GLOBAL
GEOCHEMISTRY
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6919 ETON AVENUE • CANOGA PARK • CALIFORNIA 91303-2194

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December 9, 1998

David Elias
Cambria Environmental Technology, Inc.
1144 65th Street, Suite C
Oakland, CA 94608

What does this 15yr release indicate & what was going on then?

Re: Project No. 153-1247-4

Dear Mr. Elias:

According to your request on December 7, 1998, we examined results of GC/FID and GC/MS analyses of non-aqueous phase liquid (NAPL) sample FDP-54-L. The high resolution gas chromatogram shown in Figure 1 demonstrates that the NAPL contains both gasoline (C_3 - C_{10}) and diesel (C_{10} - C_{24}) range hydrocarbons. The higher abundance of C_3 - C_{10} range hydrocarbons compared to C_{10} - C_{24} range hydrocarbons indicate that gasoline-type fuel represents the major component in sample FDP-54-L.

Relative concentrations of the gasoline-range hydrocarbons are presented in Table 1. Data in Table 1 show that the NAPL contains a majority of hydrocarbons typically found in automotive gasoline. However, depletion of the most volatile hydrocarbons from propane to methylcyclopentane (Table 1) indicates that chemical composition of gasoline in sample FDP-54-L was altered by evaporation in the subsurface environment. The diesel portion of the gas chromatogram (Figure 1) exhibits a recognizable distribution pattern of alkanes from n-C_{10} to n-C_{24} with the maximum of distribution occurring around n-C_{12}. The distribution pattern, similar to that observed for NAPL sample FDP-54-L, is characteristic of a kerosene-type fuel such as Jet A, JP-5 or diesel No.1 (Arctic diesel).

Pattern recognition analysis of the fuel-specific homologous series measured by GC/MS (Figures 2 - 6, see key for peak identification in Tables 2 - 4) supports the above conclusion that NAPL sample FDP-54-L consists of a gasoline-kerosene-type fuel mixture. A relatively high abundance of alkylbenzenes and the absence of polynuclear aromatic hydrocarbons heavier than alkylnaphthalenes (Figure 5) indicate that kerosene-type fuel represents only a minor component in the sample analyzed. The mass spect a library search for majority of peaks in the reconstructed ion chromatogram (RIC) of sample FDP-54-L (Figure 7) failed to detect any non-fuel related compounds.

The data obtained by high resolution gas chromatography allow us to evaluate the octane grade of gasoline in the sample submitted. It is generally accepted that the octane grade of gasoline fuel correlates with the 2,2,4-trimethylpentane/methylcyclohexane content ratio (TMP/MCH). Low octane (87) fuels exhibit TMP/MCH<2.5, high octane gasolines have TMP/MCH>5 and for intermediate grade gasoline the ratio falls in the range of 2.5 - 5. Based on these criteria, sample FDP-54-L contains low octane grade gasoline (TMP/MCH = 0.63).

Time of gasoline fuel release into the subsurface environment is conveniently estimated based on the cumulative BTEX index (R_b = B+T/E+X) value. In free floating product samples this index decreases compared to its value in dispensed gasoline (0.9-1.2) due to the preferential removal by dissolution of the more water soluble benzene (S=1780 mg/l) and toluene (S=515 mg/l) relative to the less soluble ethylbenzene (S=152 mg/l) and xylenes (S=158 mg/l, average value for three isomers). Depending on the NAPL layer thickness and site hydrology, the reduction in R_b value similar to that observed in sample FDP-54-L (0.13) typically occurs after approximately 15 years following a gasoline release.

Published in the scientific literature data suggest that time of diesel-type fuel release into the subsurface environment correlates with the n-heptadecane/pristane (n-C_{17}/Pr) ratio as follows:

$$T = -8.4\ (n\text{-}C_{17}/Pr) + 19.8.$$

Using the n-C_{17}/Pr ratio value calculated for sample FDP-54-L (0.44), we estimated that diesel-range fuel in this sample has been in the subsurface environment for approximately 15 years.

In summary, the analytical results obtained indicate that NAPL sample FDP-54-L represents a moderately weathered mixture of gasoline (major component) and kerosene-type fuel (subordinate component). Degradation parameters indicate that both fuel components in the sample analyzed have environmental residence time of approximately 15 years.

Please do not hesitate to contact us if you have any questions or comments regarding this report.

Sincerely,

Yakov Galperin
Laboratory Director

A4656-report.wpd

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TABLES

Table 1

Detailed Gasoline Range (C3-C10) Hydrocarbon Analysis for One product sample submitted by Cambria Environmental

(relative %)

	Sample	FDP-54-1	FDP-54-1
	GGC ID	4656-1	4656-1D
1	Propane		
2	Isobutane		
3	Isobutene		
4	Butane/Methanol		
5	trans-2-Butene		
6	cis-2-Butene		
7	3-Methyl-1-butene		
8	Isopentane	0.07	0.07
9	1-Pentene		
10	2-Methyl-1-butene	0.01	0.01
11	Pentane	0.06	0.06
12	trans-2-Pentene	0.02	0.02
13	cis-2-Pentene/t-Butanol		
14	2-Methyl-2-butene	0.05	0.05
15	2,2-Dimethylbutane		
16	Cyclopentane		
17	2,3-Dimethylbutane/MTBE	0.18	0.18
18	2-Methylpentane	0.82	0.84
19	3-Methylpentane	0.63	0.63
20	Hexane	0.74	0.74
21	trans-2-Hexene	0.07	0.07
22	3-Methylcyclopentene	0.16	0.16
23	3-Methyl-2-pentene	0.08	0.08
24	cis-2-Hexene	0.19	0.19
25	3-Methyl-trans-2-pentene	0.03	0.03
26	Methylcyclopentane	1.78	1.78
27	2,4-Dimethylpentane	0.53	0.53
28	Benzene	0.99	0.99
29	5-Methyl-1-hexene	0.07	0.06
30	Cyclohexane	0.42	0.42
31	2-Methylhexane/TAME	1.75	1.74
32	2,3-Dimethylpentane	1.36	1.36
33	3-Methylhexane	1.81	1.80
34	2-Methyl-1-hexene	0.96	0.96
35	2,2,4-Trimethylpentane	1.47	1.46
IS1	α,α,α-Trifluorotoluene		
36	n-Heptane	1.40	1.39
37	Methylcyclohexane	2.35	2.34
38	2,5-Dimethylhexane	1.33	1.31
39	2,4-Dimethylhexane	0.67	0.67
40	2,3,4-Trimethylpentane	1.08	1.07
41	Toluene	1.24	1.24
42	2,3-Dimethylhexane	0.66	0.66

Table 1 (cont)

Detailed Gasoline Range (C3-C10) Hydrocarbon Analysis for One product sample submitted by Cambria Environmental

(relative %)

Sample		FDP-54-1	FDP-54-1
GGC ID		4656-1	4656-1D
43	2-Methylheptane	1.66	1.65
44	4-Methylheptane	0.64	0.64
45	3,4-Dimethylhexane	0.10	0.10
46	3-Ethyl-3-methylpentane	1.70	1.70
47	3-Methylheptane	1.05	1.05
48	2-Methyl-1-heptene	0.35	0.35
49	n-Octane	1.60	1.59
50	2,2-Dimethylheptane	0.09	0.09
51	2,4-Dimethylheptane	0.26	0.26
52	Ethylcyclohexane	0.95	0.96
53	2,6-Dimethylheptane	0.70	0.70
54	Ethylbenzene	3.37	3.39
55	m + p Xylenes	11.09	11.00
56	4-Methyloctane	0.99	0.99
57	2-Methyloctane	1.12	1.12
58	3-Ethylheptane	1.45	1.45
59	3-Methyloctane	0.15	0.15
60	o-Xylene	3.27	3.29
61	1-Nonene		
62	n-Nonane	1.45	1.44
IS2	p-Bromofluorobenzene		
63	Isopropylbenzene	0.26	0.27
64	3,3,5-Trimethylheptane	0.27	0.27
65	2,4,5-Trimethylheptane	0.32	0.32
66	n-Propylbenzene	1.39	1.40
67	1-Methyl-3-ethylbenzene	2.63	2.64
68	1-Methyl-4-ethylbenzene	2.32	2.34
69	1,3,5-Trimethylbenzene	2.95	2.96
70	3,3,4-Trimethylheptane	0.27	0.27
71	1-Methyl-2-ethylbenzene	1.84	1.85
72	3-Methylnonane		
73	1,2,4-Trimethylbenzene	8.45	8.49
74	Isobutylbenzene	0.20	0.20
75	sec-Butylbenzene	0.17	0.17
76	n-Decane	1.50	1.50
77	1,2,3-Trimethylbenzene	2.58	2.55
78	Indan	2.19	2.29
79	1,3-Diethylbenzene	1.98	1.91
80	1,4-Diethylbenzene	1.00	1.00

Table 1 (cont)

Detailed Gasoline Range (C3-C10) Hydrocarbon Analysis for One product sample submitted by Cambria Environmental

(relative %)

	Sample	FDP-54-1	FDP-54-1
	GGC ID	4656-1	4656-1D
81	n-Butylbenzene	1.75	1.76
82	1,3-Dimethyl-5-ethylbenzene	0.60	0.61
83	1,4-Dimethyl-2-ethylbenzene	1.88	1.88
84	1,3-Dimethyl-4-ethylbenzene	1.29	1.30
85	1,2-Dimethyl-4-ethylbenzene	3.29	3.30
86	Undecene		
87	1,2,4,5-Tetramethylbenzene	1.07	1.07
88	1,2,3,5-Tetramethylbenzene	1.42	1.43
89	1,2,3,4-Tetramethylbenzene	2.17	2.19
90	Naphthalene	0.42	0.42
91	2-Methyl-naphthalene	0.60	0.60
92	1-Methyl-naphthalene	0.20	0.20

Table 2

Key to Chromatogram Symbol Identification

Symbol	Detail
i-10	Iso-alkane with 10 carbon atoms
i-15	Farnesane (isoprenoid with 15 carbon atoms)
i-16	Isoprenoid with 16 carbon atoms
Pr	Pristane (isoprenoid with 19 carbon atoms)
Ph	Phytane (isoprenoid with 20 carbon atoms)
nC_8	n-C_8 normal alkane
nC_{15}	n-C_{15} normal alkane
i-8	2,5-(2,4)-Dimethylhexane
i-8'	2,3,4-Trimethylpentane
i-8"	2,3-Dimethylhexane
CH-*n*	Alkylcyclohexane (where *n* indicates number of carbon atoms in the side chain)

Table 3

Key for C_4-Alkylbenzenes (m/z 134 mass chromatograms)

#	Compound
16	Sec-Butylbenzene
17	1-Methyl-3-Isopropylbenzene
18	1-Methyl-4-Isopropylbenzene
19	1-Methyl-2-Isopropylbenzene
20	1,3-Diethylbenzene
21	1-Methyl-3-Propylbenzene
22	Butylbenzene
23	1,3-Diemethyl-5-Ethylbenzene
24	1,2-Diethylbenzene
25	1-Methy-2-Propylbenzene
26	1,4-Dimethyl-2-Ethylbenzene
27	1,3-Dimethyl-4-Ethylbenzene
28	1,2-Dimethyl-4-Ethylbenzene
29	1,3-Dimethyl-2-Ethylbenzene
30	1,2-Dimethyl-3-Ethylbenzene
31a	1,2,4,5-Tetramethylbenzene
31	1,2,3,5-Tetramethylbenzene
32	1,2,3,4-Tetramethylbenzene

Table 4

Key for Aromatic Compounds Identification in Bar Diagram

AB:	C_3-C_6 Alkylbenzenes
NAPH:	C_0-C_4 Naphthalenes
FL:	C_0-C_4 Fluorenes
BP:	C_0-C_2 BP Biphenyl/Dibenzofuran
PHEN:	C_0-C_4 Phenanthrenes
PY:	C_0-C_4 Pyrenes/Fluoranthenes
CHR:	C_0-C_4 Chrysenes
BT:	C_1-C_5 Benzothiophenes
DBT:	C_0-C_4 Dibenzothiophenes
NBT:	C_0-C_4 Naphthobenzothiophenes
MAS:	Monoaromatic Steranes
TAS:	Triaromatic Steranes

FIGURES

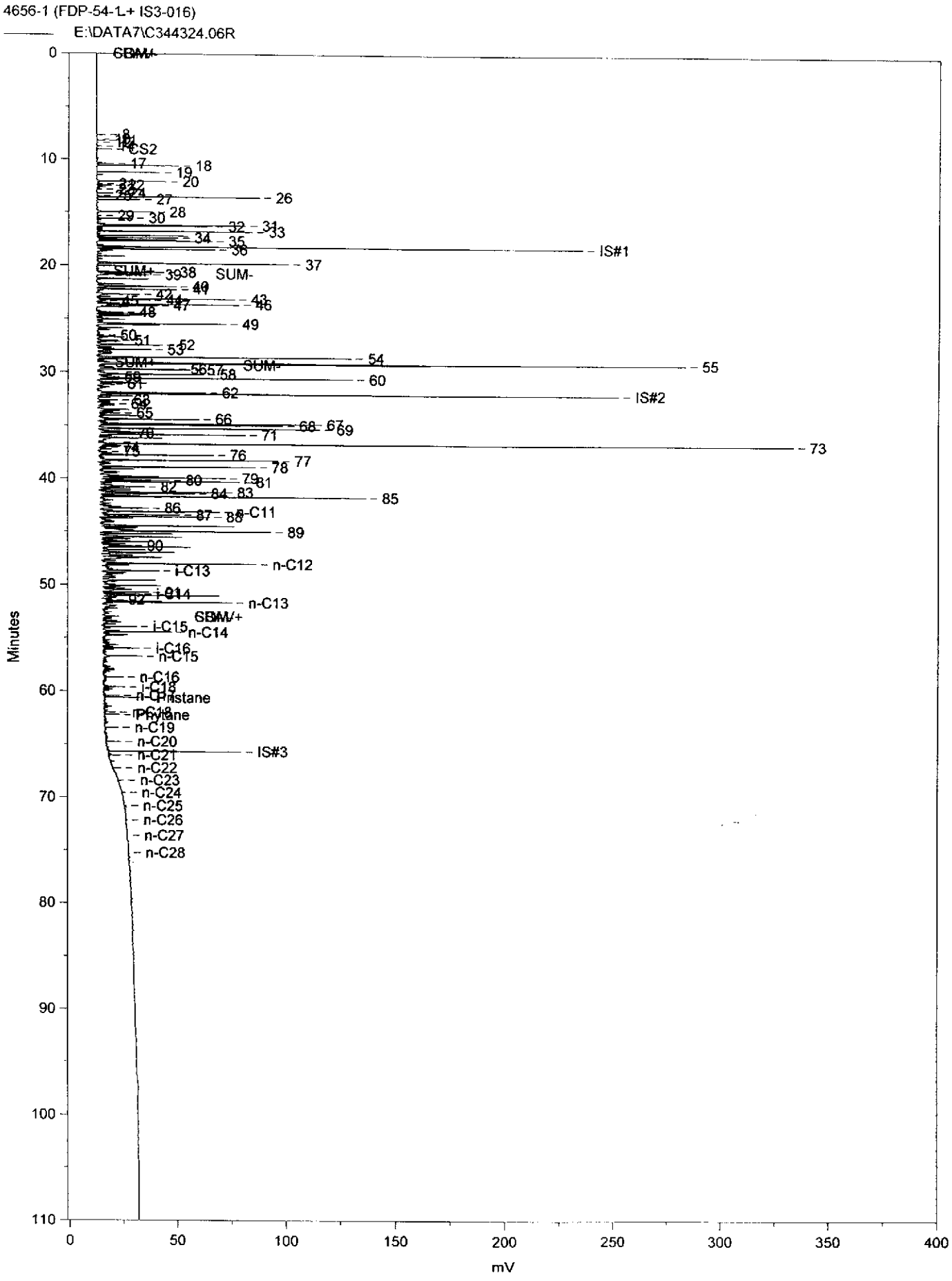

Figure 1

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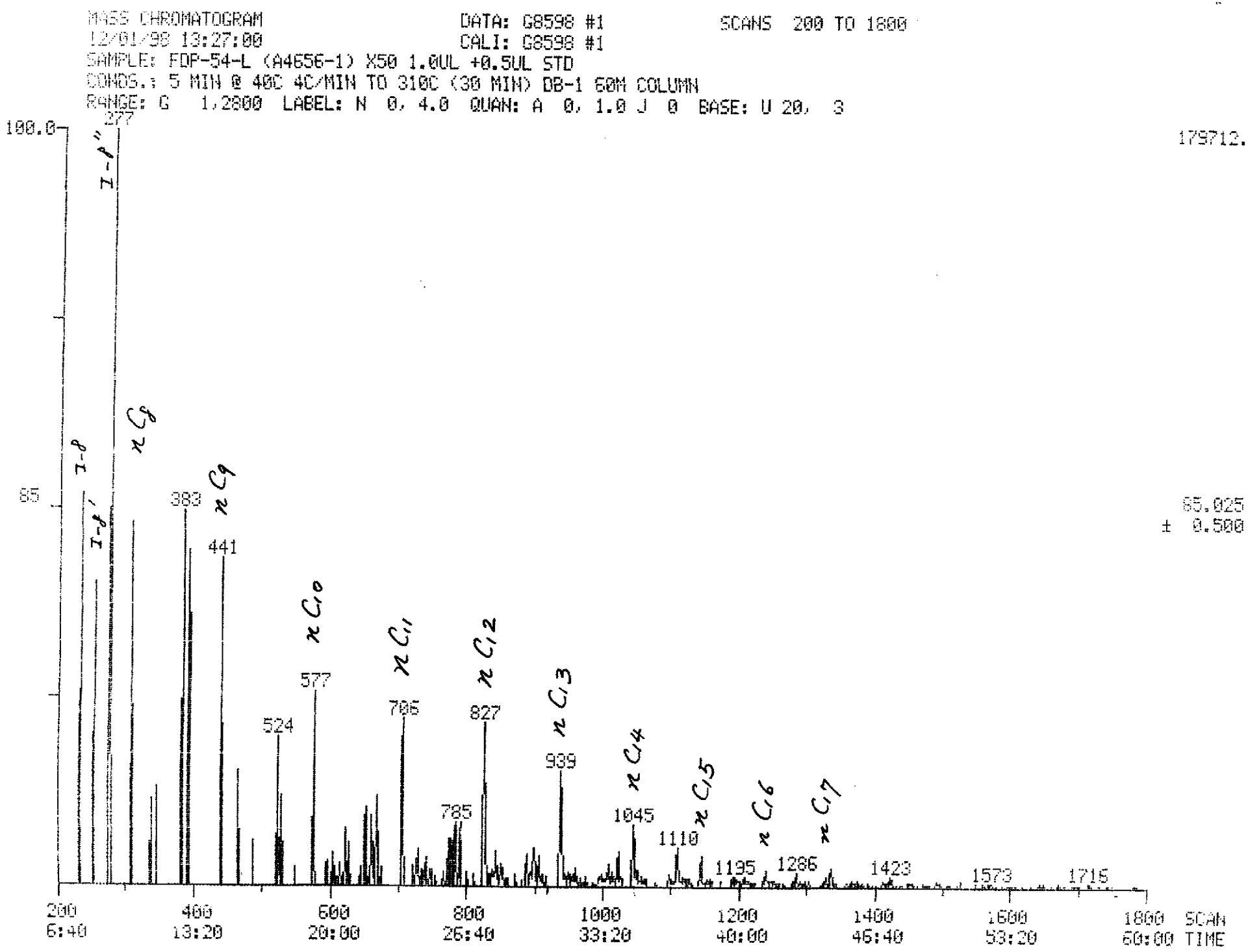
Figure 2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CONDS.: 5 MIN @ 40C 4C/MIN TO 310C (30 MIN) DB-1 60M COLUMN
RANGE: G 1,2800 LABEL: N 0, 4.0 QUAN: A 0, 1.0 J 0 BASE: U 20, 3
100.0
85
179712.
85.025
± 0.500
I-ρ''
I-ρ
I-ρ'
n C8
n C9
n C10
n C11
n C12
n C13
n C14
n C15
n C16
n C17
277
383
441
524
577
706
785
827
939
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1110
1195
1286
1423
1573
1715
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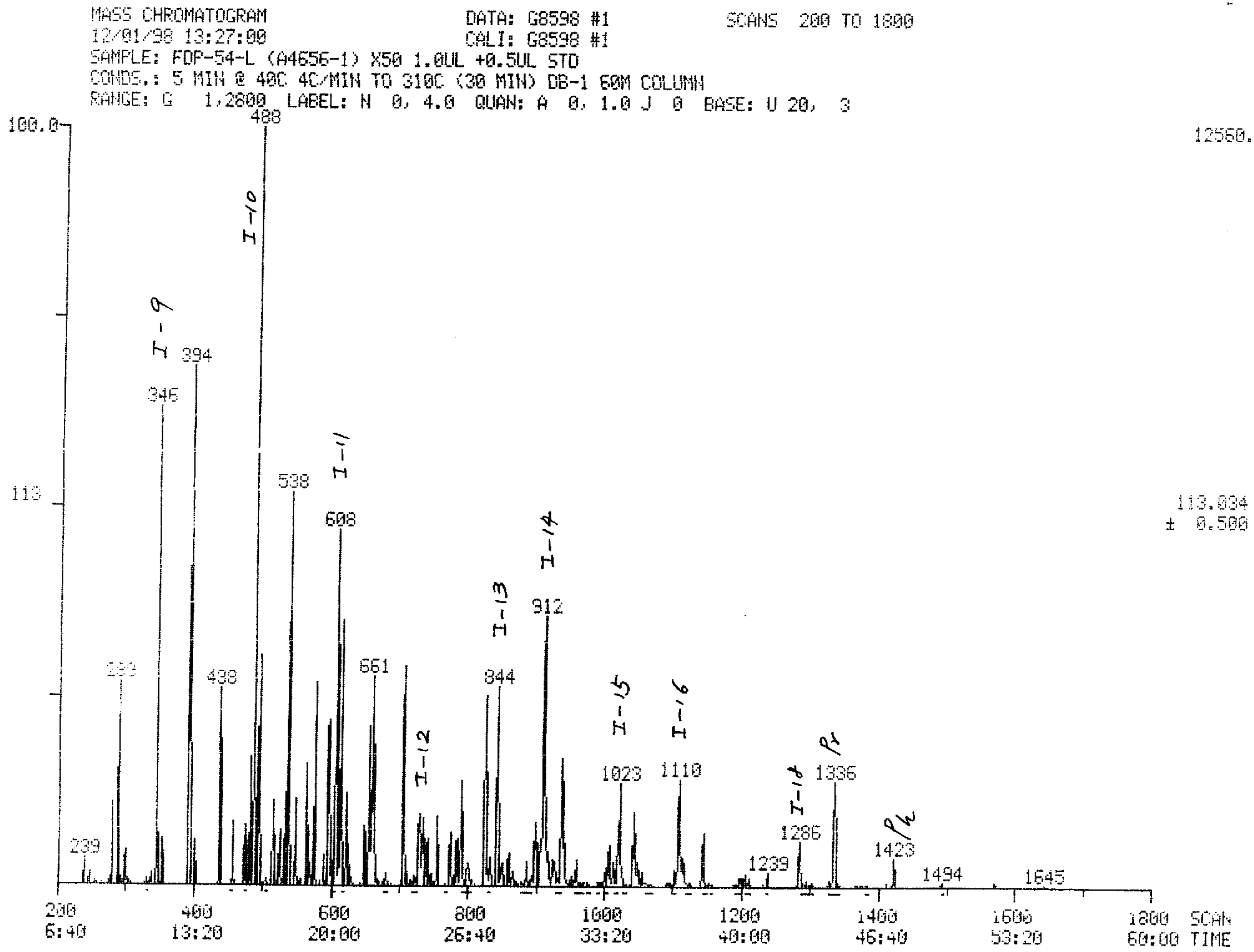
600 20:00
800 26:40
1000 33:20
1200 40:00
1400 46:40
1600 53:20
1800 60:00 SCAN TIME

Figure 3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CONDS.: 5 MIN @ 40C 4C/MIN TO 310C (30 MIN) DB-1 60M COLUMN
RANGE: G 1,2800 LABEL: N 0, 4.0 QUAN: A 0, 1.0 J 0 BASE: U 20, 3
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113
113.034
± 0.500
I-9
I-10
I-11
I-12
I-13
I-14
I-15
I-16
I-18
239
289
346
394
438
488
538
608
661
844
912
1023
1110
1239
1286
1336
1423
1494
1645
200
6:40
400
13:20
600
20:00
800
26:40
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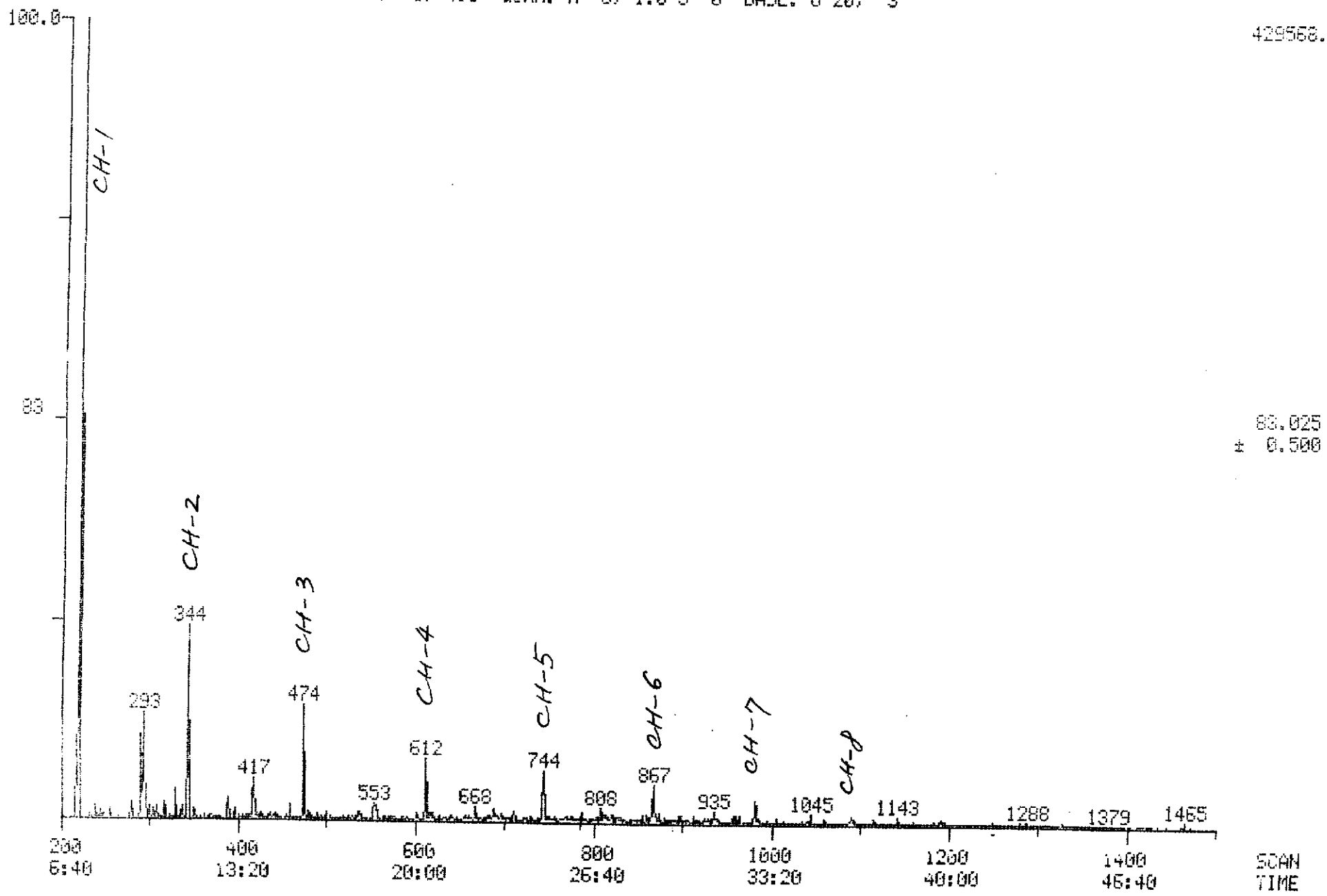
1400
46:40
1600
53:20
1800
60:00
SCAN
TIME

Figure 4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429568.
83.025
± 0.500
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CH-2
CH-3
CH-4
CH-5
CH-6
CH-7
CH-8
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417
474
553
612
668
744
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1379
1465
200
6:40
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1000
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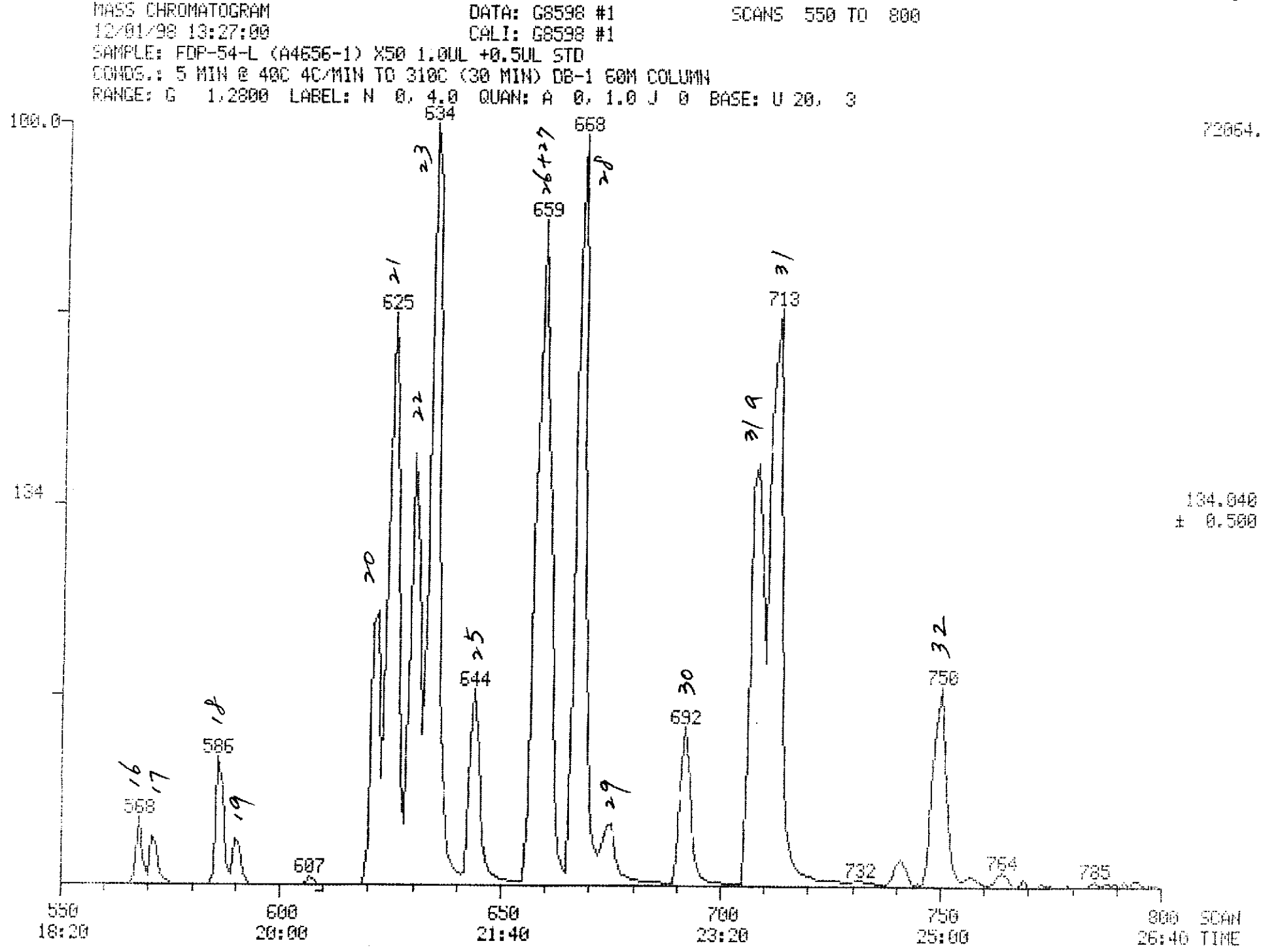
40:00
1400
46:40
SCAN
TIME

Figure 5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± 0.500
534
668
659
625
713
586
644
692
750
568
607
732
754
785
16
17
18
19
20
21
22
23
25
26+27
28
29
30
31
32
550
18:20
600
20:00
650
21:40
700
23:20
750
25:00
800 SCAN
26:40 TIME

Figure 6

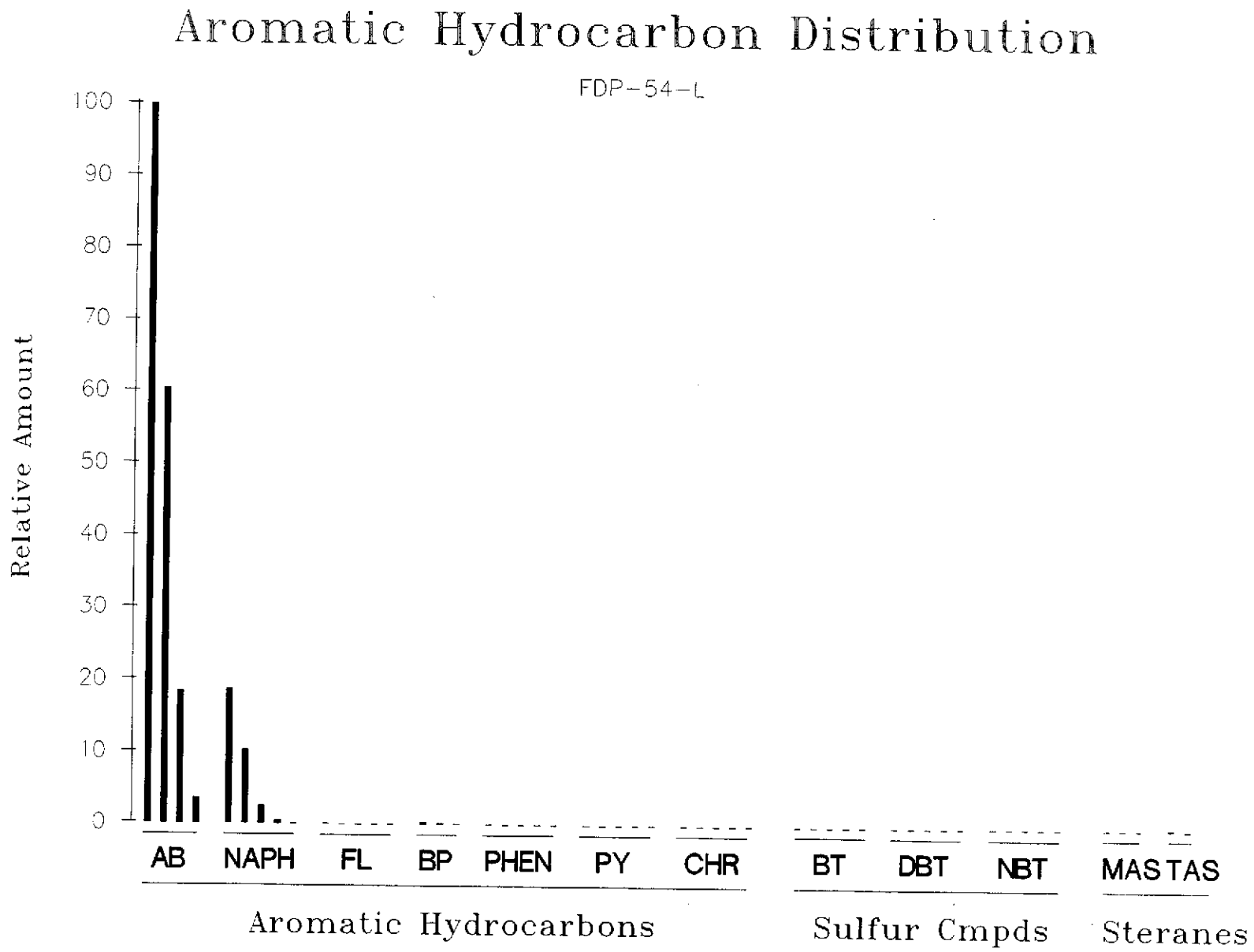

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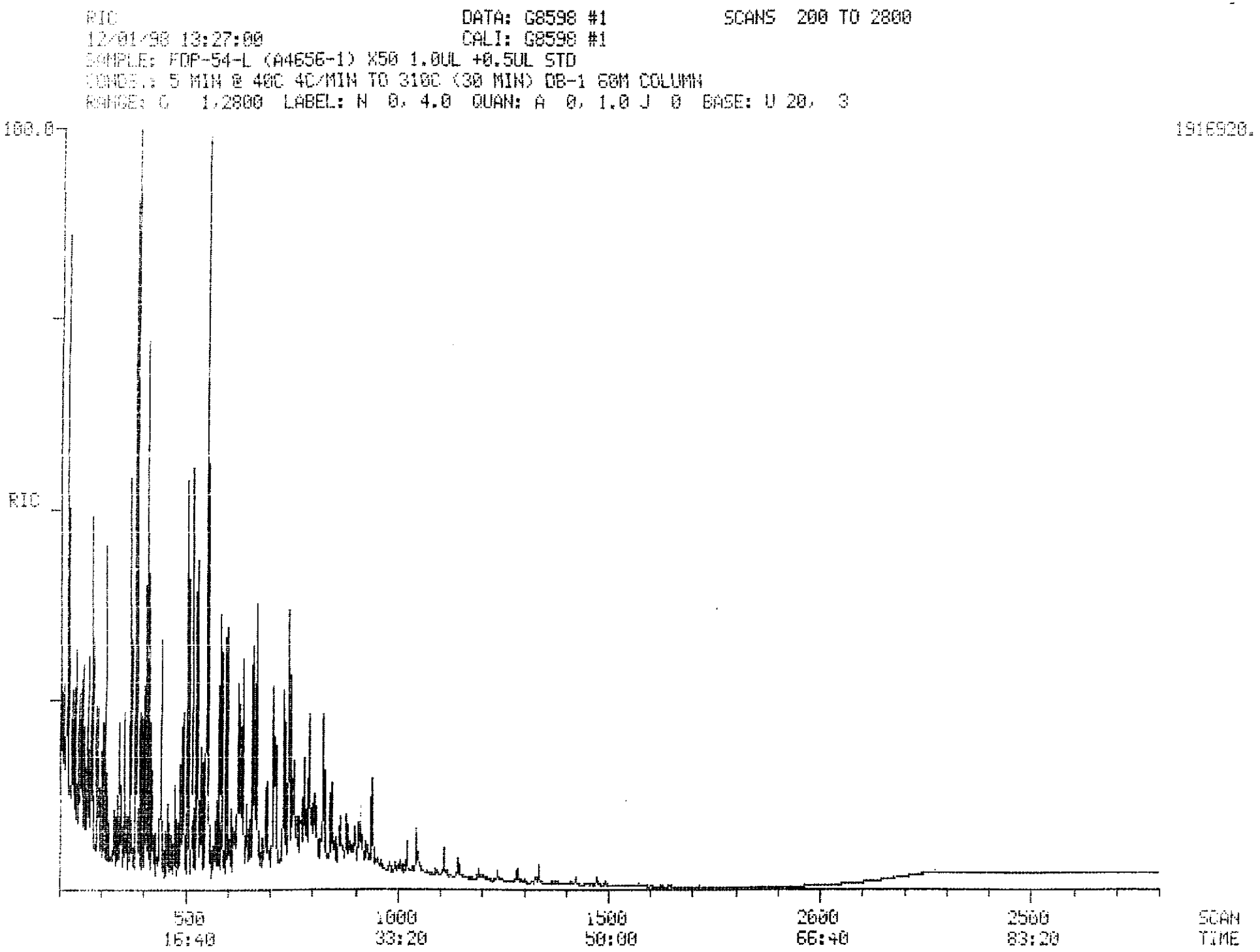
Figure 7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RANGE: C 1,2800 LABEL: N 0, 4.0 QUAN: A 0, 1.0 J 0 BASE: U 20, 3
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1916920.
RIC
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15:40
1000
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1500
50:00
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2500
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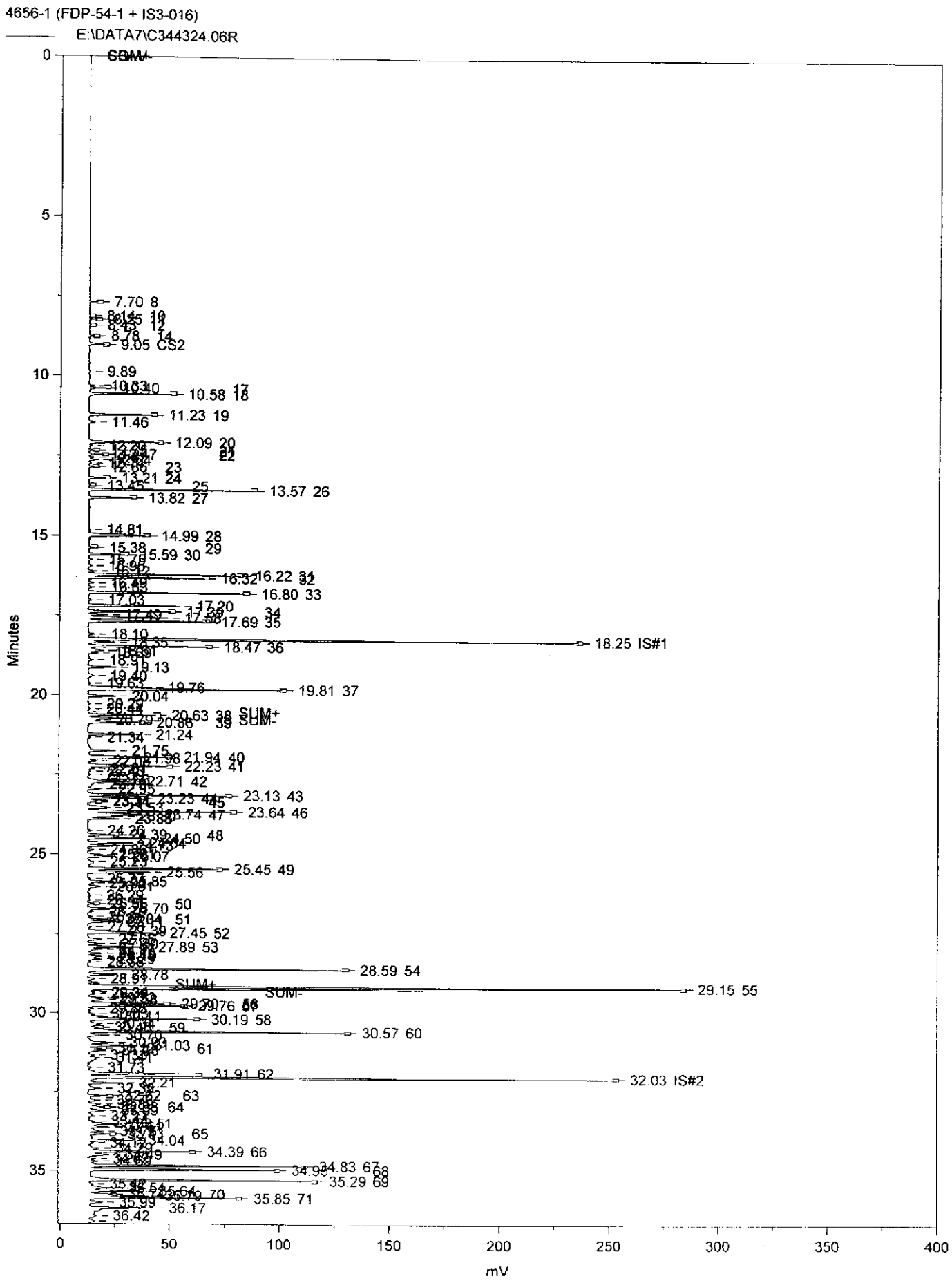
SCAN
TIME

APPENDIX

QA/QC DATA

&

CHAIN OF CUSTODY



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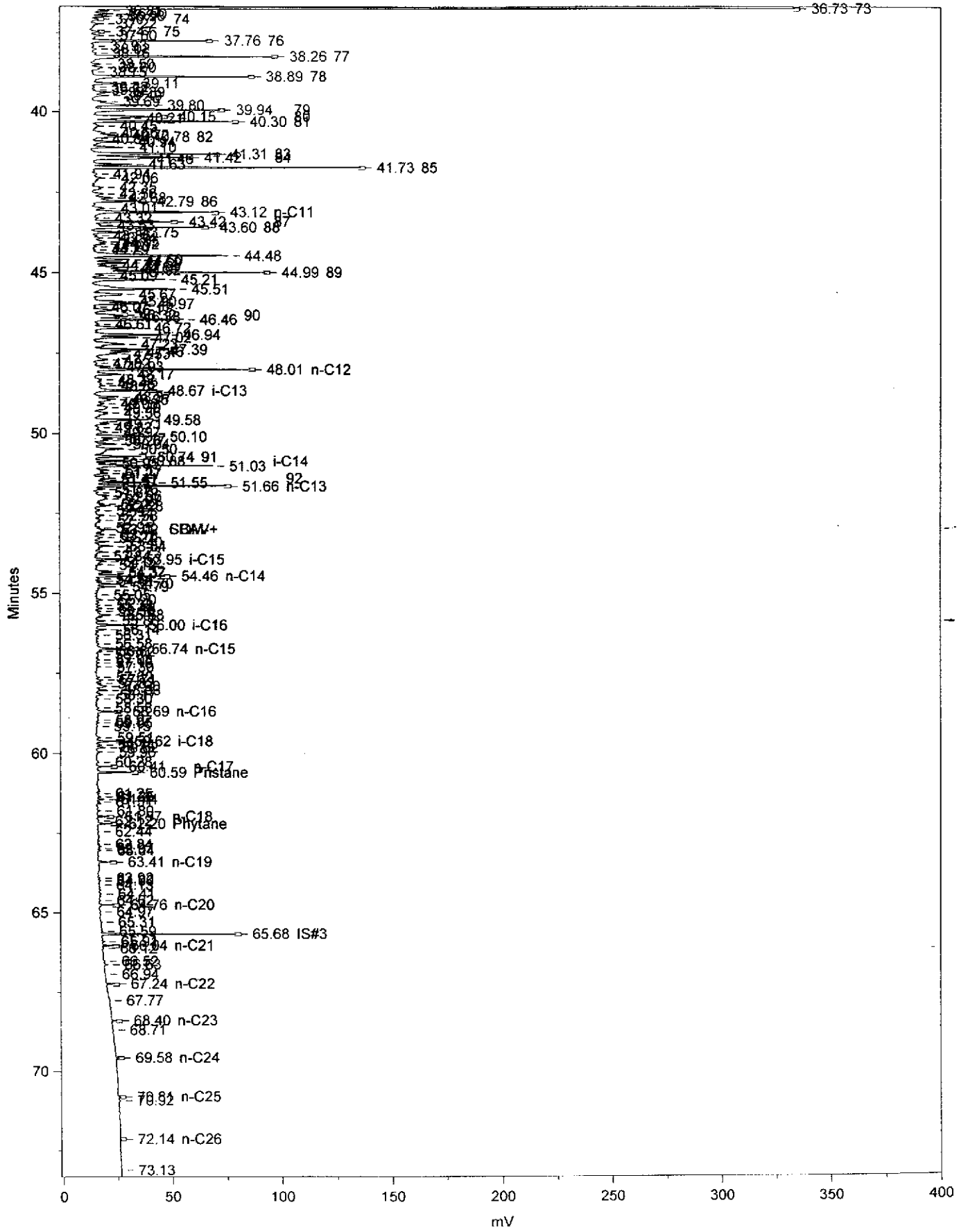
4656-1 (FDP-54-1 + IS3-016)

E:\DATA7\C344324.06R



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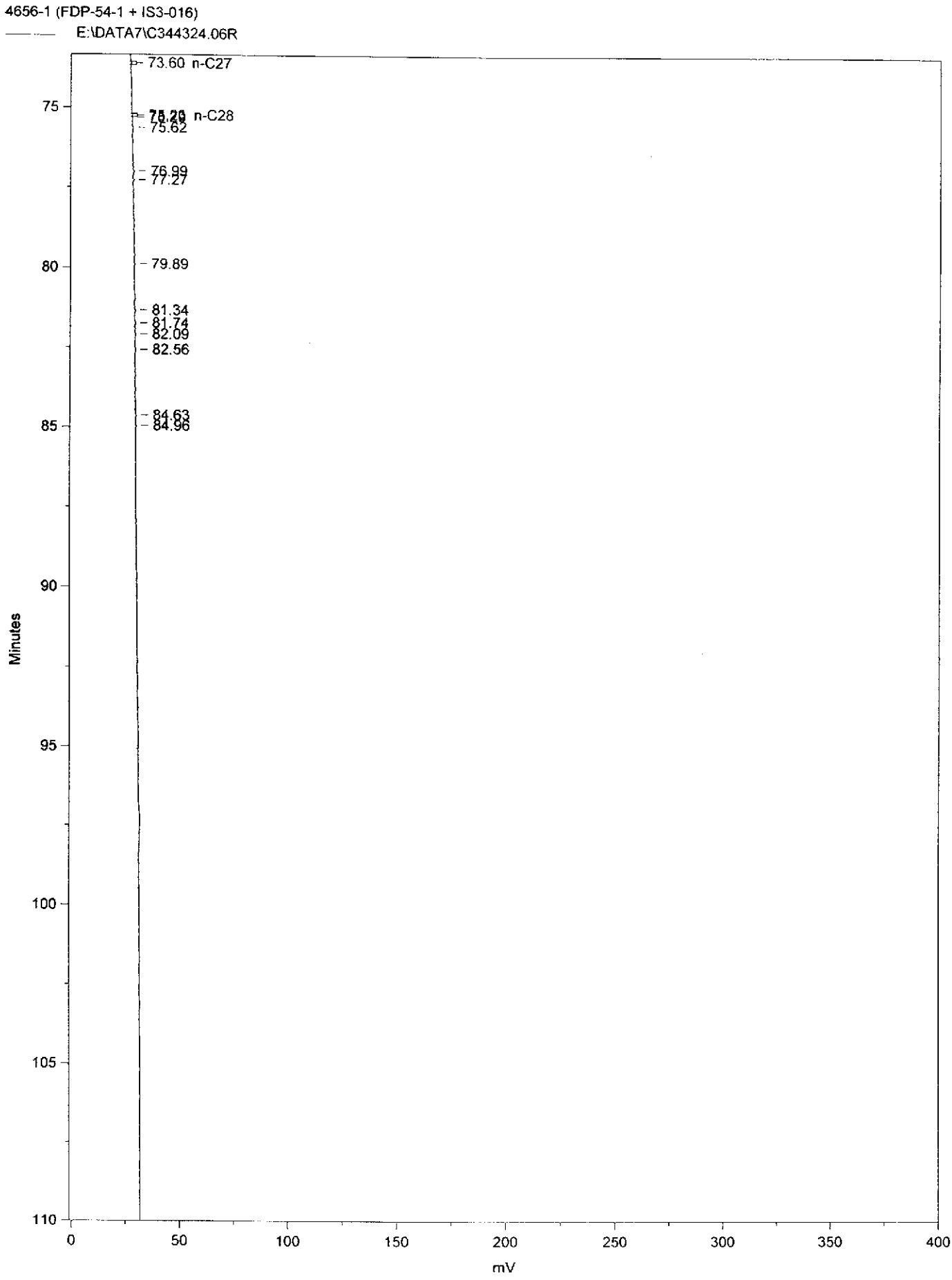
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75.20 n-C28
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79.89
81.34
81.74
82.09
82.56
84.63
84.96
Minutes
75
80
85
90
95
100
105
110
0
50
100
150
200
250
300
350
400
mV

Chromatography by GLOBAL GEOCHEMISTRY CORPORATION

TODAY'S DATE....12/4/98 TIME.....11:50:14 AM
RAW DATA FILE NAME..E:\DATA7\C344324.06R
SAMPLE NAME.....4656-1 (FDP-54-1 + IS3-016)
DATE TAKEN..11-20-1998 20:43:17
METHOD FILE.....!E:\DATA7\C344324F.MET
METHOD:..Whole Oil Analysis
CALIBRATION FILE...!E:\DATA7\C344324F.CAL CAL. FILE VERSION....28
INSTRUMENT.....HP6890/ALS--FID OPERATOR....Lev Baycher
RUN TIME.....110
AREA REJECT.....0 COM PORT....7
HEADING 1..Whole Oil Analysis-HP6890/ALS
HEADING 2..Method 1/Split 400:1
FORMAT FILE..E:\DATA7\NORMAL.FMT

PEAKS DETECTED IN THIS CHROMATOGRAM

Peak #	Ret Time (min)	Peak Name	Peak Area	Peak Height
1	7.699	8	6482	4006
2	8.138	10	1096	563
3	8.248	11	5945	3595
4	8.433	12	1773	813
5	8.777	14	4981	2484
6	9.05	CS2	16073	6958
7	9.888		2020	898
8	10.331		4868	2411
9	10.401	17	17271	7801
10	10.579	18	78131	37991
11	11.228	19	59928	29007
12	11.461		9036	2958
13	12.093	20	70039	32117
14	12.201		3837	1660
15	12.346	21	6349	2620
16	12.47	22	15184	6841
17	12.569		5554	2439
18	12.642		9754	4294
19	12.741		3349	1313
20	12.856	23	7489	2467
21	13.207	24	18302	7677
22	13.446	25	2821	1019
23	13.567	26	168875	75076
24	13.819	27	50293	19914
25	14.813		2533	893
26	14.992	28	93560	26093
27	15.376	29	6164	2114
28	15.588	30	39771	16401
29	15.752		5076	1954
30	15.953		5450	1791
31	16.122		10369	3940
32	16.225	31	165472	68739
33	16.321	32	129330	53170
34	16.488		7317	2633
35	16.627		7715	2913
36	16.801	33	171871	71710
37	17.032		4927	1644
38	17.204		101972	42153
39	17.391	34	90844	37635
40	17.49		22482	9205

Peak #	Ret Time (min)	Peak Name	Peak Area	Peak Height
41	17.576		92126	36597
42	17.691	35	139499	53254
43	18.101		8541	3130
44	18.254	IS#1	526379	223344
45	18.351		33096	12327
46	18.475	36	132457	54558
47	18.615		30393	7393
48	18.685		12118	4770
49	18.914		6454	2455
50	19.129		34374	12907
51	19.4		13009	2752
52	19.632		4811	1160
53	19.756		66476	29218
54	19.811	37	222442	88632
55	20.036		35563	12744
56	20.287		3971	1178
57	20.436		3251	1036
58	20.629	38	126217	30907
59	20.788		12741	5571
60	20.86	39	63841	23946
61	21.242		59942	23771
62	21.337		4102	1472
63	21.75		42222	12753
64	21.942	40	102761	36604
65	21.979		29288	18182
66	22.081		11659	4432
67	22.226	41	117595	36912
68	22.308		8058	3029
69	22.398		4664	1625
70	22.502		4686	1190
71	22.663		7173	4097
72	22.706	42	62274	19779
73	22.79		6049	2698
74	22.948		16174	6514
75	23.127	43	157369	63694
76	23.229	44	60733	24590
77	23.306		10223	4212
78	23.342	45	9540	4145
79	23.533		43256	10425
80	23.643	46	161002	65775
81	23.743	47	99493	27906
82	23.801		38838	16177
83	23.88		38108	14401
84	24.258		4948	1951
85	24.389	48	33364	12107
86	24.496		69527	27284
87	24.641		51176	20850
88	24.73		38462	15144
89	24.862		8809	2967
90	25.006		17461	6934
91	25.071		34388	13162
92	25.235		18682	2977
93	25.446	49	151614	59607
94	25.555		82480	28808
95	25.766		4228	1644
96	25.851		33044	12200
97	25.916		6979	2731

Peak #	Ret Time (min)	Peak Name	Peak Area	Peak Height
98	26.01		23170	6127
99	26.292		7139	1414
100	26.437		4300	1430
101	26.548	50	8590	3347
102	26.701		34724	12817
103	26.787		8719	2708
104	26.954		5693	2116
105	27.037	51	24852	9845
106	27.111		34144	10776
107	27.277		5953	1786
108	27.395		28387	11955
109	27.45	52	89932	30247
110	27.652		26574	6735
111	27.799		21174	8121
112	27.891	53	66299	25068
113	27.968		22822	6746
114	28.105		18034	6721
115	28.191		26717	7251
116	28.287		18239	6655
117	28.377		5964	1736
118	28.588	54	319826	117077
119	28.784		35967	12830
120	28.911		12391	3300
121	29.148	55	1050706	271171
122	29.342		9832	3629
123	29.393		10548	3398
124	29.516		18416	7048
125	29.576		26251	7760
126	29.699	56	94132	35605
127	29.762	57	106153	43137
128	29.857		7055	2798
129	30.034		11697	3544
130	30.109		23866	9421
131	30.186	58	137406	49057
132	30.336		32063	6742
133	30.458	59	14090	4943
134	30.574	60	310165	117624
135	30.698		31140	9889
136	30.933		43546	11957
137	31.029		61930	22716
138	31.119	61	16385	6343
139	31.181		24492	8141
140	31.33		8562	2883
141	31.413		30894	5477
142	31.729		5841	1996
143	31.908	62	137150	50250
144	32.026	IS#2	599724	240011
145	32.212		47828	16271
146	32.389		24950	6261
147	32.617	63	25035	9351
148	32.765		19285	5951
149	32.888		21387	6031
150	32.978	64	25703	8019
151	33.086		28282	8055
152	33.273		15741	3250
153	33.436		9638	3596
154	33.506		46713	14541

Peak #	Ret Time (min)	Peak Name	Peak Area	Peak Height
155	33.614		27208	10164
156	33.75		20994	7383
157	33.832	65	30583	10561
158	34.038		52726	20281
159	34.125		9400	2716
160	34.287		22272	5274
161	34.387	66	132000	47016
162	34.493		36729	9750
163	34.621		10256	3860
164	34.693		13825	4799
165	34.831	67	249623	98154
166	34.953	68	219859	85482
167	35.286	69	279276	102549
168	35.418		8769	2515
169	35.536		47350	11109
170	35.638		66911	25098
171	35.737	70	25510	10902
172	35.787		70391	27742
173	35.851	71	174500	68155
174	35.99		24215	6680
175	36.167		105361	29642
176	36.416		20529	3887
177	36.585		12368	2869
178	36.727	73	801132	320677
179	36.811		24449	8767
180	36.9		31309	10855
181	36.981		28304	10049
182	37.072	74	18758	4016
183	37.224		16565	6255
184	37.471	75	15778	4252
185	37.596		21192	6252
186	37.762	76	141953	53445
187	37.935		9451	1695
188	38.024		13005	2925
189	38.163		12796	2951
190	38.262	77	244920	83154
191	38.505		14285	5039
192	38.605		31788	5775
193	38.751		4883	1490
194	38.895	78	207100	72475
195	39.112		48155	16389
196	39.225		7256	2110
197	39.316		6218	2233
198	39.39		35470	9823
199	39.492		27208	8442
200	39.687		22638	7408
201	39.795		102203	27760
202	39.942	79	187244	58751
203	40.152	80	94742	32756
204	40.206		44460	18080
205	40.3	81	166226	65069
206	40.446		23847	6018
207	40.657		27511	6602
208	40.719		31085	11610
209	40.777	82	56779	20991
210	40.842		7149	2587
211	40.94		41379	14407

Peak #	Ret Time (min)	Peak Name	Peak Area	Peak Height
212	41.104		40067	14742
213	41.312	83	177839	56338
214	41.417	84	122004	44283
215	41.456		49332	22566
216	41.633		54091	18877
217	41.731	85	311487	122615
218	41.936		11685	2786
219	42.06		24106	6410
220	42.35		14917	5579
221	42.556		25881	5574
222	42.681		32534	9979
223	42.791	86	79213	22607
224	43.01		22843	6103
225	43.123	n-C11	171803	55661
226	43.316		13447	3277
227	43.425	87	101044	37061
228	43.529		14563	4501
229	43.602	88	135044	50945
230	43.754		44369	15439
231	43.86		7680	2653
232	43.936		17658	5134
233	44.051		27663	6594
234	44.116		17706	6374
235	44.198		6634	2317
236	44.293		5141	1496
237	44.478		215568	62011
238	44.599		51704	17201
239	44.692		45163	16550
240	44.771		17288	6405
241	44.841		46682	15123
242	44.917		50562	16289
243	44.991	89	205967	78911
244	45.086		16144	5364
245	45.21		112361	33206
246	45.511		151716	37901
247	45.671		67600	13915
248	45.903		52707	14152
249	45.975		62383	22277
250	46.07		4711	1482
251	46.168		41999	11642
252	46.324	90	39932	13880
253	46.376		42601	15840
254	46.458		115439	41540
255	46.606		11905	2973
256	46.718		77186	20558
257	46.935		99894	33936
258	47.019		59683	20836
259	47.227		66143	14655
260	47.394		75299	28037
261	47.459		56775	17260
262	47.531		35187	11051
263	47.709		33879	6931
264	47.818		8444	1696
265	47.928		20125	7999
266	48.015	n-C12	182966	71597
267	48.17		45874	12679
268	48.325		11774	3962

Peak #	Ret Time (min)	Peak Name	Peak Area	Peak Height
269	48.454		15895	3703
270	48.522		18784	5295
271	48.673	i-C13	92414	26588
272	48.868		32715	11462
273	48.945		46025	10115
274	49.077		20030	5040
275	49.2		44123	6446
276	49.356		17307	6581
277	49.581		93266	24583
278	49.705		20107	7097
279	49.818		11694	2303
280	49.967		30602	6243
281	50.101		82265	27229
282	50.173		22333	8646
283	50.227		15919	6488
284	50.339		32444	10433
285	50.496		81315	13714
286	50.738	91	57037	21516
287	50.878	i-C14	38787	17325
288	50.95		12577	5069
289	51.03		129513	54121
290	51.174		23237	6801
291	51.266		19853	6319
292	51.414	92	18942	4607
293	51.471		13044	5030
294	51.555		61640	27408
295	51.664	n-C13	126106	59965
296	51.761		14943	4944
297	51.87		4105	1707
298	51.964		17116	6466
299	52.072		38701	5921
300	52.227		9814	4368
301	52.283		17008	6908
302	52.418		6908	2268
303	52.577		14193	4111
304	52.731		6102	1966
305	52.951		3210	1625
306	53.017		3784	2649
307	53.18		11137	4036
308	53.268		11402	3586
309	53.405		13647	6529
310	53.538		12312	6889
311	53.728		10348	5619
312	53.845		2398	1266
313	53.948	i-C15	29894	15378
314	54.02		12006	4718
315	54.116		4591	2862
316	54.323		9034	5762
317	54.37		8408	5585
318	54.46	n-C14	55638	30900
319	54.542		3936	1654
320	54.614		4380	2535
321	54.7		21382	10544
322	54.794		15340	8270
323	55.055		3045	980
324	55.204		7038	3238
325	55.376		4594	1883

Peak #	Ret Time (min)	Peak Name	Peak Area	Peak Height
326	55.476		7169	3024
327	55.561		4059	2272
328	55.68		23084	6689
329	55.862		8453	4514
330	55.996	i-C16	40260	16414
331	56.137		9400	4867
332	56.313		5160	1469
333	56.584		2578	1113
334	56.741	n-C15	35154	16808
335	56.817		4283	1924
336	56.912		6018	1099
337	57.08		4858	1630
338	57.181		2234	1448
339	57.303		3429	1937
340	57.625		3793	1621
341	57.709		9860	3126
342	57.815		2989	1915
343	57.901		10126	3661
344	58.027		7711	4509
345	58.175		9202	3126
346	58.301		2693	1202
347	58.578		4134	1224
348	58.69	n-C16	17978	8726
349	58.968		4649	1131
350	59.052		2489	1431
351	59.154		2315	684
352	59.51		6125	1919
353	59.621	i-C18	20055	9557
354	59.736		5266	2223
355	59.817		8535	3909
356	59.958		5136	2593
357	60.276		2868	1099
358	60.412	n-C17	13248	7250
359	60.592	Pristane	33758	16305
360	61.255		1794	1048
361	61.354		3192	1603
362	61.435		5731	3330
363	61.51		1596	1020
364	61.798		3284	1681
365	61.974	n-C18	9210	5335
366	62.116		2200	666
367	62.203	Phytane	13227	6690
368	62.441		2069	734
369	62.841		1201	713
370	62.972		2064	1054
371	63.044		3623	1618
372	63.414	n-C19	12261	6243
373	63.922		1964	1007
374	64.001		2633	988
375	64.13		1683	642
376	64.413		2415	1115
377	64.618		1861	728
378	64.763	n-C20	12012	6810
379	64.972		1058	302
380	65.305		3183	720
381	65.592		1648	893
382	65.679	IS#3	103950	61521

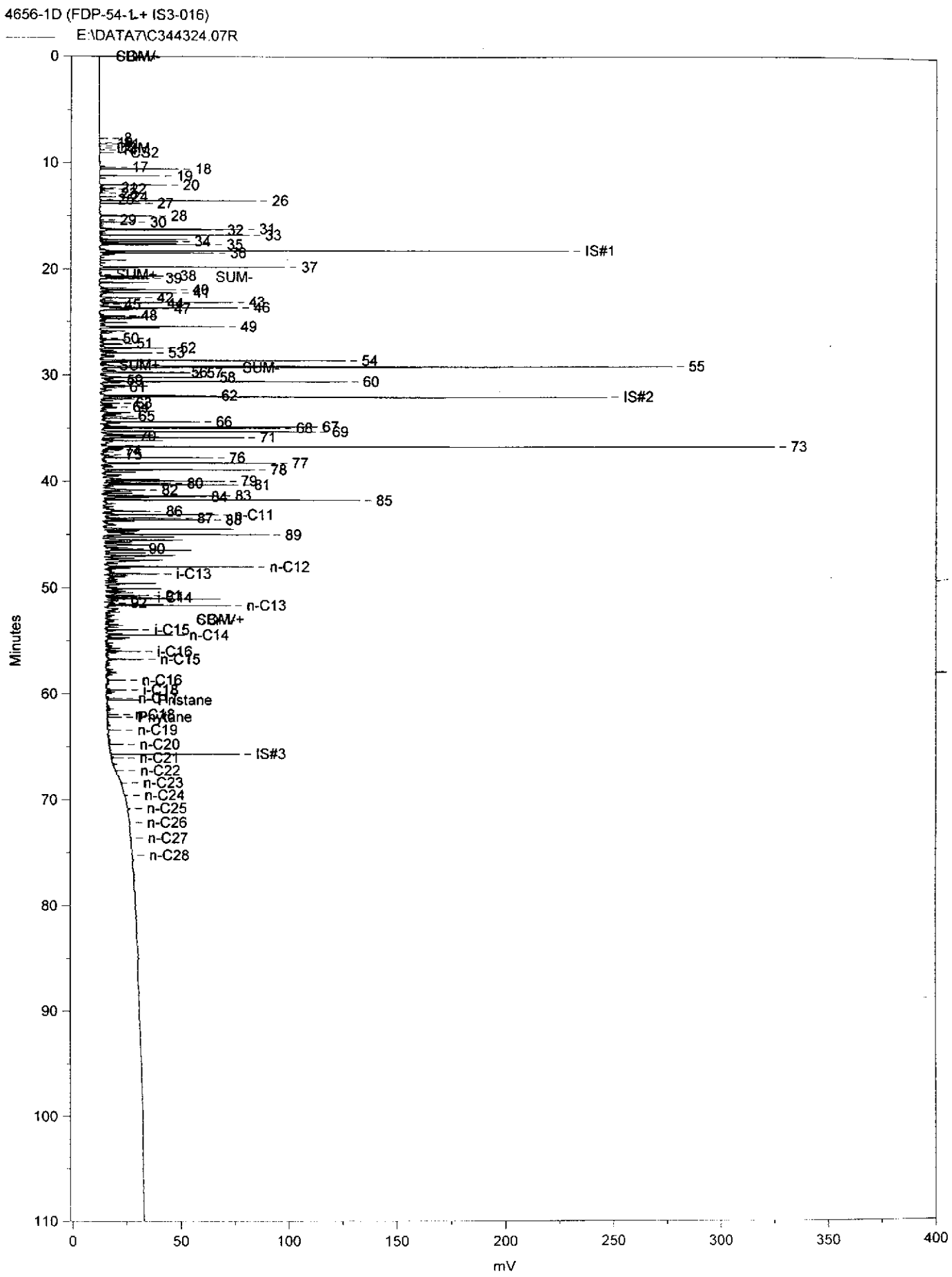
Peak #	Ret Time (min)	Peak Name	Peak Area	Peak Height
383	65.91		2509	1318
384	66.035	n-C21	9015	5570
385	66.122		1891	789
386	66.524		2384	921
387	66.63		4594	1979
388	66.938		1481	408
389	67.243	n-C22	6977	3933
390	67.771		2514	512
391	68.401	n-C23	4436	2656
392	68.705		2880	361
393	69.581	n-C24	3253	1559
394	70.808	n-C25	2619	1052
395	70.925		2322	878
396	72.145	n-C26	974	447
397	73.132		3620	371
398	73.599	n-C27	857	327
399	75.229	n-C28	765	270
400	75.292		1798	215
401	75.62		2175	564
402	76.991		1442	412
403	77.265		2232	559
404	79.893		2272	445
405	81.34		1958	330
406	81.738		2504	357
407	82.089		1695	341
408	82.564		2205	398
409	84.631		4415	427
410	84.958		2452	518

Group	Group Amount	Amount %
0	0.000	N/A

TOTAL AREA DETECTED = 1.861652E+07

Analyzed by _____ Lev Baycher

Checked by _____ Date 12/04/98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SUM-
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IS#2
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SBM+
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i-C14
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i-C15
n-C14
i-C16
n-C15
n-C16
i-C18
n-C17
Pristane
Phytane
n-C18
n-C19
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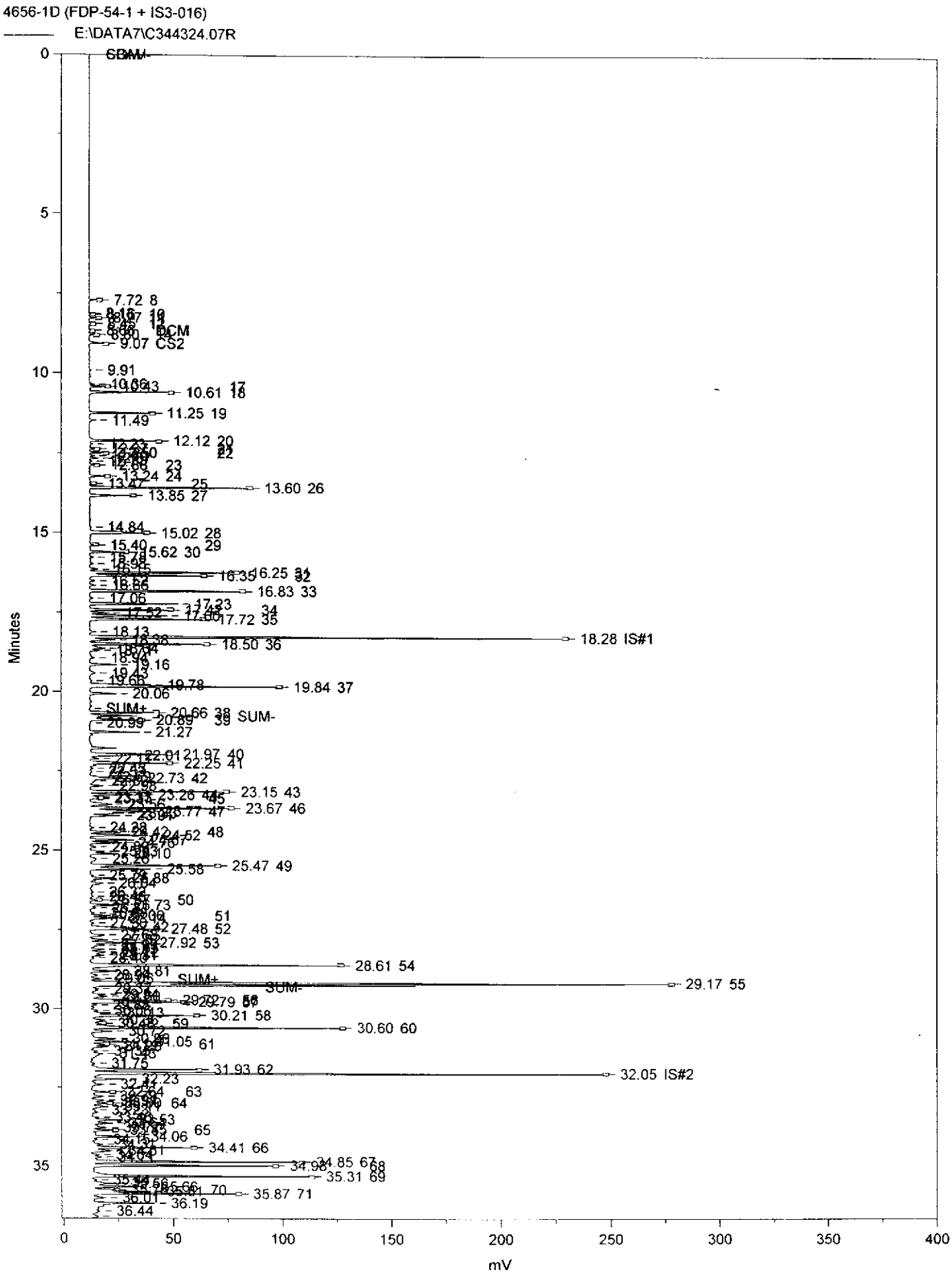
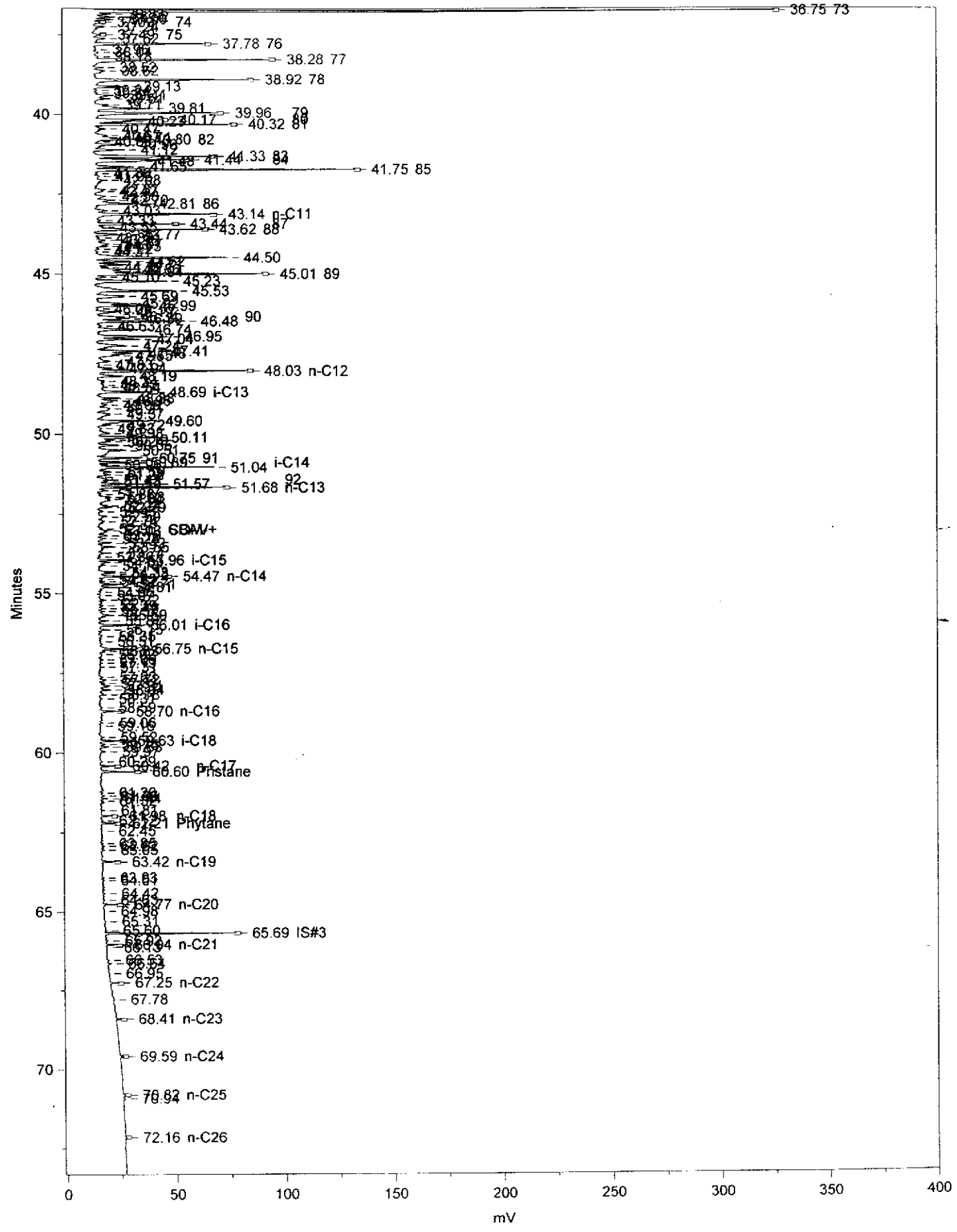
Minutes
mV



GLOBAL GEOCHEMISTRY CORP. 6919 ETON AVENUE • CANOGA PARK, CA 91303-2194 • (818) 992-4103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40.32
41.75 85
43.14 n-C11
43.62
44.50
45.01 89
46.48 90
48.03 n-C12
48.69 i-C13
49.60
50.11
51.04 i-C14
51.68 n-C13
54.47 n-C14
56.75 n-C15
58.70 n-C16
60.60 Pristane
63.42 n-C19
65.69 IS#3
67.25 n-C22
67.78
68.41 n-C23
69.59 n-C24
72.16 n-C26
Minutes
mV

4656-1D (FDP-54-1 + IS3-016)

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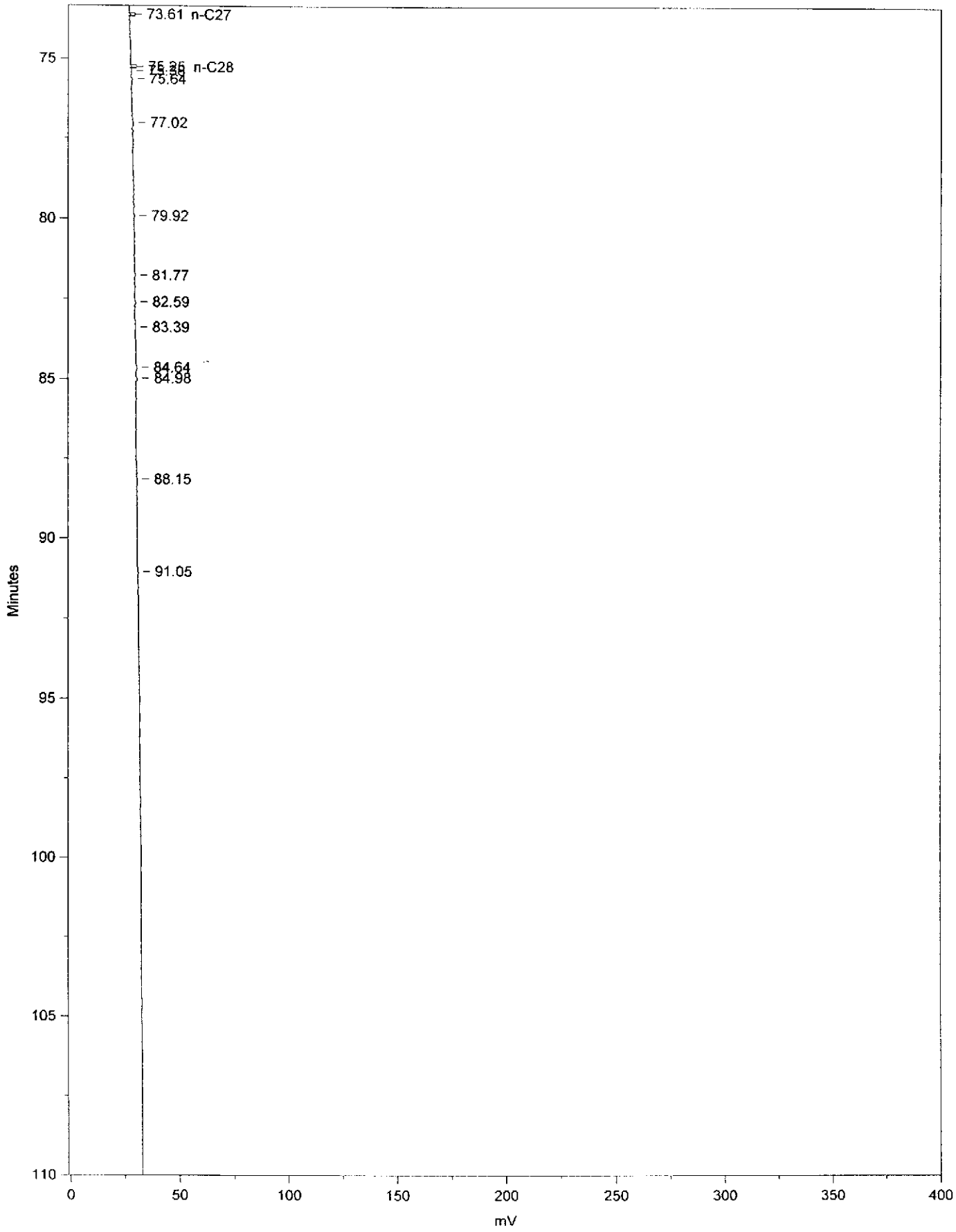

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Chromatography by GLOBAL GEOCHEMISTRY CORPORATION

TODAY'S DATE....12/4/98 TIME.....11:51:27 AM
RAW DATA FILE NAME..E:\DATA7\C344324.07R
SAMPLE NAME.....4656-1D (FDP-54-1 + IS3-016)
DATE TAKEN..11-20-1998 22:52:31
METHOD FILE.....!E:\DATA7\C344324G.MET
METHOD:..Whole Oil Analysis
CALIBRATION FILE...!E:\DATA7\C344324G.CAL CAL. FILE VERSION....28
INSTRUMENT.....HP6890/ALS--FID OPERATOR....Lev Baycher
RUN TIME.....110
AREA REJECT.....0 COM PORT....7
HEADING 1..Whole Oil Analysis-HP6890/ALS
HEADING 2..Method 1/Split 400:1
FORMAT FILE..E:\DATA7\NORMAL.FMT

PEAKS DETECTED IN THIS CHROMATOGRAM

Peak #	Ret Time (min)	Peak Name	Peak Area	Peak Height
1	7.718	8	6338	3850
2	8.126		143	60
3	8.157	10	1025	570
4	8.269	11	5655	3462
5	8.453	12	1611	797
6	8.662	DCM	1961	435
7	8.799	14	4903	2420
8	9.073	CS2	15613	6677
9	9.914		2107	872
10	10.356		4756	2334
11	10.426	17	16551	7534
12	10.605	18	77298	36519
13	11.255	19	57975	27903
14	11.488		7393	2890
15	12.12	20	67438	30920
16	12.228		3748	1607
17	12.373	21	6027	2559
18	12.497	22	14660	6602
19	12.596		5346	2338
20	12.67		9398	4133
21	12.767		3283	1264
22	12.883	23	7287	2404
23	13.235	24	17701	7413
24	13.473	25	2581	976
25	13.596	26	163285	72330
26	13.847	27	48446	19177
27	14.841		2307	847
28	15.021	28	90562	25351
29	15.404	29	5796	2027
30	15.617	30	38240	15828
31	15.78		4834	1862
32	15.981		5100	1736
33	16.15		10031	3813
34	16.254	31	159318	66306
35	16.349	32	124392	51420
36	16.516		6881	2510
37	16.656		7421	2804
38	16.83	33	165245	69084
39	17.059		4700	1589
40	17.233		98295	40632

Peak #	Ret Time (min)	Peak Name	Peak Area	Peak Height
41	17.42	34	87596	36232
42	17.519		21588	8840
43	17.605		88959	35469
44	17.72	35	134225	51157
45	18.129		8059	3016
46	18.283	IS#1	510671	216734
47	18.379		31649	11821
48	18.503	36	127643	52792
49	18.643		29150	7147
50	18.714		11647	4588
51	18.943		7228	2359
52	19.157		33133	12434
53	19.428		12256	2614
54	19.661		4590	1112
55	19.784		64451	28117
56	19.839	37	214937	85798
57	20.064		40983	12327
58	20.657	38	120236	29605
59	20.888	39	60983	22980
60	20.985		1651	543
61	21.27		101752	22798
62	21.97	40	98050	35300
63	22.005		29601	17666
64	22.109		11242	4280
65	22.254	41	113830	35669
66	22.426		4538	1558
67	22.53		4534	1160
68	22.689		6517	3888
69	22.733	42	60467	19074
70	22.818		6037	2627
71	22.975		15671	6323
72	23.154	43	151667	61570
73	23.256	44	58572	23760
74	23.333		9779	4071
75	23.37	45	9363	4000
76	23.561		41808	10120
77	23.67	46	155583	63743
78	23.772	47	96158	26890
79	23.828		37377	15588
80	23.907		36934	13925
81	24.285		4799	1903
82	24.416	48	32272	11686
83	24.523		67157	26259
84	24.668		49446	20187
85	24.758		37174	14703
86	24.888		8529	2834
87	25.032		16868	6711
88	25.098		33185	12750
89	25.261		18057	2867
90	25.472	49	145484	57568
91	25.581		80600	27769
92	25.793		4040	1584
93	25.877		31952	11847
94	26.037		22562	5963
95	26.317		4875	1378
96	26.462		4192	1370
97	26.573	50	8475	3231

Peak #	Ret Time (min)	Peak Name	Peak Area	Peak Height
98	26.727		33589	12428
99	26.814		8352	2618
100	26.98		5471	2057
101	27.062	51	23911	9518
102	27.138		32981	10467
103	27.301		5773	1727
104	27.42		26117	11585
105	27.476	52	88171	29455
106	27.677		25638	6564
107	27.825		20446	7848
108	27.916	53	63882	24158
109	27.993		22060	6554
110	28.13		17441	6492
111	28.216		25697	7014
112	28.312		17716	6463
113	28.4		5668	1696
114	28.612	54	310568	113676
115	28.809		34613	12375
116	28.936		11916	3178
117	29.047		12133	4432
118	29.173	55	1008404	264654
119	29.367		9438	3490
120	29.539		17800	6814
121	29.601		25459	7572
122	29.722	56	90730	34488
123	29.786	57	102363	41607
124	29.881		6768	2694
125	30.058		11282	3423
126	30.132		23046	9101
127	30.209	58	132631	47516
128	30.36		30916	6541
129	30.481	59	13800	4795
130	30.597	60	301331	114179
131	30.721		30026	9616
132	30.956		42326	11554
133	31.053		59769	21837
134	31.142	61	15928	6147
135	31.204		23702	7880
136	31.353		8309	2814
137	31.435		30137	5322
138	31.752		5720	1943
139	31.93	62	132296	48533
140	32.049	IS#2	588192	234415
141	32.235		46054	15747
142	32.411		23992	6081
143	32.64	63	24396	9090
144	32.787		18513	5713
145	32.911		20795	5860
146	33.001	64	24981	7713
147	33.107		27228	7737
148	33.228		6968	1886
149	33.457		9272	3499
150	33.528		45212	13994
151	33.636		26237	9874
152	33.771		28119	7141
153	33.853	65	29605	10214
154	34.059		51085	19593

Peak #	Ret Time (min)	Peak Name	Peak Area	Peak Height
155	34.147		8922	2645
156	34.309		21721	5135
157	34.409	66	128212	46007
158	34.514		35539	9326
159	34.643		10111	3710
160	34.715		13303	4650
161	34.852	67	242446	95289
162	34.975	68	214150	83216
163	35.308	69	271257	99693
164	35.439		8491	2442
165	35.557		45301	10651
166	35.658		64826	24289
167	35.758	70	24327	10560
168	35.807		68500	26815
169	35.872	71	169222	66223
170	36.011		23585	6485
171	36.187		85615	28669
172	36.436		20054	3753
173	36.605		12150	2831
174	36.748	73	778917	312162
175	36.832		23624	8501
176	36.921		30285	10523
177	37.001		27274	9785
178	37.092	74	18347	3873
179	37.244		16051	6061
180	37.492	75	15331	4101
181	37.617		20568	6099
182	37.781	76	137466	51792
183	37.958		9281	1659
184	38.044		12628	2839
185	38.181		12666	2839
186	38.283	77	233373	80936
187	38.525		13917	4902
188	38.625		30818	5743
189	38.916	78	209895	70976
190	39.131		46546	15804
191	39.243		7180	2066
192	39.335		6026	2176
193	39.409		34330	9472
194	39.512		26493	8203
195	39.706		22066	7171
196	39.815		99046	27008
197	39.961	79	175356	57121
198	40.171	80	91894	31970
199	40.225		43696	17684
200	40.32	81	161586	63187
201	40.465		23443	5874
202	40.675		27127	6498
203	40.739		29764	11262
204	40.797	82	55556	20342
205	40.861		6819	2513
206	40.958		39962	13942
207	41.122		38806	14302
208	41.331	83	172603	54175
209	41.435	84	119454	43015
210	41.476		47335	21817
211	41.651		52253	18271

Peak #	Ret Time (min)	Peak Name	Peak Area	Peak Height
212	41.75	85	302907	119635
213	41.864		5660	1852
214	41.959		11439	2667
215	42.079		22144	6270
216	42.368		14617	5441
217	42.421		14895	4417
218	42.576		25506	5388
219	42.699		31427	9705
220	42.81	86	77327	22163
221	43.028		22425	5995
222	43.141	n-C11	166577	53626
223	43.335		13155	3212
224	43.444	87	98419	36242
225	43.547		14667	4395
226	43.621	88	131255	49495
227	43.774		43307	15057
228	43.88		7601	2606
229	43.955		17224	5085
230	44.069		27196	6547
231	44.134		17027	6193
232	44.218		6549	2246
233	44.312		5011	1503
234	44.497		210549	60389
235	44.618		50163	16899
236	44.711		43707	16031
237	44.79		16821	6228
238	44.859		46430	14720
239	44.936		48534	15930
240	45.009	89	200443	76956
241	45.103		15789	5186
242	45.229		109615	32859
243	45.529		148351	36865
244	45.69		65619	13608
245	45.921		51304	13845
246	45.993		60639	21715
247	46.088		4560	1442
248	46.186		40711	11217
249	46.342	90	38344	13585
250	46.394		41993	15387
251	46.477		113260	40705
252	46.626		11635	2855
253	46.737		74935	19578
254	46.953		97185	33285
255	47.037		58025	20323
256	47.245		64483	14199
257	47.411		73102	27314
258	47.476		55342	16804
259	47.548		34245	10720
260	47.726		32728	6696
261	47.831		8351	1645
262	47.945		19611	7817
263	48.03	n-C12	176862	69336
264	48.187		44243	12384
265	48.341		11705	3833
266	48.467		15719	3583
267	48.538		18199	5155
268	48.687	i-C13	89705	25835

Peak #	Ret Time (min)	Peak Name	Peak Area	Peak Height
269	48.884		31867	11207
270	48.961		44436	9839
271	49.09		19913	4913
272	49.213		42868	6228
273	49.37		16754	6415
274	49.596		90658	23997
275	49.72		19558	6910
276	49.833		11370	2211
277	49.979		29982	6052
278	50.114		80138	26468
279	50.186		21301	8312
280	50.242		15692	6357
281	50.353		31537	9997
282	50.509		43050	13340
283	50.752	91	55450	20657
284	50.891	i-C14	37530	16775
285	50.964		12104	4975
286	51.044		127244	53362
287	51.187		22348	6576
288	51.281		19460	6135
289	51.427	92	18438	4437
290	51.484		12742	4889
291	51.569		60315	26957
292	51.677	n-C13	122193	58075
293	51.774		14575	4833
294	51.882		5575	1660
295	51.977		15250	6327
296	52.041		16993	5495
297	52.24		9462	4216
298	52.295		16463	6613
299	52.43		6752	2237
300	52.589		13926	4043
301	52.741		5998	1998
302	52.964		3042	1509
303	53.028		17222	3759
304	53.192		10945	4040
305	53.279		11205	3503
306	53.416		13295	6356
307	53.549		16043	7089
308	53.739		10084	5482
309	53.856		2363	1233
310	53.959	i-C15	29075	14894
311	54.032		11801	4666
312	54.128		4415	2786
313	54.334		9052	5726
314	54.382		8412	5627
315	54.471	n-C14	54655	30155
316	54.553		3777	1586
317	54.625		4284	2456
318	54.712		21415	10442
319	54.806		15255	8238
320	54.962		3749	1095
321	55.07		2958	946
322	55.215		6982	3247
323	55.387		4480	1843
324	55.487		7032	2964
325	55.573		4034	2262

Peak #	Ret Time (min)	Peak Name	Peak Area	Peak Height
326	55.691		13434	5670
327	55.872		8213	4375
328	56.005	i-C16	39173	15947
329	56.147		9356	4792
330	56.353		5071	1359
331	56.514		1758	746
332	56.75	n-C15	34532	16481
333	56.827		4215	1885
334	56.925		6000	1102
335	57.091		2376	1403
336	57.192		2106	1438
337	57.313		3386	1924
338	57.634		3427	1584
339	57.718		9722	3037
340	57.825		2909	1854
341	57.911		9769	3562
342	58.036		7447	4410
343	58.184		8957	3055
344	58.311		2693	1224
345	58.587		4209	1225
346	58.7	n-C16	17998	8631
347	59.061		2399	1405
348	59.163		2292	697
349	59.52		6020	1856
350	59.631	i-C18	19650	9324
351	59.745		5053	2130
352	59.826		8199	3832
353	59.967		5016	2525
354	60.286		2952	1072
355	60.421	n-C17	13243	7192
356	60.601	Pristane	32850	15848
357	61.264		1723	1014
358	61.363		3114	1561
359	61.444		5606	3275
360	61.52		1572	1012
361	61.808		3423	1747
362	61.982	n-C18	9351	5412
363	62.124		2161	660
364	62.212	Phytane	12843	6568
365	62.45		2037	730
366	62.848		1236	750
367	62.923		2352	1419
368	63.052		3586	1584
369	63.422	n-C19	12240	6259
370	63.932		1930	1012
371	64.007		2711	1018
372	64.421		2347	1091
373	64.627		2018	768
374	64.771	n-C20	12005	6825
375	64.982		1051	303
376	65.312		2991	702
377	65.599		1657	906
378	65.688	IS#3	101688	59745
379	65.919		2659	1385
380	66.043	n-C21	9111	5596
381	66.128		1843	738
382	66.532		2313	917

Peak #	Ret Time (min)	Peak Name	Peak Area	Peak Height
383	66.639		4754	2009
384	66.948		1581	421
385	67.251	n-C22	7162	4026
386	67.781		2740	567
387	68.41	n-C23	4556	2756
388	69.589	n-C24	3249	1646
389	70.819	n-C25	3094	1195
390	70.936		2185	860
391	72.158	n-C26	1104	519
392	73.61	n-C27	964	385
393	75.253	n-C28	1036	355
394	75.378		2899	306
395	75.644		2042	543
396	77.016		1381	408
397	79.919		2442	453
398	81.766		2563	361
399	82.593		2421	419
400	83.385		7069	343
401	84.639		3630	370
402	84.977		3639	634
403	88.145		2854	289
404	91.046		5265	352

Group	Group Amount	Amount %
0	0.000	N/A

TOTAL AREA DETECTED = 1.798229E+07

Analyzed by Bay Lev Baycher

Checked by [signature] Date 12/04/98

#4656

CAMBRIA ENVIRONMENTAL TECHNOLOGY, INC.

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

CHAIN OF CUSTODY

Cambria Manager: RWS
Cambria Sampler: Bob Schultz
Client: BfO, MSC
Site Address: 7101 Edgewater
Project Number: 153-1247-4

SAMPLE ID	DATE	TIME	MATRIX	# OF SAMPLES	White Oil analysis GCMS w/last Cleanup	ANALYSES									LAB:
FDP-54-L	10/19	15:30	liquid	3vocs, 1l	X										Pls. call David Elias
(TBW-5)															before running
(pipeline [illegible])															analysis.

Relinquished by: Bob Schultz
Received by: Fed X
Time/Date: 11/18/98 16:00

Relinquished by: Fed X
Received by: RMB Brewer
Time/Date: 11-19-98 1030

Relinquished by:
Received by:
Time/Date:

Relinquished by:
Received by:
Time/Date:

6D door Tom Right

N4656A

12-04-1998

Detailed Gasoline Range (C3-C10) Hydrocarbon Analysis for
One product sample submitted by Cambria Environmental
(relative %)

	Sample	FDP-54-1	FDP-54-1
	GGC ID	4656-1	4656-1D
1	Propane		
2	Isobutane		
3	Isobutene		
4	Butane/Methanol		
5	trans-2-Butene		
6	cis-2-Butene		
7	3-Methyl-1-butene		
8	Isopentane	0.07	0.07
9	1-Pentene		
10	2-Methyl-1-butene	0.01	0.01
11	Pentane	0.06	0.06
12	trans-2-Pentene	0.02	0.02
13	cis-2-Pentene/t-Butanol		
14	2-Methyl-2-butene	0.05	0.05
15	2,2-Dimethylbutane		
16	Cyclopentane		
17	2,3-Dimethylbutane/MTBE	0.18	0.18
18	2-Methylpentane	0.82	0.84
19	3-Methylpentane	0.63	0.63
20	Hexane	0.74	0.74
21	trans-2-Hexene	0.07	0.07
22	3-Methylcyclopentene	0.16	0.16
23	3-Methyl-2-pentene	0.08	0.08
24	cis-2-Hexene	0.19	0.19
25	3-Methyl-trans-2-pentene	0.03	0.03
26	Methylcyclopentane	1.78	1.78
27	2,4-Dimethylpentane	0.53	0.53
28	Benzene	0.99	0.99
29	5-Methyl-1-hexene	0.07	0.06
30	Cyclohexane	0.42	0.42
31	2-Methylhexane/TAME	1.75	1.74
32	2,3-Dimethylpentane	1.36	1.36
33	3-Methylhexane	1.81	1.80
34	2-Methyl-1-hexene	0.96	0.96
35	2,2,4-Trimethylpentane	1.47	1.46
IS1	α,α,α-Trifluorotoluene		
36	n-Heptane	1.40	1.39
37	Methylcyclohexane	2.35	2.34
38	2,5-Dimethylhexane	1.33	1.31
39	2,4-Dimethylhexane	0.67	0.67
40	2,3,4-Trimethylpentane	1.08	1.07
41	Toluene	1.24	1.24
42	2,3-Dimethylhexane	0.66	0.66

N4656A

12-04-1998

Detailed Gasoline Range (C3-C10) Hydrocarbon Analysis for
One product sample submitted by Cambria Environmental
(relative %)

	Sample	FDP-54-1	FDP-54-1
GGC	ID	4656-1	4656-1D
43	2-Methylheptane	1.66	1.65
44	4-Methylheptane	0.64	0.64
45	3,4-Dimethylhexane	0.10	0.10
46	3-Ethyl-3-methylpentane	1.70	1.70
47	3-Methylheptane	1.05	1.05
48	2-Methyl-1-heptene	0.35	0.35
49	n-Octane	1.60	1.59
50	2,2-Dimethylheptane	0.09	0.09
51	2,4-Dimethylheptane	0.26	0.26
52	Ethylcyclohexane	0.95	0.96
53	2,6-Dimethylheptane	0.70	0.70
54	Ethylbenzene	3.37	3.39
55	m + p Xylenes	11.09	11.00
56	4-Methyloctane	0.99	0.99
57	2-Methyloctane	1.12	1.12
58	3-Ethylheptane	1.45	1.45
59	3-Methyloctane	0.15	0.15
60	o-Xylene	3.27	3.29
61	1-Nonene		
62	n-Nonane	1.45	1.44
IS2	p-Bromofluorobenzene		
63	Isopropylbenzene	0.26	0.27
64	3,3,5-Trimethylheptane	0.27	0.27
65	2,4,5-Trimethylheptane	0.32	0.32
66	n-Propylbenzene	1.39	1.40
67	1-Methyl-3-ethylbenzene	2.63	2.64
68	1-Methyl-4-ethylbenzene	2.32	2.34
69	1,3,5-Trimethylbenzene	2.95	2.96
70	3,3,4-Trimethylheptane	0.27	0.27
71	1-Methyl-2-ethylbenzene	1.84	1.85
72	3-Methylnonane		
73	1,2,4-Trimethylbenzene	8.45	8.49
74	Isobutylbenzene	0.20	0.20
75	sec-Butylbenzene	0.17	0.17
76	n-Decane	1.50	1.50
77	1,2,3-Trimethylbenzene	2.58	2.55
78	Indan	2.19	2.29
79	1,3-Diethylbenzene	1.98	1.91
80	1,4-Diethylbenzene	1.00	1.00

N4656A 12-04-1998

Detailed Gasoline Range (C3-C10) Hydrocarbon Analysis for
One product sample submitted by Cambria Environmental
(relative %)

	Sample	FDP-54-1	FDP-54-1
GGC	ID	4656-1	4656-1D
81	n-Butylbenzene	1.75	1.76
82	1,3-Dimethyl-5-ethylbenzene	0.60	0.61
83	1,4-Dimethyl-2-ethylbenzene	1.88	1.88
84	1,3-Dimethyl-4-ethylbenzene	1.29	1.30
85	1,2-Dimethyl-4-ethylbenzene	3.29	3.30
86	Undecene		
87	1,2,4,5-Tetramethylbenzene	1.07	1.07
88	1,2,3,5-Tetramethylbenzene	1.42	1.43
89	1,2,3,4-Tetramethylbenzene	2.17	2.19
90	Naphthalene	0.42	0.42
91	2-Methyl-naphthalene	0.60	0.60
92	1-Methyl-naphthalene	0.20	0.20

4656AH

12-04-1998

Degradation ratios and bulk composition calculated from the gasoline range (C3-C10) analysis for
One product sample submitted by Cambria Environmental

Sample	FDP-54-1	FDP-54-1
GGC ID	4656-1	4656-1D
Evaporation		
n-Pentane/n-Heptane	0.04	0.04
2-Methylpentane/2-Methylheptane	0.50	0.51
Waterwashing		
Benzene/Cyclohexane	2.35	2.37
Toluene/Methylcyclohexane	0.53	0.53
Aromatics/Total Paraffins(n+iso+cyc)	1.64	1.64
Aromatics/Naphthenes	10.53	10.53
Biodegradation		
(C4-C8 Para+Isopara)/C4-C8 Olefins	13.04	13.05
3-Methylhexane/n-Heptane	1.30	1.29
Methylcyclohexane/n-Heptane	1.68	1.68
Isoparaffins+Naphthenes/Paraffins	4.25	4.25
Octane rating		
2,2,4-Trimethylpentane/Methylcyclohexane	0.63	0.62
Relative percentages - Bulk hydrocarbon composition as PIANO		
% Paraffinic	7.08	7.05
% Isoparaffinic	24.30	24.21
% Aromatic	60.77	60.89
% Naphthenic	5.77	5.78
% Olefinic	2.09	2.08

Supervisor

4656-1 (FDP-54-1-L+ IS3-016)

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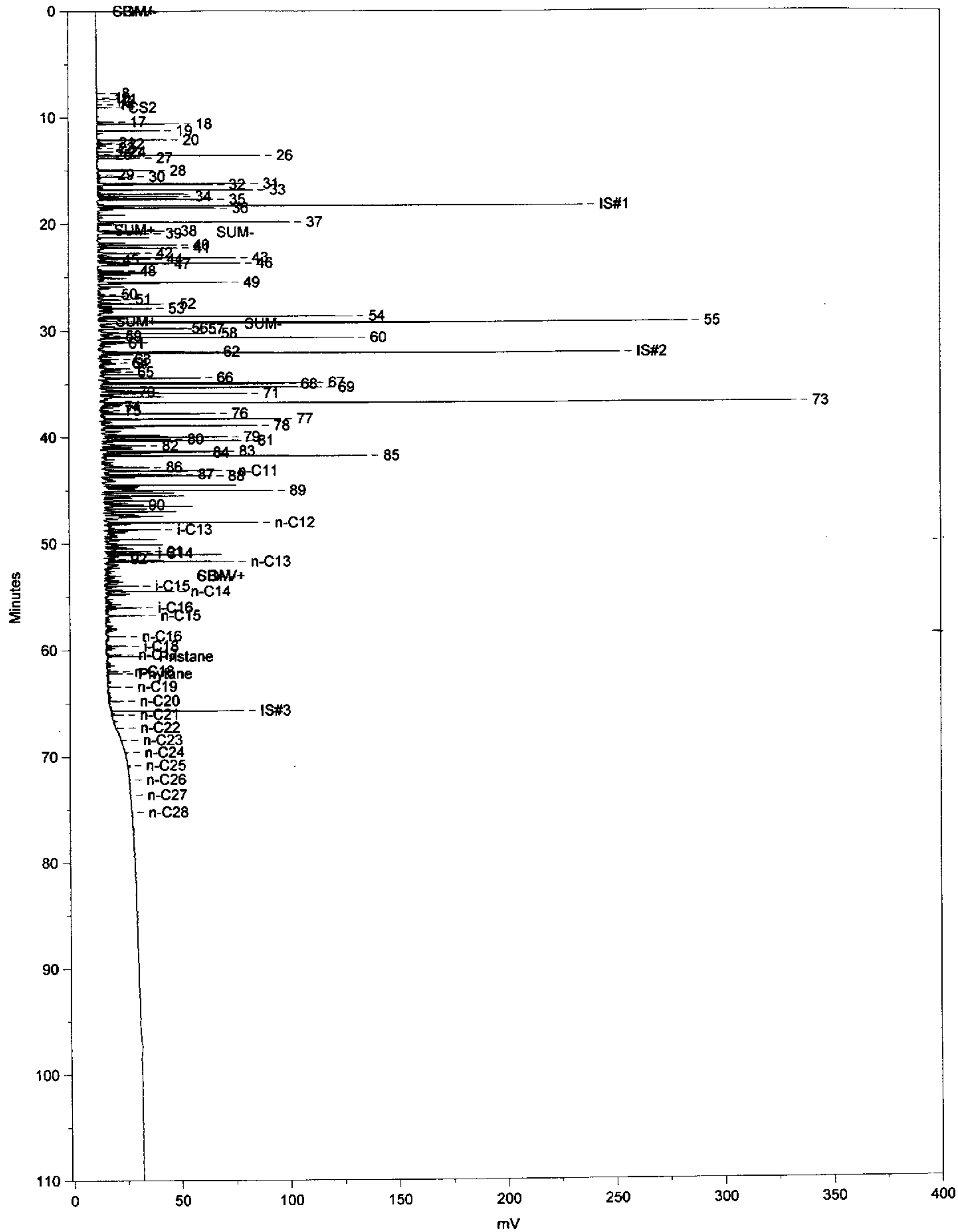

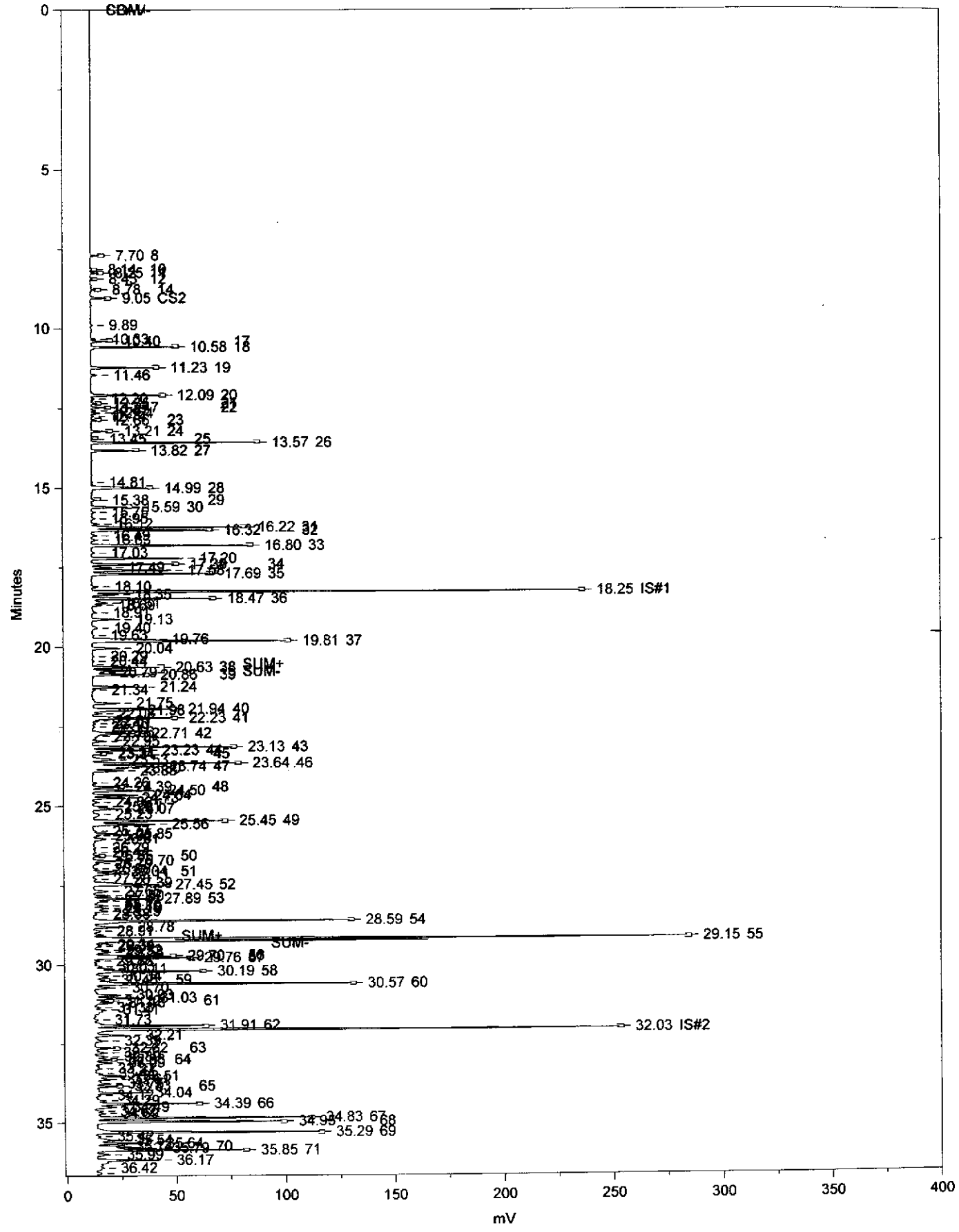

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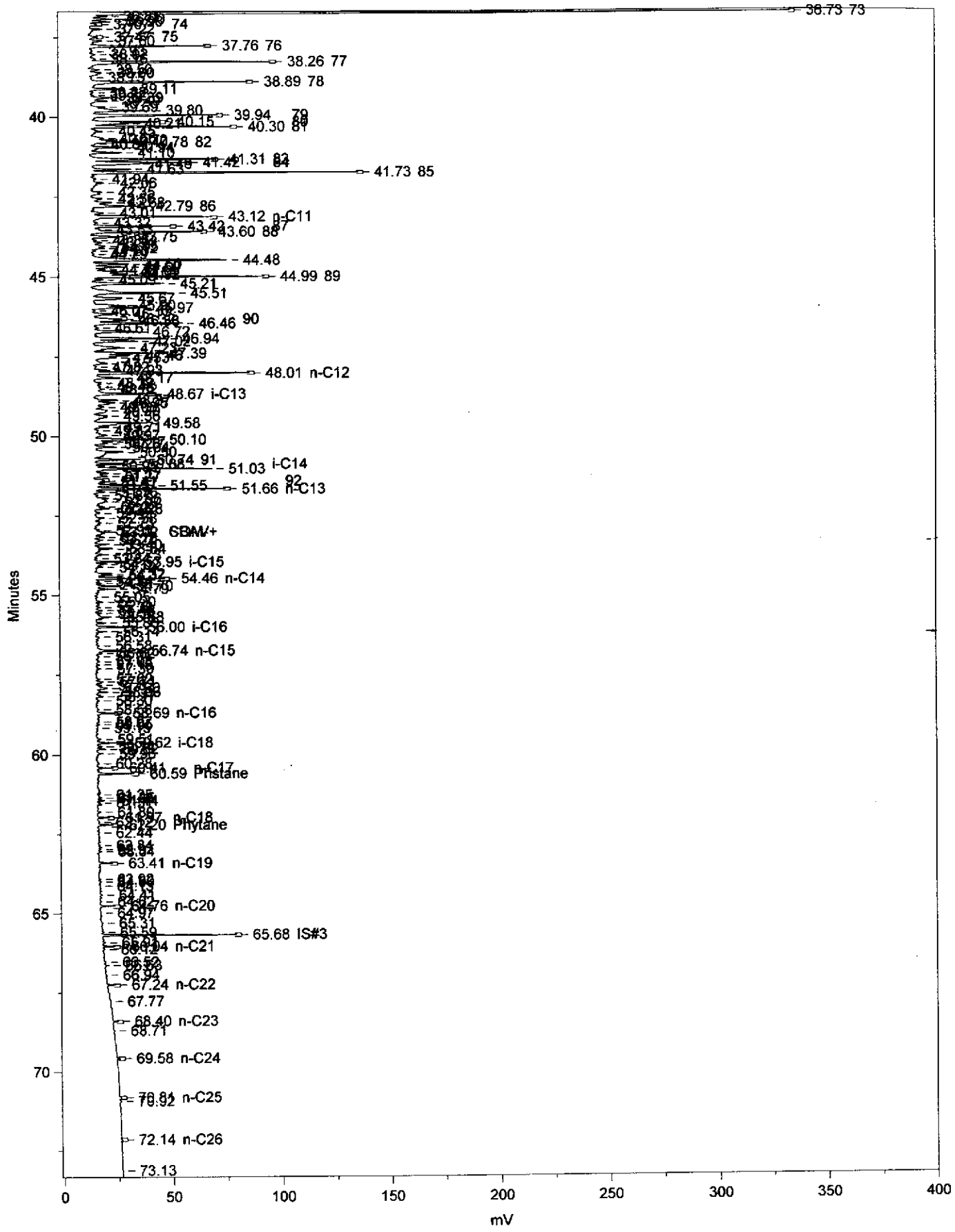
4656-1 (FDP-54-1 + IS3-016)

E:\DATA7\C344324.06R



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4656-1 (FDP-54-1 + IS3-016)

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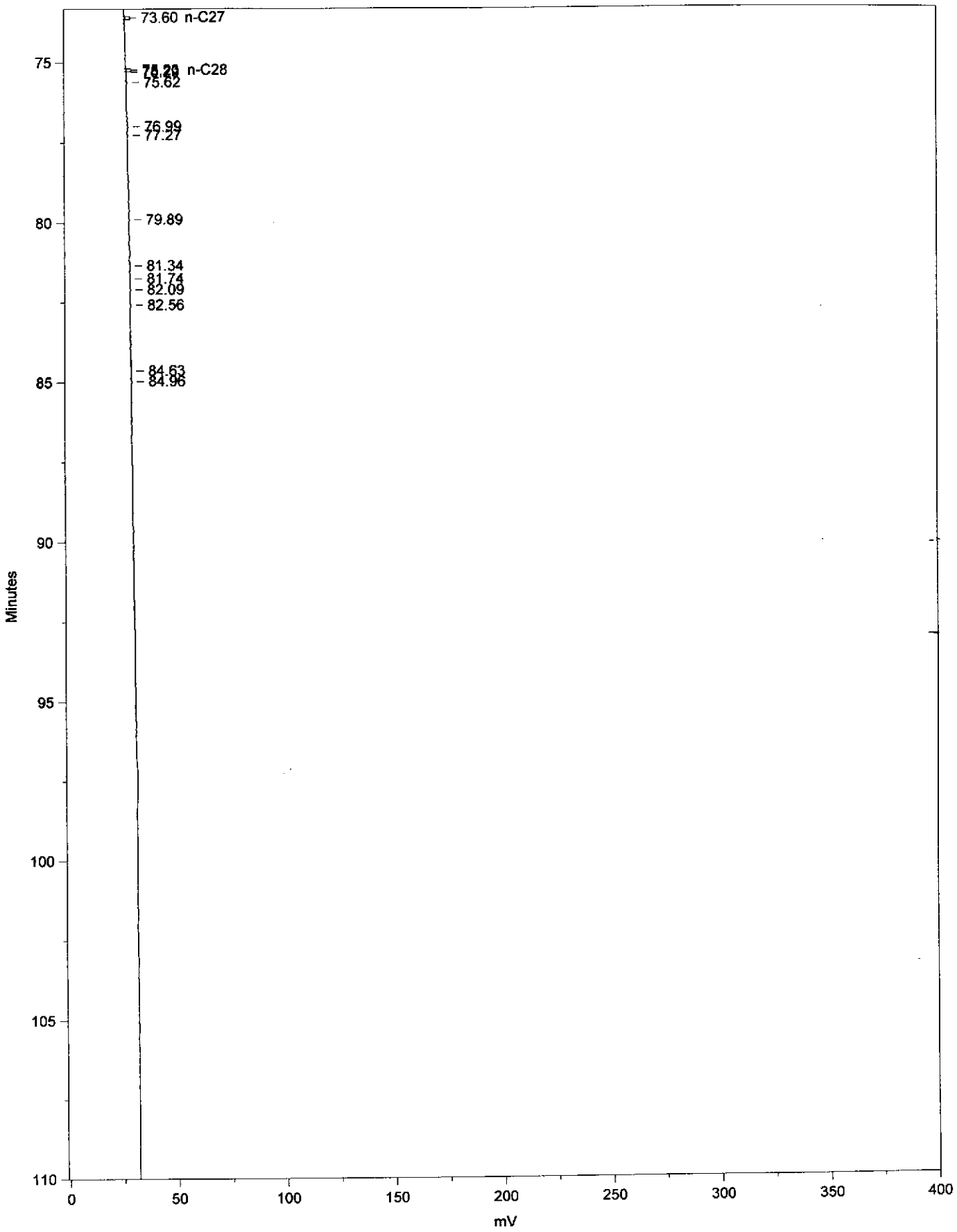

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Chromatography by GLOBAL GEOCHEMISTRY CORPORATION

TODAY'S DATE....12/4/98 TIME.....11:50:14 AM
RAW DATA FILE NAME..E:\DATA7\C344324.06R
SAMPLE NAME.....4656-1 (FDP-54-1 + IS3-016)
DATE TAKEN..11-20-1998 20:43:17
METHOD FILE.....!E:\DATA7\C344324F.MET
METHOD:..Whole Oil Analysis
CALIBRATION FILE...!E:\DATA7\C344324F.CAL CAL. FILE VERSION....28
INSTRUMENT.....HP6890/ALS--FID OPERATOR....Lev Baycher
RUN TIME.....110
AREA REJECT.....0 COM PORT....7
HEADING 1..Whole Oil Analysis-HP6890/ALS
HEADING 2..Method 1/Split 400:1
FORMAT FILE..E:\DATA7\NORMAL.FMT

PEAKS DETECTED IN THIS CHROMATOGRAM

Peak #	Ret Time (min)	Peak Name	Peak Area	Peak Height
1	7.699	8	6482	4006
2	8.138	10	1096	563
3	8.248	11	5945	3595
4	8.433	12	1773	813
5	8.777	14	4981	2484
6	9.05	CS2	16073	6958
7	9.888		2020	898
8	10.331		4868	2411
9	10.401	17	17271	7801
10	10.579	18	78131	37991
11	11.228	19	59928	29007
12	11.461		9036	2958
13	12.093	20	70039	32117
14	12.201		3837	1660
15	12.346	21	6349	2620
16	12.47	22	15184	6841
17	12.569		5554	2439
18	12.642		9754	4294
19	12.741		3349	1313
20	12.856	23	7489	2467
21	13.207	24	18302	7677
22	13.446	25	2821	1019
23	13.567	26	168875	75076
24	13.819	27	50293	19914
25	14.813		2533	893
26	14.992	28	93560	26093
27	15.376	29	6164	2114
28	15.588	30	39771	16401
29	15.752		5076	1954
30	15.953		5450	1791
31	16.122		10369	3940
32	16.225	31	165472	68739
33	16.321	32	129330	53170
34	16.488		7317	2633
35	16.627		7715	2913
36	16.801	33	171871	71710
37	17.032		4927	1644
38	17.204		101972	42153
39	17.391	34	90844	37635
40	17.49		22482	9205

Peak #	Ret Time (min)	Peak Name	Peak Area	Peak Height
41	17.576		92126	36597
42	17.691	35	139499	53254
43	18.101		8541	3130
44	18.254	IS#1	526379	223344
45	18.351		33096	12327
46	18.475	36	132457	54558
47	18.615		30393	7393
48	18.685		12118	4770
49	18.914		6454	2455
50	19.129		34374	12907
51	19.4		13009	2752
52	19.632		4811	1160
53	19.756		66476	29218
54	19.811	37	222442	88632
55	20.036		35563	12744
56	20.287		3971	1178
57	20.436		3251	1036
58	20.629	38	126217	30907
59	20.788		12741	5571
60	20.86	39	63841	23946
61	21.242		59942	23771
62	21.337		4102	1472
63	21.75		42222	12753
64	21.942	40	102761	36604
65	21.979		29288	18182
66	22.081		11659	4432
67	22.226	41	117595	36912
68	22.308		8058	3029
69	22.398		4664	1625
70	22.502		4686	1190
71	22.663		7173	4097
72	22.706	42	62274	19779
73	22.79		6049	2698
74	22.948		16174	6514
75	23.127	43	157369	63694
76	23.229	44	60733	24590
77	23.306		10223	4212
78	23.342	45	9540	4145
79	23.533		43256	10425
80	23.643	46	161002	65775
81	23.743	47	99493	27906
82	23.801		38838	16177
83	23.88		38108	14401
84	24.258		4948	1951
85	24.389	48	33364	12107
86	24.496		69527	27284
87	24.641		51176	20850
88	24.73		38462	15144
89	24.862		8809	2967
90	25.006		17461	6934
91	25.071		34388	13162
92	25.235		18682	2977
93	25.446	49	151614	59607
94	25.555		82480	28808
95	25.766		4228	1644
96	25.851		33044	12200
97	25.916		6979	2731

Peak #	Ret Time (min)	Peak Name	Peak Area	Peak Height
212	41.104		40067	14742
213	41.312	83	177839	56338
214	41.417	84	122004	44283
215	41.456		49332	22566
216	41.633		54091	18877
217	41.731	85	311487	122615
218	41.936		11685	2786
219	42.06		24106	6410
220	42.35		14917	5579
221	42.556		25881	5574
222	42.681		32534	9979
223	42.791	86	79213	22607
224	43.01		22843	6103
225	43.123	n-C11	171803	55661
226	43.316		13447	3277
227	43.425	87	101044	37061
228	43.529		14563	4501
229	43.602	88	135044	50945
230	43.754		44369	15439
231	43.86		7680	2653
232	43.936		17658	5134
233	44.051		27663	6594
234	44.116		17706	6374
235	44.198		6634	2317
236	44.293		5141	1496
237	44.478		215568	62011
238	44.599		51704	17201
239	44.692		45163	16550
240	44.771		17288	6405
241	44.841		46682	15123
242	44.917		50562	16289
243	44.991	89	205967	78911
244	45.086		16144	5364
245	45.21		112361	33206
246	45.511		151716	37901
247	45.671		67600	13915
248	45.903		52707	14152
249	45.975		62383	22277
250	46.07		4711	1482
251	46.168		41999	11642
252	46.324	90	39932	13880
253	46.376		42601	15840
254	46.458		115439	41540
255	46.606		11905	2973
256	46.718		77186	20558
257	46.935		99894	33936
258	47.019		59683	20836
259	47.227		66143	14655
260	47.394		75299	28037
261	47.459		56775	17260
262	47.531		35187	11051
263	47.709		33879	6931
264	47.818		8444	1696
265	47.928		20125	7999
266	48.015	n-C12	182966	71597
267	48.17		45874	12679
268	48.325		11774	3962

Peak #	Ret Time (min)	Peak Name	Peak Area	Peak Height
269	48.454		15895	3703
270	48.522		18784	5295
271	48.673	i-C13	92414	26588
272	48.868		32715	11462
273	48.945		46025	10115
274	49.077		20030	5040
275	49.2		44123	6446
276	49.356		17307	6581
277	49.581		93266	24583
278	49.705		20107	7097
279	49.818		11694	2303
280	49.967		30602	6243
281	50.101		82265	27229
282	50.173		22333	8646
283	50.227		15919	6488
284	50.339		32444	10433
285	50.496		81315	13714
286	50.738	91	57037	21516
287	50.878	i-C14	38787	17325
288	50.95		12577	5069
289	51.03		129513	54121
290	51.174		23237	6801
291	51.266		19853	6319
292	51.414	92	18942	4607
293	51.471		13044	5030
294	51.555		61640	27408
295	51.664	n-C13	126106	59965
296	51.761		14943	4944
297	51.87		4105	1707
298	51.964		17116	6466
299	52.072		38701	5921
300	52.227		9814	4368
301	52.283		17008	6908
302	52.418		6908	2268
303	52.577		14193	4111
304	52.731		6102	1966
305	52.951		3210	1625
306	53.017		3784	2649
307	53.18		11137	4036
308	53.268		11402	3586
309	53.405		13647	6529
310	53.538		12312	6889
311	53.728		10348	5619
312	53.845		2398	1266
313	53.948	i-C15	29894	15378
314	54.02		12006	4718
315	54.116		4591	2862
316	54.323		9034	5762
317	54.37		8408	5585
318	54.46	n-C14	55638	30900
319	54.542		3936	1654
320	54.614		4380	2535
321	54.7		21382	10544
322	54.794		15340	8270
323	55.055		3045	980
324	55.204		7038	3238
325	55.376		4594	1883

Peak #	Ret Time (min)	Peak Name	Peak Area	Peak Height
326	55.476		7169	3024
327	55.561		4059	2272
328	55.68		23084	6689
329	55.862		8453	4514
330	55.996	i-C16	40260	16414
331	56.137		9400	4867
332	56.313		5160	1469
333	56.584		2578	1113
334	56.741	n-C15	35154	16808
335	56.817		4283	1924
336	56.912		6018	1099
337	57.08		4858	1630
338	57.181		2234	1448
339	57.303		3429	1937
340	57.625		3793	1621
341	57.709		9860	3126
342	57.815		2989	1915
343	57.901		10126	3661
344	58.027		7711	4509
345	58.175		9202	3126
346	58.301		2693	1202
347	58.578		4134	1224
348	58.69	n-C16	17978	8726
349	58.968		4649	1131
350	59.052		2489	1431
351	59.154		2315	684
352	59.51		6125	1919
353	59.621	i-C18	20055	9557
354	59.736		5266	2223
355	59.817		8535	3909
356	59.958		5136	2593
357	60.276		2868	1099
358	60.412	n-C17	13248	7250
359	60.592	Pristane	33758	16305
360	61.255		1794	1048
361	61.354		3192	1603
362	61.435		5731	3330
363	61.51		1596	1020
364	61.798		3284	1681
365	61.974	n-C18	9210	5335
366	62.116		2200	666
367	62.203	Phytane	13227	6690
368	62.441		2069	734
369	62.841		1201	713
370	62.972		2064	1054
371	63.044		3623	1618
372	63.414	n-C19	12261	6243
373	63.922		1964	1007
374	64.001		2633	988
375	64.13		1683	642
376	64.413		2415	1115
377	64.618		1861	728
378	64.763	n-C20	12012	6810
379	64.972		1058	302
380	65.305		3183	720
381	65.592		1648	893
382	65.679	IS#3	103950	61521

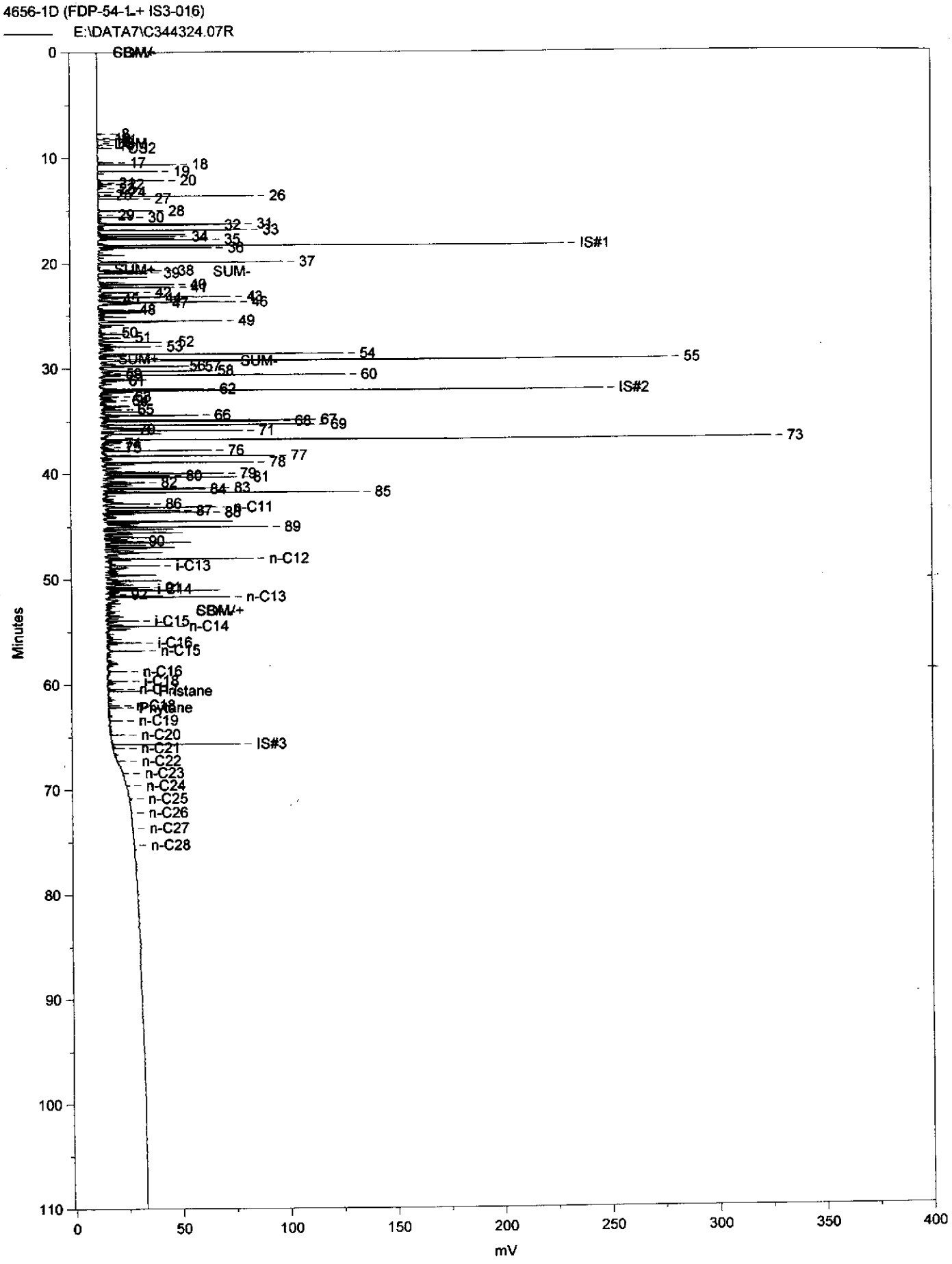
Peak #	Ret Time (min)	Peak Name	Peak Area	Peak Height
383	65.91		2509	1318
384	66.035	n-C21	9015	5570
385	66.122		1891	789
386	66.524		2384	921
387	66.63		4594	1979
388	66.938		1481	408
389	67.243	n-C22	6977	3933
390	67.771		2514	512
391	68.401	n-C23	4436	2656
392	68.705		2880	361
393	69.581	n-C24	3253	1559
394	70.808	n-C25	2619	1052
395	70.925		2322	878
396	72.145	n-C26	974	447
397	73.132		3620	371
398	73.599	n-C27	857	327
399	75.229	n-C28	765	270
400	75.292		1798	215
401	75.62		2175	564
402	76.991		1442	412
403	77.265		2232	559
404	79.893		2272	445
405	81.34		1958	330
406	81.738		2504	357
407	82.089		1695	341
408	82.564		2205	398
409	84.631		4415	427
410	84.958		2452	518

Group	Group Amount	Amount %
0	0.000	N/A

TOTAL AREA DETECTED = 1.861652E+07

Analyzed by Baycher Lev Baycher

Checked by [signature] Date 12/04/98



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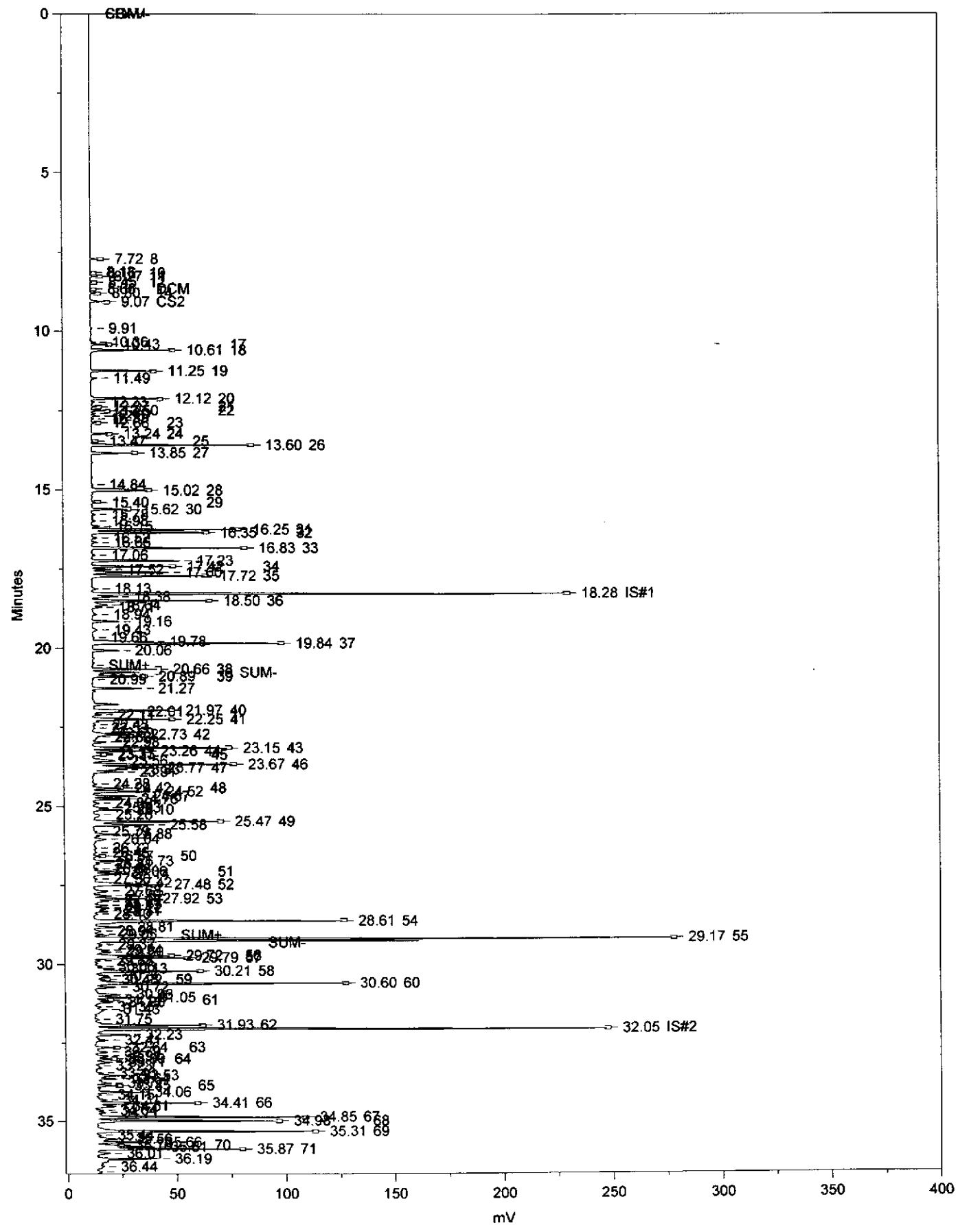

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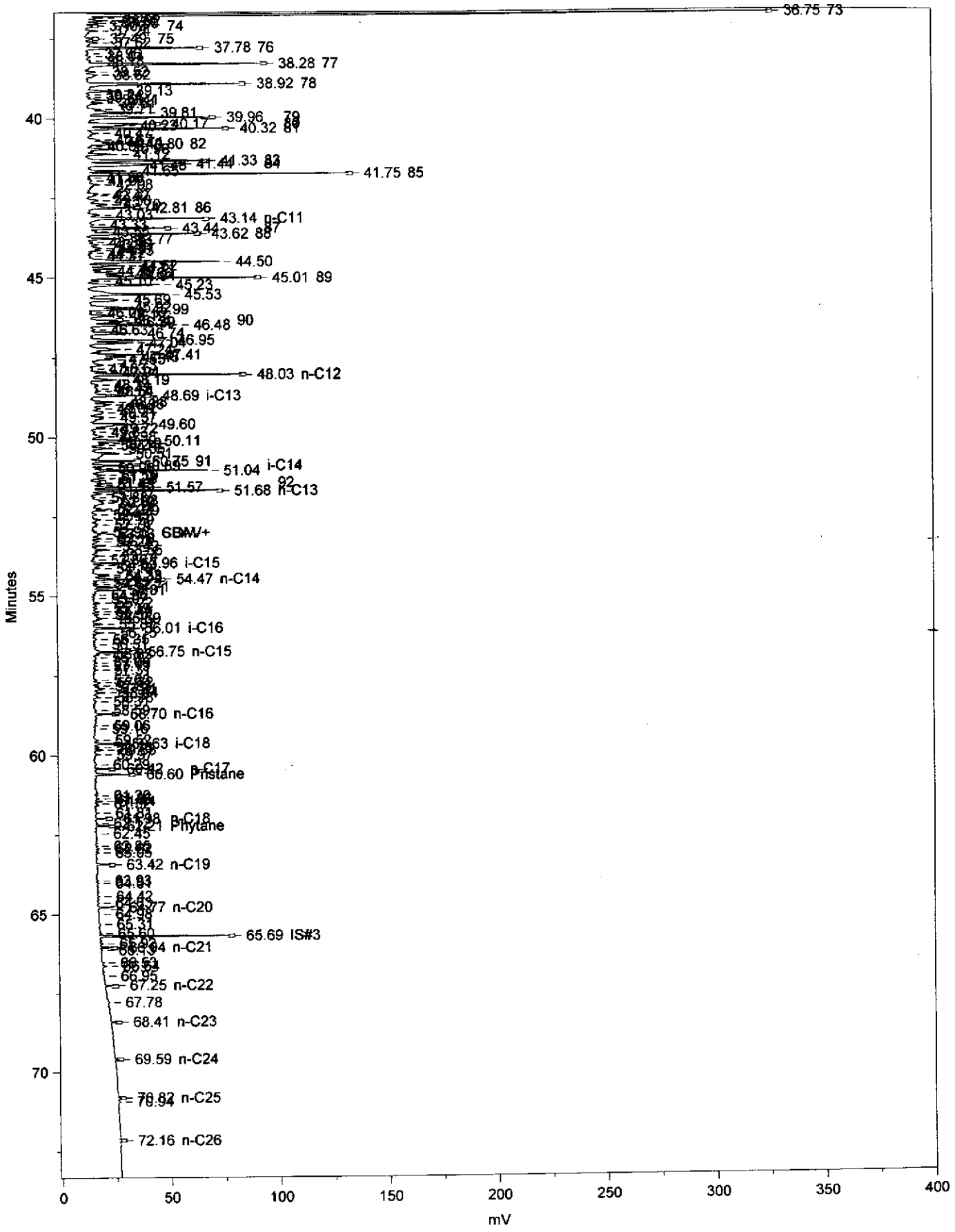
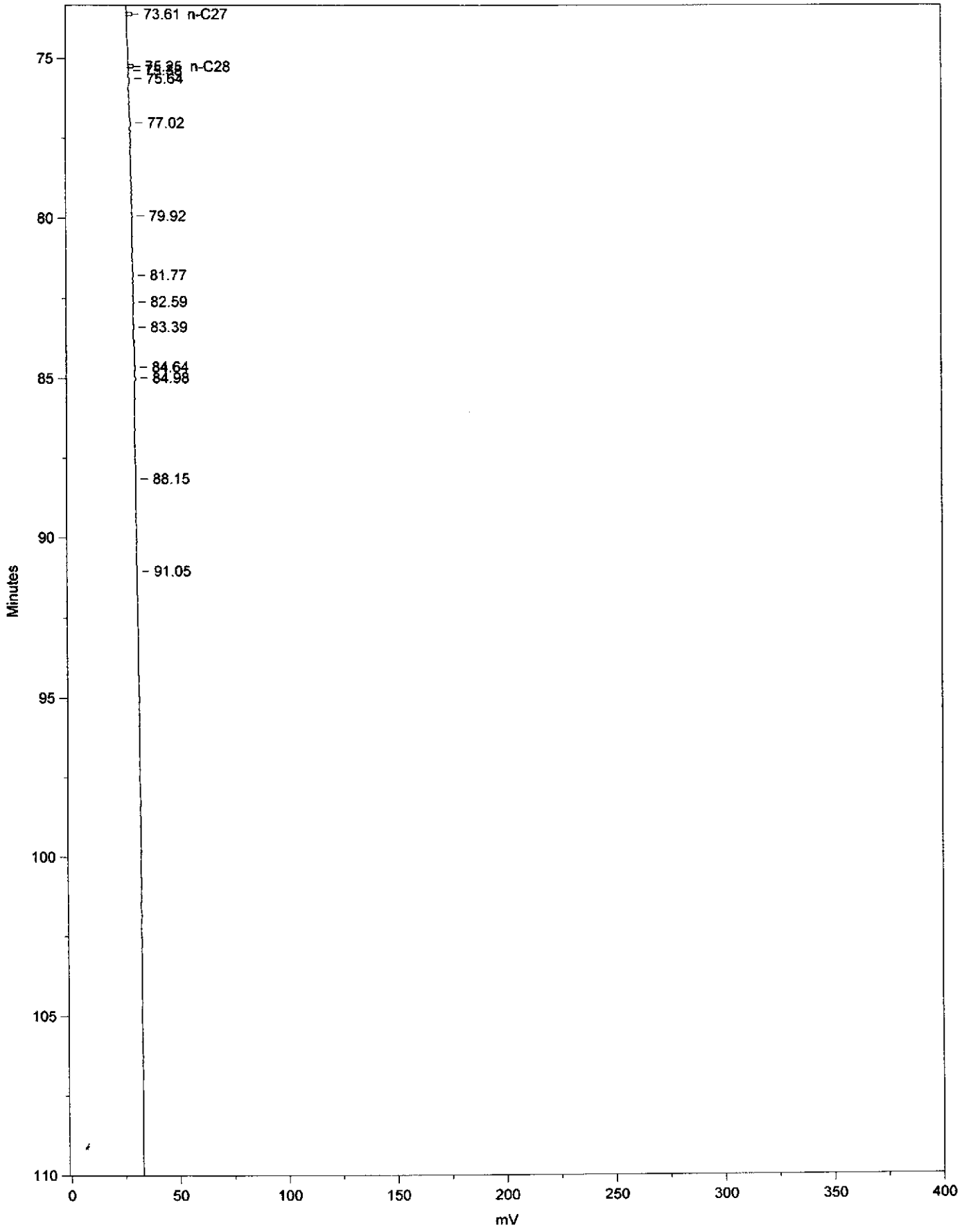
4656-1D (FDP-54-1 + IS3-016)

E:\DATA7\C344324.07R



4656-1D (FDP-54-1 + IS3-016)

E:\DATA7\C344324.07R



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Chromatography by GLOBAL GEOCHEMISTRY CORPORATION

TODAY'S DATE....12/4/98 TIME.....11:51:27 AM
RAW DATA FILE NAME..E:\DATA7\C344324.07R
SAMPLE NAME.....4656-1D (FDP-54-1 + IS3-016)
DATE TAKEN..11-20-1998 22:52:31
METHOD FILE.....!E:\DATA7\C344324G.MET
METHOD:..Whole Oil Analysis
CALIBRATION FILE...!E:\DATA7\C344324G.CAL CAL. FILE VERSION....28
INSTRUMENT.....HP6890/ALS--FID OPERATOR....Lev Baycher
RUN TIME.....110
AREA REJECT.....0 COM PORT....7
HEADING 1..Whole Oil Analysis-HP6890/ALS
HEADING 2..Method 1/Split 400:1
FORMAT FILE..E:\DATA7\NORMAL.FMT

PEAKS DETECTED IN THIS CHROMATOGRAM

Peak #	Ret Time (min)	Peak Name	Peak Area	Peak Height
1	7.718	8	6338	3850
2	8.126		143	60
3	8.157	10	1025	570
4	8.269	11	5655	3462
5	8.453	12	1611	797
6	8.662	DCM	1961	435
7	8.799	14	4903	2420
8	9.073	CS2	15613	6677
9	9.914		2107	872
10	10.356		4756	2334
11	10.426	17	16551	7534
12	10.605	18	77298	36519
13	11.255	19	57975	27903
14	11.488		7393	2890
15	12.12	20	67438	30920
16	12.228		3748	1607
17	12.373	21	6027	2559
18	12.497	22	14660	6602
19	12.596		5346	2338
20	12.67		9398	4133
21	12.767		3283	1264
22	12.883	23	7287	2404
23	13.235	24	17701	7413
24	13.473	25	2581	976
25	13.596	26	163285	72330
26	13.847	27	48446	19177
27	14.841		2307	847
28	15.021	28	90562	25351
29	15.404	29	5796	2027
30	15.617	30	38240	15828
31	15.78		4834	1862
32	15.981		5100	1736
33	16.15		10031	3813
34	16.254	31	159318	66306
35	16.349	32	124392	51420
36	16.516		6881	2510
37	16.656		7421	2804
38	16.83	33	165245	69084
39	17.059		4700	1589
40	17.233		98295	40632

Peak #	Ret Time (min)	Peak Name	Peak Area	Peak Height
41	17.42	34	87596	36232
42	17.519		21588	8840
43	17.605		88959	35469
44	17.72	35	134225	51157
45	18.129		8059	3016
46	18.283	IS#1	510671	216734
47	18.379		31649	11821
48	18.503	36	127643	52792
49	18.643		29150	7147
50	18.714		11647	4588
51	18.943		7228	2359
52	19.157		33133	12434
53	19.428		12256	2614
54	19.661		4590	1112
55	19.784		64451	28117
56	19.839	37	214937	85798
57	20.064		40983	12327
58	20.657	38	120236	29605
59	20.888	39	60983	22980
60	20.985		1651	543
61	21.27		101752	22798
62	21.97	40	98050	35300
63	22.005		29601	17666
64	22.109		11242	4280
65	22.254	41	113830	35669
66	22.426		4538	1558
67	22.53		4534	1160
68	22.689		6517	3888
69	22.733	42	60467	19074
70	22.818		6037	2627
71	22.975		15671	6323
72	23.154	43	151667	61570
73	23.256	44	58572	23760
74	23.333		9779	4071
75	23.37	45	9363	4000
76	23.561		41808	10120
77	23.67	46	155583	63743
78	23.772	47	96158	26890
79	23.828		37377	15588
80	23.907		36934	13925
81	24.285		4799	1903
82	24.416	48	32272	11686
83	24.523		67157	26259
84	24.668		49446	20187
85	24.758		37174	14703
86	24.888		8529	2834
87	25.032		16868	6711
88	25.098		33185	12750
89	25.261		18057	2867
90	25.472	49	145484	57568
91	25.581		80600	27769
92	25.793		4040	1584
93	25.877		31952	11847
94	26.037		22562	5963
95	26.317		4875	1378
96	26.462		4192	1370
97	26.573	50	8475	3231

Peak #	Ret Time (min)	Peak Name	Peak Area	Peak Height
98	26.727		33589	12428
99	26.814		8352	2618
100	26.98		5471	2057
101	27.062	51	23911	9518
102	27.138		32981	10467
103	27.301		5773	1727
104	27.42		26117	11585
105	27.476	52	88171	29455
106	27.677		25638	6564
107	27.825		20446	7848
108	27.916	53	63882	24158
109	27.993		22060	6554
110	28.13		17441	6492
111	28.216		25697	7014
112	28.312		17716	6463
113	28.4		5668	1696
114	28.612	54	310568	113676
115	28.809		34613	12375
116	28.936		11916	3178
117	29.047		12133	4432
118	29.173	55	1008404	264654
119	29.367		9438	3490
120	29.539		17800	6814
121	29.601		25459	7572
122	29.722	56	90730	34488
123	29.786	57	102363	41607
124	29.881		6768	2694
125	30.058		11282	3423
126	30.132		23046	9101
127	30.209	58	132631	47516
128	30.36		30916	6541
129	30.481	59	13800	4795
130	30.597	60	301331	114179
131	30.721		30026	9616
132	30.956		42326	11554
133	31.053		59769	21837
134	31.142	61	15928	6147
135	31.204		23702	7880
136	31.353		8309	2814
137	31.435		30137	5322
138	31.752		5720	1943
139	31.93	62	132296	48533
140	32.049	IS#2	588192	234415
141	32.235		46054	15747
142	32.411		23992	6081
143	32.64	63	24396	9090
144	32.787		18513	5713
145	32.911		20795	5860
146	33.001	64	24981	7713
147	33.107		27228	7737
148	33.228		6968	1886
149	33.457		9272	3499
150	33.528		45212	13994
151	33.636		26237	9874
152	33.771		28119	7141
153	33.853	65	29605	10214
154	34.059		51085	19593

Peak #	Ret Time (min)	Peak Name	Peak Area	Peak Height
155	34.147		8922	2645
156	34.309		21721	5135
157	34.409	66	128212	46007
158	34.514		35539	9326
159	34.643		10111	3710
160	34.715		13303	4650
161	34.852	67	242446	95289
162	34.975	68	214150	83216
163	35.308	69	271257	99693
164	35.439		8491	2442
165	35.557		45301	10651
166	35.658		64826	24289
167	35.758	70	24327	10560
168	35.807		68500	26815
169	35.872	71	169222	66223
170	36.011		23585	6485
171	36.187		85615	28669
172	36.436		20054	3753
173	36.605		12150	2831
174	36.748	73	778917	312162
175	36.832		23624	8501
176	36.921		30285	10523
177	37.001		27274	9785
178	37.092	74	18347	3873
179	37.244		16051	6061
180	37.492	75	15331	4101
181	37.617		20568	6099
182	37.781	76	137466	51792
183	37.958		9281	1659
184	38.044		12628	2839
185	38.181		12666	2839
186	38.283	77	233373	80936
187	38.525		13917	4902
188	38.625		30818	5743
189	38.916	78	209895	70976
190	39.131		46546	15804
191	39.243		7180	2066
192	39.335		6026	2176
193	39.409		34330	9472
194	39.512		26493	8203
195	39.706		22066	7171
196	39.815		99046	27008
197	39.961	79	175356	57121
198	40.171	80	91894	31970
199	40.225		43696	17684
200	40.32	81	161586	63187
201	40.465		23443	5874
202	40.675		27127	6498
203	40.739		29764	11262
204	40.797	82	55556	20342
205	40.861		6819	2513
206	40.958		39962	13942
207	41.122		38806	14302
208	41.331	83	172603	54175
209	41.435	84	119454	43015
210	41.476		47335	21817
211	41.651		52253	18271

Peak #	Ret Time (min)	Peak Name	Peak Area	Peak Height
212	41.75	85	302907	119635
213	41.864		5660	1852
214	41.959		11439	2667
215	42.079		22144	6270
216	42.368		14617	5441
217	42.421		14895	4417
218	42.576		25506	5388
219	42.699		31427	9705
220	42.81	86	77327	22163
221	43.028		22425	5995
222	43.141	n-C11	166577	53626
223	43.335		13155	3212
224	43.444	87	98419	36242
225	43.547		14667	4395
226	43.621	88	131255	49495
227	43.774		43307	15057
228	43.88		7601	2606
229	43.955		17224	5085
230	44.069		27196	6547
231	44.134		17027	6193
232	44.218		6549	2246
233	44.312		5011	1503
234	44.497		210549	60389
235	44.618		50163	16899
236	44.711		43707	16031
237	44.79		16821	6228
238	44.859		46430	14720
239	44.936		48534	15930
240	45.009	89	200443	76956
241	45.103		15789	5186
242	45.229		109615	32859
243	45.529		148351	36865
244	45.69		65619	13608
245	45.921		51304	13845
246	45.993		60639	21715
247	46.088		4560	1442
248	46.186		40711	11217
249	46.342	90	38344	13585
250	46.394		41993	15387
251	46.477		113260	40705
252	46.626		11635	2855
253	46.737		74935	19578
254	46.953		97185	33285
255	47.037		58025	20323
256	47.245		64483	14199
257	47.411		73102	27314
258	47.476		55342	16804
259	47.548		34245	10720
260	47.726		32728	6696
261	47.831		8351	1645
262	47.945		19611	7817
263	48.03	n-C12	176862	69336
264	48.187		44243	12384
265	48.341		11705	3833
266	48.467		15719	3583
267	48.538		18199	5155
268	48.687	i-C13	89705	25835

Peak #	Ret Time (min)	Peak Name	Peak Area	Peak Height
269	48.884		31867	11207
270	48.961		44436	9839
271	49.09		19913	4913
272	49.213		42868	6228
273	49.37		16754	6415
274	49.596		90658	23997
275	49.72		19558	6910
276	49.833		11370	2211
277	49.979		29982	6052
278	50.114		80138	26468
279	50.186		21301	8312
280	50.242		15692	6357
281	50.353		31537	9997
282	50.509		43050	13340
283	50.752	91	55450	20657
284	50.891	i-C14	37530	16775
285	50.964		12104	4975
286	51.044		127244	53362
287	51.187		22348	6576
288	51.281		19460	6135
289	51.427	92	18438	4437
290	51.484		12742	4889
291	51.569		60315	26957
292	51.677	n-C13	122193	58075
293	51.774		14575	4833
294	51.882		5575	1660
295	51.977		15250	6327
296	52.041		16993	5495
297	52.24		9462	4216
298	52.295		16463	6613
299	52.43		6752	2237
300	52.589		13926	4043
301	52.741		5998	1998
302	52.964		3042	1509
303	53.028		17222	3759
304	53.192		10945	4040
305	53.279		11205	3503
306	53.416		13295	6356
307	53.549		16043	7089
308	53.739		10084	5482
309	53.856		2363	1233
310	53.959	i-C15	29075	14894
311	54.032		11801	4666
312	54.128		4415	2786
313	54.334		9052	5726
314	54.382		8412	5627
315	54.471	n-C14	54655	30155
316	54.553		3777	1586
317	54.625		4284	2456
318	54.712		21415	10442
319	54.806		15255	8238
320	54.962		3749	1095
321	55.07		2958	946
322	55.215		6982	3247
323	55.387		4480	1843
324	55.487		7032	2964
325	55.573		4034	2262

Peak #	Ret Time (min)	Peak Name	Peak Area	Peak Height
326	55.691		13434	5670
327	55.872		8213	4375
328	56.005	i-C16	39173	15947
329	56.147		9356	4792
330	56.353		5071	1359
331	56.514		1758	746
332	56.75	n-C15	34532	16481
333	56.827		4215	1885
334	56.925		6000	1102
335	57.091		2376	1403
336	57.192		2106	1438
337	57.313		3386	1924
338	57.634		3427	1584
339	57.718		9722	3037
340	57.825		2909	1854
341	57.911		9769	3562
342	58.036		7447	4410
343	58.184		8957	3055
344	58.311		2693	1224
345	58.587		4209	1225
346	58.7	n-C16	17998	8631
347	59.061		2399	1405
348	59.163		2292	697
349	59.52		6020	1856
350	59.631	i-C18	19650	9324
351	59.745		5053	2130
352	59.826		8199	3832
353	59.967		5016	2525
354	60.286		2952	1072
355	60.421	n-C17	13243	7192
356	60.601	Pristane	32850	15848
357	61.264		1723	1014
358	61.363		3114	1561
359	61.444		5606	3275
360	61.52		1572	1012
361	61.808		3423	1747
362	61.982	n-C18	9351	5412
363	62.124		2161	660
364	62.212	Phytane	12843	6568
365	62.45		2037	730
366	62.848		1236	750
367	62.923		2352	1419
368	63.052		3586	1584
369	63.422	n-C19	12240	6259
370	63.932		1930	1012
371	64.007		2711	1018
372	64.421		2347	1091
373	64.627		2018	768
374	64.771	n-C20	12005	6825
375	64.982		1051	303
376	65.312		2991	702
377	65.599		1657	906
378	65.688	IS#3	101688	59745
379	65.919		2659	1385
380	66.043	n-C21	9111	5596
381	66.128		1843	738
382	66.532		2313	917

Peak #	Ret Time (min)	Peak Name	Peak Area	Peak Height
383	66.639		4754	2009
384	66.948		1581	421
385	67.251	n-C22	7162	4026
386	67.781		2740	567
387	68.41	n-C23	4556	2756
388	69.589	n-C24	3249	1646
389	70.819	n-C25	3094	1195
390	70.936		2185	860
391	72.158	n-C26	1104	519
392	73.61	n-C27	964	385
393	75.253	n-C28	1036	355
394	75.378		2899	306
395	75.644		2042	543
396	77.016		1381	408
397	79.919		2442	453
398	81.766		2563	361
399	82.593		2421	419
400	83.385		7069	343
401	84.639		3630	370
402	84.977		3639	634
403	88.145		2854	289
404	91.046		5265	352

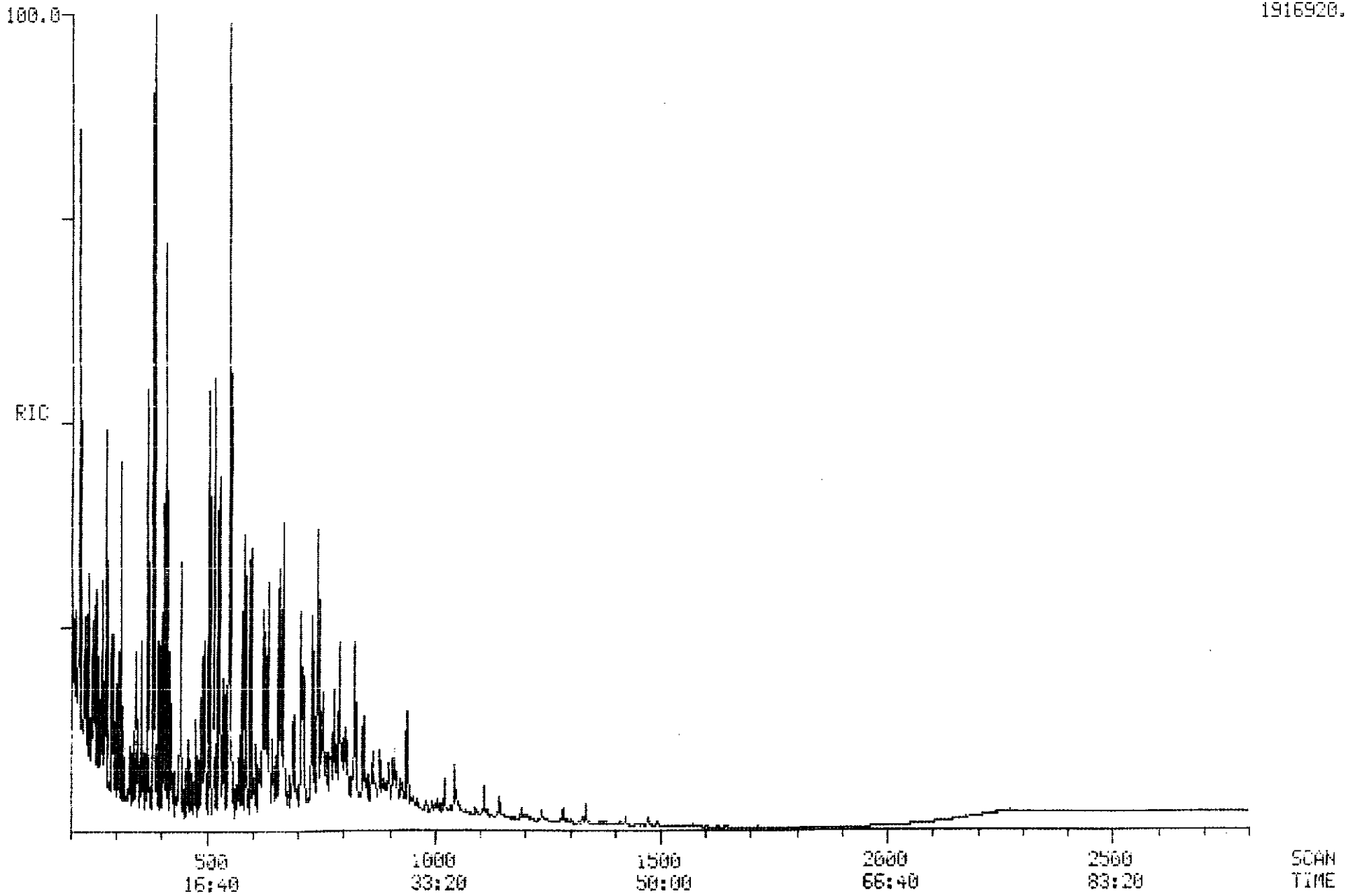
Group	Group Amount	Amount %
0	0.000	N/A

TOTAL AREA DETECTED = 1.798229E+07

Analyzed by Bay Lev Baycher

Checked by [signature] Date 12/04/98

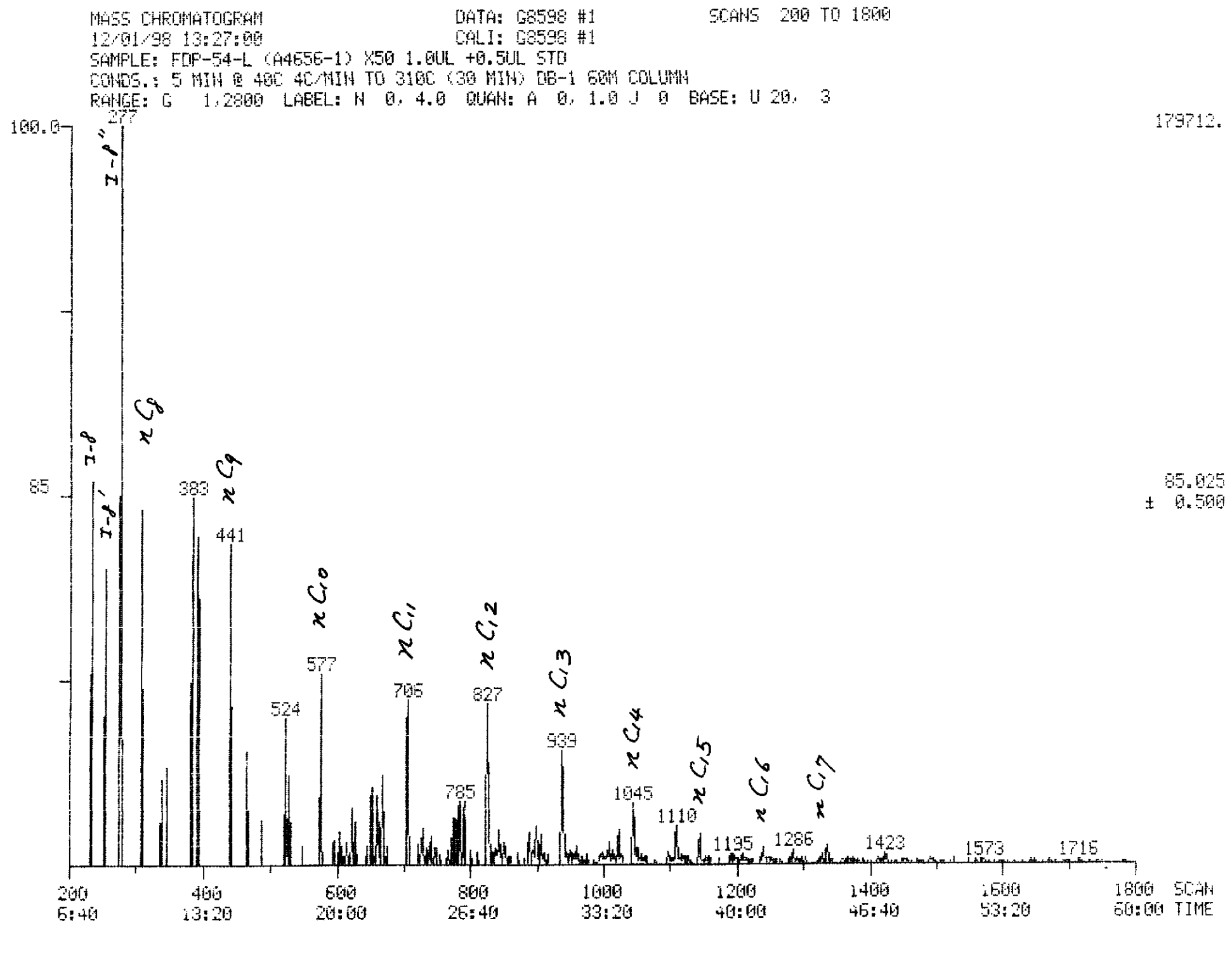
RIC DATA: G8598 #1 SCANS 200 TO 2800
12/01/98 13:27:00 CALI: G8598 #1
SAMPLE: FDP-54-L (A4656-1) X50 1.0UL +0.5UL STD
CONDS.: 5 MIN @ 40C 4C/MIN TO 310C (30 MIN) DB-1 60M COLUMN
RANGE: G 1,2800 LABEL: N 0, 4.0 QUAN: A 0, 1.0 J 0 BASE: U 20, 3



Table

Key to Chromatogram Symbol Identification

Symbol	Detail
i-10	Iso-alkane with 10 carbon atoms
i-15	Farnesane (isoprenoid with 15 carbon atoms)
i-16	Isoprenoid with 16 carbon atoms
Pr	Pristane (isoprenoid with 19 carbon atoms)
Ph	Phytane (isoprenoid with 20 carbon atoms)
nC_8	n-C_8 normal alkane
nC_{15}	n-C_{15} normal alkane
i-8	2,5-(2,4)-Dimethylhexane
i-8'	2,3,4-Trimethylpentane
i-8"	2,3-Dimethylhexane
CH-*n*	Alkylcyclohexane (where *n* indicates number of carbon atoms in the side chain)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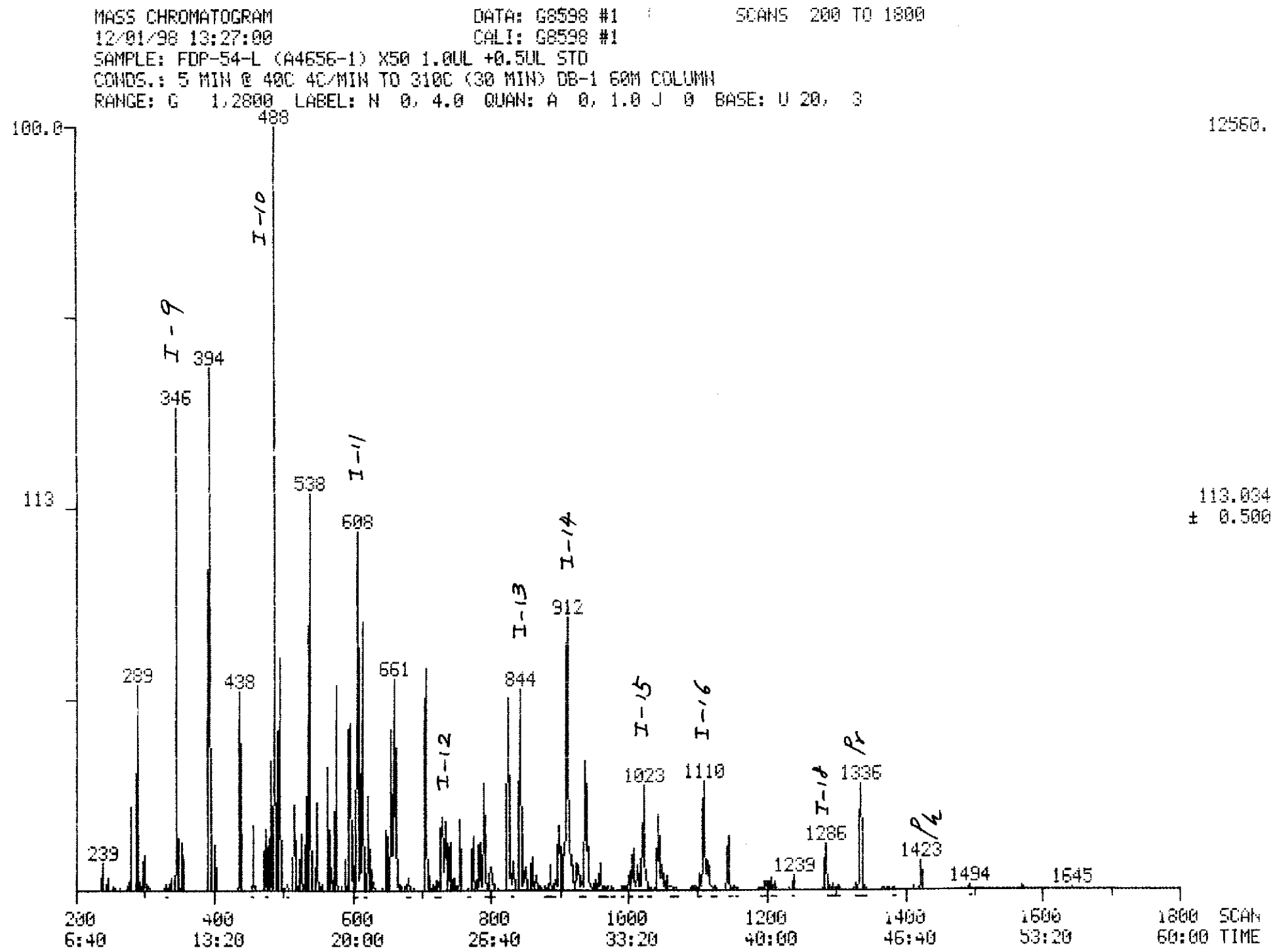
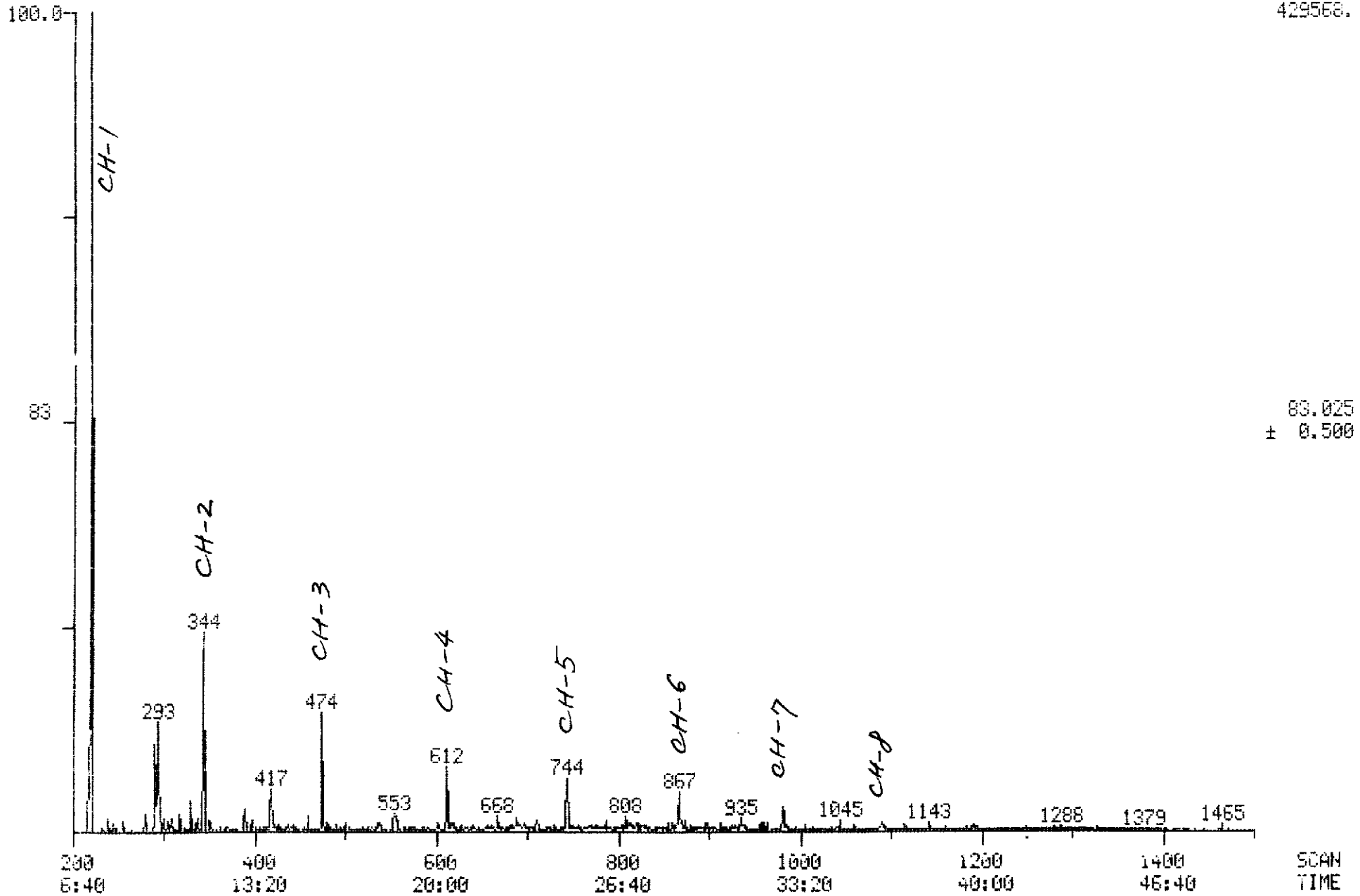
12/01/98 13:27:00
DATA: G8598 #1
CALI: G8598 #1
SCANS 200 TO 1800
SAMPLE: FDP-54-L (A4656-1) X50 1.0UL +0.5UL STD
CONDS.: 5 MIN @ 40C 4C/MIN TO 310C (30 MIN) DB-1 60M COLUMN
RANGE: G 1.2800 LABEL: N 0. 4.0 QUAN: A 0. 1.0 J 0 BASE: U 20. 3
100.0
85
179712.
85.025
± 0.500
277
I-p''
I-p
I-p'
n C8
383
n C9
441
n C10
577
524
n C11
705
n C12
827
n C13
939
n C14
1045
n C15
1110
n C16
1195
n C17
1286
785
1423
1573
1715
200
6:40
400
13:20
600
20:00
800
26:40
1000
33:20
1200
40:00
1400
46:40
1600
53:20
1800
60:00
SCAN
TIME


MASS CHROMATOGRAM
12/01/98 13:27:00
DATA: G8598 #1
CALI: G8598 #1
SCANS 200 TO 1800
SAMPLE: FDP-54-L (A4656-1) X50 1.0UL +0.5UL STD
CONDS.: 5 MIN @ 40C 4C/MIN TO 310C (30 MIN) DB-1 60M COLUMN
RANGE: G 1.2800 LABEL: N 0, 4.0 QUAN: A 0, 1.0 J 0 BASE: U 20, 3
100.0
113
12560.
113.034
± 0.500
488
394
346
299
438
538
508
661
844
912
1023
1110
1336
1285
1239
1423
1494
1645
239
I-9
I-10
I-11
I-12
I-13
I-14
I-15
I-16
I-17
P1
P2
200
6:40
400
13:20
600
20:00
800
26:40
1000
33:20
1200
40:00
1400
46:40
1600
53:20
1800
60:00
SCAN
TIME

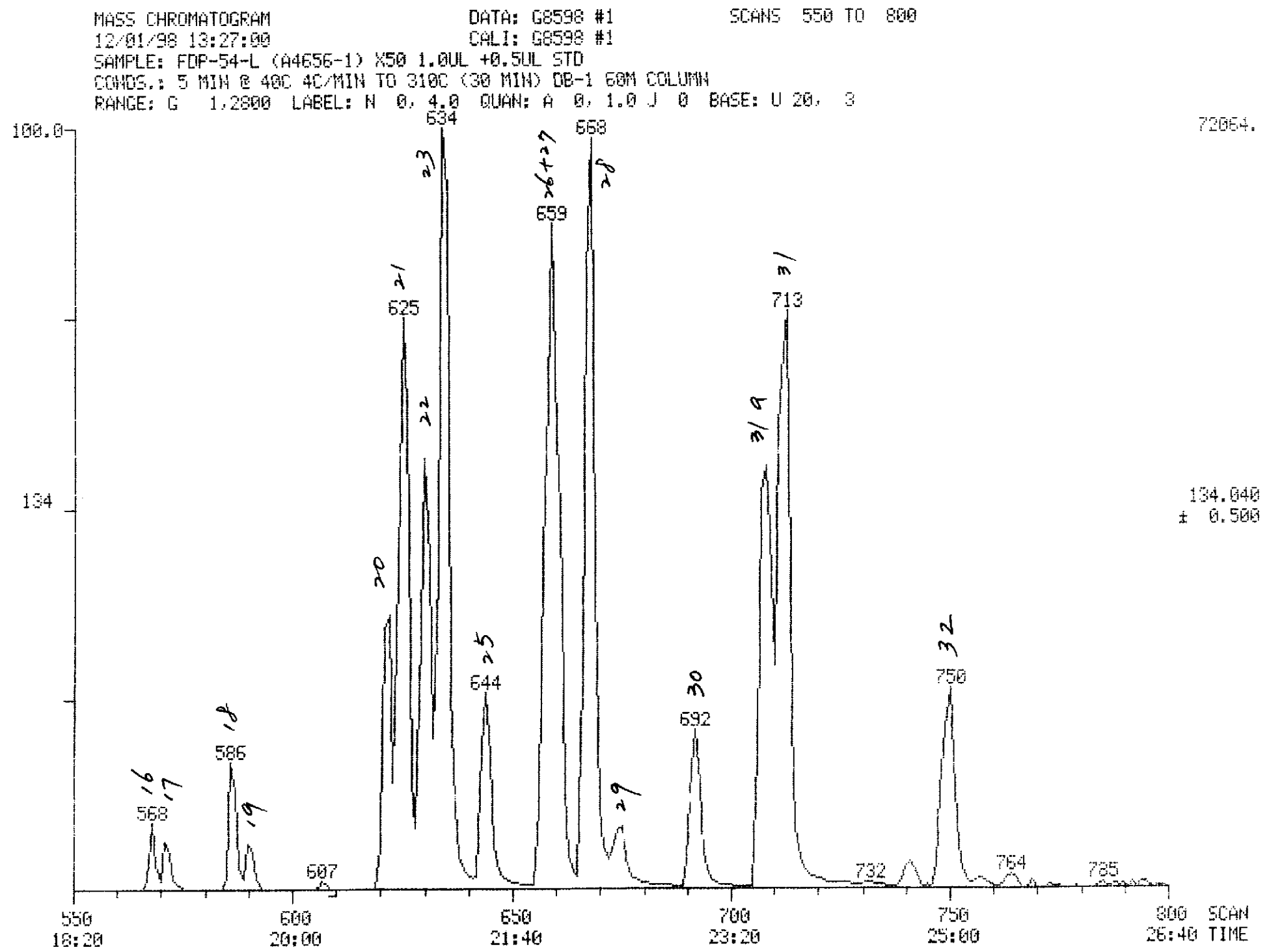
MASS CHROMATOGRAM DATA: G8598 #1 SCANS 200 TO 1500
12/01/98 13:27:00 CALI: G8598 #1
SAMPLE: FDP-54-L (A4656-1) X50 1.0UL +0.5UL STD
CONDS.: 5 MIN @ 40C 4C/MIN TO 310C (30 MIN) DB-1 60M COLUMN
RANGE: G 1.2800 LABEL: N 0. 4.0 QUAN: A 0. 1.0 J 0 BASE: U 20. 3



Table

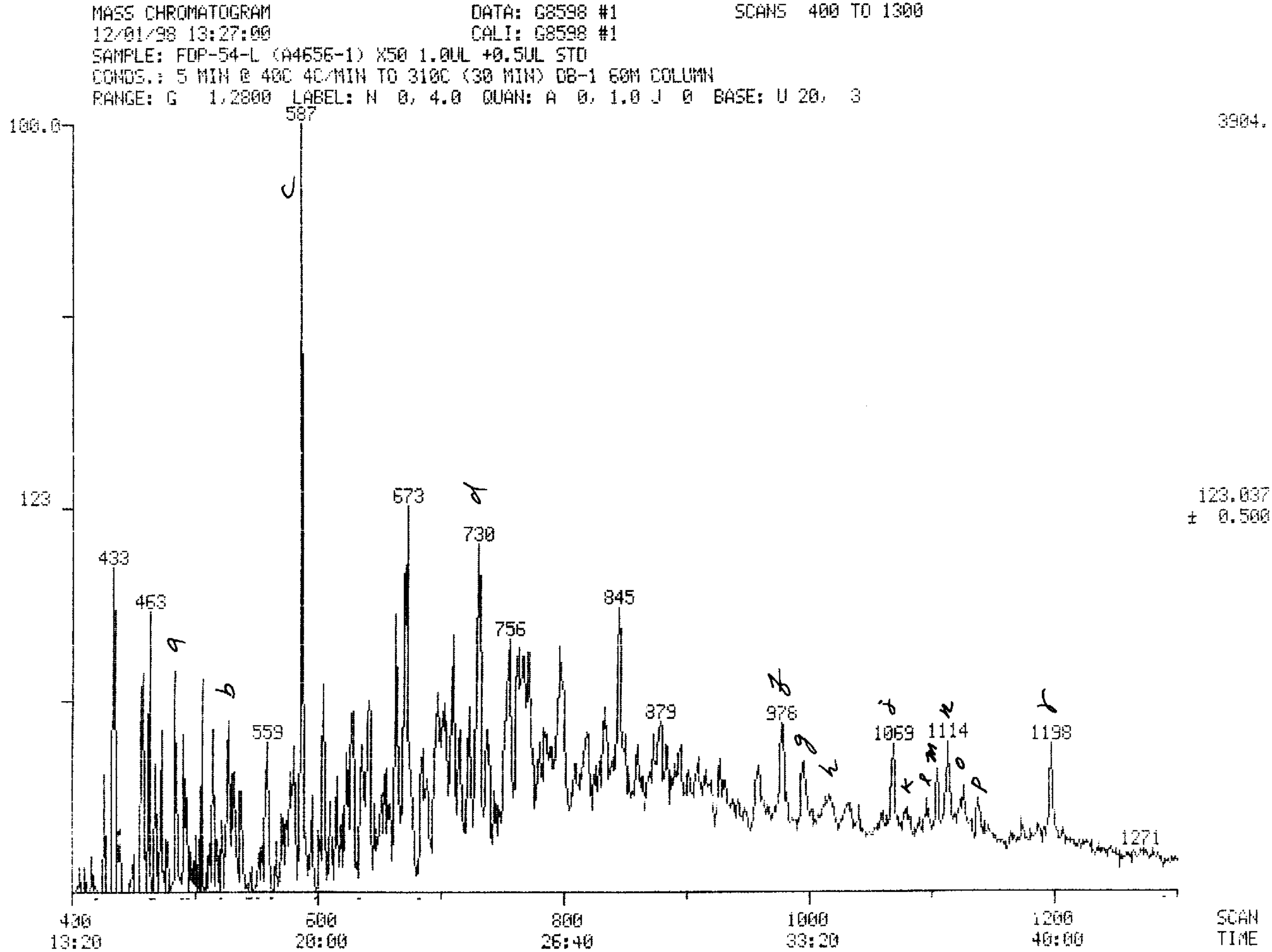
Key for C_4-Alkylbenzenes (m/z 134 chromatogram)

16	Sec-Butylbenzene
17	1-Methyl-3-Isopropylbenzene
18	1-Methyl-4-Isopropylbenzene
19	1-Methyl-2-Isopropylbenzene
20	1,3-Diethylbenzene
21	1-Methyl-3-Propylbenzene
22	Butylbenzene
23	1,3-Diemethyl-5-Ethylbenzene
24	1,2-Diethylbenzene
25	1-Methy-2-Propylbenzene
26	1,4-Dimethyl-2-Ethylbenzene
27	1,3-Dimethyl-4-Ethylbenzene
28	1,2-Dimethyl-4-Ethylbenzene
29	1,3-Dimethyl-2-Ethylbenzene
30	1,2-Dimethyl-3-Ethylbenzene
31a	1,2,4,5-Tetramethylbenzene
31	1,2,3,5-Tetramethylbenzene
32	1,2,3,4-Tetramethylbenzene


MASS CHROMATOGRAM
12/01/98 13:27:00
DATA: G8598 #1
CALI: G8598 #1
SCANS 550 TO 800
SAMPLE: FDP-54-L (A4656-1) X50 1.0UL +0.5UL STD
CONDS.: 5 MIN @ 40C 4C/MIN TO 310C (30 MIN) DB-1 60M COLUMN
RANGE: G 1.2800 LABEL: N 0, 4.0 QUAN: A 0, 1.0 J 0 BASE: U 20, 3
100.0
72064.
134
134.040
± 0.500
568
586
607
625
634
644
659
668
692
713
732
750
764
785
16
17
18
19
20
21
22
23
25
26+27
28
29
30
31
31
32
550
18:20
600
20:00
650
21:40
700
23:20
750
25:00
800 SCAN
26:40 TIME

Key for identification of the bicyclanes (m/z 123)

Peak No.	Identity	Formula	M.W.
a	2,2,3-Trimethylbicyloheptane	$C_{10}H_{18}$	138
b	C_{10} bicyclic	$C_{10}H_{18}$	138
c	3,3,7-Trimethylbicycloheptane	$C_{10}H_{18}$	138
d	C_{11} decalin	$C_{11}H_{20}$	152
f	Nordrimane	$C_{14}H_{26}$	194
g	Nordrimane	$C_{14}H_{26}$	194
h	Rearranged drimane	$C_{15}H_{28}$	208
j	Rearranged drimane	$C_{15}H_{28}$	208
k	Isomer of eudesmane	$C_{15}H_{28}$	208
l	4β(H) Eudesmane	$C_{15}H_{28}$	208
m	C_{15} bicyclic sesquiterpane	$C_{15}H_{28}$	208
n	8β(H) Drimane	$C_{15}H_{28}$	208
o	C_{15} bicyclic sesquiterpane	$C_{15}H_{28}$	208
p	C_{16} bicyclic sesquiterpane	$C_{16}H_{30}$	222
q	C_{16} bicyclic sesquiterpane	$C_{16}H_{30}$	222
r	8β(H) Homodrimane	$C_{16}H_{30}$	222


MASS CHROMATOGRAM
12/01/98 13:27:00
DATA: G8598 #1
CALI: G8598 #1
SCANS 400 TO 1300
SAMPLE: FDP-54-L (A4656-1) X50 1.0UL +0.5UL STD
CONDS.: 5 MIN @ 40C 4C/MIN TO 310C (30 MIN) DB-1 60M COLUMN
RANGE: G 1,2800 LABEL: N 0, 4.0 QUAN: A 0, 1.0 J 0 BASE: U 20, 3
100.0
3904.
123
123.037
± 0.500
587
673
730
433
463
756
845
879
976
1069
1114
1198
559
1271
400
13:20
600
20:00
800
26:40
1000
33:20
1200
40:00
SCAN
TIME

Key for Aromatic Compounds Identification in Bar Diagram

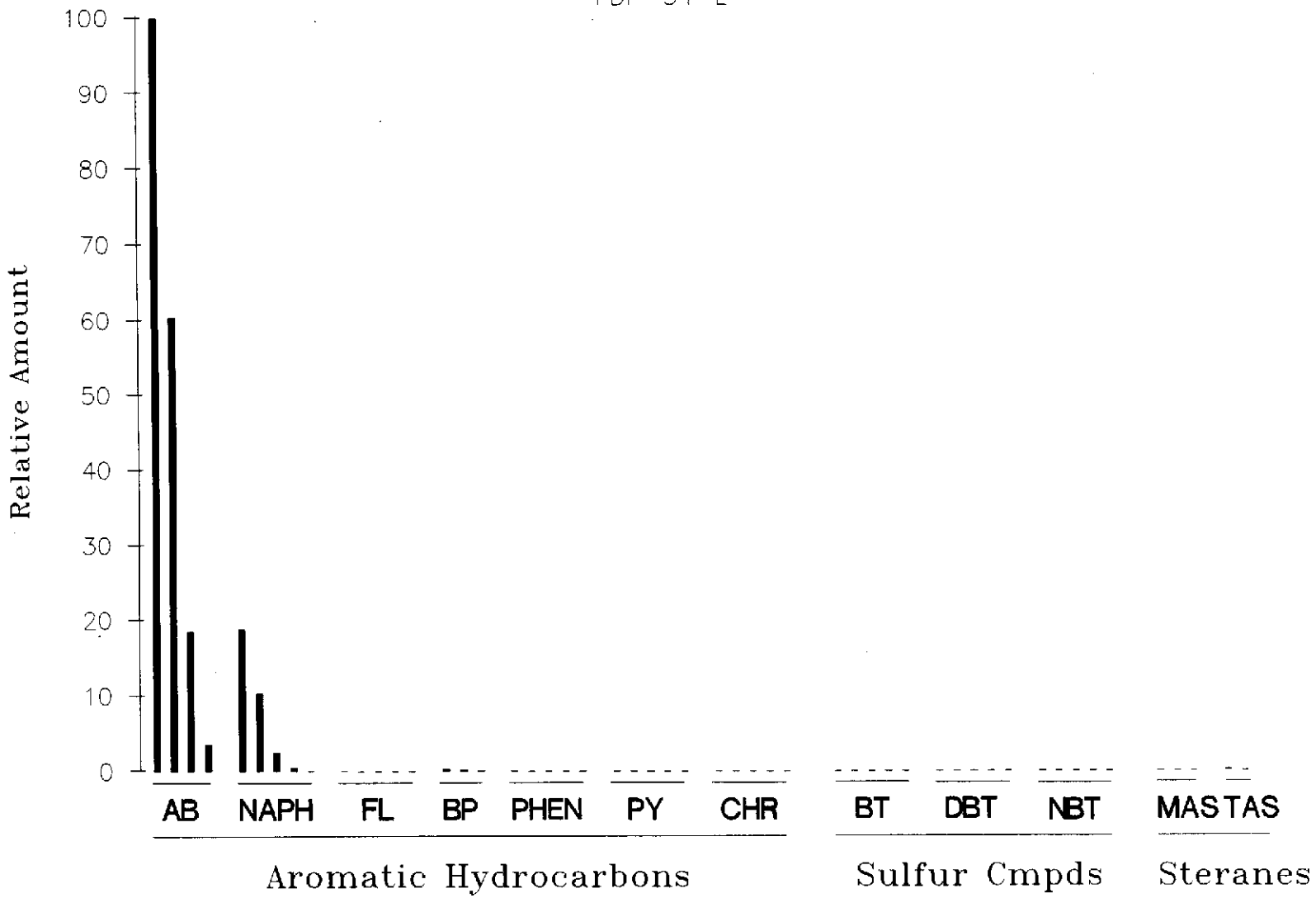
AB:	C_3-C_6 Alkylbenzenes
NAPH:	C_0-C_4 Naphthalenes
FL:	C_0-C_4 Fluorenes
BP:	C_0-C_2 BP Biphenyl/Dibenzofuran
PHEN:	C_0-C_4 Phenanthrenes
PY:	C_0-C_4 Pyrenes/Fluoranthenes
CHR:	C_0-C_4 Chrysenes
BT:	C_1-C_5 Benzothiophenes
DBT:	C_0-C_4 Dibenzothiophenes
NBT:	C_0-C_4 Naphthobenzothiophenes
MAS:	Monoaromatic Steranes
TAS:	Triaromatic Steranes

Key for Identifying Aromatic Hydrocarbons

No.	m/z	Compound
1	120	C_3-alkylbenzenes
2	134	C_4-alkylbenzenes
3	148	C_5-alkylbenzenes
4	162	C_6-alkylbenzenes
5	128	C_0-naphthalene
6	142	C_1-naphthalenes
7	156	C_2-naphthalenes
8	170	C_3-naphthalenes
9	184	C_4-naphthalenes
10	166	C_0-fluorene
11	180	C_1-fluorenes
12	194	C_2-fluorenes
13	208	C_3-fluorenes
14	222	C_4-fluorenes
15	154	C_0-biphenyl
16	168	C_1-biphenyls + dibenzofuran
17	182	C_2-biphenyls + C_1-dibenzofuran
18	178	C_0-phenanthrene
19	192	C_1-phenanthrenes
20	206	C_2-phenanthrenes
21	220	C_3-phenanthrenes
22	234	C_4-phenanthrenes
23	202	C_0-pyrene/fluoranthene
24	216	C_1-pyrenes/fluoranthenes
25	230	C_2-pyrenes/fluoranthenes
26	244	C_3-pyrenes/fluoranthenes
27	258	C_4-pyrenes/fluoranthenes
28	228	C_0-chrysene
29	242	C_1-chrysenes
30	256	C_2-chrysenes
31	270	C_3-chrysenes
32	284	C_4-chrysenes
33	148	C_1-benzothiophenes
34	162	C_2-benzothiophenes
35	176	C_3-benzothiophenes
36	190	C_4-benzothiophenes
37	204	C_5-benzothiophenes
28	184	C_0-dibenzothiophene
39	198	C_1-dibenzothiophenes
40	212	C_2-dibenzothiophenes
41	226	C_3-dibenzothiophenes
42	240	C_4-dibenzothiophenes
43	234	C_0-naphthobenzothiophene
44	248	C_1-naphthobenzothiophenes
45	262	C_2-naphthobenzothiophenes
46	276	C_3-naphthobenzothiophenes
47	290	C_4-naphthobenzothiophenes
48	253	Monoaromatic steranes
49	267	Monoaromatic steranes
50	239	Monoaromatic steranes
51	231	Triaromatic steranes
52	245	Triaromatic steranes

Aromatic Hydrocarbon Distribution

FDP-54-L



Global Geochemistry Corporation