

5.3 Formation Pressure and Sampling

An RFT - sample campaign was performed through casing in the zone 1106.4 - 1108.5 m MD. The main results from the three runs were:

- No hydrocarbon recovery.
- Reservoir pressure: 1603.4 PSIG at 1108.5 m MD (HP-Gauge).

31.03.87 Run No. 1:

Sampling depth : 1106.4 m MD
Hydrostatic pressure : 1732 PSIG
Temperature : 84° F, 28.86° C
Formation pressure (Pre-Test) : 1607.3 PSIG (not reliable)
No build-up in sampling chambers
No recovery

01.04.87 Run No. 2:

Sampling depth	: 1108.5 m MD
Hydrostatic pressure	: 1745 PSIG
Temperature	: 77° F, 25° C
Formation pressure	: 1603.4 PSIG
Recovered	: 1 gallon chamber - Mud filtrate: 70 cc
	Ca : 240 ppm
	NaCl : 17.6 g/l
	pH : 8.6

	2 3/4 gallon chamber - Cement filtrate: 40 cc
	Ca : 40 ppm
	NaCl : 17.6 g/l
	pH : 9.4

	Mud Properties - Ca : 240 ppm
	NaCl : 24 g/l
	pH : 10.1

01.04.87 Run No. 3:

Sampling depths	: 1106.8/1106.9 m MD
Hydrostatic pressure	: 1740 PSIG
Temperature	: 77.7° F, 25.4° C

Formation pressure (Pre-Test) higher than 1600 PSIG (not stabilized).

No pressure build-up in the sampling chamber even with two perforations.

Recovered - Mudfiltrate	: 80 cc
Ca	: 140 ppm
NaCl	: 15.8 g/l
pH	: 8.35

TABLE 4
(Reference log, LDT-CNL-NGT)

DEPTH					FORMATION
TEST	mRKB	mTVD	m MSL		PRESSURE (PSI)
					HP GAUGE
1	1954	1951	1926		2581.7
2	1956.5	1953.5	1928.5		2582.7
3	1957.6	1954.5	1929.5		2583.25
4	1958.5	1955.4	1930.4		2581.6
5	1959.5	1956.4	1931.4		2583.0
6	1961	1957.9	1932.9		2584.9
7	1964.5	1961.4	1936.4		2589.2
8	1970.5	1967.4	1942.4		2596.3
9	1974.7	1971.5	1946.5		2601.45
10	1978	1974.8	1949.8		2606.8
11	1985	1981.8	1956.8		2615.6
12	2000	1996.6	1971.6		2634.4
13	2009	2005.6	1980.6		2647.7
14	2020	2016.5	1991.5		2662.8
15	2030	2026.4	2001.4		2677.1
16	2040	2036.4	2011.4		2691.0

Sampling:

Depth : 1967 m RKB (1963.9 TVD - 1938.9 MSL)

Recovery: 2 3/4 gallon chamber (P: 600 psi)

10 l of mud filtrate

(NaCl : 41 g/l, Ca²⁺: 200 ppm, pH 10.2)

Traces of oil

1 - gallon chamber

Not opened - was sent onshore for analysis.

5.5 Drill Stem Test Result

Only the Frigg Gas Formation was tested.

Three tests were performed in this zone, all having the same perforated interval (1950 - 1955 m RKB).

DST No. 1 (19 - 20.04.87).

Performed in open hole. No results, screen plugged with shale and sand.

DST No. 2 (29 - 30.04.87).

Performed in cased hole. No results, technical problems.

DST No. 3 (03 - 04.05.87).

Max flow: 666 000 m³/day, choke 64/64, WHP = 60 bar.

Total produced: Approximately 400 000 m³ in 21 hours.

Estimated amount of gas in place: 1,2 x 10⁹ 5 m³.

Separator samples were analysed by Geco. Gas composition in appendix 3.

SEPARATOR GAS

MOLECULAR COMPOSITION AND PNA DISTRIBUTION

Component	Wt%	mol%	molwt.
Nitrogen	1.49	0.90	
Carbon dioxide	0.27	0.10	
Methane	90.49	95.01	
Ethane	6.73	3.77	
Propane	0.24	0.09	
iso-Butane	0.11	0.03	
n-Butane	0.03	0.01	
iso-Pentane	0.00	0.00	
n-Pentane	0.01	0.00	
Hexanes	0.04	0.01	77.4
P	0.02	0.004	
N	0.02	0.004	
A	0.00	0.00	
Heptanes	0.05	0.01	95.4
P	0.02	0.004	
N	0.02	0.003	
A	0.01	0.001	
Octanes	0.08	0.01	103.0
Nonanes	0.12	0.02	117.0
Decanes plus	0.34	0.04	156
Sum	100.00	100.00	
Average molecular weight :			16.84
Gas gravity :			0.582

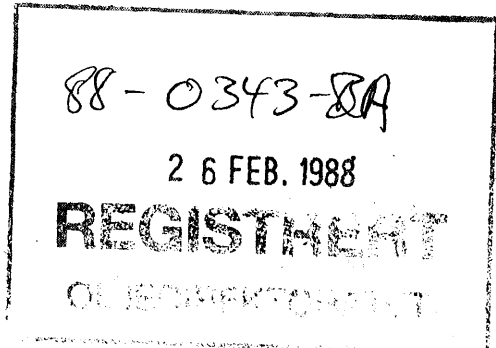


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EP/S/EXP/LAB Pau n° 87/196 RP

PAU le Septembre 1987

25/2-11 WELL



GEOCHEMICAL CHARACTERIZATION
OF THE ORGANIC EXTRACT
OF TWO IMPREGNATED OLIGOCENE SWC
(1051.5 and 1107 meters)

EP/S/EXP/LAB Pau n° 87/196 RP

CONFIDENTIAL
NO REPRODUCTION

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INTRODUCTION

Two chloroformic extracts of side wall core samples from (1051.5 and 1107 meters) which correspond to impregnated sands, have been studied by liquid and gaseous chromatography.

The aim of this study was to try to correlate these extracts with those of the neighbouring wells (25/2-10, etc. - figure 1).

2 - GEOCHEMICAL CHARACTERIZATION OF THE EXTRACT

The extracts are relatively poor in hydrocarbons (63.7 and 55.7 % respectively - table 1).

The computerized gas chromatography-mass spectrometry of saturated hydrocarbons confirms the high biodegradation of the extract :

- complete absence of steranes and hopanes (mass fragmentograms of ions $M/Z = 217$ and 191 - figures 8 and 10),
- high abundance of demethylated hopanes (mass fragmentograms of ions $M/Z = 177$ - figures 9 and 11). These products are due to the demethylation of hopanes on carbon number 10 (see figure 12).

* J.P. HOUZAY study in EVAPET program, (in progress)

T A B L E S

TABLE 1

EXTRACTABLE ORGANIC MATTER CONTENT AND COMPOSITION

DEPTH	EOM	% SAT	% ARO	% RES	% ASPH	S/A
1051.5 m swc	64010 ppm	36.4	27.3	28.7	7.1	1.3
1107 m swc	36190 ppm	35	20.7	35.2	9.1	1.7

TABLE 2

S N E A (P) Organic Geochemistry
 Computerized GC/MS Analytical Report on Steranes and Terpanes nr. 981

Sample..... : FRIGG / ST NORVEGE
 Well Depth : 1051.50 to 1051.50 (Meters)
 Particularities II. : /
 Acquisition File Name : NORV1051STM Mag tape /
 Submitted by..... : LACRAMPE july 9. , 1987.
 Particularities I. : ROC. IMPR. BIO

S T E R A N E S		Areas	T E R P A N E S		Areas
C21	Sterane.....	18640.	C23	tricyclic.....	8971.
C22	4-Methyl Sterane	nd	C24	tetracyclic.....	8945.
C22	Sterane.....	6378.	Ts.....		21159.
C27	S Diasterane.....	nd	Tm.....		9832.
C27	aa S Sterane.....	nd	29	ab Hopane.....	16103.
C27	bb R Sterane.....	nd	30	ab Hopane.....	11915.
C27	bb S Sterane.....	nd	30	ba Hopane.....	nd
C27	aa R Sterane.....	nd	31	ab S Homohopane..	7000.
C29	aa S Sterane.....	nd	31	ab R Homohopane..	3176.
C29	bb R Sterane.....	nd	32	ab S Homohopane..	6100.
C29	bb S Sterane.....	nd	32	ab R Homohopane..	2743.
C29	aa R Sterane.....	nd	TOTAL	TERPANES.....	380004.
TOTAL STERANES.....		230158.			

OPTIONAL ANALYSIS		Areas	OPTIONAL ANALYSIS		Areas
C30	tricyclic, 22 S..	ns	C35	ab S Homohopane.	nd
C30	tricyclic, 22 R..	ns	C35	ab R Homohopane.	nd
29	Desmethyl Hopane.	18358.			
C28	Bisnorhopane.....	ns			
C29/5	(RT. > 29 ab)..	15038.			
18	a(H) Oleanane....	nd	X(>29/5)		15737.
Gammacerane.....		nd			
C33	ab S Homohopane.	nd			
C33	ab R Homohopane.	nd			
C35	Hexacyclic.....	ns			

RESULTS :

27	bb S / 27	aa R ..	N / A	C29	DHop / C29 Hop	1.14
27	aa S / 27	aa R --	N / A	C28	BNHop / C29 Hop-	v. low.
27	S dia / 27	aa R .	N / A	C29/5	/ C29 Hop.....	0.93
22	4-Me st / 27	aa R	N / A	18	aH Olean/C30 Hop.	N / A
%	20 S C27		N / A	Gammacerane/C30	Hop.	N / A
%	bb C27		N / A	30/3(R&S) / C29	Hop-	v. low.
29	bb S / 29	aa R...	N / A	30/3(R&S) / 23/3...		v. low.
29	aa S / 29	aa R...	N / A	2.35Hex/C35Hop	(R&S)..	N / A
27	S dia / 29	aa R .	N / A	C35H(R&S)/C33H	(R&S)..	N / A
22	4-Me st / 29	aa R	N / A	29+30Hop/C35	H(R&S)..	N / A
%	20 S C29		N / A			
%	bb C29		N / A			
21	st / 22	st	2.92			
22	4-Me st / 22	st--	N / A	X/29+30H		0.56
C29	H / C30	H	1.35			
Tm	/ Ts		0.46			
23/3	/ 24/4		1.00			
%	22 S C31		68.78			
%	22 S C32		68.97			
ba	/ ab	X 100	N / A			
23/3	/ 21	st	0.48			
TT	/ ST		1.65			

TABLE 3

S N E A (P) Organic Geochemistry
Computerized GC/MS Analytical Report on Steranes and Terpanes nr. 983

Sample..... : FRIGG / ST NORVEGE
Well Depth..... : 1107.00 to 1107.00 (Meters)
Particularities II. : /
Acquisition File Name : NORV1057STM Mag tape /
Submitted by..... : LACRAMPE July 9. , 1987.
Particularities I... : ROC. IMPR. BIO

S T E R A N E S		Areas	T E R P A N E S		Areas
C21 Sterane.....		14971.	C23 tricyclic.....		8665.
C22 4-Methyl Sterane		3919.	C24 tetracyclic.....		8446.
C22 Sterane.....		8967.	Ts.....		20441.
C27 S Diasterane....		nd	Tm.....		8601.
C27 aa S Sterane....		nd	29 ab Hopane.....		16963.
C27 bb R Sterane....		nd	30 ab Hopane.....		10193.
C27 bb S Sterane....		nd	30 ba Hopane.....		nd
C27 aa R Sterane....		nd	31 ab S Homohopane..		10220.
C29 aa S Sterane....		nd	31 ab R Homohopane..		6030.
C29 bb R Sterane....		nd	32 ab S Homohopane..		5752.
C29 bb S Sterane....		nd	32 ab R Homohopane..		3000.
C29 aa R Sterane....		nd	TOTAL TERPANES.....		289698.
TOTAL STERANES.....		408898.			

OPTIONAL ANALYSIS		Areas	OPTIONAL ANALYSIS		Areas
C30 tricyclic, 22 S..		ns	C35 ab S Homohopane.		nd
C30 tricyclic, 22 R..		ns	C35 ab R Homohopane.		nd
29 Desmethyl Hopane.		16483.			
C28 Bismorphane....		ns			
C29/5 (RT. > 29 ab)..		14012.	X (>29/5)		14868.
18 a(H) Oleanane....		nd			
Gammacerane.....		nd			
C33 ab S Homohopane.		nd			
C33 ab R Homohopane.		nd			
C35 Hexacyclic.....		ns			

RESULTS :

27 bb S / 27 aa R ..	N / A	C29 DHop / C29 Hop .	0.97
27 aa S / 27 aa R --	N / A	C28 BNHop / C29 Hop-	v. low.
27 S dia / 27 aa R ..	N / A	C29/5 / C29 Hop.....	0.82
22 4-Me st / 27 aa R	N / A	18 aH Olean/C30 Hop.	N / A
% 20 S C27	N / A	Gammacerane/C30 Hop.	N / A
% bb C27	N / A	30/3(R&S) / C29 Hop-	v. low.
		30/3(R&S) / 23/3....	v. low.
29 bb S / 29 aa R...	N / A	2.35Hex/C35Hop(R&S).	N / A
29 aa S / 29 aa R...	N / A	C35H(R&S)/C33H(R&S).	N / A
27 S dia / 29 aa R..	N / A	29+30Hop/C35 H(R&S).	N / A
22 4-Me st / 29 aa R	N / A		
% 20 S C29	N / A		
% bb C29	N / A		
21 st / 22 st	1.66		
22 4-Me st / 22 st--	0.43	X/29+30H	0.54
C29 H / C30 H	1.66		
Tm / Ts	0.42		
23/3 / 24/4	1.02		
% 22 S C31	62.89		
% 22 S C32	65.72		
ba / ab ---- X 100 -	N / A		
23/3 / 21 st	0.57		
TT / ST	0.70		