Results of Ground Water and VES Monitoring January through June 1996 Unocal Service Station 5353 Seattle, Washington

October 11, 1996

For

Unocal ERS - West Region

GeoEngineers

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

October 11, 1996

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

Attention: Dr. Mark Brearley, R.G.

Results of Ground Water
and VES Monitoring
January through June 1996
Unocal Service Station 5353
Seattle, Washington
File No. 9161-013-04

INTRODUCTION

This progress report summarizes the results of GeoEngineers' January through June 1996 subsurface monitoring activities conducted at the site of Unocal Service Station 5353. The site is an active service station located northeast of the intersection between Westlake Avenue North and Mercer Street in Seattle, Washington. The Ecology (Washington State Department of Ecology) UST (underground storage tank) site number is 8463 and the LUST (leaking UST) incident number for the site is 3043. The site layout and monitoring well locations are shown in Figure 1. GeoEngineers has provided environmental consulting services at the site since 1989. The results of previous studies and monitoring efforts are summarized in reports that are on file at Unocal.

The purposes of our services from January to June 1996 were to monitor on- and off-site ground water conditions and to monitor and maintain the VES (vapor extraction system). Depths to ground water and combustible vapors were measured and ground water samples were obtained from selected monitoring wells on April 1 and June 25, 1996. GeoEngineers' scope of services completed for these ground water and system monitoring activities is presented in Attachment A. Our ground water sampling procedures are described in Attachment B. The depths to ground

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water, ground water elevations, and combustible vapor measurements for this reporting period and since September 1995 are summarized in Table 1.

The inferred direction of shallow ground water flow and ground water elevations at the monitoring wells, based on our measurements, are shown in Figure 1. The ground water analytical results for this reporting period and since September 1995 are summarized in Table 2 and Figure 2. Vapor sampling analytical results are presented in Table 3. The laboratory reports and our review of the laboratory QA/QC (quality assurance and quality control) program are included in Attachment D.

SUMMARY OF MONITORING RESULTS

- Ground water was present in the monitoring well casings at depths ranging from approximately 7.0 to 15.0 feet below the ground surface during this reporting period. These depths to ground water generally are consistent with measurements obtained during previous monitoring events.
- The inferred ground water flow direction (to the northeast) during this reporting period is consistent with the ground water flow direction during previous monitoring events.
- Combustible vapor concentrations were greater than 10,000 ppm (parts per million) in 14 of the 18 on- and off-site monitoring wells measured during this reporting period (Table 1).
- Combustible vapor concentrations were detected at concentrations less than the lower threshold of significance for the instrument (400 ppm) in SMW-3, MW-36, MW-42 and MW-44 during this reporting period.
- Free product was detected at thicknesses of 0.02 feet and 0.20 feet in MW-37 on April 1 and June 25, 1996, respectively. Free product was not detected in the remaining monitoring wells.
- One or more BETX (benzene, ethylbenzene, toluene and xylenes) constituents, gasoline-range hydrocarbons, diesel-range hydrocarbons, and/or heavy oil-range hydrocarbons were detected in ground water samples obtained from the following wells at concentrations greater than MTCA (Model Toxics Control Act) Method A cleanup levels in April and/or June 1996: MW-32A, MW-33, MW-34, MW-35, MW-40, MW-42, MW-46, MW-47 and SMW-4 (Table 2 and Figure 2).
- In our opinion, historical trends in chemical analytical data indicate that ground water samples obtained on April 1, 1996 from SMW-3 and SMW-4 were inadvertently mislabelled (switched). Therefore, the data as reported are not indicative of conditions in these monitoring wells.
- Petroleum hydrocarbons either were not detected or were detected at concentrations less than MTCA Method A cleanup levels in the April and June samples from MW-36, MW-41, MW-43, MW-44 and SMW-3.

- In general, contaminant concentrations in ground water samples obtained during this reporting period are consistent with data from recent sampling events, understanding that the April samples from SMW-3 and SMW-4 were switched or mislabeled.

VES MONITORING RESULTS

The VES blower was replaced on January 31, 1996 and the system operated continuously from January 31 through April 1, 1996. The VES operated in 2-week intervals for the remainder of the reporting period.

- System measurements and vapor sampling were performed concurrently with ground water monitoring activities on April 1 and June 25, 1996.
- The flow rate varied from 105 to 115 cfm (cubic feet per minute) during this reporting period.
- The applied vacuum pressure was greater than 50 inches of water column during this reporting period.
- Ground vacuum pressures were measured on April 1 and June 25, 1996 in all the monitoring wells. Vacuum pressures measured in the well casings ranged from 0 inches water column to .05 inch water column.
- Field measurements were obtained from the effluent vapor stream. The concentrations of combustible vapors in the vapor stream were less than 400 ppm during this reporting period.
- Vapor samples, obtained in April and June 1996 from the effluent stream, were submitted for laboratory analysis of TPH (total petroleum hydrocarbons), BETX and methane.
- TPH and BETX constituents either were not detected or were detected at levels near the detection limits of each analyte in the vapor samples obtained during this reporting period (Table 3).
- Methane was detected at a concentration of 10,000 ppm in the vapor sample obtained in June 1996. Methane was not detected in the vapor sample obtained in April 1996 (Table 3).
- The low vapor and hydrocarbon concentrations measured during this reporting period indicate that the volume of gasoline vapor removed by the VES was negligible during this period of VES operation.
- Daily emissions of gasoline vapors to the atmosphere during this reporting period did not exceed the 15 pounds per day allowed by the PSAPCA permit.

FUTURE MONITORING

- We recommend continued quarterly ground water and VES monitoring at the site. We will continue to operate the VES in 2-week intervals during the next monitoring period. The

results of our September and December 1996 quarterly ground water monitoring/sampling and vapor sampling will be summarized in one report to Unocal.

- Although petroleum hydrocarbon concentrations in the effluent stream remain low, we recommend continued operation of the VES. The VES introduces oxygen into the subsurface, which enhances natural biodegradation of the nonvolatile hydrocarbons that are not removed by the VES.

LIMITATIONS

We have prepared this report for use by Unocal. This report may be made available to regulatory agencies. This report is not intended for use by others and the information contained herein is not applicable to other sites. Our interpretation of subsurface conditions is based on field observations and chemical analytical data from discrete locations.

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

We appreciate the opportunity to provide these services to Unocal. Please contact us if you have questions regarding our ongoing studies at the site.

Respectfully submitted,

GeoEngineers, Inc.

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Staff Scientist

for JF
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DEW:JF:cms
Document ID: 9161013.PR4

Attachments
Two copies submitted

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TABLE 1 (Page 1 of 2)
GROUND WATER ELEVATIONS, PRODUCT THICKNESS AND COMBUSTIBLE VAPOR CONCENTRATIONS
UNOCAL SERVICE STATION 5353
SEATTLE, WASHINGTON

Monitoring Well[1]	Date Measured	Depth to Water (feet)	Ground Water Elevation[2] (feet)	Combustible Vapor Concentration[3] (ppm)
MW-32A	09/28/95	11.27	9.43	>10,000
	12/08/95	10.61	10.09	--
	04/01/96	10.90	9.80	>10,000
	06/25/96	10.98	9.72	>10,000
MW-33	09/28/95	11.20	9.55	>10,000
	12/08/95	--	--	--
	04/01/96	11.00	9.75	>10,000
	06/25/96	11.05	9.70	>10,000
MW-34	09/28/95	11.57	9.85	2,000
	12/08/95	10.92	10.50	--
	04/01/96	11.21	10.21	6,000
	06/25/96	11.19	10.23	5,600
MW-35	09/28/95	10.67	9.43	>10,000
	12/08/95	--	--	--
	04/01/96	--	--	--
	06/25/96	11.11	8.99	>10,000
MW-36	09/28/95	8.11	9.69	--
	12/08/95	9.00	8.80	--
	04/01/96	9.00	8.80	<400
	06/25/96	8.97	--	<400
MW-37	09/28/95	11.17	9.84	<400
	12/08/95	10.22	10.79	>10,000
	04/01/96	10.79[4]	10.22	>10,000
	06/25/96	10.82[4]	10.19	>10,000
MW-40	09/28/95	11.08	9.81	>10,000
	12/08/95	10.30	10.59	3,000
	04/01/96	10.56	10.33	>10,000
	06/25/96	10.69	10.20	8,000
MW-41	09/28/95	15.00	12.00	>10,000
	12/08/95	16.30	10.70	--
	04/01/96	15.02	11.98	>10,000
	06/25/96	15.07	11.93	>10,000
MW-42	09/28//95	9.50	10.84	>10,000
	12/08/95	8.95	11.39	--
	04/01/96	9.03	11.31	<400
	06/25/96	9.07	11.27	<400
MW-43	09/28/95	11.14	9.90	>10,000
	12/08/95	10.85	10.19	>10,000
	04/01/96	10.98	10.06	>10,000
	06/25/96	11.06	9.98	>10,000

Notes appear on page 2 of 2.

TABLE 1 (Page 2 of 2)

Monitoring Well[1]	Date Measured	Depth to Water (feet)	Ground Water Elevation[2] (feet)	Combustible Vapor Concentration[3] (ppm)
MW-44	09/28/95	7.94	10.79	>10,000
	12/08/95	8.09	10.64	>10,000
	04/01/96	7.98	10.75	<400
	06/25/96	7.90	10.83	<400
MW-45	09/28/95	8.59	9.56	>10,000
	12/08/95	--	--	--
	04/01/96	9.08	9.42	>10,000
	06/25/96	9.27	9.63	>10,000
MW-46	09/28/95	7.80	8.93	>10,000
	12/08/95	8.32	8.59	--
	04/01/96	7.04	9.87	>10,000
	06/25/96	7.85	9.06	>10,000
MW-47	09/28/95	10.76	9.07	>10,000
	12/08/95	10.40	9.43	--
	04/01/96	10.67	9.16	>10,000
	06/25/96	10.71	9.12	>10,000
SMW-3	09/07/95	10.89	Note[5]	<400
	12/08/95	11.36	Note[5]	--
	04/01/96	10.07	Note[5]	<400
	06/25/96	10.19	Note[5]	<400
SMW-4	09/28/95	8.99	Note[5]	2,000
	12/08/95	7.56	Note[5]	>10,000
	04/01/96	8.13	Note[5]	>10,000
	06/25/96	8.20	Note[5]	>10,000

Notes:

[1]Approximate locations of monitoring wells are shown in Figure 1.

[2]Elevations are measured relative to the city of Seattle datum.

[3]Measured with a Bacharach TLV Sniffer calibrated to hexane equipped with a 2-inch-diameter clip cap.

[4]Free product was detected at thicknesses of 0.02 and 0.20 feet in MW-37 on 04/01/96 and 06/25/96, respectively.

[5]Elevations are not calculated because GeoEngineers does not have survey data for these City of Seattle wells.

ppm = parts per million

"--" = not calculated

Field procedures are described in Attachment B.

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TABLE 2 (Page 1 of 3)
SUMMARY OF MONITORING WELL GROUND WATER CHEMICAL ANALYTICAL DATA
UNOCAL SERVICE STATION 5353
SEATTLE, WASHINGTON

Sample Number	Date Sampled	BETX[1] (µg/l) B	E	T	X	Gasoline-range Hydrocarbons[2] (mg/l)	Diesel-range Hydrocarbons[3] (mg/l)	Heavy Oil-range Hydrocarbons[3] (mg/l)
MW-32A	09/07/95	4,200	730	470	2,000	20	2.5	1.5
	12/08/95	1,600	420	86	910	11	1.2	<0.75
	04/01/96	2,200	300	58	490	7.9	1.4	1.0
	06/25/96	1,200	217	60.4	435	7.5	1.25	<0.75
MW-33	09/07/95	550	230	140	620	9.7	1.4	0.82
	12/08/95	800	280	240	760	13	1.9	1.8
	04/01/96	630	130	33	270	5.2	0.96	<0.75
	06/25/96	230	46.5	24.6	61.1	2.7	1.03	<0.75
MW-34	09/07/95	4,800	560	2,300	2,000	18	1.8	0.93
	12/08/95	12,000	1,200	9,200	5,500	68	2.9	1.6
	04/01/96	5,500	520	580	1,200	10	1.9	<0.75
	06/25/96	4,190	393	1,110	1,740	13.7	1.61	<0.75
MW-35	09/07/95	--	--	--	--	--	--	--
	12/08/95	--	--	--	--	--	--	--
	04/01/96	--	--	--	--	--	--	--
	06/25/96	68.2	26.7	1.11	17.6	1.62	0.85	<0.75
MW-36	09/07/95	<0.5	<0.5	<0.5	<1.0	<0.05	<0.25	<0.75
	12/08/95	1.1	<0.5	<0.5	<1.0	<0.05	0.51	1.2
	04/01/96	<0.5	<0.5	<0.5	<1.0	<0.05	<0.25	<0.75
	06/25/96	0.58	<0.5	0.5	<1.0	<0.05	<0.25	<0.75
MTCA Method A Ground Water Cleanup Levels		5	30	40	20	1.0[7]		

Notes appear on page 3 of 3.

TABLE 2 (Page 2 of 3)

Sample Number	Date Sampled	BETX[1] (µg/l) B	E	T	X	Gasoline-range Hydrocarbons[2] (mg/l)	Diesel-range Hydrocarbons[3] (mg/l)	Heavy Oil-range Hydrocarbons[3] (mg/l)
MW-40	09/07/95	11	0.57	0.91	<1.0	0.65	13[4]	66[4]
	12/08/95	2.7	<0.5	3	<1.0	0.50	1.4	4.8
	04/01/96	1.2	0.55	<0.5	<1.0	0.52	3.2	13
	06/25/96	<0.5	<0.5	9.82	<1.0	0.50	2.70	8.46
MW-41	09/07/95	<0.5	<0.5	<0.5	<1.0	<0.05	<0.25	<0.75
	12/08/95	<0.5	<0.5	<0.5	<1.0	<0.05	<0.25	0.82
	04/01/96	<0.5	<0.5	<0.5	<1.0	<0.05	<0.25	<0.75
	06/25/96	<0.5	<0.5	<0.5	<1.0	<0.05	<0.25	<0.75
MW-42	09/07/95	210	42	4.1	230	3	0.78	1.2
	12/08/95	380	<2.0	<2.0	<4.0	0.20	1.3	1.9
	04/01/96	280	<0.5	0.52	<1.0	0.18	0.65	<0.75
	06/25/96	150	<0.5	<0.5	<1.0	0.15	0.72	<0.75
MW-43	09/07/95	10	<0.5	<0.5	<1.0	<0.05	<0.25	0.85
	12/08/95	37	<0.5	<0.5	<1.0	<0.05	0.96	3.1
	04/01/96	4.5	<0.5	<0.5	<1.0	<0.05	0.30	<0.75
	06/25/96	2.57	<0.5	<0.5	<1.0	<0.05	0.37	<0.75
MW-44	09/07/95	<0.5	<0.5	<0.5	<1.0	<0.05	<0.25	<0.75
	12/08/95	<0.5	<0.5	<0.5	<1.0	<0.05	0.52	2.5
	04/01/96	<0.5	<0.5	<0.5	<1.0	<0.05	<0.25	<0.75
	06/25/96	<0.5	<0.5	<0.5	<1.0	<0.05	<0.25	<0.75
MW-46	09/07/95	<0.5	<0.5	<0.5	<1.0	<0.05	0.71	5.6
	12/08/95	<0.5	<0.5	<0.5	<1.0	<0.05	1.4	14
	04/01/96	<0.5	<0.5	<0.5	<1.0	<0.05	0.40	2.8
	06/25/96	<0.5	<0.5	<0.5	<1.0	<0.05	0.44	2.09
MW-47	09/07/95	1.7	<0.5	<0.5	<1.0	<0.05	0.26	<0.75
	12/08/95	<0.5	<0.5	<0.5	<1.0	0.74	0.58	2.0
	04/01/96	4.4	<0.5	<0.5	<1.0	<0.05	<0.25	<0.75
	06/25/96	14.4	<0.5	<0.5	<1.0	0.11	0.40	<0.75
MTCA Method A Ground Water Cleanup Levels		5	30	40	20		1.0[7]	

Notes appear on page 3 of 3.

TABLE 2 (Page 3 of 3)

Sample Number	Date Sampled	BETX[1] (µg/l) B	E	T	X	Gasoline-range Hydrocarbons[2] (mg/l)	Diesel-range Hydrocarbons[3] (mg/l)	Heavy Oil-range Hydrocarbons[3] (mg/l)
SMW-3	09/07/95	<0.5	<0.5	<0.5	<1.0	<0.05	<0.25	<0.75
	12/08/95	<0.5	<0.5	<0.5	<1.0	<0.05	0.30	<0.75
	04/01/96	6,400[5]	2,100[5]	42[5]	3,000[5]	34[5]	4.0[5]	2.3[5]
	06/25/96	<0.5	<0.5	<0.5	<1.0	<0.05	0.32	<0.75
SMW-4	09/07/95	--	--	--	--	--	--	--
	12/08/95	8,100	2,600	57	3,600	40	1.5[6]	0.92[6]
	04/01/96	<0.5[5]	<0.5[5]	<0.5[5]	<1.0[5]	<0.05[5]	<0.25[5]	<0.75[5]
	06/25/96	3,900	1,710	31.4	1,710	28.1	2.66	0.83
MTCA Method A Ground Water Cleanup Levels		5	30	40	20	1.0[7]		

Notes:

[1]Analyzed by EPA Method 8020. B = benzene, E = ethylbenzene, T = toluene, X = xylenes.

[2]Analyzed by Ecology Method WTPH-G.

[3]Analyzed by Ecology Method WTPH-D (extended range, through N-C_{34}).

[4]Data are considered not representative of ground water quality because the monitoring well had previously been exposed to surface water.

[5]It is our opinion these chemical analytical results are not representative of ground water quality in this monitoring well, as discussed in the text of this report.

[6]Results should be considered estimated because of surrogate recovery exceptions.

[7]The MTCA Method A ground water cleanup level for the sum of gasoline-, diesel- and heavy oil-range hydrocarbon concentrations is 1.0 mg/l if the carbon ranges are distinctly quantified using gas chromatography methods.

µg/l = micrograms per liter

mg/l = milligrams per liter

"--" = not tested

Shading indicates that the concentration exceeds the MTCA Method A cleanup level.

Chemical analyses by North Creek Analytical. Laboratory reports are provided in Attachment B.

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TABLE 3
SUMMARY OF CHEMICAL ANALYTICAL DATA
VES EFFLUENT VAPOR SAMPLES
UNOCAL SERVICE STATION 5353
SEATTLE, WASHINGTON

Sample Number	Date Sampled	BETX[1] (ppm)				TPH[2] (ppmv)	Methane[3] (ppmv)
		B	E	T	X		
040196-01	04/01/96	<0.003	<0.003	<0.003	<0.003	0.41	<0.003
062596-01	06/25/96	<0.002	0.005	0.003	0.009	1.7	10,000

Notes:

[1]Analyzed by EPA Method TO-3 (GC-PID). B = benzene, E = ethylbenzene, T = toluene, X = xylenes.

[2]Analyzed by EPA Method TO-3 (GC-FID). Total petroleum hydrocarbons referenced to gasoline.

[3]Analyzed by ASTM D-3416.

Chemical analyses by Air Toxics of Folsom, California. Laboratory reports are in Attachment B.

Document ID: 161013P3.WK1

EXPLANATION:

MW-2 ● MONITORING WELL INSTALLED IN 1980

MW-32A ◑ MONITORING WELL INSTALLED IN 1991 OR 1992

SMW-2S ⊗ MONITORING WELL INSTALLED BY SCS

10.09 GROUND WATER ELEVATION (FEET) ON 06/25/96

GENERAL DIRECTION OF GROUND WATER FLOW ON 06/25/96

N

0 80 160

SCALE IN FEET

VALLEY STREET

MERCER STREET

TERRY AVENUE NORTH

Unocal Property Line

MW-36

MW-38

MW-46 9.06

MW-47 9.12

MW-48

MW-29

Denny's Restaurant

MW-40 10.20

MW-45 9.23

City of Seattle Property

MW-32

MW-49

MW-3

MW-33 9.70

MW-19

MW-35 8.99

MW-2

Unocal SS-5353

MW-37 10.19

SMW-1S

SMW-5

MW-18

MW-24

SMW-4

MW-32A 9.72

SMW-3

SMW-2S

MW-1

MW-34 10.23

City Park

MW-17

MW-42 11.27

MW-41 11.93

MW-11

MW-27

WESTLAKE AVENUE NORTH

MW-13

MW-15

MW-14

MW-16

MW-44 10.83

MW-43 9.98

WESTLAKE AVENUE NORTH

BROAD STREET

MW-39

SMW-2

Notes: 1. The locations of all features shown are approximate.

2. Ground water elevations are referenced to City of Seattle datum.

Geo Engineers

GROUND WATER ELEVATIONS ON 06/25/96

FIGURE 1

08/09/96

E:\0161\013\0161013H.DWG

DEW:HLA

MW-46	B	G	D	O
09/07/95	<0.5	<0.05	0.71	5.6
12/08/95	<0.5	<0.05	1.4	14
04/01/96	<0.5	<0.05	0.40	2.8
06/25/96	<0.5	<0.05	0.44	2.09
MTCA	5.0	1.0		

MW-36	B	G	D	O
09/07/95	<0.5	<0.05	<0.25	<0.75
12/08/95	1.1	<0.05	0.51	1.2
04/01/96	<0.5	<0.05	<0.25	<0.75
06/25/96	0.58	<0.05	<0.25	<0.75
MTCA	5.0	1.0		

MW-47	B	G	D	O
09/07/95	1.7	<0.05	0.26	<0.75
12/08/95	<0.5	0.74	0.58	2.0
04/01/96	4.4	<0.05	<0.25	<0.75
06/25/96	14.4	0.11	0.40	<0.75
MTCA	5.0	1.0		

MW-33	B	G	D	O
09/07/95	550	9.7	1.4	0.82
12/08/95	800	13	1.9	1.8
04/01/96	630	5.2	0.96	<0.75
06/25/96	230	2.7	1.03	<0.75
MTCA	5.0	1.0		

MW-40	B	G	D	O
09/07/95	11	0.65	13	66
12/08/95	2.7	0.50	1.4	4.8
04/01/96	1.2	0.52	3.2	13
06/25/96	<0.5	0.50	2.70	8.46
MTCA	5.0	1.0		

MW-32A	B	G	D	O
09/07/95	4,200	20	2.5	1.5
12/08/95	1,600	11	1.2	<0.75
04/01/96	2,200	7.9	1.4	1.0
06/25/96	1,200	7.5	1.25	<0.75
MTCA	5.0	1.0		

MW-36	B	G	D	O
09/07/95	--	--	--	--
12/08/95	--	--	--	--
04/01/96	--	--	--	--
06/25/96	68.2	1.62	0.85	<0.75
MTCA	5.0	1.0		

SMW-3	B	G	D	O
09/07/95	<0.5	<0.05	<0.25	<0.75
12/08/95	<0.5	<0.05	0.30	<0.75
04/01/96	6,400*	34*	4.0*	2.3*
06/25/96	<0.5	<0.05	<0.25	<0.75
MTCA	5.0	1.0		

MW-34	B	G	D	O
09/07/95	4,800	18	1.8	0.93
12/08/95	12,000	68	2.9	1.6
04/01/96	5,500	10	1.9	<0.75
06/25/96	4,190	13.7	1.61	<0.75
MTCA	5.0	1.0		

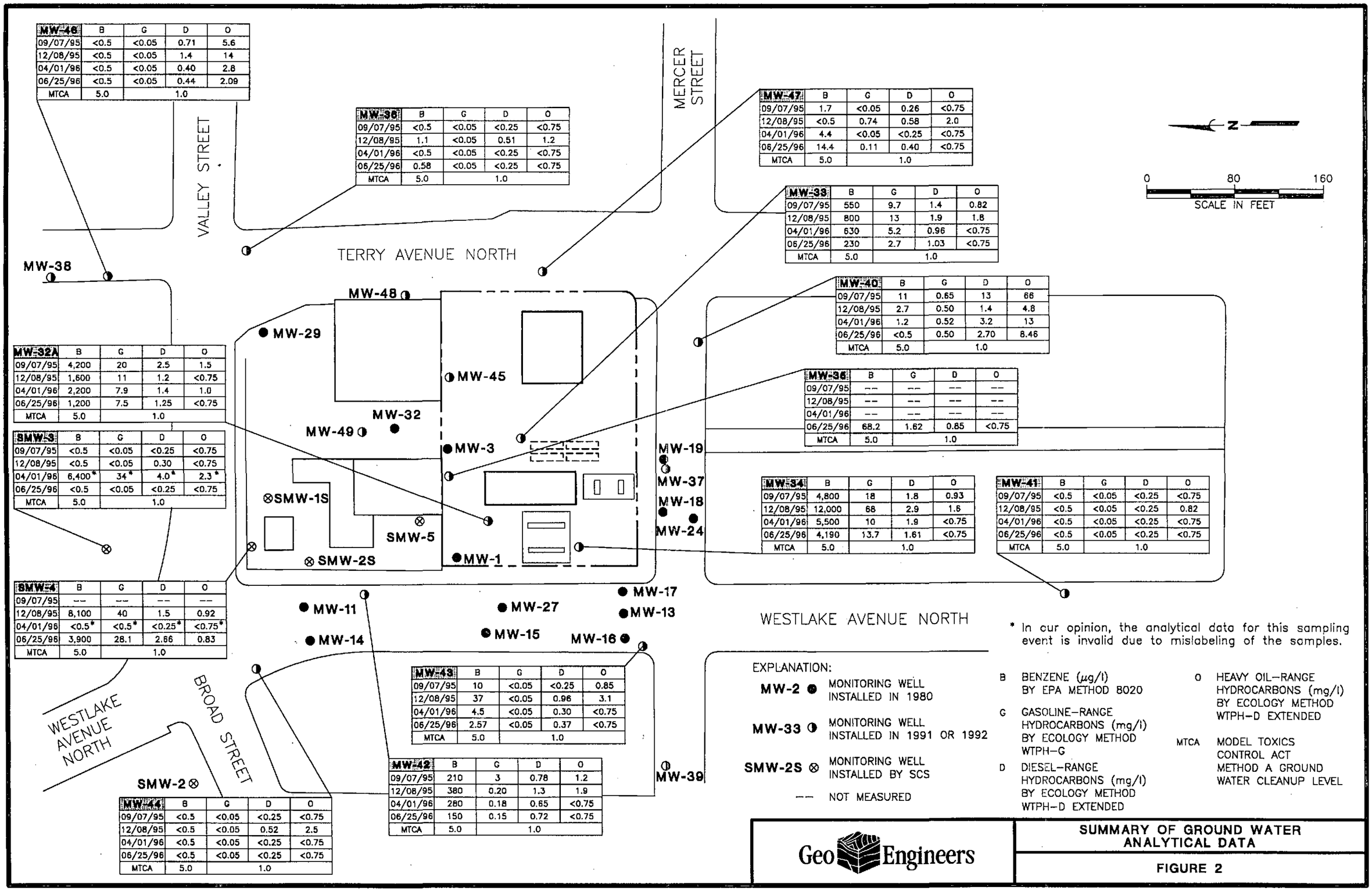
MW-41	B	G	D	O
09/07/95	<0.5	<0.05	<0.25	<0.75
12/08/95	<0.5	<0.05	<0.25	0.82
04/01/96	<0.5	<0.05	<0.25	<0.75
06/25/96	<0.5	<0.05	<0.25	<0.75
MTCA	5.0	1.0		

SMW-4	B	G	D	O
09/07/95	--	--	--	--
12/08/95	8,100	40	1.5	0.92
04/01/96	<0.5*	<0.5*	<0.25*	<0.75*
06/25/96	3,900	28.1	2.66	0.83
MTCA	5.0	1.0		

MW-43	B	G	D	O
09/07/95	10	<0.05	<0.25	0.85
12/08/95	37	<0.05	0.96	3.1
04/01/96	4.5	<0.05	0.30	<0.75
06/25/96	2.57	<0.05	0.37	<0.75
MTCA	5.0	1.0		

MW-42	B	G	D	O
09/07/95	210	3	0.78	1.2
12/08/95	380	0.20	1.3	1.9
04/01/96	280	0.18	0.65	<0.75
06/25/96	150	0.15	0.72	<0.75
MTCA	5.0	1.0		

MW-44	B	G	D	O
09/07/95	<0.5	<0.05	<0.25	<0.75
12/08/95	<0.5	<0.05	0.52	2.5
04/01/96	<0.5	<0.05	<0.25	<0.75
06/25/96	<0.5	<0.05	<0.25	<0.75
MTCA	5.0	1.0		



EXPLANATION:

- MW-2 ● MONITORING WELL INSTALLED IN 1980
- MW-33 ◑ MONITORING WELL INSTALLED IN 1991 OR 1992
- SMW-2S ⊗ MONITORING WELL INSTALLED BY SCS
- -- NOT MEASURED

* In our opinion, the analytical data for this sampling event is invalid due to mislabeling of the samples.

- B BENZENE (µg/l) BY EPA METHOD 8020
- G GASOLINE-RANGE HYDROCARBONS (mg/l) BY ECOLOGY METHOD WTPH-G
- D DIESEL-RANGE HYDROCARBONS (mg/l) BY ECOLOGY METHOD WTPH-D EXTENDED
- O HEAVY OIL-RANGE HYDROCARBONS (mg/l) BY ECOLOGY METHOD WTPH-D EXTENDED
- MTCA MODEL TOXICS CONTROL ACT METHOD A GROUND WATER CLEANUP LEVEL

Geo Engineers

SUMMARY OF GROUND WATER ANALYTICAL DATA

FIGURE 2

09/04/96
D:\0161\013\016101301.DWG
TMK:HLA

ATTACHMENT A

ATTACHMENT A

SCOPE OF SERVICES

Our scope of services completed during the reporting period is summarized below.

1. Measure the depths to ground water and free product thicknesses, if any, in accessible wells.
2. Measure the concentrations of combustible vapors in the casings of accessible wells using a Bacharach TLV combustible gas meter equipped with a drop hose.
3. Measure ground vacuum pressures in accessible well casings using Dwyer Magnehelic vacuum pressure gauges.
4. Obtain ground water samples from SMW-3, SMW-4, MW-32A, MW-33 through MW-37 and MW-40 through MW-47 (except MW-35 in April 1996) and submit the samples for chemical analysis of BETX by EPA Method 8020, gasoline-range hydrocarbons by Ecology Method WTPH-G and diesel- and heavy oil-range hydrocarbons by Ecology Method WTPH-D extended.
5. Obtain vapor samples from the VES and submit the samples for chemical analysis of BETX, methane and TPH as gasoline.
6. Obtain a composite sample of purge and decontamination water stored in the existing drums on site and submit the sample for chemical analysis of BETX by EPA Method 8020 and FOG (fats, oils and grease) by EPA Method 413.2.
7. Evaluate the field and laboratory data with regard to existing regulatory concerns.

ATTACHMENT B

ATTACHMENT B

FIELD PROCEDURES

DEPTHS TO GROUND WATER AND FREE PRODUCT THICKNESSES

The depths to the ground water table were measured relative to the well casing rims. The measurements were made using an ORS interface probe or an electric water level indicator. The ground water and product levels were measured to the nearest 0.01 foot. The instruments were cleaned with a Liquinox wash and a distilled water rinse prior to use in each well.

COMBUSTIBLE VAPOR CONCENTRATIONS

Combustible vapor concentrations were measured in accessible well casings on the site using a Bacharach TLV combustible gas meter calibrated to hexane and associated drop hose. The lower threshold of significance for the TLV in this application is 400 ppm (4 percent of the lower explosive limit of hexane).

GROUND VACUUM PRESSURES

Ground vacuum pressures were measured in the accessible monitoring and recovery well casings during this monitoring period. The measurements were made with a Magnehelic pressure gauge with a resolution of 0.01 inches of water column. A slip cap enabled a tight fit around the monitoring well casings. Vacuum pressures were measured in the well casings while the on-site VES was operating.

VES MEASUREMENTS AND SAMPLING

MEASUREMENTS

The operating efficiency of the VES was monitored with manufactured meters permanently installed on the system. The meters include the following: (1) air flow meter, (2) vapor temperature meter, and (3) vacuum pressure gauge.

Combustible vapor concentrations also were obtained from the system using a Bacharach TLV Sniffer calibrated to hexane. The sample port for vapor measurement and sampling is located in the vapor conveyance line between the blower and the discharge stack.

VAPOR SAMPLING

The vapor samples were obtained from the sample port in the vapor conveyance line during this monitoring period. The vapor samples were collected in evacuated stainless steel containers by opening the valve in the sample port and allowing the vacuum in the canisters to draw in the vapors. Chain-of-custody procedures were followed in transporting the vapor samples to the testing laboratory. The laboratory data sheets and chain-of-custody records are presented in Attachment C.

ATTACHMENT C

ATTACHMENT C

CHEMICAL ANALYTICAL PROGRAM

ANALYTICAL METHODS

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

ANALYTICAL DATA REVIEW

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

ANALYTICAL DATA REVIEW SUMMARY

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

NORTH CREEK ANALYTICAL
Environmental Laboratory Services

GeoEngineers

JUL 17 1996

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Geo Engineers - Redmond	Project: UNOCAL #5353	Sampled: 6/25/96
8410 154th Ave NE	Project Number: 9161-013-04	Received: 6/26/96
Redmond, WA 98052	Project Manager: Don Wyll	Reported: 7/10/96

Project Summary

Sample Description	Laboratory Sample Number	Sample Matrix	Date Sampled
SMW-3	B606471-01	Water	6/25/96
SMW-4	B606471-02	Water	6/25/96
MW-32A	B606471-03	Water	6/25/96
MW-33	B606471-04	Water	6/25/96
MW-34	B606471-05	Water	6/25/96
MW-35	B606471-06	Water	6/25/96
MW-36	B606471-07	Water	6/25/96
MW-40	B606471-08	Water	6/25/96
MW-41	B606471-09	Water	6/25/96
MW-42	B606471-10	Water	6/25/96
MW-43	B606471-11	Water	6/25/96
MW-44	B606471-12	Water	6/25/96
MW-46	B606471-13	Water	6/25/96
MW-47	B606471-14	Water	6/25/96

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8410 154th Ave NE	Project Number:	9161-013-04	Received: 6/26/96
Redmond, WA 98052	Project Manager:	Don Wyll	Reported: 7/10/96

Gasoline Hydrocarbons (Toluene to Dodecane) and BTEX by WTPH-G and EPA 8020A

Analyte	Batch Number	Date Prepared	Date Analyzed	Surrogate Limits	Reporting Limit	Result	Units	Notes*
SMW-3			**B606471-01**				Water	
Gasoline Range Hydrocarbons	6070160	7/1/96	7/1/96		50.0	ND	ug/l (ppb)	
Benzene	"	"	"		0.500	ND	"	
Toluene	"	"	"		0.500	ND	"	
Ethylbenzene	"	"	"		0.500	ND	"	
Xylenes (total)	"	"	"		1.00	ND	"	
Surrogate: 4-BFB (FID)	"	"	"	*50.0-150*		*90.0*	%	
Surrogate: 4-BFB (PID)	"	"	"	*53.0-136*		*86.9*	"	
SMW-4			**B606471-02**				Water	
Gasoline Range Hydrocarbons	6070160	7/1/96	7/1/96		2500	**28100**	ug/l (ppb)	
Benzene	"	"	"		25.0	**3900**	"	
Toluene	"	"	"		25.0	**31.4**	"	
Ethylbenzene	"	"	"		25.0	**1710**	"	
Xylenes (total)	"	"	"		50.0	**1710**	"	
Surrogate: 4-BFB (FID)	"	"	"	*50.0-150*		*146*	%	
Surrogate: 4-BFB (PID)	"	"	"	*53.0-136*		*113*	"	
MW-32A			**B606471-03**				Water	
Gasoline Range Hydrocarbons	6070160	7/1/96	7/1/96		1000	**7540**	ug/l (ppb)	
Benzene	"	"	"		10.0	**1200**	"	
Toluene	"	"	"		10.0	**60.4**	"	
Ethylbenzene	"	"	"		10.0	**217**	"	
Xylenes (total)	"	"	"		20.0	**435**	"	
Surrogate: 4-BFB (FID)	"	"	"	*50.0-150*		*148*	%	
Surrogate: 4-BFB (PID)	"	"	"	*53.0-136*		*107*	"	
MW-33			**B606471-04**				Water	
Gasoline Range Hydrocarbons	6070160	7/1/96	7/2/96		250	**2790**	ug/l (ppb)	
Benzene	"	"	"		2.50	**230**	"	
Toluene	"	"	"		2.50	**24.6**	"	
Ethylbenzene	"	"	"		2.50	**46.5**	"	
Xylenes (total)	"	"	"		5.00	**61.1**	"	
Surrogate: 4-BFB (FID)	"	"	"	*50.0-150*		*ND*	%	*1*
Surrogate: 4-BFB (PID)	"	"	"	*53.0-136*		*121*	"	
MW-34			**B606471-05**				Water	
Gasoline Range Hydrocarbons	6070160	7/1/96	7/2/96		5000	**13700**	ug/l (ppb)	
Benzene	"	"	"		50.0	**4190**	"	
Toluene	"	"	"		50.0	**1740**	"	

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Geo Engineers - Redmond	Project:	UNOCAL #5353	Sampled: 6/25/96
8410 154th Ave NE	Project Number:	9161-013-04	Received: 6/26/96
Redmond, WA 98052	Project Manager:	Don Wyll	Reported: 7/10/96

Gasoline Hydrocarbons (Toluene to Dodecane) and BTEX by WTPH-G and EPA 8020A

Analyte	Batch Number	Date Prepared	Date Analyzed	Surrogate Limits	Reporting Limit	Result	Units	Notes*
MW-34 (continued)			**B606471-05**				**Water**	
Ethylbenzene	6070160	7/1/96	7/2/96		50.0	**393**	ug/l (ppb)	
Xylenes (total)	"	"	"		100	**1110**	"	
Surrogate: 4-BFB (FID)	"	"	"	*50.0-150*		*109*	%	
Surrogate: 4-BFB (PID)	"	"	"	*53.0-136*		*93.1*	"	
MW-35			**B606471-06**				**Water**	
Gasoline Range Hydrocarbons	6070160	7/1/96	7/1/96		50.0	**1620**	ug/l (ppb)	
Benzene	"	"	"		0.500	**68.2**	"	
Toluene	"	"	"		0.500	**1.11**	"	
Ethylbenzene	"	"	"		0.500	**26.7**	"	
Xylenes (total)	"	"	"		1.00	**17.6**	"	
Surrogate: 4-BFB (FID)	"	"	"	*50.0-150*		*ND*	%	*1*
Surrogate: 4-BFB (PID)	"	"	"	*53.0-136*		*ND*	"	*1*
MW-36			**B606471-07**				**Water**	
Gasoline Range Hydrocarbons	6070160	7/1/96	7/1/96		50.0	ND	ug/l (ppb)	
Benzene	"	"	"		0.500	**0.585**	"	
Toluene	"	"	"		0.500	ND	"	
Ethylbenzene	"	"	"		0.500	ND	"	
Xylenes (total)	"	"	"		1.00	ND	"	
Surrogate: 4-BFB (FID)	"	"	"	*50.0-150*		*90.0*	%	
Surrogate: 4-BFB (PID)	"	"	"	*53.0-136*		*83.1*	"	
MW-40			**B606471-08**				**Water**	
Gasoline Range Hydrocarbons	6070160	7/1/96	7/1/96		50.0	**507**	ug/l (ppb)	
Benzene	"	"	"		0.500	ND	"	
Toluene	"	"	"		0.500	**9.82**	"	
Ethylbenzene	"	"	"		0.500	ND	"	
Xylenes (total)	"	"	"		1.00	ND	"	
Surrogate: 4-BFB (FID)	"	"	"	*50.0-150*		*ND*	%	*1*
Surrogate: 4-BFB (PID)	"	"	"	*53.0-136*		*135*	"	
MW-41			**B606471-09**				**Water**	
Gasoline Range Hydrocarbons	6070160	7/1/96	7/1/96		50.0	ND	ug/l (ppb)	
Benzene	"	"	"		0.500	ND	"	
Toluene	"	"	"		0.500	ND	"	
Ethylbenzene	"	"	"		0.500	ND	"	
Xylenes (total)	"	"	"		1.00	ND	"	
Surrogate: 4-BFB (FID)	"	"	"	*50.0-150*		*90.0*	%	

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Geo Engineers - Redmond	Project:	UNOCAL #5353	Sampled: 6/25/96
8410 154th Ave NE	Project Number:	9161-013-04	Received: 6/26/96
Redmond, WA 98052	Project Manager:	Don Wyll	Reported: 7/10/96

Gasoline Hydrocarbons (Toluene to Dodecane) and BTEX by WTPH-G and EPA 8020A

Analyte	Batch Number	Date Prepared	Date Analyzed	Surrogate Limits	Reporting Limit	Result	Units	Note
MW-41 (continued)			**B606471-09**				**Water**	
Surrogate: 4-BFB (PID)	*6070160*	*7/1/96*	*7/1/96*	*53.0-136*		*86.3*	*%*	
MW-42			**B606471-10**				**Water**	
Gasoline Range Hydrocarbons	6070160	7/1/96	7/5/96		100	**152**	ug/l (ppb)	
Benzene	"	"	7/2/96		1.00	**150**	"	
Toluene	"	"	"		1.00	ND	"	
Ethylbenzene	"	"	"		1.00	ND	"	
Xylenes (total)	"	"	"		2.00	ND	"	
Surrogate: 4-BFB (FID)	"	"	"	*50.0-150*		*123*	*%*	
Surrogate: 4-BFB (PID)	"	"	"	*53.0-136*		*102*	"	
MW-43			**B606471-11**				**Water**	
Gasoline Range Hydrocarbons	6070160	7/1/96	7/1/96		50.0	ND	ug/l (ppb)	
Benzene	"	"	"		0.500	**2.57**	"	
Toluene	"	"	"		0.500	ND	"	
Ethylbenzene	"	"	"		0.500	ND	"	
Xylenes (total)	"	"	"		1.00	ND	"	
Surrogate: 4-BFB (FID)	"	"	"	*50.0-150*		*98.1*	*%*	
Surrogate: 4-BFB (PID)	"	"	"	*53.0-136*		*90.0*	"	
MW-44			**B606471-12**				**Water**	
Gasoline Range Hydrocarbons	6070160	7/1/96	7/1/96		50.0	ND	ug/l (ppb)	
Benzene	"	"	"		0.500	ND	"	
Toluene	"	"	"		0.500	ND	"	
Ethylbenzene	"	"	"		0.500	ND	"	
Xylenes (total)	"	"	"		1.00	ND	"	
Surrogate: 4-BFB (FID)	"	"	"	*50.0-150*		*90.0*	*%*	
Surrogate: 4-BFB (PID)	"	"	"	*53.0-136*		*86.3*	"	
MW-46			**B606471-13**				**Water**	
Gasoline Range Hydrocarbons	6070160	7/1/96	7/2/96		50.0	ND	ug/l (ppb)	
Benzene	"	"	"		0.500	ND	"	
Toluene	"	"	"		0.500	ND	"	
Ethylbenzene	"	"	"		0.500	ND	"	
Xylenes (total)	"	"	"		1.00	ND	"	
Surrogate: 4-BFB (FID)	"	"	"	*50.0-150*		*81.3*	*%*	
Surrogate: 4-BFB (PID)	"	"	"	*53.0-136*		*86.3*	"	

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Geo Engineers - Redmond	Project:	UNOCAL #5353	Sampled: 6/25/96
8410 154th Ave NE	Project Number:	9161-013-04	Received: 6/26/96
Redmond, WA 98052	Project Manager:	Don Wyll	Reported: 7/10/96

Gasoline Hydrocarbons (Toluene to Dodecane) and BTEX by WTPH-G and EPA 8020A

Analyte	Batch Number	Date Prepared	Date Analyzed	Surrogate Limits	Reporting Limit	Result	Units	Notes*
MW-47			**B606471-14**				**Water**	
Gasoline Range Hydrocarbons	6070160	7/1/96	7/2/96		50.0	**117**	ug/l (ppb)	
Benzene	"	"	"		0.500	**14.4**	"	
Toluene	"	"	"		0.500	ND	"	
Ethylbenzene	"	"	"		0.500	ND	"	
Xylenes (total)	"	"	"		1.00	ND	"	
Surrogate: 4-BFB (FID)	"	"	"	*50.0-150*		*104*	*%*	
Surrogate: 4-BFB (PID)	"	"	"	*53.0-136*		*90.0*	"	

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Geo Engineers - Redmond	Project:	UNOCAL #5353	Sampled: 6/25/96
8410 154th Ave NE	Project Number:	9161-013-04	Received: 6/26/96
Redmond, WA 98052	Project Manager:	Don Wyll	Reported: 7/10/96

Diesel Hydrocarbons (C12-C24) and Heavy Oil (C24-C40) by WTPH-D (extended)

Analyte	Batch Number	Date Prepared	Date Analyzed	Surrogate Limits	Reporting Limit	Result	Units	Note
SMW-3			**B606471-01**				**Water**	
Diesel Range Hydrocarbons	6070005	7/1/96	7/3/96		0.250	**0.323**	mg/l (ppm)	
Heavy Oil Range Hydrocarbons	"	"	"		0.750	ND	"	
Surrogate: 2-FBP	"	"	"	*50.0-150*		*68.7*	*%*	
SMW-4			**B606471-02**				**Water**	2
Diesel Range Hydrocarbons	6070005	7/1/96	7/3/96		0.250	**2.66**	mg/l (ppm)	
Heavy Oil Range Hydrocarbons	"	"	"		0.750	**0.836**	"	
Surrogate: 2-FBP	"	"	"	*50.0-150*		*57.4*	*%*	
MW-32A			**B606471-03**				**Water**	2
Diesel Range Hydrocarbons	6070005	7/1/96	7/3/96		0.250	**1.25**	mg/l (ppm)	
Heavy Oil Range Hydrocarbons	"	"	"		0.750	ND	"	
Surrogate: 2-FBP	"	"	"	*50.0-150*		*52.8*	*%*	
MW-33			**B606471-04**				**Water**	2
Diesel Range Hydrocarbons	6070005	7/1/96	7/3/96		0.250	**1.03**	mg/l (ppm)	
Heavy Oil Range Hydrocarbons	"	"	"		0.750	ND	"	
Surrogate: 2-FBP	"	"	"	*50.0-150*		*66.4*	*%*	
MW-34			**B606471-05**				**Water**	2
Diesel Range Hydrocarbons	6070005	7/1/96	7/2/96		0.250	**1.61**	mg/l (ppm)	
Heavy Oil Range Hydrocarbons	"	"	"		0.750	ND	"	
Surrogate: 2-FBP	"	"	"	*50.0-150*		*69.3*	*%*	
MW-35			**B606471-06**				**Water**	2
Diesel Range Hydrocarbons	6070005	7/1/96	7/2/96		0.250	**0.849**	mg/l (ppm)	
Heavy Oil Range Hydrocarbons	"	"	"		0.750	ND	"	
Surrogate: 2-FBP	"	"	"	*50.0-150*		*67.9*	*%*	
MW-36			**B606471-07**				**Water**	
Diesel Range Hydrocarbons	6070005	7/1/96	7/3/96		0.250	ND	mg/l (ppm)	
Heavy Oil Range Hydrocarbons	"	"	"		0.750	ND	"	
Surrogate: 2-FBP	"	"	"	*50.0-150*		*69.4*	*%*	
MW-40			**B606471-08**				**Water**	
Diesel Range Hydrocarbons	6070005	7/1/96	7/3/96		1.25	**2.70**	mg/l (ppm)	3
Heavy Oil Range Hydrocarbons	"	"	"		3.75	**8.46**	"	
Surrogate: 2-FBP	"	"	"	*50.0-150*		*55.8*	*%*	

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**Refer to end of report for text of note*

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Laura L Dutton, Project Manager

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Geo Engineers - Redmond	Project:	UNOCAL #5353	Sampled: 6/25/96
8410 154th Ave NE	Project Number:	9161-013-04	Received: 6/26/96
Redmond, WA 98052	Project Manager:	Don Wyll	Reported: 7/10/96

Diesel Hydrocarbons (C12-C24) and Heavy Oil (C24-C40) by WTPH-D (extended)

Analyte	Batch Number	Date Prepared	Date Analyzed	Surrogate Limits	Reporting Limit	Result	Units	Notes*
MW-41			**B606471-09**				**Water**	
Diesel Range Hydrocarbons	6070005	7/1/96	7/3/96		0.250	ND	mg/l (ppm)	
Heavy Oil Range Hydrocarbons	"	"	"		0.750	ND	"	
Surrogate: 2-FBP	"	"	"	*50.0-150*		*58.3*	*%*	
MW-42			**B606471-10**				**Water**	
Diesel Range Hydrocarbons	6070005	7/1/96	7/3/96		0.250	**0.726**	mg/l (ppm)	
Heavy Oil Range Hydrocarbons	"	"	"		0.750	ND	"	
Surrogate: 2-FBP	"	"	"	*50.0-150*		*67.2*	*%*	
MW-43			**B606471-11**				**Water**	
Diesel Range Hydrocarbons	6070005	7/1/96	7/3/96		0.250	**0.377**	mg/l (ppm)	
Heavy Oil Range Hydrocarbons	"	"	"		0.750	ND	"	
Surrogate: 2-FBP	"	"	"	*50.0-150*		*68.7*	*%*	
MW-44			**B606471-12**				**Water**	
Diesel Range Hydrocarbons	6070005	7/1/96	7/3/96		0.250	ND	mg/l (ppm)	
Heavy Oil Range Hydrocarbons	"	"	"		0.750	ND	"	
Surrogate: 2-FBP	"	"	"	*50.0-150*		*59.0*	*%*	
MW-46			**B606471-13**				**Water**	
Diesel Range Hydrocarbons	6070005	7/1/96	7/9/96		0.250	**0.446**	mg/l (ppm)	3
Heavy Oil Range Hydrocarbons	"	"	"		0.750	**2.09**	"	
Surrogate: 2-FBP	"	"	"	*50.0-150*		*71.3*	*%*	
MW-47			**B606471-14**				**Water**	
Diesel Range Hydrocarbons	6070005	7/1/96	7/3/96		0.250	**0.408**	mg/l (ppm)	
Heavy Oil Range Hydrocarbons	"	"	"		0.750	ND	"	
Surrogate: 2-FBP	"	"	"	*50.0-150*		*63.7*	*%*	

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Geo Engineers - Redmond	Project:	UNOCAL #5353	Sampled: 6/25/96
8410 154th Ave NE	Project Number:	9161-013-04	Received: 6/26/96
Redmond, WA 98052	Project Manager:	Don Wyll	Reported: 7/10/96

Gasoline Hydrocarbons (Toluene to Dodecane) and BTEX by WTPH-G and EPA 8020A
Quality Control

Analyte	Date Analyzed	Spike Level	Sample Result	QC Result	Units	Reporting Limit / Recov. Limits	Recov. %	RPD Limit	RPD %	Notes*
Batch: 6070160	**Date Prepared: 7/1/96**									
Blank	**6070160-BLK1**				**Water**					
Gasoline Range Hydrocarbons	7/1/96			**ND**	ug/l (ppb)	**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*		*16.6*	"	*50.0-150*	*104*			
Surrogate: 4-BFB (PID)	"	*16.0*		*15.2*	"	*53.0-136*	*95.0*			
Blank Spike	**6070160-BS1**				**Water**					
Gasoline Range Hydrocarbons	7/1/96	501		554	ug/l (ppb)	63.0-127	**111**			
Surrogate: 4-BFB (FID)	"	*16.0*		*21.8*	"	*50.0-150*	*136*			
Duplicate	**6070160-DUP1**		**B606471-01**		**Water**					
Gasoline Range Hydrocarbons	7/1/96		ND	ND	ug/l (ppb)			45.0		4
Surrogate: 4-BFB (FID)	"	*16.0*		*14.7*	"	*50.0-150*	*91.9*			
Duplicate	**6070160-DUP2**		**B606471-06**		**Water**					
Gasoline Range Hydrocarbons	7/1/96		1620	1430	ug/l (ppb)			45.0	**12.5**	
Surrogate: 4-BFB (FID)	"	*16.0*		*ND*	"	*50.0-150*	*ND*			
Matrix Spike	**6070160-MS1**		**B606471-08**		**Water**					
Benzene	7/1/96	10.0	ND	9.09	ug/l (ppb)	62.0-126	**90.9**			
Toluene	"	10.0	9.82	19.2	"	72.0-120	**93.8**			
Ethylbenzene	"	10.0	ND	9.95	"	69.0-129	**99.5**			
Xylenes (total)	"	30.0	ND	30.1	"	73.0-126	**100**			
Surrogate: 4-BFB (PID)	"	*16.0*		*22.6*	"	*53.0-136*	*141*			
Matrix Spike Dup	**6070160-MSD1**		**B606471-08**		**Water**					
Benzene	7/1/96	10.0	ND	9.14	ug/l (ppb)	62.0-126	**91.4**	13.5	**0.549**	
Toluene	"	10.0	9.82	18.8	"	72.0-120	**89.8**	8.70	**4.36**	
Ethylbenzene	"	10.0	ND	9.76	"	69.0-129	**97.6**	13.6	**1.93**	
Xylenes (total)	"	30.0	ND	29.4	"	73.0-126	**98.0**	16.3	**2.02**	
Surrogate: 4-BFB (PID)	"	*16.0*		*22.4*	"	*53.0-136*	*140*			

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Geo Engineers - Redmond	Project:	UNOCAL #5353	Sampled: 6/25/96
8410 154th Ave NE	Project Number:	9161-013-04	Received: 6/26/96
Redmond, WA 98052	Project Manager:	Don Wyll	Reported: 7/10/96

Diesel Hydrocarbons (C12-C24) and Heavy Oil (C24-C40) by WTPH-D (extended)
Quality Control

Analyte	Date Analyzed	Spike Level	Sample Result	QC Result	Units	Reporting Limit / Recov. Limits	Recov. %	RPD Limit	RPD %	Notes*
Batch: 6070005	**Date Prepared: 7/1/96**									
Blank	**6070005-BLK1**				**Water**					
Diesel Range Hydrocarbons	7/3/96			**ND**	mg/l (ppm)	**0.250**				
Heavy Oil Range Hydrocarbons	"			**ND**	"	**0.750**				
Surrogate: 2-FBP	"	*0.344*		*0.241*	"	*50.0-150*	*70.1*			
Blank Spike	**6070005-BS1**				**Water**					
Diesel Range Hydrocarbons	7/3/96	2.04		1.55	mg/l (ppm)	54.0-121	**76.0**			
Surrogate: 2-FBP	"	*0.344*		*0.220*	"	*50.0-150*	*64.0*			
Duplicate	**6070005-DUP1**	**B606471-01**			**Water**					
Diesel Range Hydrocarbons	7/3/96		0.323	0.301	mg/l (ppm)			44.0		4
Surrogate: 2-FBP	"	*0.655*		*0.480*	"	*50.0-150*	*73.3*			
Duplicate	**6070005-DUP2**	**B606471-14**			**Water**					
Diesel Range Hydrocarbons	7/3/96		0.408	0.361	mg/l (ppm)			44.0		4
Surrogate: 2-FBP	"	*0.655*		*0.454*	"	*50.0-150*	*69.3*			

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Geo Engineers - Redmond	Project:	UNOCAL #5353	Sampled:	6/25/96
8410 154th Ave NE	Project Number:	9161-013-04	Received:	6/26/96
Redmond, WA 98052	Project Manager:	Don Wyll	Reported:	7/10/96

Notes

#	Note
1	The surrogate recovery for this sample cannot be accurately quantified due to interference from coeluting organic compounds present in the sample.
2	This sample appears to contain volatile gasoline range organics.
3	The hydrocarbons present in this sample resemble heavy, non-resolvable oil range organics. Quantitation by TPH-Diesel Extended or TPH 418.1 is recommended.
4	RPD values are not reported at concentrations less than ten times the reporting limit.

North Creek Analytical, Inc.

Laura Dutton

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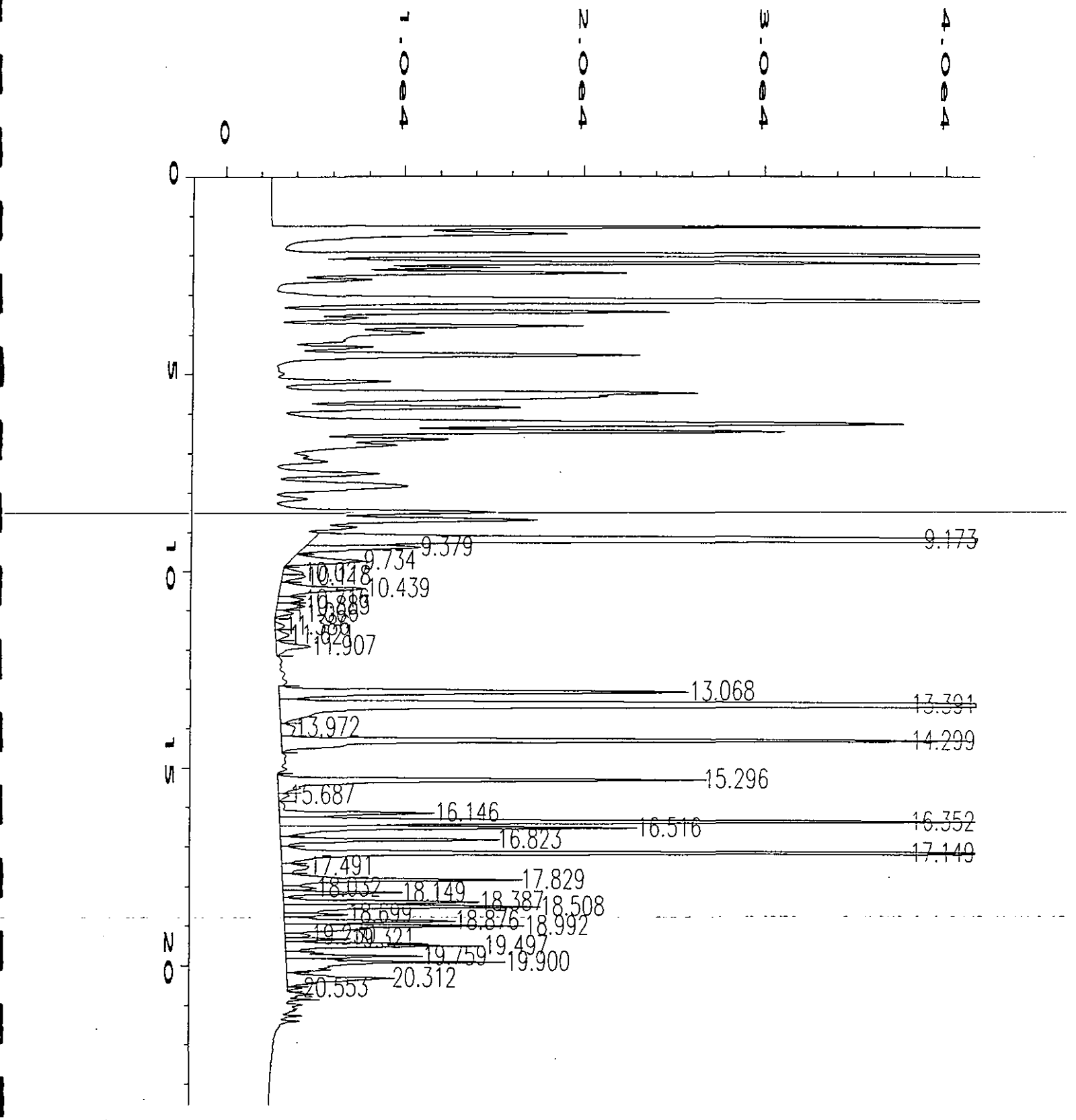

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Instrument : GC#2
Sample Name : gas std
Run Time Bar Code:
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Report Created on: 11 Jul 96 02:54 PM

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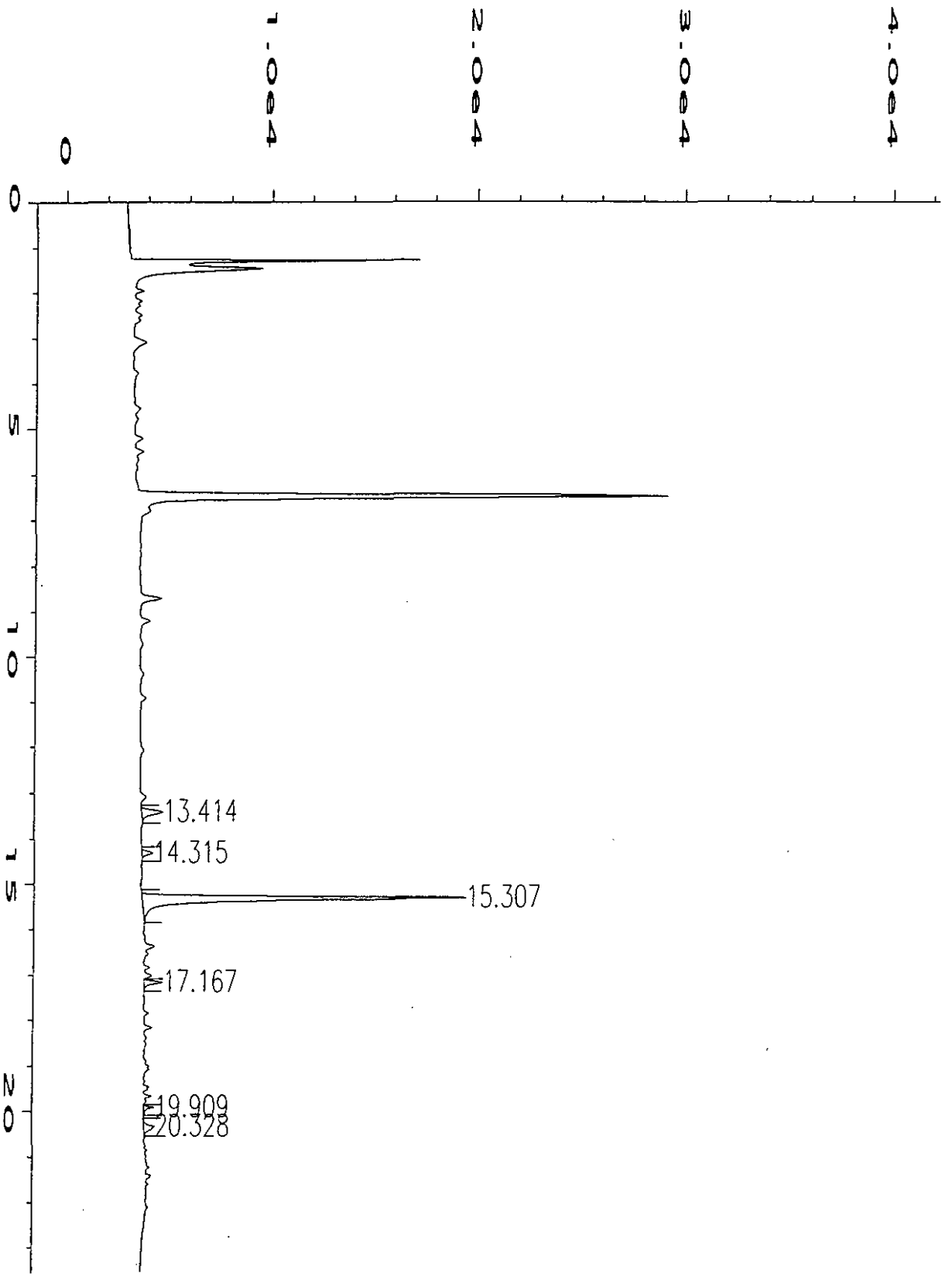
Vial Number : 2
Injection Number : 1
Sequence Line : 1
Instrument Method: WA-WATER.MTH
Analysis Method : WA-WATER.MTH



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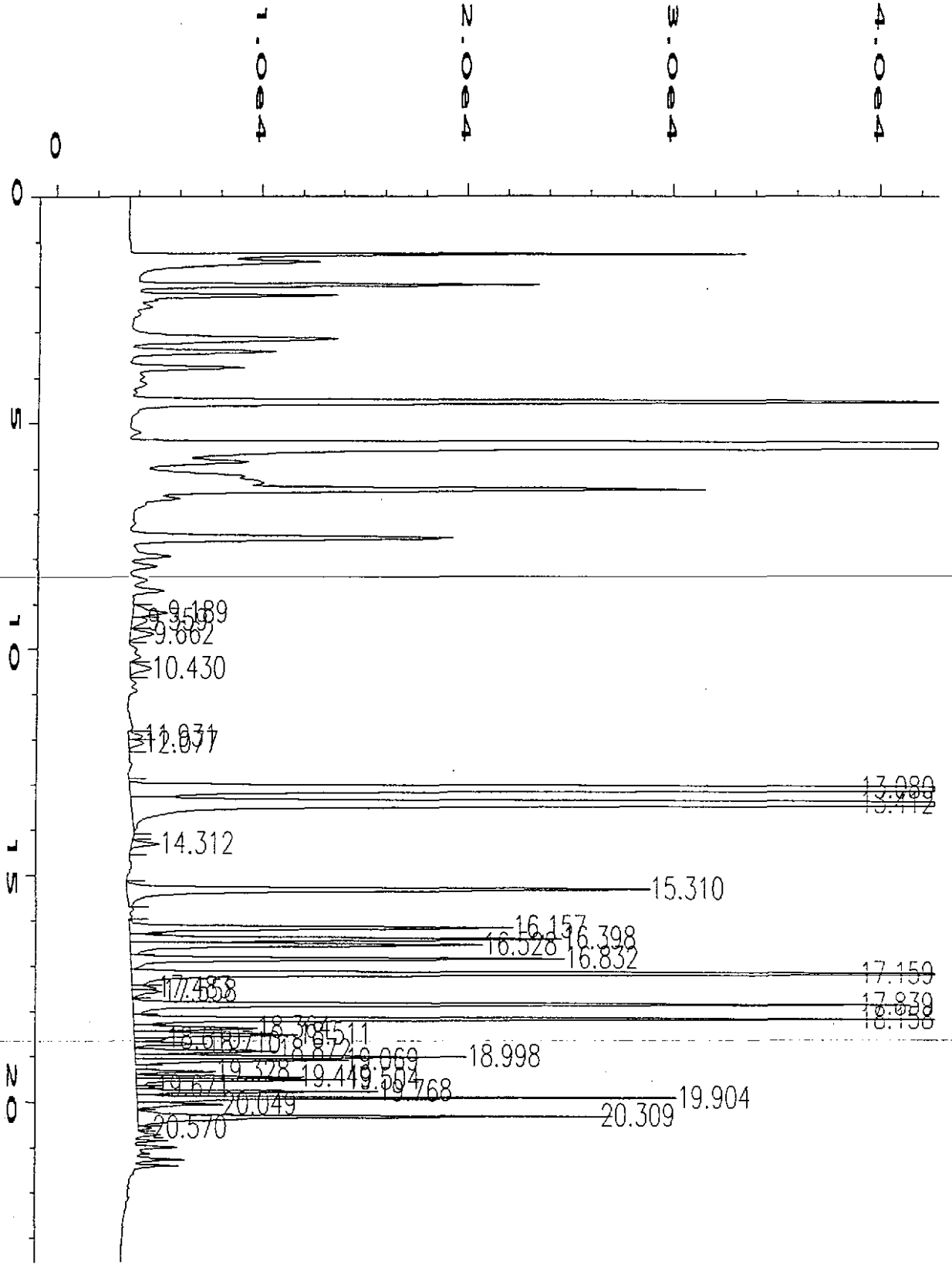
Operator :
Instrument : GC#2
Sample Name : b606471-01
Run Time Bar Code:
Acquired on : 01 Jul 96 12:53 PM
Report Created on: 11 Jul 96 02:49 PM

Page Number : 1
Vial Number : 10
Injection Number : 1
Sequence Line : 1
Instrument Method: WA-WATER.MTH
Analysis Method : WA-WATER.MTH



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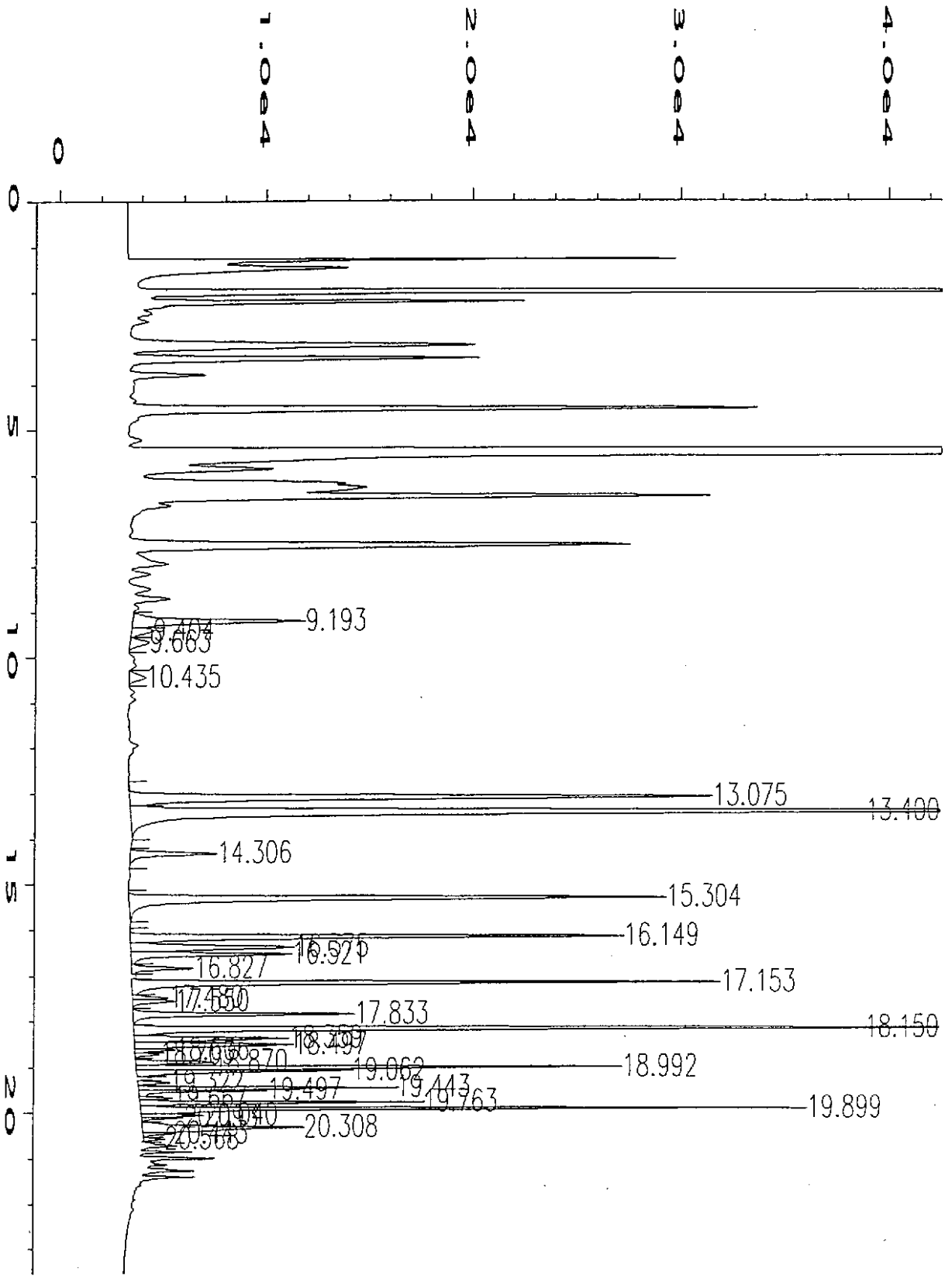
Operator :
Instrument : GC#2
Sample Name : b606471-02
Run Time Bar Code:
Acquired on : 01 Jul 96 01:53 PM
Report Created on: 11 Jul 96 02:50 PM

Page Number : 1
Vial Number : 12
Injection Number : 1
Sequence Line : 1
Instrument Method: WA-WATER.MTH
Analysis Method : WA-WATER.MTH



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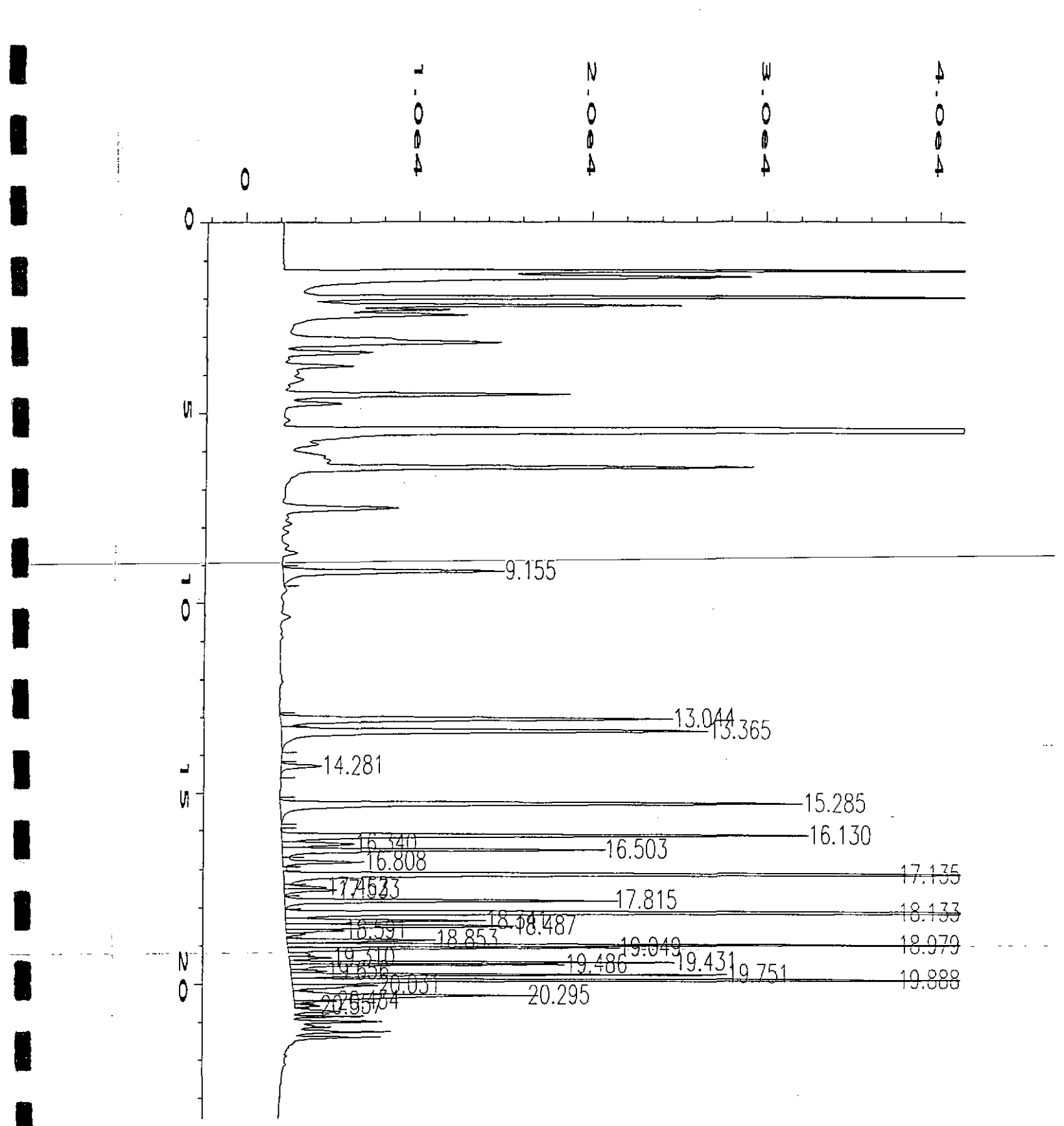
Operator :
Instrument : GC#2
Sample Name : b606471-03
Run Time Bar Code:
Acquired on : 01 Jul 96 02:24 PM
Report Created on: 11 Jul 96 02:50 PM

Page Number : 1
Vial Number : 13
Injection Number : 1
Sequence Line : 1
Instrument Method: WA-WATER.MTH
Analysis Method : WA-WATER.MTH



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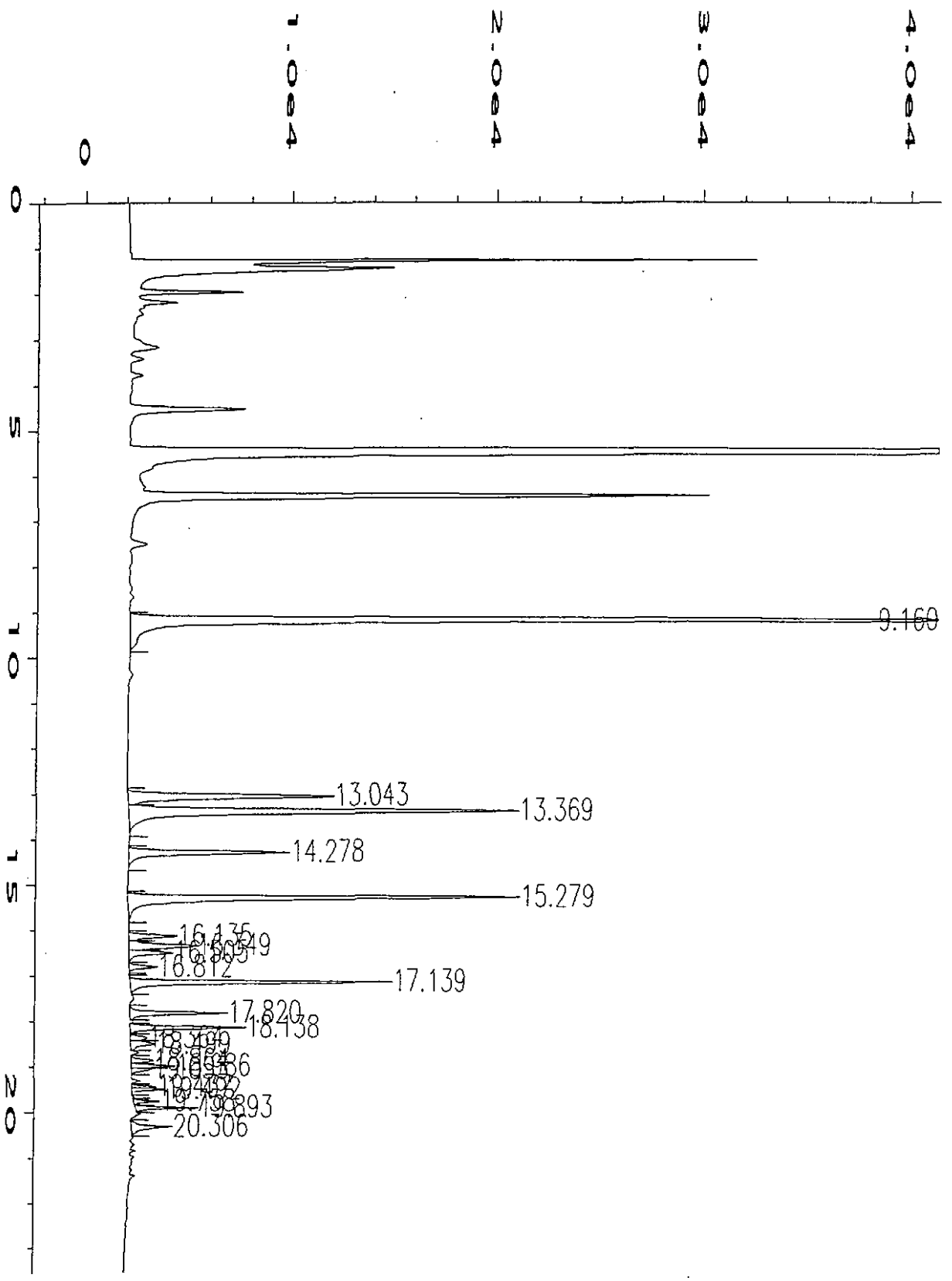
Operator :
Instrument : GC#2
Sample Name : B606471-04 R1
Run Time Bar Code:
Acquired on : 02 Jul 96 09:44 AM
Report Created on: 11 Jul 96 02:51 PM

Page Number : 1
Vial Number : 4
Injection Number : 1
Sequence Line : 1
Instrument Method: WA-WATER.MTH
Analysis Method : WA-WATER.MTH



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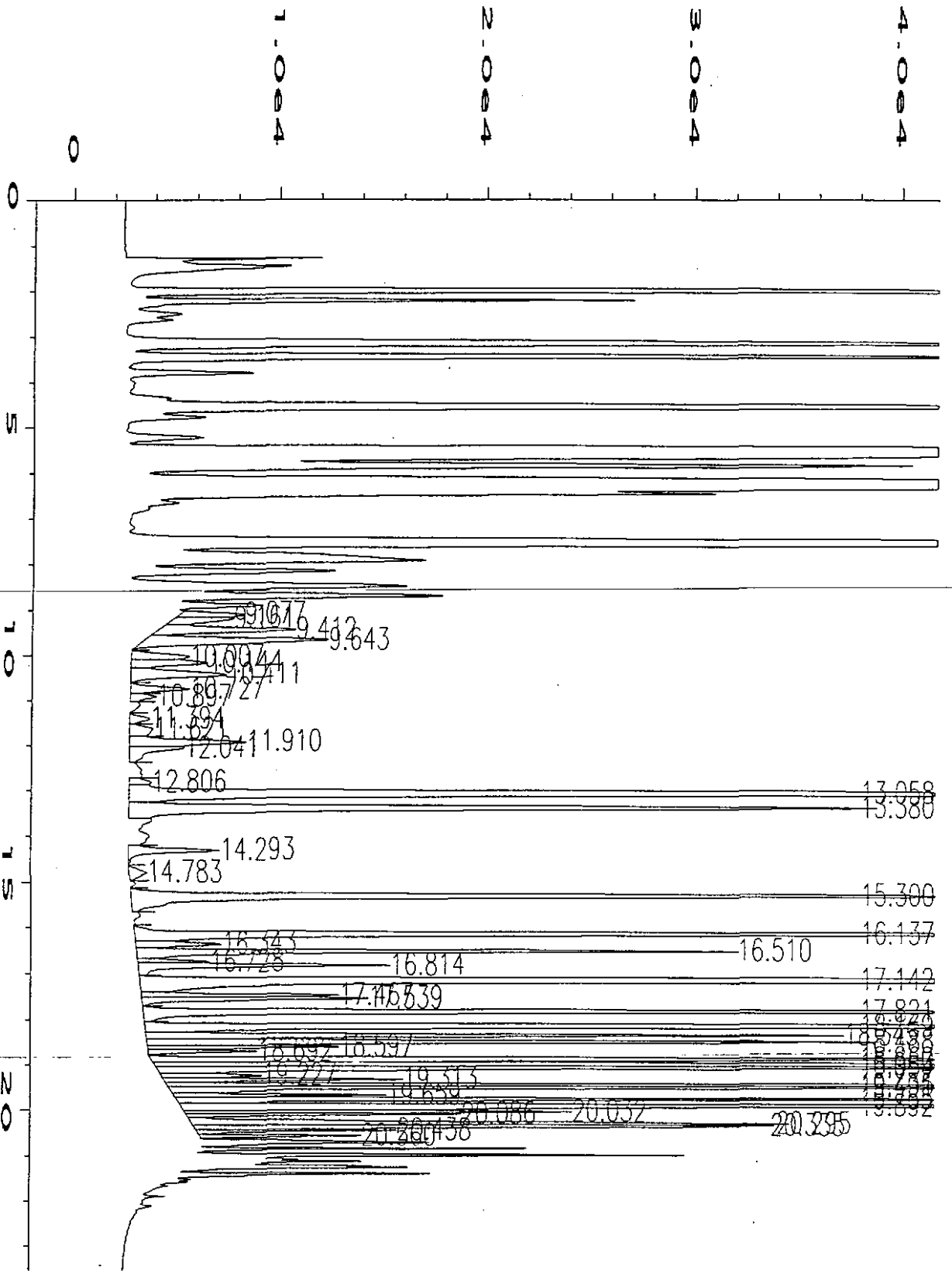
Operator :
Instrument : GC#2
Sample Name : b606471-05 r1
Run Time Bar Code:
Acquired on : 02 Jul 96 10:14 AM
Report Created on: 11 Jul 96 02:51 PM

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



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Operator	:	Page Number	: 1
Instrument	: GC#2	Vial Number	: 19
Sample Name	: b606471-06	Injection Number	: 1
Run Time Bar Code:		Sequence Line	: 1
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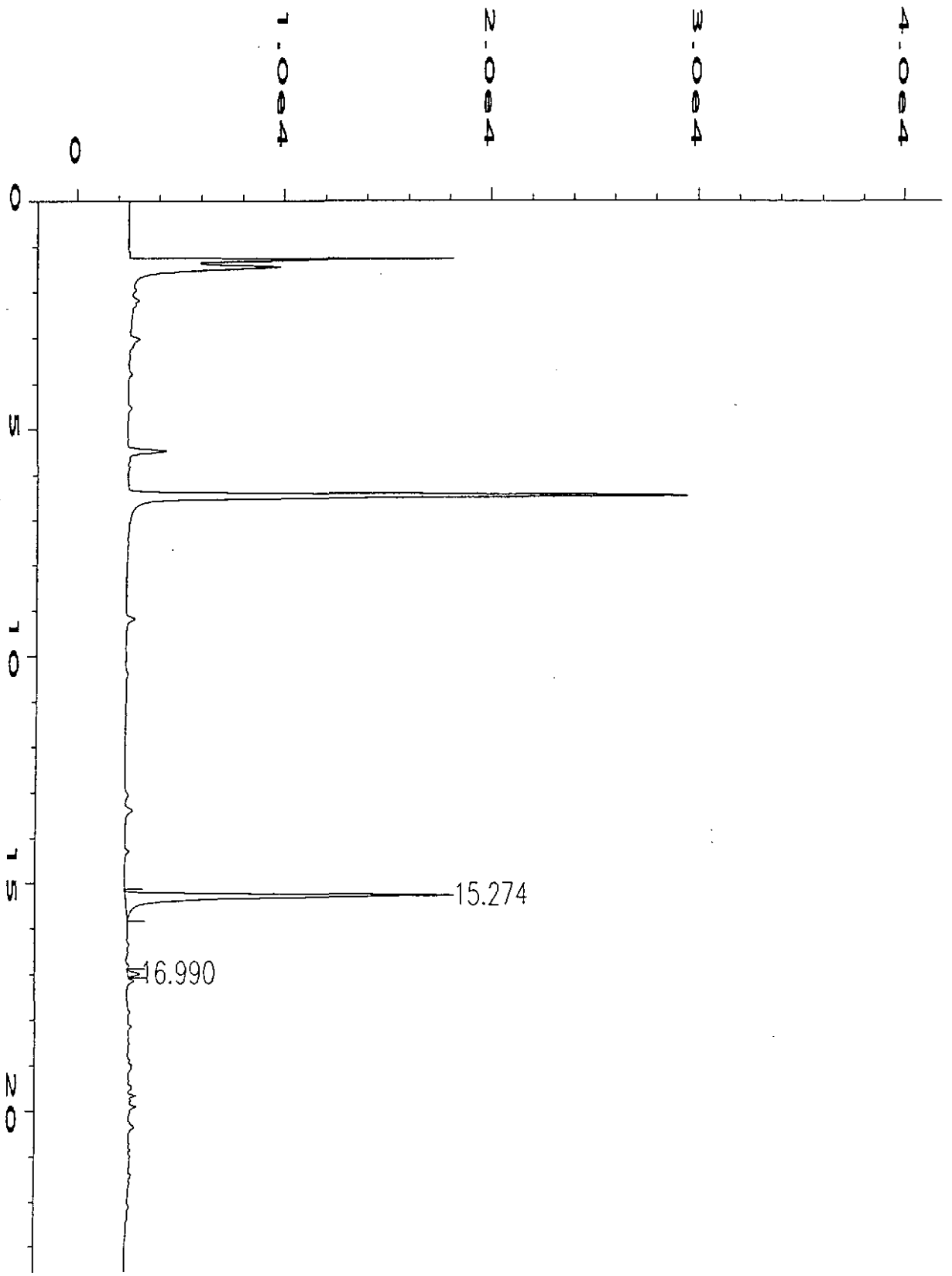
Report Created on	: 11 Jul 96 02:50 PM	Analysis Method	: WA-WATER.MTH



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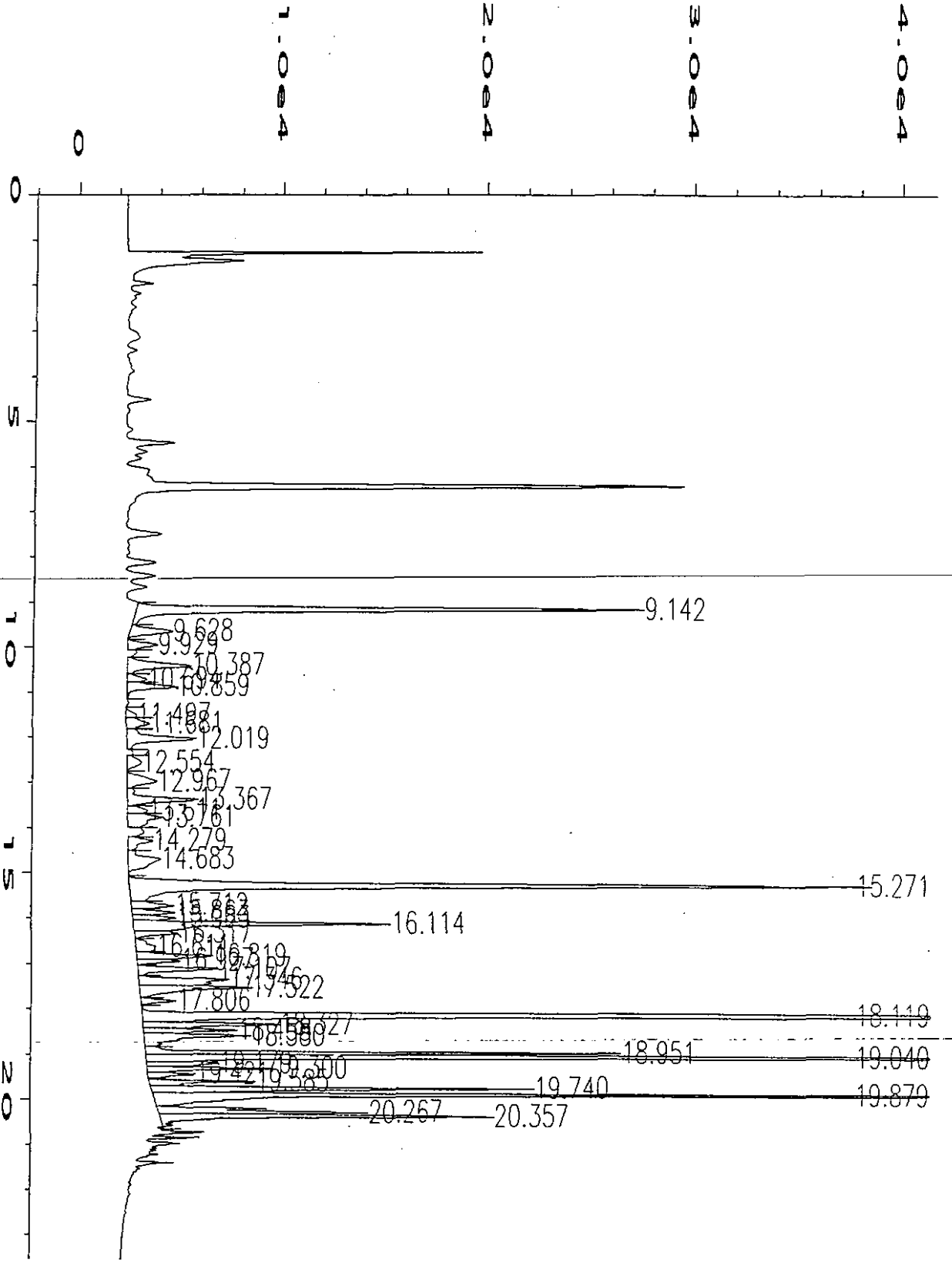
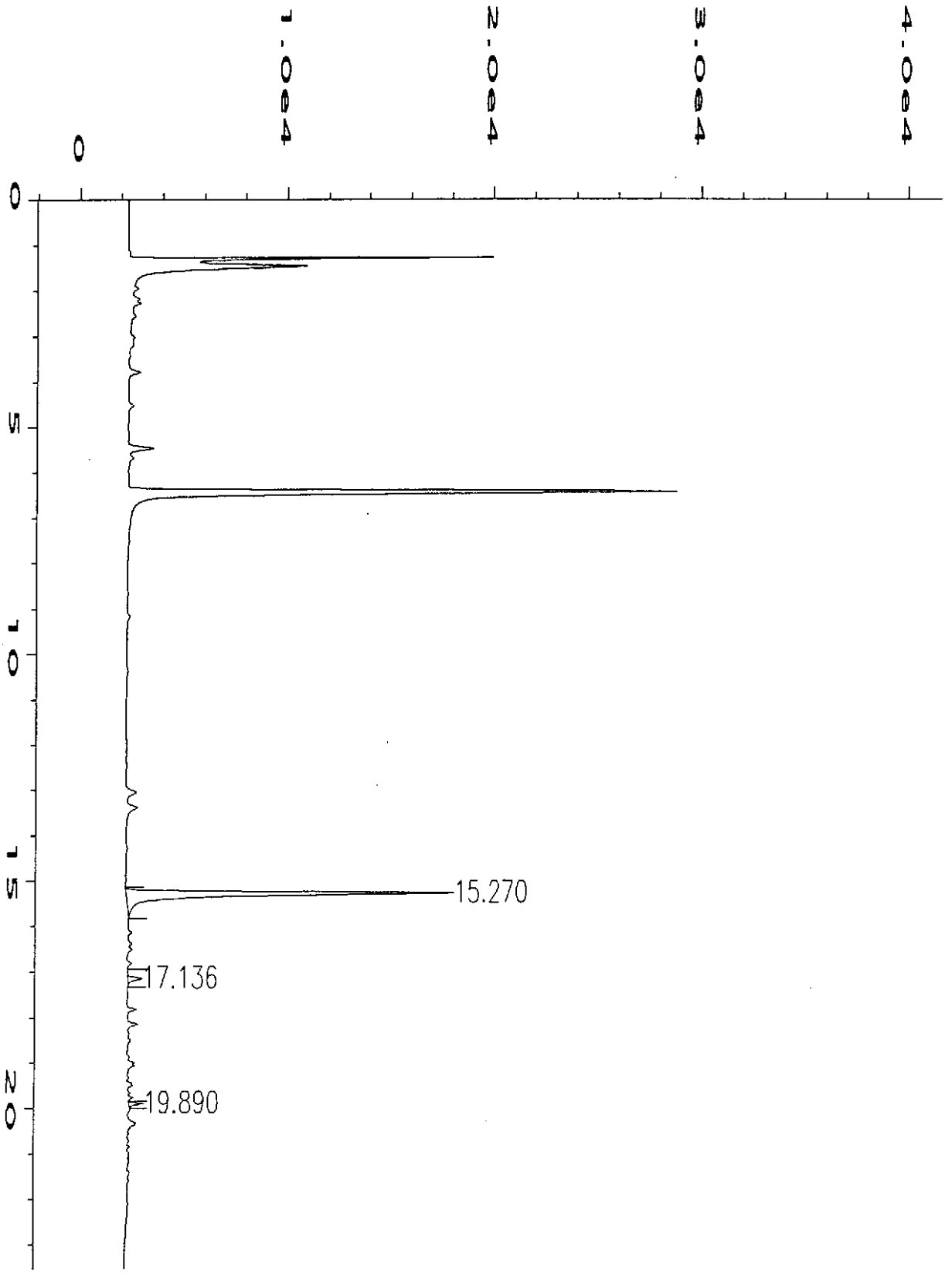
Operator :
Instrument : GC#2
Sample Name : b606471-07
Run Time Bar Code:
Acquired on : 01 Jul 96 05:56 PM
Report Created on: 11 Jul 96 02:50 PM

Page Number : 1
Vial Number : 20
Injection Number : 1
Sequence Line : 1
Instrument Method: WA-WATER.MTH
Analysis Method : WA-WATER.MTH



Data File Name : C:\HPCHEM\3\DATA\070196\025F0101.D
Operator :
Instrument : GC#2
Sample Name : b606471-08
Run Time Bar Code:
Acquired on : 01 Jul 96 08:28 PM
Report Created on: 11 Jul 96 02:53 PM

Page Number : 1
Vial Number : 25
Injection Number : 1
Sequence Line : 1
Instrument Method: WA-WATER.MTH
Analysis Method : WA-WATER.MTH



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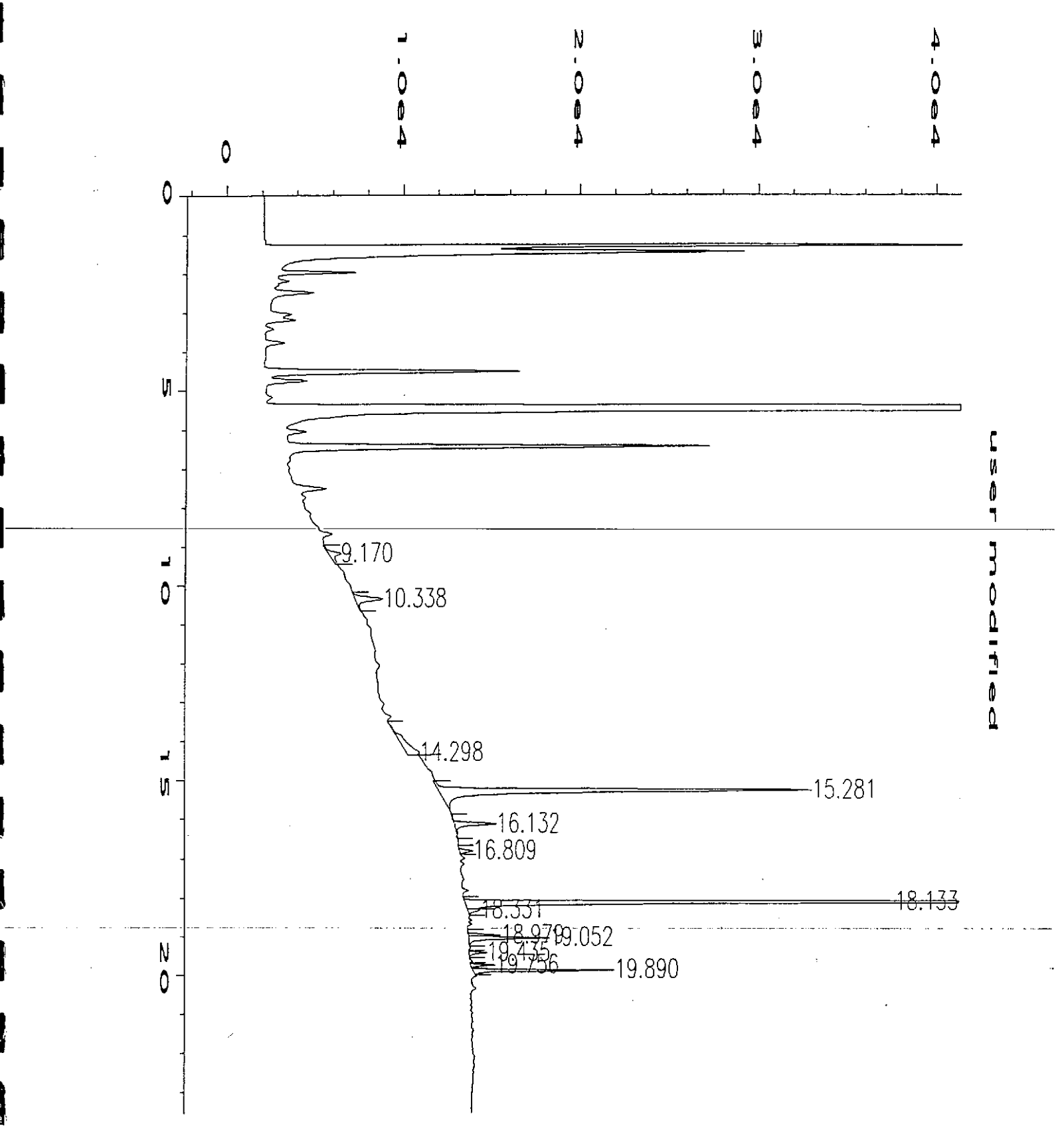
Operator :
Instrument : GC#2
Sample Name : b606471-09
Run Time Bar Code:
Acquired on : 01 Jul 96 09:59 PM
Report Created on: 11 Jul 96 02:53 PM

Page Number : 1
Vial Number : 28
Injection Number : 1
Sequence Line : 1
Instrument Method: WA-WATER.MT
Analysis Method : WA-WATER.MT



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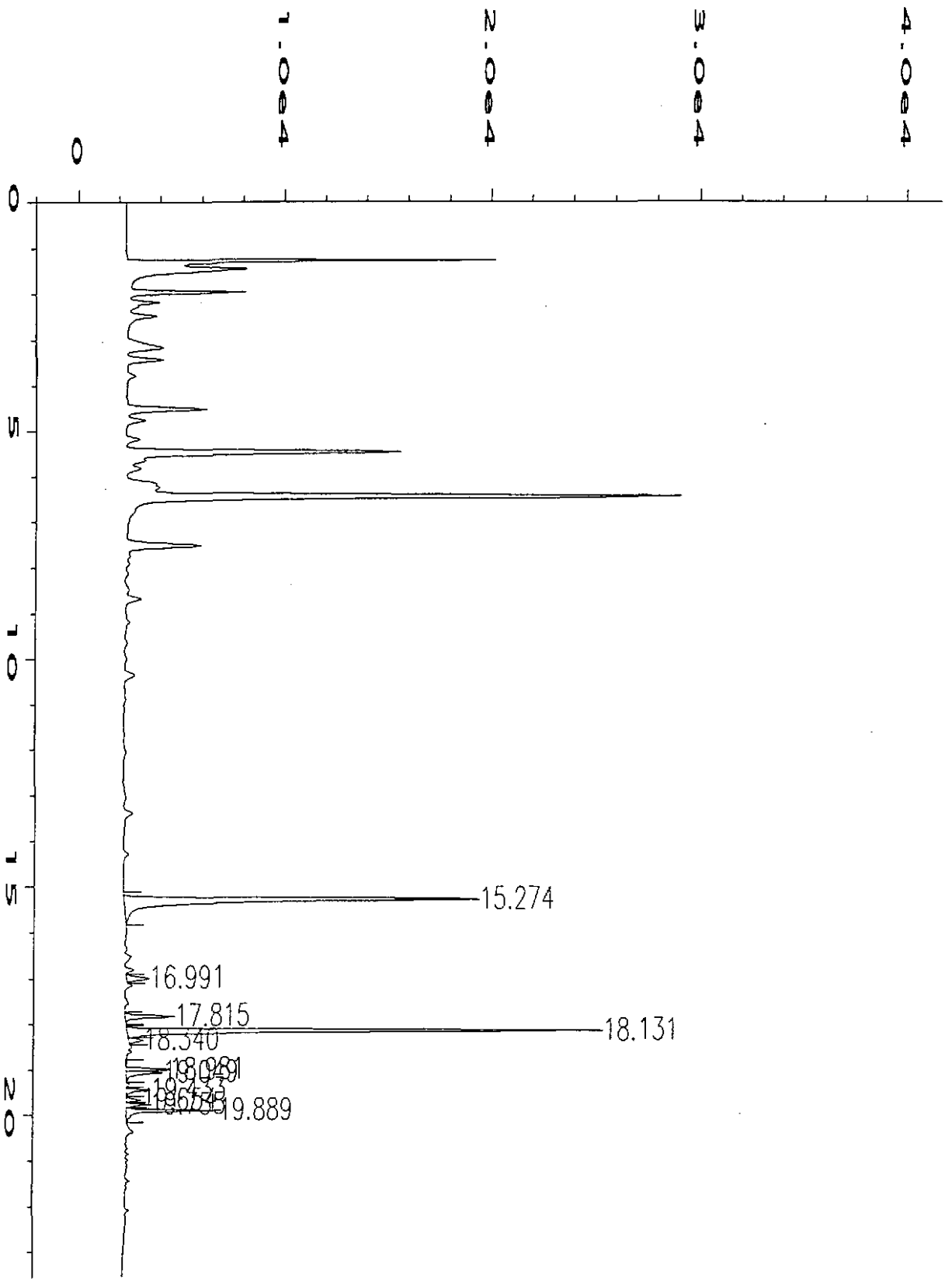
Operator :
Instrument : GC#2
Sample Name : b606471-10 r1
Run Time Bar Code:
Acquired on : 02 Jul 96 11:15 AM
Report Created on: 11 Jul 96 02:52 PM

Page Number : 1
Vial Number : 7
Injection Number : 1
Sequence Line : 1
Instrument Method: WA-WATER.MTH
Analysis Method : WA-WATER.MTH



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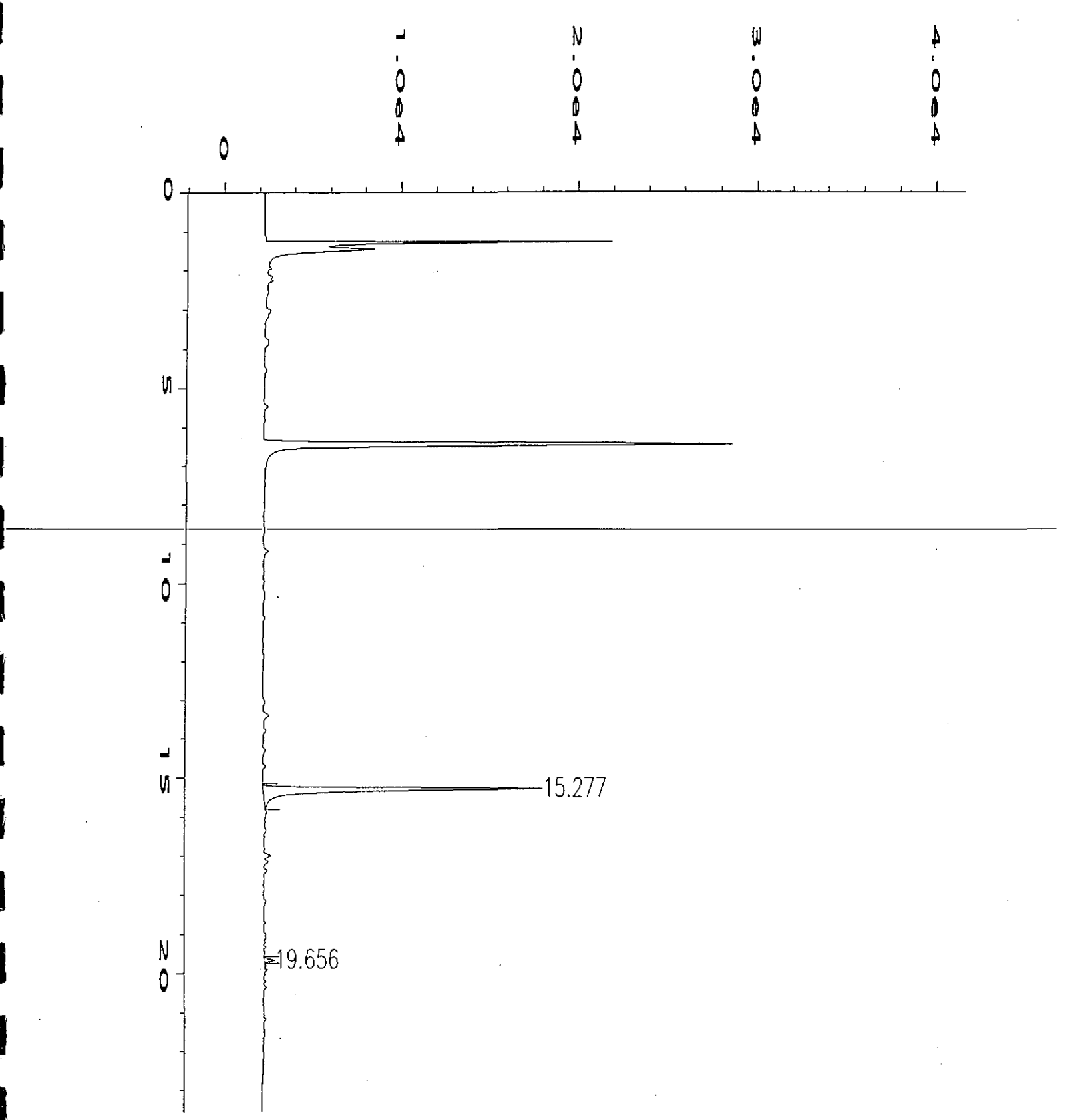
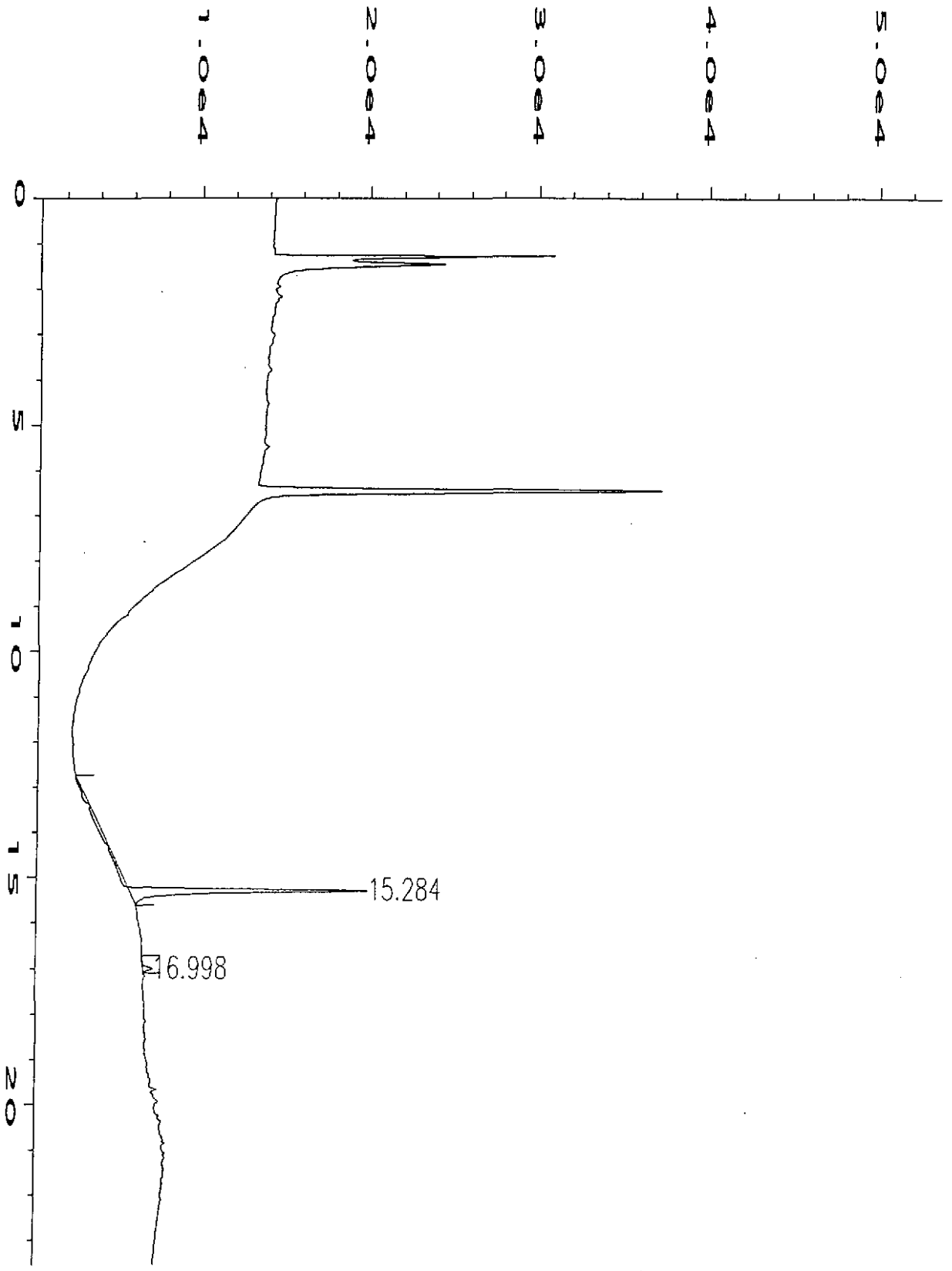
Operator :
Instrument : GC#2
Sample Name : b606471-11
Run Time Bar Code:
Acquired on : 01 Jul 96 10:59 PM
Report Created on: 11 Jul 96 02:54 PM

Page Number : 1
Vial Number : 30
Injection Number : 1
Sequence Line : 1
Instrument Method: WA-WATER.MT
Analysis Method : WA-WATER.MT



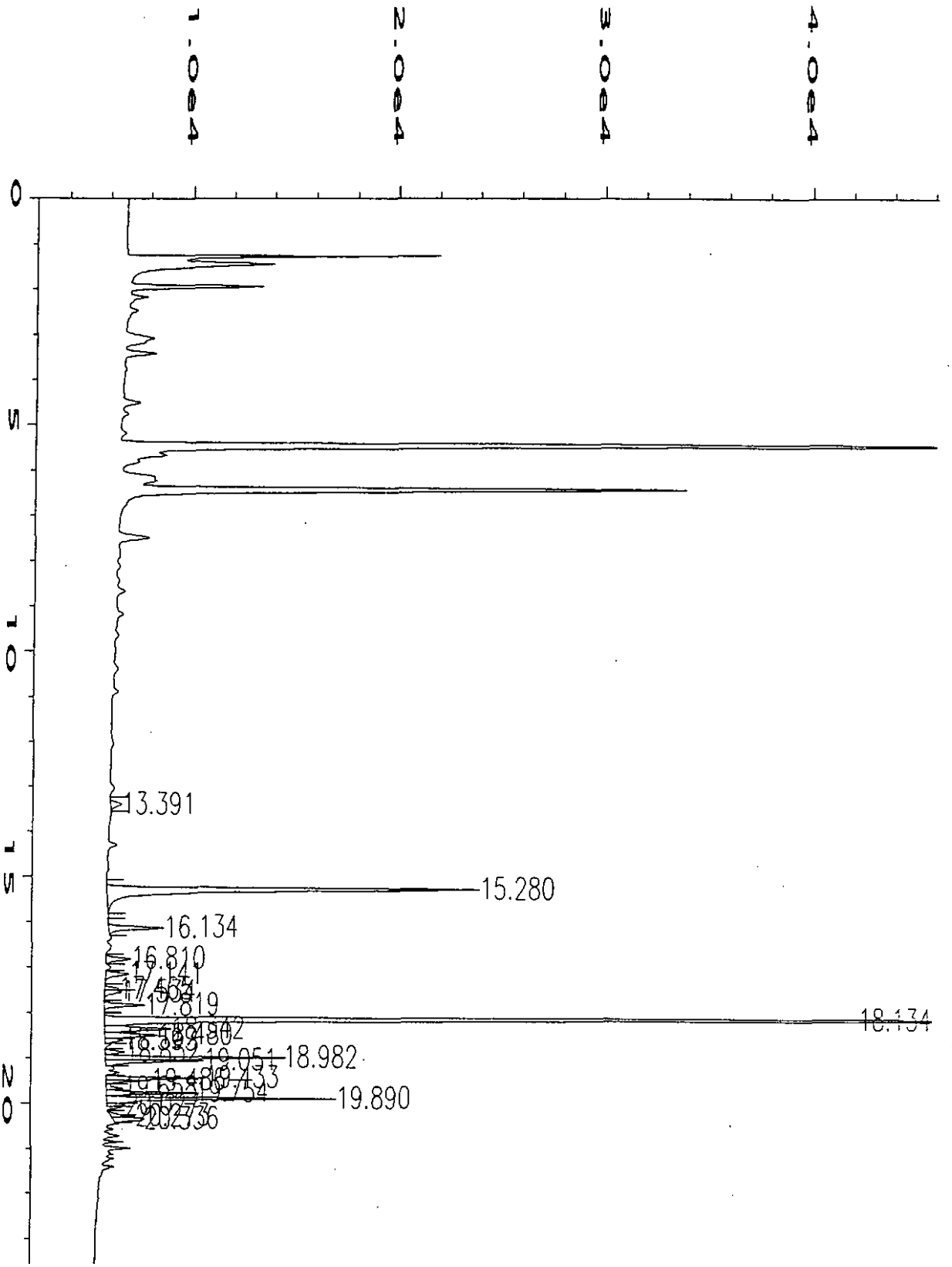
Data File Name : C:\HPCHEM\3\DATA\070196\031F0101.D
Operator :
Instrument : GC#2
Sample Name : b606471-12
Run Time Bar Code:
Acquired on : 01 Jul 96 11:30 PM
Report Created on: 11 Jul 96 02:54 PM

Page Number : 1
Vial Number : 31
Injection Number : 1
Sequence Line : 1
Instrument Method: WA-WATER.MTH
Analysis Method : WA-WATER.MTH



Data File Name : C:\HPCHEM\3\DATA\070296\008F0101.D
Operator :
Instrument : GC#2
Sample Name : b606471-13
Run Time Bar Code:
Acquired on : 02 Jul 96 11:45 AM
Report Created on: 11 Jul 96 02:52 PM

Page Number : 1
Vial Number : 8
Injection Number : 1
Sequence Line : 1
Instrument Method: WA-WATER.MT
Analysis Method : WA-WATER.MT



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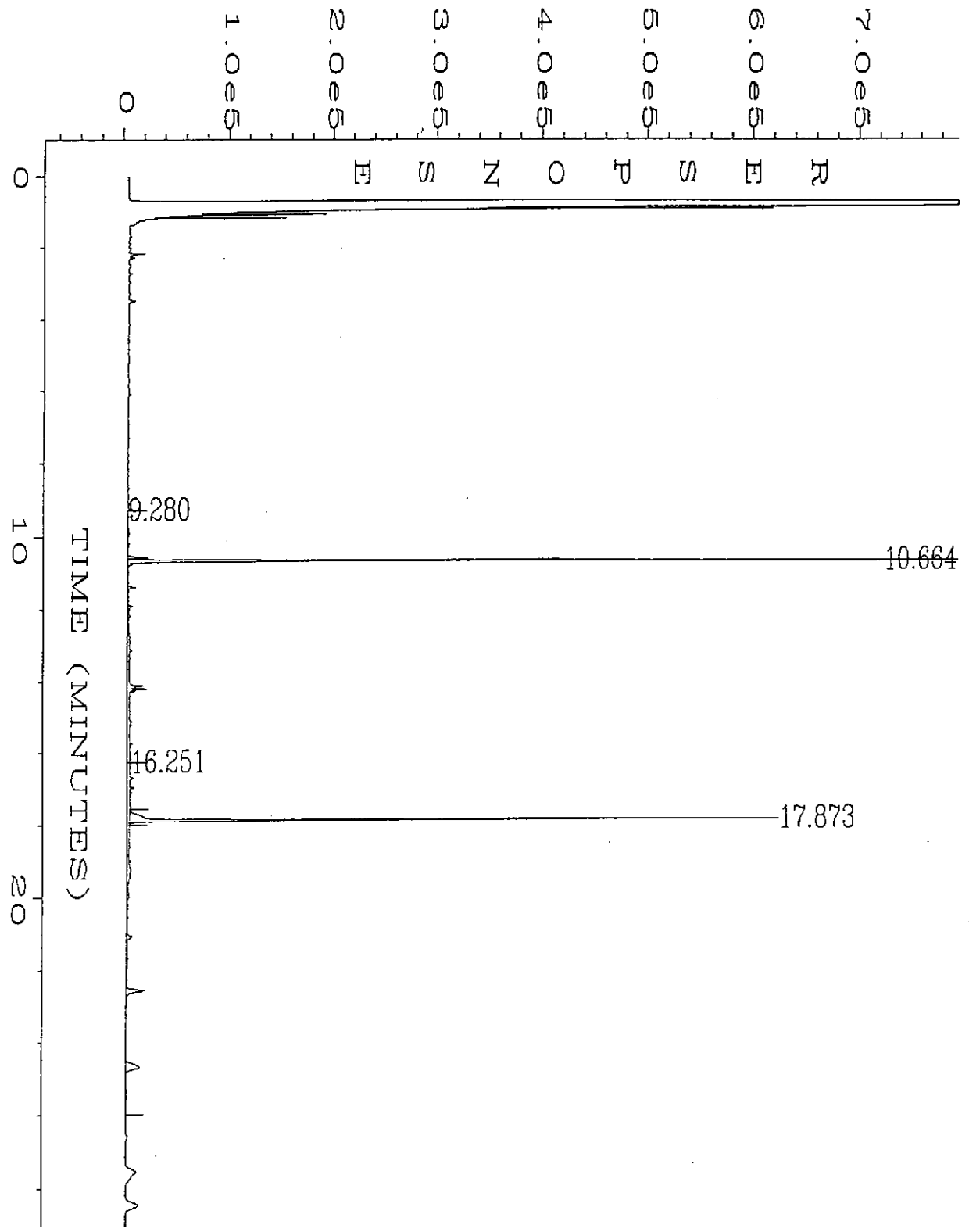
Operator :
Instrument : GC#2
Sample Name : b606471-14
Run Time Bar Code:
Acquired on : 02 Jul 96 12:16 PM
Report Created on: 11 Jul 96 02:58 PM

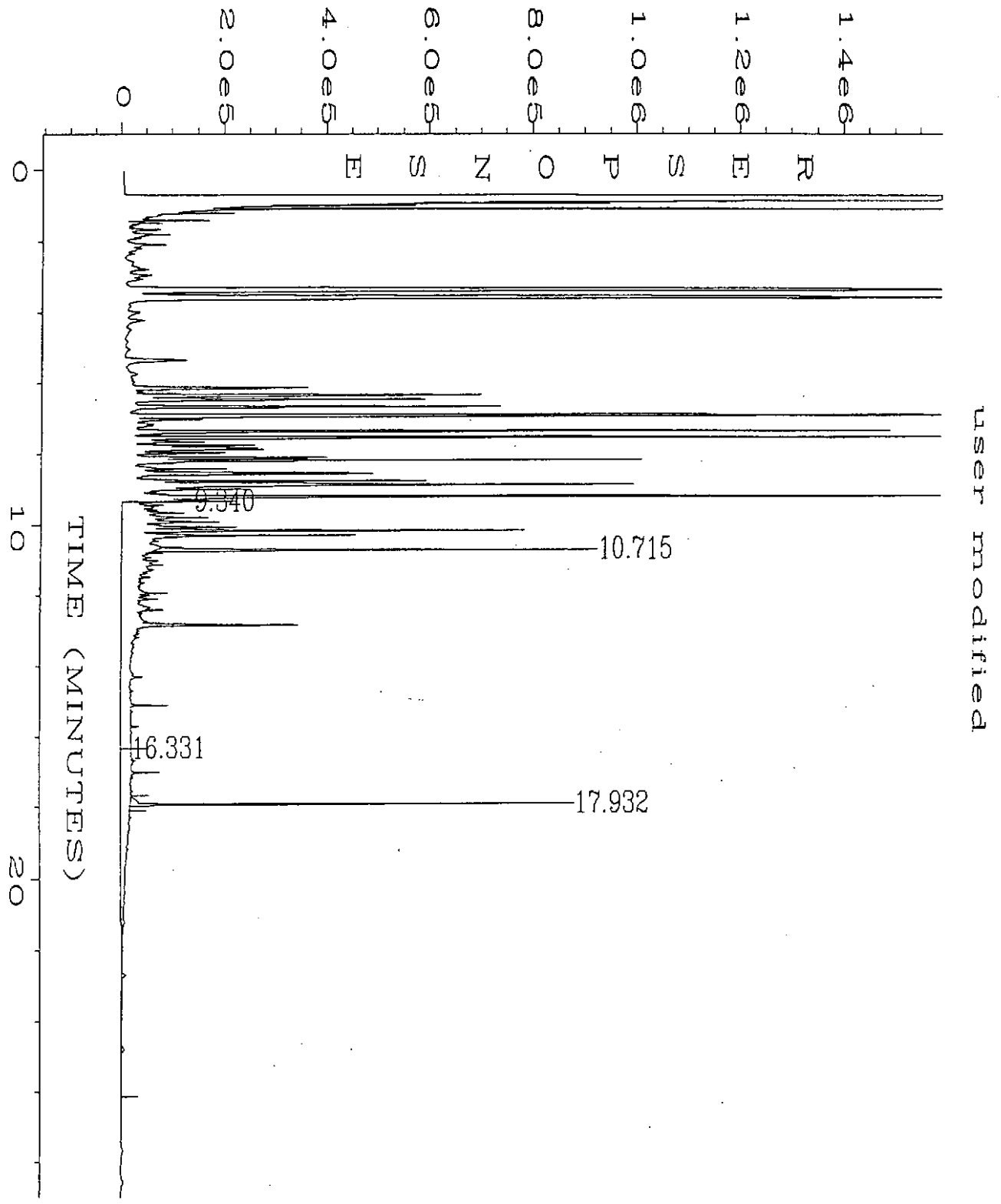
Page Number : 1
Vial Number : 9
Injection Number : 1
Sequence Line : 1
Instrument Method: WA-WATER.MTH
Analysis Method : WA-WATER.MTH



user modified

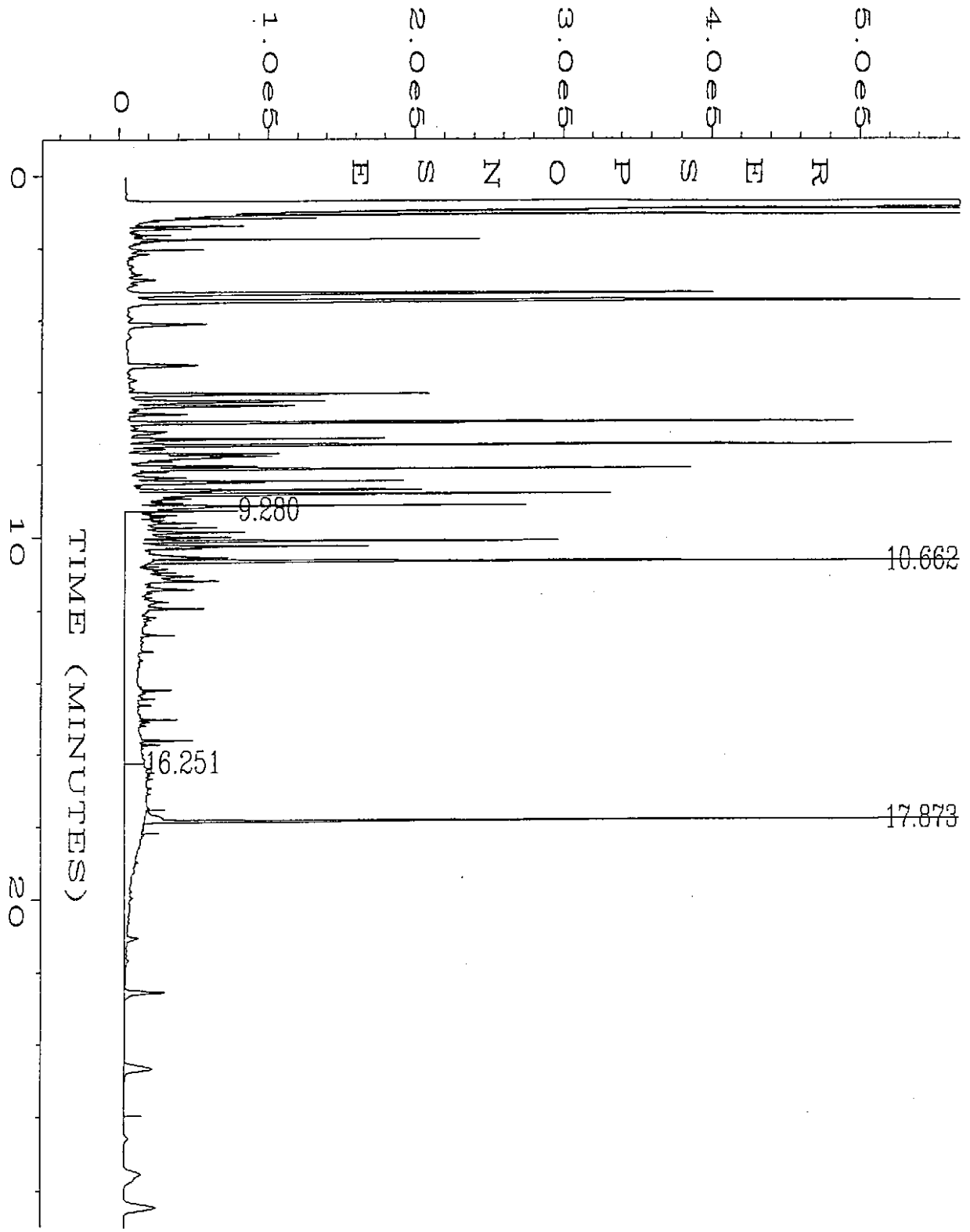
Data File Name : C:\HPCHEM\3\DATA\JUL02\010R1101.D
Operator : AD
Instrument : FUBAR
Sample Name : 606471-01 W
Run Time Bar Code:
Acquired on : 03 Jul 96 03:47 PM
Report Created on: 09 Jul 96 12:58 PM

Page Number : 1
Vial Number : 10
Injection Number : 1
Sequence Line : 11
Instrument Method: TPHE.MTH
Analysis Method : TPHE.MTH



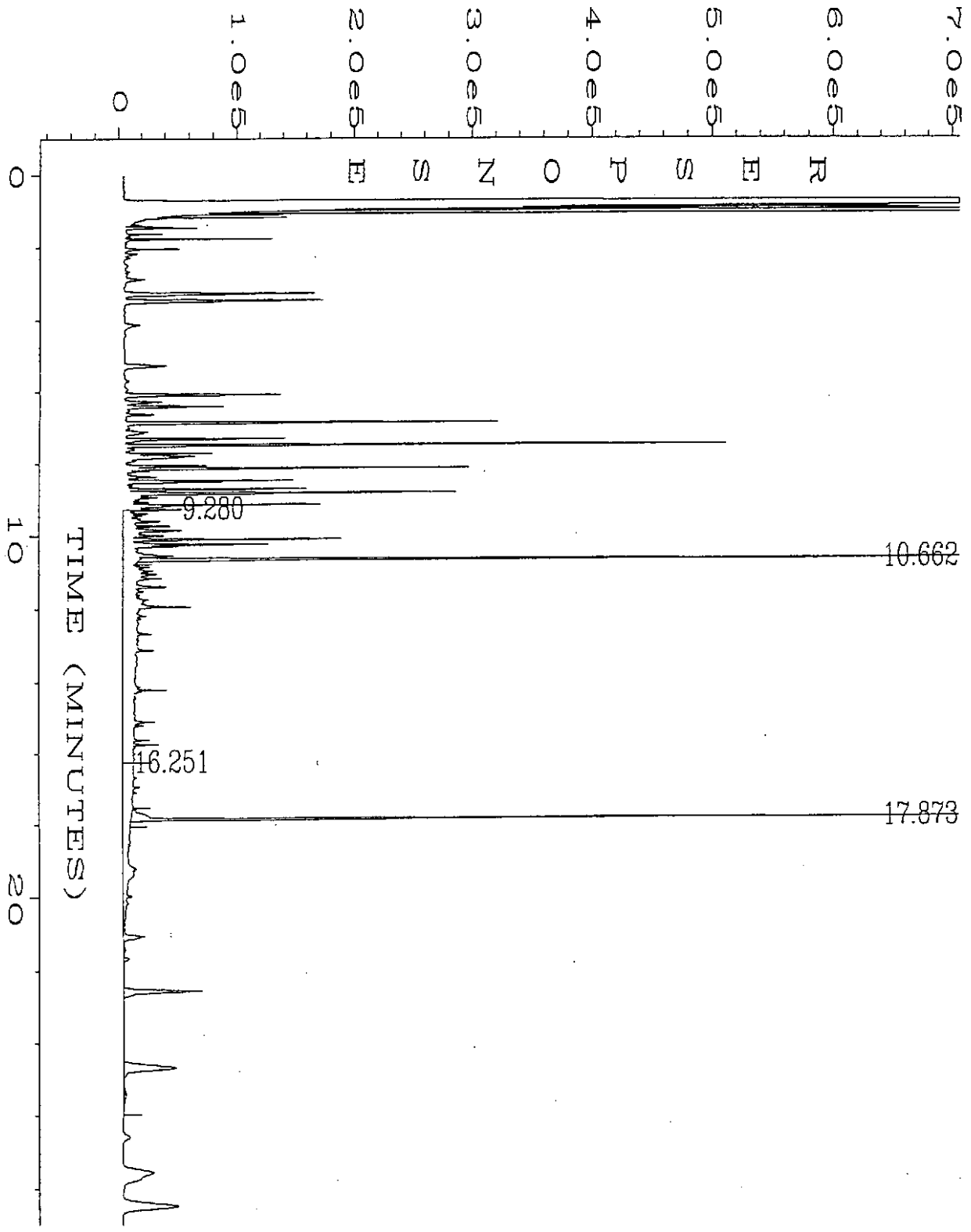
Data File Name : C:\HPCHEM\3\DATA\JUL03\004F0301.D
Operator : AD
Instrument : FUBAR
Sample Name : 606471-02 W
Run Time Bar Code:
Acquired on : 03 Jul 96 07:01 PM
Report Created on: 05 Jul 96 09:32 AM

Page Number : 1
Vial Number : 4
Injection Number : 1
Sequence Line : 3
Instrument Method: TPHE.MTH
Analysis Method : TPHE.MTH



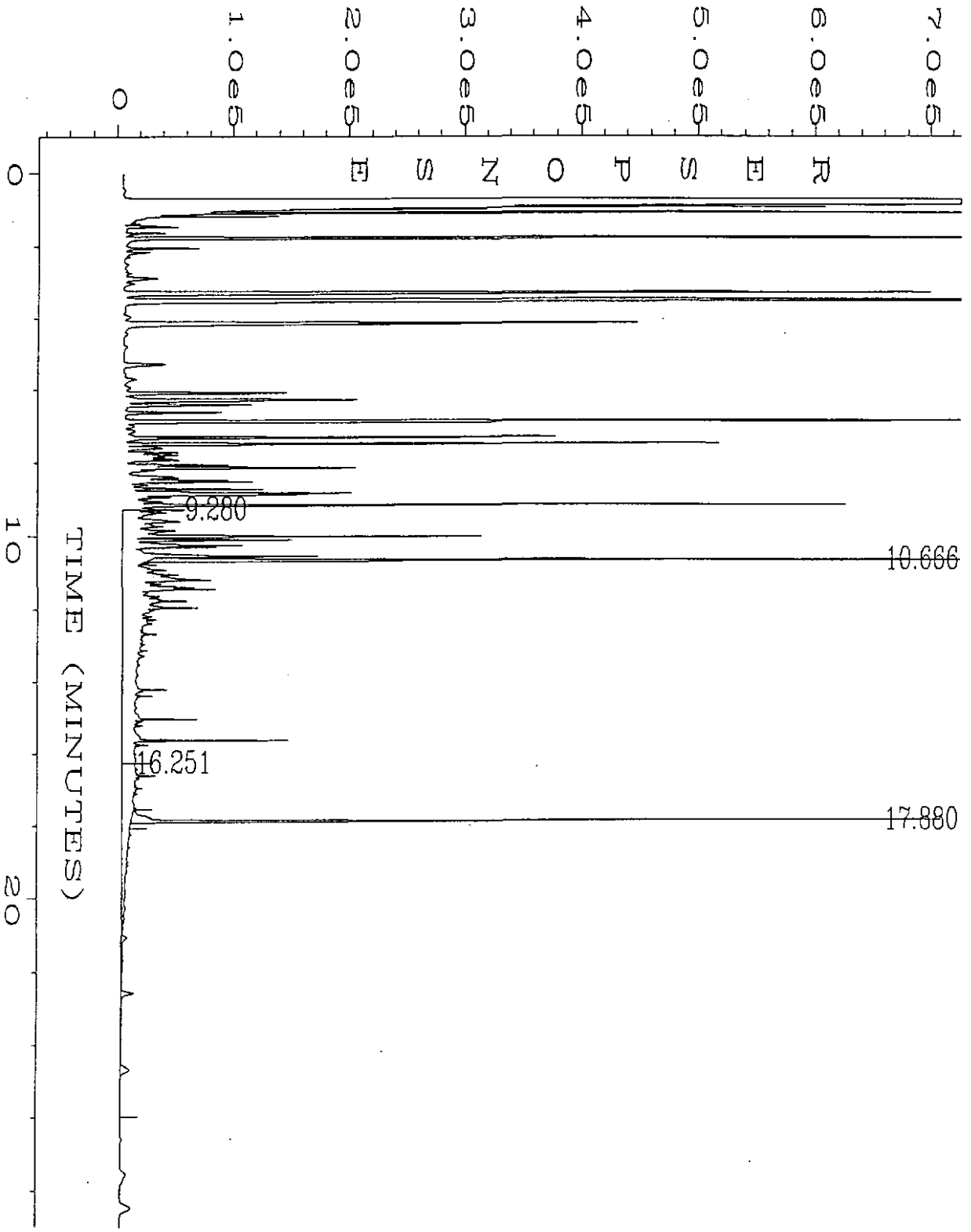
Data File Name : C:\HPCHEM\3\DATA\JUL02\012R0901.D
Operator : AD
Instrument : FUBAR
Sample Name : 606471-03 W
Run Time Bar Code:
Acquired on : 03 Jul 96 10:34 AM
Report Created on: 09 Jul 96 12:54 PM

Page Number : 1
Vial Number : 12
Injection Number : 1
Sequence Line : 9
Instrument Method: TPHD.MTH
Analysis Method : TPHE.MTH



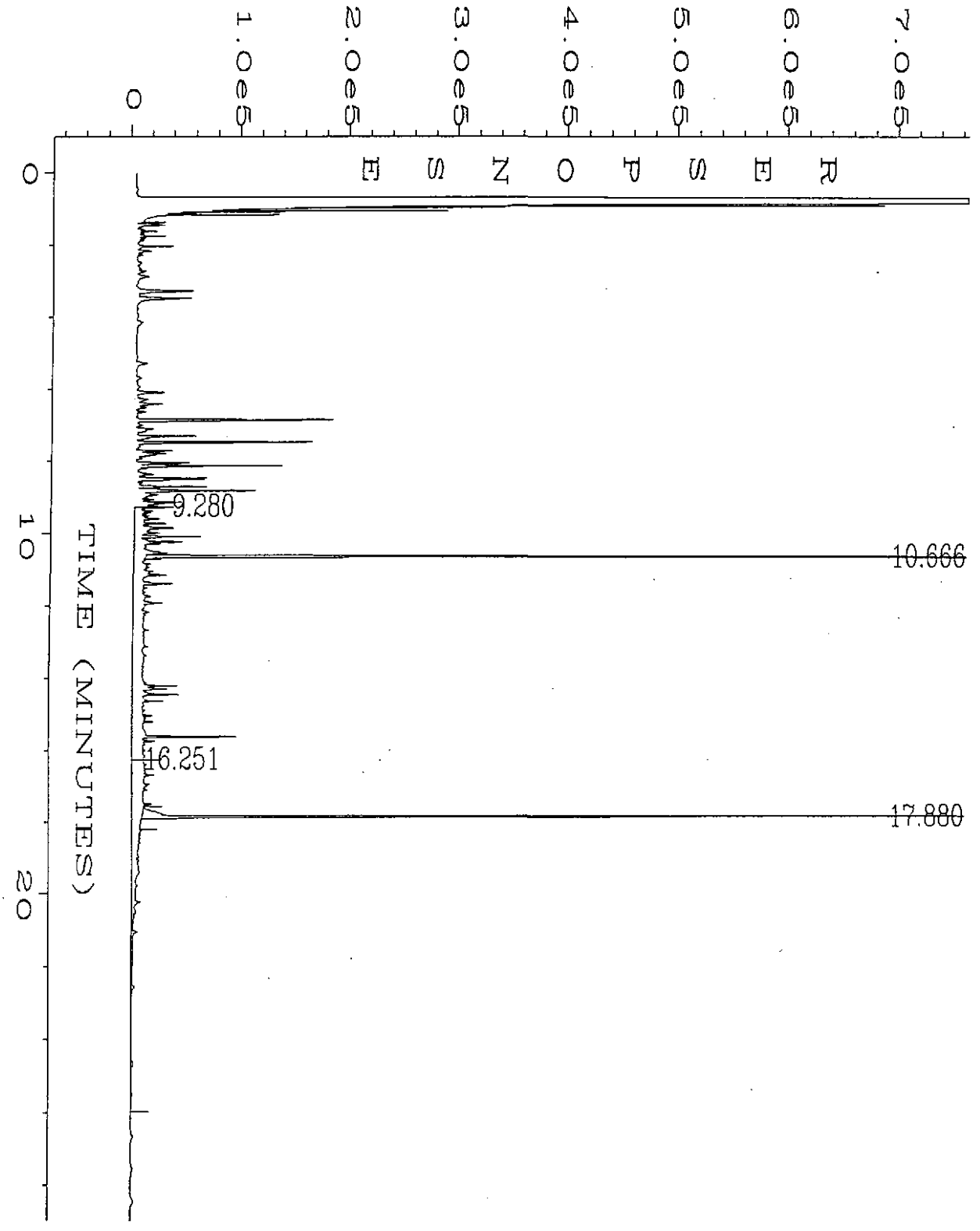
Data File Name : C:\HPCHEM\3\DATA\JUL02\013R0901.D
Operator : AD
Instrument : FUBAR
Sample Name : 606471-04 W
Run Time Bar Code:
Acquired on : 03 Jul 96 11:13 AM
Report Created on: 09 Jul 96 12:54 PM

Page Number : 1
Vial Number : 13
Injection Number : 1
Sequence Line : 9
Instrument Method: TPHD.MTH
Analysis Method : TPHE.MTH



Data File Name : C:\HPCHEM\3\DATA\JUL02\052R0401.D
Operator : AD
Instrument : FUBAR
Sample Name : 606471-05 W
Run Time Bar Code:
Acquired on : 02 Jul 96 06:34 PM
Report Created on: 09 Jul 96 12:50 PM

Page Number : 1
Vial Number : 52
Injection Number : 1
Sequence Line : 4
Instrument Method: TPHE.MTH
Analysis Method : TPHE.MTH



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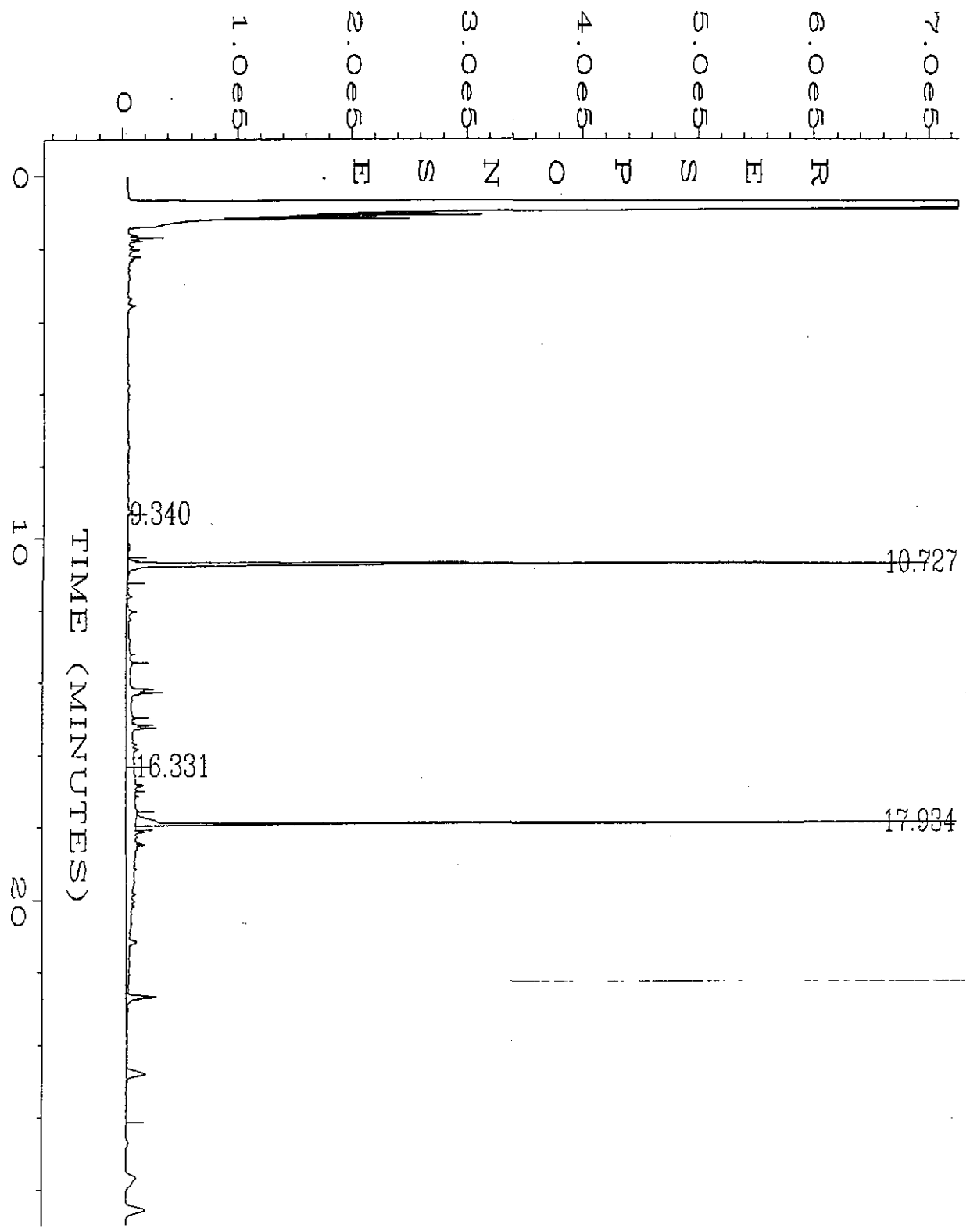
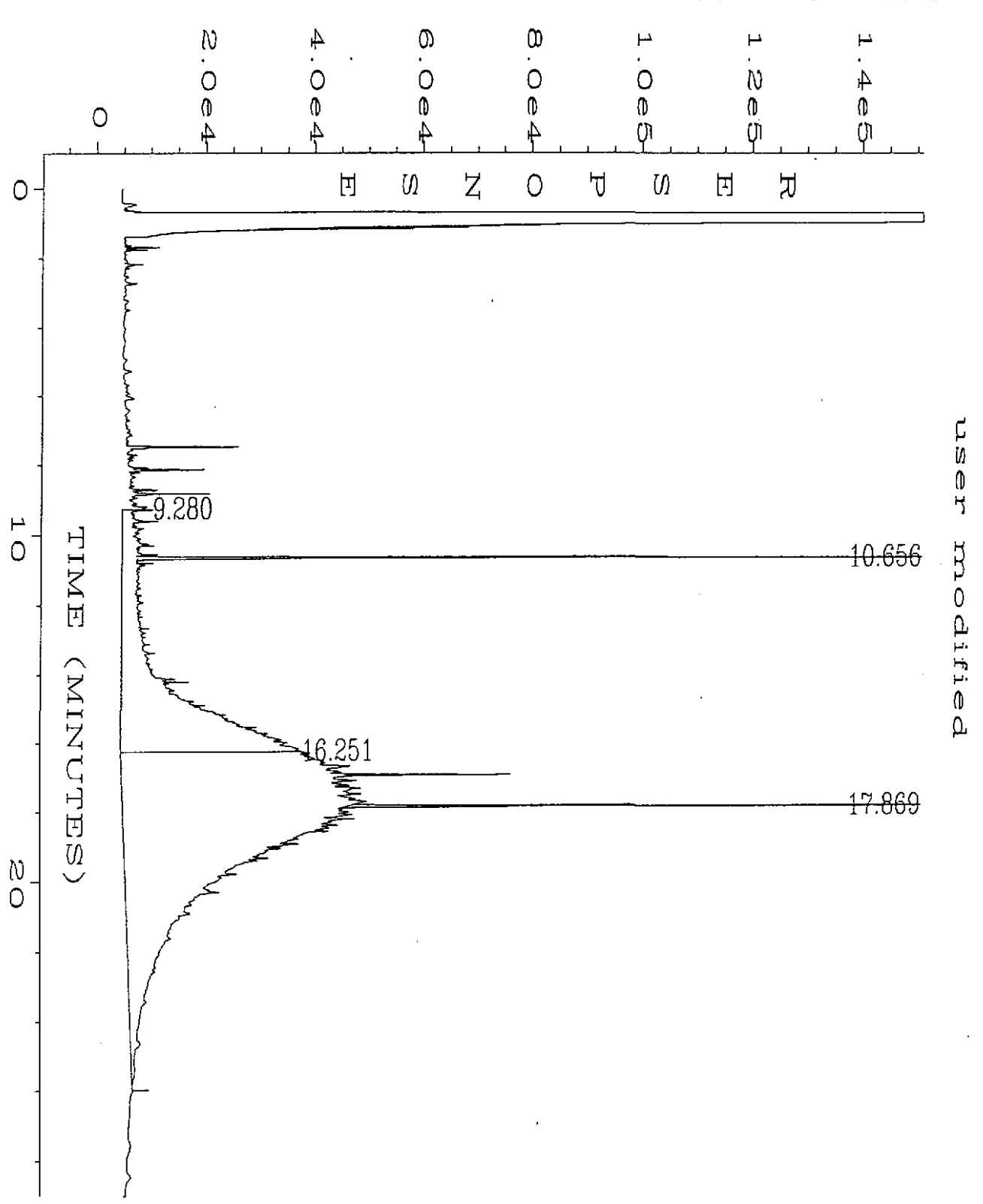
Operator : AD
Instrument : FUBAR
Sample Name : 606471-06 W
Run Time Bar Code:
Acquired on : 02 Jul 96 07:14 PM
Report Created on: 09 Jul 96 12:51 PM

Page Number : 1
Vial Number : 53
Injection Number : 1
Sequence Line : 4
Instrument Method: TPHE.MTH
Analysis Method : TPHE.MTH



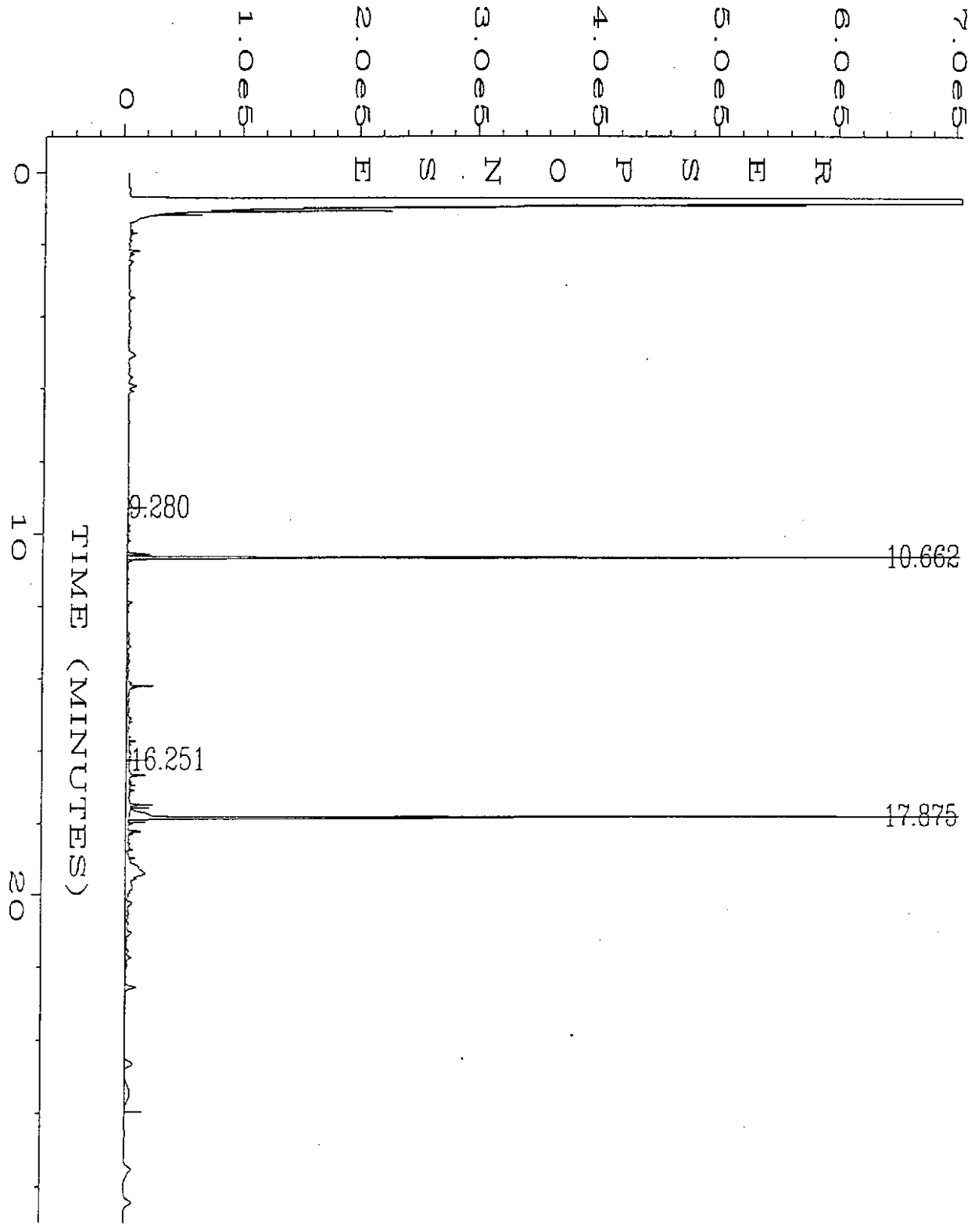
Data File Name : C:\HPCHEM\3\DATA\JUL03\005F0301.D
Operator : AD
Instrument : FUBAR
Sample Name : 606471-07 W
Run Time Bar Code:
Acquired on : 03 Jul 96 07:40 PM
Report Created on: 05 Jul 96 09:33 AM

Page Number : 1
Vial Number : 5
Injection Number : 1
Sequence Line : 3
Instrument Method: TPHE.MTH
Analysis Method : TPHE.MTH

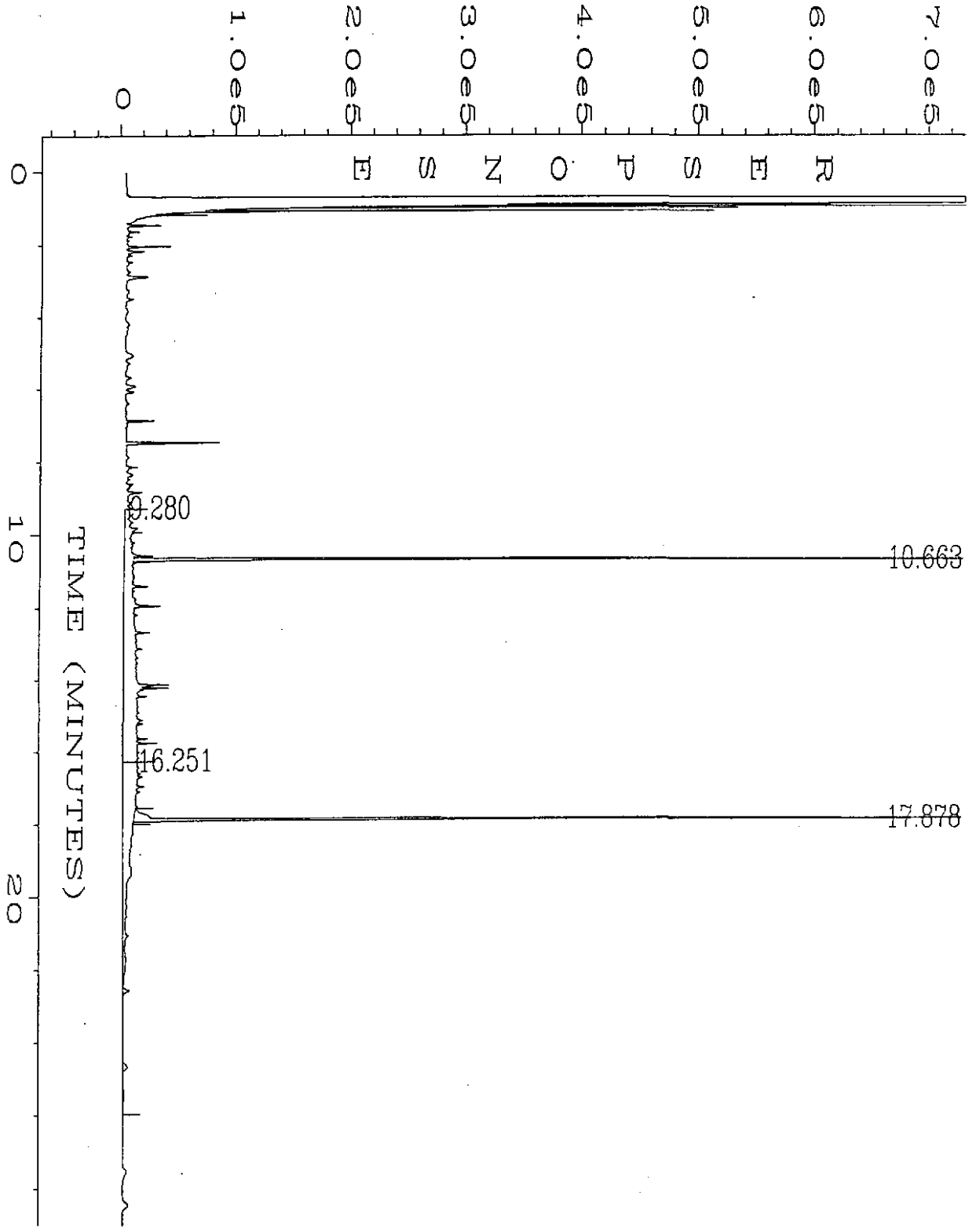


Data File Name : C:\HPCHEM\3\DATA\JUL02\055R0401.D
Operator : AD
Instrument : FUBAR
Sample Name : 606471-08 W 5X
Run Time Bar Code:
Acquired on : 03 Jul 96 07:22 AM
Report Created on: 09 Jul 96 12:52 PM

Page Number : 1
Vial Number : 55
Injection Number : 1
Sequence Line : 4
Instrument Method: TPHE.MTH
Analysis Method : TPHE.MTH

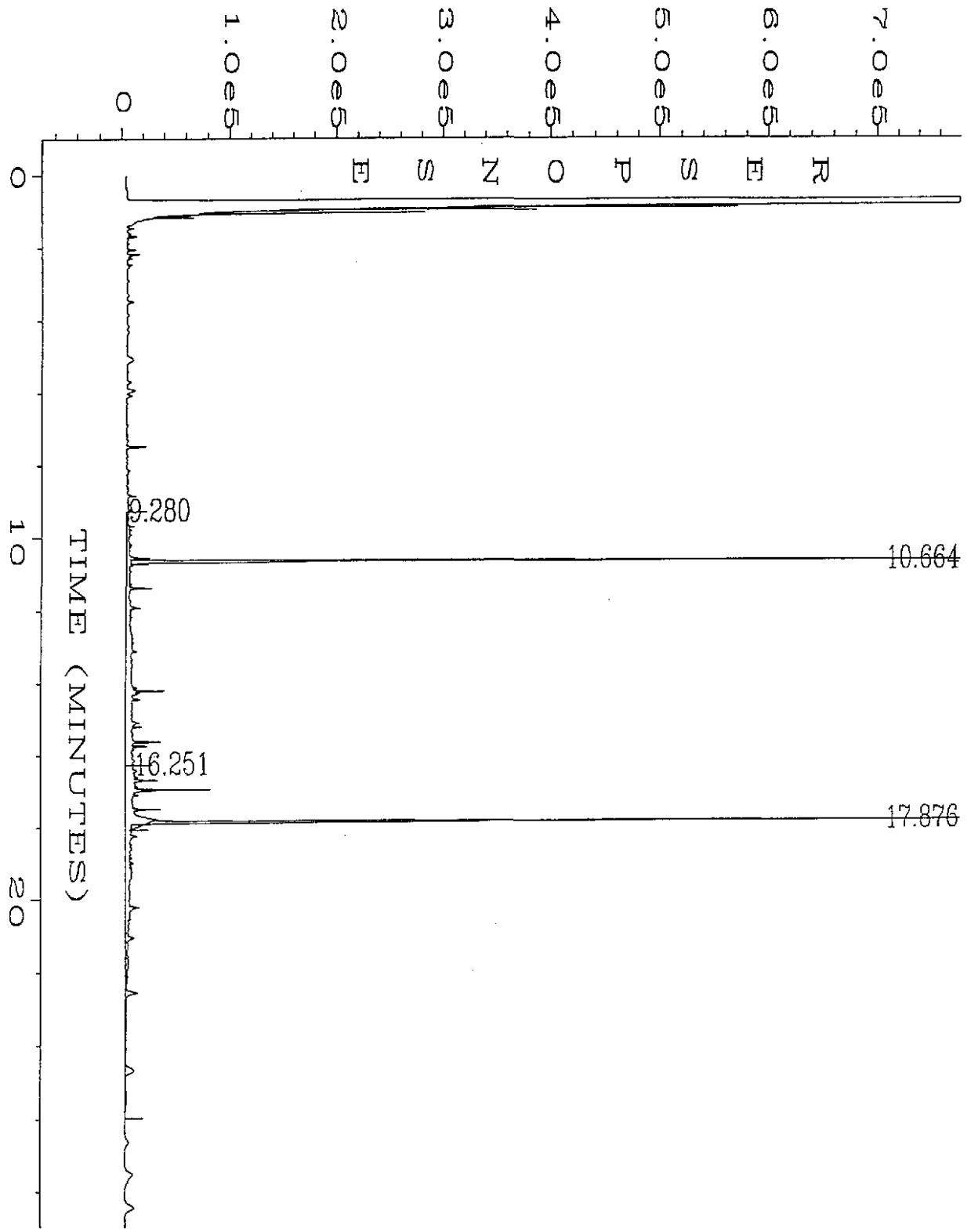


Data File Name	: C:\HPCHEM\3\DATA\JUL02\056R1001.D		
Operator	: AD	Page Number	: 1
Instrument	: FUBAR	Vial Number	: 56
Sample Name	: 606471-09 W	Injection Number	: 1
Run Time Bar Code:		Sequence Line	: 10
Acquired on	: 03 Jul 96 11:52 AM	Instrument Method	: TPHD.MTH
Report Created on	: 09 Jul 96 12:55 PM	Analysis Method	: TPHE.MTH



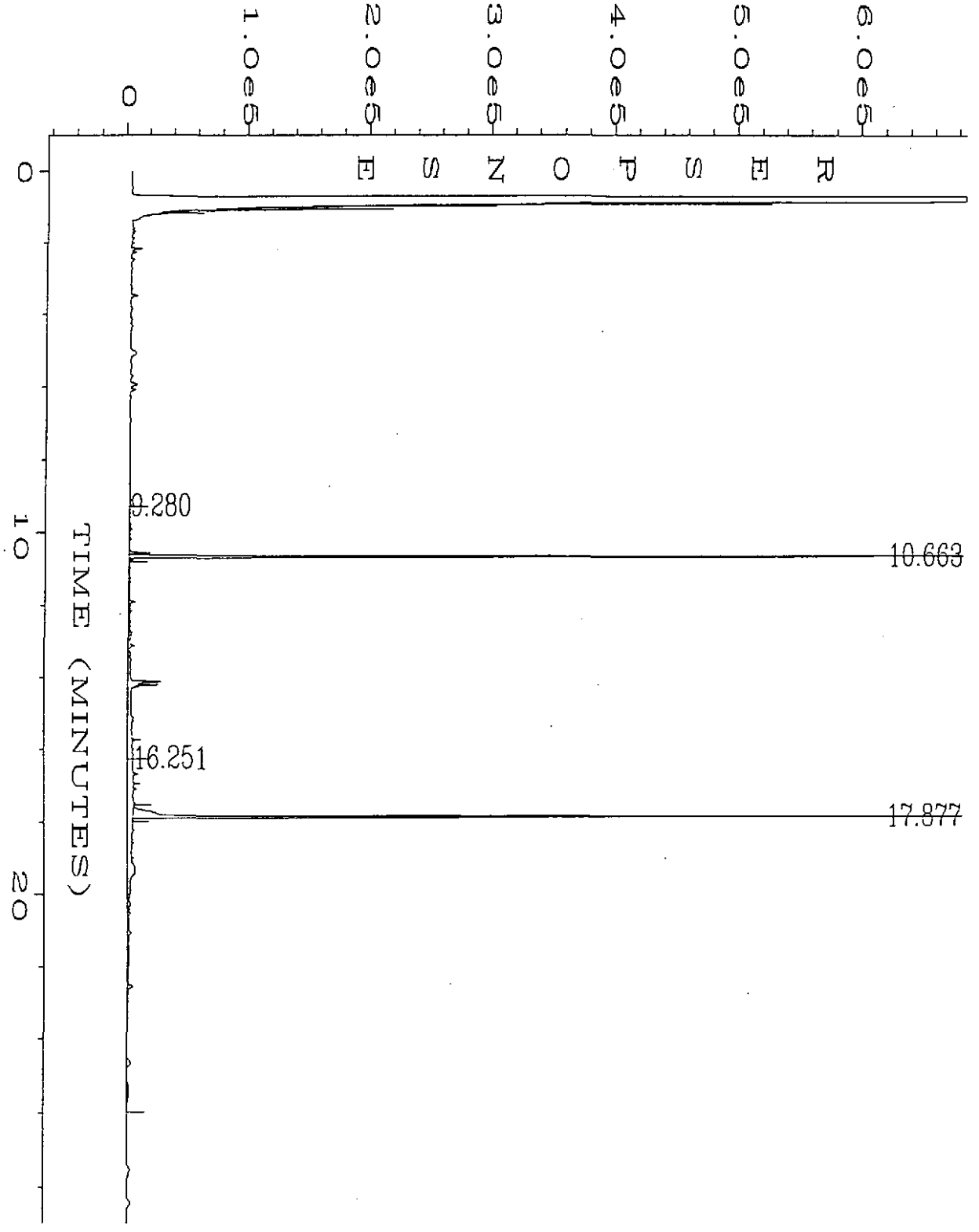
Data File Name : C:\HPCHEM\3\DATA\JUL02\057R1001.D
Operator : AD
Instrument : FUBAR
Sample Name : 606471-10 W
Run Time Bar Code:
Acquired on : 03 Jul 96 12:31 PM
Report Created on: 09 Jul 96 12:55 PM

Page Number : 1
Vial Number : 57
Injection Number : 1
Sequence Line : 10
Instrument Method: TPHE.MTH
Analysis Method : TPHE.MTH



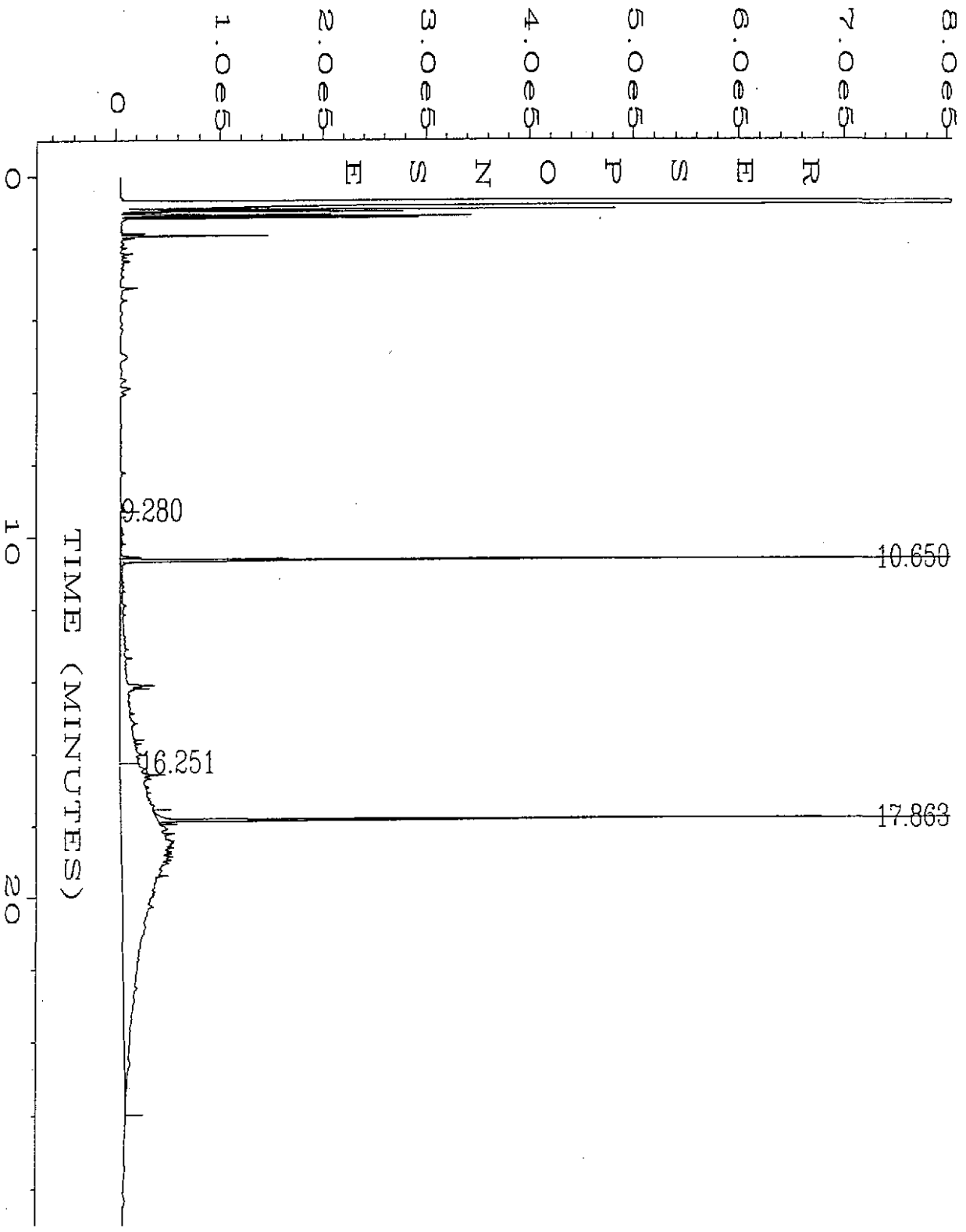
Data File Name : C:\HPCHEM\3\DATA\JUL02\058R1001.D
Operator : AD
Instrument : FUBAR
Sample Name : 606471-11 W
Run Time Bar Code:
Acquired on : 03 Jul 96 01:10 PM
Report Created on: 09 Jul 96 12:56 PM

Page Number : 1
Vial Number : 58
Injection Number : 1
Sequence Line : 10
Instrument Method: TPHD.MTH
Analysis Method : TPHE.MTH



Data File Name : C:\HPCHEM\3\DATA\JUL02\059R1001.D
Operator : AD
Instrument : FUBAR
Sample Name : 606471-12 W
Run Time Bar Code:
Acquired on : 03 Jul 96 01:48 PM
Report Created on: 09 Jul 96 12:56 PM

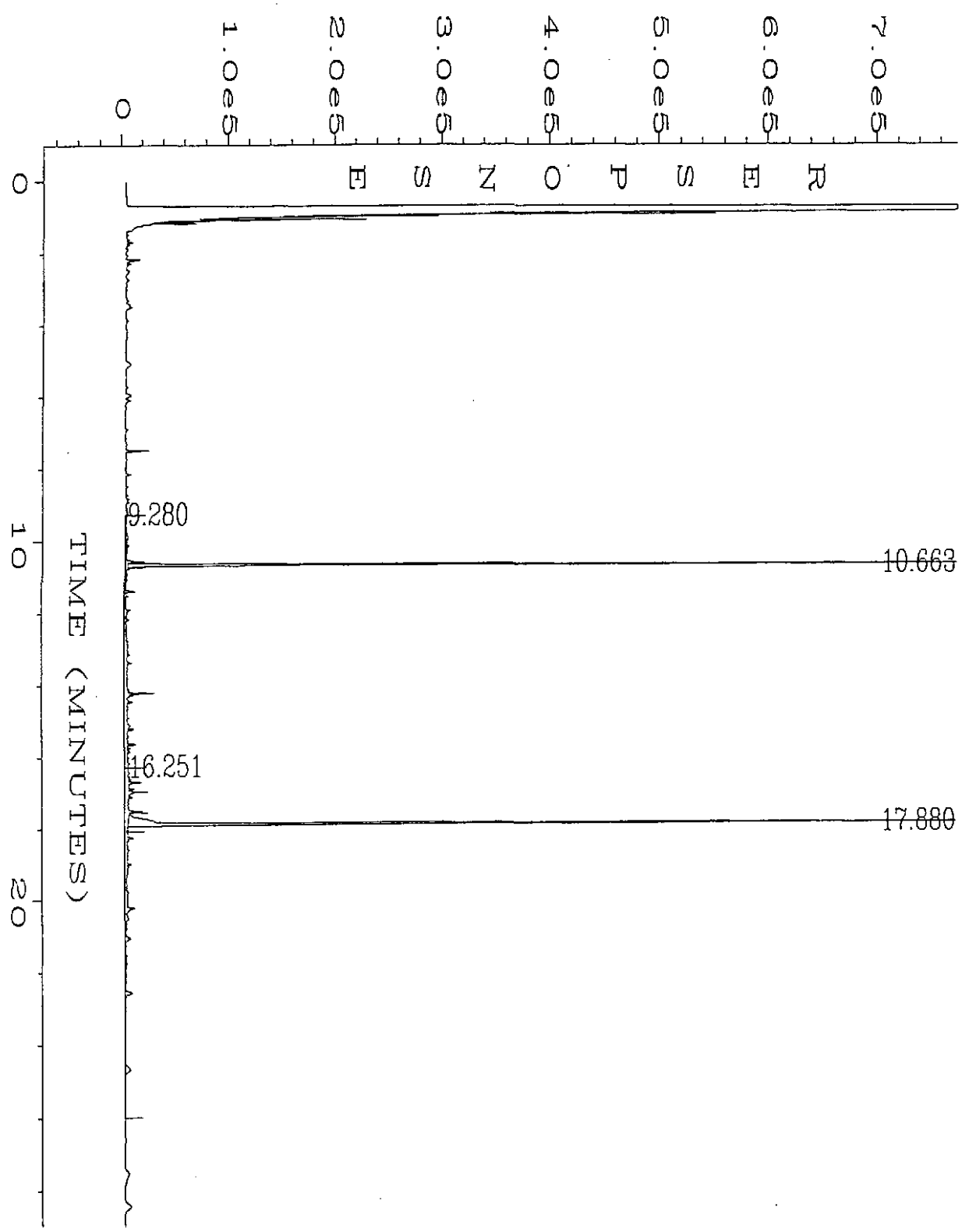
Page Number : 1
Vial Number : 59
Injection Number : 1
Sequence Line : 10
Instrument Method: TPHD.MTH
Analysis Method : TPHE.MTH



user modified

Data File Name : C:\HPCHEM\3\DATA\JUL09\052R0501.D
Operator : TF
Instrument : FUBAR
Sample Name : 606471-13 S
Run Time Bar Code:
Acquired on : 09 Jul 96 02:13 PM
Report Created on: 09 Jul 96 04:01 PM

Page Number : 1
Vial Number : 52
Injection Number : 1
Sequence Line : 5
Instrument Method: TPHD.MTH
Analysis Method : TPHE.MTH



Data File Name : C:\HPCHEM\3\DATA\JUL02\061R1001.D
Operator : AD
Instrument : FUBAR
Sample Name : 606471-14 W
Run Time Bar Code:
Acquired on : 03 Jul 96 03:07 PM
Report Created on: 09 Jul 96 12:58 PM

Page Number : 1
Vial Number : 61
Injection Number : 1
Sequence Line : 10
Instrument Method: TPHE.MTH
Analysis Method : TPHE.MTH

NORTH CREEK ANALYTICAL

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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: Unocal SS# 5353
Site Address: Westlake & Mercer
City, State, ZIP: Seattle
Site Release Number:
Unocal Manager: Dir. Mark Brearley
CERT INFO: (check one) o Evaluation ☒ Remediation
o Detection o Demolition o Closure o Miscellaneous

CONSULTANT INFORMATION

Firm: GeoEngineers Project Number: 9161-013-04
Address: 8410 154th
Redmond
Phone: 861-6000 Fax: 861-6050
Project Manager: Dan Wyll
Sample Collection by: Dan Wyll / Paul Craig

Chain of Custody Record #: B606471

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
1. MW-3	0900 6/25/96	W	3				X		X										B606471-01
2. MW-4	0915						X		X										-02
3. MW-32A	0930						X		X										-03
4. MW-33	0945						X		X										-04
5. MW-34	0500						X		X										-05
6. MW-35	~~0954~~ 0795						X		X										-06
7. MW-36	0515						X		X										-07
8. MW-40	0600 ~~0535~~						X		X										-08
9. MW-41	0615 ~~0545~~						X		X										-09
10. MW-42	0630 0620						X		X										-10

Relinquished by:	Firm:	Date & Time	Received by:	Firm:	Date & Time
1. [signature]	GEI	6/26/96 0500	RD Kelley	NCA	6/26/96 1330
2.					
3.					

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

Page 1 of 2

Comments:

Rev. [illegible]/94

Distribution: White - Laboratory Yellow - Consultant Photocopy - Unocal

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East 11115 Montgomery, Suite B, Spokane, WA 99206-4779 (509) 924-9200 FAX 924-9290
9405 S.W. Nimbus Avenue, Beaverton, OR 97008-7132 (503) 643-9200 FAX 644-2202

UNOCAL CHAIN OF CUSTODY REPORT

UNOCAL INFORMATION

Facility Number: SS # 8535
Site Address: Crestline & Narrow
City, State, ZIP: Ren WA
Site Release Number:
Unocal Manager: Dr. Mark Bradley
CERT INFO: (check one) o Evaluation x Remediation
o Detection o Demolition o Closure o Miscellaneous

CONSULTANT INFORMATION

Firm: GeoEngineers Project Number: 9161-013-04
Address: Redmond
Phone: 861-6000 Fax: 861-6052
Project Manager: Donwyll
Sample Collection by: Don Cyll / Paul Craig

Chain of Custody Record #: B606471

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-ACID	TPH-Gas	BTEX (EPA 8020 Mod.)	TPH-Gas + BTEX	TPH-Diesel	TPH-Diesel Extended	TPH-418.1	Halogen. Volatiles (EPA 8010)	Aromatic Volatiles (EPA 8020)	Pesticides/PCBs or PCBs Only	GC/MS Volatiles (EPA 8240/8260)	GC/MS SemiVols. (EPA 8270)	PAHs by HPLC (EPA 8310)	Lead: Total or Dissolved	TCLP Metals (8)	NCA SAMPLE NUMBER
1. MW-43	0645	W	3				X		X										B606471-11
2. MW-44	0700						X		X										-12
3. MW-46	0715						X		X										-13
4. MW-47	0730						X		X										-14
5.																			
6.																			
7.																			
8.																			
9.																			
10.																			

Relinquished by:	Firm:	Date & Time	Received by:	Firm:	Date & Time
1. Don Cyll	GeoEng	6/26/96 0900	RB Kelley	NCA	6/26/96 1330
2.					
3.					

Final Report Approval
Were all requested results provided? yes no Define "No" on back
Were results within requested turnaround? yes no
Final Approval Signature:
Firm: Date:

Page 2 of 2

Comments:

Rev. 2.2, 11/94

Distribution: White - Laboratory Yellow - Consultant Photocopy - Unocal

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

GeoEngineers, Inc.	Project Name:	UNOCAL Seattle, #5353	
8410 154th Avenue N.E.	Client Project :	#9161-013-04	
Redmond, WA 98052			Received: Apr 2, 1996
Attention: Don Wyll	NCA Project #:	B604032	Reported: Apr 9, 1996

PROJECT SUMMARY PAGE

GeoEngineers

APR 10 1996

Routing

File

Laboratory Sample Number	Sample Description	Sample Matrix	Date Sampled
B604032-01	SMW-3	Water	4/1/96
B604032-02	SMW-4	Water	4/1/96
B604032-03	MW-32A	Water	4/1/96
B604032-04	MW-33	Water	4/1/96
B604032-05	MW-34	Water	4/1/96
B604032-06	MW-36	Water	4/1/96
B604032-07	MW-40	Water	4/1/96
B604032-08	MW-41	Water	4/1/96
B604032-09	MW-42	Water	4/1/96
B604032-10	MW-43	Water	4/1/96
B604032-11	MW-44	Water	4/1/96

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

NORTH CREEK ANALYTICAL Inc.

Laura Dutton

Laura Dutton
Project Manager

NORTH CREEK ANALYTICAL
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GeoEngineers, Inc.	Project Name:	UNOCAL Seattle, #5353		
8410 154th Avenue N.E.	Client Project :	#9161-013-04		
Redmond, WA 98052			Received:	Apr 2, 19
Attention: Don Wyll	NCA Project #:	B604032	Reported:	Apr 9, 19

PROJECT SUMMARY PAGE

Laboratory Sample Number	Sample Description	Sample Matrix	Date Sampled
B604032-12	MW-46	Water	4/1/96
B604032-13	MW-47	Water	4/1/96

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

NORTH CREEK ANALYTICAL Inc.

Laura Dutton

Laura Dutton
Project Manager

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

GeoEngineers, Inc.	Client Project ID:	UNOCAL Seattle, #5353	Sampled:	Apr 1, 1996
8410 154th Avenue N.E.	Sample Matrix:	Water	Received:	Apr 2, 1996
Redmond, WA 98052	Analysis Method:	WTPH-G	Analyzed:	Apr 3, 1996
Attention: Don Wyll	First Sample #:	B604032-01	Reported:	Apr 9, 1996

TOTAL PETROLEUM HYDROCARBONS-GASOLINE RANGE

Sample Number	Sample Description	Sample Result µg/L (ppb)	Surrogate Recovery %
B604032-01	SMW-3	34,000	94
B604032-02	SMW-4	N.D.	79
B604032-03	MW-32A	7,900	99
B604032-04	MW-33	5,200	116
B604032-05	MW-34	10,000	89
B604032-06	MW-36	N.D.	82
B604032-07	MW-40	520	S-2
B604032-08	MW-41	N.D.	78
B604032-09	MW-42	180	93
B604032-10	MW-43	N.D.	83

Reporting Limit:	**50**

4-Bromofluorobenzene surrogate recovery control limits are 50 - 150 %.
Volatile Total Petroleum Hydrocarbons are quantitated as Gasoline Range Organics (toluene - dodecane).
Analytes reported as N.D. were not detected above the stated Reporting Limit.

NORTH CREEK ANALYTICAL Inc.

Laura Dutton
Project Manager

Please Note:
S-2 = The Surrogate Recovery for this sample cannot be accurately quantified due to interference from coeluting organic compounds present in the sample.

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

GeoEngineers, Inc.	Client Project ID:	UNOCAL Seattle, #5353	Sampled:	Apr 1, 199
8410 154th Avenue N.E.	Sample Matrix:	Water	Received:	Apr 2, 1996
Redmond, WA 98052	Analysis Method:	WTPH-G	Analyzed:	Apr 3, 1996
Attention: Don Wyll	First Sample #:	B604032-11	Reported:	Apr 9, 199

TOTAL PETROLEUM HYDROCARBONS-GASOLINE RANGE

Sample Number	Sample Description	Sample Result µg/L (ppb)	Surrogate Recovery %
B604032-11	MW-44	N.D.	79
B604032-12	MW-46	N.D.	72
B604032-13	MW-47	N.D.	82
BLK040396	Method Blank	N.D.	78

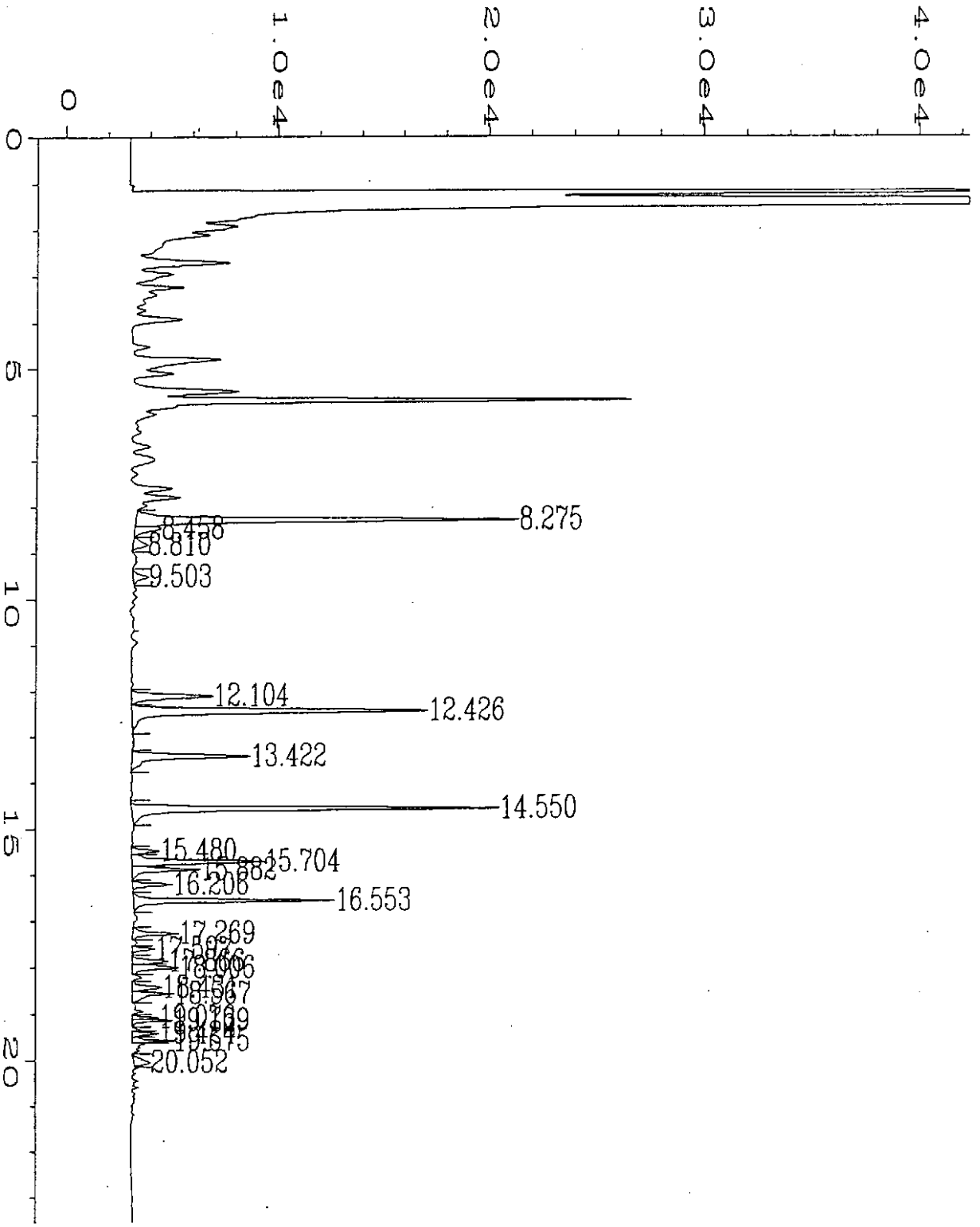
Reporting Limit:	50

4-Bromofluorobenzene surrogate recovery control limits are 50 - 150 %.
Volatile Total Petroleum Hydrocarbons are quantitated as Gasoline Range Organics (toluene - dodecane).
Analytes reported as N.D. were not detected above the stated Reporting Limit.

NORTH CREEK ANALYTICAL Inc.

Laura Dutton

Laura Dutton
Project Manager



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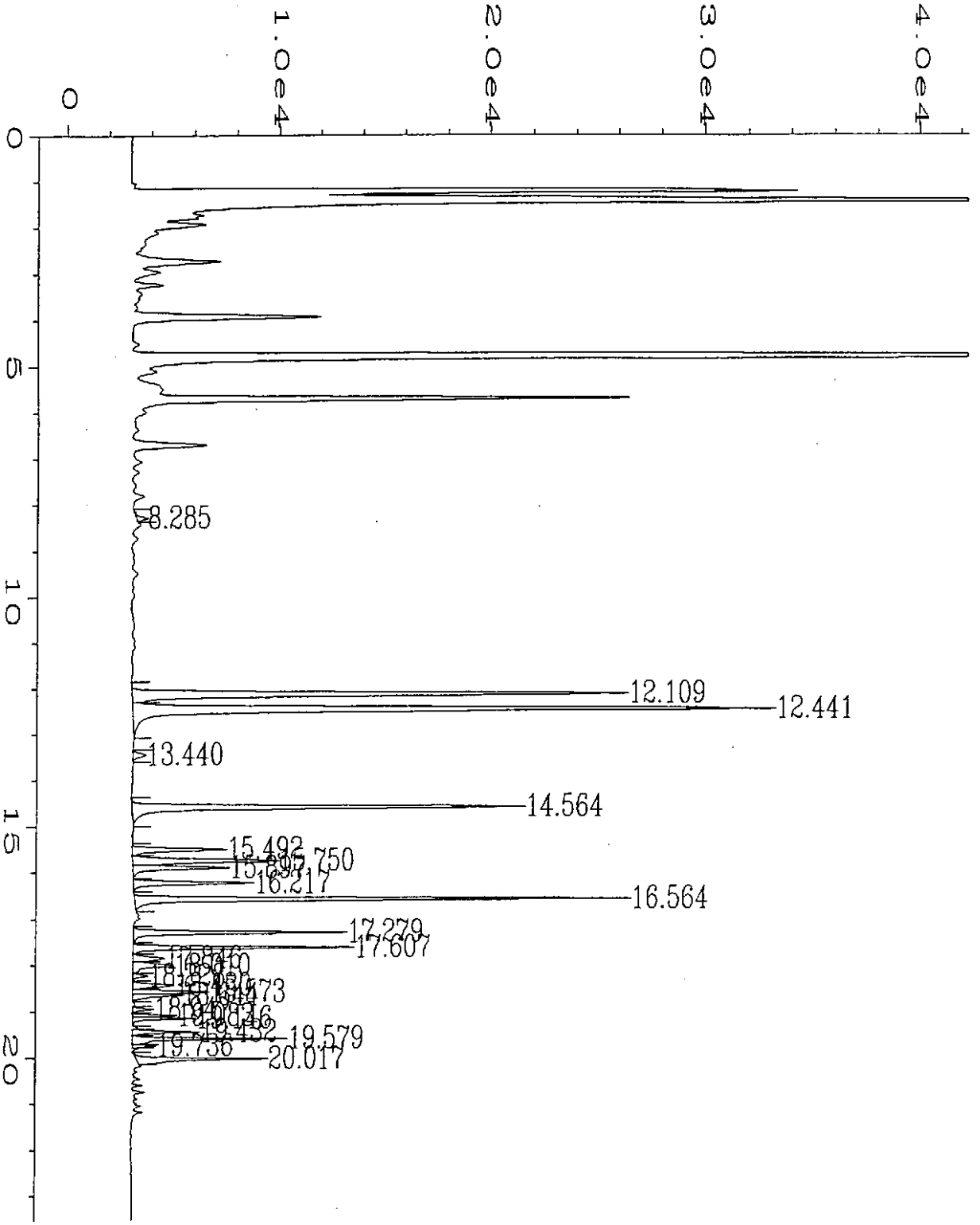
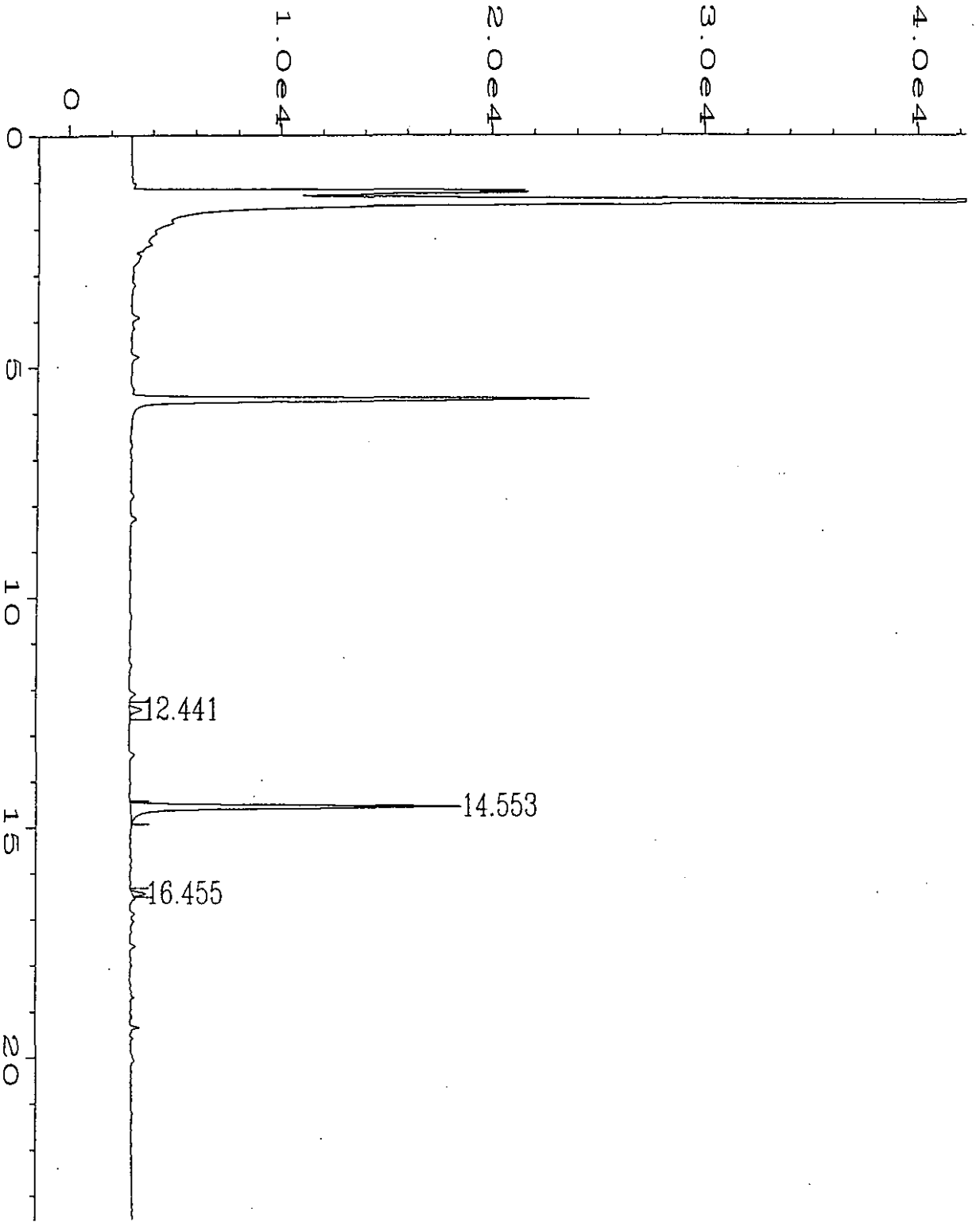
Operator	:	Page Number	: 1
Instrument	: GC#8	Vial Number	: 2
Sample Name	: gas std	Injection Number	: 1
Run Time Bar Code:		Sequence Line	: 1
Acquired on	: 03 Apr 96 07:36 AM	Instrument Method	: WA-WATER.MTH
Report Created on:	03 Apr 96 08:00 AM	Analysis Method	: WA-WATER.MTH
Sample Info	: 500 ng V-3p		



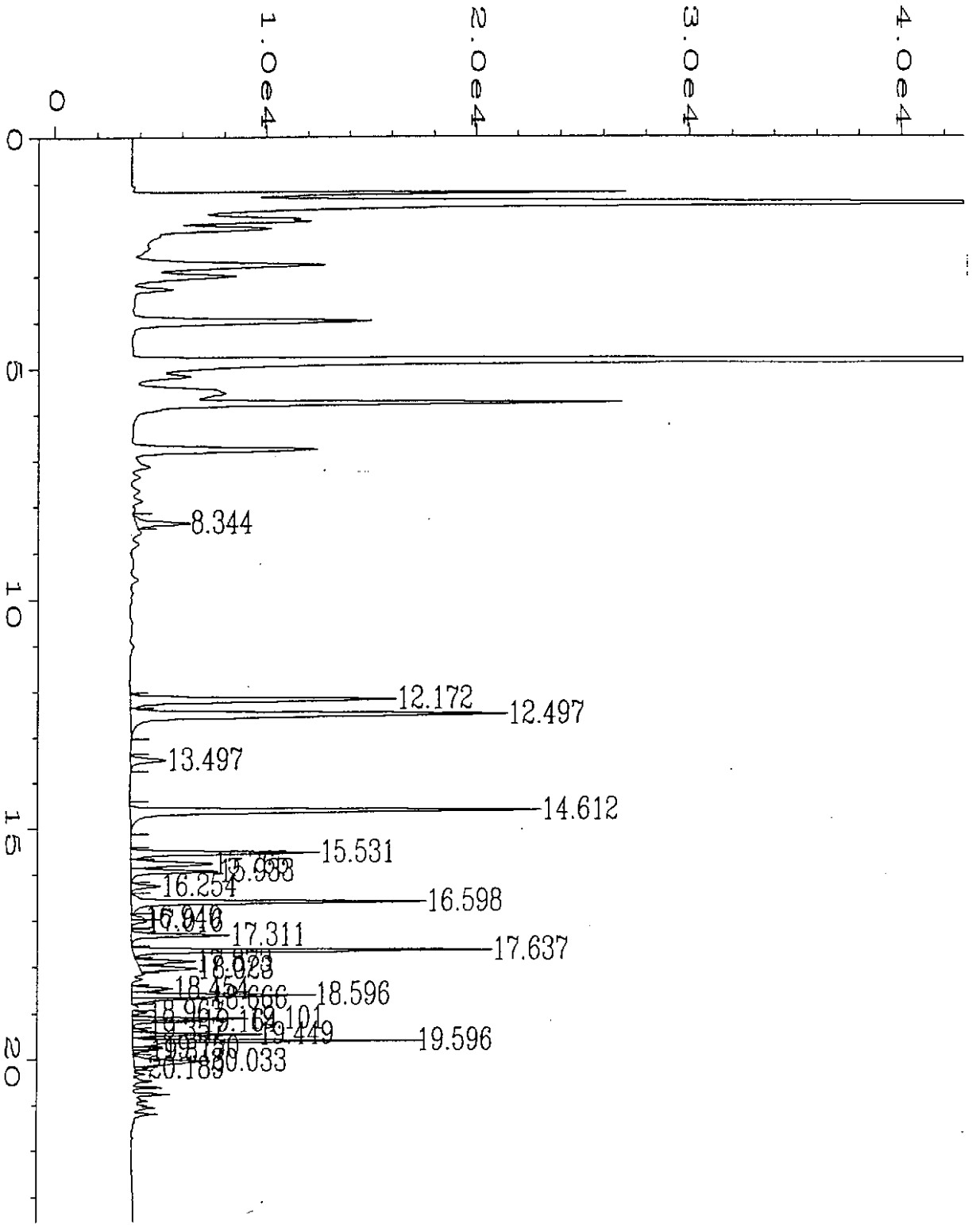
Data File Name : C:\HPCHEM\1\DATA\040396\008F0101.D
Operator :
Instrument : GC#8
Sample Name : b604032-01
Run Time Bar Code:
Acquired on : 03 Apr 96 10:37 AM
Report Created on: 03 Apr 96 11:01 AM
Multiplier : 200
Sample Info : 25 ul

Page Number : 1
Vial Number : 8
Injection Number : 1
Sequence Line : 1
Instrument Method: WA-WATER.MTH
Analysis Method : WA-WATER.MTH



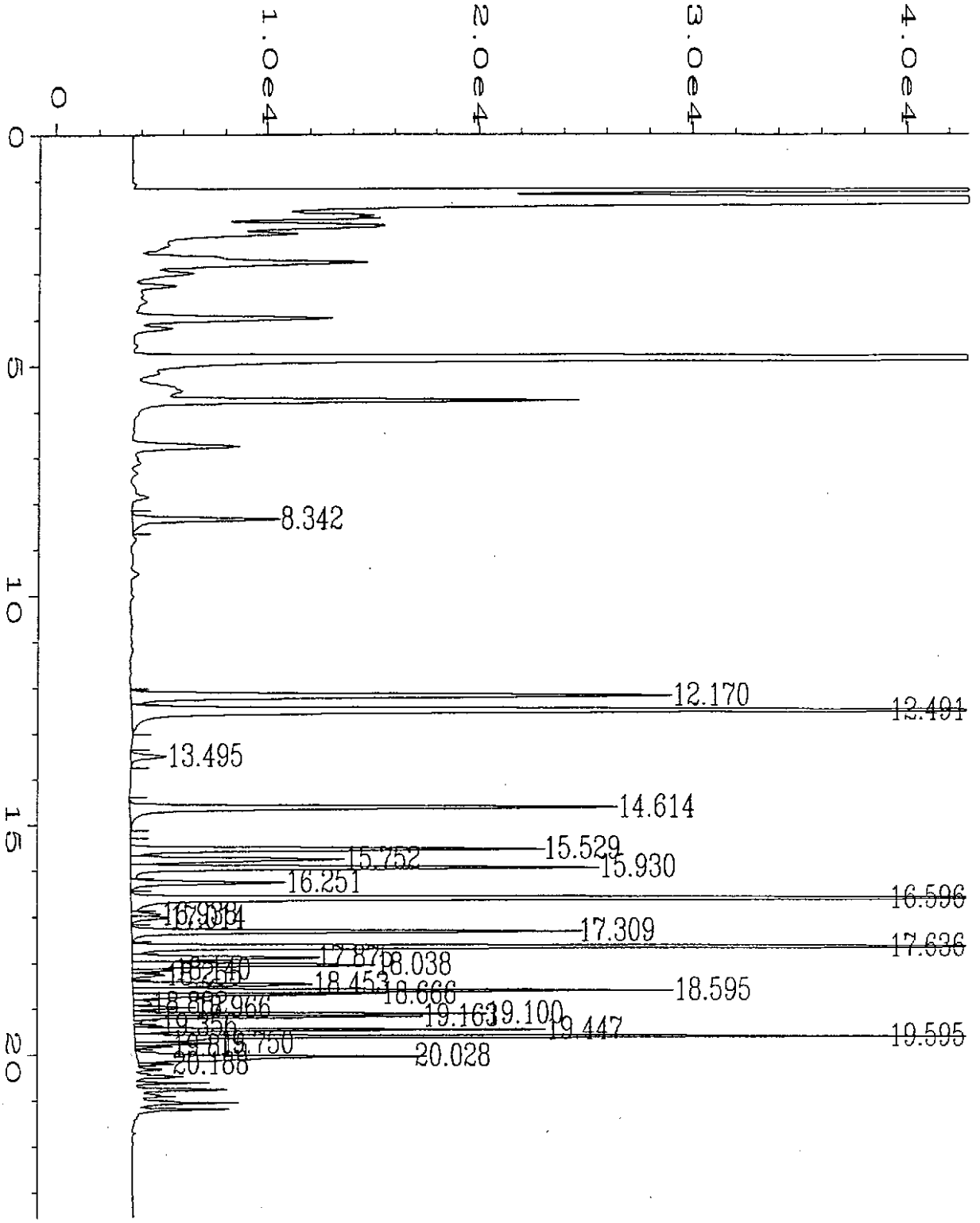
Data File Name : C:\HPCHEM\1\DATA\040396\013F0101.D
Operator :
Instrument : GC#8
Sample Name : b604032-02
Run Time Bar Code:
Acquired on : 03 Apr 96 01:09 PM
Report Created on: 03 Apr 96 01:33 PM
Sample Info : 5 ml

Page Number : 1
Vial Number : 13
Injection Number : 1
Sequence Line : 1
Instrument Method: WA-WATER.MTH
Analysis Method : WA-WATER.MTH



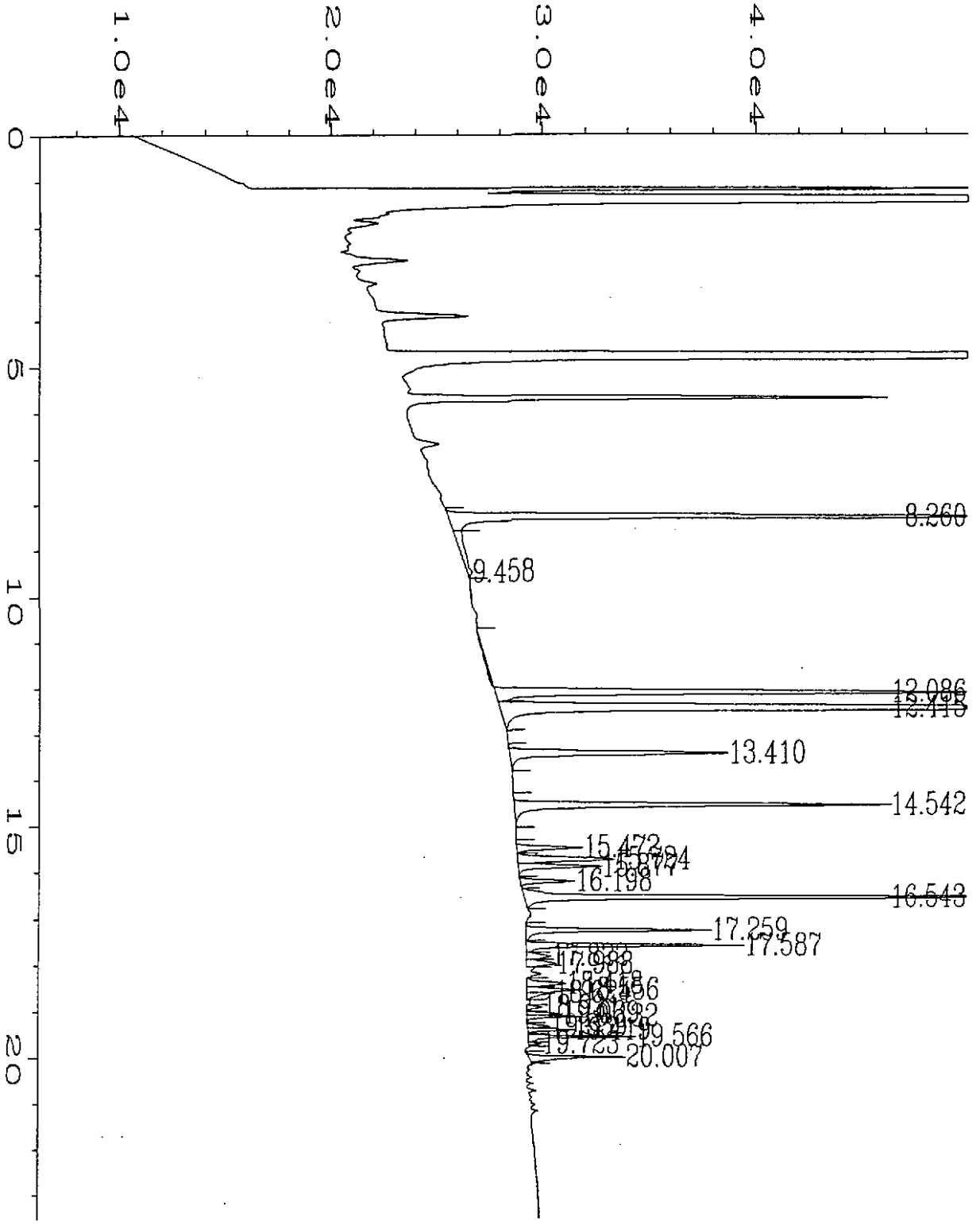
Data File Name : C:\HPCHEM\1\DATA\040396\041F0101.D
Operator :
Instrument : GC#8
Sample Name : b604032-03 r1
Run Time Bar Code:
Acquired on : 04 Apr 96 03:12 AM
Report Created on: 04 Apr 96 03:36 AM
Multiplier : 50
Sample Info : 100 ul

Page Number : 1
Vial Number : 41
Injection Number : 1
Sequence Line : 1
Instrument Method: WA-WATER.MTH
Analysis Method : WA-WATER.MTH



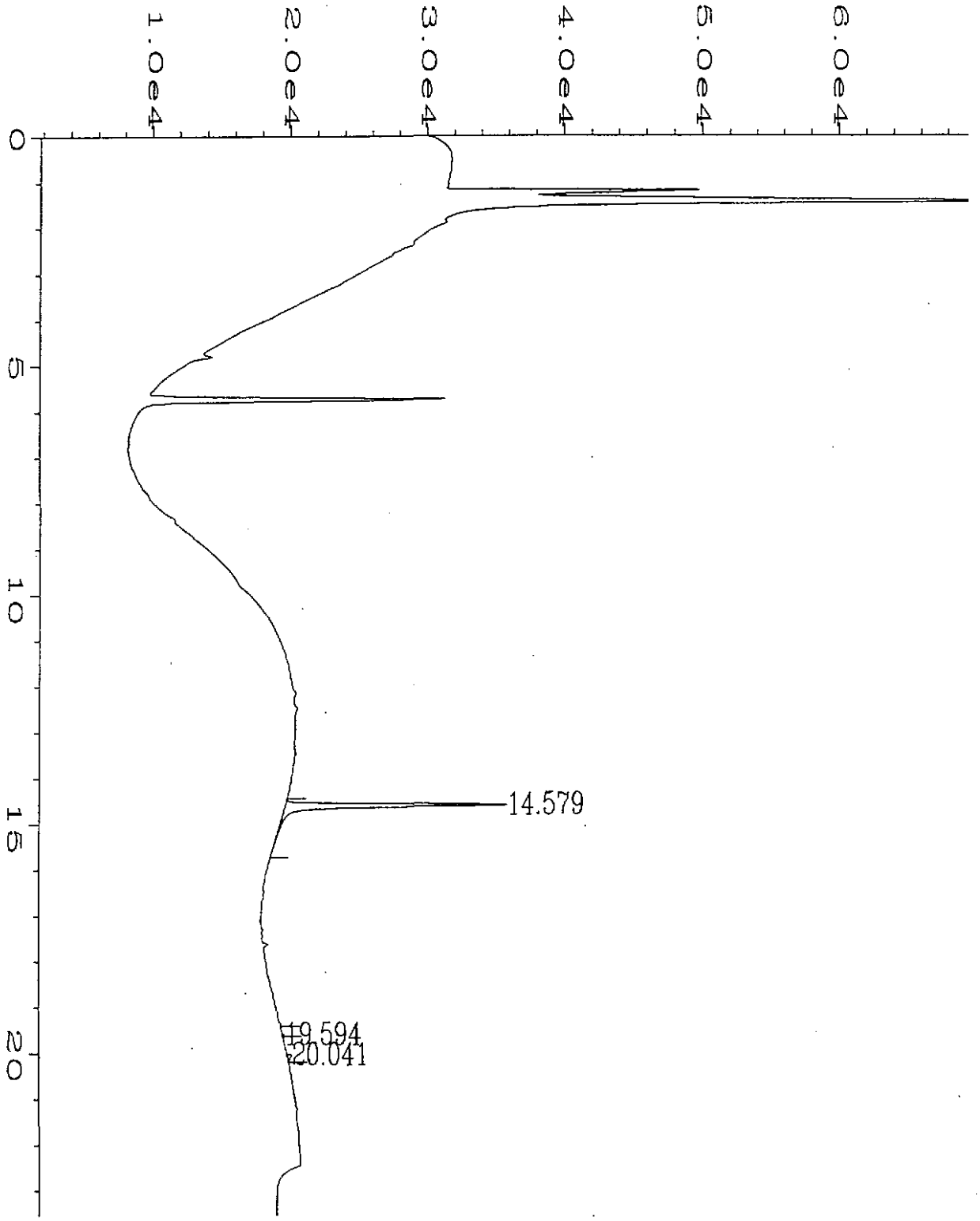
Data File Name : C:\HPCHEM\1\DATA\040396\042F0101.D
Operator :
Instrument : GC#8
Sample Name : b604032-04 r1
Run Time Bar Code:
Acquired on : 04 Apr 96 03:43 AM
Report Created on: 04 Apr 96 04:06 AM
Multiplier : 10
Sample Info : 500 ul

Page Number : 1
Vial Number : 42
Injection Number : 1
Sequence Line : 1
Instrument Method: WA-WATER.MTH
Analysis Method : WA-WATER.MTH



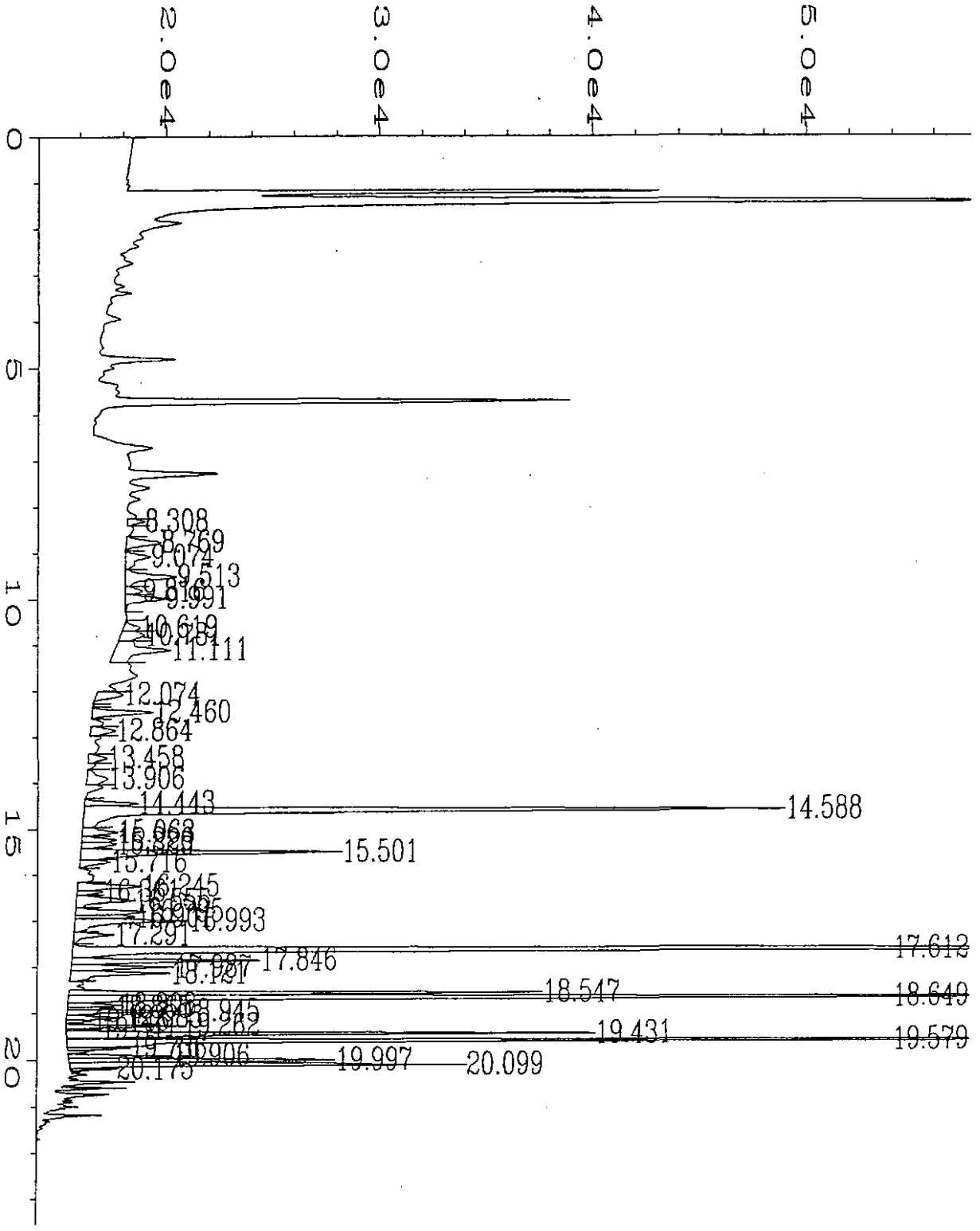
Data File Name : C:\HPCHEM\1\DATA\040396\019F0101.D
Operator :
Instrument : GC#8
Sample Name : b604032-05
Run Time Bar Code:
Acquired on : 03 Apr 96 04:09 PM
Report Created on: 03 Apr 96 04:32 PM
Multiplier : 50
Sample Info : 100 ul

Page Number : 1
Vial Number : 19
Injection Number : 1
Sequence Line : 1
Instrument Method: WA-WATER.MTH
Analysis Method : WA-WATER.MTH



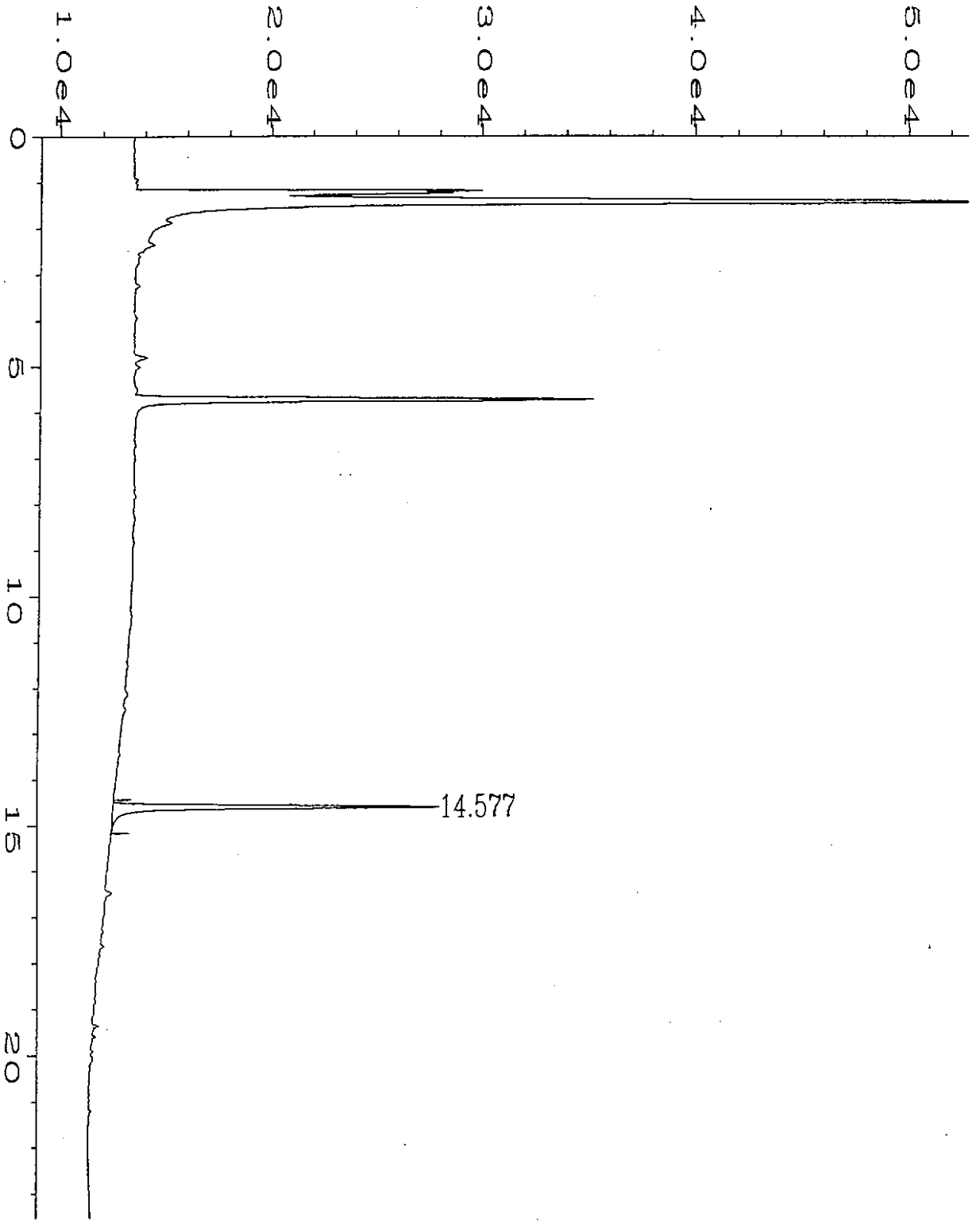
Data File Name : C:\HPCHEM\1\DATA\040396\020F0101.D
Operator :
Instrument : GC#8
Sample Name : b604032-06
Run Time Bar Code:
Acquired on : 03 Apr 96 04:39 PM
Report Created on: 03 Apr 96 08:04 PM

Page Number : 1
Vial Number : 20
Injection Number : 1
Sequence Line : 1
Instrument Method: WA-WATER.MTH
Analysis Method : WA-WATER.MTH



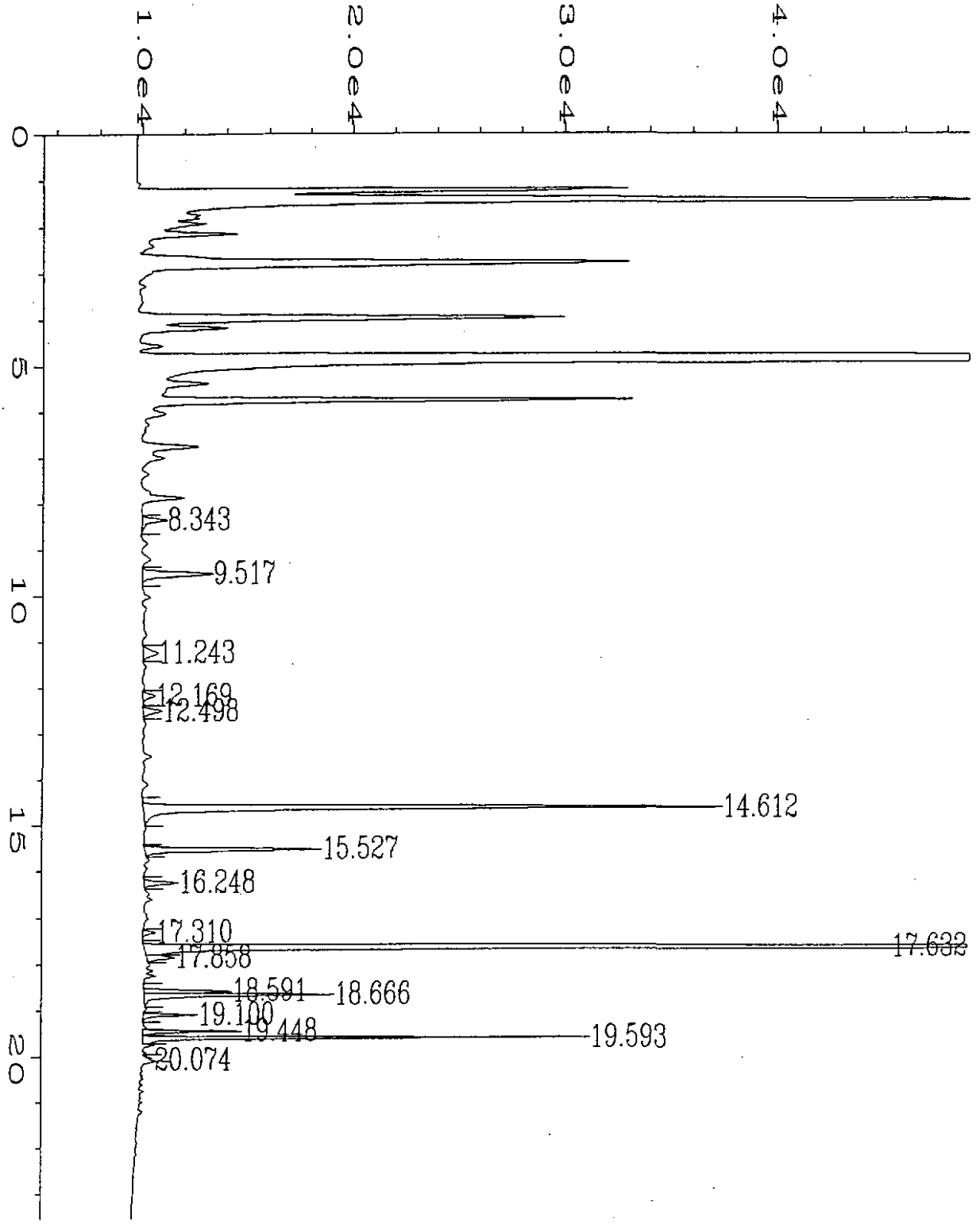
Data File Name : C:\HPCHEM\1\DATA\040396\021F0101.D
Operator :
Instrument : GC#8
Sample Name : b604032-07
Run Time Bar Code:
Acquired on : 03 Apr 96 05:09 PM
Report Created on: 03 Apr 96 05:33 PM
Sample Info : 5 ml

Page Number : 1
Vial Number : 21
Injection Number : 1
Sequence Line : 1
Instrument Method: WA-WATER.MTH
Analysis Method : WA-WATER.MTH



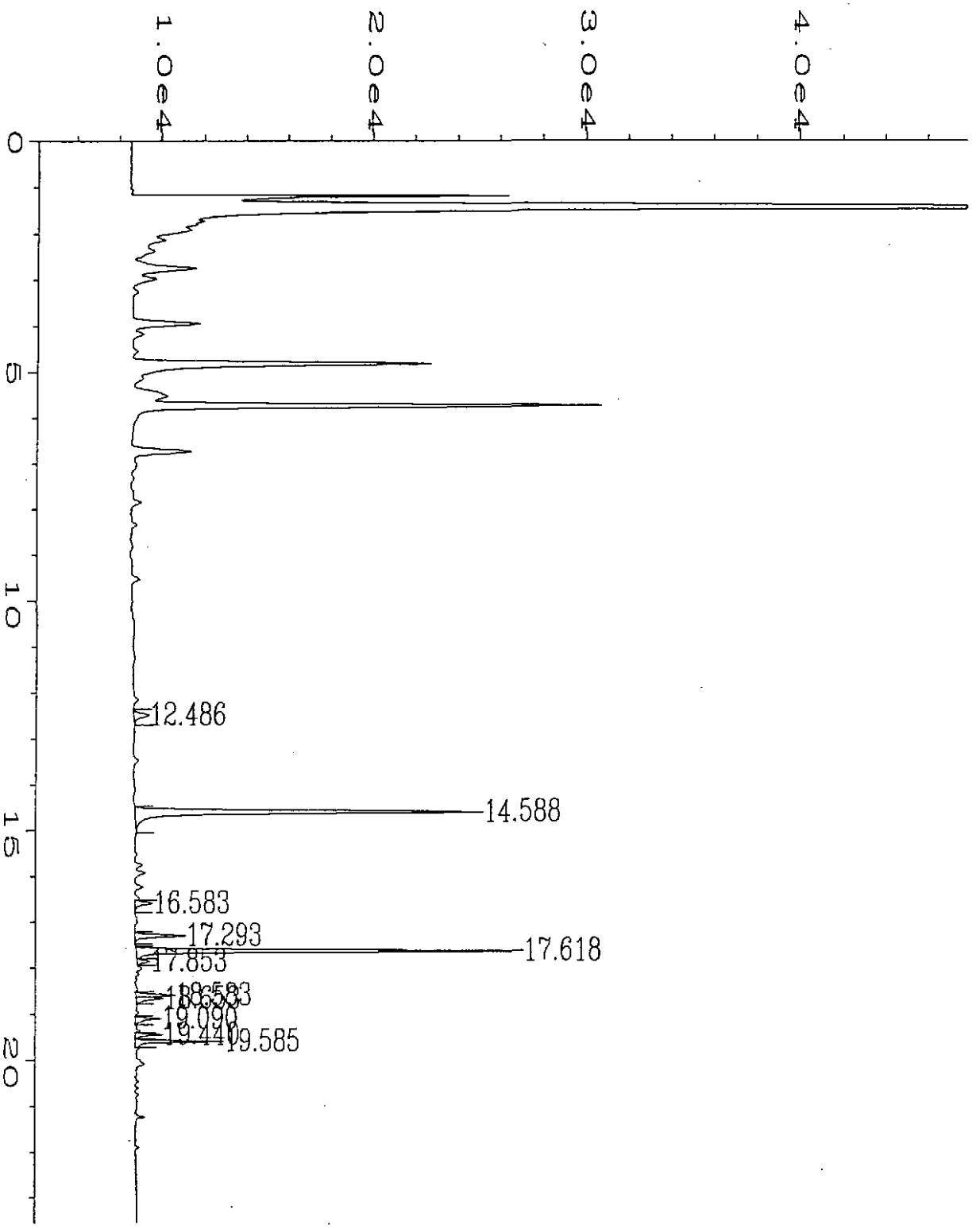
Data File Name : C:\HPCHEM\1\DATA\040396\022F0101.D
Operator :
Instrument : GC#8
Sample Name : b604032-08
Run Time Bar Code:
Acquired on : 03 Apr 96 05:40 PM
Report Created on: 03 Apr 96 06:03 PM
Sample Info : 5 ml

Page Number : 1
Vial Number : 22
Injection Number : 1
Sequence Line : 1
Instrument Method: WA-WATER.MTH
Analysis Method : WA-WATER.MTH

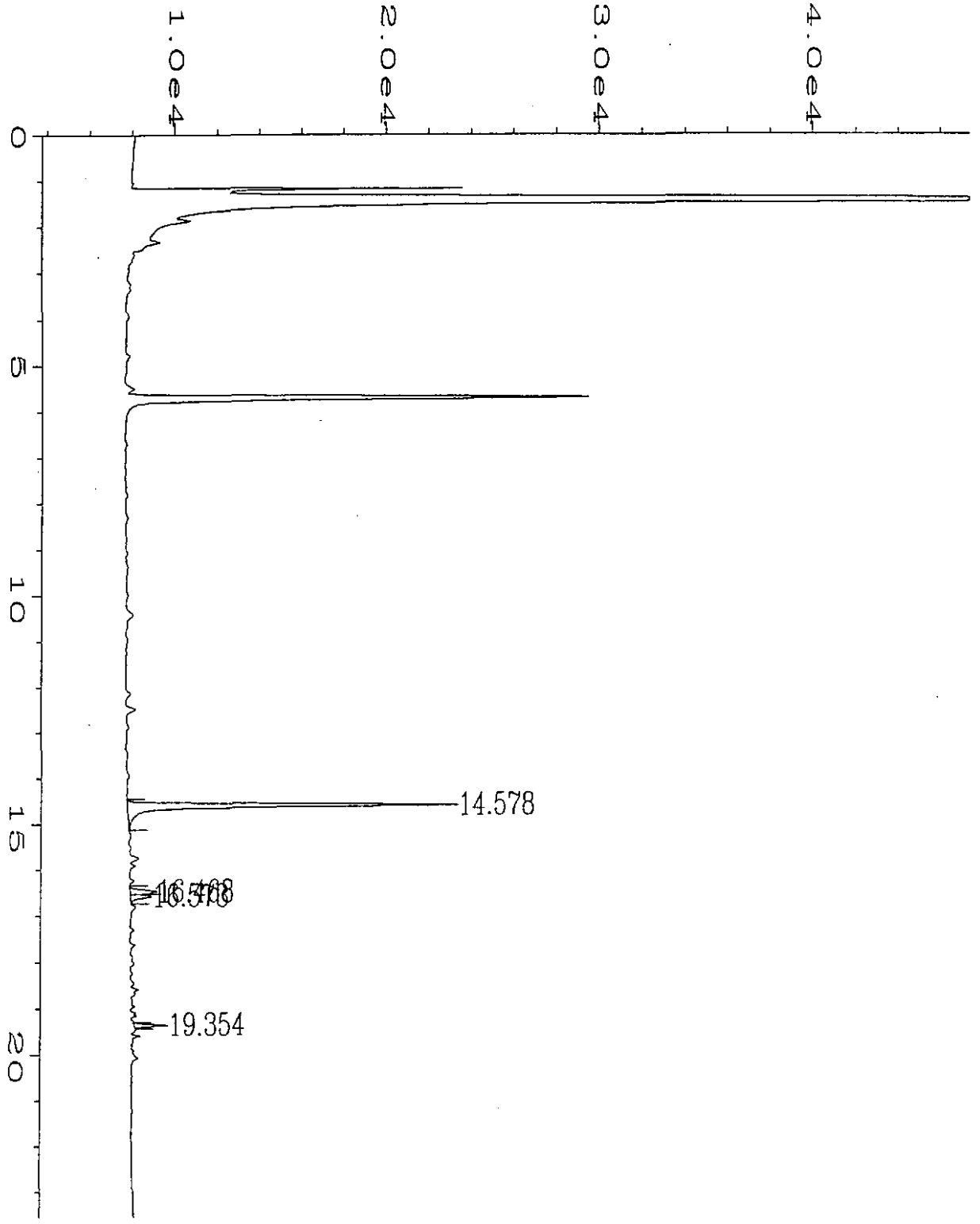


Data File Name : C:\HPCHEM\1\DATA\040396\024F0101.D
Operator :
Instrument : GC#8
Sample Name : b604032-09
Run Time Bar Code:
Acquired on : 03 Apr 96 06:40 PM
Report Created on: 03 Apr 96 07:04 PM
Sample Info : 5 ml

Page Number : 1
Vial Number : 24
Injection Number : 1
Sequence Line : 1
Instrument Method: WA-WATER.MTH
Analysis Method : WA-WATER.MTH

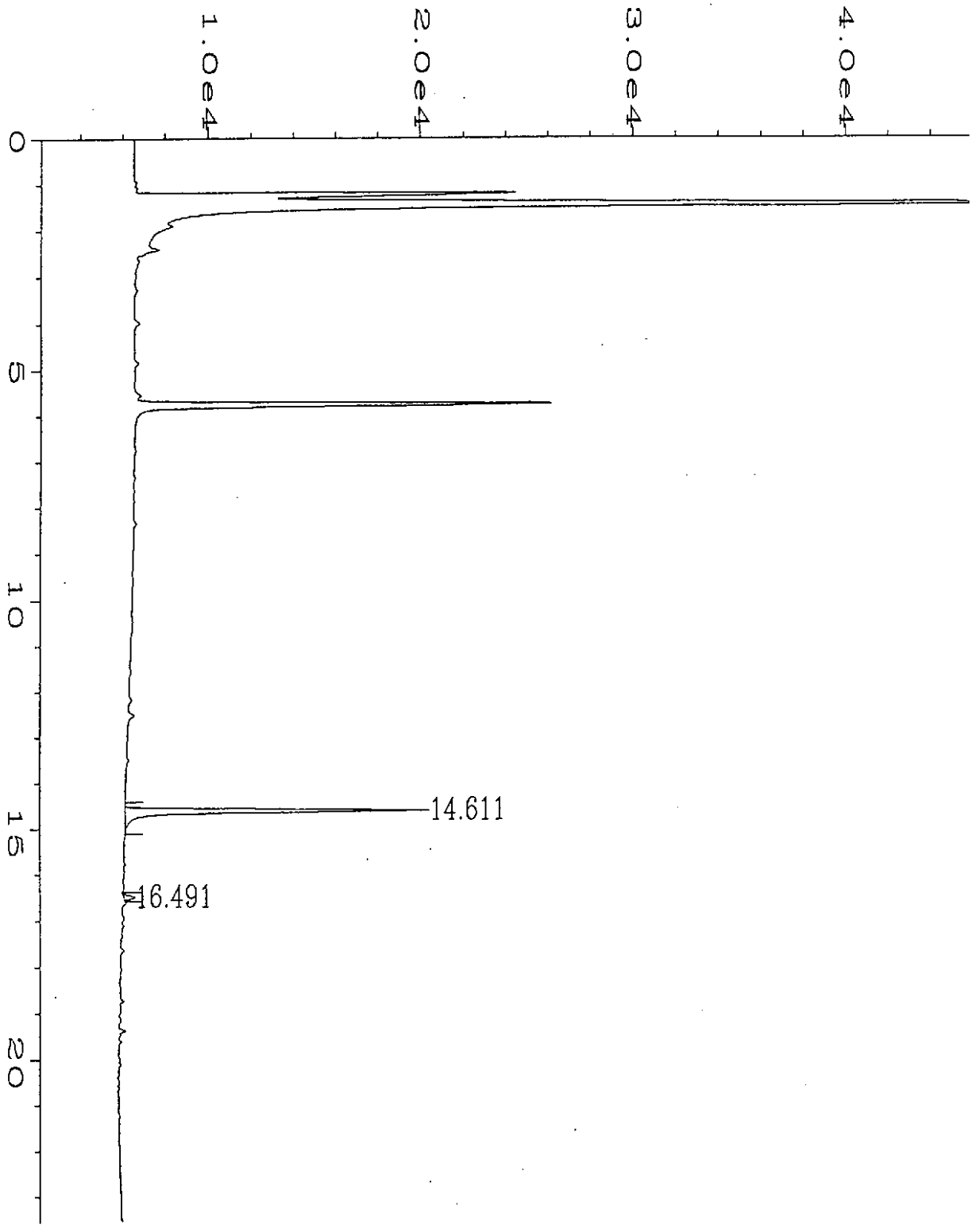


Data File Name	: C:\HPCHEM\1\DATA\040396\025F0101.D		
Operator	:	Page Number	: 1
Instrument	: GC#8	Vial Number	: 25
Sample Name	: b604032-10	Injection Number	: 1
Run Time Bar Code:		Sequence Line	: 1
Acquired on	: 03 Apr 96 07:10 PM	Instrument Method:	WA-WATER.MTH
Report Created on:	03 Apr 96 07:34 PM	Analysis Method	: WA-WATER.MTH
Sample Info	: 5 ml		



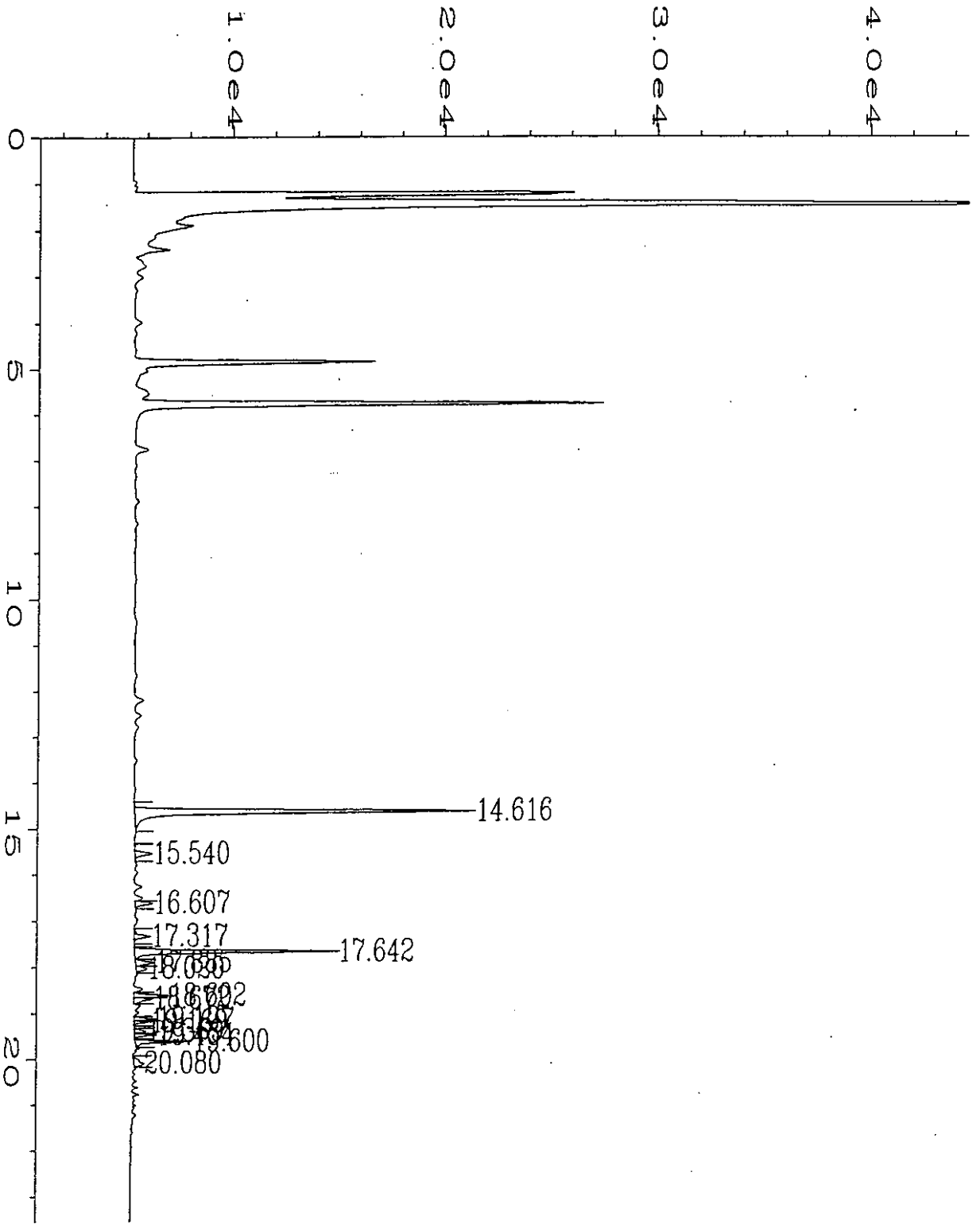
Data File Name : C:\HPCHEM\1\DATA\040396\026F0101.D
Operator :
Instrument : GC#8
Sample Name : b604032-11
Run Time Bar Code:
Acquired on : 03 Apr 96 07:40 PM
Report Created on: 03 Apr 96 08:04 PM
Sample Info : 5 ml

Page Number : 1
Vial Number : 26
Injection Number : 1
Sequence Line : 1
Instrument Method: WA-WATER.MTH
Analysis Method : WA-WATER.MTH



Data File Name : C:\HPCHEM\1\DATA\040396\029F0101.D
Operator :
Instrument : GC#8
Sample Name : b604032-12
Run Time Bar Code:
Acquired on : 03 Apr 96 09:11 PM
Report Created on: 03 Apr 96 09:35 PM
Sample Info : 5 ml

Page Number : 1
Vial Number : 29
Injection Number : 1
Sequence Line : 1
Instrument Method: WA-WATER.MTH
Analysis Method : WA-WATER.MTH



Data File Name : C:\HPCHEM\1\DATA\040396\031F0101.D
Operator :
Instrument : GC#8
Sample Name : b604032-13
Run Time Bar Code:
Acquired on : 03 Apr 96 10:12 PM
Report Created on: 03 Apr 96 10:35 PM
Sample Info : 5 ml

Page Number : 1
Vial Number : 31
Injection Number : 1
Sequence Line : 1
Instrument Method: WA-WATER.MTH
Analysis Method : WA-WATER.MTH

NORTH CREEK ANALYTICAL
Environmental Laboratory Services

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

GeoEngineers, Inc.
8410 154th Avenue N.E.
Redmond, WA 98052
Attention: Don Wyll

Client Project ID: UNOCAL Seattle, #5353
Sample Matrix: Water
Analysis Method: WTPH-G
Units: µg/L (ppb)

Analyzed: Apr 3, 1996
Reported: Apr 9, 1996

HYDROCARBON QUALITY CONTROL DATA REPORT

ACCURACY ASSESSMENT
Laboratory Control Sample

	Gasoline
Spike Conc. Added:	100
Spike Result:	90
% Recovery:	90
Upper Control Limit %:	132
Lower Control Limit %:	56

PRECISION ASSESSMENT
Sample Duplicate

	Gasoline Range Organics	Gasoline Range Organics
Sample Number:	B604032-01	B604032-11
Original Result:	34,000	N.D.
Duplicate Result:	35,000	N.D.
Relative % Difference:	2.9	Q-5
Maximum RPD:	50	50

Q-5 = RPD values are not reported at sample concentration levels <10 X the Reporting Limit.

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Laura Dutton
Project Manager

% Recovery: $\frac{\text{Spike Result}}{\text{Spike Concentration Added}} \times 100$

Relative % Difference: $\frac{\text{Original Result - Duplicate Result}}{(\text{Original Result + Duplicate Result}) / 2} \times 100$

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

GeoEngineers, Inc.	Client Project ID:	UNOCAL Seattle, #5353	Sampled:	Apr 1, 19
8410 154th Avenue N.E.	Sample Matrix:	Water	Received:	Apr 2, 1996
Redmond, WA 98052	Analysis Method:	EPA 8020	Analyzed:	Apr 3, 1996
Attention: Don Wyll	First Sample #:	B604032-01	Reported:	Apr 9, 19

BTEX DISTINCTION

Sample Number	Sample Description	Benzene µg/L (ppb)	Toluene µg/L (ppb)	Ethyl Benzene µg/L (ppb)	Xylenes µg/L (ppb)	Surrogate Recovery %
B604032-01	SMW-3	6,400	42	2,100	3,000	88
B604032-02	SMW-4	N.D.	N.D.	N.D.	N.D.	80
B604032-03	MW-32A	2,200	58	300	490	90
B604032-04	MW-33	630	33	130	270	104
B604032-05	MW-34	5,500	580	520	1,200	84
B604032-06	MW-36	N.D.	N.D.	N.D.	N.D.	79
B604032-07	MW-40	1.2	N.D.	0.55	N.D.	117
B604032-08	MW-41	N.D.	N.D.	N.D.	N.D.	82
B604032-09	MW-42	280	0.52	N.D.	N.D.	103
B604032-10	MW-43	4.5	N.D.	N.D.	N.D.	85
Reporting Limits:		**0.50**	**0.50**	**0.50**	**1.0**	

4-Bromofluorobenzene surrogate recovery control limits are 59 - 144 %.
Analytes reported as N.D. were not detected above the stated Reporting Limit.

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Laura Dutton

Laura Dutton
Project Manager

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

GeoEngineers, Inc.	Client Project ID:	UNOCAL Seattle, #5353	Sampled:	Apr 1, 1996
8410 154th Avenue N.E.	Sample Matrix:	Water	Received:	Apr 2, 1996
Redmond, WA 98052	Analysis Method:	EPA 8020	Analyzed:	Apr 3, 1996
Attention: Don Wyll	First Sample #:	B604032-11	Reported:	Apr 9, 1996

BTEX DISTINCTION

Sample Number	Sample Description	Benzene µg/L (ppb)	Toluene µg/L (ppb)	Ethyl Benzene µg/L (ppb)	Xylenes µg/L (ppb)	Surrogate Recovery %
B604032-11	MW-44	N.D.	N.D.	N.D.	N.D.	81
B604032-12	MW-46	N.D.	N.D.	N.D.	N.D.	84
B604032-13	MW-47	4.4	N.D.	N.D.	N.D.	84
BLK040396	Method Blank	N.D.	N.D.	N.D.	N.D.	76
Reporting Limits:		**0.50**	**0.50**	**0.50**	**1.0**	

4-Bromofluorobenzene surrogate recovery control limits are 59 - 144 %.
Analytes reported as N.D. were not detected above the stated Reporting Limit.

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Laura Dutton

Laura Dutton
Project Manager

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

GeoEngineers, Inc.
8410 154th Avenue N.E.
Redmond, WA 98052
Attention: Don Wyll

Client Project ID: UNOCAL Seattle, #5353
Sample Matrix: Water
Analysis Method: EPA 8020
Units: µg/L (ppb)
QC Sample #: B604032-02

Analyzed: Apr 3, 199[illegible]
Reported: Apr 9, 199[illegible]

MATRIX SPIKE QUALITY CONTROL DATA REPORT

ANALYTE	Benzene	Toluene	Ethyl Benzene	Xylenes
Sample Result:	N.D.	N.D.	N.D.	N.D.
Spike Conc. Added:	10.0	10.0	10.0	30.0
Spike Result:	9.2	8.7	9.0	26.9
Spike % Recovery:	92%	87%	90%	90%
Spike Dup. Result:	9.1	8.8	9.1	27.5
Spike Duplicate % Recovery:	91%	88%	91%	92%
Upper Control Limit %:	115	116	122	122
Lower Control Limit %:	82	81	85	85
Relative % Difference:	1.1%	1.1%	1.1%	2.2%
Maximum RPD:	16	16	16	17

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Laura Dutton

Laura Dutton
Project Manager

$$\%\ \text{Recovery:} \quad \frac{\text{Spike Result - Sample Result}}{\text{Spike Conc. Added}} \times 100$$

$$\text{Relative \% Difference:} \quad \frac{\text{Spike Result - Spike Dup. Result}}{\text{(Spike Result + Spike Dup. Result) / 2}} \times 100$$

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

GeoEngineers, Inc.	Client Project ID:	UNOCAL Seattle, #5353	Sampled:	Apr 1, 1996
8410 154th Avenue N.E.	Sample Matrix:	Water	Received:	Apr 2, 1996
Redmond, WA 98052	Analysis Method:	WTPH-D Extended	Extracted:	Apr 4, 1996
Attention: Don Wyll	First Sample #:	B604032-01	Analyzed:	Apr 7-8, 1996
			Reported:	Apr 9, 1996

TOTAL PETROLEUM HYDROCARBONS - DIESEL RANGE EXTENDED

Sample Number	Sample Description	Diesel Result mg/L (ppm)	Heavy Oil Result mg/L (ppm)	Surrogate Recovery %
B604032-01	SMW-3	4.0 D-1	2.3	110
B604032-02	SMW-4	N.D.	N.D.	100
B604032-03	MW-32A	1.4 D-1	1.0	83
B604032-04	MW-33	0.96 D-1	N.D.	98
B604032-05	MW-34	1.9 D-1	N.D.	117
B604032-06	MW-36	N.D.	N.D.	78
B604032-07	MW-40	3.2	13	70
B604032-08	MW-41	N.D.	N.D.	86
B604032-09	MW-42	0.65	N.D.	85
B604032-10	MW-43	0.30	N.D.	82
Reporting Limit:		**0.25**	**0.75**	

2-Fluorobiphenyl surrogate recovery control limits are 50 - 150%.
Extractable Hydrocarbons are quantitated as Diesel Range Organics (C12 - C24) and Heavy Oil Range Organics (>C24).
Analytes reported as N.D. were not detected above the stated Reporting Limit.

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

GeoEngineers, Inc.	Client Project ID:	UNOCAL Seattle, #5353	Sampled:	Apr 1, 19
8410 154th Avenue N.E.	Sample Matrix:	Water	Received:	Apr 2, 19
Redmond, WA 98052	Analysis Method:	WTPH-D Extended	Extracted:	Apr 4, 1996
Attention: Don Wyll	First Sample #:	B604032-11	Analyzed:	Apr 7-8, 19
			Reported:	Apr 9, 19

TOTAL PETROLEUM HYDROCARBONS - DIESEL RANGE EXTENDED

Sample Number	Sample Description	Diesel Result mg/L (ppm)	Heavy Oil Result mg/L (ppm)	Surrogate Recovery %
B604032-11	MW-44	N.D.	N.D.	84
B604032-12	MW-46	0.40	2.8	83
B604032-13	MW-47	N.D.	N.D.	89
BLK040496	Method Blank	N.D.	N.D.	96

Reporting Limit:	**0.25**	**0.75**

2-Fluorobiphenyl surrogate recovery control limits are 50 - 150%.
Extractable Hydrocarbons are quantitated as Diesel Range Organics (C12 - C24) and Heavy Oil Range Organics (>C24).
Analytes reported as N.D. were not detected above the stated Reporting Limit.

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Laura Dutton

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Project Manager

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HYDROCARBON ANALYSIS FOOTNOTES

2/94, Rev. 3

VOLATILE HYDROCARBONS - GASOLINE RANGE ORGANICS

G 1 This sample appears to contain extractable diesel range organics.

G 2 The chromatogram for this sample does not resemble a typical gasoline pattern. Please refer to the sample chromatogram.

G 3 The total hydrocarbon result in this sample is primarily due to an individual compound(s) eluting in the volatile hydrocarbon range. Identification and quantitation by EPA 8010, 8021 or 8240 is recommended.

G 4 This sample contains compound(s) not identified as Benzene, Toluene, Ethyl benzene or Xylene.

G 5 This sample appears to contain or be saturated with gasoline product.

EXTRACTABLE HYDROCARBONS - DIESEL RANGE ORGANICS

D 1 This sample appears to contain volatile gasoline range organics.

D 2 The hydrocarbons present in this sample resemble heavy, non-resolvable oil range organics. Quantitation by TPH-Diesel Extended or TPH 418.1 is recommended.

D 3 The hydrocarbon concentration result in this sample is partially due to an individual peak(s) eluting in the diesel / motor oil carbon range.

D 4 The hydrocarbons present in this sample are a complex mixture of diesel range and heavy oil range organics.

D 5 The hydrocarbon result shown is an estimated (greater than) value due to the high concentration. Reanalysis is being performed to yield a quantitative result. An amended report will follow.

D 6 The sample chromatographic pattern does not resemble the fuel standard used for quantitation. A fuel fingerprint is advised.

D 7 This sample appears to contain or be saturated with diesel product.

Oils and Lubricants
[----------]
TRPH 418.1

Diesel & Fuel Oils
[----------]
Extractable Hydrocarbons (TPH-D)

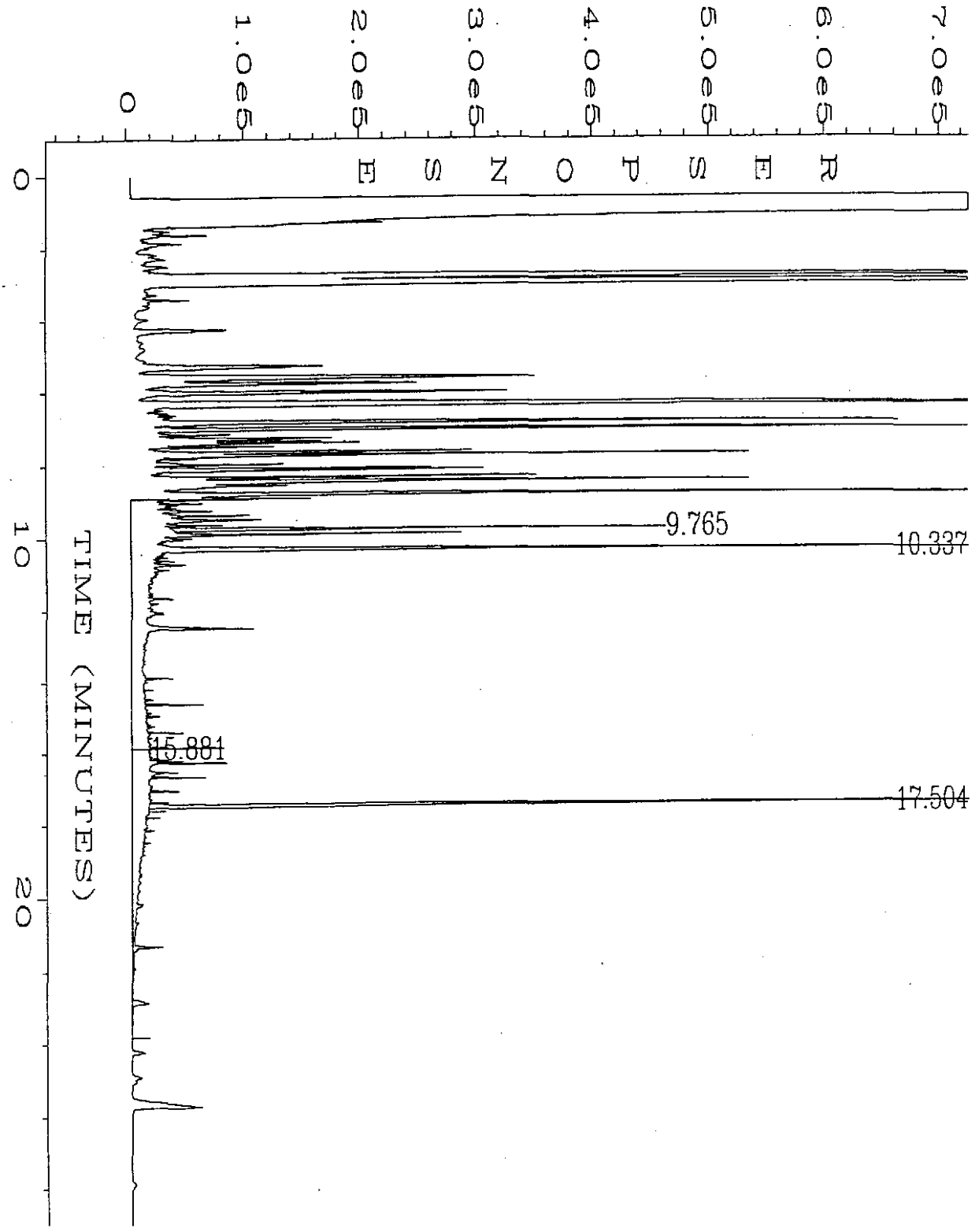
Gasoline
[----------]
Volatile Hydrocarbons (TPH-G)

HYDROCARBON BOILING POINT RANGE

LOW LOW TO MEDIUM MEDIUM MEDIUM TO HIGH VERY HIGH

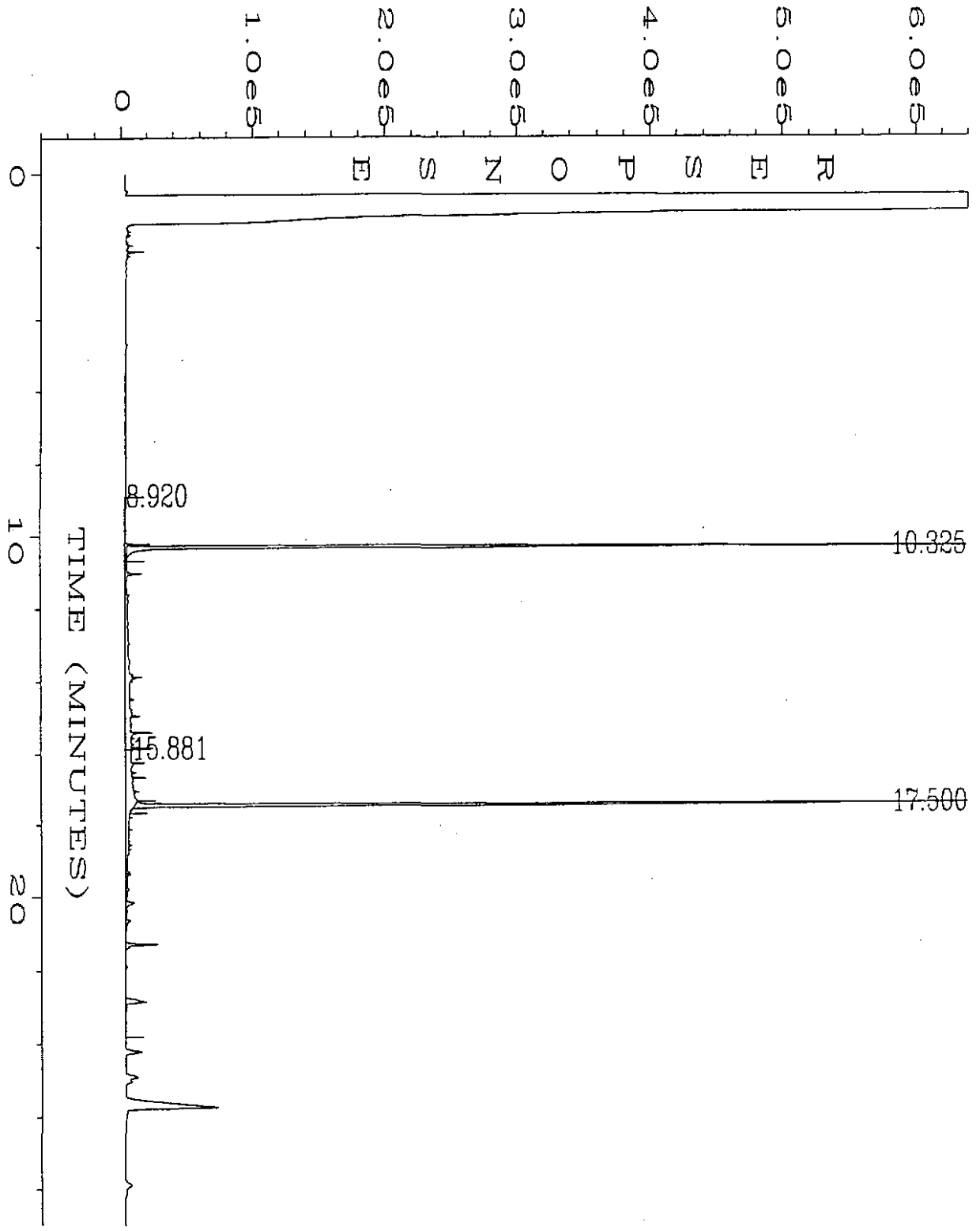
CARBON RANGE:

5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31+



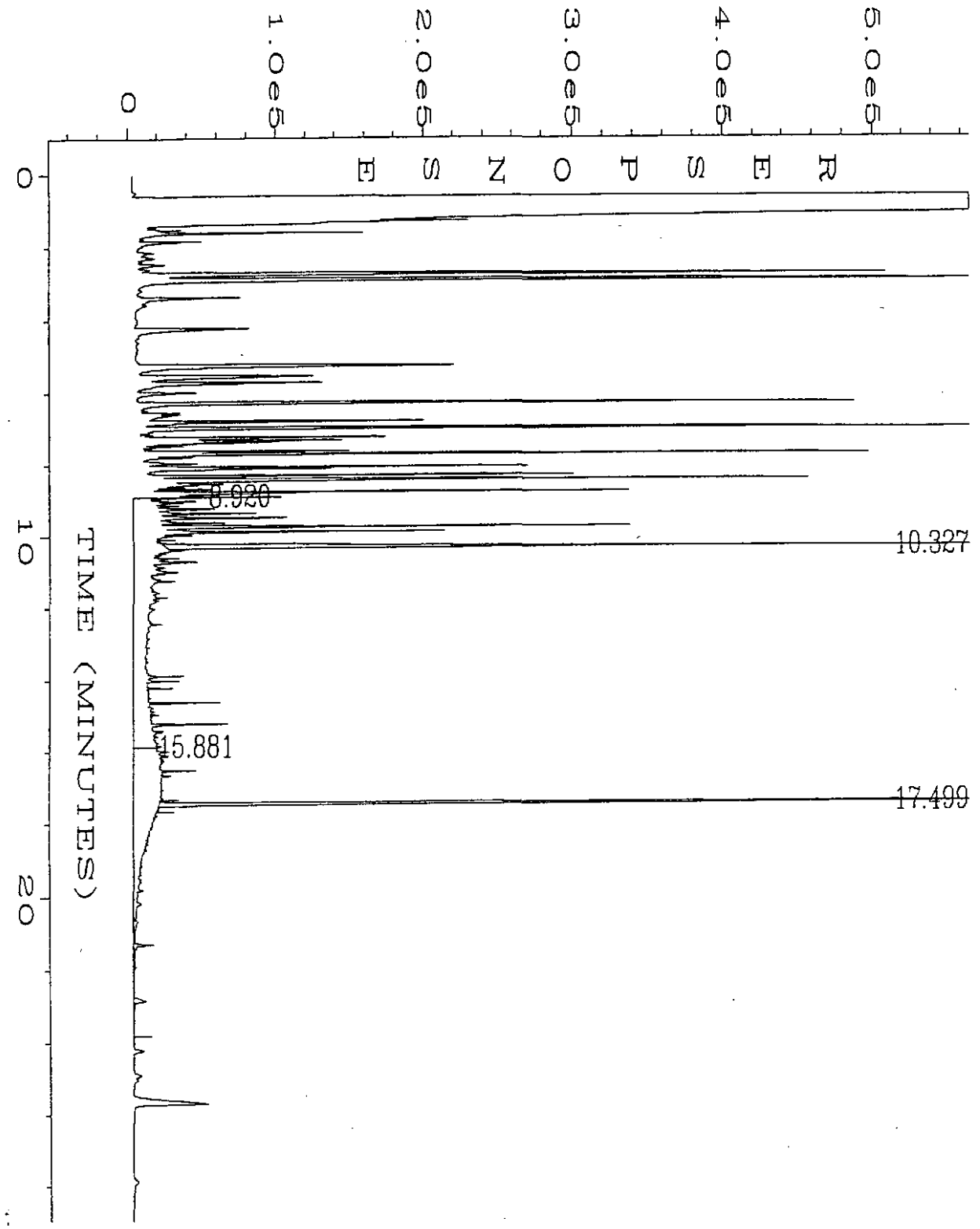
Data File Name : C:\HPCHEM\2\DATA\APR07\054R0501.D
Operator : MMS
Instrument : BOB
Sample Name : DUP-032-01 W
Run Time Bar Code:
Acquired on : 07 Apr 96 04:48 PM
Report Created on: 07 Apr 96 05:27 PM

Page Number : 1
Vial Number : 54
Injection Number : 1
Sequence Line : 5
Instrument Method: TPHE.MTH
Analysis Method : TPHE.MTH



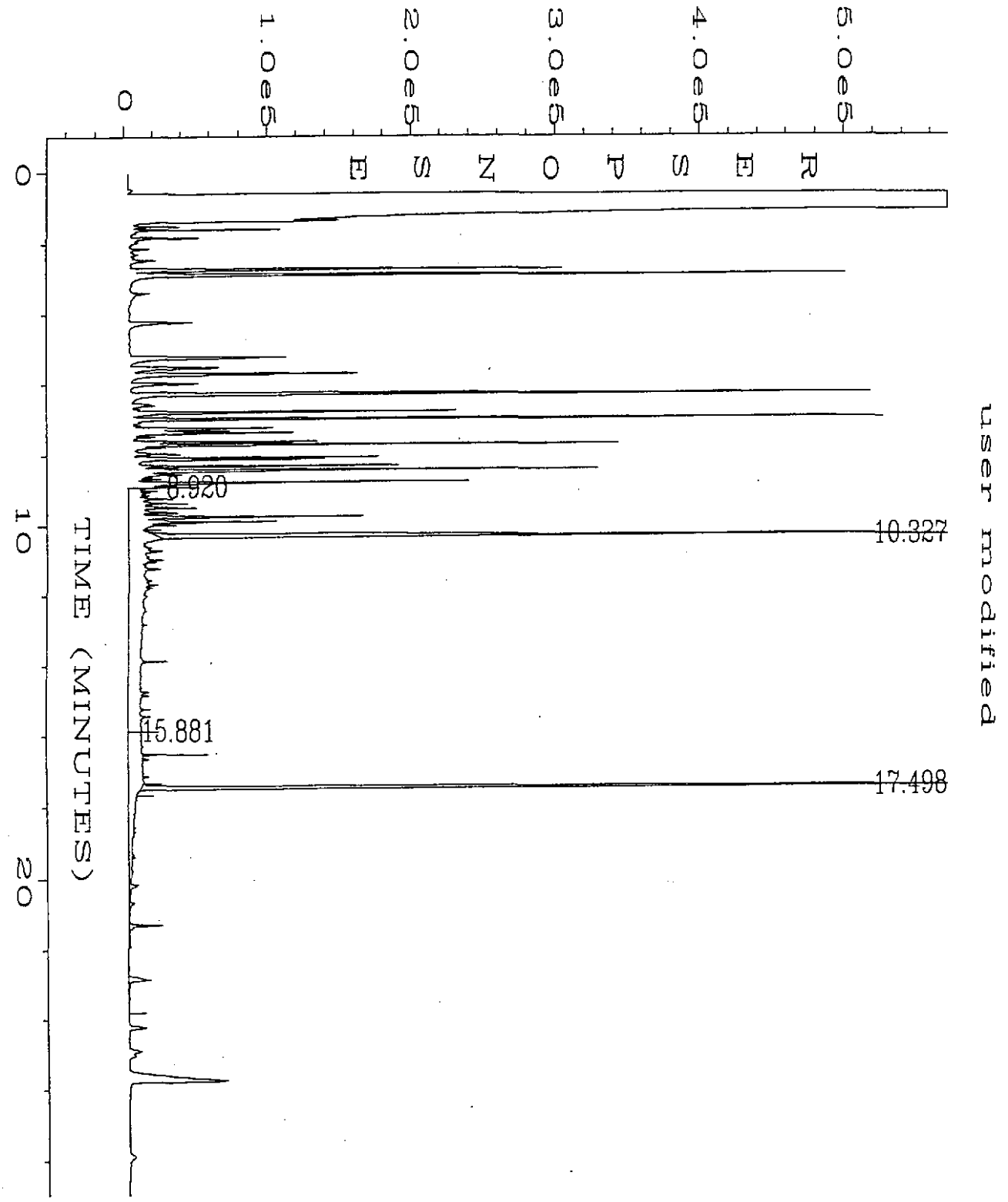
Data File Name : C:\HPCHEM\2\DATA\APR07\055R0501.D
Operator : MMS
Instrument : BOB
Sample Name : B604032-02 W
Run Time Bar Code:
Acquired on : 07 Apr 96 05:28 PM
Report Created on: 07 Apr 96 06:06 PM

Page Number : 1
Vial Number : 55
Injection Number : 1
Sequence Line : 5
Instrument Method: TPHD.MTH
Analysis Method : TPHE.MTH



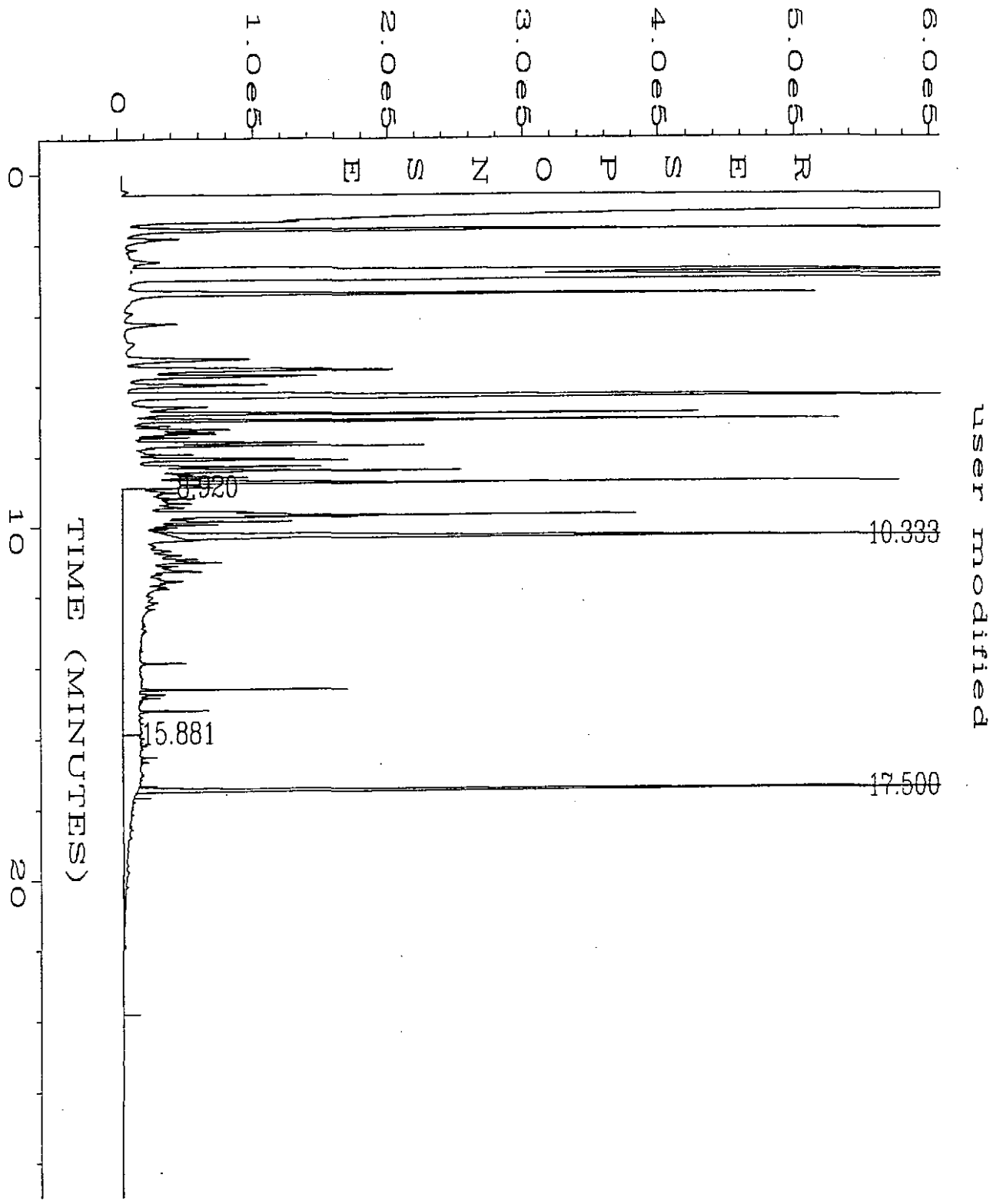
Data File Name : C:\HPCHEM\2\DATA\APR07\056R0701.D
Operator : MMS
Instrument : BOB
Sample Name : B604032-03 W
Run Time Bar Code:
Acquired on : 07 Apr 96 06:45 PM
Report Created on: 07 Apr 96 07:24 PM

Page Number : 1
Vial Number : 56
Injection Number : 1
Sequence Line : 7
Instrument Method: TPHE.MTH
Analysis Method : TPHE.MTH



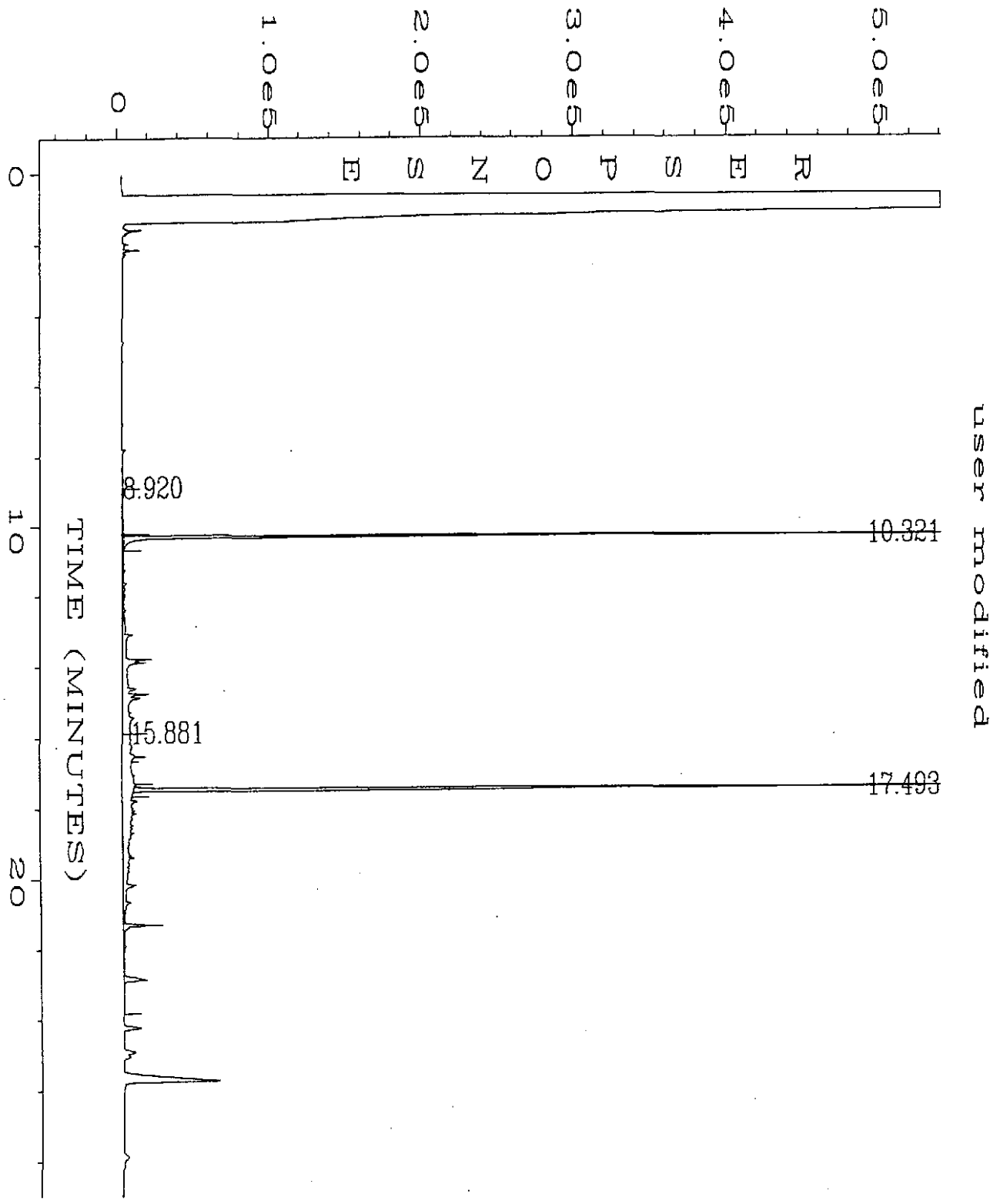
Data File Name : C:\HPCHEM\2\DATA\APR07\057R0701.D
Operator : MMS
Instrument : BOB
Sample Name : B604032-04 W
Run Time Bar Code:
Acquired on : 07 Apr 96 07:24 PM
Report Created on: 07 Apr 96 08:02 PM

Page Number : 1
Vial Number : 57
Injection Number : 1
Sequence Line : 7
Instrument Method: TPHE.MTH
Analysis Method : TPHE.MTH



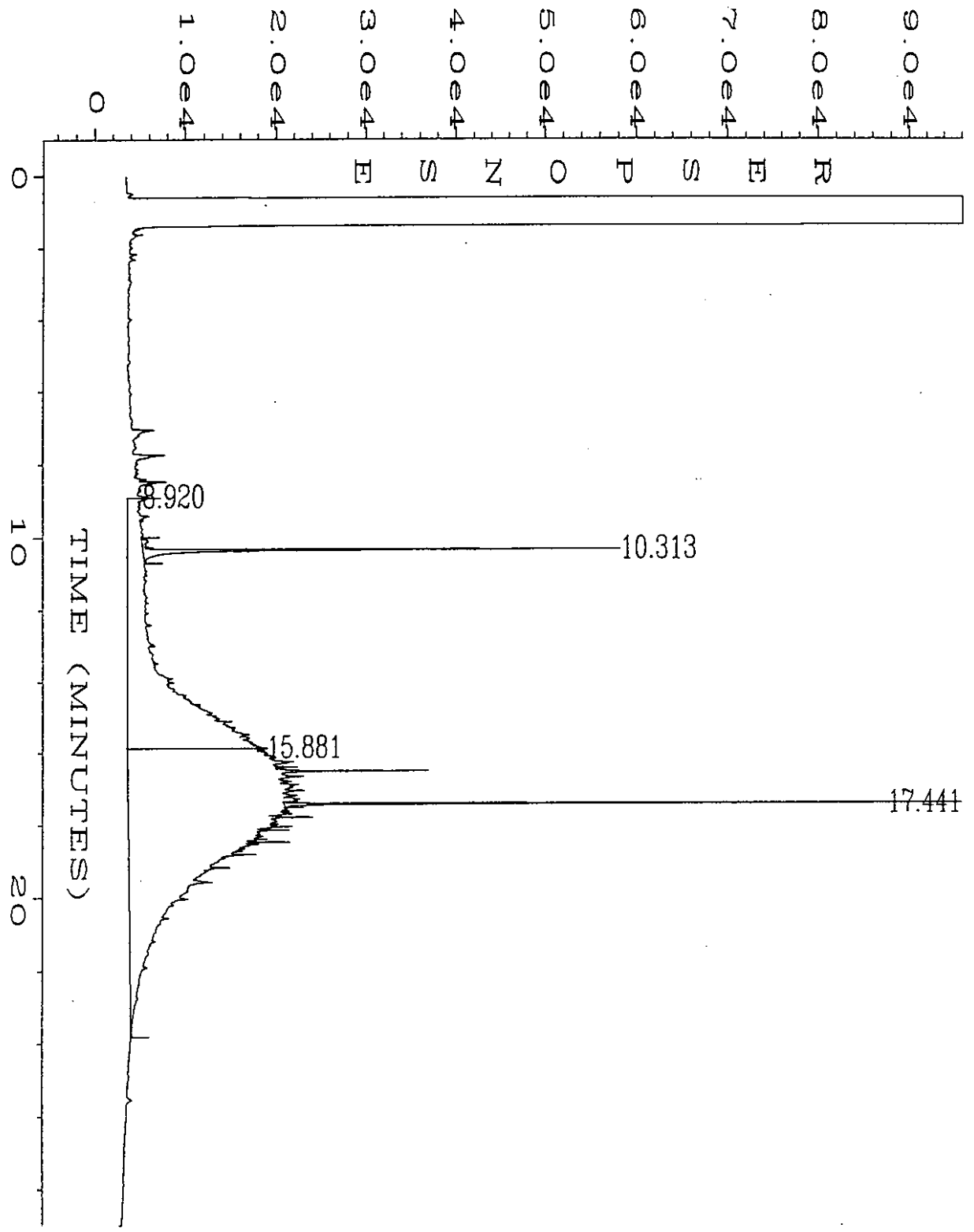
Data File Name : C:\HPCHEM\2\DATA\APR07\058R0701.D
Operator : MMS
Instrument : BOB
Sample Name : B604032-05 W
Run Time Bar Code:
Acquired on : 07 Apr 96 08:03 PM
Report Created on: 07 Apr 96 08:41 PM

Page Number : 1
Vial Number : 58
Injection Number : 1
Sequence Line : 7
Instrument Method: TPHE.MTH
Analysis Method : TPHE.MTH



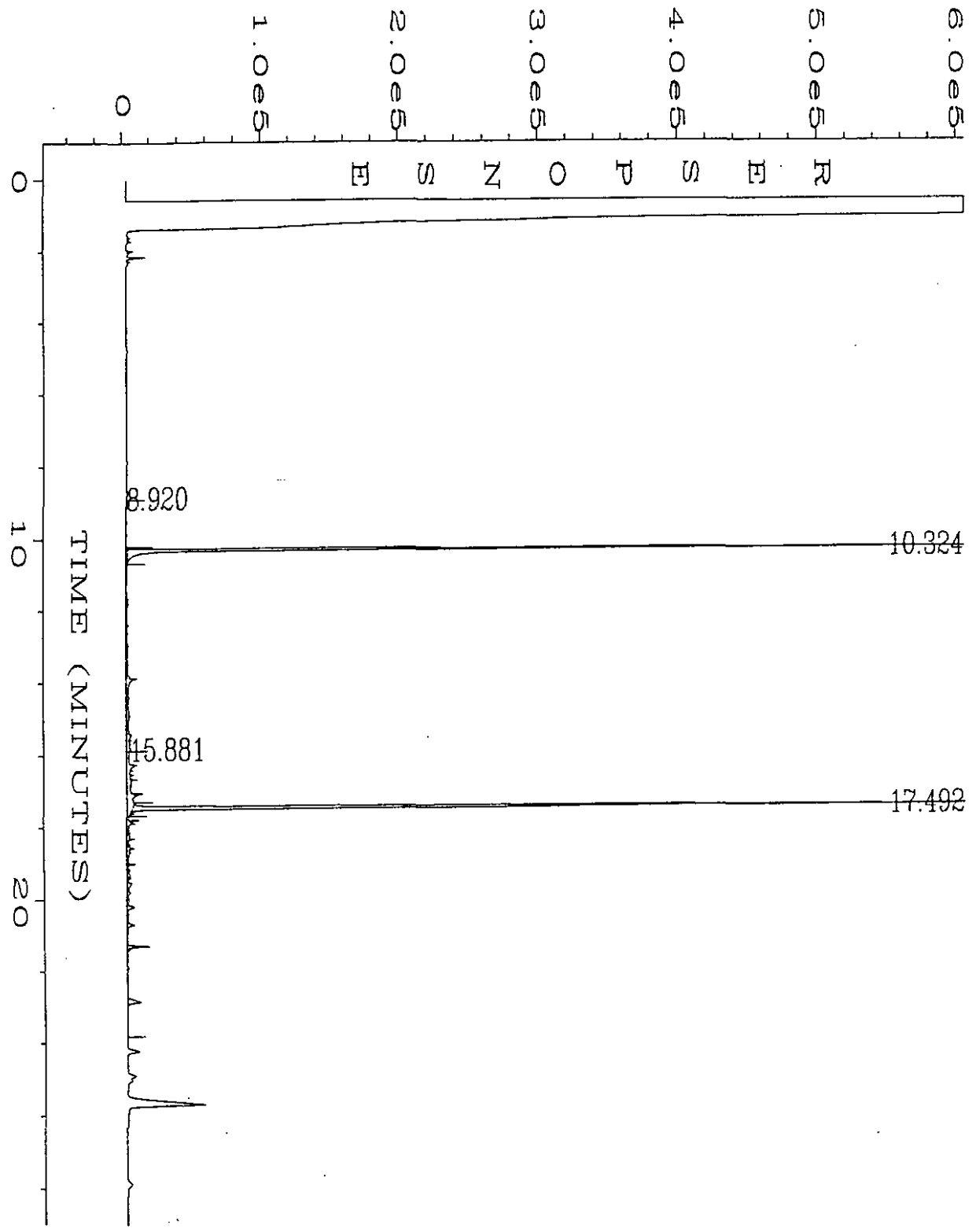
Data File Name : C:\HPCHEM\2\DATA\APR07\080R1801.D
Operator : MMS
Instrument : BOB
Sample Name : B604032-06 W
Run Time Bar Code:
Acquired on : 08 Apr 96 09:38 AM
Report Created on: 08 Apr 96 10:16 AM

Page Number : 1
Vial Number : 80
Injection Number : 1
Sequence Line : 18
Instrument Method: TPHE.MTH
Analysis Method : TPHE.MTH



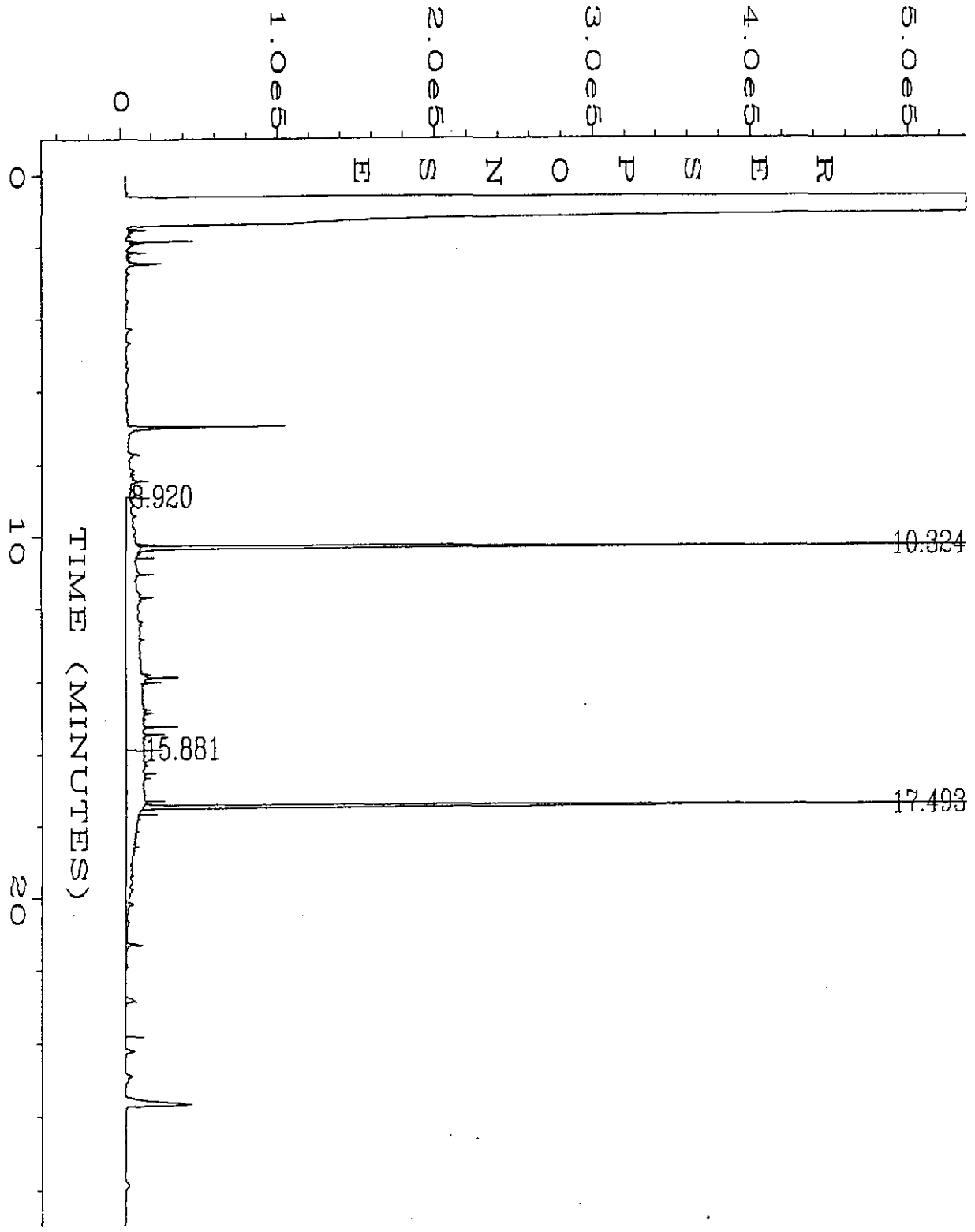
Data File Name : C:\HPCHEM\2\DATA\APR07\060R0701.D
Operator : MMS
Instrument : BOB
Sample Name : B604032-07 W 11X
Run Time Bar Code:
Acquired on : 07 Apr 96 09:21 PM
Report Created on: 07 Apr 96 09:59 PM

Page Number : 1
Vial Number : 60
Injection Number : 1
Sequence Line : 7
Instrument Method: TPHD.MTH
Analysis Method : TPHE.MTH



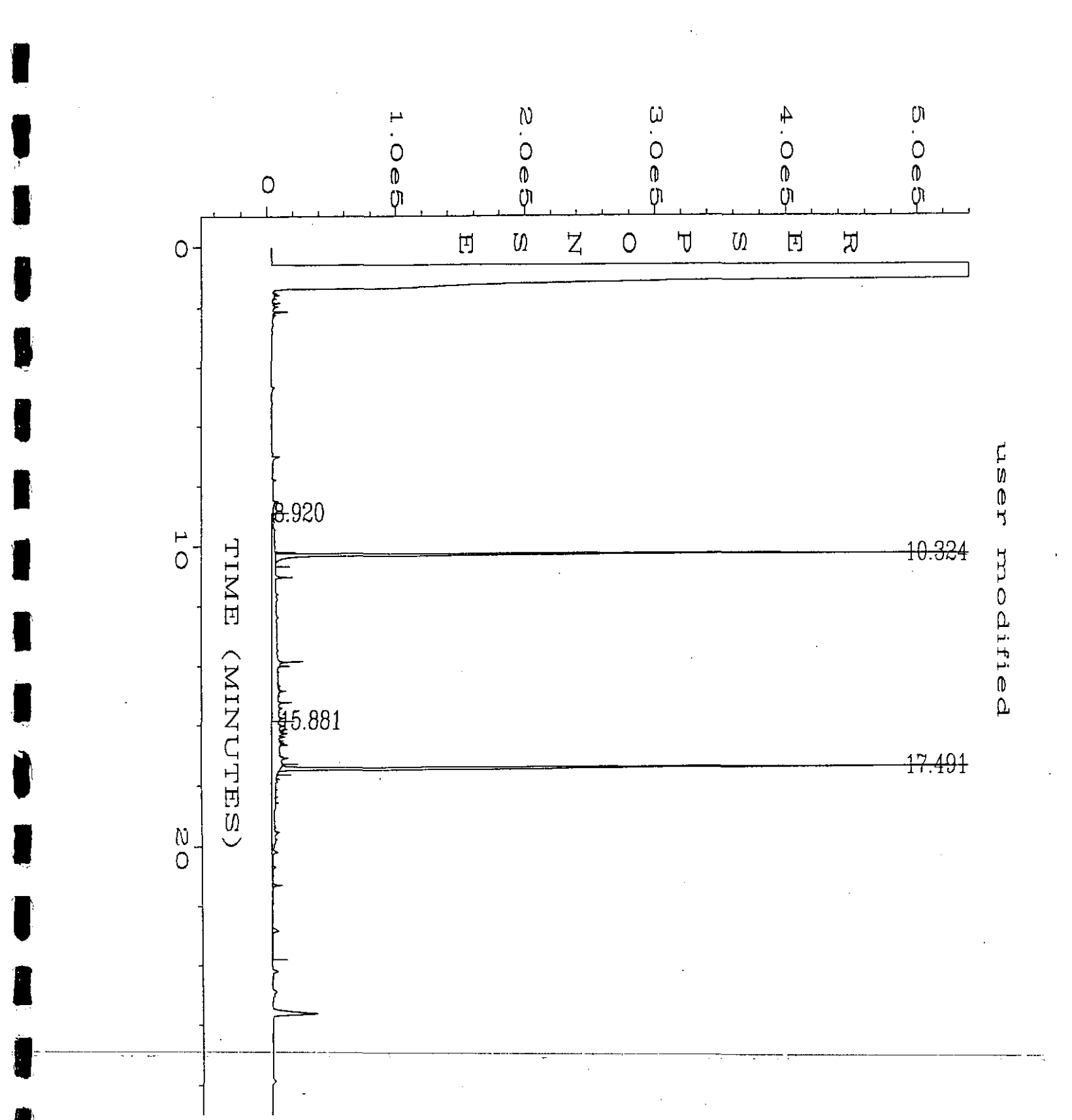
Data File Name : C:\HPCHEM\2\DATA\APR07\061R1101.D
Operator : MMS
Instrument : BOB
Sample Name : B604032-08 W
Run Time Bar Code:
Acquired on : 07 Apr 96 11:56 PM
Report Created on: 08 Apr 96 00:35 AM

Page Number : 1
Vial Number : 61
Injection Number : 1
Sequence Line : 11
Instrument Method: TPHE.MTH
Analysis Method : TPHE.MTH



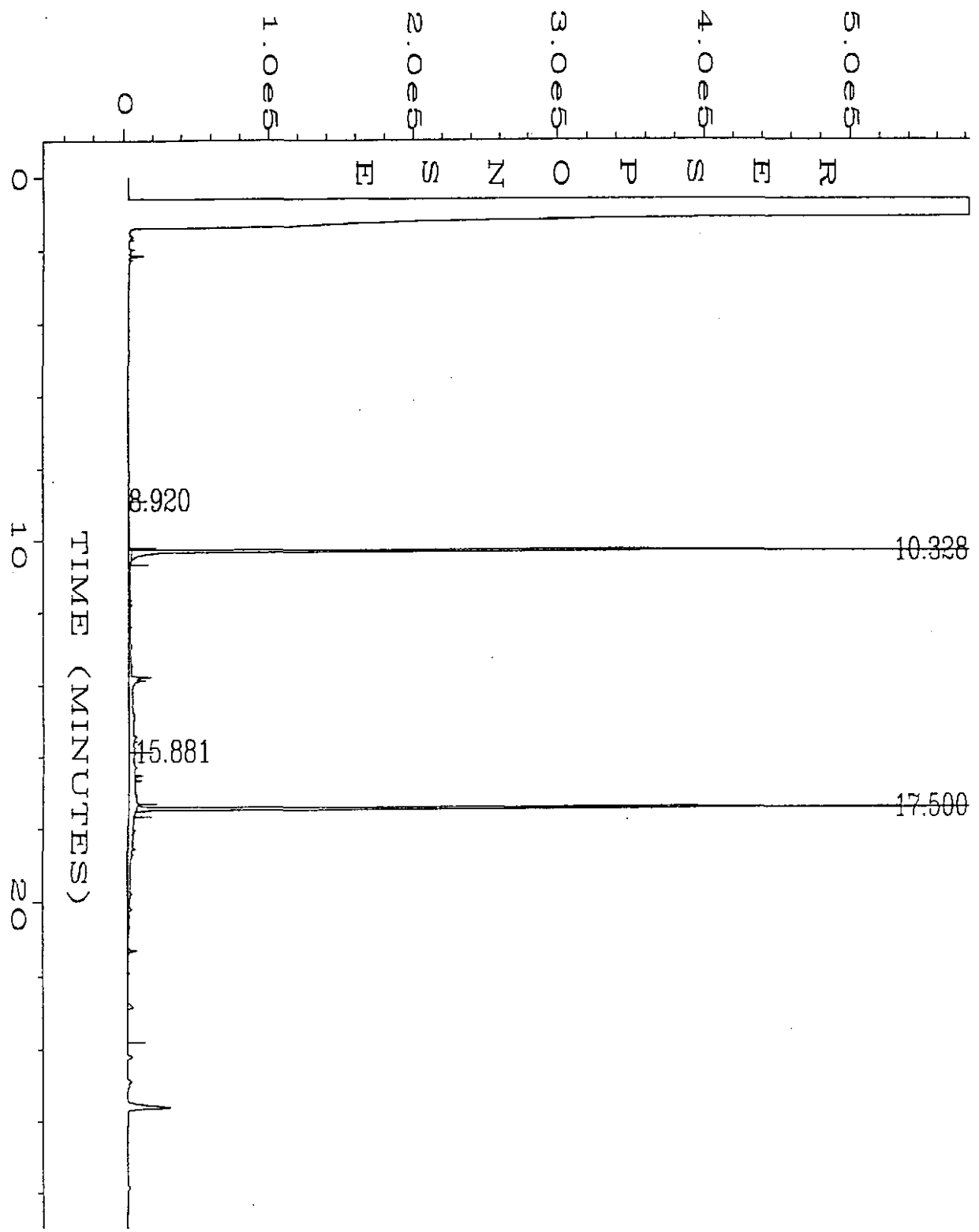
Data File Name : C:\HPCHEM\2\DATA\APR07\062R1101.D
Operator : MMS
Instrument : BOB
Sample Name : B604032-09 W
Run Time Bar Code:
Acquired on : 08 Apr 96 00:35 AM
Report Created on: 08 Apr 96 01:14 AM

Page Number : 1
Vial Number : 62
Injection Number : 1
Sequence Line : 11
Instrument Method: TPHE.MTH
Analysis Method : TPHE.MTH



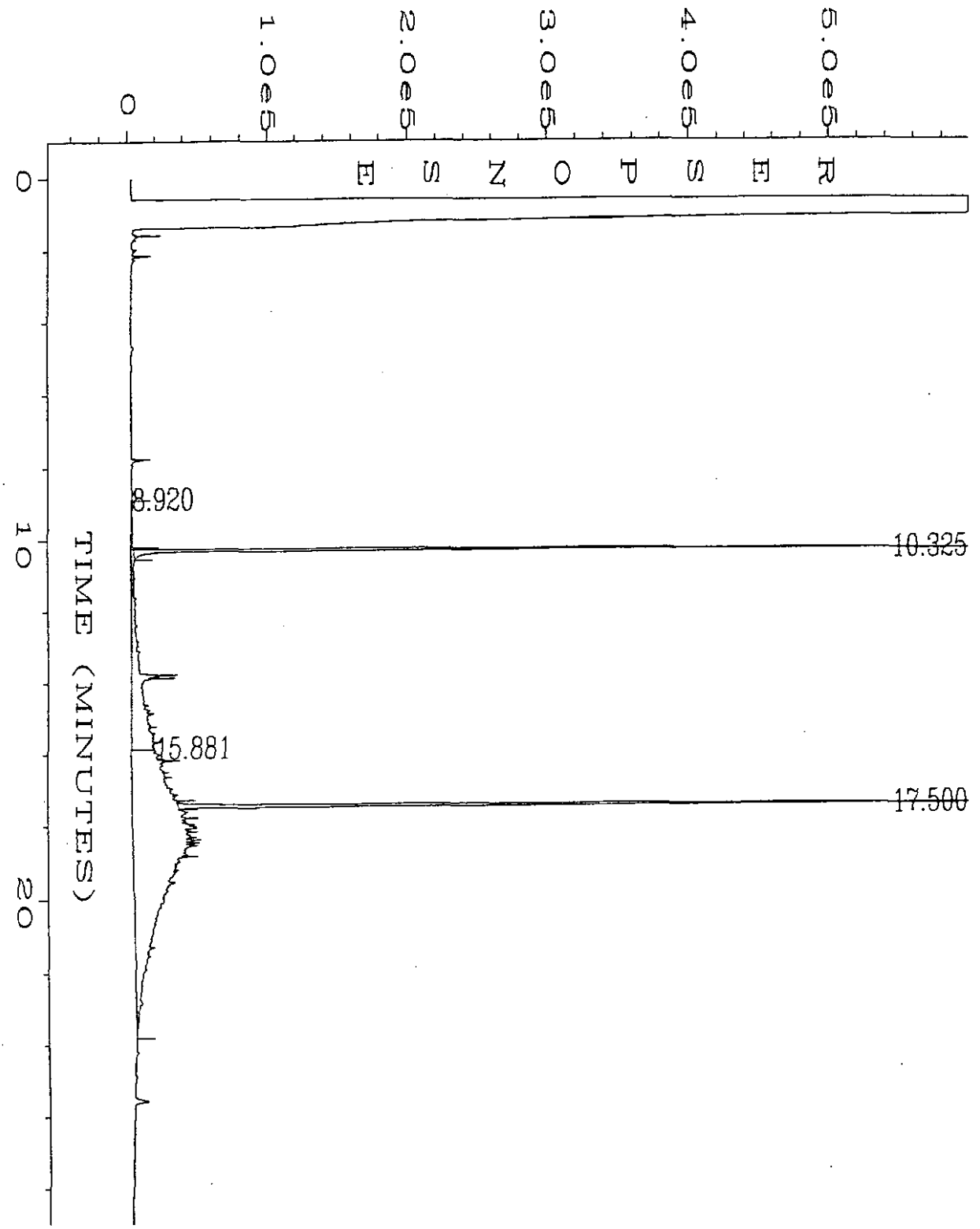
Data File Name : C:\HPCHEM\2\DATA\APR07\063R1101.D
Operator : MMS
Instrument : BOB
Sample Name : B604032-10 W
Run Time Bar Code:
Acquired on : 08 Apr 96 01:14 AM
Report Created on: 08 Apr 96 01:52 AM

Page Number : 1
Vial Number : 63
Injection Number : 1
Sequence Line : 11
Instrument Method: TPHE.MTH
Analysis Method : TPHE.MTH



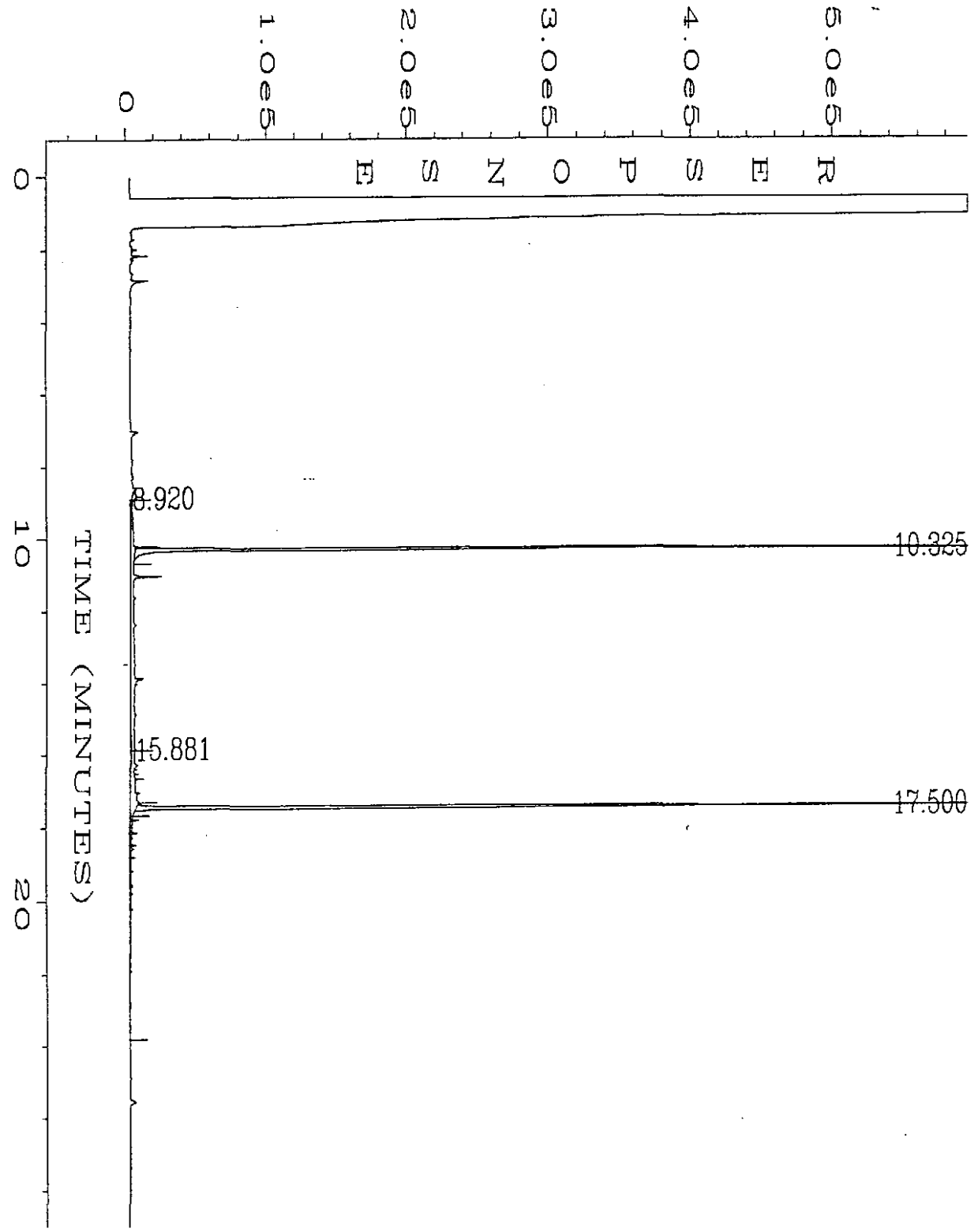
Data File Name : C:\HPCHEM\2\DATA\APR07\064R1101.D
Operator : MMS
Instrument : BOB
Sample Name : B604032-11 W
Run Time Bar Code:
Acquired on : 08 Apr 96 01:53 AM
Report Created on: 08 Apr 96 02:31 AM

Page Number : 1
Vial Number : 64
Injection Number : 1
Sequence Line : 11
Instrument Method: TPHE.MTH
Analysis Method : TPHE.MTH



Data File Name : C:\HPCHEM\2\DATA\APR07\081R1801.D
Operator : MMS
Instrument : BOB
Sample Name : B604032-12 W
Run Time Bar Code:
Acquired on : 08 Apr 96 10:17 AM
Report Created on: 08 Apr 96 10:55 AM

Page Number : 1
Vial Number : 81
Injection Number : 1
Sequence Line : 18
Instrument Method: TPHE.MTH
Analysis Method : TPHE.MTH



user modified

Data File Name : C:\HPCHEM\2\DATA\APR07\066R1301.D
Operator : MMS
Instrument : BOB
Sample Name : B604032-13 W
Run Time Bar Code:
Acquired on : 08 Apr 96 03:49 AM
Report Created on: 08 Apr 96 04:27 AM

Page Number : 1
Vial Number : 66
Injection Number : 1
Sequence Line : 13
Instrument Method: TPHE.MTH
Analysis Method : TPHE.MTH

NORTH CREEK ANALYTICAL
Environmental Laboratory Services

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

GeoEngineers, Inc.
8410 154th Avenue N.E.
Redmond, WA 98052
Attention: Don Wyll

Client Project ID: UNOCAL Seattle, #5353
Sample Matrix: Water
Analysis Method: WTPH-D
Units: mg/L (ppm)

Extracted: Apr 4, 1996
Analyzed: Apr 7, 1996
Reported: Apr 9, 1996

HYDROCARBON QUALITY CONTROL DATA REPORT

ACCURACY ASSESSMENT
Laboratory Control Sample

	Diesel
Spike Conc. Added:	2.04
Spike Result:	2.13
% Recovery:	104
Upper Control Limit %:	121
Lower Control Limit %:	54

PRECISION ASSESSMENT
Sample Duplicate

	Diesel Range Organics	Diesel Range Organics
Sample Number:	B604032-01	B604056-01
Original Result:	4.00	N.D.
Duplicate Result:	3.51	N.D.
Relative % Difference:	13	Q-5
Maximum RPD:	44	44

Q-5 = RPD values are not reported at sample concentration levels <10 X the Reporting Limit.

NORTH CREEK ANALYTICAL Inc.

Laura Dutton
Project Manager

$$\%\ \text{Recovery:} \quad \frac{\text{Spike Result}}{\text{Spike Concentration Added}} \times 100$$

$$\text{Relative \% Difference:} \quad \frac{\text{Original Result - Duplicate Result}}{(\text{Original Result + Duplicate Result}) / 2} \times 100$$

NORTH CREEK ANALYTICAL

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

UNOCAL CHAIN OF CUSTODY REPORT

UNOCAL INFORMATION

Facility Number: SS # 5353
Site Address: Westlake & Mercer ST.
City, State, ZIP: Seattle WA.
Site Release Number:
Unocal Manager: Dr. Mark Brearley
CERT INFO: (check one) o Evaluation ☒ Remediation
o Detection o Demolition o Closure o Miscellaneous

CONSULTANT INFORMATION

Firm: GeoEngineers Project Number: 9161-013-04
Address: 8410 154th Ave. NE
Redmond WA 98052
Phone: 861-6000 Fax: 861-6050
Project Manager: Don Wyll
Sample Collection by: Don Wyll \ Paul Craig

Chain of Custody Record #:

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
1. SMW-3	0400 4-1-96	W	3				X		X										B604032-01
2. SMW-4	0415						X		X										-02
3. MW-32A	0430						X		X										-03
4. MW-33	0445						X		X										-04
5. MW-34	0500						X		X										-05
6. MW-36	0530						X		X										-06
7. MW-40	0600						X		X										-07
8. MW-41	0615						X		X										-08
9. MW-42	0630						X		X										-09
10. MW-43	0645						X		X										-10

Relinquished by:	Firm:	Date & Time	Received by:	Firm:	Date & Time
1. Don Wyll	GEI	4-2-96 (08am)	RD Kelley	NCA	4/2/96 3:45pm
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 2

Comments:

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

NORTH CREEK ANALYTICAL

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

UNOCAL CHAIN OF CUSTODY REPORT

UNOCAL INFORMATION

Facility Number: Unocal 5353
Site Address: Westlake & Mercer ST.
City, State, ZIP: Sea Wa
Site Release Number:
Unocal Manager: Dil Mark Brearley
CERT INFO: (check one) o Evaluation ~~x~~ Remediation
o Detection o Demolition o Closure o Miscellaneous

CONSULTANT INFORMATION

Firm: GeoEngineers Project Number: 9161-013-04
Address: 8410 154th Ave NE
Redmond
Phone: 861-6000 Fax: 861-6050
Project Manager: Don Wyll
Sample Collection by: Don Wyll / Paul Crais

Chain of Custody Record #:

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

Laboratory Turnaround Days: (10) 5 3 2 1

o Oregon x Washington Hydrocarbon Methods

SAMPLE IDENTIFICATION	SAMPLING DATE / TIME	MATRIX (W,S,O)	# OF CONTAINERS	TPH-HCID	TPH-Gas	BTEX (EPA 8020 Mod.)	TPH-Gas + BTEX	TPH-Diesel	TPH-Diesel Extended	TPH-418.1	Halogen. Volatiles (EPA 8010)	Aromatic Volatiles (EPA 8020)	Pesticides/PCBs or PCBs Only	GC/MS Volatiles (EPA 8240/8260)	GC/MS SemiVols. (EPA 8270)	PAHs by HPLC (EPA 8310)	Lead: Total or Dissolved	TCLP Metals (8)	NCA SAMPLE NUMBER
1. MW-44	0700 4-1-96	W	3				X		X										B604032-11
2. MW-46	0730 0715 DW	↓	↓				X		X										-12
3. MW-47	0745 ↓	↓	↓				X		X										↓ -13
4.																			
5.																			
6.																			
7.																			
8.																			
9.																			
10.																			

	Relinquished by:	Firm:	Date & Time	Received by:	Firm:	Date & Time
1.	Don Wyll	GEI	4-2-96 (0900)	RD Kelley	NCA	4/2/96 3:45pm
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 2
Rev. 2.2, 11/94

Comments:

Distribution: White - Laboratory Yellow - Consultant Photocopy - Unocal

AIR TOXICS LTD.

SAMPLE NAME: 062596-V

ID#: 9606307A-01A

EPA METHOD TO-3

(Aromatic Volatile Organics in Air)

GC/PID

File Name: 6070317 **Date of Collection:** 6/25/96

Dil. Factor: 1.99 **Date of Analysis:** 7/3/96

Compound	Det. Limit (ppmv)	Det. Limit (uG/L)	Amount (ppmv)	Amount (uG/L)
Benzene	0.002	0.006	Not Detected	Not Detected
Toluene	0.002	0.008	0.005	0.019
Ethyl Benzene	0.002	0.009	0.003	0.013
Total Xylenes	0.002	0.009	0.009	0.040

TOTAL PETROLEUM HYDROCARBONS

GC/FID

(Quantitated as Gasoline)

File Name: 6070317 **Date of Collection:** 6/25/96

Dil. Factor: 1.99 **Date of Analysis:** 7/3/96

Compound	Det. Limit (ppmv)	Det. Limit (uG/L)	Amount (ppmv)	Amount (uG/L)
TPH* (C5+ Hydrocarbons)	0.020	0.083	0.94	3.9
C2 - C4** Hydrocarbons	0.020	0.036	0.76	1.4

*TPH referenced to Gasoline (MW=100)

**C2 - C4 Hydrocarbons referenced to Propane (MW=44)

Container Type: 1 Liter Summa Canister

AIR TOXICS LTD.

SAMPLE NAME: Lab Blank
ID#: 9606307A-02A

EPA METHOD TO-3
(Aromatic Volatile Organics in Air)

GC/PID

File Name: 6070306 **Date of Collection: NA**
Dil. Factor: 1.00 **Date of Analysis: 7/3/96**

Compound	Det. Limit (ppmv)	Det. Limit (uG/L)	Amount (ppmv)	Amount (uG/L)
Benzene	0.001	0.003	Not Detected	Not Detected
Toluene	0.001	0.004	Not Detected	Not Detected
Ethyl Benzene	0.001	0.004	Not Detected	Not Detected
Total Xylenes	0.001	0.004	Not Detected	Not Detected

TOTAL PETROLEUM HYDROCARBONS
GC/FID
(Quantitated as Gasoline)

File Name: 6070306 **Date of Collection: NA**
Dil. Factor: 1.00 **Date of Analysis: 7/3/96**

Compound	Det. Limit (ppmv)	Det. Limit (uG/L)	Amount (ppmv)	Amount (uG/L)
TPH* (C5+ Hydrocarbons)	0.010	0.042	Not Detected	Not Detected
C2 - C4** Hydrocarbons	0.010	0.018	Not Detected	Not Detected

*TPH referenced to Gasoline (MW=100)
**C2 - C4 Hydrocarbons referenced to Propane (MW=44)

Container Type: NA

AIR TOXICS LTD.

AN ENVIRONMENTAL ANALYTICAL LABORATORY

180 BLUE RAVINE ROAD, SUITE B
FOLSOM, CA 95630-4719
(916) 985-1000 FAX: (916) 985-1020

CHAIN-OF-CUSTODY RECORD

No 007619

Page 1 of 1

Contact Person: Don Wyll
Company: GeoEngineers
Address: 8410 154 Ave NE City: Redmond State: WA Zip: 98052
Phone: 861-6000 FAX: 861-6050
Collected By: Signature: Don Wyll

Project info:
P.O. #: 0161-013-04
Project #: 0161-013-04
Project Name: Unocal 5353

Turn Around Time:
☒ Normal
☐ Rush ____ Specify

Lab I.D.	Field Sample I.D.	Date & Time	Analyses Requested	Canister Pressure / Vacuum Initial	Final	Receipt
01A	062596-V	6-25-96 - 1000	BETX, TPH, Methane			0.2 psi
						6/27/96

Relinquished By: (Signature) Date/Time 1000 06-25-96 Print Name: Don Wyll
Received By: (Signature) Date/Time
Relinquished By: (Signature) Date/Time
Received By: (Signature) Date/Time: Jeff Clement AIR 6/27/96 1115

Notes:

Lab Use Only	Shipper Name	Air Bill #	Opened By:	Date/Time	Temp. (°C)	Condition	Custody Seals Intact?	Work Order #
	UPS	1Z9[illegible]0150199955028	JA	6/27/96 1115	AMBIENT	GOOD	Yes No (None) N/A	9606307A

Form 1293 rev. 06

AIR TOXICS LTD.

Atmospheric Gases by Modified ASTM D-3416
GC/FID

Field Sample I.D.	Lab Sample I.D.	File Name	Sample Date	Analyzed For	Dilution Factor	Det. Limit (ppmv)	Amount (ppmv)
062596-V	9606307B-01A	3070207	6/25/96	Methane	1.99	20	10000
Lab Blank	9606307B-02A	3070203	NA	Methane	1.00	10	Not Detected

Analysis Date: 7/2/96
Container Type: 1 Liter Summa Canister

COMMENTS: NA = Not Applicable

AIR TOXICS LTD.
AN ENVIRONMENTAL ANALYTICAL LABORATORY

180 BLUE RAVINE ROAD, SUITE B
FOLSOM, CA 95630-4719
(916) 985-1000 FAX: (916) 985-1020

CHAIN-OF-CUSTODY RECORD

Nº 007619

Page 1 of 1

Contact Person: Don Wyll
Company: GeoEngineers
Address: 8410 154th Ave NE City: Redmond State: WA Zip: 98052
Phone: 861-6000 FAX: 861-6050
Collected By: Signature: Don Wyll

Project info:
P.O. #: 0161-013-04
Project #: 0161-013-04
Project Name: Unocal 5353

Turn Around Time:
☒ Normal
☐ Rush _____ Specify

Lab I.D.	Field Sample I.D.	Date & Time	Analyses Requested	Canister Pressure / Vacuum Initial	Final	Receipt
01A	062596-V	6-25-96 - 1000	BETX, TPH, Methane			0.2 psi 6/27/96

Relinquished By: (Signature) Date/Time 1000 Print Name: Don Wyll
06-26-96
Relinquished By: (Signature) Date/Time — Received By: (Signature) Date/Time
Relinquished By: (Signature) Date/Time — Received By: (Signature) Date/Time
Lone Arrow AZ 6/27/96 1115

Notes:

Lab Use Only	Shipper Name	Air Bill #	Opened By:	Date/Time	Temp. (°C)	Condition	Custody Seals Intact?	Work Order #
	UPS	1Z9933 0E5019995828					Yes No None N/A	9606307B

Form 1293.rev.06