4.2 FMT Summary

Run no.1

In run no.1, 11 out of 17 attempts to take pressure points were successful. Several of the pressure readings were affected by super charge due to low formation permeability. The poor quality of the data make it difficult to draw conlusive fluid gradients and to determine an oil/water contact from the FMT log.

Two single samples were taken at 3346.5 and 3251.6 m RKB respectively. Both samples were drained offshore.

1 gallon sample at 3346.5 mRKB:

Opening pressure : 0
Content : 3300 ml mud filtrate
pH = 6.95
Cl = 19200 ppm
SG = 1.04

2 3/4 gallon sample at 3251.5 mRKB:

Opening pressure : 0
Content : Mud filtrate.

Pressure readings from the HP gauge are listed below:

Depth (mRKB)	Formation pressure (KPa)	Comments
3178.0	35694	Good perm.
3184.0	35678	Good perm.
3200.4	35787	Very good perm.
3210.0	35869	Good perm.
3222.1	36082	Good perm.
3229.4	36433	Fair perm.
3239.0	36158	Good perm.
3245.0	36869	Good perm.
3251.4	36265	Good perm.
3257.0	37225	Poor perm.
3260.4	-----	Tight
3271.4	-----	Tight
3305.4	-----	Tight
3346.4	37346	Good perm.
3371.0	37970	Good perm.
3377.4	37747	Good perm.
3470.0	38764	Good perm.
3579.0	40218	Good perm.
3546.5	37310	Good perm. (sample)
3251.6	36232	Good perm. (sample)

Run no.2

This was primarily a sampling run. Two single samples were taken at 3251.0 and 3245.0 mRKB respectively. Both samples were drained offshore.

1 gallon sample at 3245 mRKB

Formation press. : 36157 KPa

Opening pressure : 0

Content : 3000 ml mud filtrate

pH = 6.85

Cl = 18500 ppm

SG = 1.03

2 3/4 gallon sample at 3251.0 mRKB

Formation press.	:	36308 KPa
Opening pressure	:	0
Content	:	6000 ml mud filtrate
		pH = 6.84
		Cl = 19300 ppm
		SG = 1.03

4.3 Test Results

Three DST tests were performed to test the oil and water bearing sandstones of Jurassic age.

The well response from DST 1 (water test) and DST 2 was very poor due to formations of very low permeability. No reservoir fluid was produced to surface during the tests.

DST no.3 was a successful oil test of the upper part of the oil bearing reservoir.

The results listed below are preliminary due to the lack of a final well test interpretation. A separate well test report will be available later.

TEST NO. 1

Perforated interval	: 3245 - 3263 mRKB.
Water flow rate	: 20 m3/d
Flowing wellhead pressure	: 140 kPa
Flowing bottomhole press.	: 30135 kPa at 3197.5 mRKB.
Choke size	: 9.53 mm (24/64")
Max. shut in pressure	: 35846 kPa at 3197.5 mRKB:

Results from bottom hole sampling:

Two BHS contained formation water with traces of mud filtrate.

Sample	: BHS	Mud filtrate
Cl- content, ppm	: 118000	17600
NaCl content, ppm	: 195000	29000
Specific gravity, g/cc	: 1.135	1.029
PH	: 6.0	7.5
Sulphate, mgl	: 90	2700

STATOIL

TEST NO. 2

Perforated interval : 3220 - 3236 mRKB.

Oil flow rate : 5 m3/d
Flowing wellhead pressure : 183 kPa
Flowing bottomhole press. : 27760 kPa at 3197.5 mRKB.
Choke size : 9.53 mm (24/64")

Results from BHS:

Content : 50 ml oil, 400 ml mud filtrate/form. water.
Sample possible polluted by form. water from DST no.1
Oil density : 834 kg/m3 at 15 deg. C

TEST NO. 3

Perforated interval: 3177 - 3210 mRKB.

Period	Hours	Oil rate m3/d	Gas rate sm3/d	GOR m3/m3	Choke size mm (1/64")	WHP kPa	WHT °C	BHP * kPA	BHT* °C
Clean up	15.9	1080	26000	24	19.05(48)	3149	47	31087	103
Build up	15.4	0	0	-	0	11079	6	35145	98
Main Flow	14.0	659	18452	28	9.53 (24)	6748	50	32482	104
Main BU	14.0	0	0	-	0	-	-	35058	99

* Depth pressure sensor : 3119.6 mRKB

Fluid data, main flow :

Oil density	: 834 kg/m3 at 15 deg. C
Rel. gas density	: 0.818
Bubble point press. oil	: 7670 kPa at 103.8 deg. C
H2S content	: 1.8 ppm
CO2 content	: 3.0 percent

Separator conditions

main flow : 1176 - 1255 kPa

41 - 49 deg. C

Preliminary formation data:

Permeability	: 347 um2
KH	: 10410 um2m
Skin	: 5.2

STATOIL WELL NO:

MATERIAL COST AND CONSUMPTION RIGG: DYVI DELTA AREA: NORTH SEA

PRODUCT	UNIT SIZE	UNIT PRICE $	36" SECTION	COST $	26" SECTION	COST $	17.5" SECTION	COST $	12.25" SECTION	COST $	8.5" SECTION	COST $	TEST P & A	COST $	TOTAL USED	TOTAL $
BARITE	M.T.	79.00	54	4266.00		.00		.00	53	4187.00	183	14457.00	62	4898.00	352	27808.00
BENTONITE	M.T.	200.00	75	15000.00		.00	37	7400.00	2	400.00	21	4200.00	5	1000.00	140	28000.00
CAUSTIC SODA	25 KG	10.00	26	260.00		.00	14	140.00	4	40.00	8	80.00		.00	52	520.00
BICARBONATE	50 KG	16.80		.00		.00		.00		.00	8	134.40	16	268.80	24	403.20
SODA ASH	30 KG.	9.00	9	81.00		.00	5	45.00	1	9.00		.00		.00	15	135.00
GYPSUM	25 KG.	4.20		.00		.00		.00	190	798.00		.00		.00	190	798.00
LIME	40 KG.	9.60		.00		.00		.00	16	153.60	22	211.20		.00	38	364.80
XC-POLYMER	50 LBS.	215.00		.00		.00		.00	55	11825.00		.00	3	645.00	58	12470.00
DRISPAC REG	50 LBS.	79.50		.00		.00		.00	86	6837.00	195	15502.50	6	477.00	287	22816.50
DRISPAC SL	50 LBS.	79.50		.00		.00		.00		.00		.00		.00	0	.00
ANTISOL FL30000	25 KG.	97.85		.00		.00		.00	190	18591.50		.00		.00	190	18591.50
ANTISOL FL30	25 KG.	92.85		.00		.00		.00	335	31104.75	175	16248.75		.00	510	47353.50
SPERCELL C	25 KG	11.00		.00		.00		.00		.00		.00		.00	0	.00
DESCO	25 LBS.	33.60	3	100.80		.00		.00		.00		.00		.00	3	100.80
ANCOLIG C	25 KG.	15.00		.00		.00		.00		.00		.00		.00	0	.00
ANCO RESIN	25 KG	84.00		.00		.00		.00		.00		.00		.00	0	.00
ZINKCARBONAT	50 KG.	108.00		.00		.00		.00	16	1728.00		.00		.00	16	1728.00
ANCOCIDE	25 KG.	64.80		.00		.00		.00	13	842.40	3	194.40		.00	16	1036.80
ANCO DEFOAMER	25 LIT.	70.80	1	70.80		.00		.00		.00		.00		.00	1	70.80
MICA FINE	25 KG.	10.00	10	100.00		.00		.00		.00		.00		.00	10	100.00
MICA COARSE	25 KG.	10.00	30	300.00		.00		.00		.00		.00		.00	30	300.00
NUTPLUG F	25 KG.	13.20	20	264.00		.00		.00		.00		.00		.00	20	264.00
NUTPLUG C	25 KG.	13.20	20	264.00		.00		.00		.00		.00		.00	20	264.00

TOTALS	20706.60	.00	7585.00	76516.25	51028.25	7288.80	163124.90
HOLE DRILLED (METRES)	61		599	1812	1156		3628
COST PR. METRE	339.45		12.66	42.23	44.14		44.96
TOTAL DAYS	4		3	14	30	15	66
COST PR. DAY	5176.65		2528.33	5465.45	1700.94	485.92	2471.59
MUD MIXED (CU.M)	772		380	1162	599	90	3003
COST PR.CU.M	26.82		19.96	65.85	85.19	80.99	54.32

NORCEM ANCHOR A/S

MATERIAL CONSUMPTION REPORT

WELL NAME: 9/2-1 AREA: NORTH SEA

MUD SYSTEM: Spud Mud

OPERATOR: STATOIL RIG: DYVI DELTA

SECTION: 36"

ENGINEERS: E Korsvold, G Thomsen

INITIAL VOLUME: 0

DATE	21/ 2	22/ 2	23/ 2	24/ 2	TOTALS
DEPTH: M	158		198	189	
VOLUME MADE: CU.M	140	347	45	240	772
VOLUME RECEIVED: CU.M					0
SURFACE LOSSES: CU.M					0
DOWNHOLE LOSSES: CU.M	282	75	220		577
VOLUME DUMPED: CU.M					0
LEFT IN HOLE: CU.M					0
BACK LOADED: CU.M					0
FINAL VOLUME: CU.M	130	195	165	185	
BARYTE: M/T		54			54
BENTONITE: M/T	16	35	5	19	75
CAUSTIC: 25 KG	6	6	2	12	26
SODA ASH: 30 KG	3	4	1	1	9
DESCO: 12.5 KG		3			3
DEFOAMER: 25 ltr		1			1
NUTPLUG F: 25 KG		20			20
NUTPLUG C: 25 KG		20			20
MICA F: 25 KG		10			10
MICA C: 25 KG		30			30

NORCEM ANCHOR A/S

MATERIAL CONSUMPTION REPORT

WELL NAME: 9/2-1 AREA: NORTH SEA

MUD SYSTEM: Spud Mud

OPERATOR: STATOIL RIG: DYVI DELTA

SECTION: 17 1/2"

ENGINEERS: E Korsvold, G Thomsen, L Tveit

INITIAL VOLUME: 185

DATE	25/ 2	26/ 2	27/ 2	TOTALS
DEPTH: M	321	768	788	
VOLUME MADE: CU.M	80	200	100	380
VOLUME RECEIVED: CU.M				0
SURFACE LOSSES: CU.M				0
DOWNHOLE LOSSES: CU.M	105	235	205	545
VOLUME DUMPED: CU.M			20	20
LEFT IN HOLE: CU.M				0
BACK LOADED: CU.M				0
FINAL VOLUME: CU.M	160	125		
BARYTE: M/T				0
BENTONITE: M/T	13	19	5	37
CAUSTIC: 25 KG	4	9	1	14
SODA ASH: 30 KG	2	3		5

NORCEM ANCHOR A/S

MATERIAL CONSUMPTION REPORT

MUD SYSTEM: Gyp / Polymer

SECTION: 12 1/4"

INITIAL VOLUME: 0

WELL NAME: 9/2-1 AREA: NORTH SEA

OPERATOR: STATOIL RIG: DYVI DELTA

ENGINEERS: E Korsvold, L Tveit, I Torgersen

DATE	28/ 2	1/ 3	2/ 3	3/ 3	4/ 3	5/ 3	6/ 3	7/ 3	8/ 3	9/ 3	10/ 3	11/ 3	12/ 3	13/ 3	TOTALS
DEPTH: M		699	1048	1310	1440	1800	1989	2165	2317	2495	2600	2600	2600	2600	
VOLUME MADE: CU.M	284	15	118	105	40	120	120	80	80	40	120			40	1162
VOLUME RECEIVED: CU.M															0
SURFACE LOSSES: CU.M	15		29	23	15	11	28	20	15	29	31	5		4	225
DOWNHOLE LOSSES: CU.M															0
VOLUME DUMPED: CU.M	5		20	34	25	48	40	50	50	50	60	9	23	15	429
LEFT IN HOLE: CU.M														55	55
BACK LOADED: CU.M															0
FINAL VOLUME: CU.M	264	279	348	396	396	457	509	519	534	495	524	510	487	453	
BARYTE: M/T				27			4					22			53
BENTONITE: M/T		2													2
CAUSTIC: 25 KG	3	1													4
GYPSUM: 25 KG	180	10													190
GYPSUM: 40 KG															0
ANCOCIDE: 25 ltr	3		2	1	1	1	1	1	1	1	1				13
ANTISOL FL 30: 25 KG	45		35	30	30	30	30	25	35	15	45			15	335
-"- FL 3000: 25 KG	75		28	12	15	24	36								190
SODA ASH: 30 KG		1													1
LIME: 40 KG					1	3	2	2	2	3	3				16
DRISPAC REG: 50 LBS							7	22	19	20	13	2	1	2	86
XC POLYMER: 50 LBS							4	23	12	10	6				55
ZINC CARB: 50 KG													16		16

NORCEM ANCHOR A/S

MATERIAL CONSUMPTION REPORT

SHEET 1 OF 2

MUD SYSTEM: Gyp / Polymer

WELL NAME: 9/2-1

AREA: NORTH SEA

SECTION: 8 1/2"

OPERATOR: STATOIL

RIG: DYVI DELTA

INITIAL VOLUME: 453

ENGINEERS: E Korsvold, G Thomsen, I Torgersen

DATE	14/ 3	15/ 3	16/ 3	17/ 3	18/ 3	19/ 3	20/ 3	21/ 3	22/ 3	23/ 3	24/ 3	25/ 3	26/ 3	27/ 3	28/ 3	29/ 3	30/ 3
DEPTH: M	2702	2811	2891	3002	3092	3117	3147	3202	3202	3231	3264	3299					
VOLUME MADE: CU.M	40		6	25		15	108	6	18	12	20	105	45	4	80	32	
VOLUME RECEIVED: CU.M																	
SURFACE LOSSES: CU.M	4	8	12	19	15	24	16	13	22	24	14	15	38	22	17	17	12
DOWNHOLE LOSSES: CU.M																	
VOLUME DUMPED: CU.M		12	26	42	6	8	5	4	15	20	25	20	20	26	10	12	6
LEFT IN HOLE: CU.M																	
BACK LOADED: CU.M																	
FINAL VOLUME: CU.M	489	469	437	401	380	363	450	439	420	388	369	439	426	382	435	438	430
BARYTE: M/T	9			21	4		10		7	4	30	12	14	9	7	8	
BENTONITE: M/T									2	1	2	4	9			3	
CAUSTIC: 25 KG									2						1		
ANTISOL FL 30: 25 KG	15						30				29	15	16	13	41	5	1
DRISPAC REG: 50 LBS	27	8	16	18	5	4	7	6	1	8		25	16	9	15		3
ANCOCIDE: 25 ltr	1										1				1		
LIME: 40 KG					2	2	1	1			3	2	5	1	1	1	2
BICARB: 30 KG																	

NORCEM ANCHOR A/S

MATERIAL CONSUMPTION REPORT

SHEET 2 OF 2

MUD SYSTEM: Gyp / Polymer

WELL NAME: 9/2-1 AREA: NORTH SEA

SECTION: 8 1/2"

OPERATOR: STATOIL RIG: DYVI DELTA

ENGINEERS: E Korsvold, G Thomsen, I Torgersen

DATE	31/ 3	1/ 4	2/ 4	3/ 4	4/ 4	5/ 4	6/ 4	7/ 4	8/ 4	9/ 4	10/ 4	11/ 4	12/ 4	TOTALS
DEPTH: M			3756	3756	3756	3756	3756	3756	3756	3756	3756	3756	3756	
VOLUME MADE: CU.M	1	3	16				3	20		40				599
VOLUME RECEIVED: CU.M														0
SURFACE LOSSES: CU.M	15	24		28		22		16	20	30			6	453
DOWNHOLE LOSSES: CU.M														0
VOLUME DUMPED: CU.M	6	10									9			282
LEFT IN HOLE: CU.M												36		36
BACK LOADED: CU.M														0
FINAL VOLUME: CU.M	420	369	385	357	357	335	338	342	322	332	323	287	281	
BARYTE: M/T	3	12				4			18	7			4	183
BENTONITE: M/T														21
CAUSTIC: 25 KG				4			1							8
ANTISOL FL 30: 25 KG	10													175
DRISPAC REG: 50 LBS	6	3			2	4		3	3			3	3	195
ANCOCIDE: 25 ltr														3
LIME: 40 KG	1													22
BICARB: 30 KG												4	4	8

NORCEM AN[redacted]R A/S

MATERIAL CONSUMPTION REPORT

WELL NAME: 9/2-1 AREA: NORTH SEA

MUD SYSTEM: Polymer

OPERATOR: STATOIL RIG: DYVI DELTA

SECTION: WELL TESTING

ENGINEERS: Korsvold, Thomsen, Fraser

INITIAL VOLUME: 281

DATE	13/ 4	14/ 4	15/ 4	16/ 4	17/ 4	18/ 4	19/ 4	20/ 4	21/ 4	22/ 4	23/ 4	24/ 4	25/ 4	26/ 4	27/ 4	TOTALS
DEPTH: M	3756	3756	3756	3756	3756	3756										
VOLUME MADE: CU.M						40				2	1	42	2	3		90
VOLUME RECEIVED: CU.M																0
SURFACE LOSSES: CU.M	7	7			18							9	14	12	10	77
DOWNHOLE LOSSES: CU.M																0
VOLUME DUMPED: CU.M					6							5	17	20	141	189
LEFT IN HOLE: CU.M										13				87	5	105
BACK LOADED: CU.M																0
FINAL VOLUME: CU.M	274	267	267	267	243	283	283	283	283	272	272	301	272	156		
BARYTE: M/T			3			26				9			11	13		62
BENTONITE: M/T												5				5
DRISPAC REG: 50 LBS						6										6
XC-POLYMER: 25 KG					3											3
BICARB: 50 KG					4	7						6	8	2		27

MUD VOLUME DISTRIBUTION SUMMARY

WELL NO: 9/2-1 RIG: DYVI DELTA

HOLE SIZE	HOLE FROM-TO	HOLE LENGTH	MUD/BRINE BUILT	DUMPED	LOST TO FORMATION *RETURNS TO SEABED	LOST OVER SOLIDS CONTROL EQUIPMENT	MUD LEFT BETWEEN CSG/CSG	CUTTINGS VOLUME DRILLED	MUD TRANSF. TO NEXT SEC.	MUD TYPE USED FOR INTERVAL
36"	128-198 M	70 M	772 CU.M		*587 CU.M			46 CU.M	185 CU.M	SPUD MUD
26"										
17 1/2"	788 M	590 M	380 CU.M	20 CU.M	*545 CU.M			122 CU.M		SPUD
12 1/4"	2600 M	1812 M	1162 CU.M	429 CU.M		225 CU.M	55 CU.M	137 CU.M	453 CU.M	GYP/POLYMER
8 1/2"	3756 M	1156 M	599 CU.M	282 CU.M		453 CU.M	36 CU.M	43 CU.M	281 CU.M	GYP/POLYMER
PROD.										
TEST			90 CU.M	189 CU.M		77 CU.M	**105 CU.M			POLYMER

TOTALS:

MUD/BRINE BUILT: 3003 CU.M
MUD/BRINE DUMPED: 920 CU.M
MUD/BRINE LOST TO FORMATION: 1132 CU.M
MUD/BRINE LOST OVER SOLIDS CONTROL EQUIPMENT: 755 CU.M

TOTAL MUD/BRINE LEFT IN HOLE/+ BETWEEN CSG/CSG: 196 CU.M
TOTAL MUD/BRINE TO SEA (INCL. SEABED): 2807 CU.M
TOTAL CUTTINGS VOLUME DRILLED: 348 CU.M

** LEFT IN HOLE DURING PLUG AND ABANDON

U-538

5/

Exxon Production Resear

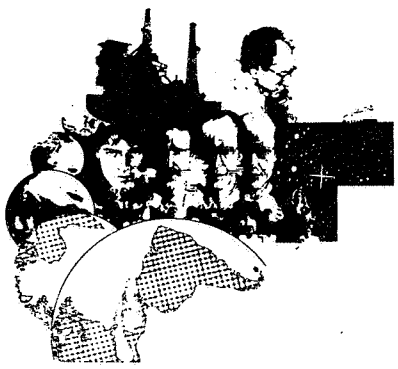
Oil Analysis from the 9/2-1 Well, Farulk Field, Egersund Basin, Norway

D. Gilbert

Sample Handling and Analyses By:

N. R. Daniel
S. L. Nash
J. O. Okafor
J. D. Pace
N. T. Phan
M. E. Schaps

Exploration Concepts Division
EPR.144ES.89
June 1989



Exploration Research Application Report

Copy

S169A

R570
RX-DDU 0820 CDT 04/18/89

USEPRTX HOU

EXXON CMSS FPK

OF USEPA
.ENFORJ8
FORUS, 18.4.89

TO: EPRCO, HOUSTON ATTN.: T. BENCE

RE: GEOCHEMICAL ANALYSES OF WHOLE OIL/NORHTERN SEA

ESSO NORGE A.S REQUEST EPRCO TO DO STANDARD GEOCHEMICAL ANALYSES OF WHOLE OIL FROM WELL 9/2-1, DST NO.3.

IN ADDITION TO THE REPORT TO US, WE WOULD NEED LISTINGS OF UNINTERPRETED ANALYTHICAL RESULTS THAT WE CAN SUPPLY TO THE OPERATOR COMPANY.

THE COST OF THIS PROJECT SHOULD BE CHARGED TO COST CENTER 4215.

REGARDS,
S. HANSLIEN/T. VALHEIM
ESSO NORGE A.S
EANDP

[illegible] 18-APR-89 12:59

RECEIVED
APR 18 8 43 AM '89

USEPRTX HOU

EXXON CMSS FPK

THEY DISC.

ELAPSED TIME 00:00:33

EXXON PRODUCTION RESEARCH COMPANY

POST OFFICE BOX 2189 • HOUSTON, TEXAS 77252-2189

EXPLORATION CONCEPTS DIVISION

R.G. TODD
Manager

June 12, 1989

Mr. J. H. Armitage
Esso Norge, a.s.
Exploration and Production
P. O. Box 60
4003 Forus, Norway
Stavanger, Norway

Attn. Messrs.: S. Hanslien/S. Ballestad/T. Valheim

Gentlemen:

Enclosed is our research applications report EPR.144ES89, "Oil Analyses from the 9/2-1 Well, Farulk Field, Egersund Basin, Norway," by D. Gilbert.

The oil from 3177-3210 meters represents a low-sulfur, mature oil generated from a source deposited in a nearshore-marine environment.

This work was authorized in S. Hanslien's April 18, 1989, telex to A. E. Bence. All charges for this work have been billed to your cost center 4215 via our Job No. 28465. referencing AFE No. 00645.

None of the interpretations in this report are considered EPR proprietary. Therefore, EPR's permission is not required before showing this report to non-Company personnel.

If you have any questions about the analyses or our interpretations, please contact us.

Very truly yours,

R. G. TODD

By _____ for CER
C. E. Rinehart

DG:ka
c: P. N. Davis

Exxon Production Research Company

Oil Analysis from the 9/2-1 Well, Farulk Field, Egersund Basin, Norway

D. Gilbert

Sample Handling and Analyses By:

N. R. Daniel
S. L. Nash
J. O. Okafor
J. D. Pace
N. T. Phan
M. E. Schaps

Exploration Concepts Division
EPR.144ES.89
June 1989

FOR COMPANY USE ONLY

OIL ANALYSIS FROM THE 9/2-1 WELL, FARULK FIELD, EGERSUND BASIN, NORWAY

INTRODUCTION

An oil sample has been analyzed from the 9/2-1 well in the Egersund Basin of the North Sea, Norway. This work was requested in S. Hanslien's telex of April 18, 1989, to A. E. Bence. All charges for this work are being billed to your cost center 4215 via our Job No. 28465.

METHODS

Whole-Oil Chromatography

The composition of the whole oil is determined with a gas chromatograph equipped with both hydrocarbon (flame ionization) and sulfur (flame photometric) detectors. The sulfur response is shown at the bottom and the hydrocarbon response at the top of Figure 1a.

Sulfur

Total organic sulfur is determined by combustion in a LECO instrument and is reported as weight percent (Table 1).

Gasoline-Range Hydrocarbons (C4-C10)

The composition of the C4-C7 range hydrocarbons for the oil is reported in Table 2. The extended-range compositions (C4-C10) are reported in Table 4.

Separation of the C15+ Fraction

The sample is evaporated for 19 hours at 45°C to eliminate the light fractions (less that about the nC15 paraffin). The C15+ fraction is treated with an excess volume of n-pentane to precipitate the asphaltenes, which are then removed by filtration. The oily fractions are recovered by evaporating the pentane. The separation into hydrocarbon and nonhydrocarbon fractions is accomplished by liquid-solid chromatographic techniques (Table 5).

Gas Chromatography

The C15+ saturated-hydrocarbon fraction is analyzed by gas chromatography to generate the distributions of the normal paraffins (Figure 2). The numbered peaks on the figures are the normal paraffins and PR and PH are the isoprenoids, pristane and phytane.

Biomarkers

The C15+ saturated-hydrocarbon fraction is analyzed by GCMS to obtain the molecular compositions of selected ions (M/z 191, 217, 418, and 259). This combination of gas chromatography, mass spectrometry, and computer generates the spectra shown on Figures 5, 6, and 7. The details of the technique are described in the literature.

Carbon Isotopes

Carbon-isotopic compositions are measured on both the saturate- and aromatic-hydrocarbon fractions of the oil and the extracts. The C13 ratios obtained (Table 2) are expressed as per mil differences of the sample with respect to the Pee Dee belemnite standard. Organic-geochemistry laboratories commonly use the NBS 22 lubricating oil as a reference standard. It was originally calibrated as -29.4 per mil on the PDB scale but this was later revised to -29.8 for internal consistency. EPR continues to use the -29.4 per mil calibration value. Consequently, a 0.4 per mil correction must be made when comparisons are made with data reported by laboratories that use the -29.8 per mil calibrations.

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Thompson, K. F., 1983, Classification and thermal history of petroleum based on light hydrocarbons. Geochim. et Cosmochim. Acta 47, 303-316.

Table 1. Description of 9/2-1 Oil, Farulk Field, Egersund Basin

Depth	Sample No.	Formation	°API	% S
3177-3210 m	115687	Sandnes	38.80	0.16

115687 NORWAY 9/201

	TOTAL PERCENT	NORM PERCENT
Methane	0.000	
Ethane	0.000	
Propane	0.244	
I-Butane	1.074	7.28
N-Butane	2.447	16.58
I-Pentane	1.173	7.95
N-Pentane	1.650	11.18
2,2-DMB	0.006	0.04
CPentane	0.249	1.69
2,3-DMB	0.000	0.00
2-MP	0.675	4.57
3-MP	0.419	2.84
N-Hexane	1.137	7.71
MCP	0.755	5.11
2,2-DMP	0.009	0.06
2,4-DMP	0.049	0.33
223-TMB	0.000	0.00

	TOTAL PERCENT	NORM PERCENT
CHexane	0.567	3.84
33-DMP	0.000	0.00
1,1-DMCP	0.074	0.50
2-MHexane	0.310	2.10
2,3-DMP	0.122	0.83
3-MHexane	0.387	2.62
1-C-3-DMCP	0.185	1.25
1-T-3-DMCP	0.208	1.41
1-T-2-DMCP	0.349	2.37
3-EPent?ne	0.039	0.26
224-TMP	0.000	0.00
N-Heptane	1.012	6.86
1-C-2-DMCP	0.000	0.00
MCH	1.213	8.22
ECP	0.083	0.56
Benzene	0.159	1.08
Toluene	0.405	2.75

	TOTALS
All Comp	15.001
Gasoline	14.757

SIG COMP RATIOS	
C1/C2	1.41
A /D2	5.56
D1/D2	1.46
C1/D2	5.59
N-P/IP	1.41
CH/MCP	0.75

Paraffin Index 1	0.939
Paraffin Index 2	22.660

Interpreter - D.GILBERT Analyst - NRD Instrument - HP58

Table 2. C4-C7 Ligh Gasoline-Range Hydrocarbons

Table 3. Biomarker Ratios

EXXON PRODUCTION & RESEARCH COMPANY

BIOMARKER LABORATORIES

EPR #: 115687 PROJECT #: 28465 DATE: 5/16/89

COUNTRY: NORWAY BASIN: _____ WELL: ESSO No. 9/2-1

SAMPLE TYPE: OIL LITH: _____ DEPTH: 10423.19-10531.46

SIM: 191, 217, 218, 259 FULL SCAN: ____

STERANE REPORT:

Biomarker Parameter	Ion(s) (m/z)	INTENSITY	AREA
A: THERMAL MATURITY			
% C29 20S	217	49.94	45.91
C29 20S/C29 20R	217	1.00	0.85
% abb	218,217	53.95	43.29
% C27 ba	259,217	23.65	17.17
% C27 ba 20S	259	58.33	58.00
Total Steranes	217	5610	46438
Total Steranes	218	6088	43392
Total Diasteranes	259	2392	15003
Sidechain Cracking	217,218	0.53	0.50
Additional Parameter			
Additional Parameter			
B: DEPOSITIONAL ENVIRONMENT			
% C27 abb	218	35.75	35.50
% C28 abb	218	29.39	30.33
% C29 abb	218	34.86	34.17

% Total C27	217,218,259	28.08	24.69
% Total C28	217,218,259	22.80	23.70
% Total C29	217,218,259	31.80	34.99
Steranes/Triterpanes		0.32	0.24
Pregnane/Homopregnane	217	1.28	1.51
Additional Parameter			
Additional Parameter			

C: DEP. ENV. & BIODEGRADATION

Dia-/Regular steranes	217,218,259	0.20	0.17
C27 ba 20R/C27 ba 20S	259	0.71	0.72
Additional Parameter			

TRITERPANE REPORT

A: THERMAL MATURITY

% C32 ab 22S	191	58.08	53.17
% C30 bb	191		
% C30 ab-I	191		
% C30 ab-II	191	84.51	80.70
% Ts/Ts+Tm	191	57.47	52.29
Ts/Tm	191	1.35	1.10
% C30 Moretane	191	15.49	19.30
C30abH/C30baM+C29baNM	191	3.36	2.53
%C29(NM/NM+NH)	191	19.76	26.64
% C29abNH/C29abNH+C30abH	191	31.71	30.00

% Ts+Tm/Ts+Tm+C30H	191	27.75	31.13
Additional Parameter			

B: DEPOSITIONAL ENVIRONMENT

% 18a-Oleanane	191	0.00	0.00
% BNHM	191		
% Tricyclics	191	9.30	8.57
C23/SUM(C23-C25)	191	0.52	0.32
% Gammacerane	191	0.00	0.00
C35/C32 Homohopane	191	0.22	0.16
% Total C27 pentacyclics	191	8.71	8.77
% Total C28 pentacyclics	191	2.17	1.89
% Total C29 pentacyclics	191	13.13	11.34
% Total C30 pentacyclics	191	26.84	24.05
% Total C31 pentacyclics	191	14.76	15.04
% Total C32 pentacyclics	191	9.33	11.99
% Total C33 pentacyclics	191	6.58	8.37
% Total C34 pentacyclics	191	3.54	4.80
% Total C35 pentacyclics	191	2.07	1.90
Total m/z 191	191	44630.00	434344.00
Additional Parameter	191		

Table 4. PNA Analysis

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P N A A N A L Y S I S
++++++++++++++++++++++++++

[hp] 5880A MANUAL INJECTION @ 09:54 MAY 5, 1989
SAMPLE: 115687 BOTTLE# *** INJECTION# ***

SAMPLE WEIGHT 1.0310 G INT. STANDARD WEIGHT .0106 G

HC TYPE	WT %	VOL %
TOTAL P	65.02	94.98
TOTAL N	24.42	30.37
TOTAL A	10.56	11.62

P5-P5	24.79	40.10
P6	8.42	12.22
P7	7.31	10.22
P8	7.69	10.47
P9+	16.81	21.97
TOTAL P	65.02	94.98

N5	.94	1.20
N6	4.97	6.25
N7	7.95	9.99
N8	5.67	7.01
N9+	4.89	5.92
TOTAL N	24.42	30.37

A6	.60	.65
A7	1.52	1.69
A8	2.05	2.27
A9+	6.38	7.01
TOTAL A	10.56	11.62

RT	COMPONENT	NORM WT %	NORM C4-7	WT %
4.50	C3	.917	0.000	.2438
4.83	IC4	4.041	7.277	1.0739
5.11	NC4	9.207	16.580	2.4467
6.12	IC5	4.416	7.952	1.1734
6.67	NC5	6.211	11.184	1.6504
7.71	22DMC4	.023	.041	.0061
8.80	CYC5	.939	1.690	.2494
9.03	2MC5	2.539	4.573	.6748
9.73	3MC5	1.576	2.837	.4187
10.70	NC6	4.280	7.707	1.1374
12.39	22DMC5	.033	.060	.0088
12.58	MCYC5	2.840	5.114	.7546
12.87	24DMC5	.185	.334	.0493
14.60	3E	.598	1.077	.1589
15.53	CYC6	2.133	3.841	.5668
16.50	2MC6	1.167	2.101	.3100
16.67	23DMC5	.460	.829	.1223
16.95	11DMCYC5	.277	.499	.0737
17.45	3MC6	1.455	2.621	.3868
18.13	T13DMCYC5	.783	1.410	.2081
18.45	C13DMCYC5	.696	1.253	.1849
18.61	3EC5	.147	.265	.0390
18.76	T12DMCYC5	1.313	2.365	.3490
20.35	NC7	3.809	6.858	1.0120
22.72	MCYC6	4.566	8.223	1.2134
23.12	22DMC6	.439	0.000	.1166
24.20	ECYC5	.313	.565	.0833
24.44	25DMC6	.172	0.000	.0457
24.63	24DMC6	.204	0.000	.0543
25.37	CTC124TMCYC5	.440	0.000	.1169
25.56	234TMC5	.030	0.000	.0080
26.33	CTC123TMCYC5	.499	0.000	.1325
26.71	233TMC5	.065	0.000	.0172
27.17	TOL	1.524	2.745	.4051
28.22	23DMC6	.305	.550	.0811
28.37	2M3EC5	.070	0.000	.0187
29.09	2MC7	1.509	0.000	.4010
29.28	4MC7	.429	0.000	.1139
29.46	34DMC6	.047	0.000	.0126
29.76	CCT124TMCYC5	.055	0.000	.0147
30.11	3MC7	.706	0.000	.1876
30.22	1M2ECYC5	.838	0.000	.2228
30.47	T14DMCYC6	.543	0.000	.1443
31.20	11DMCYC6	.104	0.000	.0277
31.73	C1E2MCYC6	.127	0.000	.0336
32.02	C1E3MCYC6	.107	0.000	.0283
32.19	C9-P	.372	0.000	.0987
32.46	224TMC6	.042	0.000	.0113
32.84	T12DMCYC6	.770	0.000	.2046

[illegible]	[illegible]	.061	0.000	.0162
35.67	225TMC6	.044	0.000	.0117
36.20	244TMC6	.036	0.000	.0096
36.48	235TMC6	.024	0.000	.0064
37.02	33DMC7	.211	0.000	.0560
37.73	NC3CYC5	1.351	0.000	.3590
37.94	ECYC6	.423	0.000	.1125
38.19	C12DMCYC6	.025	0.000	.0066
38.47	113TMCYC6	.837	0.000	.2225
38.81	25DMC7	.258	0.000	.0685
39.32	24DMC7	.088	0.000	.0234
39.52	233TMC6	.049	0.000	.0129
40.07	ETBZ	.421	0.000	.1119
40.22	CCC135TMCYC5	.191	0.000	.0509
40.44	114TMCYC6	.666	0.000	.1769
41.17	MXYL	1.008	0.000	.2679
41.29	PXYL	.198	0.000	.0525
41.40	23DMC7	.372	0.000	.0988
41.63	44DMC7	.023	0.000	.0061
41.73	34DMC7	.023	0.000	.0062
41.98	3MEC6	.058	0.000	.0154
42.34	4MC8	.307	0.000	.0815
42.46	2MC8	.519	0.000	.1379
42.82	C9-P	.049	0.000	.0129
43.21	3MC8	.511	0.000	.1359
43.76	OXYL	.426	0.000	.1133
44.59	1M2C3CYC5	.306	0.000	.0813
44.83	C1E4MCYC6	.321	0.000	.0852
45.39	33DEC5	.054	0.000	.0143
45.91	226TMC7	.021	0.000	.0055
46.23	NC9	3.112	0.000	.8270
46.56	1M1ECYC6	.361	0.000	.0958
46.95	C10-P	.065	0.000	.0173
47.24	IC3BZ	.155	0.000	.0413
47.62	TERTC4CYC5	.416	0.000	.1107
47.81	TERTC4BZ	.233	0.000	.0620
48.09	IC4CYC5	.129	0.000	.0343
48.24	C10-P	.063	0.000	.0168
48.64	1M4IC3CYC6	.100	0.000	.0265
48.97	CCC123TMCYC6	.052	0.000	.0139
49.19	NC4CYC5	.232	0.000	.0617
49.33	1M2ECYC6	.061	0.000	.0163
49.81	3MC9	.168	0.000	.0446
50.04	36DMC8	.537	0.000	.1428
50.40	NC3CYC6	.040	0.000	.0105
50.71	M ETOL	.404	0.000	.1072
50.90	P ETOL	.257	0.000	.0683
51.38	135TMBZ	.409	0.000	.1088
51.82	C10-P	.132	0.000	.0351
51.97	C10-P	.301	0.000	.0799
52.20	O ETOL	.809	0.000	.2151
52.48	22DMC8	.146	0.000	.0388
53.48	124TMBZ	.364	0.000	.0968
53.61	C1M3ECYC6	.237	0.000	.0629
53.86	T1M2C3CYC6	.272	0.000	.0724
53.99	C10-P	.053	0.000	.0142
54.21	C10-P	[illegible]	[illegible]	[illegible]

	[illegible]	.052	0.000	.0165
54.70	IC4BZ	.152	0.000	.0404
55.01	NC10	2.163	0.000	.5749
55.33	C11-P	.024	0.000	.0064
55.53	C11-P	.035	0.000	.0094
55.65	123TMBZ	.135	0.000	.0359
55.86	C11-P	.049	0.000	.0130
55.99	1M4IC3BZ	.049	0.000	.0131
56.21	C11-P	.093	0.000	.0246
56.61	C11-P	.063	0.000	.0168
56.98	1M2IC3BZ	.034	0.000	.0092
57.19	C10-N	.122	0.000	.0325
57.58	C11-P	.295	0.000	.0784
57.93	NC4BZ	.308	0.000	.0819
58.21	1M4C3BZ	.033	0.000	.0089
58.28	1M3C3BZ	.168	0.000	.0447
58.53	DEBZ	.132	0.000	.0352
58.99	IC4CYC6	.438	0.000	.1165
59.46	SMC10	.209	0.000	.0555
59.73	14DEBZ	.443	0.000	.1178
60.20	C10-A	.245	0.000	.0652
60.39	1M2C3BZ	.223	0.000	.0593
60.72	C11-P	.090	0.000	.0240
60.86	C11-P	.100	0.000	.0266
61.31	C11-P	.246	0.000	.0653
61.62	C11-P	.142	0.000	.0378
61.97	14DM2EBZ	.189	0.000	.0503
62.42	NC11	2.768	0.000	.7356
62.77	C11-P	.077	0.000	.0205
62.97	1245TETMBZ	.093	0.000	.0248
63.13	12DM4EBZ	.096	0.000	.0255
64.00	C12-P	.148	0.000	.0392
64.23	C12-P	.030	0.000	.0080
64.49	13DM2EBZ	.037	0.000	.0099
64.98	C12-P	.267	0.000	.0710
65.19	C11-A	.071	0.000	.0189
65.43	C11-A	.378	0.000	.1005
65.73	C11-A	.153	0.000	.0406
66.49	12DM3EBZ	.086	0.000	.0228
66.81	C12-P	.102	0.000	.0272
67.28	C12-P	.159	0.000	.0423
67.68	C11-A	.196	0.000	.0520
67.89	C12-P	.038	0.000	.0100
68.32	C11-A	.018	0.000	.0048
68.47	1TERTC42MBZ	.168	0.000	.0445
68.96	C12-P	.032	0.000	.0086
69.36	C12-P	.057	0.000	.0151
69.56	C11-A	.046	0.000	.0123
69.94	C12-P	.039	0.000	.0105
70.13	C12-P	.034	0.000	.0089
70.56	C12-P	.200	0.000	.0531
71.07	C11-A	.085	0.000	.0227
71.78	NC12	2.058	0.000	.5468
73.50	PENTYL BZ	.207	0.000	.0551

```
C1/C3 =      1.409
P/D2 =       5.557
I1/D2 =      1.458
C1/D2 =      5.595
PENT/I PENT =    1.406
CH/MCP =      .751
PARAFFIN INDEX 1 =       .939
PARAFFIN INDEX 2 =     22.660
% GASOLINE =    14.757
```

Table 5. C15 + Chromatographic and Isotopic Summary

Depth	SAT	ARO	NSO	N-EL	ASP	I+L	C13 SAT	C13 ARO
3177-3210	52.5	26.9	7.6	7.2	4.9	0.9	-29.12	-28.19

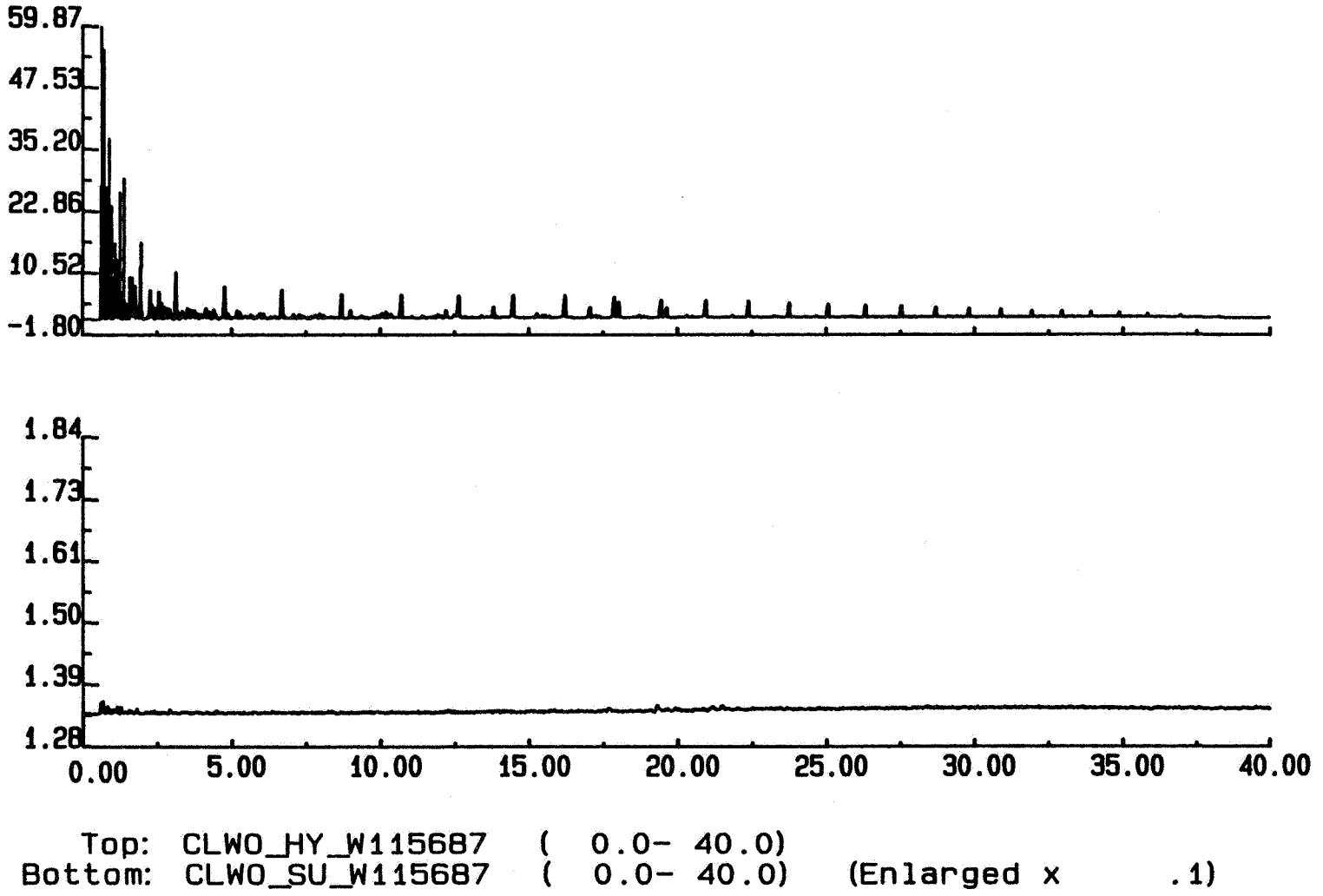


Figure 1A. Whole-Oil Chromatogram from the 9/2-1 Well

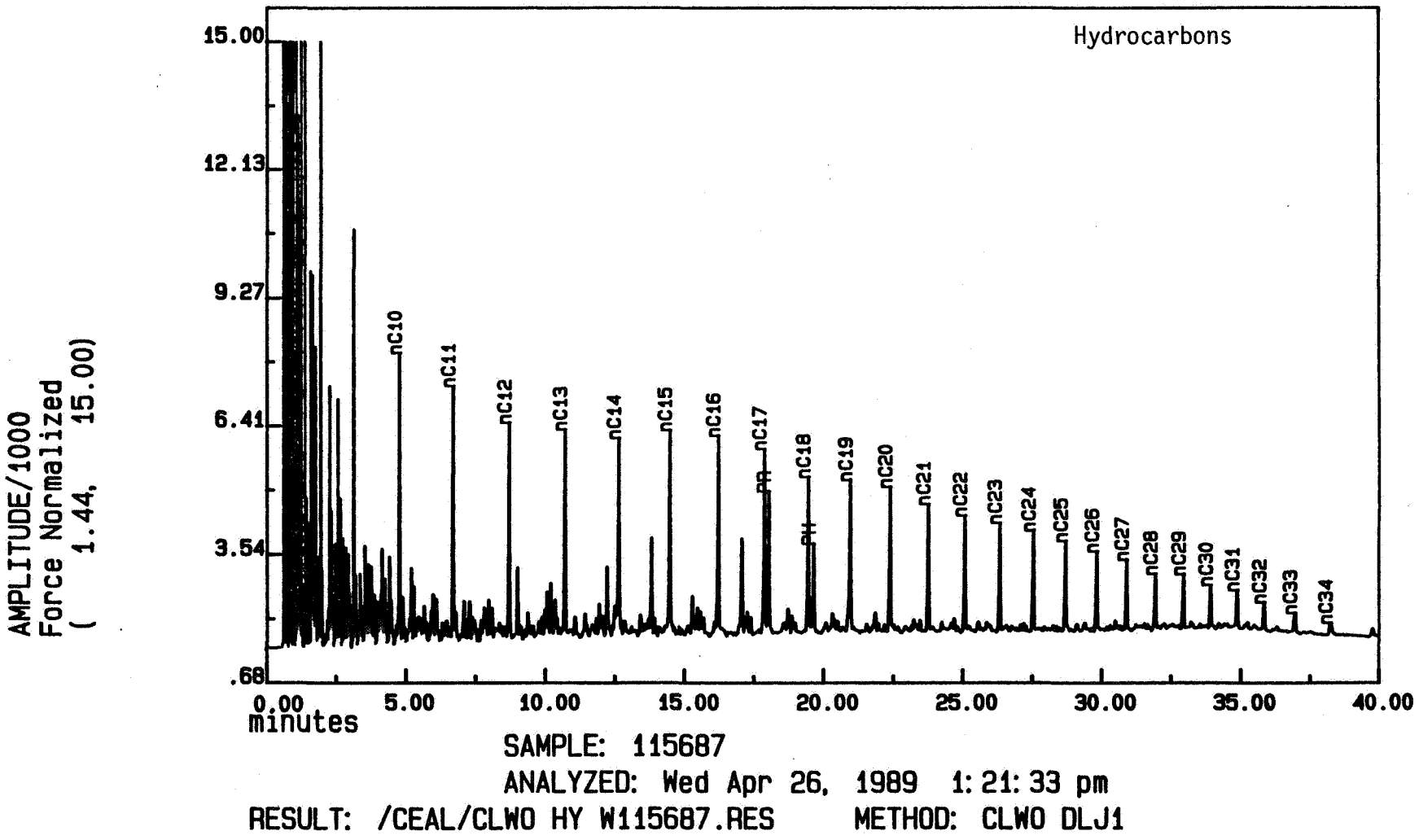


Figure 1B. Enlarged Whole-Oil Chromatogram from the 9/21-1 Well

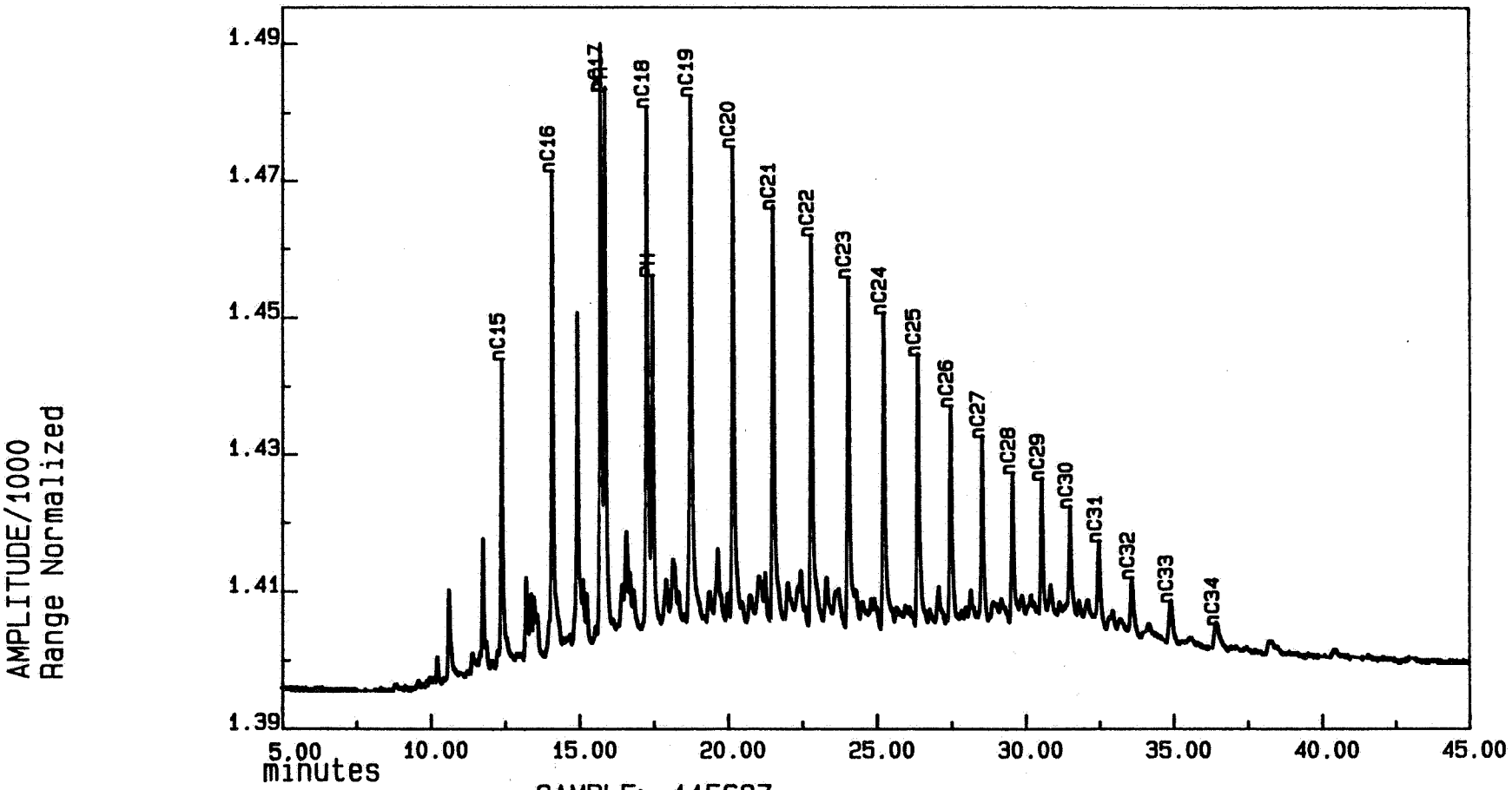
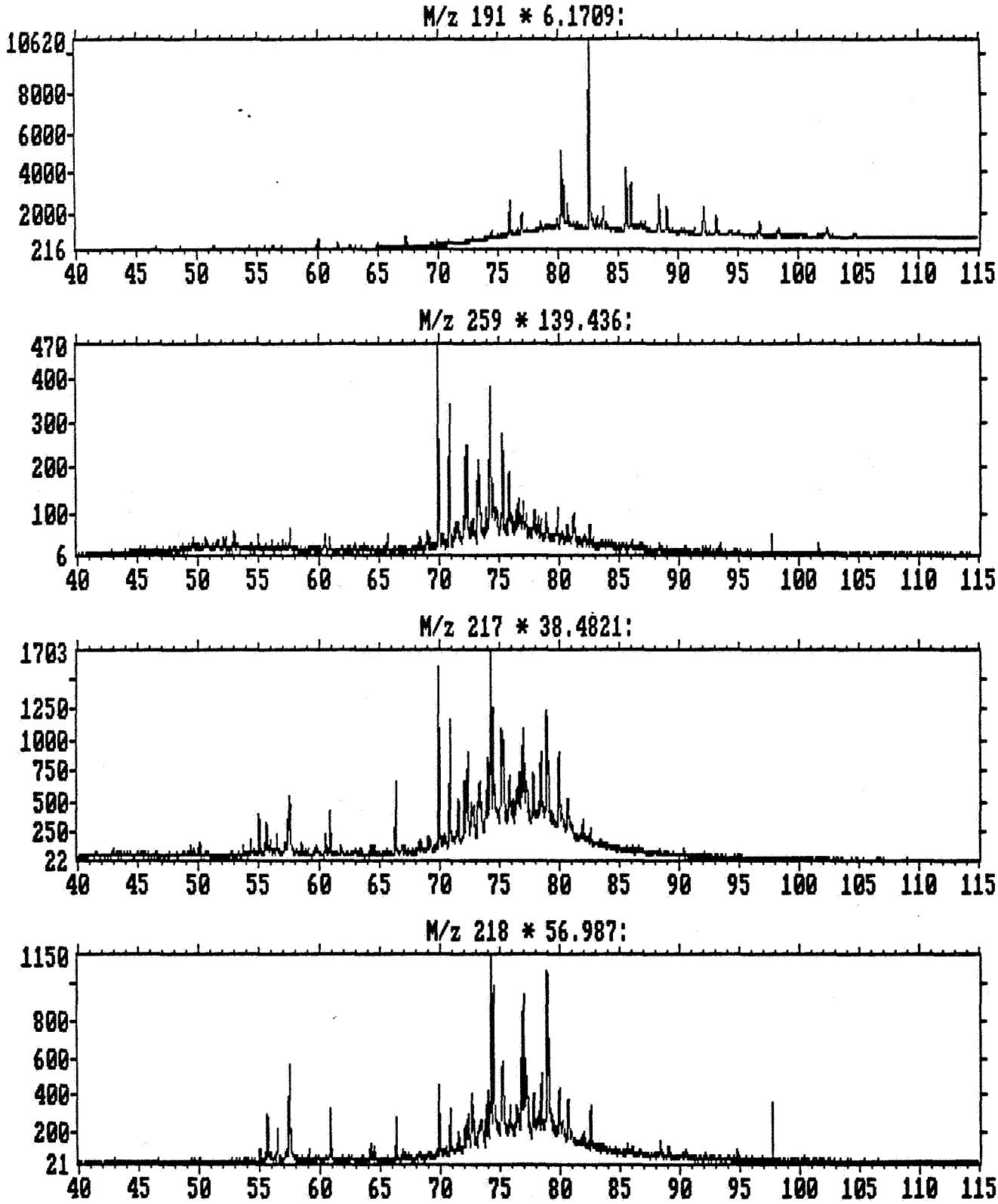


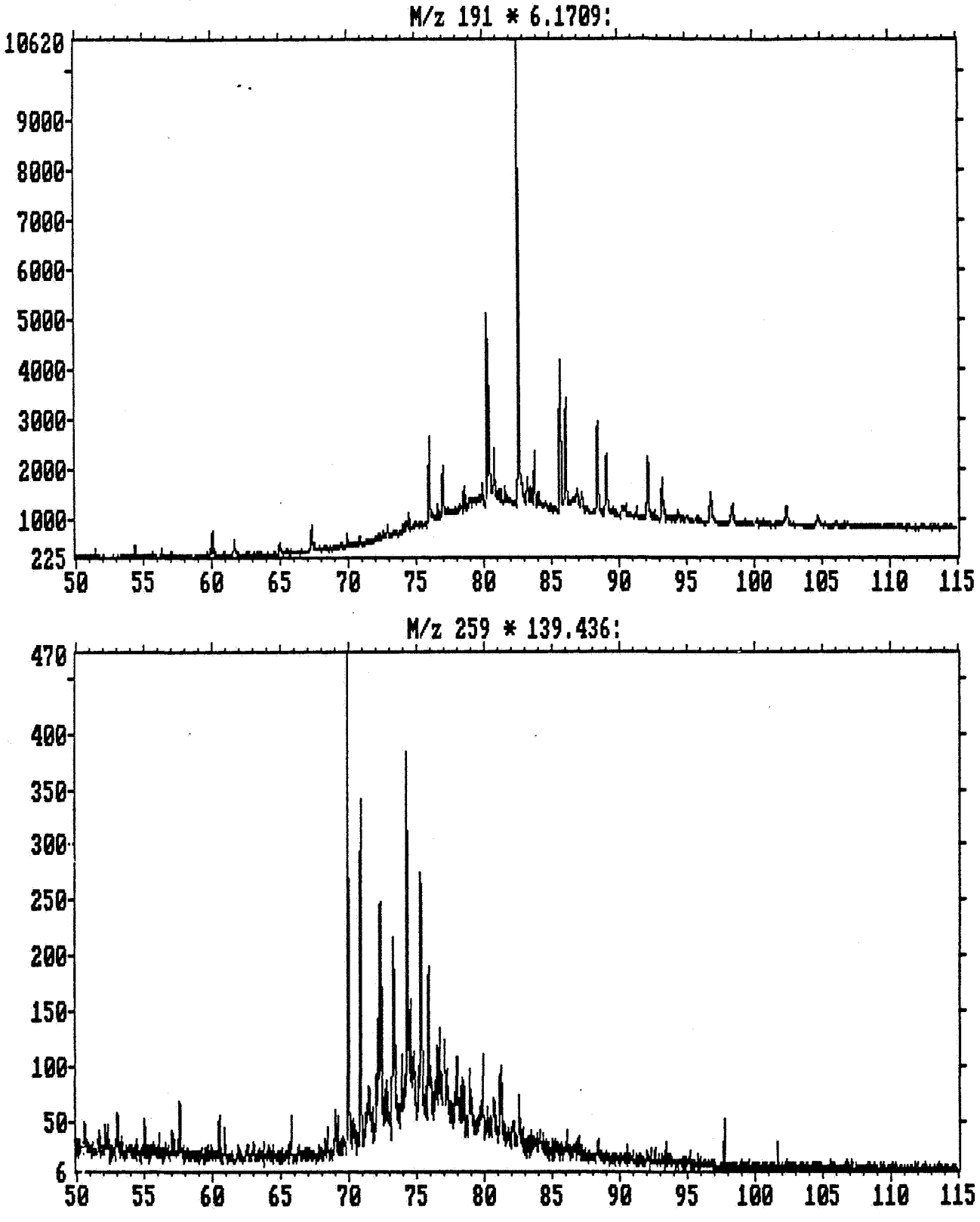
Figure 2. C1S+ Chromatogram from the 9/2-1 Oil, Farulk Field

Figure 5. Biomarkers from the 9/2-1 Oil



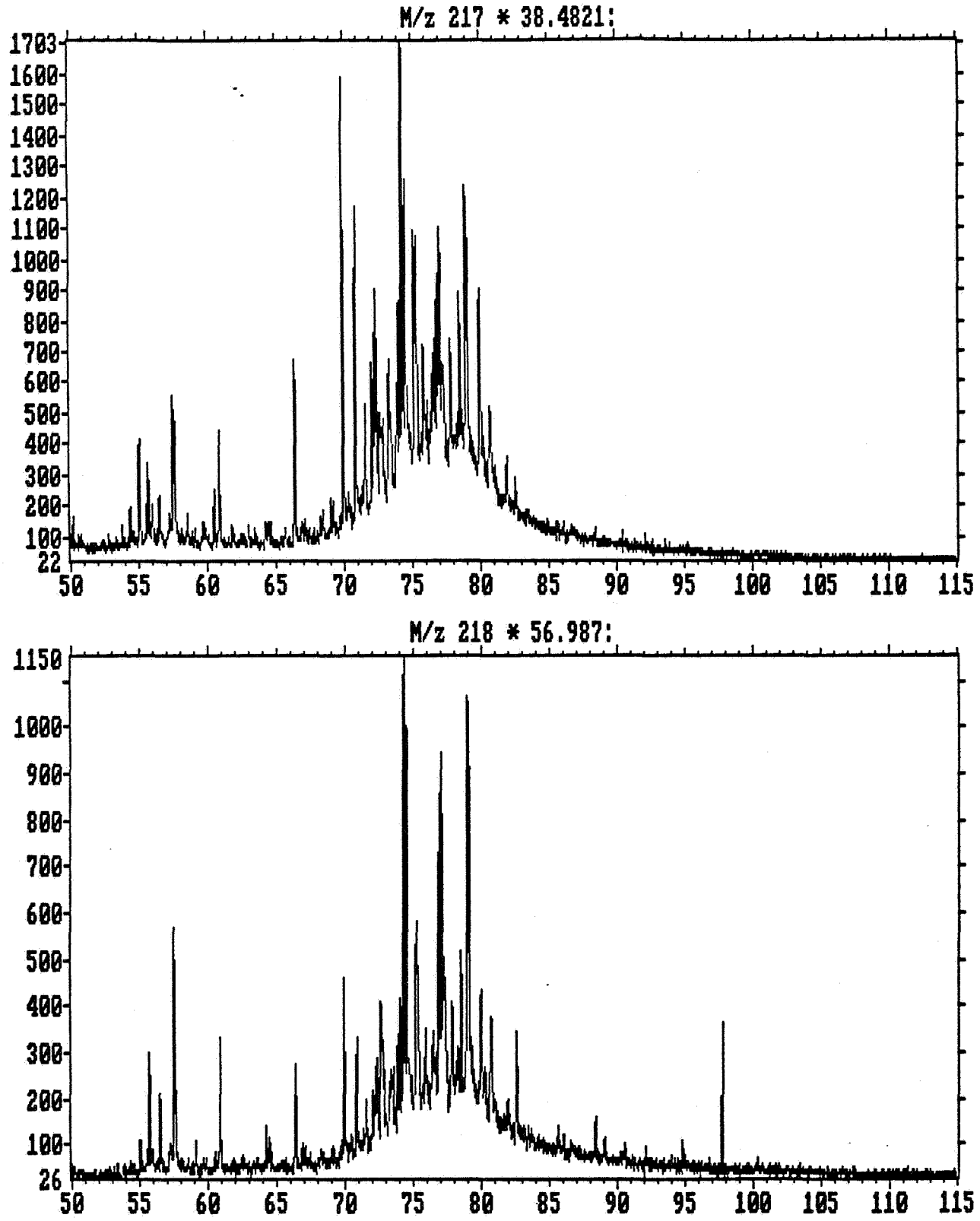
SAVE\115687
4501 scans acquired on 16 May,1989 at 07:08:59. Rate = 1 seconds/scan
115687 SAT (Oil) Norway, Esso No. 9/2-1, 10423.19-10531.46
1.5 ng 5B-Cholane
25 ug Saturates, 6 millisecond integration, averaging 39 times
[DB-5 (0.25um)] [Head Pressure = 215 kpa] [75, 3.0/310/35]
EI Instrument Project: 28465

Figure 6. M/z 191 and m/z 259 Biomarkers from the 9/2-1 Oil



SAVE\115687
4501 scans acquired on 16 May,1989 at 07:08:59. Rate = 1 seconds/scan
115687 SAT (Oil) Norway, Esso No. 9/2-1, 10423.19-10531.46
1.5 ng 5B-Cholane
25 ug Saturates, 6 millisecond integration, averaging 39 times
[DB-5 (0.25um)] [Head Pressure = 215 kpa] [75, 3.0/310/35]
EI Instrument Project: 28465

Figure 7. M/z 217 and 218 Biomarkers from the 9/2-1 Oil



SAVE\115687
4501 scans acquired on 16 May,1989 at 07:08:59. Rate = 1 seconds/scan
115687 SAT (Oil) Norway, Esso No. 9/2-1, 10423.19-10531.46
1.5 ng 5B-Cholane
25 ug Saturates, 6 millisecond integration, averaging 39 times
[DB-5 (0.25um)] [Head Pressure = 215 kpa] [75, 3.0/310/35]
EI Instrument Project: 28465