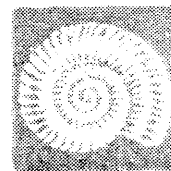


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CLIENT/ OPPDRAGSGIVER Norsk Hydro A/S			
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SUMMARY/ SAMMENDRAG

Zone A (1250-1385m) Poor potential for gas. Immature to early mature.

Zone B (1385-1640m) Good to rich potential for gas. Immature to early mature. Evidence of non-indigenous hydrocarbons.

Zone C (1640-1970m) Sandstone unit. No indigenous source potential but evidence of migrated hydrocarbons.

Zone D (1970-2075m) Good to rich potential for oil and gas. Early mature. Evidence of migrated hydrocarbons at the base of the zone.

Zone E (2075-2135m) Sandstone unit. Some evidence of migrated hydrocarbons.

Zone F (2135-2255m) Fair to poor potential for gas. Moderately mature.

KEY WORDS/ STIKKORD

TROLL

Source Rock Analyses

31/6-3

Screening

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ENCLOSURES

EXPERIMENTAL

Headspace Gas Analysis

One ml. of the headspace gas from each of the cans was analysed gas chromatographically for light hydrocarbons. The results are shown in Table 1a. The canned samples were washed with tempered water on 4, 2, 1 and 0.125 mm sieves to remove drilling mud and thereafter dried at 35⁰C.

Occluded Gas

An aliquot of the 1-2 mm fraction of each sample before drying was crushed in water using an airtight ball mill, and one ml. of the headspace analysed chromatographically. The results are shown in Table 1b.

The composite gas data are also plotted and shown in enclosure 1.

Total Organic Carbon

Bulk samples were crushed in a centrifugal mill. Aliquots of the samples were then weighed into Leco crucibles and treated with hot 2N HCl to remove carbonate, and washed twice with distilled water to remove traces of HCl. The crucibles were then placed in a vacuum oven at 50⁰C and - evacuated to 20mm Hg for 12 hrs. The total organic carbon (TOC) content of the dried samples was determined using a Leco EC12 carbon analyser.

Rock-Eval Pyrolysis

Crushed sample (100mg) was weighed into a platinum crucible the base and cover of which are made of sintered steel, and analysed on a Rock-Eval pyrolyser.

RESULTS AND DISCUSSION

The analysed sequence, 1250-2255m, has been subdivided into 6 zones based upon lithology, light hydrocarbon analyses, TOC and Rock-Eval. The zones are as follows:

- Zone A: 1250 - 1385m
- Zone B: 1385 - 1640m
- Zone C: 1640 - 1970m
- Zone D: 1970 - 2075m
- Zone E: 2075 - 2135m
- Zone F: 2135 - 2255m

The only formation top data available from the client was that for 31/6-1, namely:

- Top Cretaceous: 1230/1236m
- Top Jurassic: 1335m
- Top Triassic: 2150m

Zone A, 1250-1385m: This zone is composed mainly of two types of claystone; an olive grey calcareous claystone and a dark yellowish brown claystone. The dark grey claystone becomes the dominant lithology towards the base of the zone. The yellow-brown claystone shows poor TOC values (around 0.2%). The dark grey claystone is richer with values around 0.7%. Minor amounts of dark reddish marl occur throughout the zone. Methane is the predominant light hydrocarbon. The upper part of the zone (1265-1310m) shows good abundances of C₁ (probably biogenic) but poor abundances of C₂+ hydrocarbons. The wetness is low (around 2%). The samples from the lower part of this zone contains poor abundances of C₁ but more abundant C₂+ hydrocarbons than the upper part of the zone. Particularly so in the lowermost sample (1370m) where C₅+ hydrocarbons are the most abundant. The wetness increases to 20-30% at the base of the zone. The increase in wetness coincides with the increase in the amount of grey claystone in the samples. The increased wetness towards the base of the zone may be due to the migration of hydrocarbons from the organic rich claystone of the zone below.

Rock-Eval results indicate type IV kerogen in this zone (2 samples). The petroleum potential and the production indices are low. The T_{max} indicates that the samples are immature.

Zone B, (1385-1640m): The top of this zone is marked by the appearance of a TOC rich dark grey claystone. TOC values vary from 1.9-4% TOC (i.e. good to rich) being highest at the top of the zone. Until 1550m this claystone comprises 100% of the sample, below this depth minor amounts (5%) of fine sand appear.

The methane abundances are good for the upper part of the zone down to 1490m with a very high value at 1490m. C_2 hydrocarbon abundances are poor below 1490m (except for n.Butane at 1535m and propane at 1625m). The wetness increases markedly below 1490m with samples B-1029 and B-1031 showing very high values >2 and 81% respectively. Above 1490m the wetness is variable: 8-21%. IC_4/nC_4 ratios are moderately high indicating immature/early mature samples. The values do decrease towards the base of the zone with the samples of higher wetness. This may indicate the presence of migrated hydrocarbons from a more mature source (especially in B-1029, 1535m. This showed a strong white cut in DCM under Ultra-Violet light).

Rock-Eval data for this zone show a type III to type II/III kerogen in the claystone. One exception is the sample showing type IV kerogen at the top of the zone. This probably represents caved material from the zone of TOC poor claystone above. The production indices are all low indicating little generation of hydrocarbons or migrated hydrocarbons. This is interesting as it seem to contradict the results from the light hydrocarbon analyses. Further analysis would be required to establish whether not migrated hydrocarbons are present.

Zone C, 1640-1970m: The top of this zone is marked by the appearance of a poorly sorted light grey sand. This is accompanied throughout the zone by minor amounts of claystone and coal. It is not possible to tell from the screening analyses whether this coal is an additive or not. The claystone is probably caved material from the zone above as it is of similar lithological character and has similar TOC values. One sand sample was analysed for TOC and as expected showed a very poor value: 0.14%.

The abundance of light hydrocarbons in this zone is variable. Methane is present in rich abundance in all samples except B-1097, B-1053 and B-1057. Methane is the predominant hydrocarbon although B-1045 (1775m) also contains a good abundance of C₂+ hydrocarbons.

The wetness varies over the zone. It is fairly high (around 20%) in most of the samples (except B-1041, B-1053 and B-107 which show relatively low wetness and samples B-1045 and B-1047 which have fairly high wetness, 58% and 40% respectively. The high wetness is accompanied by low IC₄/nC₄ ratios which suggest possible migrated hydrocarbons from a more mature source, especially in sample B-1045.

Only one Rock-Eval analysis was carried out over this interval. This was on a claystone at the top of the zone. Results indicate a type II/III kerogen of moderate maturity.

Zone D, 1970-2075m: The top of this zone is marked by the appearance of a dark grey silty claystone. This is the dominant lithology throughout the zone and shows good to rich TOC values.

Methane is the most abundant light hydrocarbon. All three samples from this zone show good abundances especially the lowermost are B-1065 (2045m). The abundance of C₂-C₄ hydrocarbons is good in the bottom sample. The wetness is fairly high for all the samples (over 20%) although this decreased with depth. The IC₄/nC₄ ratios are fairly low for the bottom two samples indicating early mature samples or the presence of non-indigenous hydrocarbons. The latter may be the case as the upper sample in this zone shows a much higher IC₄/nC₄ ratio indicative of immaturity.

The Rock-Eval results show a type II/III kerogen. The lowest sample is richest and could be called a type II kerogen. The production indices are low, indicating little generation of hydrocarbons. The petroleum potential varies in accordance with the hydrogen index. The lowermost sample having the greatest value. T_{max} results indicate that the samples are early mature.

Zone E, 2075-2135m: This is a small zone where the dominant lithology is a light grey, poorly sorted sand with minor (5%) claystone and

limestone. One set of Rock-Eval and TOC results was obtained. These were for a dark grey claystone. The results are very similar to those from the claystone of the zone above (caving?) showing a rich TOC content and a type II/III kerogen.'

Light hydrocarbon analyses show fair to good abundances of methane but poor abundances of C_2-C_4 hydrocarbons. Despite this the wetness values are fairly high, around 20%. IC_4/nC_4 ratios indicate that the samples are moderately to early mature (or contain migrated hydrocarbons).

Zone F, 2135-2255m: The top of this zone is marked by the appearance of a red-brown claystone with very low TOC values (under 0.1% the TOC is so low as to be within the limit of resolution of the carbon analyser i.e. 0.04%). This claystone and a poorly sorted sand are the dominant lithologies. A second type of claystone: dark grey with good TOC values is also present in the uppermost sample. This may be caved material.

Light hydrocarbon analyses show poor abundances of C_1-C_4 hydrocarbons except in the top 2 samples (fair abundances - 1000 - 3000 μ l/kg). Methane is the dominant hydrocarbon. The wetness is moderately high in the upper 2 samples (45% and 33%) but decreases down the zone. The IC_4/nC_4 ratios indicate moderate mature samples.

The Rock-Eval results indicate an increasingly hydrogen poor kerogen with depth. The uppermost value (B-1071) is from the dark grey claystone. It indicates a type II/III kerogen. The very high oxygen index for the last sample should be ignored. Extreme readings such as this can occur when the total TOC is under 0.1%.

CONCLUSIONS

As no formation top data was available to IKU for this particular well little can be said about the correspondence of our zone system with the actual stratigraphy. Although zone A probably corresponds fairly closely to the Cretaceous in this well, and Zone B to the Kimmeridge Clay formation and upper part of the Heather formation. Zones C-E probably lie in the middle and lower Jurassic while from the appearance of a red claystone in zone F this probably belongs in the upper Triassic.

The source potential and maturity (based only on T_{max} and IC_4/nC_4 ratios) of the zones from the data available has been summarised below:

Zone A, 1250-1385m: The yellow-brown claystone shows poor potential for gas. Immature to early mature.

Zone B, 1385-1640m: A dark grey claystone with good to rich potential for oil and gas. Immature to early mature. Some evidence of non-indigenous hydrocarbons in the lower samples (below 1490m).

Zone C, 1640-1970m: This is largely a sand unit it has no oil or gas potential as a producer but it may contain some migrated hydrocarbons. Especially between 1745m and 1805m. Probably early mature but this cannot be ascertained as IC_4/nC_4 ratios are affected by migrated hydrocarbons and the Rock-Eval result has been obtained from a claystone that is probably caved.

Zone D, 1970-2075m: This zone shows good to rich potential for oil and gas, and is early mature. Some evidence of non-indigenous hydrocarbons at the base of the zone.

Zone E, 2075-2135m: Predominantly a sand unit with no source potential but there is some evidence of migrated hydrocarbons.

Zone F, 2135-2255m: Fair to poor source potential for gas (poor at the base of the zone). Moderately mature.

TABLE I a.

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

	IKU	DEPTH	C1	C2	C3	iC4	nC4	C5+	SUM	SUM	WET-	iC4	
I	no.	m/ft							C1-C4	C2-C4	NESS	-----	I
I											(%)	nC4	I
I													I
I	B 1011	1265	1638	10	3				1652	13	0.81		I
I	B 1012	1280	973	7	3				983	10	1.02		I
I	B 1013	1290	1296	13	4				1314	17	1.30		I
I	B 1014	1310	1399	23	11	6			1440	40	2.81		I
I	B 1015	1325	700	16	8				724	24	3.27		I
I	B 1016	1340	789	24	14				827	38	4.59		I
I	B 1017	1355	83	12	10	6			112	29	25.53		I
I	B 1018	1370	67	9	7	4	3		91	24	26.17	1.53	I
I	B 1019	1385	15138	985	323	146	79	148	16670	1532	9.19	1.86	I
I	B 1020	1400	13451	849	237	89	54	115	14680	1229	8.37	1.65	I
I	B 1021	1415	33190	1514	394	148	92	193	35338	2147	6.08	1.62	I
I	B 1022	1430	60147	2822	721	254	146	281	64090	3943	6.15	1.75	I
I	B 1023	1445	41874	2076	530	178	118	220	44776	2902	6.48	1.52	I
I	B 1024	1460	62619	2449	552	177	116	226	65912	3293	5.00	1.52	I
I	B 1025	1475	34931	1532	344	93	68	117	36968	2037	5.51	1.38	I
I	B 1026	1490	371372	18531	4319	1038	779	1434	396039	24667	6.23	1.33	I
I	B 1029	1535	1345	219	63	24	13	17	1665	319	19.17	1.90	I
I	B 1031	1565	2						2		0.00		I
I	B 1033	1595	1100	150	54	21	13	24	1338	239	17.85	1.61	I
I	B 1035	1625	2337	343	117	42	28	41	2868	530	18.50	1.49	I
I	B 1037	1655	4548	150	26	8	4	6	4736	189	3.98	1.76	I
I	B 1039	1685	18318	884	104	18	10	15	19335	1017	5.26	1.74	I
I	B 1041	1710	17869	700	103	21	12	8850	18704	835	4.46	1.76	I

DATE : 9 - 1 - 84.

TABLE I a.

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

IKU no.	DEPTH m/ft	C1	C2	C3	iC4	nC4	C5+	SUM C1-C4	SUM C2-C4	WET-NESS (%)	iC4 nC4
B 1043	1745	4988	330	67	15	10	15	5410	422	7.80	1.61
B 1045	1775	1892	97	96	23	72	3	2180	288	13.20	0.33
B 1047	1805	348	54	21	6	4	8	433	85	19.60	1.40
B 1049	1835	2175	183	48	12	8	17	2427	252	10.38	1.43
B 1051	1865	1837	143	42	10	7	2	2039	202	9.93	1.44
B 1053	1895	1583	83	21	6	4	5	1697	114	6.74	1.80
B 1055	1925	6371	337	78	21	13	21	6820	448	6.57	1.66
B 1057	1955	75	5					80	5	6.63	
B 1059	1985	3698	459	231	72	62	103	4522	824	18.23	1.17
B 1061	2015	3207	472	295	98	67	153	4139	932	22.51	1.46
B 1065	2045	21001	1753	1319	489	405	621	24967	3967	15.89	1.21
B 1068	2090	1844	143	96	33	29	39	2145	301	14.04	1.12
B 1069	2105	3036	214	142	45	40	12	3476	440	12.66	1.14
B 1071	2135	837	94	75	30	19	30	1055	218	20.70	1.57
B 1073	2165	561	69	60	23	15		729	168	22.99	1.56
B 1076	2210	116	12					128	12	8.99	
B 1079	2255	123						123		0.00	

DATE : 9 - 1 - 84.

TABLE I b.

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

I	I	I	I	I	I	I	I	I	I	I	I	I	I	I
I	IKU	DEPTH	C1	C2	C3	iC4	nC4	C5+	SUM	SUM	WET-	iC4	I	
I	no.	m/ft							C1-C4	C2-C4	NESS	-----	I	
I											(%)	nC4	I	
I													I	
I	I B 1011	1265	149	8	6			42	162	13	8.08		I	
I	I B 1012	1280	49	4	4				57	8	13.88		I	
I	I B 1013	1290	73	7	6			28	86	14	15.69		I	
I	I B 1014	1310	6						6		0.00		I	
I	I B 1015	1325	55	6	9	6	6	98	83	27	32.97	1.09	I	
I	I B 1016	1340	45	6	9	11	11	167	82	37	45.02	1.03	I	
I	I B 1017	1355	22	5	3	3	4	144	38	15	40.80	0.84	I	
I	I B 1018	1370	43	4	3			201	50	6	12.73		I	
I	I B 1019	1385	134	101	146	125	127	629	633	499	78.76	0.99	I	
I	I B 1020	1400	538	406	453	373	333	1124	2103	1565	74.40	1.12	I	
I	I B 1021	1415	1169	5	484	377	327	1019	2362	1193	50.51	1.15	I	
I	I B 1022	1430	1471	733	6766	5186	448	1235	14604	13133	89.93	11.57	I	
I	I B 1023	1445	1338	791	690	472	409	965	3701	2363	63.85	1.15	I	
I	I B 1024	1460	2308	899	703	475	434	1151	4820	2512	52.12	1.10	I	
I	I B 1025	1475	17833	767	643	418	414	1180	20075	2242	11.17	1.01	I	
I	I B 1026	1490	1978	1184	917	440	439	933	4957	2979	60.09	1.00	I	
I	I B 1029	1535	286	463	469	294	2774	732	4286	4000	93.32	0.11	I	
I	I B 1031	1565	262	265	352	273	257	841	1408	1147	81.41	1.06	I	
I	I B 1033	1595	248	269	312	221	207	572	1258	1010	80.26	1.07	I	
I	I B 1035	1625	515	415	4352	295	270	753	5846	5332	91.20	1.10	I	
I	I B 1037	1655	1142	477	319	180	180	711	2297	1155	50.30	1.00	I	
I	I B 1039	1685	9296	3570	1050	298	274	808	14487	5192	35.84	1.09	I	
I	I B 1041	1710	471	49	13	3		54	536	65	12.09		I	

DATE : 9 - 1 - 84.

TABLE I b.

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

	IKU	DEPTH	C1	C2	C3	iC4	nC4	C5+	SUM	SUM	WET-	iC4	I
I	no.	m/ft							C1-C4	C2-C4	NESS	-----	I
I											(%)	nC4	I
I													I
I													I
I	B 1043	1745	1058	545	334	151	162	804	2249	1192	52.98	0.93	I
I	B 1045	1775	390	323	2374	141	143	534	3370	2981	88.44	0.99	I
I	B 1047	1805	321	88	113	79	87	425	688	367	53.40	0.90	I
I	B 1049	1835	271	161	155	89	92	333	768	497	64.70	0.96	I
I	B 1051	1865	597	196	131	53	66	409	1044	447	42.81	0.80	I
I	B 1053	1895	156	15	5			13	176	20	11.45		I
I	B 1055	1925	2022	855	548	278	270	820	3974	1951	49.11	1.03	I
I	B 1057	1955											I
I	B 1059	1985	187	96	105	510	59	171	957	770	80.46	8.72	I
I	B 1061	2015	2150	220	411	235	327	916	3343	1193	35.68	0.72	I
I	B 1065	2045	1634	534	1111	640	903	2759	4823	3189	66.12	0.71	I
I	B 1068	2090	271	46	80	44	63	270	505	233	46.22	0.69	I
I	B 1069	2105	396	69	118	65	93	414	742	345	46.58	0.70	I
I	B 1071	2135	137	86	197	143	177	746	740	603	81.47	0.80	I
I	B 1073	2165	255	39	81	52	63	230	490	235	48.00	0.82	I
I	B 1076	2210	69	11	3	4		66	86	18	20.51		I
I	B 1079	2255	30	4	6	6	8	67	54	24	44.69	0.69	I
I													I

DATE : 9 - 1 - 84.

TABLE I c.

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

	IKU	DEPTH	C1	C2	C3	iC4	nC4	C5+	SUM	SUM	WET-	iC4	
I	no.	m/ft							C1-C4	C2-C4	NESS	-----	I
I											(%)	nC4	I
I													I
I	B 1011	1265	1787	18	9			42	1814	26	1.46		I
I	B 1012	1280	1023	11	7				1041	18	1.73		I
I	B 1013	1290	1369	20	11			28	1400	31	2.19		I
I	B 1014	1310	1405	23	11	6			1445	40	2.80		I
I	B 1015	1325	756	22	17	6	6	98	807	51	6.31	1.09	I
I	B 1016	1340	834	29	24	11	11	167	909	75	8.22	1.03	I
I	B 1017	1355	105	17	13	10	4	144	149	44	29.37	2.41	I
I	B 1018	1370	110	13	10	4	3	201	140	30	21.42	1.53	I
I	B 1019	1385	15272	1086	468	271	205	776	17303	2031	11.74	1.32	I
I	B 1020	1400	13989	1255	690	462	387	1239	16783	2794	16.65	1.19	I
I	B 1021	1415	34359	1519	877	525	419	1212	37700	3340	8.86	1.25	I
I	B 1022	1430	61617	3555	7488	5440	594	1516	78694	17077	21.70	9.16	I
I	B 1023	1445	43212	2867	1221	650	527	1185	48477	5265	10.86	1.23	I
I	B 1024	1460	64927	3348	1255	652	550	1377	70732	5805	8.21	1.19	I
I	B 1025	1475	52764	2299	987	511	481	1297	57043	4279	7.50	1.06	I
I	B 1026	1490	373350	19715	5236	1478	1217	2366	400996	27646	6.89	1.21	I
I	B 1029	1535	1632	682	532	318	2787	749	5951	4319	72.58	0.11	I
I	B 1031	1565	264	265	352	273	257	841	1410	1147	81.31	1.06	I
I	B 1033	1595	1348	419	366	243	220	596	2596	1248	48.09	1.10	I
I	B 1035	1625	2852	758	4469	337	298	794	8714	5862	67.27	1.13	I
I	B 1037	1655	5689	627	345	187	184	716	7033	1344	19.11	1.02	I
I	B 1039	1685	27614	4454	1154	316	284	823	33822	6208	18.36	1.11	I
I	B 1041	1710	18340	748	116	24	12	8904	19240	900	4.68	2.02	I

DATE : 9 - 1 - 84.

TABLE I c.

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

	IKU	DEPTH	C1	C2	C3	iC4	nC4	C5+	SUM	SUM	WET-	iC4	
I	no.	m/ft							C1-C4	C2-C4	NESS	----	I
I											(%)	nC4	I
I													I
I	B 1043	1745	6046	875	401	166	171	819	7660	1614	21.07	0.97	I
I	B 1045	1775	2282	420	2470	164	214	537	5550	3268	58.89	0.77	I
I	B 1047	1805	669	142	134	84	91	432	1121	452	40.33	0.92	I
I	B 1049	1835	2446	345	203	101	100	349	3195	749	23.44	1.00	I
I	B 1051	1865	2434	340	173	63	74	412	3084	649	21.06	0.86	I
I	B 1053	1895	1739	99	26	6	4	17	1874	135	7.18	1.80	I
I	B 1055	1925	8394	1192	626	299	283	840	10793	2400	22.23	1.06	I
I	B 1057	1955	75	5					80	5	6.63		I
I	B 1059	1985	3885	555	337	582	120	274	5480	1594	29.10	4.85	I
I	B 1061	2015	5358	692	707	333	394	1069	7483	2125	28.40	0.84	I
I	B 1065	2045	22635	2287	2430	1129	1309	3380	29790	7155	24.02	0.86	I
I	B 1068	2090	2116	189	176	77	93	309	2650	534	20.17	0.83	I
I	B 1069	2105	3432	282	260	110	133	427	4218	786	18.63	0.83	I
I	B 1071	2135	974	180	272	173	197	776	1795	821	45.76	0.88	I
I	B 1073	2165	816	108	142	75	78	230	1218	403	33.04	0.96	I
I	B 1076	2210	185	22	3	4		66	214	29	13.63		I
I	B 1079	2255	153	4	6	6	8	67	177	24	13.72	0.69	I

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Lithology and Total Organic Carbon measurements

TABLE NO.: 2.
WELL NO.: 31/6-3

Sample	Depth (m)	TOC	Lithology
B-1011	1250-1265	0.73	50% <u>Claystone</u> , olive grey-medium grey, partly silty, slightly micaceous, partly calcareous
		0.25	45% <u>Claystone</u> , dark yellowish brown, slightly micaceous
			5% <u>Marl</u> , dark reddish brown - moderate brown
B-1012	1265-1280	0.61	50% <u>Claystone</u> , olive grey - medium dark grey - grey, partly silty, slightly micaceous, partly calcareous
		0.29	45% <u>Claystone</u> , dark yellowish brown
			5% <u>Marl</u> , as above
B-1013	1280-1295	0.57	65% <u>Claystone</u> , grey - medium dark grey - olive grey, as above
		0.16	30% <u>Claystone</u> , dark yellowish brown, as above
			5% <u>Marl</u> , as above
B-1014	1295-1310	0.51	70% <u>Claystone</u> , grey - medium dark grey, partly silty, slightly micaceous, slightly calcareous
		0.19	30% <u>Claystone</u> , dark yellowish brown - dark brownish grey
			Sm.am. <u>Marl</u> , as above
B-1015	1310-1325	0.42	75% <u>Claystone</u> , grey - medium dark grey, as above
		0.20	25% <u>Claystone</u> , dark yellowish brown - brownish grey, as above
			Sm.am. <u>Marl</u> , as above



Lithology and Total Organic Carbon measurements

TABLE NO.: 2.
WELL NO.: 31/6-3

Sample	Depth (m)	TOC	Lithology
B-1016	1325-1340	0.5	95% <u>Claystone</u> , medium grey (medium dark grey), partly silty, calcareous, partly very calcareous grading to marl 5% <u>Claystone</u> , dark yellowish brown, brownish grey, as above Sm.am. Marl, as above
B-1017	1340-1355	0.54	70% <u>Claystone</u> , medium grey - light grey, calcareous 30% <u>LCM</u> (Nut shells, Mica)
B-1018	1355-1370	0.46	60% <u>LSM</u> (Nut shells, Mica) 40% <u>Claystone</u> , medium grey - light grey, calcareous
B-1019	1370-1385	0.45 4.66	60% <u>Claystone</u> , medium grey - light grey, as above 40% <u>Claystone</u> , dark grey, silty, slightly micromicaceous, partly micropyrritic
B-1020	1385-1400	1.67	100% <u>Claystone</u> , dark grey, as above Sm.am. Siderite; Limestone
B-1021	1400-1415	1.86	100% <u>Claystone</u> , dark grey, as above Sm.am. Claystone, light grey
B-1022	1415-1430	2.22	100% <u>Claystone</u> , dark grey, as above
B-1023	1430-1445	2.08	100% <u>Claystone</u> , dark grey, as above
B-1024	1445-1460	2.00	100% <u>Claystone</u> , dark grey, as above
B-1025	1460-1475	1.68	100% <u>Claystone</u> , dark grey, as above



Lithology and Total Organic Carbon measurements

TABLE NO.: 2.
WELL NO.: 31/6-3

Sample	Depth (m)	TOC	Lithology
B-1026	1475-1490	1.77	100% <u>Claystone</u> , dark grey, as above
B-1029	1520-1535	1.95	100% <u>Claystone</u> , dark grey, as above Sm.am. Dolomite/Siderite
B-1031	1550-1565	2.14	95% <u>Claystone</u> , medium dark grey - dark grey 5% <u>Sand</u> , very fine
B-1033	1580-1595	1.94	95% <u>Claystone</u> , medium dark grey - dark grey 5% <u>Sand</u> , very fine
B-1035	1610-1625	1.96	100% <u>Claystone</u> , dark grey Sm.am. Sand, very fine
B-1037	1640-1655	1.88	50% <u>Claystone</u> , dark grey 50% <u>Sand</u> , light grey, very fine - coarse
B-1039	1670-1685	0.14 2.03	80% <u>Sand</u> , light grey, very fine - very coarse 15% <u>Claystone</u> , dark grey 5% <u>Coal</u>
B-1041	1700-1710	3.31	80% <u>Sand</u> , as above 15% <u>Claystone</u> , as above 5% <u>Coal</u>
B-1043	1730-1745		95% <u>Sand</u> , light grey, very fine - coarse 5% <u>Claystone</u> , grey, dark grey, silty, slightly micromicaceous



Lithology and Total Organic Carbon measurements

TABLE NO.: 2.
WELL NO.: 31/6-3

Sample	Depth (m)	TOC	Lithology
B-1045	1760-17765		90% <u>Sand</u> , light grey, very fine - coarse 10% <u>Claystone</u> , grey, dark grey, as above
B-1047	1790-1805	2.35	85% <u>Sand</u> , light grey, very fine - very coarse 15% <u>Claystone</u> , grey, dark grey, as above
B-1049	1820-1835		95% <u>Sand</u> , light grey, very fine - coarse 5% <u>Claystone</u> , grey, dark grey, as above
B-1051	1850-1865		100% <u>Sand</u> , light grey, very fine - very coarse Sm.am. <u>Claystone</u> , grey, dark grey, as above
B-1053	1880-1895		90% <u>Sand</u> , as above 10% <u>Claystone</u> , grey, dark grey, as above
B-1055	1910-1925	2.05	80% <u>Sand</u> , as above 10% <u>Claystone</u> , grey, dark grey, as above Sm.am. <u>Claystone</u> , dark brownish grey
B-1057	1940-1955		100% <u>Sand</u> , very fine - fine, clear, light grey Sm.am. <u>Claystone</u> , grey, dark grey
B-1059	1970-1985	2.27	50% <u>Claystone</u> , grey, dark grey, silty, micaceous 40% <u>Sand</u> , very fine - fine, light grey 10% <u>Sandstone</u> , very fine, argillaceous, micaceous
B-1061	2000-2015	1.26	95% <u>Siltstone</u> , grey - olive grey, clayey, occasionally sandy, micaceous 5% <u>Sand</u> , very fine - fine, light grey
B-1065	2030-2045	2.32	100% <u>Claystone</u> , dark grey, silty, slightly micaceous



Lithology and Total Organic Carbon measurements

TABLE NO.: 2.
WELL NO.: 31/6-3

Sample	Depth (m)	TOC	Lithology
B-1068	2075-2090		90% <u>Sand</u> , light grey, fine - very coarse 5% <u>Claystone</u> , dark grey, as above 5% <u>Limestone</u> , white
B-1069	2090-2105		90% <u>Sand</u> , as above 5% <u>Claystone</u> , as above 5% <u>Limestone</u> , as above
B-1071	2120-2135	2.09	35% <u>Sand</u> , as above 35% <u>Sandstone</u> , very fine - medium, argillaceous, very micaceous 30% <u>Claystone</u> , dark grey - grey
B-1073	2150-2165	1.32	60% <u>Claystone</u> , dark reddish brown - moderate brown, very silty, sandy 30% <u>Claystone</u> , dark grey, silty, occasionally sandy, micaceous 10% <u>Sand</u> , light grey, very fine - coarse
B-1076	2195-2210		50% <u>Sand</u> , light grey, very fine - very coarse 40% <u>Sandstone</u> , light grey, greenish grey, very argillaceous, partly calcareous 10% <u>Claystone</u> , dark reddish brown - moderate brown
B-1079	2240-2255		50% <u>Sand</u> , moderate brown, very fine - medium 50% <u>Claystone</u> , dark reddish brown - dark brown, very silty, sandy, partly calcareous Sm.am. Sandstone, light grey - greenish grey, very argillaceous, as above

TABLE 3.

DATA FROM ROCK EVAL PYROLYSIS

I	I	I	I	I	I	I	I	I	I	I	I	I
I	IKU	DEPTH	:	S1	S2	S3	TOC	HYDR. INDEX	OXYGEN INDEX	PETROLEUM POTENTIAL	PROD. INDEX	TEMP. MAX
I	No.		:				(%)			S1+S2	S1+S2	(C)
I		m/ft	:									
I	B 1015	1325	:	0.12	0.09	0.49	0.42	21	117	0.21	0.57	423
I	B 1018	1370	:	0.14	0.14	0.41	0.46	30	89	0.28	0.50	425
I	B 1019	1385	:	0.04	0.05	0.17	0.45	11	38	0.09	0.44	422
I	B 1019	1385	:	0.54	17.40	1.36	4.66	373	29	17.94	0.03	423
I	B 1020	1400	:	0.12	3.71	0.52	1.67	222	31	3.83	0.03	436
I	B 1021	1415	:	0.18	3.82	0.57	1.86	205	31	4.00	0.05	441
I	B 1022	1430	:	0.24	6.13	0.44	2.22	276	20	6.37	0.04	438
I	B 1023	1445	:	0.27	6.40	1.16	2.08	308	56	6.67	0.04	433
I	B 1024	1460	:	0.24	4.63	0.35	2.00	232	18	4.87	0.05	437
I	B 1025	1475	:	0.14	2.38	0.27	1.68	142	16	2.52	0.06	432
I	B 1026	1490	:	0.13	2.88	0.26	1.77	163	15	3.01	0.04	433
I	B 1029	1535	:	0.13	3.60	0.47	1.95	185	24	3.73	0.03	433
I	B 1031	1565	:	0.26	5.18	0.43	2.11	245	20	5.44	0.05	434
I	B 1033	1595	:	0.29	4.90	0.45	1.94	253	23	5.19	0.06	436
I	B 1035	1625	:	0.17	4.24	0.31	1.96	216	16	4.41	0.04	435
I	B 1037	1655	:	0.41	3.80	0.30	1.88	202	16	4.21	0.10	435
I	B 1059	1985	:	0.29	5.78	0.21	2.27	255	9	6.07	0.05	435
I	B 1061	2015	:	0.17	2.86	0.18	1.26	227	14	3.03	0.06	438
I	B 1065	2045	:	0.49	8.78	0.47	2.32	378	20	9.27	0.05	430
I	B 1071	2135	:	0.27	6.88	0.56	2.09	329	27	7.15	0.04	433
I	B 1073	2165	:	0.13	1.37	0.33	1.32	104	25	1.50	0.09	438
I	B 1079	2255	:	0.10	0.01	0.75	0.05	20	1500	0.11	0.91	444

DATE : 19 - 1 - 84.