Anchor Drilling Fluids

MUDPROPERTIES SUMMARY

Anchor Drilling Fluids

WELL NO: 7/4-1

AREA: NORTH SEA

DAY	DATE	DEPTH	HOLE	MW	F.VIS	VG-METER READINGS								AV	PV	YP	GEL	GEL	pH	API	HTHP	Cl-	Pf	Mf	TOT. H	Ca++	SOLIDS	OIL	SAND	Anco 208	MBT	KCL	HGS	LGS	Bacteria Test
no.	1993		SIZE			600	300	200	100	60	30	6	3				10sec	10min																
		mtrs	inch	S.G.	s/qt.	rpm	rpm	rpm	rpm	rpm	rpm	rpm	rpm	cps	cps	Pa	Pa	Pa		ml	ml	mg/l	ml	ml	mg/l	mg/l	vol%	vol%	vol%	vol %	kg/m3	kg/m3	kg/m3	kg/m3	org./ml
1	5-jul	171	36	1,20	58	40	26	20	14			2	1	20	14	6																		
2	6-jul	171	36	1,03	100+																													
3	7-jul	306	9 7/8	1,20		43	27	20	13			3	2	21,5	16	5,5																		
4	8-jul	626	9 7/8	1,20		43	27	20	13			3	2	21,5	16	5,5																		
5	9-jul	920	9 7/8	1,20		44	28	21	13			3	2	22	16	6																		
6	10-jul	425	26	1,20		44	28	21	13			3	2	22	16	6																		
7	11-jul	828	26	1,20		43	27	21	13			3	2	21,5	16	5,5																		
8	12-jul	926	26	1,20		44	28	21	13			3	2	22	16	6																		
9	13-jul	926	26	1,20		44	28	21	13			3	2	22	16	6																		
10	14-jul	926	17 1/2	MIXING MUD																														
11	15-jul	978	17 1/2	1,50	86	98	56	41	22	17	9	3	2	48	40	8	1,5	2	8,8	3,8		56000	0,1	1,2	460	300	17	0	0	3,5	5	98	564	24	
12	16-jul	1470	17 1/2	1,50	69	101	59	42	24	16	9	3	2	50,5	42	8,5	1,5	2	8,2	2,8		59000	0,05	0,9	520	320	17,5	0	TR	3,2	8	99	541	49	
13	17-jul	1760	17 1/2	1,60	70	112	65	47	27	18	10	3	2	56	47	9	1,5	2	8,6	3		59000	0	0,7	500	320	21,5	0	0,25	3,1	30	105	638	97	
14	18-jul	1760	17 1/2	1,60	73	104	59	41	23	16	9	3	2	52	45	7	1,5	2	8,8	2,9		60000	0,05	0,7	480	260	21	0	TR	3,3	27	103	658	70	
15	19-jul	1929	17 1/2	1,65	78	111	65	48	28	18	11	3	2	55,5	46	9,5	1,5	2	8,5	3		60000	0	0,6	500	320	23	0	0,25	3,5	30	96	705	93	NEG.
16	20-jul	2175	17 1/2	1,65	77	136	79	60	36	26	16	6	5	68	57	11	3	5	8,1	2,8		58000	0	0,65	540	380	24	0	0,75	3,3	40	94	669	142	NEG.
17	21-jul	2297	17 1/2	1,65	68	137	83	63	39	28	17	6	4	68,5	54	14,5	2,5	4,5	8,1	3		60000	0	0,6	480	340	24,3	0	0,5	3,2	45	89	651	162	NEG.
18	22-jul	2409	17 1/2	1,65	61	124	75	55	33	24	15	6	4	62	49	13	2,5	4,5	8	3		59000	0	0,7	520	340	24,2	0	0,5	3	47	90	657	157	NEG.
19	23-jul	2460	17 1/2	1,65	58	112	69	52	32	23	14	5	4	56	43	13	2	3,5	8	3,1		59000	0	0,65	520	240	24	0	0,5	3,1	45	91	665	147	NEG.
20	24-jul	2460	17 1/2	1,65	59	93	57	41	25	17	11	4	3	46,5	36	10,5	2	3,5	8	3,1		59000	0	0,65	540	260	24	0	TR	3	52	90	665	147	NEG.
21	25-jul	2460	17 1/2	1,65	65	100	60	44	26	18	11	5	3	50	40	10	2	3,5	8	3		56000	0	0,6	620	440	25	0	TR	3,1	51	95	625	202	NEG.
22	26-jul	2460	17 1/2	1,65	64	104	63	47	29	20	12	5	3	52	41	11	2	3,5	8	3		56000	0	0,65	580	440	25	0	TR	3,1	49	95	625	202	NEG.
23	27-jul	2460	17 1/2	1,65	58	90	55	40	24	17	11	4	3	45	35	10	2	3	8	3,1		56000	0	0,6	520	380	25	0	TR	3	50	90	625	202	NEG.
24	28-jul	2460	17 1/2	1,65	58	92	56	41	24	17	11	4	3	46	36	10	2	3	8	3,1		56000	0	0,6	520	380	25	0	TR	3,1	50	95	625	202	NEG.
25	29-jul	2530	12 1/4	1,65	54	80	48	36	21	15	9	4	3	40	32	8	2	3	8,4	3,2	16	56000	0	0,6	680	560	25	0	TR	3,1	48	93	625	202	NEG.
26	30-jul	2655	12 1/4	1,65	52	77	46	33	21	14	9	4	3	38,5	31	7,5	2	3	8,1	3,1	16	57000	0	0,6	680	560	25	0	TR	3,1	47	89	625	201	NEG.
27	31-jul	2793	12 1/4	1,65	54	81	49	37	22	16	10	4	3	40,5	32	8,5	2	3	8,1	3,2	15,5	58000	0	0,65	440	360	25	0	TR	3,1	45	92	624	200	NEG.
28	1-aug	2871	12 1/4	1,71	55	99	59	47	28	18	12	5	3	49,5	40	9,5	2	4	8	2,9	15	59000	0	0,7	440	320	26	0	TR	3	44	92	650	170	NEG.
29	2-aug	2931	12 1/4	1,71	54	88	52	39	24	17	11	4	3	44	34	9	2	4	8	3,1	15,5	61500	0	0,65	480	380	26	0	TR	3,1	44	93	650	170	NEG.
30	3-aug	2980	12 1/4	1,74	54	103	61	45	27	19	12	5	3	51,5	42	9,5	2,5	5,5	8	3,2	16	61500	0	0,7	400	320	26,5	0	TR	3,1	45	93	796	131	
31	4-aug	2989	12 1/4	1,74	55	96	56	43	28	18	12	5	3	48	40	8	2,5	4,5	8,2	3,2	16	60500	0	0,65	320	180	26,5	0	TR	3,2	44	93	796	131	
32	5-aug	2989	12 1/4	1,74	55	84	50	32	22	16	10	5	3	42	34	8	2	4	8,2	3,2	16	61000	0	0,7	340	200	26,5	0	TR	3,1	44	94	796	130	
33	6-aug	2989	12 1/4	1,74	55	84	50	32	22	16	10	5	3	42	34	8	2	4	8,2	3,2	16	61000	0	0,7	340	200	26,5	0	TR	3,1	44	94	796	130	
34	7-aug	2989	12 1/4	1,74	55	85	51	32	22	16	10	5	3	42,5	34	8,5	2	4	8,2	3,2	16	61000	0	0,7	340	200	26,5	0	TR	3,1	44	94	796	130	
35	8-aug	2989	8 3/8	1,74	56	86	52	29	24	17	11	5	3	43	34	9	2	4	8,1	3,2	16	61000	0	0,7	350	200	26,5	0	TR	3,1	44	94	796	130	
36	9-aug	3016	8 3/8	1,74	63	105	64	49	30	22	14	6	4	52,5	41	11,5	2,5	6	9,1	3,4	16	62000	0,05	1,2	300	180	26,5	0	0,75	3,1	40	95	798	130	
37	10-aug	3024	8 3/8	1,90	60	124	74	56	34	24	15	6	4	62	50	12	2	6	8,9	3,4	15	61000	0,05	0,9	300	240	31,5	0	0,5	3,1	42	92	1008	133	
38	11-aug	3059	8 3/8	1,90	73	124	74	56	35	26	16	6	4	62	50	12	2	7,5	8,7	2,8	14,5	62000	0	0,9	380	240	31,5	0	0,5	3,1	44	94	1008	133	
39	12-aug	3077	8 3/8	1,90	75	116	70	51	31	22	15	6	4	58	46	12	2	7	8,2	2,8	14,2	62000	0	1,5	380	240	31,5	0	0,5	3,1	44	94	1008	133	
40	13-aug	3088	8 3/8	1,85	74	107	65	50	29	21	14	5	4	53,5	42	11,5	2	6	8,2	3	14,6	61000	0	1	340	260	30,5	0	0,25	3	38	91	919	162	
41	14-aug	3106	8 3/8	1,85	76	124	75	56	35	24	15	5	4	62	49	13	2	6	8,1	3	14,8	60000	0	1,2	920	680	30	0	0,25	3	38	90	940	138	
42	15-aug	3133	8 3/8	1,85	75	125	75	56	35	25	15	5	4	62,5	50	12,5	2	7	8	2,8	14,4	58000	0	1	720	600	30	0	0,25	3	36	89	941	138	
43	16-aug	3133	8 3/8	1,85	80	123	74	55	34	24	14	5	4	61,5	49	12,5	2	6	8	2,8	14,8	58000	0	1	720	600	30	0	0,25	3	36	89	941	138	

Anchor Drilling Fluids

MUDPROPERTIES SUMMARY

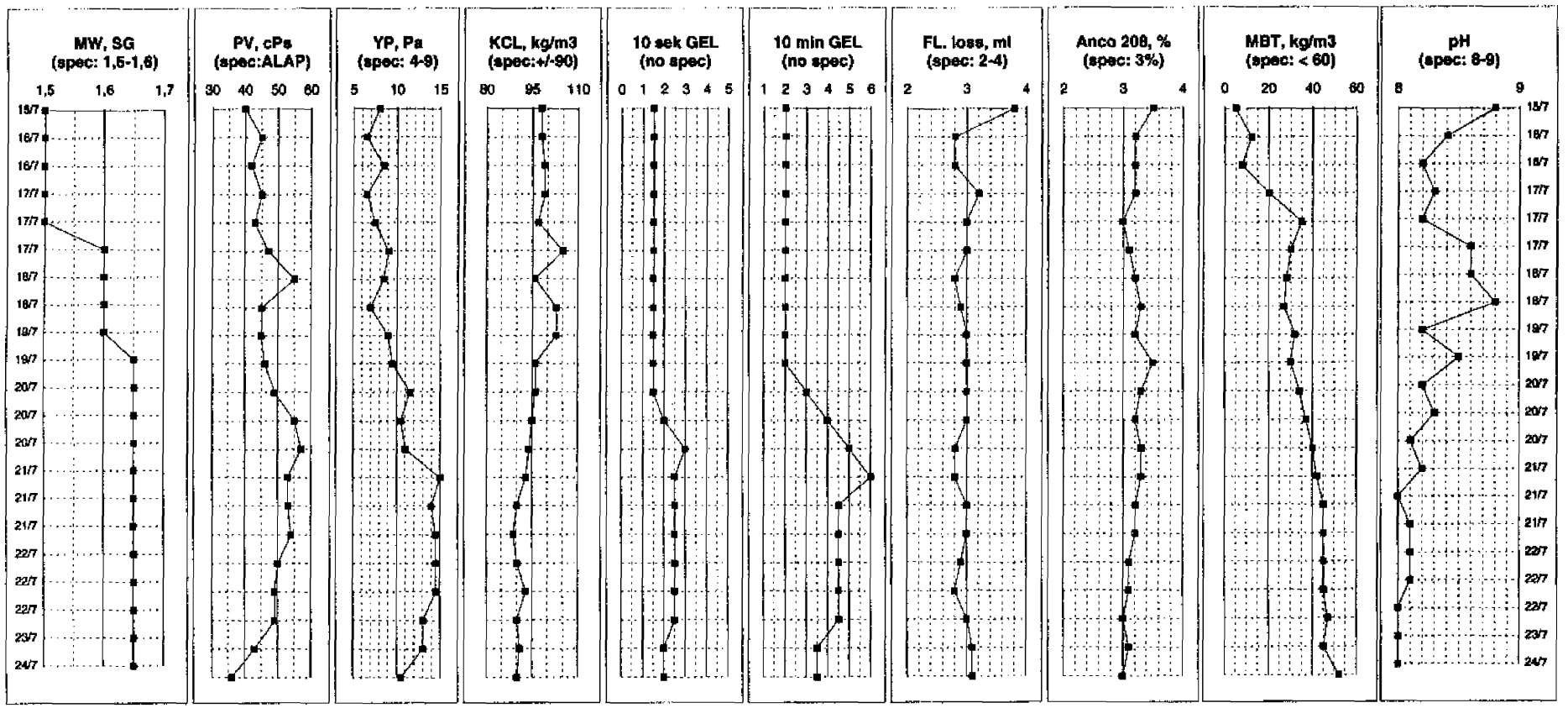
Anchor Drilling Fluids

WELL NO: 7/4-1

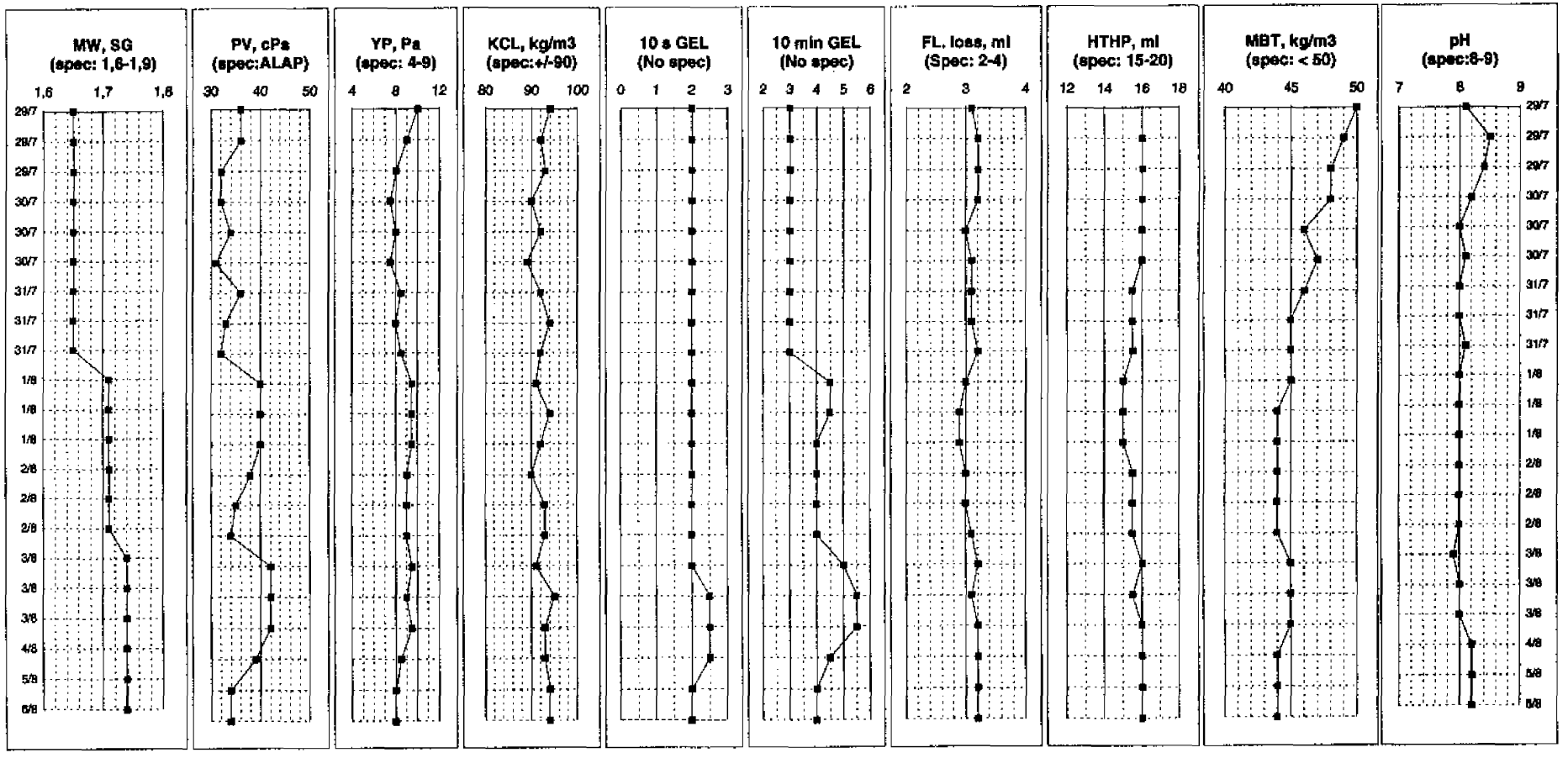
AREA: NORTH SEA

DAY	DATE	DEPTH	HOLE	MW	F.VIS	VG-METER READINGS								AV	PV	YP	GEL	GEL	pH	API	HTHP	Cl-	Pf	Mf	TOT.	Ca++	SOLIDS	OIL	SAND	Anco	MBT	KCL	HGS	LGS	Bacteria
no.	1993		SIZE			600	300	200	100	60	30	6	3				10sec	10min							H					208				Test
		mtrs	inch	S.G.	s/qt.	rpm	rpm	rpm	rpm	rpm	rpm	rpm	rpm	cps	cps	Pa	Pa	Pa		ml	ml	mg/l	ml	ml	mg/l	mg/l	vol%	vol%	vol%	vol %	kg/m3	kg/m3	kg/m3	kg/m3	org./ml
44	17-aug	2791	P & A	1,85	79	120	73	55	35	24	15	6	5	60	47	13	2,5	7,5	8,9	3,2	16,4	57000	0,05	1,6	600	540	30	0	0,25	3	36	89	941	138	
45	18-aug	2989	P & A	1,74	74	89	53	34	23	17	11	5	3	44,5	36	8,5	1,5	5	8,7	3		55000	0,05	1,6	540	480	26	0	0,25	2,8	32	85	820	109	
46	19-aug	840	P & A	1,65	76	80	47	35	21	15	10	4	3	40	33	7	1,5	6,5	11	3,4		54000	0,1	1,6	1200	980	23	0	TR	2,8	27	82	710	98	
47	20-aug	690	P & A	1,65	76	82	49	36	22	16	10	4	3	41	33	8	1,5	8	11	3,5		53000	0,1	1,4	1050	920	23	0	TR		27		710	98	
48	21-aug	106	P & A	END WELL																														

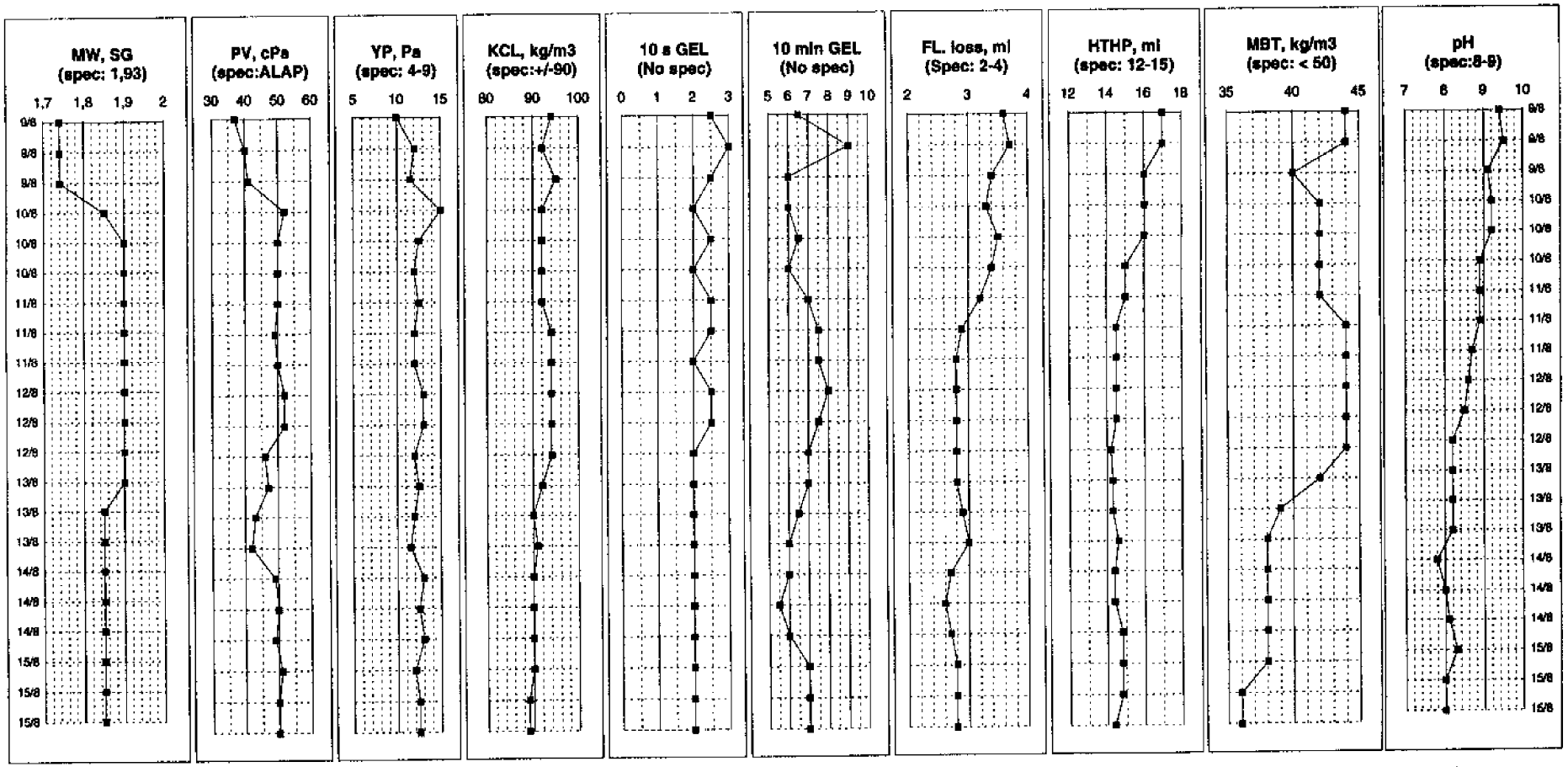
7/4-1, 17 1/2" SECTION MUD PROPERTIES



7/4-1, 12 1/4" SECTION MUD PROPERTIES



7/4-1, 8 3/8" SECTION MUD PROPERTIES



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SECTOR FOR GEOSCIENCE TECHNOLOGY
Geochemistry Department

Grading confidential

Title
ORGANIC GEOCHEMICAL CHARACTERISATION OF WELL 7/4-1.

Requested by	**Project**	
RUN SN v/R. Sunnarvik		
Date	**No. of pages**	**No. of enclosures**
20.12.93	272	

Keywords

Organic geochemistry, source rocks, residual petroleum, maturity

Abstract

This project has been carried out according to the guidelines given in "The Norwegian Industry Guide to Organic Geochemical Analyses 1993".

Prepared by

IKU
IFE

Text operator

Approved by

20.12.93 Kjersti Knudsen

Kjersti Knudsen, senior geochemist

20.12.93 Trygve Meyer

Trygve Meyer, department manager

1. Introduction

IKU performed organic geochemical analyses for Statoil under contract number T-183553, Rammeavtale Nr. T.121.450. Vitrinite reflectance and carbon isotope measurements were carried out by Institutt for Energiteknikk in Oslo (Report No IKF/KR/F-93/165).

The objectives of the study are threefold:

1. Evaluation of the hydrocarbon source-rock potential of the Mandal and Farsund Formations.
2. Detection and characterisation of residual hydrocarbons in the Gyda sandstone.
3. Evaluation of the thermal maturity of the well section.

A total of thirty-two samples was submitted for screening analysis, with subsequent analyses being carried out on a selected sub-set of this total. This sub-set was selected on the basis of the screening data by Statoil. An overview of the analytical programme is given in Table 1.1.

Formation tops and drilling information were supplied by Statoil, and are shown in tables 1.2 and 1.3, respectively. All depths referred to in the report text, tables and figures are given in metres RKB measured depth, unless otherwise stated.

1.1. Personnel participating in the project

The analyses were carried out by Torun Vinge, Kristin Lind and Sølvi Stene. The lithological description was carried out by Hans Rendall. The report was written by Leslie Leith, and was scientifically controlled by May Britt Myhr.

Table 1.1 Samples and analyses

IKU No.	Depth (m)	Sample Type	Lithology	TOC	Rock-Eval	Visual Kerogen	Py-GC	Iatroscan	EOM/-MPLC	GC SAT/ARO	GC-MS SAT/ARO	EOM FRACs	KER
H-373	2974.20	swc	X	X	X								
H-374	2978.70	swc	X	X	X								
H-375	2981.00	core	X	X	X	X	X	X	X	X	X		
H-376	2983.00	core	X	X	X								
H-377	2985.00	core	X	X	X	X	X	X	X	X	X	X	X
H-378	2986.50	core	X	X	X	X	X	X	X	X	X		
H-379	2988.00	core	X	X	X								
H-380	2988.55	core	X	X	X	X	X	X	X	X	X	X	X
H-381	2991.00	cutt	X	X	X								
H-382	2997.00	cutt	X	X	X	X		X	X	X	X		
H-383	3000.00	cutt	X	X	X		X	X	X	X	X		
H-384	3006.00	cutt	X	X	X								
H-385	3011.70	swc	X	X	X								
H-386	3015.05	core	X	X	X	X	X	X	X	X	X	X	X
H-387	3018.00	core	X	X	X								
H-388	3019.50	core	X	X	X	X	X	X	X	X	X	X	X
H-389	3021.00	core	X	X	X								
H-390	3021.90	core	X	X	X	X	X	X	X	X	X		
H-391	3023.00	core	X	X	X	X	X	X	X	X	X		
H-392	3030.00	cutt	X	X	X								
H-393	3036.00	cutt	X	X	X								
H-394	3042.00	cutt	X	X	X								
H-395	3048.00	cutt	X	X	X	X		X	X	X	X		
H-396	3054.00	cutt	X	X	X		X	X	X	X	X		
H-397	3057.70	swc	X	X	X								

IKU SINTEF GROUP

Table 1.1 Samples and analyses (cont'd)

IKU No.	Depth (m)	Sample Type	Lithology	TOC	Rock-Eval	Visual Kerogen	Py-GC	Iatroscan	EOM/-MPLC	GC SAT/ARO	GC-MS SAT/ARO	EOM FRACs	KER
H-398	3063.00	cutt	X	X	X								
H-399	3066.00	cutt	X		X								
H-400	3069.10	core	X		X			X	X	X	X	X	
H-401	3071.25	core	X		X								
H-402	3072.05	core	X		X			X	X	X	X		
H-403	3073.50	core	X		X			X	X	X	X	X	
H-404	3084.00	cutt	X		X								

IKU SINTEF GROUP

Table 2.1 Lithology and total organic carbon content

SAMPLE	DEPTH (m)	TOC (% of rock wt)	LITHOLOGY
H 0373 SWC	2974.20	8.19	Sh, slty. w/some sd grns, dk gy to dk brn gy, fiss, w/sst lam, sm. am. py.
H 0374 SWC	2978.70	10.60	Clst, gy, slty, subfiss, occ w/some wh. spots, contains shell fragm.
H 0375 Core	2981.00	8.11	Clst, dk gy, lam, blky, with a few wh spots, micromic.
H 0376 Core	2983.00	9.03	Clst, dk gy, slty, micromic. w/some mica, cracks filled with a glass resembling material. (transparent to transluscent)
H 0377 Core	2985.00	10.60	Clst, slty, and sndy lam w/slt and snd lam, blky, some pyr
H 0378 Core	2986.50	7.25	Clst, dk gy slty, lam w/lighther slt lam, micromic
H 0379 Core	2988.00	6.26	Clst, dk gy, slty, w/lam, blky sm am of glauc. White spots (volcanic origin?)
H 0380 Core	2988.55	5.89	Clst, dk gy, slty lam, with white spots, possibly of volcanic origin (devitrified glass fragments?) micromic sm. am. glauc.
H 0381 Cut	2991	6.33	30% clst, dk gy. slty, lam, subfiss - blky, 2% clst, red brn, blocky 68% Casing cement.
H 0382 Cut	2997	5.27	80% clst, dk gy, slty, lam, blky - subfiss, 1%, clst, red brn, blky 19% casing cement.

The underlined lithology was picked for analysis.

Table 2.1 cont.

SAMPLE	DEPTH (m)	TOC (% of rock wt)	LITHOLOGY
H 0383 Cut	3000	4.89	90% clst. dk gy, slty, lam, subfiss - blky, 2% clst, red brn - gy red, blky 8% casing cement.
H 0384 Cut	3006	4.36	98% clst, dk gy, slty, lam, blky - subfiss, 2% casing cement sm am. clst, gy red - brn red, blky.
H 0385 SWC	3011.70	4.82	Clst, dk gy, slty, micromic, subfiss, w/some shell fragments.
H 0386 Core	3015.05	6.07	Clst, dk gy, slty, lam with slt. lam, micromic, some pyr.
H 0387 Core	3018.00	4.35	Clst, slty, dk gy, faint lam, some pyr.
H 0388 Core	3019.50	4.28	Clst. dk gy, slty lam, cavities (poss replacement after fossils) filled with an outermost thin rim of pyr, the rest of the cavity is filled by calcite. The clst is micromic with dispersed pyr.
H 0389 Core	3021.00	4.47	Clst, dk gy, slty, lam, white spots (volc?),calcite filled cavities after fossils, some pyr. and glauc.
H 0390 Core	3021.90	4.36	Clst, dk gy, slty, micromic, lam some pyr, fossil fragm.
H 0391 Core	3023.00	5.19	Clst, dk gy, slty, micromic, lam calcite shell fragm. some pyr.
H 0392 Cut	3030	6.00	100% Clst, dk gy, slty, lam, subfiss - blky, some pyr. Sm am clst, red brn Sm am Casing cement.

The underlined lithology was picked for analysis.

Table 2.1 cont.

SAMPLE	DEPTH (m)	TOC (% of rock wt)	LITHOLOGY
H 0393 Cut	3036	5.06	100% clst, dk gy, slty, lam, subfiss - blky, some py Sm am Casing cement.
H 0394 Cut	3042	5.79	40% Clst, dk gy, slty, lam, subfiss - blky 60% clst, brn gy - yel gy, slty, micromic, blky - subfiss.
H 0395 Cut	3048	3.28	80% clst, dk gy, slty, lam, blky - subfiss. 20% clst, brn gy - yel gy sm am sst, gy. vf-f.
H 0396 Cut	3054	2.70	70% Clst, dk gy, slty, lam 20% Clst brn gy, silty lam 5% Mrl, gy wh, dissolves in HCl. 5% Sst, Vf-f, lam.
H 0397 SWC	3057.7	0.52	Mrl, gy wh. w/some clst laminae, disintegrates when HCl is applied.
H 0398 Cut	3063	2.01	80% Sst, gy, vf-f, occ lam 15% clst, dk gy, slty, lam 5% clst, brn gy, slty, lam.
H 0399 Cut	3066		80% Sst, gy vf-f, occ lam 10% sltst, gy, blky 10% Clst, dk gy, subfiss-blocky.
H 0400 Core	3069.10		Sst. wh - lt gy, f-m, w/abundant kaolinite cement, kaolinite also fills cracks in the rock, some mica present.
H 0401 Core	3071.25		Sst. crs, wh to lt gy, poss with kaolinite cem. abundant micro fossil fragm. and Spicules, often forms small cavities in the rock.

The underlined lithology was picked for analysis.

Table 2.1 cont.

SAMPLE	DEPTH (m)	TOC (% of rock wt)	LITHOLOGY
H 0402 Core	3072.05		Sst, f - m, wt to lt gy, with abundant kaolinite cement, in addition to qrtz grns also feldspar grain is common. Well consolidated, low porosity.
H 0403 Core	3073.50		Sst, f - m, wht to lt gy, abundant calcite cem. probably also kalinite
H 0404 Cut	3084		80% Sst, f - m, wh, ab calcite cement, probably also kaolinite 20% lst wh, probably some of it casing cement, or reconsolidated calcareous mud sm am Clst, dk gy.

The underlined lithology was picked for analysis.

Table 2.2

Project no.: 23250800
Date : 93.10.13

DATA FROM ROCK EVAL PYROLYSIS

IKUNO	FRAC NAME	DEPTH (m)	SAMPLE TYPE	S1 (mg/g rock)	S2 (mg/g rock)	TOC (%)	HYDRO. INDEX (mg/g TOC)	PETR. POTEN. S1+S2	PROD. INDEX S1/(S1+S2)	Tmax (°C)
7/4-1										
H0373		2974.20	SWC	5.97	44.64	8.19	545	50.61	0.12	439
H0374		2978.70	SWC	7.50	64.01	10.60	604	71.51	0.10	437
H0375		2981.00	CORE	5.80	39.98	8.11	493	45.78	0.13	435
H0376		2983.00	CORE	7.21	44.71	9.03	495	51.92	0.14	437
H0377		2985.00	CORE	6.77	62.40	10.60	589	69.17	0.10	438
H0378		2986.50	CORE	5.41	35.33	7.25	487	40.74	0.13	436
H0379		2988.00	CORE	4.78	30.47	6.26	487	35.25	0.14	435
H0380		2988.55	CORE	5.08	23.04	5.89	391	28.12	0.18	431
H0381	CLST,	2991.00	CUT	5.64	30.52	6.33	482	36.16	0.16	436
H0382	CLST,	2997.00	CUT	4.69	15.91	5.27	302	20.60	0.23	428
H0383	CLST,	3000.00	CUT	4.58	15.99	4.89	327	20.57	0.22	428
H0384	CLST,	3006.00	CUT	3.73	14.41	4.36	331	18.14	0.21	430
H0385		3011.70	SWC	2.86	17.16	4.82	356	20.02	0.14	435
H0386		3015.05	CORE	4.70	23.55	6.07	388	28.25	0.17	431
H0387		3018.00	CORE	3.17	18.41	4.35	423	21.58	0.15	434
H0388		3019.50	CORE	3.22	17.66	4.28	413	20.88	0.15	430
H0389		3021.00	CORE	4.07	17.56	4.47	393	21.63	0.19	431
H0390		3021.90	CORE	2.95	18.31	4.36	420	21.26	0.14	433
H0391		3023.00	CORE	4.79	19.23	5.19	371	24.02	0.20	430
H0392	CLST,	3030.00	CUT	7.23	20.47	6.00	341	27.70	0.26	426
H0393	CLST,	3036.00	CUT	4.77	19.65	5.06	388	24.42	0.20	435
H0394	CLST,	3042.00	CUT	6.33	26.99	5.79	466	33.32	0.19	436
H0395	CLST,	3048.00	CUT	3.08	13.51	3.28	412	16.59	0.19	436
H0396	CLST,	3054.00	CUT	2.08	10.27	2.70	380	12.35	0.17	433
H0397		3057.70	SWC	1.65	1.61	0.52	310	3.26	0.51	353
H0398	CLST,	3063.00	CUT	1.79	7.59	2.01	378	9.38	0.19	432
H0399		3066.00	CUT	0.53	1.15			1.68	0.32	426
H0400		3069.10	CORE	1.55	0.72			2.27	0.68	391
H0401		3071.25	CORE	0.28	0.41			0.69	0.41	392
H0402		3072.05	CORE	0.32	0.35			0.67	0.48	385
H0403		3073.50	CORE	0.57	0.37			0.94	0.61	352
H0404		3084.00	CUTE	0.28	0.84			1.12	0.25	367

Legend
-1 - No data available.

VISUAL KEROGEN ANALYSIS

TABLE NO.: 1
WELL NO.: 7/4-1

Sample	Depth (m)	Composition of residue	Particle size	Preservation palynomorphs	Thermal maturation index *	Remarks
H-375	2981 m Kj	85% FA 10% AL <5% WO	F-M	Fair-Good		Tasmanites, Green algae, Acritarchs
H-377	2985 m Kj	85% FA 20% AL	F-M-L	Fair-Good		Tasmanites, Green algae
H-378	2986.5 mKj	90% FA 10% AL	F-M	Fair-Good		Tasmanites, Green algae, Acritarchs
H-380	2988.5 mKj	85% FA 10% AL <5% WO	F-M	Fair-Good	3-4	Tasmanites, Green algae, Acritarchs, Bisaccate pollen

ABBREVIATIONS:

AL = Algal Organic Matter
FA = Fluoramorphinite
HA = Hebamorphinite
HE = Herbaceous Organic Matter
WO = Woody Organic Matter

F = Fine
M = Medium
L = Large

* New TAI (1-10 scale; see experimental)

IKU SINTEF GROUP

Table 2.3 cont.

VISUAL KEROGEN ANALYSIS

TABLE NO.: 2
WELL NO.: 7/4-1

Sample	Depth (m)	Composition of residue	Particle size	Preservation palynomorphs	Thermal maturation index *	Remarks
H-382	2997 m Cu	95% FA 5% AL	F-M	Fair-Good		Tasmanites, Green algae, Acritarchs
H-386	3015.05mKj	85% FA 5% HA 10% AL	F-M	Fair-Good	3-4	Tasmanites, Green algae, Acritarchs, Dinocysts, Bisaccate pollen
H-388	3019.5 mKj	85% FA 10% AL <5% WO	F-M	Fair-Good		Sheets of material

ABBREVIATIONS:

AL = Algal Organic Matter
FA = Fluoramorphinite
HA = Hebamorphinite
HE = Herbaceous Organic Matter
WO = Woody Organic Matter

F = Fine
M = Medium
L = Large

* New TAI (1-10 scale; see experimental)

IKU SINTEF GROUP

VISUAL KEROGEN ANALYSIS

TABLE NO.: 3
WELL NO.: 7/4-1

Sample	Depth (m)	Composition of residue	Particle size	Preservation palynomorphs	Thermal maturation index *	Remarks
H-390	3021.9 mKj	85% FA <5% HE 10% AL	F-M	Fair-Good		Tasmanites, Green algae, Acritarchs, Dinocysts, Botryococcus. Pale degraded sheets of material.
H-391	3023 m Kj	85% FA 10% AL <5% HE	F-M	Fair-Good		Green algae, Botryococcus, Acritarchs, Pollen
H-395	3048 m Cu	80% FA <5% HE 10% AL 5% WO	F-M	Fair-Good		Tasmanites, Green algae, Acritarchs, Botryococcus

ABBREVIATIONS:

AL = Algal Organic Matter
FA = Fluoramorphinite
HA = Hebamorphinite
HE = Herbaceous Organic Matter
WO = Woody Organic Matter

F = Fine
M = Medium
L = Large

* New TAI (1-10 scale; see experimental)

IKU SINTEF GRUPPEN

Table 2.4 Pyrolysis-GC data (S2 peak) as percentage of total area

IKUNO	Depth (m)	Sample Type	C_1	C_2-C_5	C_6-C_{14}	C_{15+}
H-375	2981.00	Core	7.4	31.1	41.0	20.5
H-377	2985.00	Core	4.4	24.0	45.4	26.1
H-378	2986.50	Core	4.5	24.5	44.6	26.4
H-380	2988.55	Core	5.9	29.9	43.4	20.8
H-383	3000.00	Cuttings	6.4	42.2	44.4	6.9
H-386	3015.05	Core	5.8	27.5	49.1	17.6
H-388	3019.50	Core	7.7	36.8	47.0	8.5
H-390	3021.90	Core	4.3	23.4	49.2	23.0
H-391	3023.00	Core	5.9	31.7	51.8	10.6
H-396	3054.00	Cuttings	5.0	32.8	47.9	14.3

Table 2.5 Concentration and composition of extractable organic matter using Iatroscan TLC

IKUNO	Depth (m)	Rock (g)	EOM (mg)	EOM (mg/g rock)	Sat/ EOM (%)	Aro/ EOM (%)	Pol/ EOM[1)] (%)	Asph/ EOM[2)] (%)	HC/ EOM (%)	Non-HC/ EOM (%)
H-375	2981.00	8.42	112.20	13.33	30.87	35.75	9.60	23.79	66.61	33.39
H-377	2985.00	8.50	133.30	15.68	26.57	35.48	10.17	27.88	61.95	38.05
H-378	2986.50	8.50	109.50	12.88	31.80	34.39	9.89	23.92	66.19	33.81
H-380	2988.55	11.99	140.30	11.70	35.52	37.03	7.26	20.19	72.55	27.45
H-383	3000.00	15.76	215.60	13.68	40.11	35.69	14.55	9.65	75.80	24.20
H-386	3015.05	11.44	135.90	11.88	36.42	35.87	7.59	20.11	72.29	27.71
H-388	3019.50	9.17	76.80	8.38	31.55	36.03	9.57	22.84	67.59	32.41
H-390	3021.90	18.04	135.40	7.51	33.48	32.57	9.53	24.42	66.06	33.94
H-391	3023.00	9.04	98.40	10.88	34.22	36.47	6.91	22.39	70.69	29.31
H-396	3054.00	7.72	58.40	7.56	33.46	29.73	22.82	13.99	63.19	36.81
H-400	3069.10	18.49	95.20	5.15	5.81	4.07	77.66	12.46	9.88	90.12
H-402	3072.05	24.93	44.30	1.78	7.87	7.35	69.27	15.51	15.23	84.77
H-403	3073.50	25.45	65.50	2.57	7.51	11.17	66.60	14.72	18.67	81.33

Legend

1): From Resin1+Resin2 Iatroscan peak.
2): From Asphaltene precipitation.

Table 2.6 Concentration and composition of extractable organic matter using Iatroscan TLC

IKUNO	Depth (m)	TOC (%)	EOM (mg/g TOC)	Sat (mg/g TOC)	Aro (mg/g TOC)	Pol[1)] (mg/g TOC)	Asph[2)] (mg/g TOC)	Sat/Aro *100	HC/Non-HC *100
H-375	2981.00	8.11	164.3	49.53	57.35	15.40	38.17	86.36	199.53
H-377	2985.00	10.60	147.8	38.17	51.17	14.67	40.21	74.60	162.78
H-378	2986.50	7.25	177.7	55.01	59.49	17.10	41.38	92.47	195.78
H-380	2988.55	5.89	198.7	69.35	72.31	14.17	39.41	95.91	264.36
H-383	3000.00	4.89	279.8	109.19	97.14	39.59	26.27	112.41	313.24
H-386	3015.05	6.07	195.5	70.08	69.01	14.61	38.70	101.55	260.90
H-388	3019.50	4.28	195.7	60.36	68.94	18.31	43.71	87.56	208.51
H-390	3021.90	4.36	172.1	56.48	54.94	16.07	41.18	102.79	194.62
H-391	3023.00	5.19	209.7	70.99	75.66	14.34	46.46	93.83	241.20
H-396	3054.00	2.70	280.2	90.91	80.76	62.00	38.00	112.57	171.67
H-400	3069.10	-1	-1	-1	-1	-1	-1	142.82	10.96
H-402	3072.05	-1	-1	-1	-1	-1	-1	107.03	17.96
H-403	3073.50	-1	-1	-1	-1	-1	-1	67.25	22.96

Legend

1): From Resin1+Resin2 Iatroscan peak.
2): From Asphaltene precipitation.

Table 2.7 Ratios calculated from saturated hydrocarbon gas chromatograms

IKUNO	Depth (m)	CPI-1	Pristane/ nC_{17} (A)	Phytane/ nC_{18} (B)	A/B	Pristane/ Phytane	nC_{17}/ nC_{17}+nC_{27}
H-375	2981.00	0.8	1.3	1.1	1.2	1.3	0.7
H-377	2985.00	0.8	1.3	1.0	1.2	1.4	0.8
H-378	2986.50	0.8	1.2	1.0	1.2	1.3	0.7
H-380	2988.55	0.8	1.4	1.1	1.3	1.4	0.7
H-383	3000.00	0.8	1.3	1.1	1.2	1.3	0.7
H-386	3015.05	0.8	1.1	1.1	1.0	1.1	0.7
H-388	3019.50	0.8	1.1	1.1	1.0	1.2	0.8
H-390	3021.90	0.8	1.0	1.0	1.0	1.0	0.6
H-391	3023.00	0.8	1.0	1.0	1.0	1.1	0.7
H-396	3054.00	0.8	1.5	0.9	1.6	1.3	0.7
H-400	3069.10	0.9	1.2	0.8	1.6	1.3	0.6
H-402	3072.05	0.9	1.5	0.6	2.5	2.0	0.6
H-403	3073.50	0.9	1.6	0.6	2.8	1.9	0.6

$$CPI1 = 0.5 * \left(\frac{C_{25} + C_{27} + C_{29} + C_{31}}{C_{24} + C_{26} + C_{28} + C_{30}} + \frac{C_{25} + C_{27} + C_{29} + C_{31}}{C_{26} + C_{28} + C_{30} + C_{32}} \right)$$

Table 2.8 Ratios calculated from aromatic hydrocarbon gas chromatograms

IKU Nr.	Depth (m)	MPI-1	F1	F2
H-375	2981.00	0.62	0.45	0.15
H-377	2985.00	0.65	0.46	0.15
H-378	2986.50	0.61	0.43	0.15
H-380	2988.50	0.64	0.44	0.17
H-383	3000.00	0.55	0.40	0.17
H-386	3015.50	0.63	0.42	0.21
H-388	3019.50	0.58	0.41	0.17
H-390	3021.90	0.56	0.40	0.17
H-391	3023.00	0.57	0.39	0.16
H-396	3054.00	0.71	0.45	0.16
H-400	3069.10	0.74	0.44	0.16
H-402	3072.05	0.67	0.39	0.15
H-403	3073.50	0.69	0.42	0.16

Legend

$$MPI-1=\frac{3/2(2-MP+3-MP)}{P+1-MP+9-MP}$$

$$F1=\frac{3-MP+2-MP}{3-MP+2-MP+9-MP+1-MP}$$

$$F2=\frac{2-MP}{3-MP+2-MP+9-MP+1-MP}$$

Table 2.9 Molecular ratios from terpane and sterane mass fragmentograms. Maturity characteristic ratios

IKUNO	Depth (m)	αβ/αβ+βα hopanes 1)	22S hopanes 2)	22S hopanes 3)	22S hopanes 4)	20S steranes 5)	ββ steranes 6)	ββ steranes 7)
H-375	2981.00	0.88	61	63	61	36	58	41
H-377	2985.00	0.88	62	61	61	39	60	43
H-378	2986.50	0.88	60	63	61	33	53	36
H-380	2988.55	0.88	59	62	60	33	59	42
H-383	3000.00	0.89	60	61	60	28	59	42
H-386	3015.05	0.89	59	59	59	34	66	49
H-388	3019.50	0.89	60	62	60	35	52	35
H-390	3021.90	0.90	59	61	60	31	51	34
H-391	3023.00	0.90	58	60	59	29	51	34
H-396	3054.00	0.93	60	62	61	35	69	52
H-400	3069.10	0.90	59	61	60	36	59	42
H-402	3072.05	0.92	61	63	61	36	64	48
H-403	3073.50	0.89	59	59	59	36	61	44

Legend:
1) 100 * 30αβ/(30αβ+30βα) in m/z 191.
2) 100 * 31αβS/(31αβS+31αβR) in m/z 191.
3) 100 * 32αβS/(32αβS+32αβR) in m/z 191.
4) 100 * average of 31αβS/(31αβS+31αβR),.....35αβS/(35αβS+35αβR) in m/z 191.
5) 100 * 29ααS/(29ααS+29ααR) in m/z 217.
6) 100 * 2 * (29ββR+29ββS)/(29ααS+29ααR+2(29ββR+29ββS)) in m/z 217.
7) 100 * (29ββR+29ββS)/(29ααS+29ααR+29ββR+29ββS) in m/z 217.

Table 2.10 Molecular ratios of C_{27} : C_{28} : C_{29}

IKUNO	Depth (m)	from m/z 217[1] C27 (%)	C28 (%)	C29 (%)	from m/z 218[2] C27 (%)	C28 (%)	C29 (%)
H-375	2981.00	54.1	17.7	28.2	37.2	31.7	31.1
H-377	2985.00	36.9	25.1	38.0	37.2	31.6	31.2
H-378	2986.50	58.1	14.8	27.1	39.1	33.0	38.0
H-380	2988.55	54.3	17.7	27.9	36.6	32.8	30.5
H-383	3000.00	51.1	16.6	32.3	35.3	31.5	33.2
H-386	3015.05	50.2	20.8	29.0	33.7	32.0	34.3
H-388	3019.50	48.8	24.1	27.2	33.2	38.5	28.3
H-390	3021.90	50.6	20.3	29.1	35.1	35.2	29.7
H-391	3023.00	44.7	20.9	34.4	34.9	34.5	30.6
H-396	3054.00	43.1	17.1	39.8	33.0	26.6	40.3
H-400	3069.10	46.1	18.9	34.9	36.1	28.3	35.6
H-402	3072.05	43.6	15.9	40.5	44.6	20.8	34.5
H-403	3073.50	48.9	14.0	37.1	41.2	23.8	35.0

Legend:
[1] distribution of peaks 27ααR,28ααR,29ααR in m/z 217.?
[2] distribution of peaks ((29dβS+27ββR)+(27ββS+28dαR)), ((29dαR+28ββR)+28ββS), (29ββR+29ββS) in m/z 218.

Table 2.11 Molecular ratios from terpane and sterane mass fragmentograms. Maturity and source characteristic ratios.

IKUNO	Depth (m)	Tricyclic terpanes 1)	Tm/Ts terpanes 2)	30d/30αβ terpane 3)	C_{28} bis-norhopane 4)	C_{27} diasteranes 5)
H-375	2981.00	0.59	2.16	0.07	1.04	0.78
H-377	2985.00	0.53	1.93	0.06	0.84	0.89
H-378	2986.50	0.82	1.60	0.05	0.38	0.79
H-380	2988.55	0.49	1.70	0.05	0.67	0.78
H-383	3000.00	0.31	1.94	0.06	0.90	0.76
H-386	3015.05	0.40	1.39	0.05	1.71	0.74
H-388	3019.50	0.37	1.40	0.04	0.35	0.73
H-390	3021.90	0.38	1.25	0.04	0.27	0.72
H-391	3023.00	0.28	1.28	0.04	0.36	0.76
H-396	3054.00	0.31	1.93	0.04	0.89	0.80
H-400	3069.10	0.24	1.32	0.05	0.08	0.77
H-402	3072.05	0.23	2.79	0.05	0.00	0.87
H-403	3073.50	0.42	1.23	0.05	0.00	0.80

Legend:
1) (24/3)/30αβ in m/z 191.
2) $27T_m/27T_s$ in m/z 191.
3) 30d/30αβ in m/z 191.
4) 28αβ/30αβ in m/z 191.
5) 100 * 27dβS/(27dβS+27ααR) in m/z 217.

Table 2.12 Molecular ratios from mass fragmentograms of aromatic steroid hydrocarbons

IKUNO	Depth (m)	20/20+27 TA[1] (%)	20/20+28 TA[2] (%)	21/21+28 MA[3] (%)	27TA/ 27TA+28MA[4] (%)	28TA/ 28TA+29MA[5] (%)
H-375	2981.00	69	88	75	68	83
H-377	2985.00	67	86	62	68	82
H-378	2986.50	69	88	63	64	78
H-380	2988.55	66	85	66	65	79
H-383	3000.00	47	74	56	77	83
H-386	3015.05	60	84	56	63	78
H-388	3019.50	54	81	53	68	83
H-390	3021.90	54	78	53	69	84
H-391	3023.00	58	83	51	65	81
H-396	3054.00	56	84	54	74	86
H-400	3069.10	68	90	69	68	-1
H-402	3072.05	77	93	63	63	-1
H-403	3073.50	70	87	60	65	-1

Legend:
[1] $100 * C_{20}TA/(C_{20}TA+(C_{26}TA+C_{27}TA))$ in m/z 231
(Mackenzie et al. 1981, main text).
[2] $100 * C_{20}TA/(C_{20}TA+C_{28}TA)$ in m/z 231
(Mackenzie et al. 1981, note added in proof).
[3] $100 * C_{21}MA/(C_{21}MA+(C_{28}MA+C_{29}MA))$ in m/z 253
(Mackenzie et al. 1981, note added in proof).
[4] $100 * (C_{26}TA+C_{27}TA)/((C_{26}TA+C_{27}TA)+(C_{28}MA+C_{29}MA))$ in m/z 231 and 253
(Mackenzie et al. 1981, main text).
[5] $100 * C_{28}TA/(C_{28}TA+C_{29}MA+((C_{28}MA+C_{29}MA)*(C_{28}TA/(C_{28}TA+C_{27}TA))))$ in m/z 231 and 253 (Mackenzie et al. 1981, note added in proof).
-1 Data are not available.

TA: tri-aromatic steroid
MA: mono-aromatic steroid

Table 2.13: Carbon isotopic composition of kerogen, EOM and chromatographic fractions: Well 7/4-1

IKU Nr.	Depth	$\delta^{13}C$ SAT ‰ PDB	$\delta^{13}C$ ARO ‰ PDB	$\delta^{13}C$ NSO ‰ PDB	$\delta^{13}C$ ASPH ‰ PDB	$\delta^{13}C$ Kerogen ‰ PDB	$\delta^{13}C$ EOM ‰ PDB
H-377	2981.00	-32.1	-31.1	-30.5	-29.8	-29.3	-30.9
H-380	2988.55	-32.9	-31.9	-31.1	-31.0	-30.0	-31.6
H-386	3015.05	-32.2	-31.9	-31.2	-31.1	-29.4	-31.3
H-388	3019.50	-32.4	-31.5	-30.8	-30.5	-29.1	-31.5
H-400	3069.10	-30.5	-29.6	-29.9	-28.9		-29.4
H-403	3073.50	+-26.2	-28.9	-29.3	-29.5		-29.5

+: Value for saturated hydrocarbon fraction is probably too heavy, but insufficient material was available to permit a repeat analysis.

Analysis of a standard oil sample was carried out with the analysis of the above samples and gave a value within ±0.1 ‰ of the standard value. IFE's value obtained on the NBS-22 standard was -29.77 ‰ ±0.06 ‰ PDB.

IKU SINTEF GRUPPEN

Rock Standard analysis number	Date	Weight (mg)	S1 (mg/g rock)	S2 (mg/g rock)	Tmax (°C)
Black Ven Marl (nominal values):			0.47	19.00	420
77	93.10.13	100.4	0.48	19.00	419
78	93.10.13	99.7	0.51	18.94	419
79	93.10.13	99.3	0.48	19.00	417
80	93.10.13	99.6	0.48	18.33	418
81	93.10.13	99.9	0.38	17.61	423
82	93.10.13	103.9	0.37	18.40	420
Minimum			0.37	17.61	417
Maximum			0.51	19.00	423
Average			0.45	18.55	419
Standard Deviation			0.0	0.0	0
Nr. of measurements			6	6	6