A/S Norske Shell
LETE- OG UTVINNINGSAVDELINGEN
(EXPLORATION AND PRODUCTION)

Tel.: 04-57 61 00
P. O. Box 10, N-4033 Forus
Telex 33046 shelp n

CONOCO
P.O. Box 488

4001 STAVANGER

Attn: J.R. Hultman

Your ref:	Our ref:	Date:
	044103 EPXE/1/mr	19.12.83

D-12

Dear Sir,

Subject: Geochemical analysis of core samples, well 24/9-1

We refer to your telex of 16/1-83 in which Norske Shell was granted permission to sample the core from 24/9-1 for geochemical studies.

We have now completed our analysis and we have the pleasure to send you copies of the following 3 reports:

- RKER 83.099
  source rock analysis of cores from interval 4441.9 - 4459.6 m of the Kimmeridge Clay Fm, from well 24/9-1, Norway
- RKER 83.062 Geochemical extract analysis of six core samples of the Kimmeridge Clay Formation from interval 4443.1 - 4459.6 m in well 24/9-1, Norway
- Robertson Research. Rock Eval. Pyrolysis data sheets.

We regret our delay in reporting which was caused by instrumental problems in our research laboratory.

Yours faithfully,
A/S NORSKE SHELL

B.M. Thomas
Team Leader
Exploration and Production

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B.M. Thomas
Team Leader
Exploration and Production

MAY 1983

RKER 83.099

SOURCE ROCK ANALYSIS OF CORES FROM INTERVAL 4441.9 TO 4459.6 M OF KIMMERIDGE CLAY FM. FROM WELL 24/9-1, NORWAY

by
J.M.J.Terken and F.M.van der Veen

code: 774.103

in co-operation with

J.E.A.M.Dielwart

R.F.M.Hofland

P.J.van der Vet

Investigation

9.5.4091

KONINKLIJKE/SHELL EXPLORATIE EN PRODUKTIE LABORATORIUM

RIJSWIJK, THE NETHERLANDS

(Shell Research B.V.)

CONTENTS

1.0 INTRODUCTION

A source rock evaluation has been carried out on cores from well 24/9-1, NORWAY. The approximate location is shown in Figure 1.
The samples are taken from interval 4441.9 to 4459.6 m of the Kimmeridge Clay Fm, i.e. Portlandian, Upper Jurassic. Total depth was reached at 4907.0 m.b.d.f..

The purpose of the investigation was:

1. to detect the presence (or absence) of source rocks in the samples
2. to determine the quality of the organic matter, as well as its distribution.
3. to establish the degree of organic metamorphism (level of maturity).

A source rock is identified by measuring the amount of temperature reactive ("live") organic matter present, i.e. the amount of organic matter that yields hydrocarbons upon pyrolysis. The method excludes any ("dead") organic matter such as inertinites.

In addition, the total organic carbon content can be determined which gives the sum of "live" and "dead" organic carbon. Rocks containing less than 0.5%wt organic carbon are not considered to have a potential for commercial oil accumulations.

The source rock indications (SRI), which are a measure of the amount of pyrolysable organic matter, are determined on the original samples and in certain cases also after extraction with organic solvents. A systematically lower value after extraction is due to the presence of extractable hydrocarbons. These may consist of trapped oil, oil generated in situ by a source rock, or e.g. gasoil used in the drilling fluid.

In general, samples with source rock indications of 30 or less do not represent (immature or mature) source rocks. Values between 30 and 100 generally indicate marginal source rocks, while values above 100 commonly indicate good source rocks.

Intervals or samples with high source rock indications are investigated under a microscope to ensure that the high values indicate genuine source rock properties and are not due to contaminants of an organic nature such as lost circulation material.

The quality of a source rock for oil/gas generation depends on the type of organic matter present. Five categories of organic matter can be distinguished, viz.: humic, mainly humic, mixed, mainly kerogenous , kerogenous. This classification is based on the hydrogen content of the organic matter.

Source rocks with organic matter of kerogenous, mainly kerogenous and/or mixed type generate predominantly oil. Organic matter of humic type generates gas only. Strata with organic matter of mainly humic quality generate either gas, or gas and oil.

In addition to the type and the concentration of the organic matter , the source rock quality is also characterised by the distribution of the typical organic constituents, or macerals(1), in the sediments. The maceral distribution can be used to further qualify the source rock, especially when mainly humic quality is found. For this purpose a microscopic investigation on polished rock fragments is carried out.

The "maturity" of source rocks is expressed in terms of degree of organic metamorphism. With increasing degree of organic metamorphism the organic matter is gradually carbonised while generating hydrocarbons. With increasing carbonification the light reflectance of vitrinite, one of the coal macerals, increases. The degree of organic metamorphism can be assessed by measuring this reflectance.

1)maceral: an organic constituent which can be recognised with the microscope (with objectives 25x to 50x)

2.0 RESULTS

The results are listed in Table I (source rock indications values, total organic carbon content ,type of organic matter), Table II (maceral description , comment lines). All chemically obtained results are summarised in Enclosure 1 (Geochemical log).

3.0 DISCUSSION

3.1 Interval 4441.9 to 4459.6 m (Portlandian, Kimmeridge Clay Fm.)

All samples from this interval show fairly good to good source rock indication (SRI) values, together with high amounts of organic carbon in the range 4.3 - 7.7 %wt.

In their maceral composition all samples show as main constituent sapropelic organic matter. In addition to the SOM, which is partly converted, some exsudatinite, fusinite, micrinite and very small amounts of detrital desmocollinite are present.

The type of organic matter reveals a "mixed to mainly kerogenous" character. The combination of high organic carbon contents and SOM abundance in these samples on the one hand, and the relatively low SRI-values and "mixed to mainly kerogenous" typing on the other, may point to an advanced stage of maturity for all samples.

Hence it can be concluded that this interval should be regarded as a fairly good to good source rock for oil, which may already have reached an advanced stage of maturity.

4.0 CONCLUSION

Interval 4441.9 - 4459.6 m can be regarded as a fairly good to good source rock for oil, which may already have reached an advanced stage of maturity.

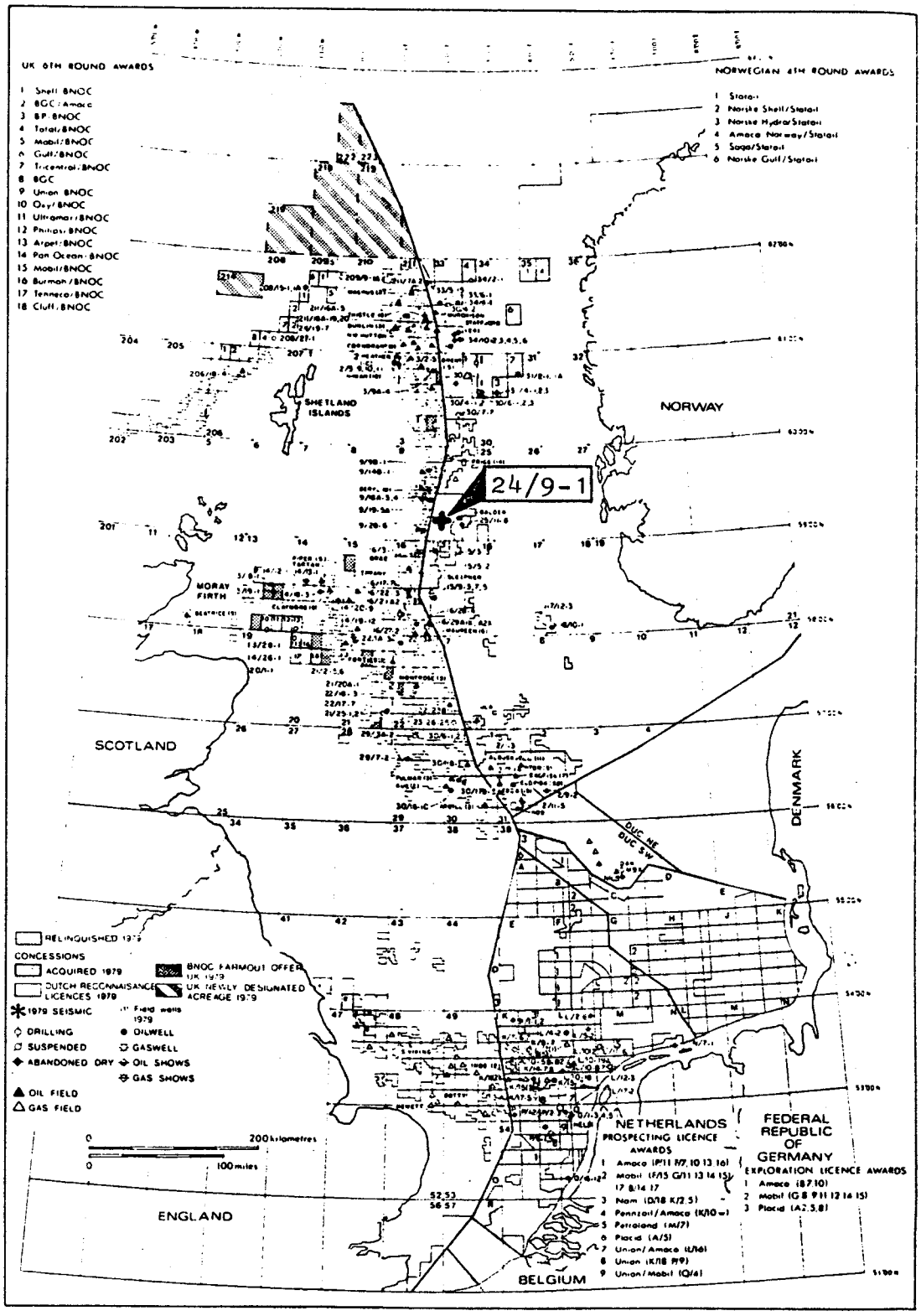


FIGURE 1: LOCATION MAP

GEOCHEMICAL SOURCE ROCK DATA

TABLE 1 WELL: 24/9-1

DEPTH M	TYPE OF SAMPLE	SOURCE ROCK INDICATION BEFORE EXTR.	SOURCE ROCK INDICATION AFTER EXTR.	TYPE OF ORGANIC MATTER	ORGANIC CARBON CONTENT % W
4441.90	R	320	155	MK	4.3
4442.60	R	450	330	MK	6.2
4443.10	R	295	255	MK/M	6.3
4443.90	R	340	235	MK	5.6
4444.60	R	240	150	M	5.0
4445.90	R	260	200	M/MK	5.1
4446.90	R	295	180	MK	5.4
4448	R	190	135	M	4.9
4448.60	R	415	280	MK	6.3
4449.40	R	265	170	MK/M	5.2
4450.70	R	460	235	M/MK	6.7
4451.90	R	470	320	MK	7.6
4452.90	R	370	275	MK/M	7.0
4453.70	R	310	205	M/MK	6.5
4454.80	R	490	350	MK	7.7
4455.30	R	395	240	MK/M	7.1
4457.90	R	400	255	MK	6.5
4458.90	R	340	220	M/MK	7.3
4459.80	R	325	235	MK	6.3

TYPE OF SAMPLE C = CUTTINGS, R = CORE, S = SIDEWALL SAMPLE

CONTAMINATION : W = WALNUT FRAGMENTS OR SOME SIMILAR PRODUCT, C = CELLOPHANE SHREDS, F = FIBRES, P = PLASTIC OR PAINT AND X = CONTAMINATED BUT KIND NOT SPECIFIED

A DASH (-) INDICATES TEST NOT MADE, ASTERISKS INDICATE THE ORGANIC CARBON CONTENT IS THE AVERAGE FOR THE SAMPLES CONCERNED

MACERAL DESCRIPTION OF 19 SAMPLES FROM WELL 24/9-1

DEPTH IN M	SAMPLE TYPE	ORGANIC																						INORG.			
			VITR.			LIPTINITE											INERT.										
											ALGAE																
		SAPROPELIC ORG. MATTER	TELOCOLLINITE	TELINITE	DESMOCOLLINITE	SPORINITE	CUTINITE	RESINITE	LIPTODETRINITE	BOTRYOCOCCUS	TASMANITES	OTHER ALGAE	MICROPLANKTON	EXSUDATINITE	SCLEROTINITE	FUSINITE	MACRINITE	MICRINITE	UNDEFINED MINERALS	FRAMBOIDAL PYRITE	AGGREGATES OF PYRITE	CRYSTALS OF PYRITE
4441.9	CORE	+			-								/		/		+	*	/	-	/
4442.6	CORE	+			-								/		/		+	*	/	-	/
4443.1	CORE	+			-								/		+		+	*	/	-	+
4443.9	CORE	+			-								/		/		+	*	/	/	/
4444.6	CORE	+			-								/		/		+	*	/	-	/
4445.9	CORE	+			-								/		/		+	*	/	-	/
4446.9	CORE	+			-								/		/		+	*	/	-	/
4448.0	CORE	+			-								-		-		+	*	/	/	-
4448.6	CORE	+			-								/		/		+	*	/	-	-
4449.4	CORE	+			-								/		/		+	*	/	/	-
4450.7	CORE	+			-								/		/		+	*	/	/	/
4451.9	CORE	+			-								/		/		+	*	/	/	/
4452.9	CORE	+			-								/		/		+	*	/	-	-
4453.7	CORE	+			-								/		/		+	*	/	/	/
4454.8	CORE	+			-								/		+		+	*	+	/	-
4455.9	CORE	+			-								/		/		+	*	+	/	-
4457.9	CORE	+			-								/		/		+	*	/	-	/

LEGEND	
*	: ABUNDANT
+	: COMMON
/	: FEW
-	: RARE

TABLE: II (part 1)

DEPTH IN M	SAMPLE TYPE
4458.9	CORE
4459.6	CORE

ORGANIC																		INORG.			
	VITR.			LIPTINITE									INERT.								
								ALGAE													
SAPROPELIC ORG. MATTER	TELOCOLLINITE	TELINITE	DESMOCOLLINITE	SPORINITE	CUTINITE	RESINITE	LIPTODETRINITE	BOTRYOCOCCUS	TASMANITES	OTHER ALGAE	MICROPLANKTON	EXSUDATINITE	SCLEROTINITE	FUSINITE	MACRINITE	MICRINITE	UNDEFINED MINERALS	FRAMBOIDAL PYRITE	AGGREGATES OF PYRITE	CRYSTALS OF PYRITE
+			-								/		+		+	*	+	/	-
+			-								/		+		+	*	/	-	/

L E G E N D	
*	: ABUNDANT
+	: COMMON
/	: FEW
-	: RARE

TABLE: II (part 2)

COMMENT LINES FROM WELL/OUTCROP : 24/9-1

4441.9 M : S.O.M. PARTLY CONVERTED
FOSSIL REMAINS

4442.6 M : S.O.M. PARTLY CONVERTED

4443.1 M : S.O.M. PARTLY CONVERTED

4443.9 M : S.O.M. PARTLY CONVERTED
FOSSIL REMAINS

4444.6 M : S.O.M. PARTLY CONVERTED

4445.9 M : S.O.M. PARTLY CONVERTED

4446.9 M : S.O.M. PARTLY CONVERTED
FOSSIL REMAINS

4448.0 M : FOSSIL REMAINS
S.O.M. PARTLY CONVERTED

4448.6 M : S.O.M. PARTLY CONVERTED
FOSSIL REMAINS

4449.4 M : FOSSIL REMAINS
S.O.M. PARTLY CONVERTED

4450.7 M : S.O.M. PARTLY CONVERTED
FOSSIL REMAINS

4451.9 M : S.O.M. PARTLY CONVERTED

4452.9 M : S.O.M. PARTLY CONVERTED
FOSSIL REMAINS

4453.7 M : S.O.M. PARTLY CONVERTED
FOSSIL REMAINS

4454.8 M : S.O.M. PARTLY CONVERTED
FOSSIL REMAINS

4455.9 M : S.O.M. PARTLY CONVERTED

4457.9 M : FOSSIL REMAINS
S.O.M. PARTLY CONVERTED

4458.9 M : FOSSIL REMAINS
S.O.M. PARTLY CONVERTED

4459.6 M : S.O.M. PARTLY CONVERTED

TABLE: II (part 3)

GEOCHEMICAL LOG

SCALE 1:250

WELL 24/9-1

LOCATION

REGEO IDENTIFIER

DEPTH IN M

LITHOLOGY

DOM(VR)

SOURCE ROCK INDICATION OF ORIGINAL SAMPLE

100 200 300 400 500 600

TYPE OF SAMPLE

SOURCE ROCK INDICATION OF SAMPLE AFTER EXTRACTION WITH CHLOROFORM

100 200 300 400 500 600

CONTAMINATION

DEPTH IN M

ORG.CARBON (PCT. WT)

TYPE OF ORGANIC MATTER

4430

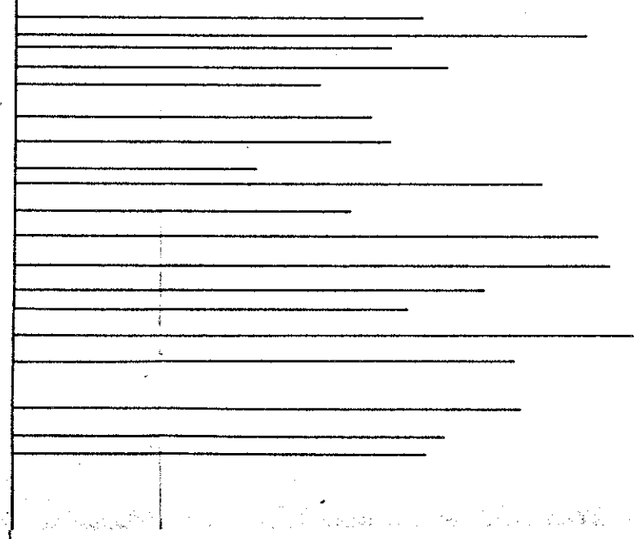
4440

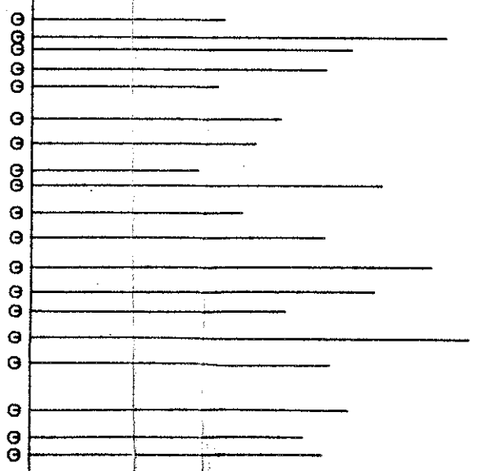
4450

4460

4470

CORED INTERVAL





VALUES SMALLER THAN 30 ARE CONSIDERED NOT TO BE OF SIGNIFICANCE

INTERVAL 4441.9 TO 4459.6 M CAN BE REGARDED AS A FAIRLY GOOD TO GOOD SOURCE ROCK FOR OIL, WHICH MAY HAVE REACHED AN ADVANCED STAGE OF MATURITY.

DEPTH IN M	ORG.CARBON (PCT. WT)	TYPE OF ORGANIC MATTER
4430		
4440	4.3	MAINLY KEROGENOUS
	8.2	MAINLY KEROGENOUS
	6.3	MAINLY KEROGENOUS
	5.6	MAINLY KEROGENOUS
	5.0	MIXED
	5.1	MIXED
	5.4	MAINLY KEROGENOUS
	4.9	MIXED
	6.3	MAINLY KEROGENOUS
4450	5.2	MAINLY KEROGENOUS
	6.7	MIXED
	7.6	MAINLY KEROGENOUS
	7.0	MAINLY KEROGENOUS
	6.5	MIXED
	7.7	MAINLY KEROGENOUS
	7.1	MAINLY KEROGENOUS
	6.5	MAINLY KEROGENOUS
	7.3	MIXED
4460	6.3	MAINLY KEROGENOUS
4470		

NUMBER OF SAMPLES ANALYSED 19

NUMBER OF SAMPLES ANALYSED 19

LEGEND

TYPE OF SAMPLE G= CORE

▶= SIDEWALL SAMPLE

CONTAMINATION C = UNSPECIFIED

W = WALNUTS

E = CELLOPHANE

F = FIBRES

P = PLASTIC OR PAINT

KONINKLYKE/SHELL

EXPLORATIE EN PRODUKTIE LABORATORIUM

GEOCHEMICAL LOG

COUNTRY : NORWAY

WELL : 24/9-1

INTERVAL : 4430 - 4470 M.

SCALE 1:250

AUTHOR: TERKEN		DATE: MAY 1983
REP: 83.085. 073	ENCL: 1	DRAW.NO:

June 1983

RKER.83.062

GEOCHEMICAL EXTRACT ANALYSIS OF SIX CORE SAMPLES OF THE KIMMERIDGE CLAY FORMATION FROM INTERVAL 4443.1 - 4459.6 M IN WELL 24/9-1, NORWAY

by

P.J. Grantham and J.M.A. Buiskool-Toxopeus

Investigation 9.5.4097

With co-operation from P. Lohbeck and R. Lieffering

KONINKLIJKE/SHELL EXPLORATIE EN PRODUKTIE LABORATORIUM

RIJSWIJK, THE NETHERLANDS

(Shell Research B.V.)

CONTENTS

GEOCHEMICAL EXTRACT ANALYSIS OF SIX CORE SAMPLES OF THE KIMMERIDGE CLAY FORMATION FROM INTERVAL 4443.1 - 4459.6 M IN WELL 24/9-1, NORWAY

1. RESULTS AND DISCUSSION

Geochemical extract analysis has been carried out on 6 core samples (4443.1, 4445.9, 4449.4, 4451.9, 4454.9, and 4459.6 m, Upper Jurassic, Kimmeridge Clay Fm.) from well 24/9-1, Norway.

The results are shown in Tables 1-3 and Figures 1-12. The results indicate the following:

1.1 All six selected samples are source rocks for oil (organic carbon contents; extract/carbon ratios; source rock indication between 170 and 350 units; maceral analyses, Figs 11 and 12).

1.2 The extracts of the samples are mature (gas chromatograms, Figs 1-6; gross compositions; sterane fragmentograms, Figs 8-10; sterane diagram, Fig.11).

1.3 The extracts were derived predominantly from sapropelic organic matter (maceral analysis, Figs 11 and 12). This is in agreement with the shape of the gas chromatograms, (Figs 1-6).

The sapropelic organic matter is of bacterially reworked phytoplanktonic origin (C_{27}-C_{29} distribution of the sterane fragmentograms, Figs 8-10).

1.4 The extracts are similar to an average North Sea crude oil with respect to their gas chromatograms and sterane distributions. The carbon isotope values however are somewhat lighter (-30^{o}/oo) compared to the mean for many crude oils from the North Sea (-29.0^{o}/oo).

2. CONCLUSIONS

Six core samples from the Upper Jurassic Kimmeridge Clay Formation of well 24/9-1, Norway (4443.1-4459.6 m) are source rocks for oil. The extracts of the samples are mature and are derived from predominantly structureless organic matter (bacterially reworked phytoplankton).

The extracts are of the same broad type of organic matter as that of an average North Sea crude oil. The carbon isotope values however are slightly lighter (approximately 1°/oo) compared to those of many crude oils from the North Sea.

TABLE 1 - GEOCHEMICAL DATA OF EXTRACTS

	Norway 24/9-1 4443.1 m core	24/9-1 4445.9 m core
% ethyl acetate extract	0.61	0.66
% organic carbon after ethyl acetate extraction	6.7	5.5
% sulphur	0.7	0.9
ppm V as metals		
ppm Ni as metals		
pristane/phytane	1.4	1.3
pristane/nC17	0.5	0.5
phytane/nC18	0.4	0.4
C_{15} distribution		
1-ring	52	54
2-ring	31	31
3-ring	17	16
C_{30} distribution		
3-ring	33	37
4-ring	45	43
5-ring	22	20
C_{29} DOM	70	69
% saturates*	67	67
% aromatics	29	27
% heterocompounds	4	6
$\delta^{13}C^{o}/oo$	-30.0	-30.1
extract/carbon	0.09	0.12

* determined by thin-layer chromatography.

TABLE 2 - GEOCHEMICAL DATA OF EXTRACTS

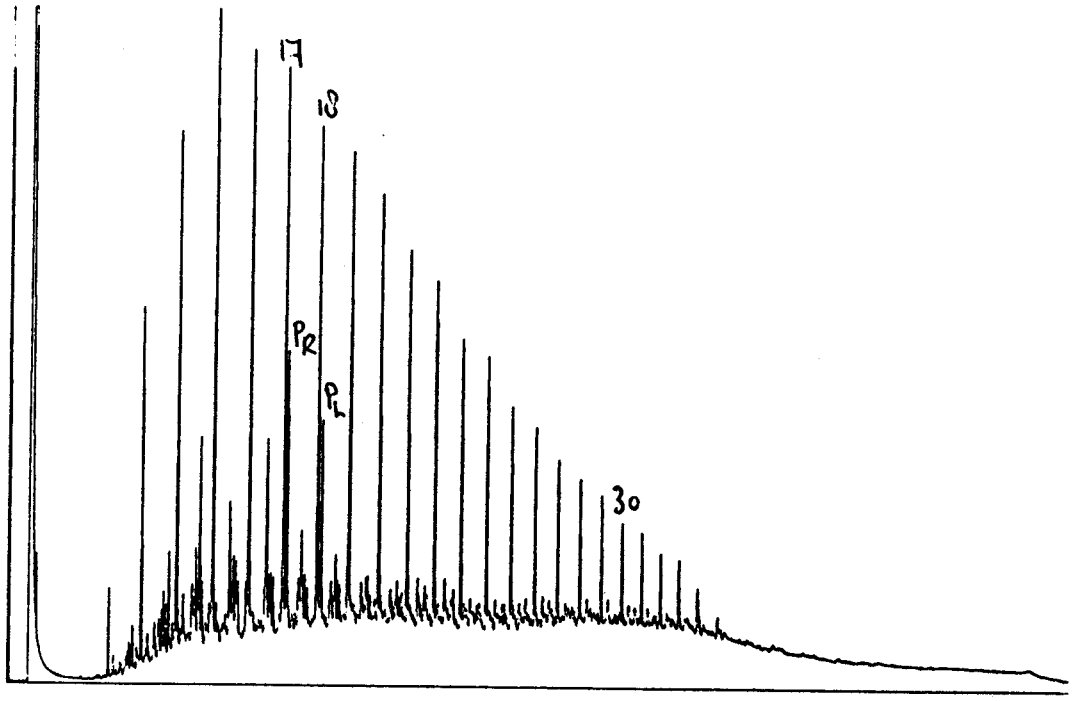
	Norway 24/9-1 4449.4 m core	24/9-1 4451.9 m core
% ethyl acetate extract	0.69	0.42
% organic carbon after ethyl acetate extraction	5.8	7.9
% sulphur	0.8	1.3
ppm V as metals		
ppm Ni as metals		
pristane/phytane	1.4	1.4
pristane/nC17	0.5	0.5
phytane/nC18	0.4	0.4
C_{15} distribution		
1-ring	50	46
2-ring	35	40
3-ring	15	14
C_{30} distribution		
3-ring	32	30
4-ring	45	45
5-ring	23	25
C_{29} DOM	70	69
% saturates*	66	54
% aromatics	25	39
% heterocompounds	9	7
$\delta^{13}C^{o}/oo$	-30.0	-29.9
extract/carbon	0.12	0.05

* determined by thin-layer chromatography.

TABLE 3 - GEOCHEMICAL DATA OF EXTRACTS

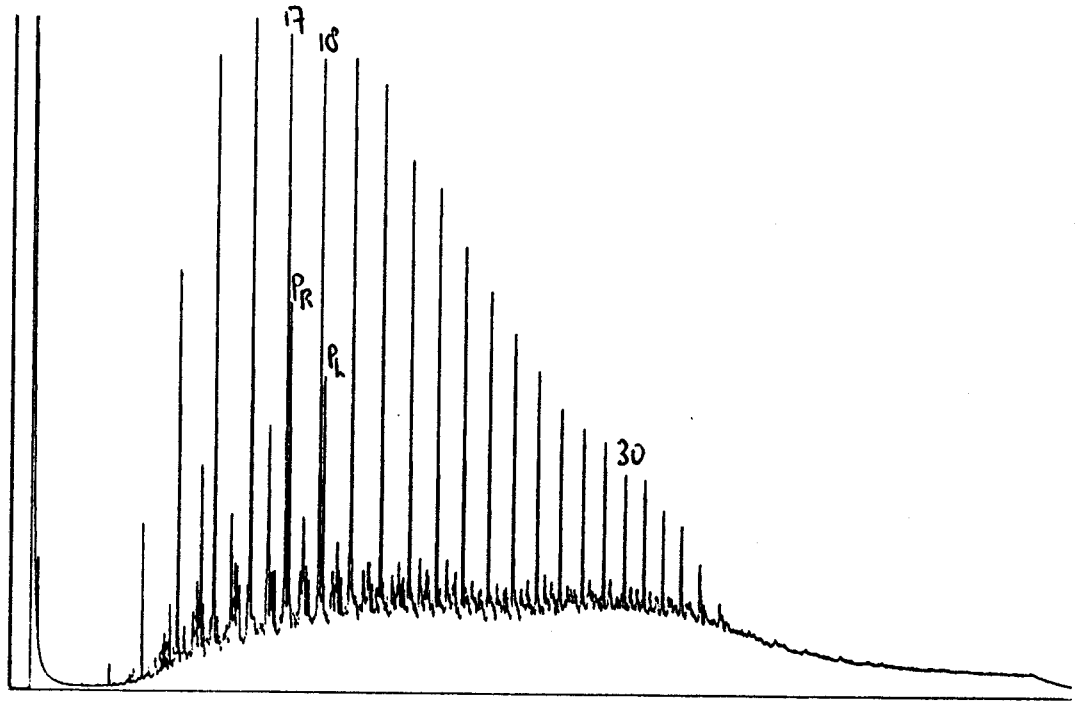
	Norway 24/9-1 4454.8 m core	24/9-1 4459.6 m core
% ethyl acetate extract	0.5	0.45
% organic carbon after ethyl acetate extraction	8.0	6.6
% sulphur	0.6	1.0
ppm V as metals		
ppm Ni as metals		
pristane/phytane	1.4	1.3
pristane/nC17	0.5	0.5
phytane/nC18	0.4	0.4
C_{15} distribution		
1-ring	41	43
2-ring	42	38
3-ring	17	19
C_{30} distribution		
3-ring	36	32
4-ring	42	42
5-ring	22	26
C_{29} DOM	69	69
% saturates*	57	59
% aromatics	37	35
% heterocompounds	6	6
$\delta^{13}C^{o}/oo$	-30.0	-30.0
extract/carbon	0.06	0.07

* determined by thin-layer chromatography.



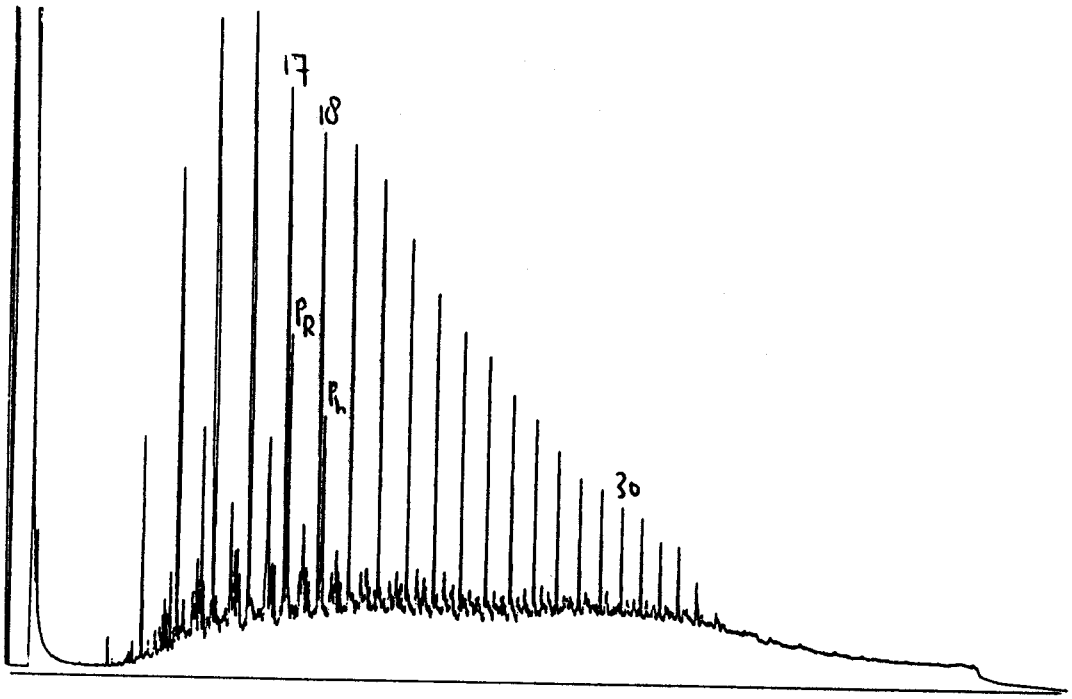
GAS CHROMATOGRAM OF SATURATED HYDROCARBONS

FIG. 1. NORWAY. 24/9-1 4443.1 M



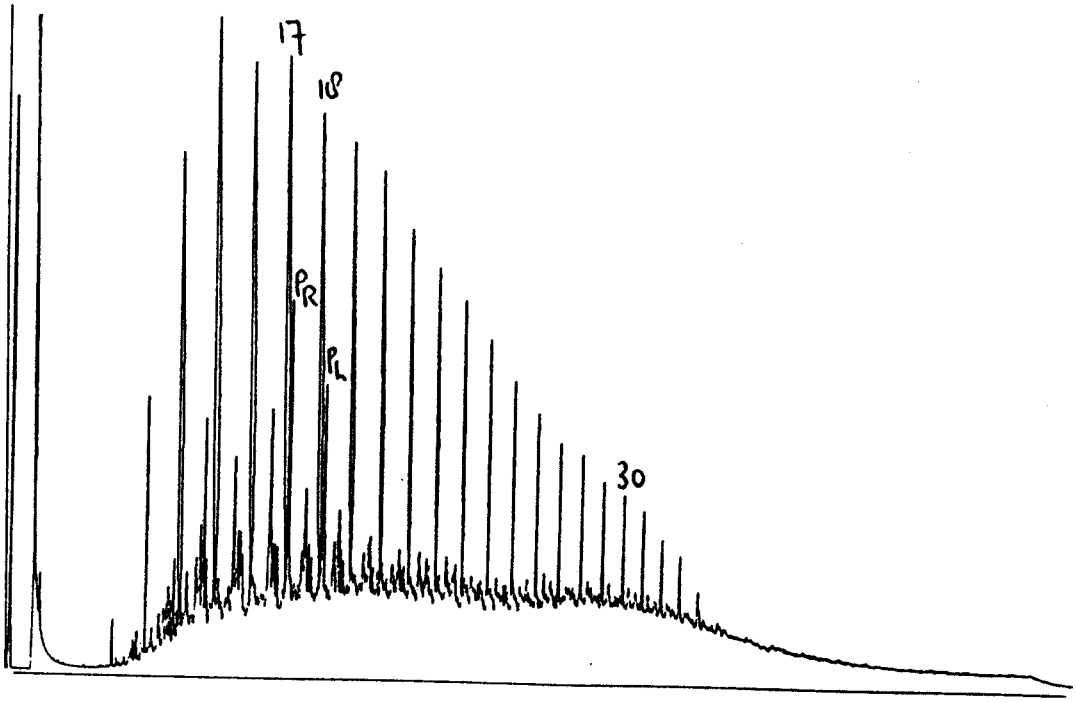
GAS CHROMATOGRAM OF SATURATED HYDROCARBONS

FIG. 2. NORWAY. 24/9-1 4445.9 M



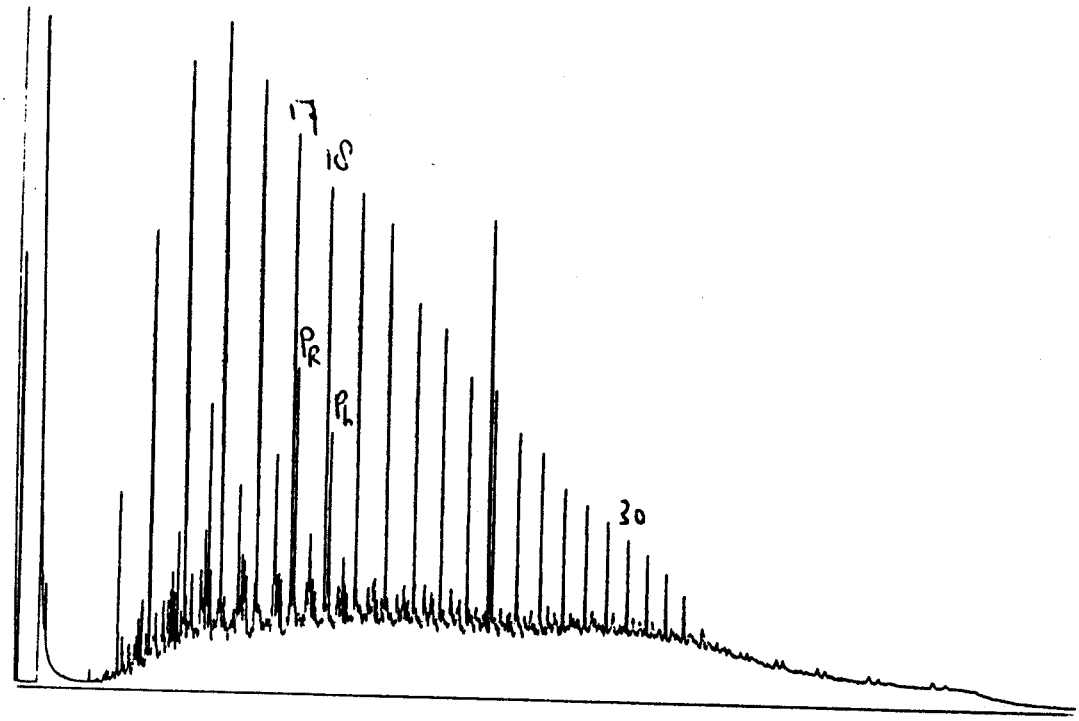
GAS CHROMATOGRAM OF SATURATED HYDROCARBONS

FIG. 3. NORWAY. 24/9-1 4449.4 M



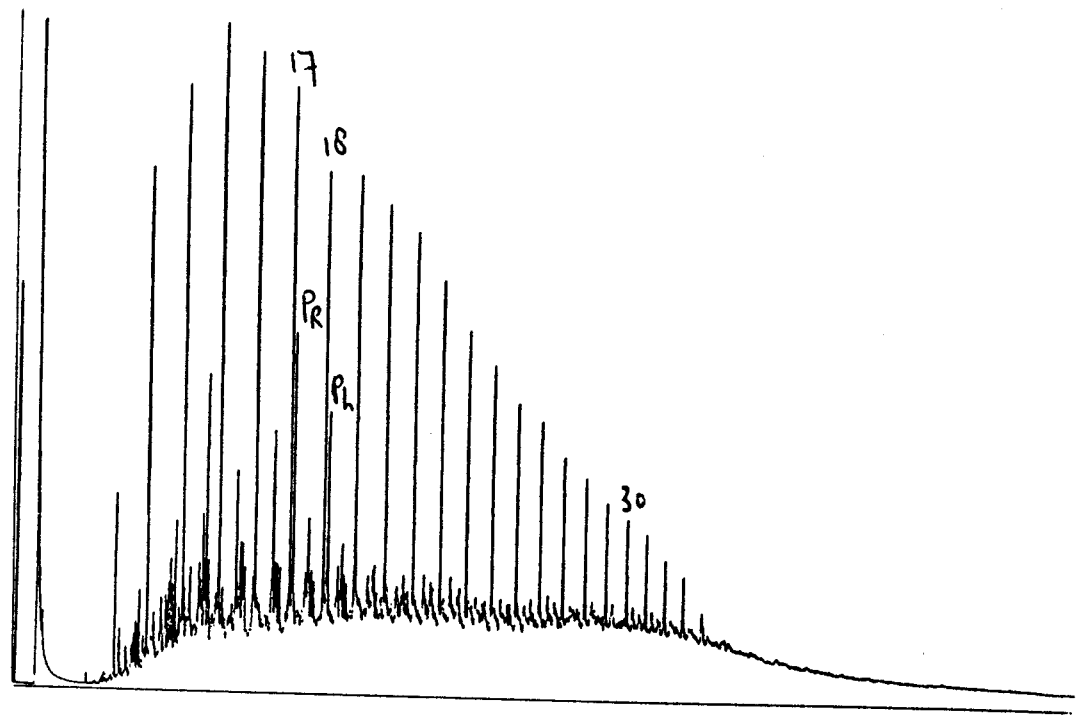
GAS CHROMATOGRAM OF SATURATED HYDROCARBONS

FIG. 4. NORWAY. 24/9-1 4451.9 M



GAS CHROMATOGRAM OF SATURATED HYDROCARBONS

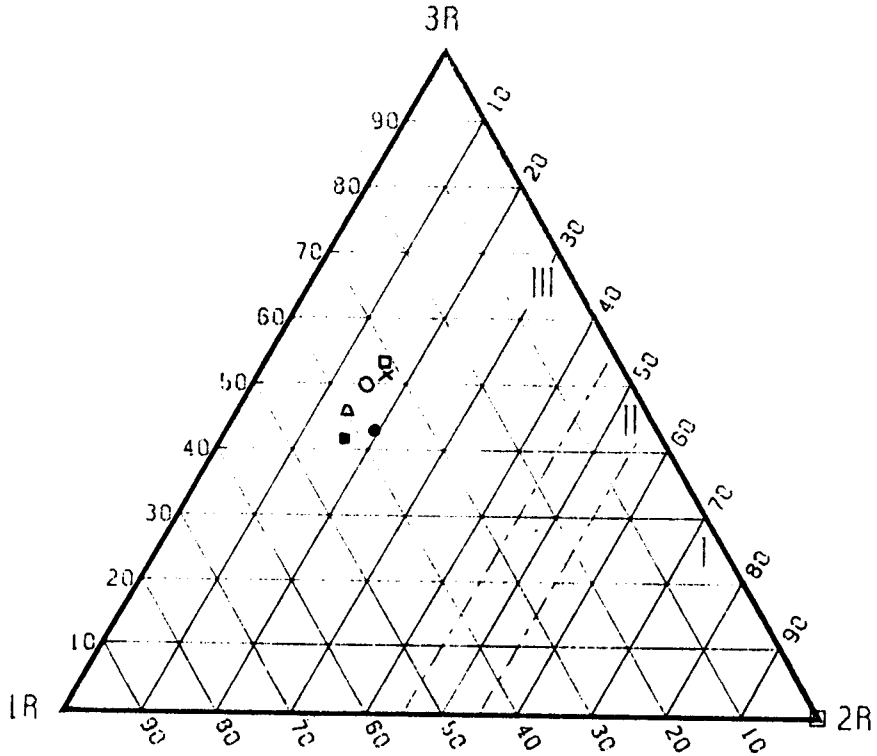
FIG. 5. NORWAY. 24/9-1 4454.8 M



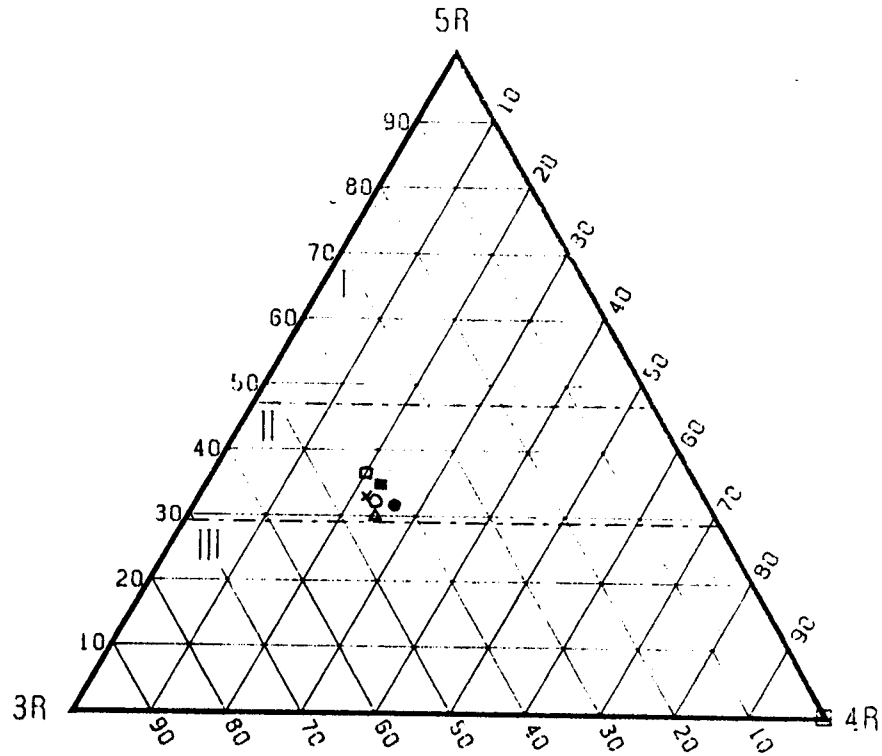
GAS CHROMATOGRAM OF SATURATED HYDROCARBONS

FIG 6. NORWAY. 24/9-1 4459.6 M

C_{15}-RINGDISTRIBUTION



C_{30}-RINGDISTRIBUTION



I LANDPLANT-DERIVED CRUDES WITH SUBSTANTIAL RESIN CONTRIBUTION TO SOURCE MATTER

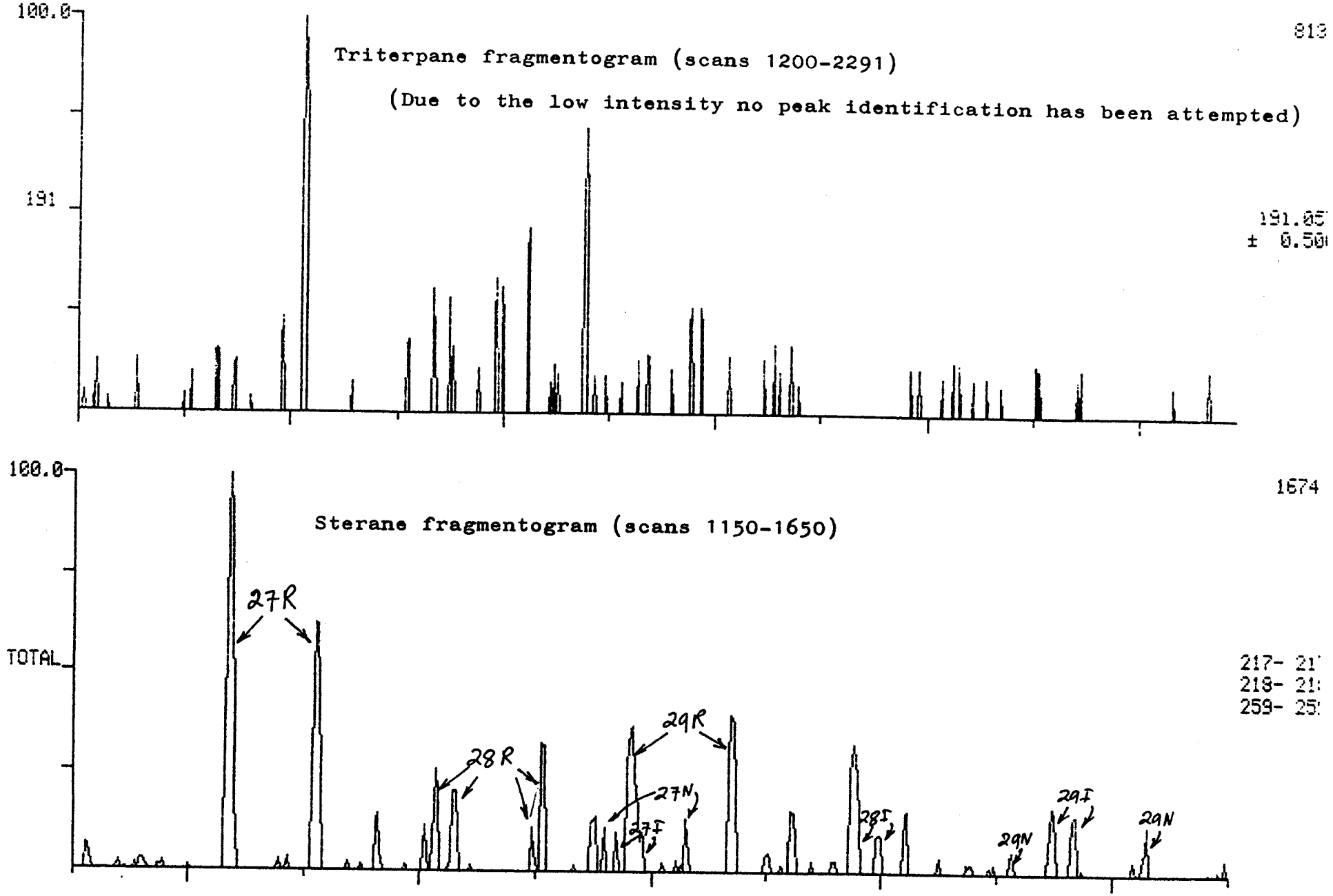
II CRUDES OF MIXED ORIGIN

III CRUDES DERIVED FROM SOM AND/OR ALGAL MATTER

LEGEND
□ -

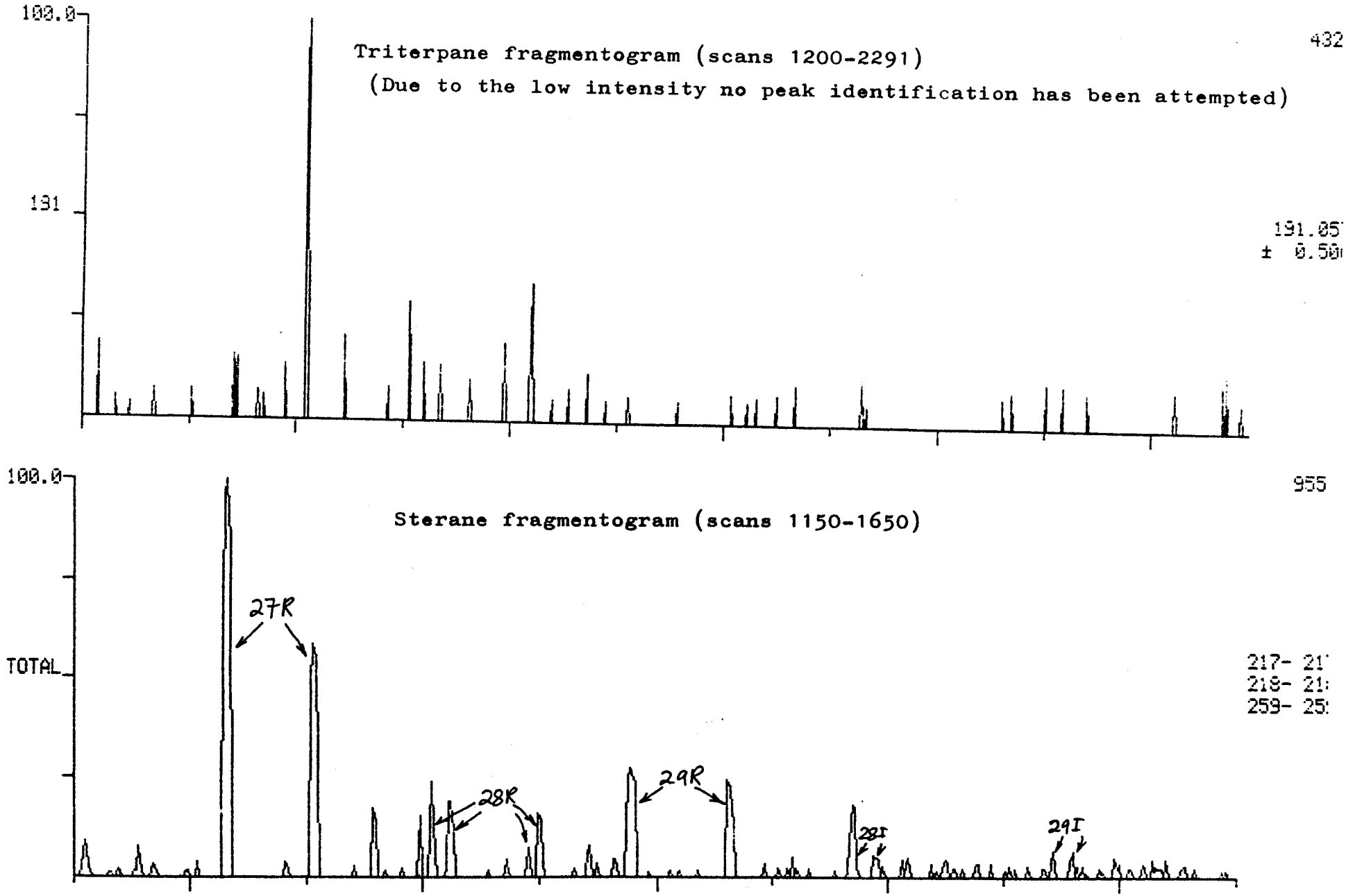
× 4443.1m
□ 4445.9m
○ 4449.4m
△ 4451.9m
■ 4454.8m
● 4459.6m

FIG. 7



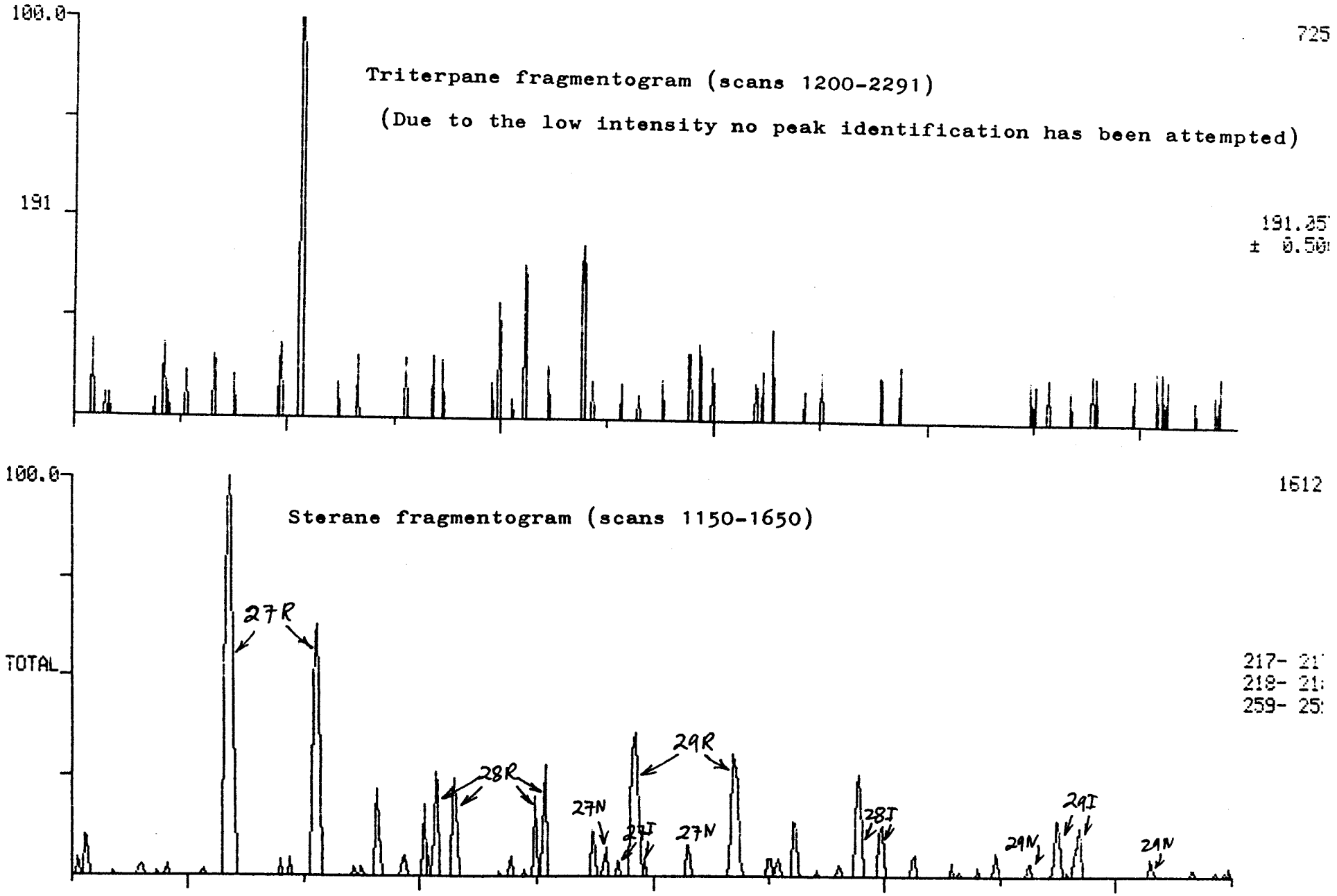
GC-MS analysis 24/9-1 4443.1 m extract

Fig. 8



GC-MS analysis 24/9-1 4451.9 m extract

Fig. 9



GC-MS analysis 24/9-1 4459.6 m extract

Fig. 10

MACERAL DESCRIPTION OF 19 SAMPLES FROM WELL 24/9-1

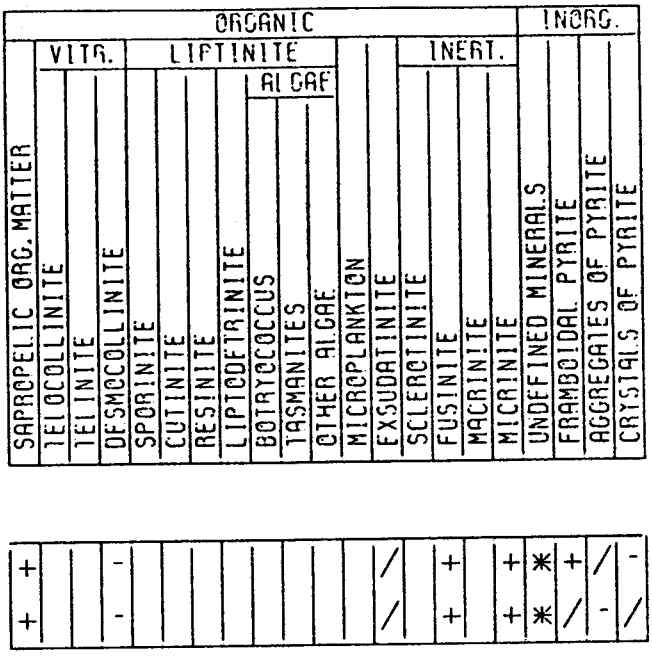
DEPTH IN M	SAMPLE TYPE
4441.9	CORE
4442.6	CORE
4443.1	CORE
4443.9	CORE
4444.6	CORE
4445.9	CORE
4446.9	CORE
4448.0	CORE
4448.6	CORE
4449.4	CORE
4450.7	CORE
4451.9	CORE
4452.9	CORE
4453.7	CORE
4454.8	CORE
4455.9	CORE
4457.9	CORE

ORGANIC																		INORG.			
	VITR.			LIPTINITE					ALGAE					INERT.							
SAPROPELIC ORG. MATTER	TELOCOLLINITE	TELINITE	DESMOCOLLINITE	SPORINITE	CUTINITE	RESINITE	LIPTODETRINITE	BOTRYOCOCCUS	TASMANITES	OTHER ALGAE	MICROPLANKTON	EXSUDATINITE	SCLEROTINITE	FUSINITE	MACRINITE	MICRINITE	UNDEFINED MINERALS	FRAMBOIDAL PYRITE	AGGREGATES OF PYRITE	CRYSTALS OF PYRITE
+			-								/		/	+	*	/	-	/
+			-								/		/	+	*	/	-	/
+			-								/		+	+	*	/	-	+
+			-								/		/	+	*	/	/	/
+			-								/		/	+	*	/	-	/
+			-								/		/	+	*	/	-	/
+			-								/		/	+	*	/	-	/
+			-								/		/	+	*	/	-	/
+			-								-		-	+	*	/	/	-
+			-								/		/	+	*	/	-	-
+			-								/		/	+	*	/	/	-
+			-								/		/	+	*	/	/	/
+			-								/		/	+	*	/	/	/
+			-								/		/	+	*	/	-	-
+			-								/		/	+	*	/	/	/
+			-								/		+	+	*	+	/	-
+			-								/		/	+	*	+	/	-
+			-								/		/	+	*	/	-	/

LEGEND	
*	: ABUNDANT
+	: COMMON
/	: FEW
-	: RARE

Fig. 11

DEPTH IN M	SAMPLE TYPE
4458.9	CORE
4459.6	CORE



+			-								/		+		+	*	+	/	-
+			-								/		+		+	*	/	-	/

L E G E N D	
*	: ABUNDANT
+	: COMMON
/	: FEW
-	: RARE

Fig. 12

COMPANY: NORSKE SHELL **WELL:** 24/9-1 **LOCATION:** NORTH SEA

GENERAL DATA			CHEMICAL ANALYSIS DATA												
				PYROLYSIS					SOLVENT EXTRACTION						
SAMPLE DEPTH (METRES)	SAMPLE TYPE	ANALYSED LITHOLOGY	ORGANIC CARBON % OF ROCK	TEMP - ERATURE °C	HYDROGEN INDEX	OXYGEN INDEX	PRODUCTION INDEX	POTENTIAL YIELD (ppm)	TOTAL EXTRACT (ppm)	HYDRO-CARBONS (ppm)	EXTRACT % OF ORGANIC CARBON	HYDROCARBONS mg/g OF ORGANIC CARBON	HYDROCARBONS % OF EXTRACT	ALKANES % OF HYDRO-CARBONS
4441.9	Core	SH, gy-blk, micr	5.16	449	196	34	.35	10130						
	"	After extraction	4.49	455	115	7	.01	5190						
	"	After extr & decarb	4.74	450	115	5	.03	5490						
4442.6	"	A/a	6.44	448	181	21	.25	11670						
	"	After extraction	5.98	454	116	7	.01	6940						
	"	After extr & decarb	6.35	446	127	2	.03	8080						
4443.1	"	A/a	6.22	444	115	17	.40	7200						
	"	After extraction	5.85	445	90	5	.02	5280						
	"	After extr & decarb	6.22	449	123	10	.02	7650						
4443.9	"	A/a	5.99	438	97	21	.44	5840						
	"	After extraction	5.47	442	67	3	.03	3710						
	"	After extr & decarb	5.79	449	113	5	.03	6580						
4444.6	"	A/a	5.73	431	85	18	.49	4880						
	"	After extraction	5.19	437	63	9	.05	3280						
	"	After extr & decarb	5.65	446	103	5	.03	5850						
4445.9	"	A/a	6.06	448	178	24	.32	10840						
	"	After extraction	5.46	455	116	6	.02	6390						
	"	After extr & decarb	5.77	453	114	4	.02	6630						
4446.9	"	A/a	5.83	437	177	19	.33	10380						
	"	After extraction	5.35	456	110	7	.02	5900						
	"	After extr & decarb	5.80	451	127	4	.02	7420						
4448	"	A/a	5.14	436	97	17	.49	5030						
	"	After extraction	4.74	446	62	5	.03	2940						
	"	After extr & decarb	5.09	449	91	4	.03	4660						
4448.6	"	A/a	6.97	452	186	21	.28	12980						
	"	After extraction	6.38	457	122	8	.01	7790						
	"	After extr & decarb	6.91	451	115	5	.05	7980						
4449.4	"	A/a	5.90	452	173	23	.31	10220						
	"	After extraction	5.29	453	121	9	.02	6410						
	"	After extr & decarb	5.81	450	110	8	.03	6420						
4450.7	"	A/a	7.21	449	142	15	.35	10300						
	"	After extraction	6.62	454	109	7	.02	7220						
	"	After extr & decarb	7.36	446	109	5	.02	8070						
4451.9	"	A/a	7.95	446	124	10	.30	9910						
	"	After extraction	7.33	451	105		.02	7710						
	"	After extr & decarb	8.19	449	129	4	.02	10610						
4452.9	"	A/a	7.48	443	115	14	.34	8620						

TABLE 3A Chemical Analysis Data

COMPANY: NORSKE SHELL **WELL:** 24/9-1 **LOCATION:** NORTH SEA

GENERAL DATA			CHEMICAL ANALYSIS DATA												
				PYROLYSIS					SOLVENT EXTRACTION						
SAMPLE DEPTH (METRES)	SAMPLE TYPE	ANALYSED LITHOLOGY	ORGANIC CARBON % OF ROCK	TEMP - °C ERATURE	HYDROGEN INDEX	OXYGEN INDEX	PRODUCTION INDEX	POTENTIAL YIELD (ppm)	TOTAL EXTRACT (ppm)	HYDRO-CARBONS (ppm)	EXTRACT % OF ORGANIC CARBON	HYDROCARBONS mg/g OF ORGANIC CARBON	HYDROCARBONS % OF EXTRACT	ALKANES % OF HYDRO-CARBONS
4452.9	Core	After extraction	6.96	453	96	7	.02	6690						
	"	After extr & decarb	7.70	447	129	7	.03	10010						
4453.7	"	SH, gy-blk, micr	7.01	440	98	12	.38	6910						
	"	After extraction	6.48	443	87	6	.02	5650						
	"	After extr & decarb	7.39	446	102	5	.01	7590						
4454.8	"	A/a	7.88	446	119	16	.34	9400						
	"	After extraction	7.25	453	101	5	.02	7330						
	"	After extr & decarb	8.48	448	114	5	.02	9680						
4455.9	"	A/a	7.40	440	92	17	.38	6870						
	"	After extraction	7.16	446	79	6	.03	5690						
	"	After extr & decarb	8.20	447	105	6	.04	8610						
4457.9	"	A/a	7.04	452	165	27	.28	11670						
	"	After extraction	6.90	456	124	4	.01	8570						
	"	After extr & decarb	7.53	447	109	5	.02	8260						
4458.9	"	A/a	7.92	438	96	22	.38	7680						
	"	After extraction	7.62	448	74	6	.03	5700						
	"	After extr & decarb	8.27	444	92	5	.03	7690						
4459.6	"	A/a	6.74	446	102	21	.35	6920						
	"	After extraction	6.93	450	77	7	.03	5340						
	"	After extr & decarb	7.50	444	94	3	.02	7080						

TABLE 3B Chemical Analysis Data