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Geochemical Analysis of an Oil from 2/1-8, Central Trough, Norway

SST/184/95

M.P. Dee
Subsurface Technology

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November 1994

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MAIN TITLE

Geochemical Analysis of an Oil from 2/1-8, Centrtal Trough, Norway

SUB TITLE

CLIENT	PRINCIPAL RECIPIENT	COMMISSIONED BY
BP NORWAY	TIM DODD	TIM DODD

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- [ ] UNCLASSIFIED
- [x] CONFIDENTIAL
- [ ] SECRET

KEYWORDS

CENTRAL TROUGH, GEOCHEMISTRY, NORWAY, OIL

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ABSTRACT

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CONTENTS

SUMMARY

This report contains geochemical data for an oil sample from 2/1-8, Central Trough, Norway. The oil has been characterised by whole oil GC, high resolution GC-MS and stable carbon isotope determination of saturates and aromatics fractions. The sample has been analysed twice by high resolution GC-MS to examine the repeatability of the technique.

Data contained in this report will be interpreted by Dim Dodd (BP Norway) at a later date.

List of Tables

List of Figures

OIL ANALYSIS

WELL	2/1-8
SUITE	
TEST NUMBER	
DEPTH	
DEPTH RANGE (m)	
SAMPTYPE	CRU
LOCATION	
OILFIELD	
API GRAVITY @ 15°C	
DENSITY @ 15°C	
WAX %wt	
POUR POINT	
ASPHALTENES %wt	
SULPHUR %wt	
NITROGEN ppm	
NICKEL ppm	
VANADIUM ppm	
VISCOSITY cST @ 20°C	
n-ALKANE CPI	
PRISTANE/PHYTANE	
PRISTANE/nC17	
PHYTANE/nC18	
ALKANE INDEX	
R22	

TYPE ANALYSIS BY HPLC ON DE-ASPHALTENED RESIDUE>200°C

SATURATES %wt	
AROMATICS %wt	
RESIDUE %wt	

CARBON ISOTOPE RATIOS per mil

TOTAL OIL	
ASPHALTENE	
SATURATES	
AROMATICS	
RESIDUE	
STANDARD	

LIGHT HYDROCARBONS

MCH %	
HER	
HXR	

BIOMARKER RATIOS

H1	0.58	S1	0.62	A1	0.55
H2	0.56	S2	0.59	A2	0.58
H3	0.87	S3	36:37:27	A3	0.85
H4	0	S4	34:28:38	A4	0.69
H5	100:84:72:45:28:22	S5	32.2	A5	0.34
H6	0.47	S6		A6	1.27
H7	0.54	S7	57.13		
H10		S8		M2	0.94
H11	11.01	S9		M3	0.88
H12	8.25	S10		M4	32.22
H13	16.61				
H14	28.58			MBP	5.9
H15	0.00			MDR	3.7
H16	0.00				
H17	43.99				

QUANTITATIVE ANALYSIS

SATURATE FRACTION	QSNALK	ppm
	QSNC20	ppm
	QSC29ST	ppm
	QSC30HO	ppm
	QSC32HO	ppm
AROMATIC FRACTION	QAMONAR	ppm
	QATRIAR	ppm
	QAMEPH	ppm

CODING LISTINGS FOR BIOMARKERS CAN BE FOUND AT THE BACK OF THIS REPORT

TABLE 1.1

OIL ANALYSIS

WELL	2/1-8
SUITE	
TEST NUMBER	
DEPTH	
DEPTH RANGE (m)	
SAMPTYPE	CRU
LOCATION	
OILFIELD	
API GRAVITY @ 15°C	
DENSITY @ 15°C	
WAX %wt	
POUR POINT	
ASPHALTENES %wt	0.10
SULPHUR %wt	
NITROGEN ppm	
NICKEL ppm	
VANADIUM ppm	
VISCOSITY cST @ 20°C	
n-ALKANE CPI	
PRISTANE/PHYTANE	
PRISTANE/nC17	
PHYTANE/nC18	
ALKANE INDEX	
R22	

TYPE ANALYSIS BY HPLC ON DE-ASPHALTENED RESIDUE>200°C

SATURATES %wt	71.4
AROMATICS %wt	23.5
RESIDUE %wt	5.1

CARBON ISOTOPE RATIOS per mil

TOTAL OIL	
ASPHALTENE	
SATURATES	-25.8
AROMATICS	-25.6
RESIDUE	
STANDARD	NBS22 -29.8

LIGHT HYDROCARBONS

MCH %	38.10
HER	0.38
HXR	0.51

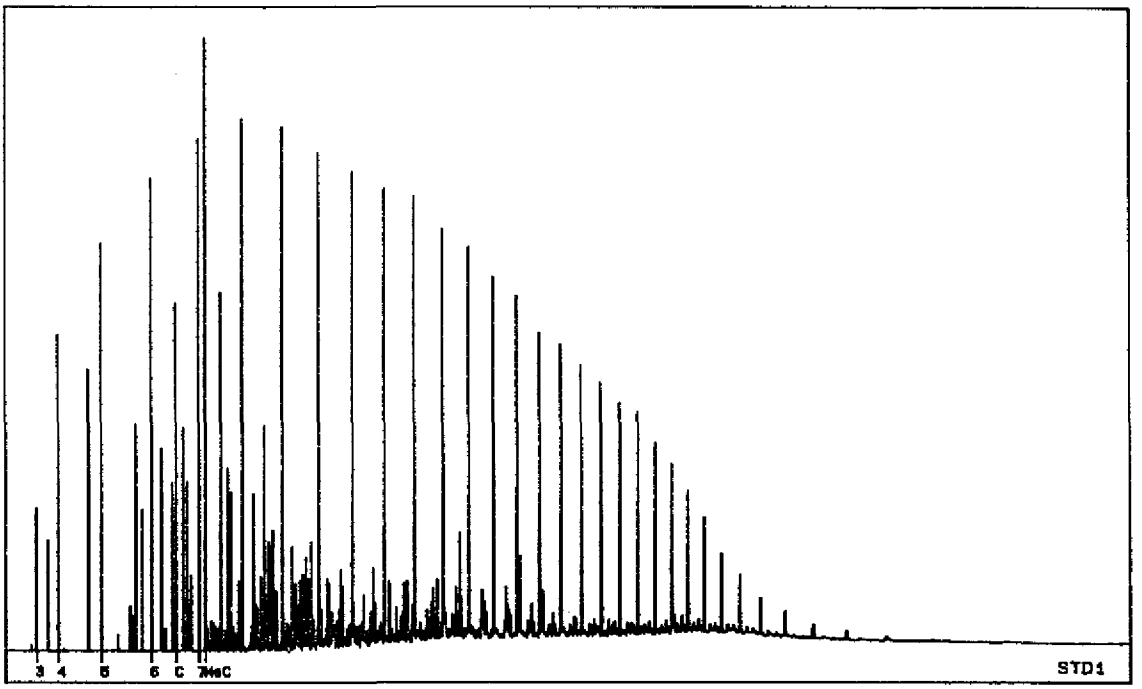
BIOMARKER RATIOS

H1	0.61	S1	0.63	A1	0.58
H2	0.56	S2	0.52	A2	0.62
H3	0.89	S3	34:36:31	A3	0.86
H4	0	S4	33:30:37	A4	0.71
H5	100:88:71:41:30:25	S5	47.1	A5	0.36
H6	0.47	S6		A6	1.27
H7	0.58	S7	52.38		
H10		S8		M2	0.97
H11	11.18	S9		M3	0.87
H12	7.44	S10		M4	34.04
H13	15.24				
H14	28.65			MBP	6.6
H15	0.00			MDR	4.1
H16	0.00				
H17	45.13				

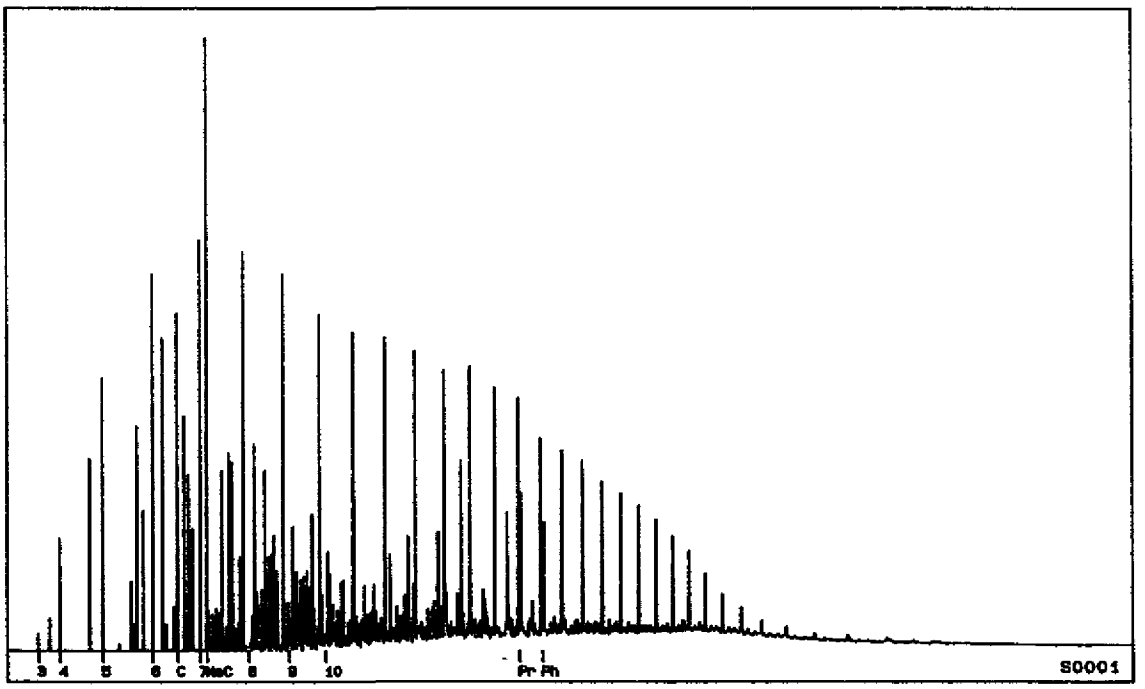
QUANTITATIVE ANALYSIS

SATURATE FRACTION	QSNALK	ppm
	QSNC20	ppm
	QSC29ST	ppm
	QSC30HO	ppm
	QSC32HO	ppm
AROMATIC FRACTION	QAMONAR	ppm
	QATRIAR	ppm
	QAMEPH	ppm

CODING LISTINGS FOR BIOMARKERS CAN BE FOUND AT THE BACK OF THIS REPORT



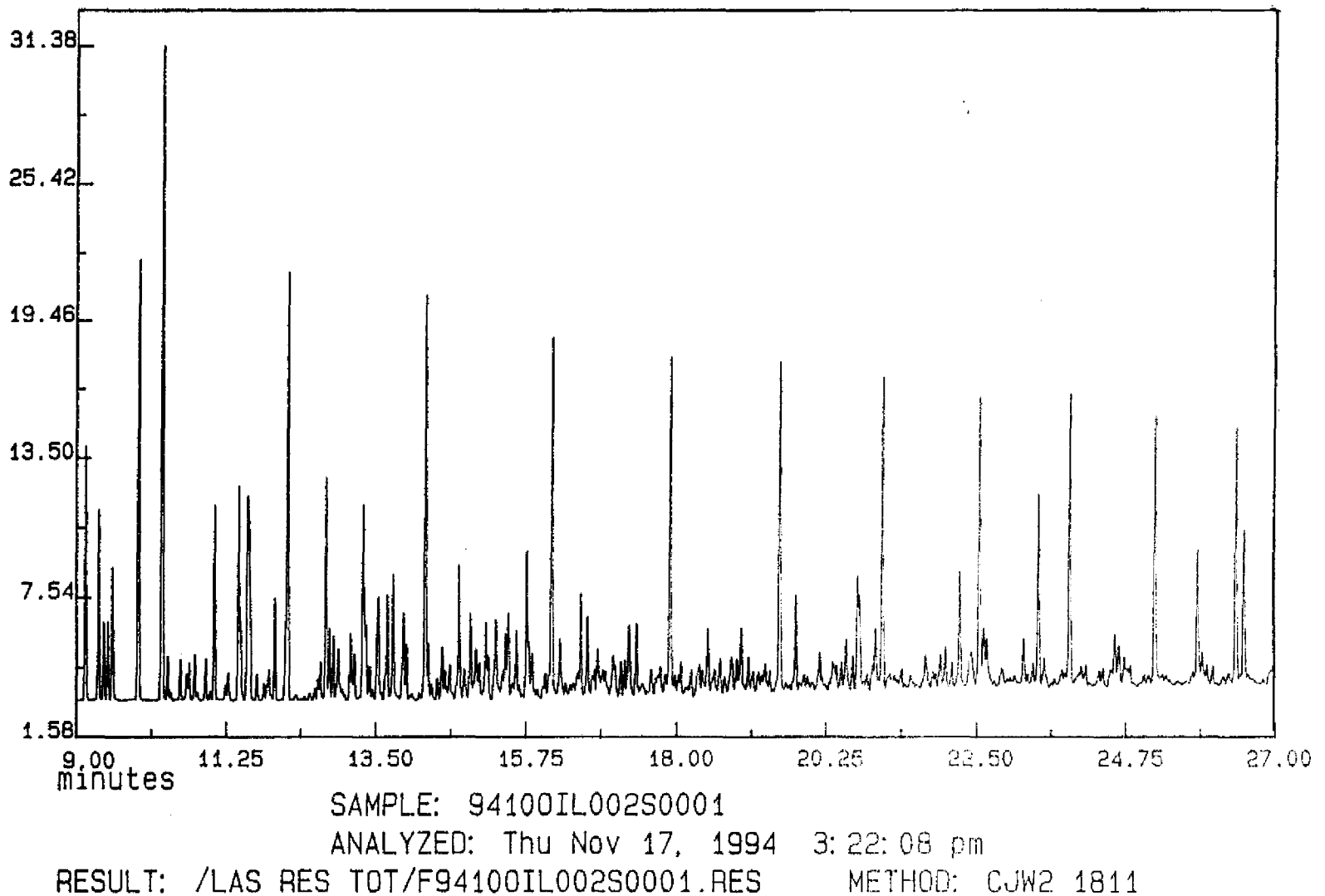
STANDARD



2/1-8 (CRU)

WHOLE OIL GC

ETB ref. 94100IL002
Figure 1.1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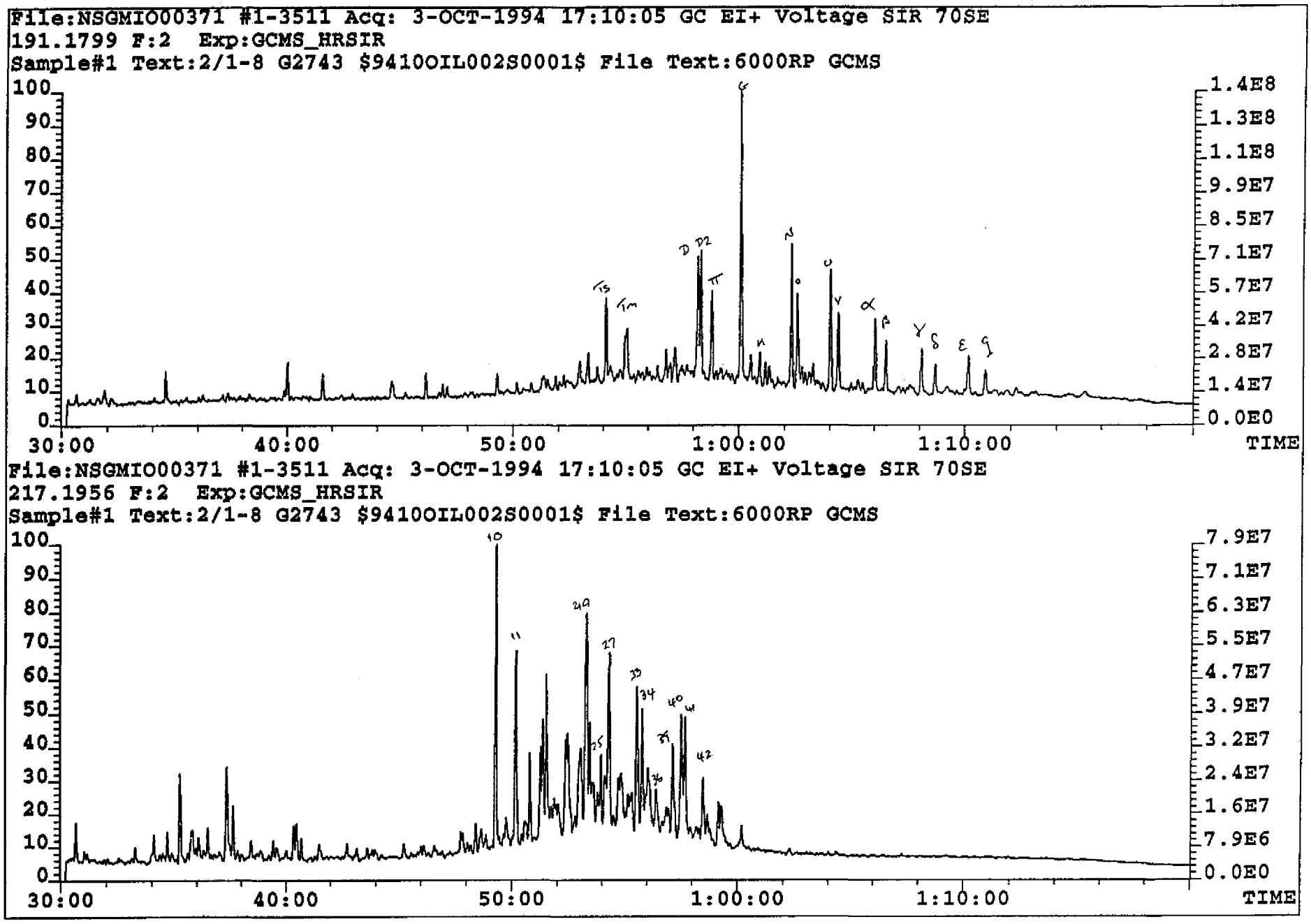
25.42
19.46
13.50
7.54
1.58
9.00
11.25
13.50
15.75
18.00
20.25
22.50
24.75
27.00
minutes
SAMPLE: 94100IL002S0001
ANALYZED: Thu Nov 17, 1994 3:22:08 pm
RESULT: /LAS RES TOT/F94100IL002S0001.RES
METHOD: CJW2 1811

Figure 1.2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90
80
70
60
50
40
30
20
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0
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1.3E8
1.1E8
9.9E7
8.5E7
7.1E7
5.7E7
4.2E7
2.8E7
1.4E7
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40:00
50:00
1:00:00
1:10:00
TIME
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217.1956 F:2 Exp:GCMS_HRSIR
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90
80
70
60
50
40
30
20
10
0
7.9E7
7.1E7
6.3E7
5.5E7
4.7E7
3.9E7
3.2E7
2.4E7
1.6E7
7.9E6
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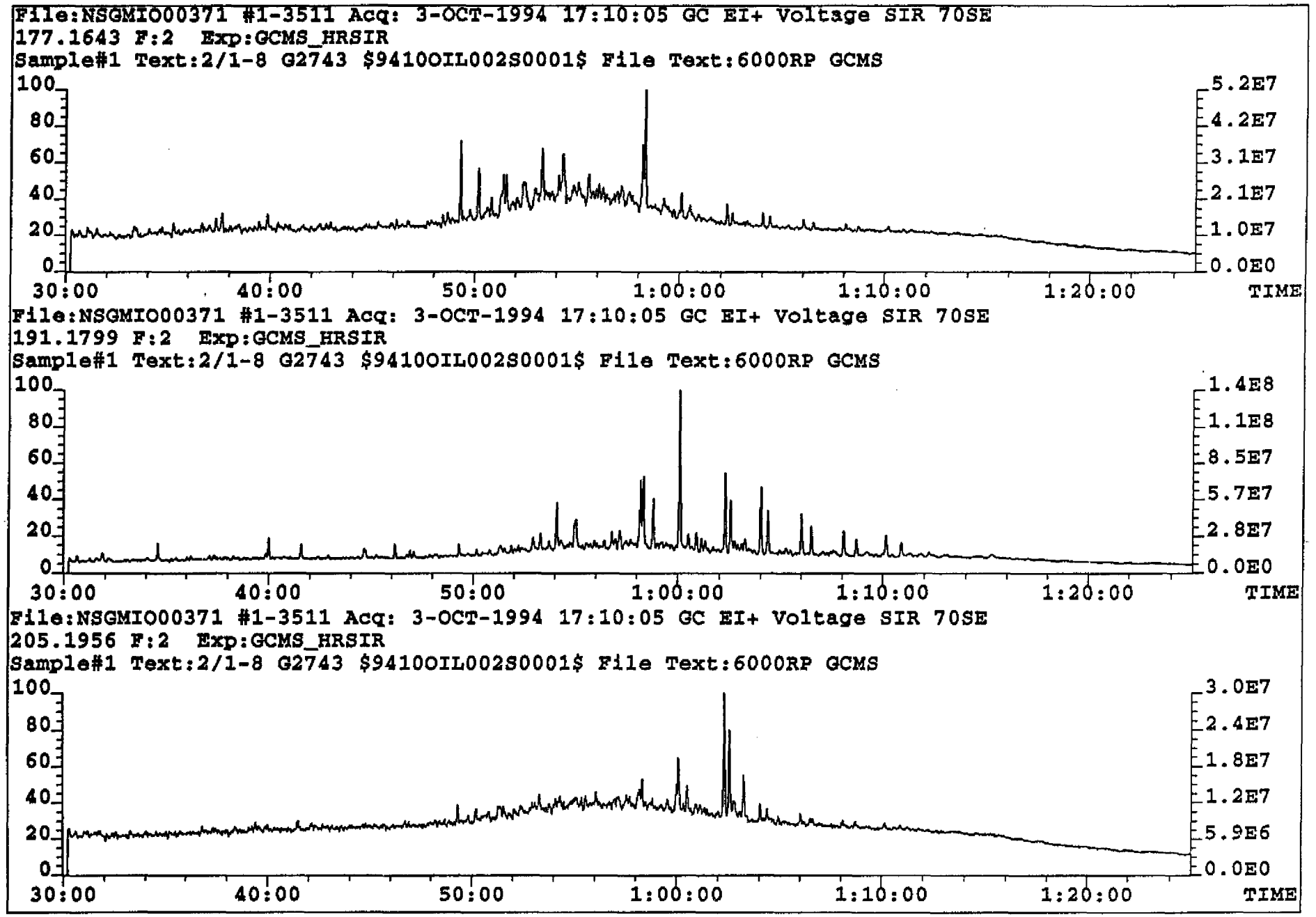
TIME

Figure 2.1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60
40
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0
5.2E7
4.2E7
3.1E7
2.1E7
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1:20:00
TIME
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191.1799 F:2 Exp:GCMS_HRSIR
Sample#1 Text:2/1-8 G2743 $9410OIL002S0001$ File Text:6000RP GCMS
100
80
60
40
20
0
1.4E8
1.1E8
8.5E7
5.7E7
2.8E7
0.0E0
30:00
40:00
50:00
1:00:00
1:10:00
1:20:00
TIME
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205.1956 F:2 Exp:GCMS_HRSIR
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100
80
60
40
20
0
3.0E7
2.4E7
1.8E7
1.2E7
5.9E6
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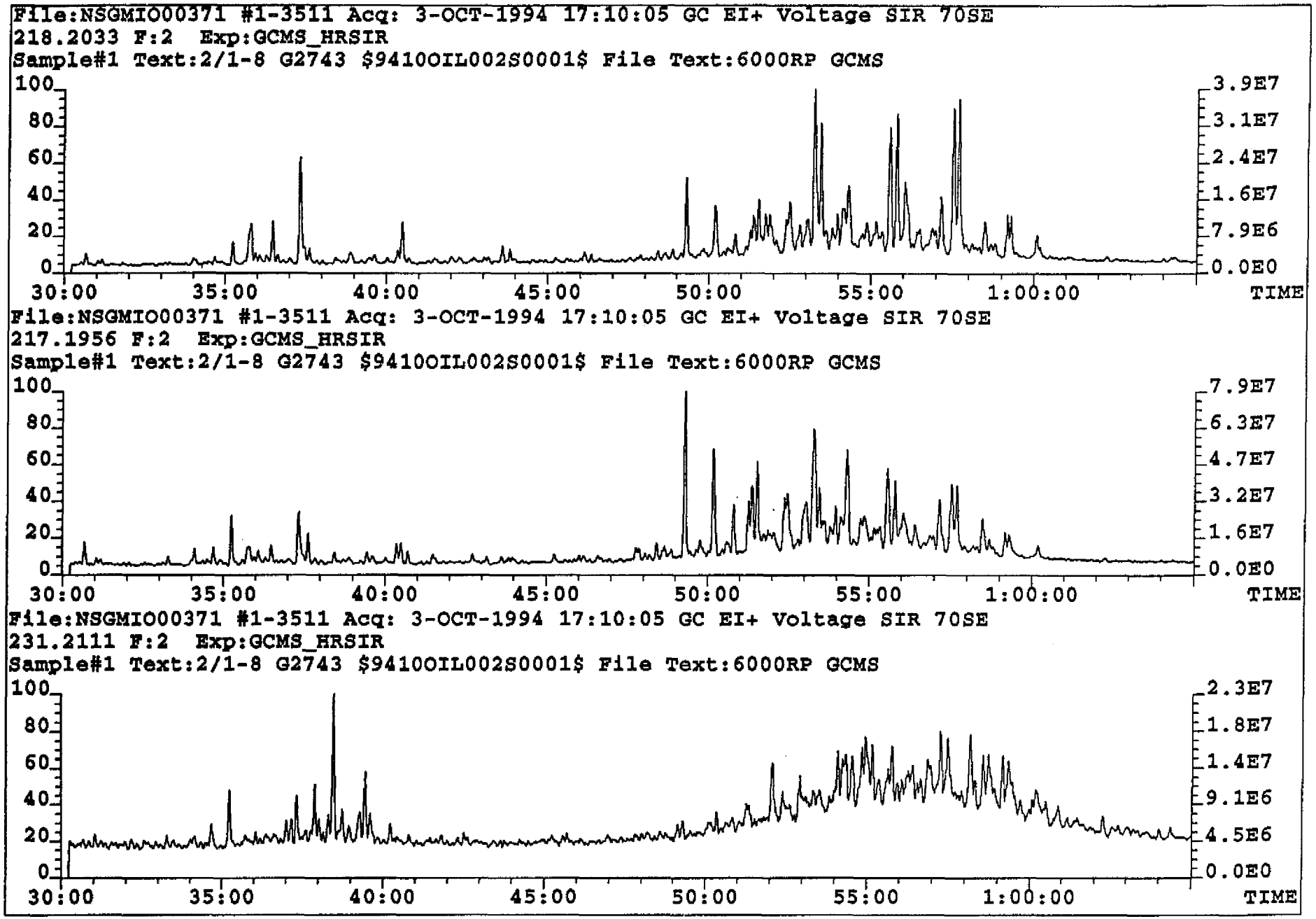
40:00
50:00
1:00:00
1:10:00
1:20:00
TIME

Figure 2.2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80
60
40
20
0
3.9E7
3.1E7
2.4E7
1.6E7
7.9E6
0.0E0
30:00
35:00
40:00
45:00
50:00
55:00
1:00:00
TIME
File:NSGMIO00371 #1-3511 Acq: 3-OCT-1994 17:10:05 GC EI+ Voltage SIR 70SE
217.1956 F:2 Exp:GCMS_HRSIR
Sample#1 Text:2/1-8 G2743 $9410OIL002S0001$ File Text:6000RP GCMS
100
80
60
40
20
0
7.9E7
6.3E7
4.7E7
3.2E7
1.6E7
0.0E0
30:00
35:00
40:00
45:00
50:00
55:00
1:00:00
TIME
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60
40
20
0
2.3E7
1.8E7
1.4E7
9.1E6
4.5E6
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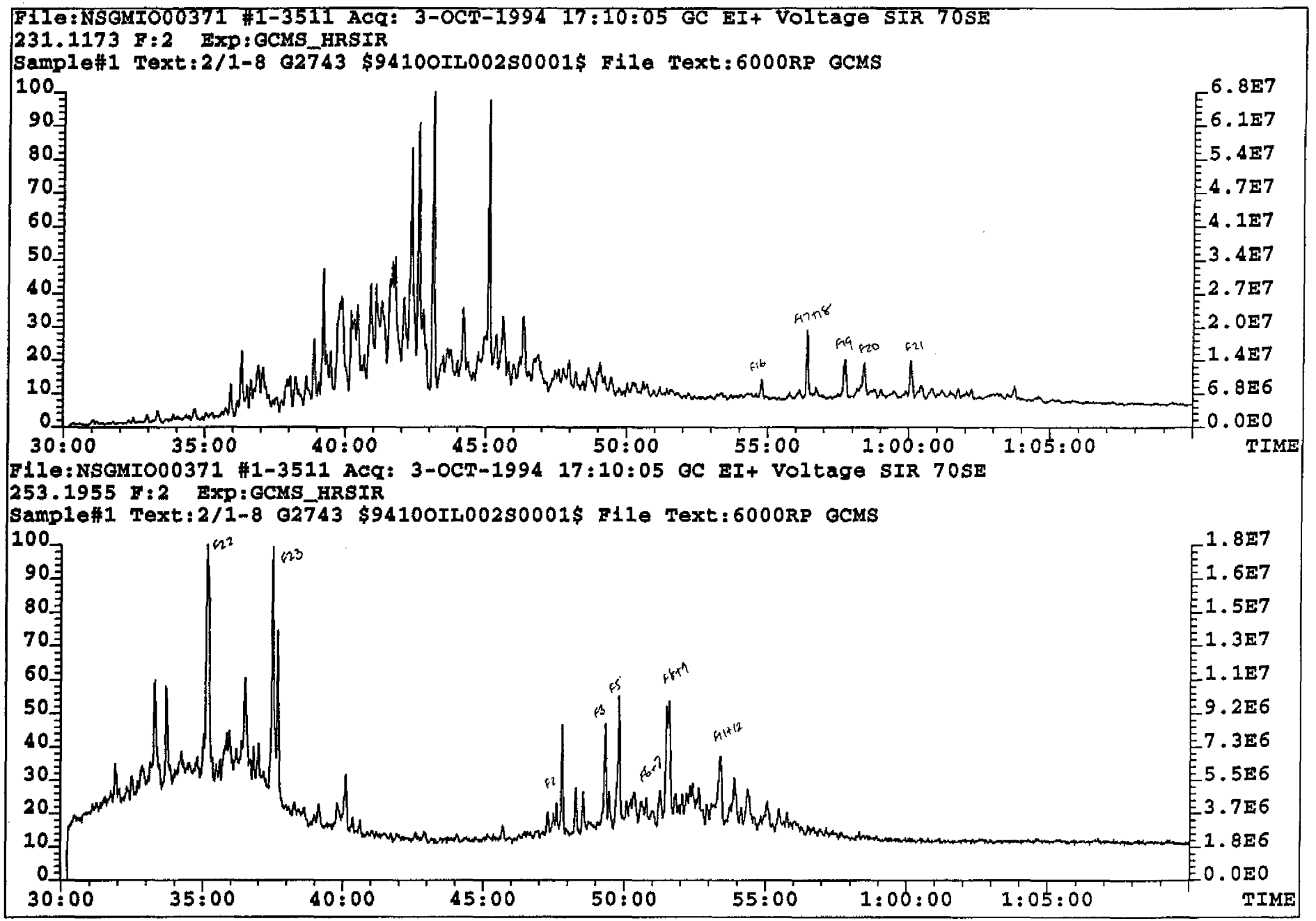
1:00:00
TIME

Figure 2.3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70
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50
40
30
20
10
0
6.8E7
6.1E7
5.4E7
4.7E7
4.1E7
3.4E7
2.7E7
2.0E7
1.4E7
6.8E6
0.0E0
30:00
35:00
40:00
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50:00
55:00
1:00:00
1:05:00
TIME
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253.1955 F:2 Exp:GCMS_HRSIR
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80
70
60
50
40
30
20
10
0
1.8E7
1.6E7
1.5E7
1.3E7
1.1E7
9.2E6
7.3E6
5.5E6
3.7E6
1.8E6
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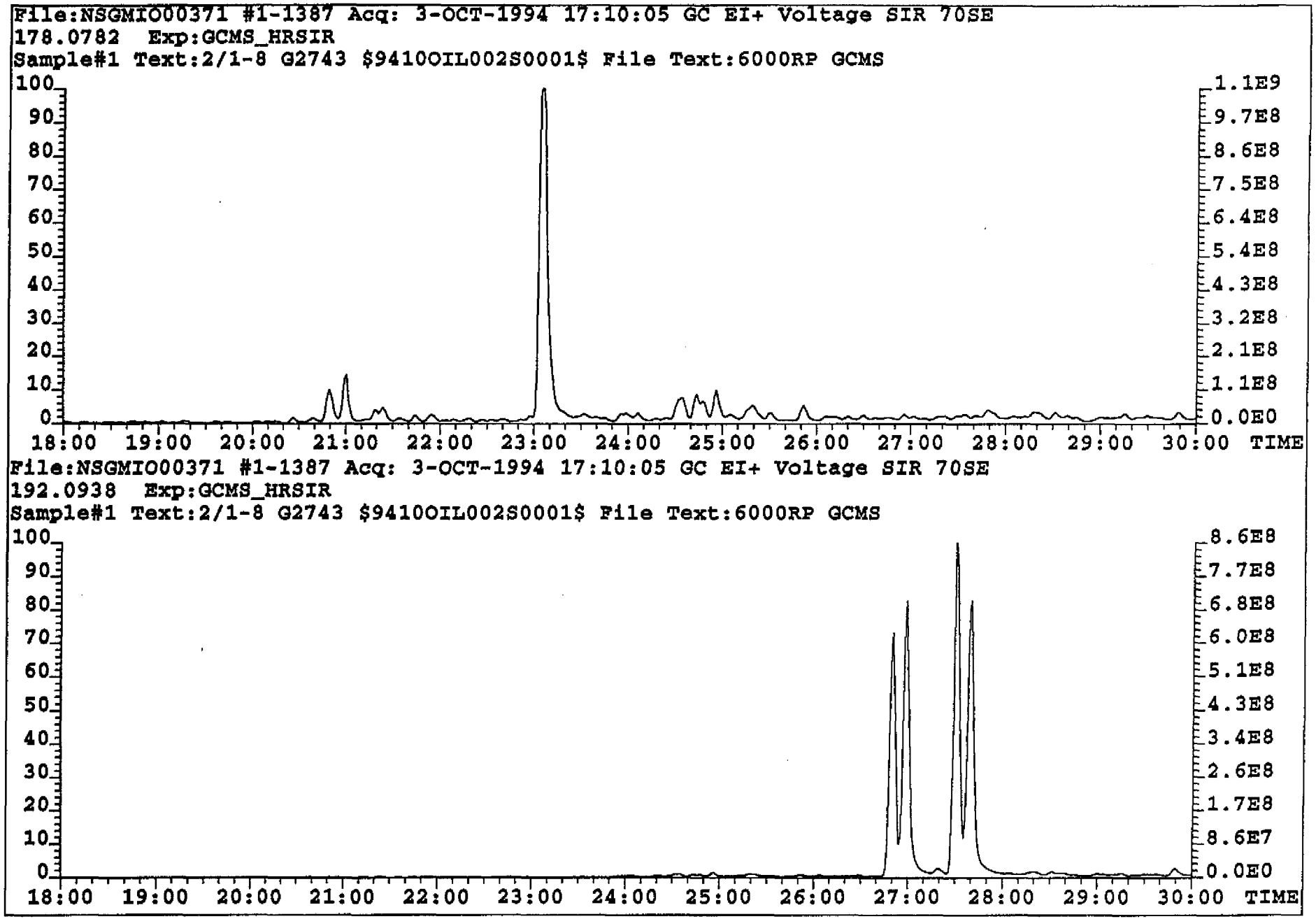
1:05:00
TIME

Figure 3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70
60
50
40
30
20
10
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7.5E8
6.4E8
5.4E8
4.3E8
3.2E8
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8.6E8
7.7E8
6.8E8
6.0E8
5.1E8
4.3E8
3.4E8
2.6E8
1.7E8
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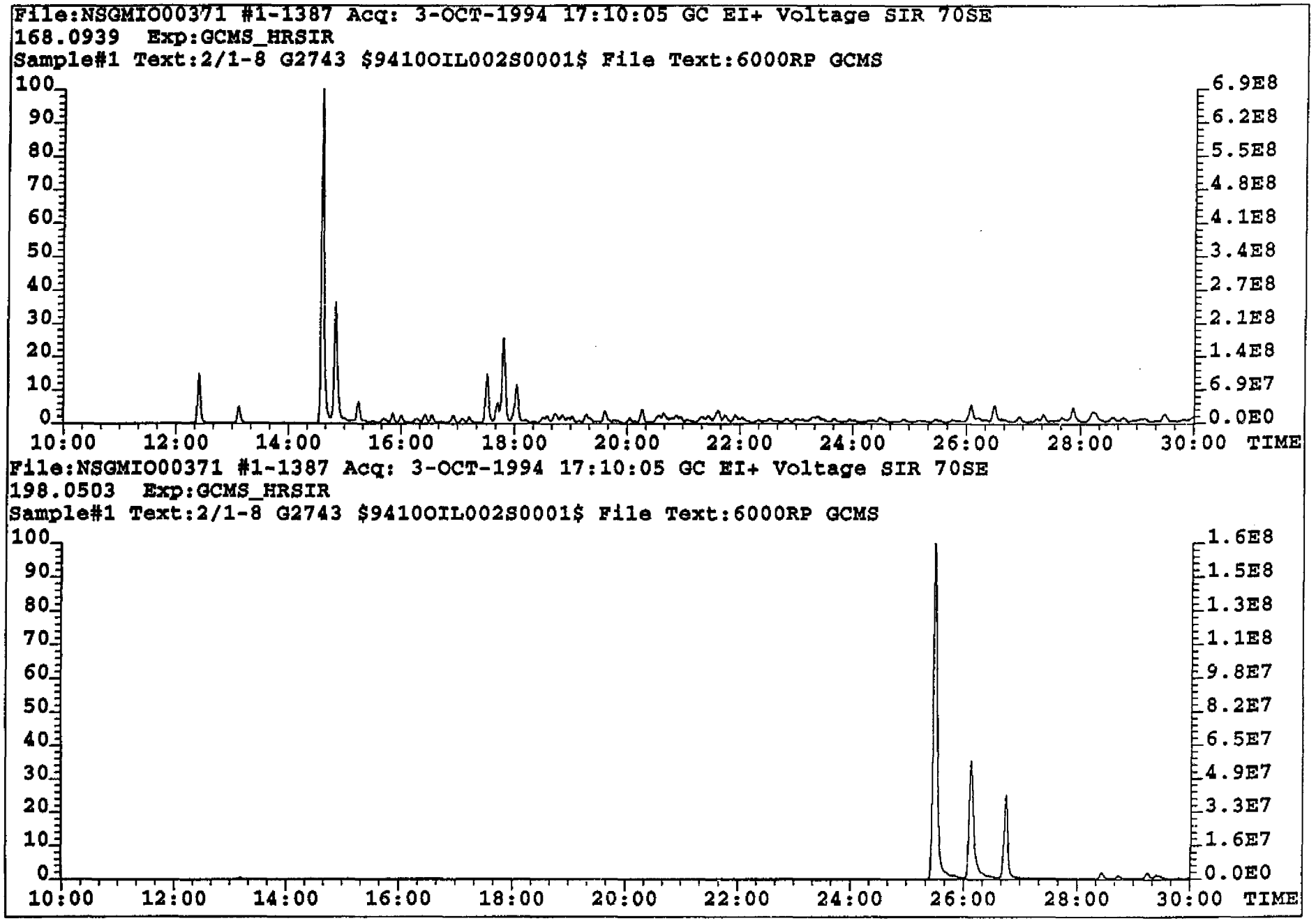
Figure 4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90
80
70
60
50
40
30
20
10
0
6.9E8
6.2E8
5.5E8
4.8E8
4.1E8
3.4E8
2.7E8
2.1E8
1.4E8
6.9E7
0.0E0
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12:00
14:00
16:00
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22:00
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TIME
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20
10
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1.5E8
1.3E8
1.1E8
9.8E7
8.2E7
6.5E7
4.9E7
3.3E7
1.6E7
0.0E0
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12:00
14:00
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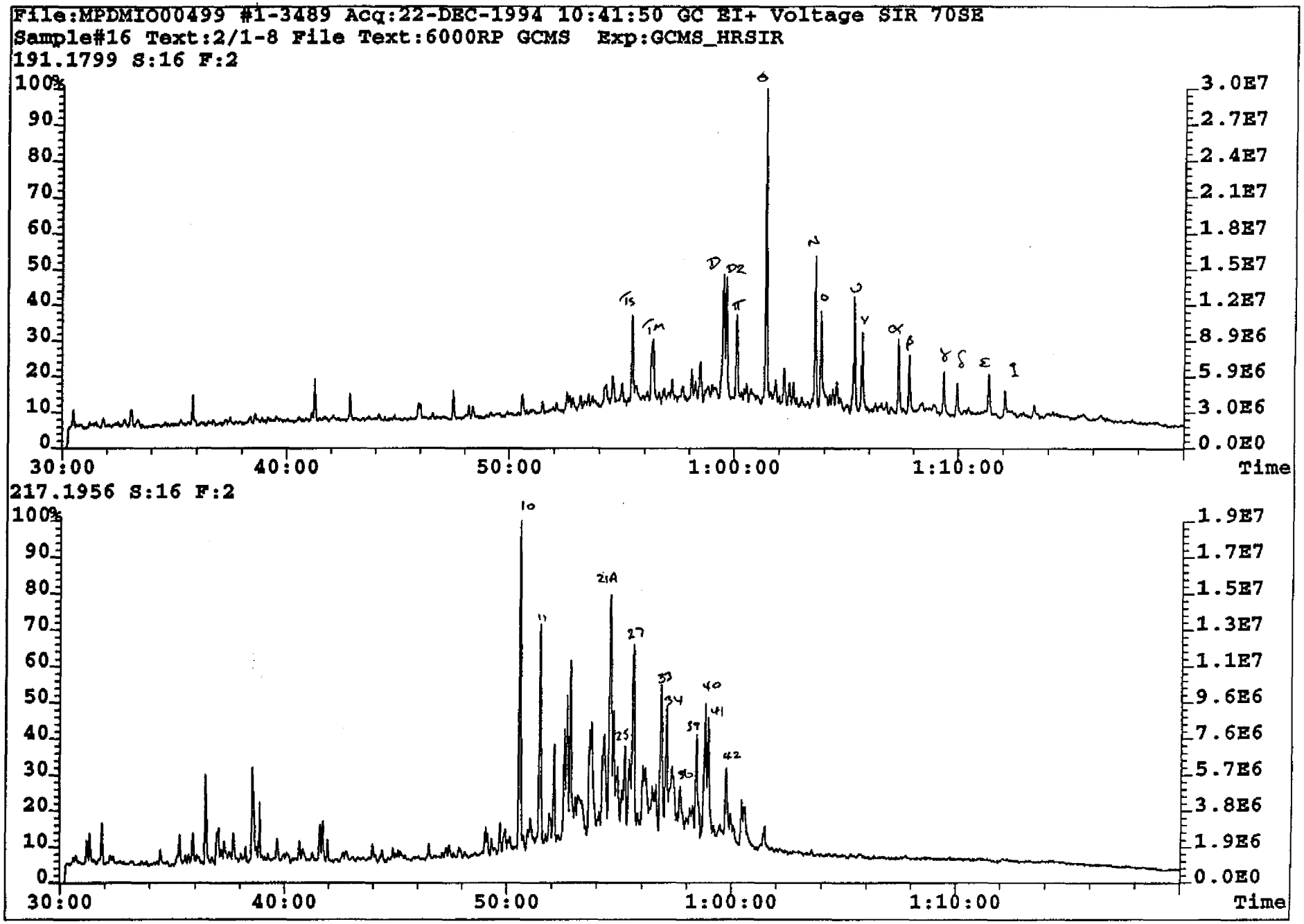
22:00
24:00
26:00
28:00
30:00
TIME

Figure 5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191.1799 S:16 F:2
100%
90
80
70
60
50
40
30
20
10
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3.0E7
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2.4E7
2.1E7
1.8E7
1.5E7
1.2E7
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50:00
1:00:00
1:10:00
Time
217.1956 S:16 F:2
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1.5E7
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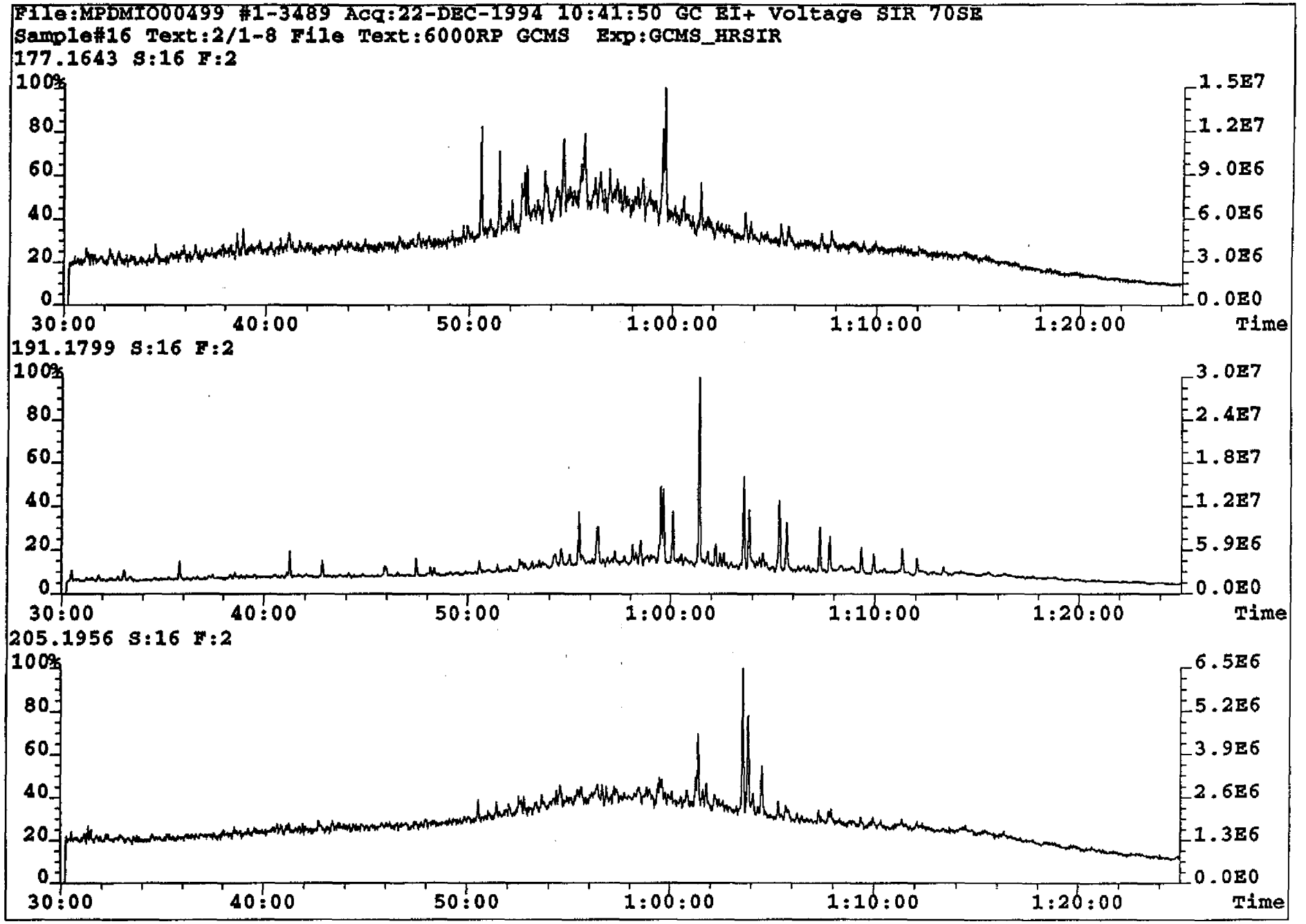
Figure 6.1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177.1643 S:16 F:2
100%
80
60
40
20
0
1.5E7
1.2E7
9.0E6
6.0E6
3.0E6
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30:00
40:00
50:00
1:00:00
1:10:00
1:20:00
Time
191.1799 S:16 F:2
100%
80
60
40
20
0
3.0E7
2.4E7
1.8E7
1.2E7
5.9E6
0.0E0
30:00
40:00
50:00
1:00:00
1:10:00
1:20:00
Time
205.1956 S:16 F:2
100%
80
60
40
20
0
6.5E6
5.2E6
3.9E6
2.6E6
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1:20:00
Time

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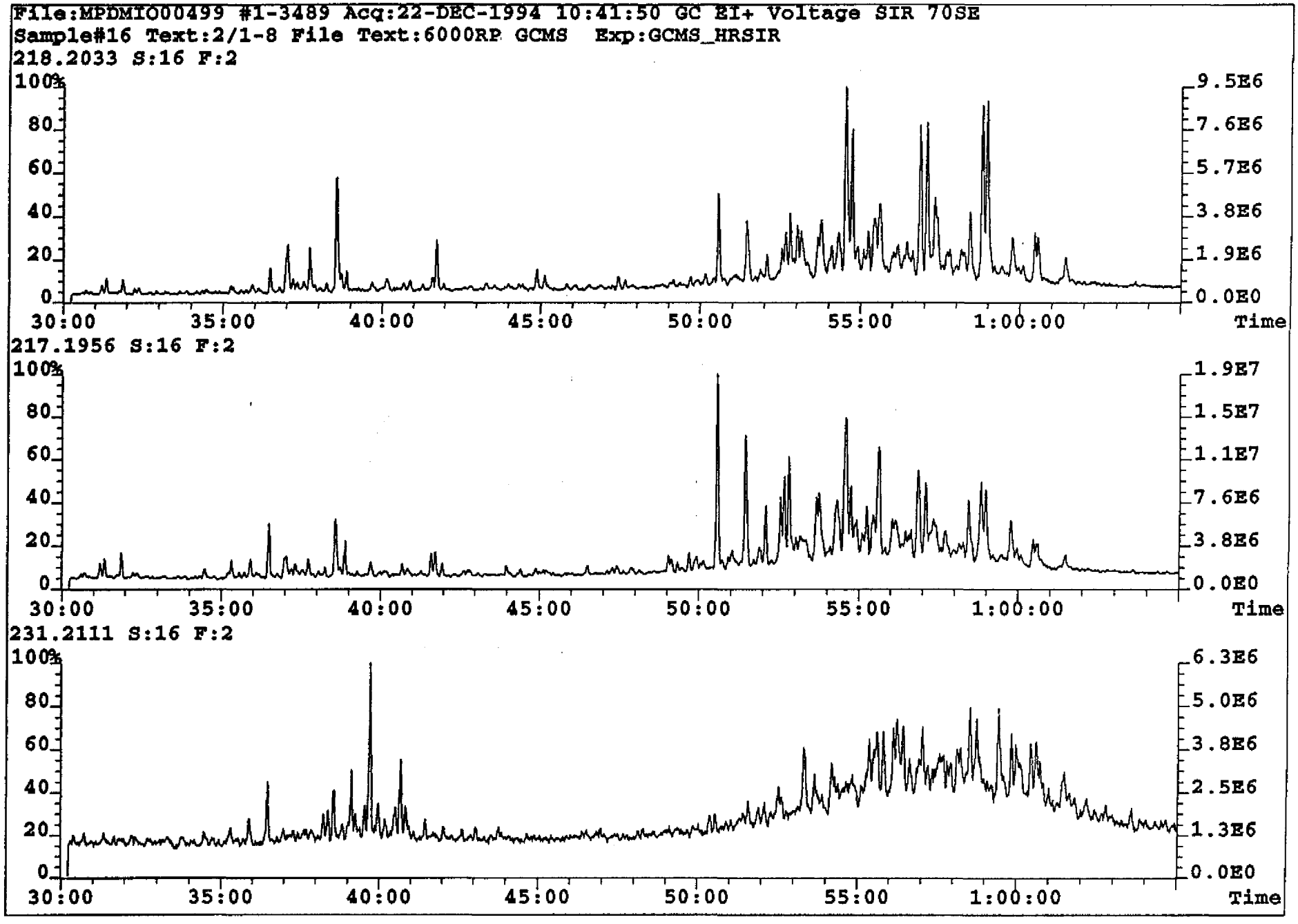
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218.2033 S:16 F:2
100%
80
60
40
20
0
9.5E6
7.6E6
5.7E6
3.8E6
1.9E6
0.0E0
30:00
35:00
40:00
45:00
50:00
55:00
1:00:00
Time
217.1956 S:16 F:2
100%
80
60
40
20
0
1.9E7
1.5E7
1.1E7
7.6E6
3.8E6
0.0E0
30:00
35:00
40:00
45:00
50:00
55:00
1:00:00
Time
231.2111 S:16 F:2
100%
80
60
40
20
0
6.3E6
5.0E6
3.8E6
2.5E6
1.3E6
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35:00
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1:00:00
Time

Figure 6.3

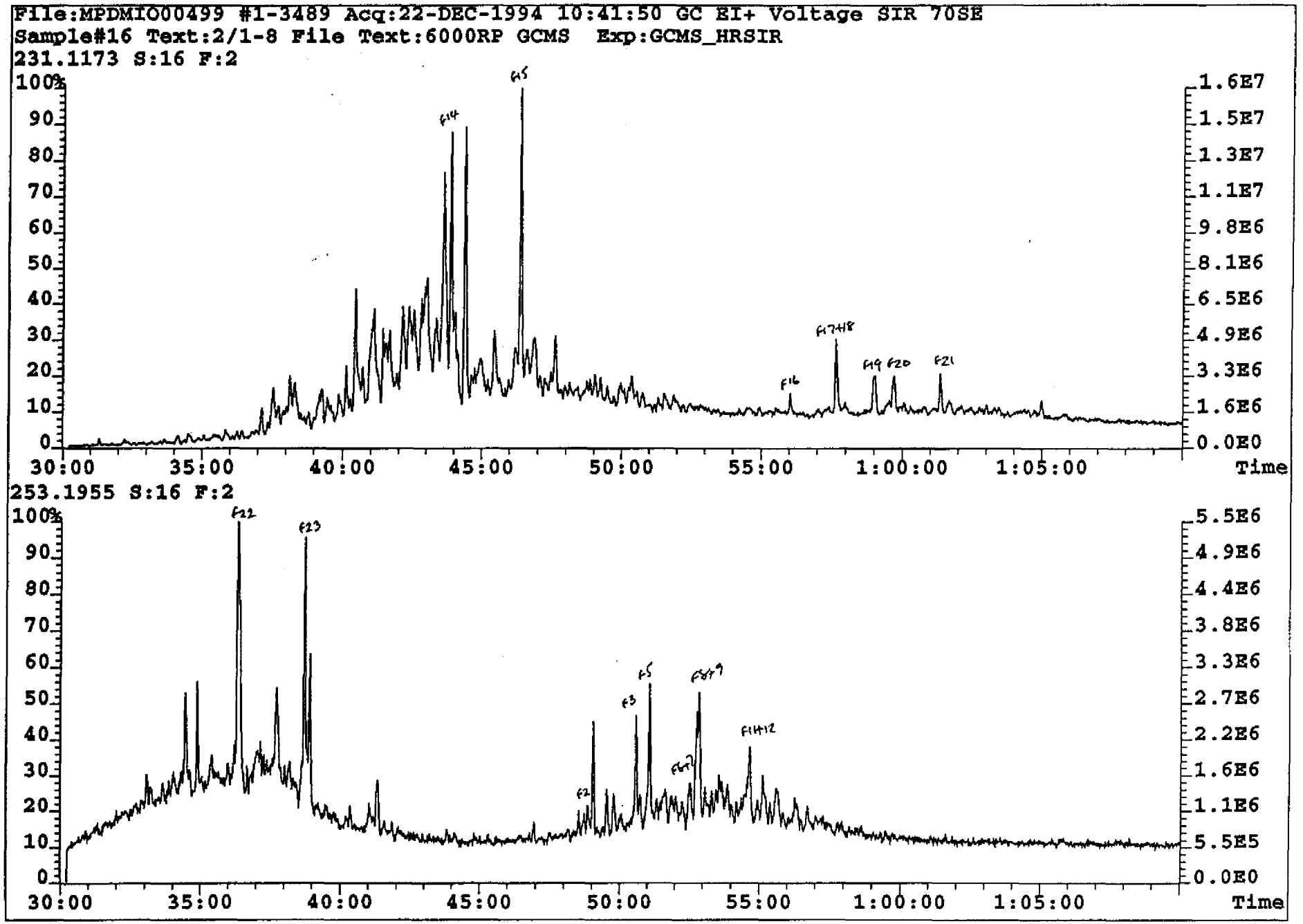
File:MPDMIO00499 #1-3489 Acq:22-DEC-1994 10:41:50 GC EI+ Voltage SIR 70SE
Sample#16 Text:2/1-8 File Text:6000RP GCMS Exp:GCMS_HRSIR
231.1173 S:16 F:2
100%
90
80
70
60
50
40
30
20
10
0
1.6E7
1.5E7
1.3E7
1.1E7
9.8E6
8.1E6
6.5E6
4.9E6
3.3E6
1.6E6
0.0E0
30:00
35:00
40:00
45:00
50:00
55:00
1:00:00
1:05:00
Time
253.1955 S:16 F:2
100%
90
80
70
60
50
40
30
20
10
0
5.5E6
4.9E6
4.4E6
3.8E6
3.3E6
2.7E6
2.2E6
1.6E6
1.1E6
5.5E5
0.0E0
30:00
35:00
40:00
45:00
50:00
55:00
1:00:00
1:05:00
Time

Figure 7

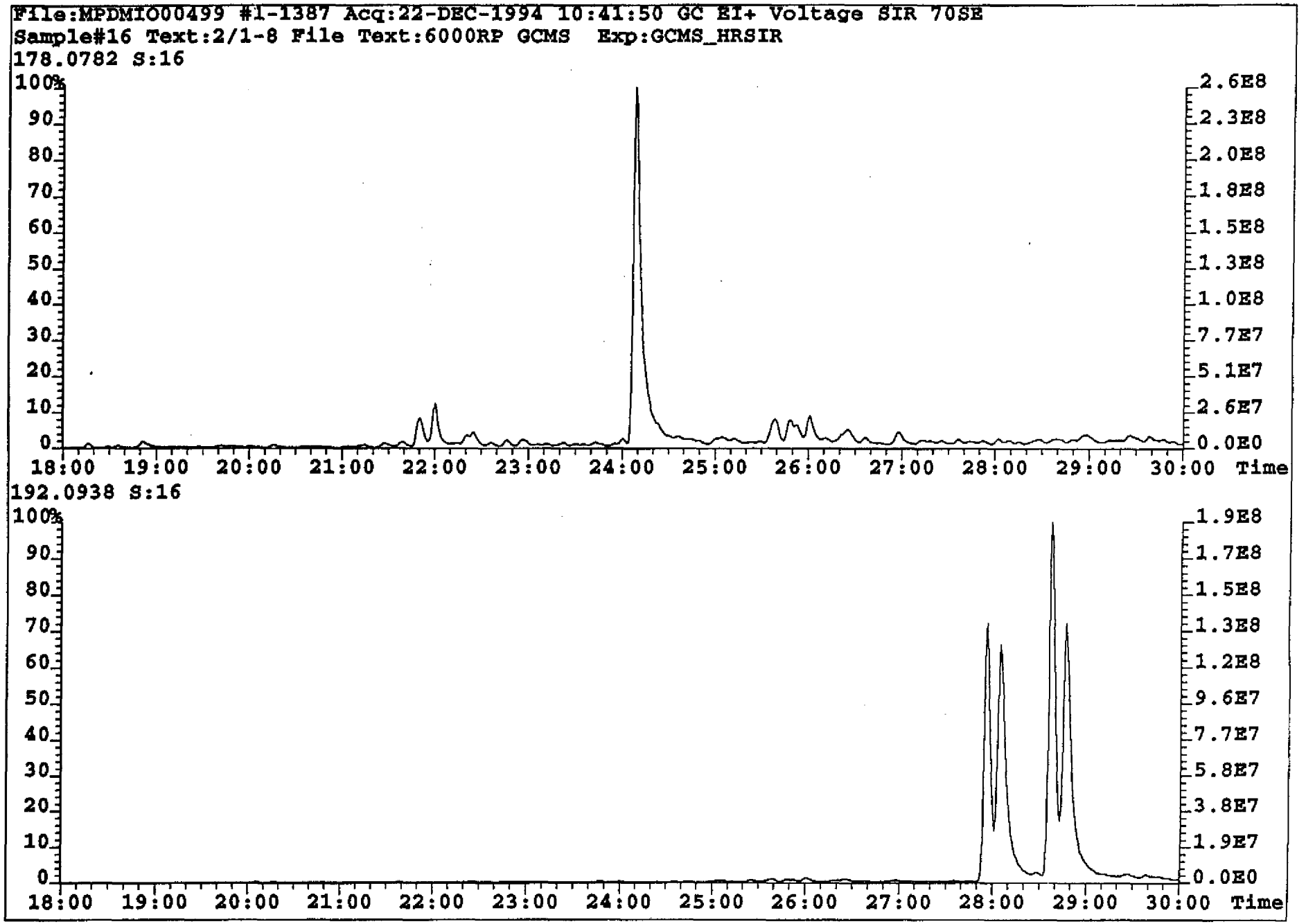
File:MPDMIO00499 #1-1387 Acq:22-DEC-1994 10:41:50 GC EI+ Voltage SIR 70SE
Sample#16 Text:2/1-8 File Text:6000RP GCMS Exp:GCMS_HRSIR
178.0782 S:16
100%
90
80
70
60
50
40
30
20
10
0
2.6E8
2.3E8
2.0E8
1.8E8
1.5E8
1.3E8
1.0E8
7.7E7
5.1E7
2.6E7
0.0E0
18:00 19:00 20:00 21:00 22:00 23:00 24:00 25:00 26:00 27:00 28:00 29:00 30:00 Time
192.0938 S:16
100%
90
80
70
60
50
40
30
20
10
0
1.9E8
1.7E8
1.5E8
1.3E8
1.2E8
9.6E7
7.7E7
5.8E7
3.8E7
1.9E7
0.0E0
18:00 19:00 20:00 21:00 22:00 23:00 24:00 25:00 26:00 27:00 28:00 29:00 30:00 Time

Figure 8

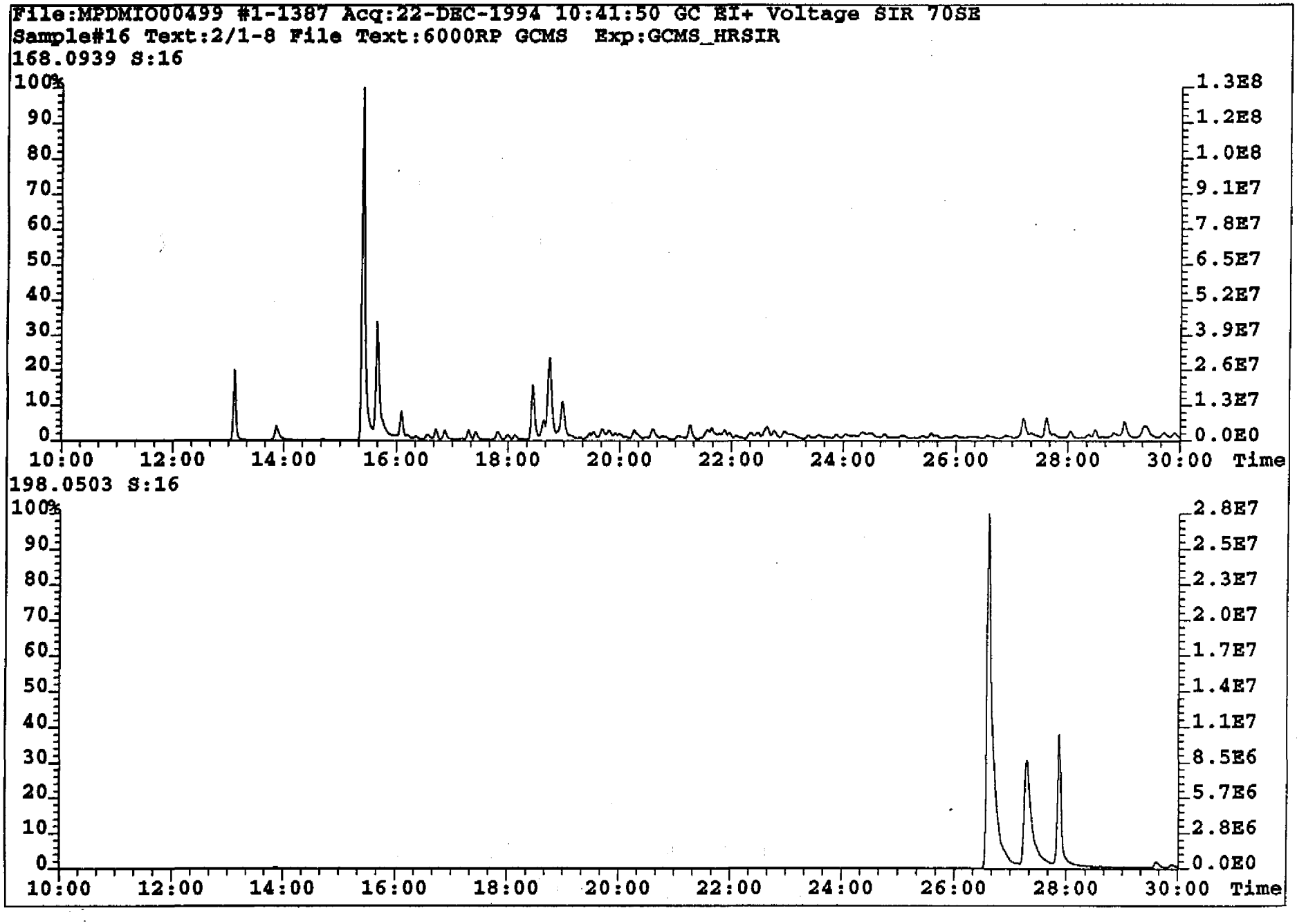
File:MPDMIO00499 #1-1387 Acq:22-DEC-1994 10:41:50 GC EI+ Voltage SIR 70SE
Sample#16 Text:2/1-8 File Text:6000RP GCMS Exp:GCMS_HRSIR
168.0939 S:16
100%
90
80
70
60
50
40
30
20
10
0
1.3E8
1.2E8
1.0E8
9.1E7
7.8E7
6.5E7
5.2E7
3.9E7
2.6E7
1.3E7
0.0E0
10:00
12:00
14:00
16:00
18:00
20:00
22:00
24:00
26:00
28:00
30:00
Time
198.0503 S:16
100%
90
80
70
60
50
40
30
20
10
0
2.8E7
2.5E7
2.3E7
2.0E7
1.7E7
1.4E7
1.1E7
8.5E6
5.7E6
2.8E6
0.0E0
10:00
12:00
14:00
16:00
18:00
20:00
22:00
24:00
26:00
28:00
30:00
Time

Figure 9

MOLECULAR PARAMETER LIST

BP CODE	PARAMETER	USE
H1	C_{32} HOPANE 22S/(22S+22R)	M
H2	C_{31} HOPANE 22S/(22S+22R)	M
H3	C_{30} HOPANE/(C_{30} HOPANE+C_{30} MORETANE)	MS
H4	$\beta\ \beta$ HOPANES PRESENT/ABSENT	M
H5	C_{30}:C_{31}:C_{32}:C_{33}:C_{34}:C_{35} HOPANE DISTRIBUTION	S
H6	C_{27} HOPANES $T_s/(T_s+T_m)$	MS
H7	C_{33} HOPANE 22S/(22S+22R)	M
H8	C_{34} HOPANE 22S/(22S+22R)	M
H9	C_{35} HOPANE 22S/(22S+22R)	M
H10	RESIN DITERPANES % RELATIVE TO C_{30} HOPANE (PEAK G)	S
H11	C_{23} EXT TRICYCLIC TERPANE % RELATIVE TO C_{30} HOPANE (PEAK G)	S
H12	C_{24} TETRACYCLIC TERPANE % RELATIVE TO C_{30} HOPANE (PEAK G)	S
H13	28,30 BISNORHOPANE (PEAK X) % RELATIVE TO C_{30} HOPANE (PEAK G)	S
H14	PENTACYCLANE II % RELATIVE TO C_{30} HOPANE (PEAK G)	S
H15	OLEANANE % RELATIVE TO C_{30} HOPANE (PEAK G)	S
H16	GAMMACERANE % RELATIVE TO (PEAK G)	S
H17	HOPANES $C_{35}/(C_{34}+C_{35})$ %	S
S1	C_{29} $\alpha\alpha\alpha$ STERANES 20S/(20S+20R)	M
S2	C_{29} STERANES $\alpha\beta\beta/(\alpha\beta\beta+\alpha\alpha\alpha)$	M
S3	STERANES $\alpha\alpha\alpha$ C_{27}:C_{28}:C_{29}	S
S4	STERANES $\alpha\beta\beta$ C_{27}:C_{28}:C_{29}	S
S5	$\beta\alpha$ DIASTERANES/(SAME+$\alpha\alpha\alpha$+$\alpha\beta\beta$ STERANES) %	SM
S6	LOW MOLECULAR WEIGHT STERANES RELATIVE TO C_{29} STERANES	S
S7	STERANE INDEX $C_{27}/(C_{27}+C_{29})$ % (FROM S3)	S
S8	4-ME C_{30} STERANE % RELATIVE TO C_{29} 20R $\alpha\alpha\alpha$ STERANE (PEAK 42)	S
S9	4-ME STERANES INDEX $C_{28}/(C_{28}+C_{30})$ %	S
S10	BICADINANES PRESENT/ABSENT	S
A1	C_{28} 20R TRIAROM. STERANE/(SAME+C_{29} 20R MONOAROM. STERANE)	M
A2	SUM TRIAROM. STERANES/(SAME+SUM MONOAROM. STERANES)	M
A3	C_{20} TRIAROM. STERANE/(SAME+C_{28} 20R TRIAROM. STERANE)	M
A4	C_{20}+C_{21} TRIAROM. STERANE/(SAME+SUM C_{26}-C_{28} TRIAROM. STERANES)	M
A5	C_{26} 20S TRIAROM. STERANE/C_{28} 20S TRIAROM. STERANE	S
A6	C_{27} 20R TRIAROM. STERANE/C_{28} 20R TRIAROM. STERANE	S
M2	PHENANTHRENES (3ME+2ME)/(9ME+1ME)	M
M3	MPI [(3ME+2ME)/(PHENANTHRENE+9ME+1ME)] * 1.5	M
M4	SUM C_{27}-C_{35} HOPANES/(SAME+ SUM C_{27}-C_{29} STERANES) %	S
ALKIND	ALKANE INDEX n-C_{17}/(n-C_{17}+n-C_{27}) %	S
R22	R22 INDEX (2 * n-C_{22})/(n-C_{21}+n-C_{23})	SM

NOTES:

1. S=SOURCE PARAMETER, M=MATURITY PARAMETER.

2. TRIAROM. STERANE=MONOMETHYL TRIAROMATIC STERANES
   MONOAROM. STERANE=DIMETHYL MONOAROMATIC STERANES.

(5/6/89)

BIOMARKER IDENTIFICATION - PENTACYCLIC HYDROCARBONS

BP CODE	TENTATIVE ASSIGNMENT BASED ON MASS SPECTROMETRY (m/e 191)
I	9-DODECYLPERHYDROANTHRACENE [INTERNAL STANDARD]
T_s	18α(H)-22,29,30-TRISNORNEOHOPANE
T_m	17α(H)-22,29,30-TRISNORHOPANE
θ	17α(H)-29,30-BISNORHOPANE
Q	17β(H)-22,29,30-TRISNORHOPANE
W	17α(H)-25,30-BISNORHOPANE
X	17α(H),18α(H),21β(H)-28,30-BISNORHOPANE
Y	17α(H)-25-NORHOPANE
D	17α(H),21β(H)-30-NORHOPANE
D2	18α(H)-30-NORNEOHOPANE
π	17α(H),15α(Me)-27-NORHOPANE ("DIAHOPANE")
A	17β(H),21α(H)-30-NORMORETANE
B	18α(H)-OLEANANE
G	17α(H),21β(H)-HOPANE
φ	17α(H)-30NOR-29-METHYLHOPANE
H	17β(H),21β(H)-30-NORHOPANE
K	17β(H),21α(H)-MORETANE
N	(22S)-17α(H),21β(H)-30-METHYLHOPANE
O	(22R)-17α(H),21β(H)-30-METHYLHOPANE
S	GAMMACERANE
P	17β(H),21β(H)-HOPANE
R	17β(H),21α(H)-30-METHYLMORETANE
U	(22S)-17α(H),21β(H)-30-ETHYLHOPANE
V	(22R)-17α(H),21β(H)-30-ETHYLHOPANE
J	17β(H),21β(H)-METHYLHOPANE
α	(22S)-17α(H),21β(H)-30-n-PROPYLHOPANE
β	(22R)-17α(H),21β(H)-30-n-PROPYLHOPANE
L	17β(H),21β(H)-ETHYLHOPANE
γ	(22S)-17α(H),21β(H)-30-n-BUTYLHOPANE
δ	(22R)-17α(H),21β(H)-30-n-BUTYLHOPANE
ε	(22S)-17α(H),21β(H)-30-n-PENTYLHOPANE
ζ	(22R)-17α(H),21β(H)-30-n-PENTYLHOPANE

BIOMARKER IDENTIFICATION - STERANES

BP CODE	TENTATIVE ASSIGNMENT BASED ON MASS SPECTROMETRY (m/e 217)
10	(20S)-13β(H),17α(H)-DIACHOLESTANE
11	(20R)-13β(H),17α(H)-DIACHOLESTANE
13	(20S)-13α(H),17β(H)-DIACHOLESTANE
14	(20R)-13α(H),17β(H)-DIACHOLESTANE
15	(24S/R)-(20S)-13β(H),17α(H)-24-METHYLDIACHOLESTANE
16	(24S/R)-(20S)-13β(H),17α(H)-24-METHYLDIACHOLESTANE
18	(24S/R)-(20R)-13β(H),17α(H)-24-METHYLDIACHOLESTANE
19	(24R/S)-(20R)-13β(H),17α(H)-24-METHYLDIACHOLESTANE
20A	(24S/R)-(20S)-13α(H),17β(H)-24-METHYLDIACHOLESTANE
20B	(20S)-5α(H),14α(H),17α(H)-CHOLESTANE
21A	(24R+S)-(20S)-13β(H),17α(H)-24-ETHYLDIACHOLESTANE
21B	(20R)-5α(H),14β(H),17β(H)-ISOCHOLESTANE
22	(20S)-5α(H),14β(H),17β(H)-ISOCHOLESTANE
25	(20R)-5α(H),14α(H),17α(H)-CHOLESTANE
27	(24S+R)-(20R)-13β(H),17α(H)-24-ETHYLDIACHOLESTANE
29	(24S+R)-(20S)-13α(H),17β(H)-24-ETHYLDIACHOLESTANE
33A	(24S+R)-(20R)-5α(H),14β(H),17β(H)-24-METHYLISOCHOLESTANE
33B	(24S+R)-(20R)-13α(H),17β(H)-24-ETHYLDIACHOLESTANE
34	(24S+R)-(20S)-5α(H),14β(H),17β(H)-24-METHYLISOCHOLESTANE
36	(24S+R)-(20R)-5α(H),14α(H),17α(H)-24-METHYLCHOLESTANE
39	(24S+R)-(20S)-5α(H),14α(H),17α(H)-24-ETHYLCHOLESTANE
40	(24S+R)-(20S)-5α(H),14β(H),17β(H)-24-ETHYLISOCHOLESTANE
41	(24S+R)-(20R)-5α(H),14β(H),17β(H)-24-ETHYLISOCHOLESTANE
42	(24S+R)-(20R)-5α(H),14α(H),17α(H)-24-ETHYLCHOLESTANE
46	(24S+R)-(20R)C_{30} STERANE

BIOMARKER IDENTIFICATION - AROMATIC STEROIDAL HYDROCARBONS (AROMATIC STERANES)

BP CODE	TENTATIVE ASSIGNMENT BASED ON MASS SPECTROMETRY (m/e 253 mass fragmentogram)
F22	C_{21} DIMETHYL MONOAROMATIC STERANE
F23	C_{22} DIMETHYL MONOAROMATIC STERANE
F2	C_{27}(20S)5β(H)DIMETHYL MONOAROMATIC STERANE
F3	C_{27}(20R)5β(H)DIMETHYL MONOAROMATIC STERANE
F4	C_{27}(20S)5α(H)DIMETHYL MONOAROMATIC STERANE
F5	C_{28}(20S)5β(H)DIMETHYL MONOAROMATIC STERANE
F6	C_{27}(20R)5α(H)DIMETHYL MONOAROMATIC STERANE
F7	C_{28}(20S)5α(H)DIMETHYL MONOAROMATIC STERANE
F8	C_{28}(20R)5β(H)DIMETHYL MONOAROMATIC STERANE
F9	C_{29}(20S)5β(H)DIMETHYL MONOAROMATIC STERANE
F10	C_{29}(20S)5α(H)DIMETHYL MONOAROMATIC STERANE
F11	C_{28}(20R)5α(H)DIMETHYL MONOAROMATIC STERANE
F12	C_{29}(20R)5β(H)DIMETHYL MONOAROMATIC STERANE
F13	C_{29}(20R)5α(H)DIMETHYL MONOAROMATIC STERANE
Ω	$C_{20}H_{12}$ POLYAROMATIC HYDROCARBONS
	(m/e 231 mass fragmentogram)
F14	C_{20}METHYL TRIAROMATIC STERANE
F15	C_{21}METHYL TRIAROMATIC STERANE
F16	C_{26}(20S)METHYL TRIAROMATIC STERANE
F17	C_{26}(20R)METHYL TRIAROMATIC STERANE
F18	C_{27}(20S)METHYL TRIAROMATIC STERANE
F19	C_{28}(20S)METHYL TRIAROMATIC STERANE
F20	C_{27}(20R)METHYL TRIAROMATIC STERANE
F21	C_{28}(20R)METHYL TRIAROMATIC STERANE

BIOMARKER IDENTIFICATION - NORHOPANES

BP CODE	TENTATIVE ASSIGNMENT BASED ON MASS SPECTROMETRY (m/e 177)
W	17α(H)-25,30-BISNORHOPANE
Y	17α(H)-25-NORHOPANE
D	17α(H),21β(H)-30-NORHOPANE
C1	(22S)-17α(H)-25-NOR-30-METHYLHOPANE
G	17α(H),21β(H)HOPANE
C2	(22R)-17α(H)-25-NOR-30-METHYLHOPANE
C3	(22S)-17α(H)-25-NOR-30-ETHYLHOPANE
C4	(22R)-17α(H)-25-NOR-30-ETHYLHOPANE
C5	(22S)-17α(H)-25-NOR-30-n-PROPYLHOPANE
C6	(22R)-17α(H)-25-NOR-30-n-PROPYLHOPANE
C7	(22S)-17α(H)-25-NOR-30-n-BUTYLHOPANE
C8	(22R)-17α(H)-25-NOR-30-n-BUTYLHOPANE
C9	(22S)-17α(H)-25-NOR-30-n-PENTYLHOPANE
C10	(22R)-17α(H)-25-NOR-30-n-PENTYLHOPANE