

Date	Hole size	Hole depth	Mud weight	PV	YP	Gel strength	pH	Alkalinity Pf / Mf	Ca++ mg/l	Cl- mg/l	Sand %	Solids %	Mudtype
850816	36	263.0	1.03										SPUD MUD
850817	36	380.0	1.03										SPUD MUD
850818	36	380.0	1.03										SPUD MUD
850819	17-1/2	634.0	1.15	9	30	30/40	9.6	0.1/0.3	260	8000	0.3	4.0	GEL MUD
850820	26	920.0	1.17	8	42	22/28	9.7	0.1/0.3	320	10000	0.3	8.0	GEL MUD
850821	26	713.0	1.17	9	39	23/35	9.6	0.1/0.3	320	13000	0.3	9.0	GEL MUD
850822	26	920.0	1.42	7	15	16/29	9.1	0.1/0.4	320	1400	0.3	9.0	GEL MUD
850823	26	920.0											GYP/POLYMER MUD
850824	26	920.0	1.42	21	35	5/8	9.4	0.1/0.2	1600	14000	0.3	12.0	GYP/POLYMER MUD
850825	17-1/2	720.0	1.42	20	32	4/7	11.0	0.0/0.3	2200	19000	0.3	12.0	GYP/POLYMER MUD
850826	17-1/2	1028.0	1.15	11	16	2/4	10.3	0.1/0.4	3000	19000	1.0	8.0	GYP/POLYMER MUD
850827	17-1/2	1344.0	1.15	12	18	2/4	9.8	0.1/0.3	2720	20000	0.5	8.0	GYP/POLYMER MUD
850828	17-1/2	1635.0	1.25	13	19	2/4	9.7	0.1/0.3	2720	19500	1.5	13.0	GYP/POLYMER MUD
850829	17-1/2	1965.0	1.30	15	14	5/15	9.3	0.1/0.3	2700	20000	0.3	11.0	GYP/POLYMER MUD
850830	17-1/2	1965.0	1.35	16	18	12/20	9.3	0.2/0.5	2520	20000	0.3	13.0	GYP/POLYMER MUD
850831	17-1/2	1965.0	1.35	14	10	4/9	9.7	0.2/5.0	2200	20000	0.3	13.0	GYP/POLYMER MUD
850901	12-1/4	1949.0	1.35	15	13	3/6	9.2	0.1/0.6	2400	20000	0.3	13.0	GYP/POLYMER MUD
850902	12-1/4	1989.0	1.35	18	16	4/10	10.0	0.2/0.7	2000	16000	0.3	13.0	GEL MUD
850903	12-1/4	1989.0	1.27	13	15	3/6	10.2	0.1/0.4	800	12000	0.3	10.0	GEL MUD
850904	12-1/4	2120.0	1.23	16	16	4/12	10.5	0.2/0.7	1440	12000	0.3	11.0	GEL MUD
850905	12-1/4	2278.0	1.20	17	17	3/17	10.3	0.1/0.6	1000	11000	0.3	11.0	GEL MUD
850906	12-1/4	2440.0	1.20	17	16	3/19	10.4	0.1/0.6	760	11500	0.3	10.0	GEL MUD
850907	12-1/4	2600.0	1.20	17	16	3/14	10.3	0.1/0.7	480	10500	0.3	11.0	GEL MUD
850908	12-1/4	2600.0	1.20	17	16	3/14	10.3	0.1/0.7	480	10500	0.3	11.0	GEL MUD
850909	12-1/4	2600.0	1.20	17	15	3/14	10.3	0.1/0.6	480	10500	0.3	11.0	GEL MUD
850910		1835.0	1.20	21	16	3/15	10.8	0.2/1.2	680	10500	0.3	11.0	GEL MUD
850911		650.0	1.35	23	17	3/17	10.6	0.2/1.0	520	10500	0.3	12.0	GEL MUD
850912		.0	1.35	23	17	3/17	10.6	0.2/1.0	520	10500	0.3	12.0	GEL MUD

SAGA PETROLEUM A.S.

6.2.2 MUD MATERIALS USED

Well no: 6507/12-3

Materials	Unit	36 in hole	26 in hole	17-1/2 hole	12-1/4 hole	8-1/2 hole	Total
BARITE	M/T	0	535	125	313	0	973
BICARBONATE	50 KG	0	0	18	4	0	22
CAUSTIC SODA	25 KG	6	44	105	98	0	253
DRISPAC REG	50 LB	0	0	103	0	0	103
DRISPAC S/L	50 LB	0	0	64	124	0	188
GYPSUM	50 KG	0	0	327	0	0	327
LIME	40 KG	8	0	7	0	0	15
MILBIO	55 GA	0	0	6	1	0	7
MILPOL 302	25 KG	0	0	200	0	0	200
PERMALOSE	25 KG	0	0	236	0	0	236
PRO-DEFOAMER	25 L	0	2	6	6	0	14
BENTONITE	M/T	32	15	0	39	0	86
BENTONITE	50 KG	0	0	56	14	0	70
PRO-THIN	25 KG	0	0	40	244	0	284

GEOCHEMICAL SCREENING ANALYSES

NOCS WELL 6507/12-3

SAGA PETROLEUM

Author: N Mills

Prepared by GEOLAB NOR, October 1985

13 NOV. 1985

**REGISTRERT**  
**REKORD**

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1. SUMMARY

Cuttings samples from the sequence 1000 m - 2600 m (TD) of Saga Petroleum NOCS 6507/12-3 Haltenbanken well were subjected to routine geochemical screening analyses.

## 2. INTRODUCTION

Routine geochemical screening analyses of samples from Haltenbanken well 6507/12-3 were commissioned by Ellen Sofie Mo on behalf of Saga Petroleum A/S.

Canned samples from 390 m to 2600 m (TD) were received at GEOLAB NOR.

### 3. SAMPLE QUALITY

Throughout the drilled sequence the cans were in good condition (no evidence of faulty seals or leaks). However, in the interval 1000 - 1820 m the samples were very soft and difficult to clean. Very little material was present in some samples after removal of drilling muds. The size fraction constituting the bulk of any sample varies greatly. Where possible 2 mm fractions are picked for analysis. However, in some samples there was insufficient material in the 2 mm and in the 125 mm fractions for analysis. The 4 mm fraction is not used for analysis so in these samples no TOC analyses were performed.

Around the casing point at 1949 m (especially at about 1950 - 2050 m) the samples contain almost exclusively cement.

No significant fluorescence was observed from any samples following screening examination in UV light.

TABLE Ia

CONCENTRATION OF C1 - C7 HYDROCARBONS IN HEADSPACE.  
(ul Gas / kg Rock)

6507/12-3

I I I	DEPTH (m)	C1	C2	C3	iC4	nC4	C5+	SUM C1-C4	SUM C2-C4	WET- NESS %	iC4 --- nC4	I I I
	1000.	15105.	26.	0.	17.	0.	0.	15147.	43.	0.3	0.0	
	1030.	3892.	33.	3.	8.	0.	0.	3936.	44.	1.1	0.0	
	1040.	17045.	25.	17.	15.	0.	0.	17103.	58.	0.3	0.0	
	1090.	22995.	74.	35.	0.	0.	13.	23104.	109.	0.5	0.0	
	1120.	129578.	171.	129.	0.	0.	0.	129878.	300.	0.2	0.0	
	1150.	19342.	22.	14.	0.	0.	0.	19378.	36.	0.2	0.0	
	1180.	12782.	17.	12.	0.	0.	0.	12811.	29.	0.2	0.0	
	1210.	22500.	31.	25.	11.	0.	0.	22567.	67.	0.3	0.0	
	1240.	8070.	180.	16.	6.	5.	6.	8278.	208.	2.5	1.2	
	1270.	10415.	27.	23.	10.	0.	24.	10475.	60.	0.6	0.0	
	1300.	10112.	33.	32.	21.	6.	15.	10204.	91.	0.9	3.7	
	1330.	30433.	115.	106.	87.	0.	49.	30741.	308.	1.0	0.0	
	1360.	69021.	332.	293.	235.	0.	0.	69880.	860.	1.2	0.0	
	1390.	83822.	611.	646.	266.	89.	359.	85433.	1611.	1.9	3.0	
	1420.	128426.	425.	688.	244.	72.	439.	129855.	1429.	1.1	3.4	
	1450.	385602.	1313.	2119.	506.	0.	0.	389538.	3937.	1.0	0.0	
	1480.	48493.	422.	360.	86.	48.	102.	49409.	916.	1.9	1.8	
	1510.	55799.	203.	459.	158.	62.	0.	56681.	882.	1.6	2.6	
	1540.	22870.	56.	78.	23.	0.	16.	23027.	157.	0.7	0.0	
	1570.	9407.	57.	40.	13.	0.	0.	9516.	110.	1.2	0.0	
	1600.	540.	5.	4.	1.	0.	3.	551.	11.	2.0	0.0	
	1630.	4324.	15.	14.	15.	0.	15.	4369.	44.	1.0	0.0	
	1660.	8878.	35.	26.	21.	0.	55.	8960.	81.	0.9	0.0	
	1690.	2617.	19.	12.	0.	0.	66.	2648.	31.	1.2	0.0	
	1720.	5218.	15.	8.	4.	8.	26.	5254.	36.	0.7	0.6	



TABLE Ia

CONCENTRATION OF C1 - C7 HYDROCARBONS IN HEADSPACE.  
(ul Gas / kg Rock)

6507/12-3

DEPTH (m)	C1	C2	C3	iC4	nC4	C5+	SUM C1-C4	SUM C2-C4	WET- NESS %	iC4 nC4
1750.	3153.	23.	8.	3.	0.	0.	3187.	34.	1.1	0.0
1780.	3692.	18.	7.	3.	0.	0.	3721.	28.	0.8	0.0
1810.	5435.	54.	17.	20.	0.	41.	5526.	90.	1.6	0.0
1830.	2437.	24.	6.	1.	3.	41.	2471.	34.	1.4	0.5
1850.	908.	6.	1.	1.	1.	6.	918.	9.	1.0	0.8
1870.	1667.	6.	1.	0.	0.	4.	1674.	7.	0.4	0.0
1890.	3506.	13.	6.	0.	0.	11.	3526.	20.	0.6	0.0
1910.	2636.	10.	3.	0.	0.	5.	2649.	13.	0.5	0.0
1930.	1506.	7.	2.	0.	0.	6.	1516.	9.	0.6	0.0
1950.	4293.	37.	11.	5.	6.	133.	4352.	59.	1.4	0.8
1977.	787.	7.	4.	2.	1.	11.	800.	14.	1.7	1.4
1986.	780.	9.	4.	2.	1.	21.	797.	17.	2.1	1.5
2004.	126.	3.	2.	0.	4.	46.	136.	10.	7.1	0.0
2022.	274.	21.	4.	0.	2.	115.	302.	27.	9.1	0.0
2040.	902.	32.	7.	3.	4.	44.	947.	45.	4.7	0.7
2058.	1412.	33.	6.	2.	2.	39.	1456.	44.	3.0	1.0
2076.	865.	27.	5.	2.	3.	25.	902.	37.	4.1	0.7
2094.	934.	26.	5.	2.	2.	31.	968.	34.	3.5	0.7
2112.	685.	334.	11.	0.	16.	23.	1046.	361.	34.5	0.0
2130.	5160.	154.	23.	6.	15.	132.	5358.	198.	3.7	0.4
2148.	10471.	188.	22.	0.	0.	26.	10680.	209.	2.0	0.0
2166.	8211.	166.	30.	5.	10.	86.	8422.	211.	2.5	0.5
2184.	8465.	164.	38.	11.	20.	152.	8699.	233.	2.7	0.6
2202.	551.	25.	8.	1.	3.	32.	588.	37.	6.2	0.5
2220.	305.	13.	4.	1.	3.	19.	326.	21.	6.5	0.4

TABLE Ia

CONCENTRATION OF C1 - C7 HYDROCARBONS IN HEADSPACE.  
(ul Gas / kg Rock)

6507/12-3

I I I	DEPTH (m)	C1	C2	C3	iC4	nC4	C5+	SUM C1-C4	SUM C2-C4	WET- NESS %	iC4 --- nC4
	2238.	264.	22.	5.	1.	2.	48.	294.	30.	10.2	0.5
	2256.	183.	19.	5.	1.	2.	21.	209.	27.	12.7	0.5
	2274.	75.	12.	3.	1.	2.	6.	92.	17.	18.1	0.3
	2292.	28.	9.	2.	0.	1.	21.	40.	12.	30.6	0.0
	2310.	81.	4.	1.	0.	1.	17.	87.	6.	7.1	0.0
	2328.	89.	4.	1.	0.	0.	9.	95.	6.	6.1	0.0
	2346.	195.	19.	2.	0.	0.	5.	217.	21.	9.8	0.0
	2364.	5472.	234.	17.	1.	1.	12.	5725.	253.	4.4	0.5
	2382.	3378.	263.	33.	2.	2.	19.	3679.	301.	8.2	0.9
	2400.	21152.	1406.	120.	4.	3.	13.	22685.	1533.	6.8	1.5
	2418.	14343.	1120.	42.	2.	1.	3.	15508.	1164.	7.5	2.0
	2436.	14422.	933.	38.	3.	1.	4.	15396.	974.	6.3	4.5
	2454.	16191.	834.	52.	6.	2.	14.	17085.	893.	5.2	4.1
	2472.	14738.	551.	30.	5.	1.	8.	15326.	588.	3.8	3.6
	2490.	11621.	435.	71.	17.	8.	29.	12152.	531.	4.4	2.1
	2508.	5436.	375.	75.	18.	9.	24.	5911.	475.	8.0	2.1
	2526.	11547.	831.	286.	89.	50.	107.	12803.	1256.	9.8	1.8
	2544.	10638.	331.	86.	28.	19.	77.	11102.	464.	4.2	1.4
	2562.	17138.	563.	122.	34.	23.	100.	17880.	742.	4.1	1.5
	2580.	26875.	2582.	413.	92.	55.	95.	30017.	3142.	10.5	1.7
	2600.	27916.	3029.	372.	81.	44.	110.	31441.	3525.	11.2	1.9

TABLE Ib

CONCENTRATION OF C1 - C7 HYDROCARBONS IN CUTTINGS.  
(ul Gas / kg Rock)

6507/12-3

DEPTH (m)	C1	C2	C3	iC4	nC4	C5+	SUM C1-C4	SUM C2-C4	WET- NESS %	iC4 nC4
1000.	859.	11.	14.	9.	0.	1.	892.	34.	3.8	0.0
1030.	108.	3.	2.	0.	0.	5.	114.	6.	5.1	0.0
1060.	10.	0.	0.	1.	0.	0.	12.	1.	12.3	10.0
1090.	9.	2.	1.	0.	0.	2.	12.	3.	27.7	0.0
1120.	199.	25.	26.	0.	20.	13.	270.	71.	26.3	0.0
1150.	865.	29.	35.	0.	22.	0.	950.	86.	9.0	0.0
1180.	252.	14.	11.	0.	7.	48.	285.	32.	11.4	0.0
1210.	173.	30.	25.	0.	10.	113.	238.	65.	27.5	0.0
1240.	69.	0.	0.	0.	2.	16.	72.	2.	3.1	0.0
1270.	1024.	24.	23.	0.	18.	0.	1090.	65.	6.0	0.0
1300.	588.	16.	19.	0.	0.	6.	623.	35.	5.7	0.0
1330.	700.	16.	23.	6.	0.	8.	745.	45.	6.0	0.0
1360.	126.	0.	11.	0.	0.	0.	137.	11.	7.9	0.0
1390.	38.	13.	4.	0.	0.	8.	54.	17.	31.1	0.0
1420.	27.	0.	3.	1.	4.	0.	36.	8.	23.4	0.3
1450.	23.	0.	4.	0.	0.	4.	27.	4.	15.1	0.0
1480.	928.	111.	167.	3.	108.	244.	1318.	389.	29.5	0.0
1510.	569.	60.	90.	0.	54.	39.	772.	203.	26.3	0.0
1540.	126.	12.	20.	5.	8.	26.	170.	45.	26.4	0.6
1570.	54.	6.	11.	3.	5.	22.	79.	25.	32.1	0.6
1600.	137.	12.	26.	12.	6.	42.	192.	55.	28.7	2.0
1630.	169.	17.	27.	0.	8.	10.	221.	52.	23.5	0.0
1660.	170.	17.	25.	0.	11.	15.	223.	53.	23.8	0.0
1690.	160.	21.	37.	0.	17.	44.	235.	75.	32.0	0.0
1720.	113.	13.	21.	0.	8.	8.	155.	42.	27.0	0.0

TABLE Ib

CONCENTRATION OF C1 - C7 HYDROCARBONS IN CUTTINGS.  
(ul Gas / kg Rock)

4507/12-3

I I I	DEPTH (m)	C1	C2	C3	iC4	nC4	C5+	SUM C1-C4	SUM C2-C4	WET- NESS %	iC4 I --- I nC4 I
	1750.	136.	16.	23.	0.	11.	10.	186.	50.	27.0	0.0
	1780.	42.	6.	7.	0.	2.	4.	57.	15.	26.1	0.0
	1810.	127.	17.	31.	0.	14.	32.	188.	61.	32.4	0.0
	1830.	145.	9.	8.	1.	4.	29.	168.	23.	13.8	0.2
	1850.	63.	5.	7.	0.	5.	30.	80.	17.	21.5	0.0
	1870.	104.	9.	11.	8.	0.	40.	132.	28.	21.3	0.0
	1890.	183.	15.	22.	15.	0.	59.	236.	52.	22.2	0.0
	1910.	106.	9.	12.	8.	0.	53.	135.	29.	21.5	0.0
	1930.	124.	11.	14.	10.	0.	43.	159.	35.	22.0	0.0
	1950.	78.	9.	13.	0.	8.	39.	109.	30.	27.9	0.0
	1977.	87.	6.	6.	2.	3.	57.	104.	17.	15.9	0.9
	1986.	92.	10.	10.	2.	3.	77.	118.	26.	21.8	0.7
	2004.	11.	0.	3.	0.	0.	52.	14.	3.	20.8	0.0
	2022.	132.	11.	6.	0.	0.	45.	149.	17.	11.4	0.0
	2040.	37.	4.	2.	0.	0.	40.	43.	6.	13.0	0.0
	2058.	10.	2.	1.	0.	0.	3.	13.	3.	22.1	0.0
	2076.	212.	8.	6.	1.	2.	48.	228.	16.	7.1	0.5
	2094.	264.	15.	15.	3.	7.	40.	304.	40.	13.0	0.4
	2112.	534.	20.	13.	0.	8.	49.	575.	40.	7.0	0.0
	2130.	183.	11.	8.	1.	4.	55.	207.	24.	11.5	0.3
	2148.	868.	57.	21.	3.	17.	118.	967.	99.	10.2	0.2
	2166.	329.	26.	22.	3.	12.	121.	391.	63.	16.1	0.3
	2184.	340.	26.	21.	2.	12.	129.	400.	61.	15.2	0.2
	2202.	88.	8.	9.	0.	6.	41.	110.	22.	20.3	0.0
	2220.	22.	2.	3.	0.	1.	22.	28.	6.	21.2	0.0

TABLE Ib

CONCENTRATION OF C1 - C7 HYDROCARBONS IN CUTTINGS.  
(ul Gas / kg Rock)

6507/12-3

I I I	DEPTH (m)	C1	C2	C3	iC4	nC4	C5+	SUM C1-C4	SUM C2-C4	WET- NESS %	iC4 --- nC4
2238.	296.	14.	13.	1.	9.	41.	332.	37.	11.0	0.1	
2256.	311.	58.	33.	1.	23.	63.	426.	115.	27.1	0.0	
2274.	40.	9.	6.	1.	4.	28.	59.	19.	32.7	0.1	
2292.	16.	2.	3.	1.	1.	45.	24.	8.	32.2	0.5	
2310.	10.	2.	2.	0.	0.	38.	14.	4.	29.1	0.0	
2328.	2.	7.	9.	2.	0.	48.	21.	19.	89.9	0.0	
2346.	66.	5.	3.	0.	0.	0.	74.	8.	11.1	0.0	
2364.	1364.	664.	25.	1.	0.	0.	2053.	690.	33.6	0.0	
2382.	309.	169.	97.	10.	12.	28.	597.	288.	48.3	0.9	
2400.	9841.	5114.	1353.	74.	33.	30.	16415.	6573.	40.0	2.2	
2418.	24702.	8373.	984.	55.	17.	32.	34131.	9429.	27.6	3.3	
2436.	12675.	5781.	799.	101.	21.	66.	19377.	6702.	34.6	4.9	
2454.	0.	0.	0.	0.	0.	0.	0.	0.	0.0	0.0	
2472.	3602.	1703.	374.	94.	22.	56.	5795.	2193.	37.8	4.4	
2490.	15361.	3043.	1073.	320.	125.	220.	19922.	4561.	22.9	2.6	
2508.	18100.	5162.	2040.	718.	280.	754.	26301.	8201.	31.2	2.6	
2526.	14033.	3419.	1941.	820.	374.	911.	20587.	6554.	31.8	2.2	
2544.	16965.	3602.	1957.	757.	436.	1249.	23716.	6751.	28.5	1.7	
2562.	4700.	1655.	1015.	416.	296.	1015.	8081.	3382.	41.8	1.4	
2580.	13487.	4323.	1608.	572.	279.	495.	20269.	6781.	33.5	2.1	
2600.	17838.	6240.	2218.	752.	392.	832.	27439.	9601.	35.0	1.9	

TABLE Ic

CONCENTRATION OF C1 - C7 HYDROCARBONS (Ia + Ib).  
(ul Gas / kg Rock)

6507/12-3

I I I	DEPTH (m)	C1	C2	C3	iC4	nC4	C5+	SUM C1-C4	SUM C2-C4	WET- NESS %	iC4 I ---- I nC4 I
	1000.	15963.	37.	14.	25.	0.	1.	16040.	77.	0.5	0.0
	1030.	4000.	37.	5.	8.	0.	5.	4050.	49.	1.2	0.0
	1060.	17056.	25.	17.	16.	0.	0.	17115.	59.	0.3	0.0
	1090.	23003.	76.	36.	0.	0.	14.	23116.	113.	0.5	0.0
	1120.	129777.	196.	155.	0.	20.	13.	130148.	371.	0.3	0.0
	1150.	20207.	50.	49.	0.	22.	0.	20328.	122.	0.6	0.0
	1180.	13035.	31.	23.	0.	7.	48.	13096.	61.	0.5	0.0
	1210.	22673.	62.	50.	11.	10.	113.	22805.	132.	0.6	1.1
	1240.	8140.	180.	16.	6.	7.	23.	8350.	210.	2.5	0.9
	1270.	11440.	52.	46.	10.	18.	24.	11565.	125.	1.1	0.6
	1300.	10700.	49.	51.	21.	6.	21.	10827.	127.	1.2	3.7
	1330.	31133.	131.	129.	93.	0.	57.	31486.	353.	1.1	0.0
	1360.	69147.	332.	304.	235.	0.	0.	70017.	871.	1.2	0.0
	1390.	83857.	623.	650.	266.	89.	367.	85488.	1628.	1.9	3.0
	1420.	128454.	425.	692.	245.	75.	439.	129890.	1437.	1.1	3.2
	1450.	385625.	1313.	2123.	506.	0.	4.	389566.	3941.	1.0	0.0
	1480.	49421.	533.	527.	89.	157.	346.	50727.	1306.	2.6	0.6
	1510.	56368.	263.	549.	158.	116.	39.	57454.	1085.	1.9	1.4
	1540.	22996.	68.	98.	28.	8.	42.	23198.	202.	0.9	3.3
	1570.	9460.	63.	51.	16.	5.	22.	9596.	135.	1.4	3.3
	1600.	676.	17.	30.	13.	6.	45.	742.	66.	8.9	2.1
	1630.	4494.	32.	40.	15.	8.	24.	4590.	96.	2.1	1.8
	1660.	9048.	52.	51.	21.	11.	69.	9182.	134.	1.5	1.9
	1690.	2776.	39.	49.	0.	17.	110.	2882.	106.	3.7	0.0
	1720.	5331.	28.	30.	4.	16.	35.	5409.	78.	1.4	0.3

TABLE Ic

CONCENTRATION OF C1 - C7 HYDROCARBONS (Ia + Ib).  
(ul Gas / kg Rock)

6507/12-3

I I I	DEPTH (m)	C1	C2	C3	iC4	nC4	C5+	SUM C1-C4	SUM C2-C4	WET- NESS %	iC4 I --- I nC4 I
	1750.	3289.	39.	31.	3.	11.	10.	3374.	84.	2.5	0.3
	1780.	3734.	24.	14.	3.	2.	4.	3777.	43.	1.1	1.7
	1810.	5562.	70.	48.	20.	14.	74.	5714.	151.	2.7	1.4
	1830.	2581.	33.	14.	2.	7.	70.	2638.	57.	2.2	0.3
	1850.	971.	12.	8.	1.	6.	36.	998.	27.	2.7	0.2
	1870.	1771.	15.	13.	8.	0.	44.	1806.	35.	1.9	0.0
	1890.	3689.	28.	28.	15.	0.	70.	3761.	72.	1.9	0.0
	1910.	2742.	19.	15.	8.	0.	57.	2784.	42.	1.5	0.0
	1930.	1630.	18.	16.	10.	0.	49.	1675.	44.	2.7	0.0
	1950.	4372.	46.	24.	5.	14.	172.	4461.	89.	2.0	0.4
	1977.	874.	13.	9.	4.	4.	68.	904.	30.	3.3	1.0
	1986.	872.	20.	14.	4.	5.	98.	914.	42.	4.6	0.9
	2004.	138.	3.	5.	0.	4.	99.	150.	13.	8.4	0.0
	2022.	407.	32.	10.	0.	2.	160.	451.	44.	9.8	0.0
	2040.	940.	36.	8.	3.	4.	84.	990.	50.	5.1	0.7
	2058.	1422.	36.	6.	2.	2.	42.	1469.	47.	3.2	1.0
	2076.	1077.	35.	11.	3.	5.	73.	1130.	53.	4.7	0.6
	2094.	1198.	41.	20.	4.	9.	71.	1272.	74.	5.8	0.5
	2112.	1219.	354.	24.	0.	24.	71.	1621.	402.	24.8	0.0
	2130.	5344.	165.	32.	7.	18.	187.	5566.	222.	4.0	0.4
	2148.	11265.	240.	42.	3.	15.	135.	11564.	300.	2.6	0.2
	2166.	8539.	192.	52.	9.	22.	207.	8813.	274.	3.1	0.4
	2148.	11339.	245.	43.	3.	17.	144.	11647.	308.	2.6	0.2
	2202.	639.	32.	17.	1.	9.	72.	698.	59.	8.5	0.2
	2220.	327.	15.	7.	1.	4.	41.	354.	27.	7.6	0.3

TABLE Ic

CONCENTRATION OF C1 - C7 HYDROCARBONS (Ia + Ib).  
(ul Gas / kg Rock)

6507/12-3

I I I	DEPTH (m)	C1	C2	C3	iC4	nC4	C5+	SUM C1-C4	SUM C2-C4	WET- NESS %	iC4 I --- I nC4 I
	2238.	560.	35.	18.	2.	11.	89.	626.	66.	10.6	0.2
	2256.	493.	77.	38.	2.	25.	83.	635.	142.	22.4	0.1
	2274.	115.	21.	9.	1.	5.	34.	150.	36.	23.8	0.2
	2292.	44.	12.	5.	1.	2.	65.	64.	20.	31.2	0.4
	2310.	91.	6.	3.	1.	1.	55.	102.	10.	10.2	0.8
	2328.	91.	11.	10.	3.	0.	58.	115.	24.	21.1	0.0
	2346.	262.	24.	5.	0.	1.	6.	291.	29.	10.1	0.0
	2364.	6836.	898.	42.	1.	1.	12.	7778.	942.	12.1	0.8
	2382.	3687.	432.	130.	13.	14.	47.	4276.	589.	13.8	0.9
	2400.	30993.	6520.	1472.	78.	36.	43.	39100.	8106.	20.7	2.2
	2418.	39046.	9492.	1026.	56.	18.	34.	49639.	10593.	21.3	3.2
	2436.	27097.	6713.	837.	104.	22.	70.	34773.	7676.	22.1	4.8
	2454.	16191.	834.	52.	6.	2.	14.	17085.	893.	5.2	4.1
	2472.	18340.	2254.	404.	100.	23.	64.	21121.	2781.	13.2	4.3
	2490.	26982.	3478.	1144.	337.	133.	250.	32074.	5092.	15.9	2.5
	2508.	23536.	5535.	2116.	736.	288.	777.	32211.	8675.	26.9	2.6
	2526.	25580.	4250.	2227.	909.	424.	1018.	33390.	7810.	23.4	2.1
	2544.	27603.	3933.	2043.	784.	455.	1326.	34818.	7215.	20.7	1.7
	2562.	21837.	2219.	1137.	450.	319.	1115.	25961.	4124.	15.9	1.4
	2580.	40363.	6905.	2020.	664.	334.	591.	50286.	9923.	19.7	2.0
	2600.	45754.	9269.	2590.	832.	435.	941.	58880.	13126.	22.3	1.9



LITHOLOGY DESCRIPTIONS AND TOC CONTENTS - 6507/12-3

Depth (m)	TOC (%)	%	Lithology Description
1000			Quartz sand, unconsolidated, medium to coarse grained, subrounded, clear. Igneous fragments (basalt), dark grey, patchy, hard. Cement/LCM, mica
1030			Quartz sand a/a, rounded - sub angular Igneous fragments a/a Cement/LCM a/a
1060			Quartz sand a/a Igneous fragments a/a Cement/LCM a/a Drilling mud, shell fragments
1090			A/A
1120			A/A  Dominantly sand, shells, glauconite
1150			A/A
1180			A/A
1210			A/A More shell fragments, mica
1240			A/A
1270			A/A Glauconite
1300			A/A
1330			A/A
1360			Abundant Glauconite
1390			A/A Trace of Iron staining
1420	0.58		Quartz sand a/a LCM a/a Igneous fragments a/a Trace claystone - silty, soft, non calcareous - sl calcareous
1450	5.14	90	Claystone a/a, silty, brown-grey to olive grey, glauconitic, micaceous, occ calcareous
		10	Mixed lithologies a/a

Depth (m)	TOC (%)	%	Lithology Description
1480	2.97	90 10	Claystone a/a Mixed lithologies a/a
1510	2.39	90  10	Claystone, a/a, blocky, soft, silty, non calcareous, olive grey to dark brown-grey Quartz sand a/a Trace igneous fragments
1540	1.66	95 5	Claystone a/a Mixed lithologies a/a (dominantly quartz)
1570	1.36	100	Claystone, light olive grey to green grey, micaceous
1600	1.70	100	Claystone, a/a, occ. brown grey Trace (caved) igneous fragments
1630	0.88	100	Claystone, light to medium green grey to light olive grey, varicoloured but apparently same lithology
1660	0.69	100	Claystone, a/a Trace red to brown claystone
1690	0.60	100	Claystone, a/a, light green grey to green grey grading to and/or interbedded with light olive grey
1720	0.53	100	Claystone, a/a
1750	0.44	65 35	Claystone, a/a Claystone, a/a
1780	0.50	60	Claystone, a/a, slightly more variable green grey
	0.16	40	Claystone, a/a Trace (caved) claystone, mud
	Bulk = 0.42		
1810	0.16	35 35 30	Claystone, a/a (interbedded with ?) Claystone, a/a Claystone, sandy, light green grey, very silty (caved?)
1830	0.34	50	Claystone, light green grey to green/olive grey
	0.97	30	Claystone, medium grey, soft, non calcareous
		20	Claystone, light brown to red brown
1850	0.53	95  5	Claystone, light green grey to medium grey, varicoloured, silty Claystone, red brown to dull brown

Depth (m)	TOC (%)	%	Lithology Description
=====			
1870	0.46	100	Claystone, a/a, darker grey Trace cavings, mud
1890	0.47	90	Claystone, light grey to light green grey or olive grey
		10	Claystone, light brown red
1910	0.54	80	Claystone, light grey to green grey
		15	Claystone, light grey to dull brown grey and olive grey
		5	Claystone, red brown
1930	0.34	70	Claystone, light green grey
	0.72	25	Claystone, medium to dark grey
		5	Claystone, red brown
			Trace claystone, dark green to mauve, sand grains
1950	0.85	90	Claystone, light green grey to olive grey
		5	Claystone, red brown
		5	Quartz sand, pyrite, contamination
1977	0.95	30	Claystone, light to medium to dark grey non calcareous, subfissile?
		70	Cement/LCM, paint, lignite, mica
1986	0.99	30	Claystone a/a
		20	Quartz sand, very small, subangular to subrounded
		50	Cement/LCM, mud, mica, red brown clay stone (trace)
2004		90	Cement
		10	Quartz sand
2022		60	Quartz sand, loose grains, occ. slight ly cemented, subrounded, clear
		40	Cement/LCM, mica
			Trace claystone
2040		90	Quartz sand, loose, clear grains
		10	Coal, LCM, pyrite, mica
2058		95	Quartz sand, unconsolidated, medium to fine grained, subangular, clear to white
		5	Claystone, dark grey, cement, pyrite
2076			A/A, slightly more pyrite
2094		95	Quartz sand a/a
		5	Coal, pyrite, claystone, mud, mica
2112		85	Quartz sand, a/a, plus consolidated sandstone
		15	Coal, mud, rust, pyrite

Depth (m)	TOC (%)	%	Lithology Description
=====			
2130		80	Quartz plus sandstone
		20	Mud, LCM, pyrite, paint
2148		65	Sandstone/ Quartz
		30	Claystone, medium to dark grey
		5	Pyrite, LCM
2166	Bulk = 0.98	30	Claystone a/a
		50	Sandstone
		20	LCM, coal, pyrite, paint etc
2184		80	Claystone, light to medium grey
		20	Sandstone/Quartz
			Trace pyrite, paint, glauconite, coal
2202	1.61	75	Claystone, slightly platy, non to slightly calcareous, medium grey to olive grey micaceous
		20	Sandstone/Quartz grains, clean, subrounded
		5	Lignite/coal, LCM
2220		95	Quartz grains a/a
		5	Claystone a/a, lignite etc
2238	1.19	75	Quartz, a/a
		20	Claystone, medium grey to green grey
		5	Paint, pyrite, lignite
2256	0.93	75	Quartz, a/a
		20	Claystone a/a
		5	Paint etc a/a
2274	1.24	70	Quartz a/a
		20	Claystone, a/a
		10	Mud, pyrite, lignite etc
2292		80	Quartz/sandstone, a/a
		10	Claystone, a/a
		10	LCM/cement, lignite, paint, metal
2310		80	Quartz sand
		10	Claystone
		10	LCM, mud, cement, paint, pyrite
2328	0.20	90	Sandstone
		5	Claystone, silty, soft, light to medium grey to green grey
		5	Coal, pyrite
2346	0.96	95	Sandstone, cemented plus loose quartz grains
		5	Claystone, coal, mud

Depth (m)	TOC (%)	%	Lithology Description
2364	0.97	90 10	Sandstone Coal Trace pyrite, claystone
2382	0.13	95 5	Sandstone Coal Trace additives
2400		60 40	Coal - carbonaceous claystone, grey to black to dark grey Sandstone, very small grains quartz
2418	0.16	60 40	Coal a/a Sandstone a/a
2436		70 30	Coal, grading to carbargillite, dull to bright, brown to black, brittle Sandstone, very fine Trace claystone
2454	4.92	65 10 25	Coal a/a Claystone, medium to dark grey, occ. very carbonaceous Sandstone/ quartz sand
2472	12.16	50 25 25	Claystone, light to medium grey very carbonaceous, black Coal Sandstone
2490	32.20	50 50	Quartz grains/sandstone Coal plus carbonaceous claystone
2508		90 10	Coal Quartz/sandstone Trace paint
2526		100	Coal, mixture of brittle black and soft brown Trace claystone, quartz
2544	0.18 16.39	75 25	Quartz Coal grading to carbonaceous claystone
2562	30.51	60 30 10	Coal grading to carbargillite or coaly shale Quartz sandstone Claystone

Depth (m)	TOC (%)	%	Lithology Description
2580	85		Coal
	5		Coaly shale
	10		Sandstone
2600	90		Coal to carbonaceous claystone
	10		Quartz/sandstone, claystone, mica, additives

EP/S/EXP/LAB.Pau n°87/124RP.

Pau , le Août 1987

HALTENBANKEN AREA (NORWAY)

Geochemical study of the core samples

Wells : 64-07/9-2  
64-07/4-1  
65-06/12-1  
65-07/12-3

EP/S/EXP/LAB.Pau n°87/124RP

**CONFIDENTIAL**  
**NO REPRODUCTION**

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ANNEX 1E

Summary of organic matter petrology data  
HALTENBANKEN area

WELL	DEPTH	SAMPLE	Ro %	eq Ro	FLUO INDEX	REMARKS
64-07/9-2	1638.9	K1		0.45	2	
	1640.9	K1		0.45	2	
64-07/4-1	4471-4474	Cutting	1.0		ε	
	4498-4501	Cutting	1.10		ε	
	4561-4564	Cutting	1.20		0	
	4601.21	K15	1.20		ε	
	4684-4687	Cutting	1.25		ε	
	4774-4777	Cutting	1.30		ε	
	4834-4835	Cutting	1.35		ε	
65-06/12-1	4011.60	K2	~ 0.8		0.25	
	4027.90	K3		0.8-0.9	0.75	
	4038.50	K3		0.9-1.0	1.5	
	4042.60	K3		0.8-0.9	3.5	
	4582.75	K15	1.0		ε	
	4586.60	K15	0.95		0.5	
	4590.90	K15	0.95		0.75	
	4593.40	K15	> 0.9			fluo vitrinite
65-07/12-3	2504.50	K3	0.5		0.25	
	2807.20	K3	0.5		2	
	2518.55	K3	0.35		0	vitrite nodule
		K3	> 0.4		2.5	vitrite in shale



ABBREVIATIONS AND UNITS USED IN THE TABLES

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S	Sample type (K=core, S=SWC, C=cutting)
TOC	Total Organic Carbon (% weight of rock)
S1	Hydrocarbons present in the rock (mg HC/g rock)
S2	Hydrocarbons produced by pyrolysis (mg HC/g rock)
S3	CO <sub>2</sub> produced by pyrolysis (mg CO <sub>2</sub> /g rock)
PI	Production Index = $S1/(S1+S2)$
HI	Hydrogen Index (mg HC/ g TOC)
OI	Oxygen Index (mg CO <sub>2</sub> /g TOC)
TM	Temperature recorded at the maximum of pyrolysis (°C)
EOM	Extractible Organic Matter (ppm of rock)
SAT.	Saturated HC )
ARO.	Aromatic HC ) (% of EOM )
POL.	Polar compounds )
S/A	Saturated HC/Aromatic HC ratio
Pr,Ph	Pristane,Phytane
A/B	(Pristane/n-C17)/(Phytane/n-C18)
CPI	Carbon Preference Index
MPI 1	Methylphenantrene Index 1 = $1.5(ZMP+3MP)/(P+1MP+9MP)$
MPI 2	Methylphenantrene Index 2 = $3(ZMP)/(P+1MP+9MP)$

TABLE 1 64-07/9-2 ORGANIC INVENTORY

DEPTH	S	TOC	S1	S2	S3	PI	HI	OI	TM
1638.9	K1	4.08	0.69	10.30	0.79	0.06	252	19	406
1640.9	K2	5.96	0.97	18.74	1.20	0.05	314	20	408

TABLE 2 64-07/4-1 ORGANIC INVENTORY

DEPTH	S	TOC	S1	S2	S3	PI	HI	OI	TM
4606.21	K15	29.21	1.70	40.52	0.34	0.04	143	1	473
4608.52	"	0.58	0.06	0.14	0.57	0.30	24	98	-
4610.0	"	1.17	0.06	0.24	0.27	0.20	20	23	-
4613.12	"	0.27	0.14	0.05	0.33	0.78	18	122	-
4614.32	"	2.46	0.15	1.12	0.25	0.12	45	10	487
4616.53	"	0.31	0.04	0.04	0.18	0.50	12	58	-
4618.10	"	1.63	0.14	0.71	0.23	0.17	43	14	481
4618.95	"	6.02	0.54	5.43	0.16	0.09	90	2	474
4619.23	"	4.40	0.36	3.29	0.25	0.10	74	5	478

TABLE 3 65-06/12-1 ORGANIC INVENTORY

DEPTH	S	TOC	S1	S2	S3	PI	HI	OI	TM
4582.75	K15	13.71	1.12	13.32	1.28	0.08	97	9	466
4586.6	"	24.90	5.66	53.88	1.58	0.10	216	6	462
4590.9	"	0.75	0.07	0.19	0.65	0.27	25	86	-
4593.4	"	35.09	6.36	66.72	1.48	0.09	190	4	453

TABLE 4 65-07/12-3 ORGANIC INVENTORY

DEPTH	S	TOC	S1	S2	S3	PI	HI	OI	TM
2504.3	K3	56.80	2.54	104.40	7.84	0.02	183	13	423
2505.8	"	61.05	4.14	137.12	7.28	0.03	224	11	418
2507.2	"	6.47	0.53	8.80	1.40	0.06	136	21	429
2509.2	"	2.04	0.24	2.21	2.88	0.10	108	141	432
2510.5	"	0.92	0.03	0.45	2.44	0.06	48	265	435
2514.9	"	0.23	0.02	0.06	0.81	0.25	26	352	-
2516.3	"	24.36	1.02	60.48	2.60	0.02	248	10	429
2518.55	"	53.77	5.60	148.64	5.76	0.04	276	10	429
2518.55 A	"	37.02	1.25	69.70	4.45	0.02	188	12	424
2518.55 B	"	60.27	2.30	104.40	14.20	0.02	173	23	415

A shale

B lens of homogenous vitrinite

## IATROSCAN

TABLE 5 64-07/9-2 EXTRACTS

DEPTH	EOM	EOM	SAT.	ARO.	POL.	S/A	MOE	d13C
m	ppm	%TOC	%	%	%		/S1	0/00
1638.9	2300	5.64	10.5	9.9	79.6	1.1	3.3	-29.9
1640.9	2930	4.92	8.9	11.6	79.5	0.8	3.0	-30.3

TABLE 6 64-07/4-1 EXTRACTS

DEPTH	EOM	EOM	SAT.	ARO.	POL.	S/A	MOE	d13C
		%TOC					/S1	0/00
4606.21	680	0.24	4.3	28.4	67.3	0.15	0.4	-25.05
4618.95	210	0.35	10.1	32.6	57.3	0.3	0.4	-25.7

TABLE 7 65-06/12-1 EXTRACTS

DEPTH	EOM	EOM	SAT.	ARO.	POL.	S/A	MOE	d13C
		%TOC					/S1	0/00
4586.6	1740	0.70	11.9	37.7	50.5	0.3	0.3	-25.9
4593.4	2100	0.60	18.4	42.0	39.6	0.4	0.3	-26.7

TABLE 8 65-07/12-3 EXTRACTS

DEPTH	EOM	EOM	SAT.	ARO.	POL.	S/A	MOE	d13C
		%TOC					/S1	0/00
2505.8	29420	4.82	3.4	19.7	76.9	0.2	7.1	-27.2
2518.55 A	9850	2.66	5.8	18.1	76.1	0.3	7.9	-
2518.55 B	23260	3.86	<2	15	83	<0.1	10.1	-

A shale ( -27.5  
 B lens of homogenous vitrinite A et B ( -26.4

TABLE 9 64-07/9-2 CHROMATOGRAPHICAL DATA

DEPTH	nALK	Pr	Ph	Pr	A/B	CPI	MPI1	MPI2
	%SAT	/n-C17	/n-C18	/Ph		20-30		
1640.9	9	0.84	1.26	1.33	0.67	1.13	-	-

TABLE 10 64-07/4-1 CHROMATOGRAPHICAL DATA

DEPTH	nALK	Pr	Ph	Pr	A/B	CPI	MPI1	MPI2
	%SAT	/n-C17	/n-C18	/Ph		20-30		
4606.21	11	0.58	0.68	0.68	0.86	0.98	1.42	1.64
4618.95	14	0.73	0.94	0.84	0.78	0.96	1.47	1.71

TABLE 11 65-06/12-1 CHROMATOGRAPHICAL DATA

DEPTH	nALK	Pr	Ph	Pr	A/B	CPI	MPI1	MPI2
	%SAT	/n-C17	/n-C18	/Ph		20-30		
4586.6	32	0.37	0.13	2.40	2.91	1.03	1.01	1.21
4593.4	33	0.41	0.15	2.35	2.60	1.04	0.90	1.02

TABLE 12 65-07/12-3 CHROMATOGRAPHICAL DATA

DEPTH	nALK	Pr	Ph	Pr	A/B	CPI	MPI1	MPI2
	%SAT	/n-C17	/n-C18	/Ph		20-30		
2505.8	8	2.85	0.81	4.13	3.50	2.38	0.53	0.74
2518.55 A	28	0.93	0.65	2.42	1.42	2.32	0.51	0.51
2518.55 B	8	2.62	0.47	3.76	5.53	1.95	0.44	0.47

A shale

B lens of homogenous vitrinite

