

**Mageobar**

DRILLING FLUID SERVICES

**DRESSER****WELL  
SUMMARY**

Statoil's re-entry well 24/12-1 was spudded June 4, 1978. Three cement plugs were drilled in the 9 5/8" casing using the existing mud left in the hole before re-entry. Slight settling of 2-3 meters had occurred to the old mud due to the length of time the mud had been static before re-entry, and the mud wt was cut about .06 R.D. Conditioning of system for drilling cement consisted of Barite and Bentonite additions, as well as small additions of chemical for stability.

The 9 5/8" casing shoe was drilled out at 3966 meters using 1.93 - 1.94 R.D. mud weight. After drilling shoe, became stuck at 3968 meters, no circulation or rotation. Freed pipe and circulated out pipe rubbers that have been stripped. Resumed drilling 18-6-78. Raised mud wt. to 2.00 R.D. Ran core barrel from 4160 meters to 4180 meters, after running core barrel raised mud weight in active system to 2.04 R.D. due to background gas. Turbine drilling was continue to T.D. depth of 4825 meters. Schlumberger logging began and continue with occasional circulation and conditioning of hole. Plugging and abandoning - procedures began, and rig moving commenced on 13-8-78.

The re-entry and drilling of well 24/12-1 encompassed 73 days with a mud cost of \$ 266,551. 62.5% of this cost reflects the high consumption of Barite due to constant dilution to maintain flow properties as per Statoil's requirements. It should be noted that chemical consumptions also increased above expected with dilutions of up to 20 bbl/hr. Properties before dilution ran as follows: Gels of 4/24 with a yield Pt of 8-10; After dilution gels were reduced to 3/18 with a yield pt. of 5-6. The properties before dilution were well within the specifications listed in the mud program for well 24/12-1, while the lower readings represent a decrease achievable only through constant dilution.



# TOTAL MATERIAL CONSUMPTION

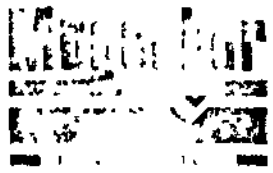
REENTRY WELL 24/12 - 1

8 3/8" Open Hole  
859 Meters

<u>PRODUCT</u>	<u>UNITS</u>	<u>COST</u>
1 Barite mt	1474	\$ 166,517.78
2 Bentonite mt	125	38,347.50
3 Bentonite sxs	213	3,097.02
4 Spersene sxs	431	6,193.47
5 XP-20	390	7,971.60
6 Tannathin sxs	49	606.13
7 Caustic Soda sxs	273	4,045.86
8 Resinex sxs	649	37,979.48
9 Soda Ash sxs	13	260.00
10 Lime sxs	69	491.97
11 Mica Fine sxs	15	208.20
12 Mica Course sxs	45	624.60
13 Nut Plug	5	76.80
14 Drispac sxs	1	131.05
		<hr/>
	Total cost	\$ 266,551.46

Cost/Day \$ 3,651.39

Cost/Meter \$ 310.30



DRESSER

# TOTAL MATERIAL CONSUMPTION

## REENTRY WELL 24/12-1

6 3/8" Open Hole

859 Meters

<u>PRODUCT</u>	<u>MATERIAL CONSUMPTION COST BREAKDOWN - %</u>
1. Barite	62.5%
2. Bentonite	14.4%
3. Bentonite (sx)	1.2%
4. Spicrsene	2.3%
5. xF-20	3%
6. Tannathin	.2%
7. Caustic Soda	1.5%
8. Resinex	14.2%
9. Soda Ash	.09%
10. Lime	.19%
11. Mica (Fine)	.09%
12. Mica (Coarse)	.23%
13. Nut Plug	.04%
14. Drispac	.06%

U-189

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**REPORT TITLE**

SOURCE ROCK EVALUATION of WELL 24/12 - 1.

Section II

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**CONTRACTOR**

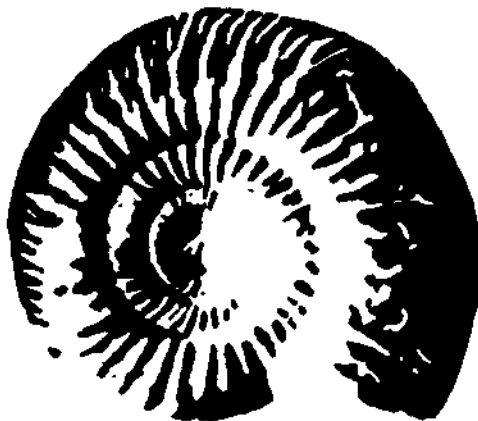
STATOIL

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**CONTRACTORS REF.:**

**JOB. NO.:**

**IKU**



INSTITUTT FOR  
KONTINENTALSOKKELUNDERSØKELSER

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## EXPERIMENTAL

One ml of the headspace gas from each of the cans was analysed gas-chromatographically for light hydrocarbons. The results are shown in Table I.a. The canned samples were washed with tempered water on a 0.125 mm sieve to remove drilling mud and thereafter dried at 35°C.

### Light Hydrocarbons.

Aliquotes of the samples were dried at room temperature after washing and sieving. The cuttings with a grain size between 1 and 2 mm were used for light hydrocarbon determination. These were treated with 6N HCl in a closed evacuated system, thereafter flushed with water and the released gas analysed gaschromatographically. The results are shown in Table I.b.

### Total Organic Carbon (TOC)

Aliquotes of the samples were treated with hot 6N HCl to remove carbonates, and then analysed on a Leco EC 12 carbon determinator, to determine the total organic carbon (TOC). Table II.

### Extractable Organic Matter (EOM)

From the TOC results, samples were selected and extracted with DCM in soxhlet apparatus for 48 h., and the amount of extractable organic matter was determined. Table III.

### Chromatographic Separation

The extracts were separated on columns packed with 2/3 silica and 1/3 alumina, by eluting with hexane, benzene and methanol. Table III. The saturated fractions were analysed gaschromatographically on a 25 mm glass capillary column, using a Carlo Erba FV 2150 Chromatograph. The measurements from the gaschromatograms are shown in Table VII.

### Vitrinite Reflectance

Samples, taken at various intervals, were sent for vitrinite reflectance measurements at Geoconsultants, Newcastle upon Tyne. Upon receipt, the samples were soaked in warm water and sieved through 72 mesh to remove drilling mud. After oven drying of 40<sup>0</sup>C, they were mounted in Bakelite resin blocks; care being taken during the setting in the plastic to avoid temperatures in excess of 100<sup>0</sup>C. The samples were then ground, initially on a diamond lap followed by two grades of corundum paper. All grinding and subsequent polishing stages in the preparation were carried out using isopropyl alcohol as lubricant, since water leads to the swelling and disintegration of the clay fraction of the samples.

Polishing of the samples was performed on Selvyt cloths using three grades of alumina, 5/20, 3/50 and Gamma, followed by careful cleaning of the surface.

Reflectance determinations were carried out on a leitz M.P.V. micro-photometer under oil immersion, R.I. 1.516 at a wavelength of 546 nm. The field measured was varied to suit the size of the organic particle, but was usually of the order of 2 micron diameter.

The surface of the polished block was searched by the operator for suitable areas of vitrinitic material in the sediment. The reflectance of the organic particle was determined relative to optical glass standards of known reflectance. Where possible, a minimum of twenty individual particles of vitrinite was measured, although in many cases this number could not be achieved. The search for vitrinitic material was maintained for approximately 45 minutes on each sample before termination, if the operator considered that no more vitrinitic particles were likely to be located.

### Visual Kerogen

Samples for visual kerogen were picked from the screening analyses. The samples were crushed, treated with HCl and HF to remove the rock matrix, centrifuged and mounted on slides.

Maturity of the individual samples was determined by visual estimation of the colours of pollen, spores, cuticles, wood remains, and finely dispersed organic matter.

The colour tones are given according to Burgess' index (Burgess, J.D., 1974. Geol. Soc. Amer. Spec. Paper, 153, 19-30).

Table I.A.

Concentration ( $\mu\text{l}$  gas/kg rock) of  $C_1 - C_7$  hydrocarbons. (Headspace).

Depth (m)	$C_1$	$C_2$	$C_3$	$iC_4$	$nC_4$	$C_5^+$	$\Sigma C_1-C_4$	$\Sigma C_2-C_4$	% Gas wetness	$iC_4/nC_4$
3980-3989	372	175	44	0.5	3	122	595	223	37.5	0.16
3989-3998	999	733	403	82	218	1132	2440	1441	59.1	0.38
3998-4007	384	452	511	85	247	380	1678	1295	77.1	0.34
4007-4016	951	7978	777	144	505	1390	3174	2223	70.1	0.28
4016-4025	1790	3042	5946	1142	4124	9564	16044	14253	88.8	0.28
4025-4034	1521	2937	5741	1131	3903	10208	15232	13711	90.0	0.29
4034-4043	512	794	1934	435	1366	2484	5041	4529	89.9	0.32
4043-4052	671	847	1806	460	1341	2275	5125	4454	86.9	0.34
4052-4061	3476	7439	8863	1275	4086	3861	25139	21663	86.2	0.31
4061-4070	4396	12725	15617	2550	7995	11038	43283	38887	89.84	0.32
4070-4079	2416	1080	966	165	520	1216	5147	2731	53.1	0.32
4079-4088	5974	3238	3571	447	2386	11000	15815	9841	62.2	0.27
4088-4097	2282	1224	1116	207	752	3161	5580	3299	59.1	0.28
4097-4106	2044	1241	1049	168	581	1602	5083	3040	59.8	0.29



Table I.A. - p. 2

Depth (m)	C <sub>1</sub>	C <sub>2</sub>	C <sub>3</sub>	iC <sub>4</sub>	nC <sub>4</sub>	C <sub>5</sub> <sup>+</sup>	$\Sigma C_1-C_4$	$\Sigma C_2-C_4$	Gas % wetness	iC <sub>4</sub> /nC <sub>4</sub>
4106-4115	1887	1322	1133	176	673	4149	5191	3304	63.7	0.26
4115-4124	986	535	506	122	409	1347	2557	1571	61.5	0.30
4124-4133	1314	669	575	122	406	1351	3087	1773	57.4	0.30
4133-4142	4242	1923	1432	196	623	1776	8416	4174	49.6	0.31
4142-4151	5059	3925	3439	501	1753	8780	14677	9617	65.53	0.29
4151-4160	22485	11664	6704	688	1828	3444	43370	20885	48.2	0.38
4160-4169	3916	2456	2396	525	1313	6865	10607	6691	63.1	0.40
4169-4178	2466	1840	1200	184	408	1865	6098	3632	59.6	0.45
4178-4187	8227	6537	5529	723	2030	4317	23046	14819	64.3	0.36
4187-4196	3282	2307	1429	282	685	2389	8285	5004	60.4	0.41
4196-4205	9111	3834	1943	334	710	3442	15932	6821	42.8	0.47
4205-4214	969	869	805	150	438	3197	3230	2261	70.0	0.34
4214-4223	3508	2837	2131	261	843	6961	9580	6073	63.4	0.31
4223-4232	3796	2418	1413	170	430	4468	8228	4431	53.9	0.40
4232-4241	2192	1164	668	81	207	1893	4312	2119	49.1	0.39

Table I.A. - p. 3

Depth (m)	C <sub>1</sub>	C <sub>2</sub>	C <sub>3</sub>	iC <sub>4</sub>	nC <sub>4</sub>	C <sub>5</sub> <sup>+</sup>	$\Sigma C_1-C_4$	$\Sigma C_2-C_4$	Gas % wetness	iC <sub>4</sub> /nC <sub>4</sub>
4241-4250	6146	3053	2053	252	655	1995	12160	6014	49.5	0.38
4250-4259	627	601	634	101	279	1249	2243	1616	72.1	0.36
4259-4268	3678	2281	1524	198	578	1125	8258	4581	55.5	0.34
4268-4277	5257	3278	2248	288	806	1790	11877	6621	55.7	0.36
4277-4286	6625	5151	4274	434	1327	2013	17811	11186	62.8	0.33
4286-4295	3411	2634	2335	293	926	2493	9599	6188	64.5	0.32
4295-4304	3693	2121	1338	155	480	2095	7787	4094	52.6	0.32
4304-4313	1938	973	617	76	216	1009	3820	1881	49.3	0.35
4313-4322	14435	6530	3438	422	1225	3466	26049	11614	44.6	0.34
4322-4331	667	355	323	57	169	893	1570	903	57.5	0.34
4331-4340	1742	316	179	60	155	1112	2453	710	29.0	0.39
4340-4349	23167	2915	441	65	142	407	26731	3563	13.3	0.45
4349-4358	13100	1823	120	90	210	866	15343	2243	14.6	0.43
4358-4367	13341	1436	428	25	78	311	15308	1967	12.9	0.32
4367-4376	4970	1445	698	105	207	759	7427	2457	33.1	0.51

Table I.A. - p. 4

Depth (m)	C <sub>1</sub>	C <sub>2</sub>	C <sub>3</sub>	iC <sub>4</sub>	nC <sub>4</sub>	C <sub>5</sub> <sup>+</sup>	$\Sigma C_1-C_4$	$\Sigma C_2-C_4$	Gas wetness %	iC <sub>4</sub> /nC <sub>4</sub>
4376-4385	11080	3406	1320	152	344	970	16303	5222	32.0	0.44
4385-4394	3957	1265	577	76	177	659	6052	2095	34.6	0.43
4394-4403	7069	2557	1194	176	357	1123	11354	4285	37.7	0.49
4403-4412	4895	1366	508	69	164	833	7002	2107	30.1	0.42
4412-4421	2809	962	505	29	108	790	4412	1603	36.3	0.26
4421-4430	840	396	353	47	126	813	1763	923	52.3	0.38
4430-4439	2565	684	379	75	159	568	3861	1297	33.6	0.47
4439-4448	2283	513	296	60	126	537	3277	994	30.3	0.47
4448-4457	1868	652	484	92	217	715	3313	1445	43.6	0.42
4457-4466	698	192	102	10	30	192	1032	334	32.3	0.34
4466-4475	604	203	81	8	27	366	923	319	34.6	0.30
4475-4484	4658	1318	352	27	67	826	6422	1764	27.5	0.40
4484-4493	2950	835	223	17	42	512	4067	1117	27.5	0.40
4493-4502	2867	830	239	16	29	455	3981	1114	28.0	0.53
4502-4511	3858	822	178	25	43	403	4926	1068	21.7	0.58

Table I.A. -p. 5

Depth (m)	C <sub>1</sub>	C <sub>2</sub>	C <sub>3</sub>	iC <sub>4</sub>	nC <sub>4</sub>	C <sub>5</sub> <sup>+</sup>	ΣC <sub>1</sub> -C <sub>4</sub>	ΣC <sub>2</sub> -C <sub>4</sub>	% Gas wetness	iC <sub>4</sub> /nC <sub>4</sub>
4493-4502	2867	830	239	16	29	455	3981	1114	28.0	0.53
4502-4511	3858	822	178	25	43	403	4926	1068	21.7	0.58
4511-4520	6977	1654	370	16	49	528	9066	2089	23.0	0.32
4520-4529	2694	820	261	23	72	396	3870	1176	30.4	0.32
4529-4538	3103	1070	451	31	90	514	4745	1642	34.6	0.35
4538-4547	3916	1018	279	28	60	259	5301	1385	26.1	0.47
4547-4556	5018	1255	390	44	81	624	6788	1770	26.1	0.54
4556-4565	4802	1110	380	46	89	534	6427	1625	25.3	0.52
4565-4574	5707	1830	862	118	203	1442	8720	3013	34.6	0.58
4574-4583	4920	1653	670	97	135	1267	7476	2556	34.2	0.72
4583-4592	1157	282	180	24	36	456	1679	521	31.1	0.65
4592-4601	4592	511	567	8	12	234	5179	587	11.3	0.63
4601-4610	11874	1480	163	20	36	182	13573	1699	12.5	0.56
4610-4619	9703	1105	123	9	18	282	10960	1256	11.5	0.51
4619-4628	9005	975	94	9	16	117	10098	1093	10.8	0.56
4628-4637	5238	1197	399	51	114	885	7000	1762	25.2	0.45

Table 1.A. -p. 6

Depth (m)	C <sub>1</sub>	C <sub>2</sub>	C <sub>3</sub>	iC <sub>4</sub>	nC <sub>4</sub>	C <sub>5</sub> <sup>+</sup>	ΣC <sub>1</sub> -C <sub>4</sub>	ΣC <sub>2</sub> -C <sub>4</sub>	% Gas wetness	iC <sub>4</sub> /nC <sub>4</sub>
4637-4646	733	628	504	86	184	1190	2135	1402	65.7	0.47
4646-4655	1240	1797	798	75	169	1136	4078	2838	69.6	0.44
4655-4664	4157	5190	1993	160	378	911	11879	7722	65.0	0.42
4664-4673	5508	3884	1425	135	275	652	11226	5718	50.9	0.49
4673-4682	3588	2734	1112	125	235	623	7794	4207	54.0	0.53
4682-4691	2892	851	470	84	141	602	4437	1546	34.8	0.60
4691-4700	4141	1643	936	182	271	1046	7172	3031	42.3	0.67
4700-4709	3102	1682	1638	414	537	1300	7373	4271	57.9	0.77
4709-4718	3277	1968	1106	245	341	839	6937	3660	52.8	0.72
4718-4727	4473	1198	559	93	148	652	6471	1998	30.9	0.63
4727-4736	2542	855	388	49	102	519	3936	1394	35.4	0.48
4736-4745	2750	1613	643	69	119	418	5194	2443	47.1	0.59
4745-4754	3051	2205	1119	128	228	537	6731	3680	54.7	0.56
4754-4760	3670	1339	803	112	204	1187	6128	2458	40.1	0.55
4760-4769	2856	2603	1229	119	241	869	7047	4192	59.5	0.49
4769-4778	1621	1336	578	66	147	966	3548	1927	54.3	0.45

Table 1.A. -p. 7

Depth (m)	C <sub>1</sub>	C <sub>2</sub>	C <sub>3</sub>	iC <sub>4</sub>	nC <sub>4</sub>	C <sub>5</sub> <sup>+</sup>	ΣC <sub>1</sub> -C <sub>4</sub>	ΣC <sub>2</sub> -C <sub>4</sub>	Gas wetness %	iC <sub>4</sub> /nC <sub>4</sub>
4778-4787	874	236	153	13	13	668	1289	414	32.2	1.00
4787-4796	878	379	269	23	51	42	1600	722	45.1	0.45
4796-4805	1092	570	294	27	68	37	2051	959	46.8	0.40
4805-4814	803	822	489	5	7	93	2125	1322	62.2	0.73
4814-4823	2332	2036	1113	135	297	59	5914	3581	60.6	0.45
4823-4825	3596	3822	1672	135	318	86	9543	5947	62.3	0.42

Table I B.

Concentration ( $\mu$  gas/kg rock) og  $C_1 - C_7$  hydrocarbons (Absorbed gas)

Depth (m)	$C_1$	$C_2$	$C_3$	i $C_4$	n $C_4$	$C_5^{\pm}$	$\Sigma C_1-C_4$	$\Sigma C_2-C_4$	% Gas wetness	$\frac{iC_4}{nC_4}$
3980-89	4883	985	808	31	104	230	6812	1928	28.3	0.29
3989-98	1914	320	354	30	78	210	2696	783	29.0	0.39
3998-4007	7008	1886	977	194	598	1352	10664	3655	34.3	0.32
4007-4016	4721	879	638	116	554	1544	6908	2187	31.4	0.21
4016-4025	8420	1307	936	143	703	1672	11509	3089	26.8	0.20
4025-4034	11426	1641	1094	230	889	1853	15280	3854	25.2	0.26
4034-4043	7324	1188	928	130	483	1224	10054	2729	27.2	0.27
4043-4052	4894	710	680	63	303	942	6651	1756	26.4	0.21
4052-4061	3825	907	1069	181	556	1353	6538	2714	41.5	0.33
4061-4070	3127	1310	1096	130	465	1124	6029	2901	48.1	0.28
4070-4079	2521	893	920	119	462	1263	4915	2394	48.7	0.26
4079-4088	2759	1405	1466	241	827	1902	6699	3940	58.8	0.29
4088-4097	30940	11198	8740	1138	4257	9142	56222	25332	45.0	0.27
4097-4106	2985	953	827	88	386	1114	5240	2255	43.0	0.23

Table I B - p. 2

Depth (m)	C <sub>1</sub>	C <sub>2</sub>	C <sub>3</sub>	iC <sub>4</sub>	nC <sub>4</sub>	C <sub>5</sub> <sup>+</sup>	ΣC <sub>1</sub> -C <sub>4</sub>	ΣC <sub>2</sub> -C <sub>4</sub>	% Gas wetness	$\frac{iC_4}{nC_4}$
4106-4115	3487	426	829	53	240	879	5734	2247	39.2	0.21
4115-4124	7977	3631	2905	406	1520	2192	16451	8473	51.5	0.27
4124-4133	6921	3011	2646	411	1574	2673	14563	7642	52.5	0.26
4133-4142	13354	7886	7111	1162	4122	9518	33635	20281	60.3	0.28
4142-4151	8544	3734	3281	528	1800	3465	17887	9343	52.2	0.29
4151-4160	1329	524	663	147	578	3119	3240	1911	59.0	0.25
4160-4169	1257	459	347	96	213	1037	2372	1115	47.0	0.45
4169-4178	459	151	181	44	144	697	979	520	53.1	0.31
4178-4187	831	275	273	69	221	936	1670	838	50.2	0.31
4187-4196	744	210	178	26	87	957	1245	501	40.2	0.30
4196-4205	359	137	127	33	94	475	750	392	52.2	0.35
4205-4214	461	140	147	37	110	1048	895	434	48.5	0.33
4214-4223	5346	908	448	64	205	1770	6969	1622	23.3	0.31
4223-4232	15696	2375	775	165	498	3143	19510	3814	19.6	0.33
4232-4241	1374	205	138	48	142	1321	1907	533	27.9	0.34
4241-4250	5442	873	419	97	347	275	7178	1736	24.2	0.28



Table I B - p. 3

Depth (m)	C <sub>1</sub>	C <sub>2</sub>	C <sub>3</sub>	iC <sub>4</sub>	nC <sub>4</sub>	C <sub>5</sub> <sup>+</sup>	$\Sigma C_1-C_4$	$\Sigma C_2-C_4$	Gas % wetness	$\frac{iC_4}{nC_4}$
4250-4259	2060	494	393	78	243	1791	3269	1209	37.0	0.32
4259-4268	3597	849	414	56	207	2075	5123	1525	29.8	0.27
4268-4277	3466	2162	2058	435	1240	5614	9362	5896	63.0	0.35
4277-4286	2900	781	498	108	342	1542	4629	1729	37.4	0.31
4286-4295	3037	1274	1147	248	804	3242	6511	3473	53.4	0.29
4295-4304	3653	1161	622	97	343	1496	5856	2204	37.6	0.28
4304-4313	19096	5049	1926	248	764	2990	27082	7986	29.5	0.32
1313-4322	4875	4003	3276	360	1107	1591	13620	8745	64.2	0.33
4322-4331	3572	759	151	25	37	26062	4543	971	21.4	0.68
4331-4370	4797	1510	883	143	278	545	7612	2815	37.0	0.51
4340-4349	4640	1201	710	96	212	474	6920	2280	33.0	0.45
4349-4358	9200	2003	604	75	156	318	12038	2838	23.6	0.48
4358-4367	16710	2686	453	43	61	131	19954	3245	16.3	0.70
4367-4376	14044	2570	393	31	47	147	17086	3041	17.8	0.67
4376-4385	14995	2123	242	14	22	54	17396	2400	13.8	0.63
4385-4394	21203	2797	352	27	41	136	24420	3217	13.2	0.67

Table I B - p. 4

Depth (m)	C <sub>1</sub>	C <sub>2</sub>	C <sub>3</sub>	iC <sub>4</sub>	nC <sub>4</sub>	C <sub>5</sub> <sup>+</sup>	ΣC <sub>1-C<sub>4</sub></sub>	ΣC <sub>2-C<sub>4</sub></sub>	Gas % wetness	$\frac{iC_4}{nC_4}$
4394-4403	16622	2889	545	55	92	220	10203	3581	17.7	0.60
4403-4412	4495	966	273	41	88	282	5864	1368	23.3	0.47
4412-4421	7181	1195	277	37	77	234	8767	1586	18.1	0.48
4421-4430	18966	2536	301	28	39	144	21869	2903	13.3	0.71
4430-4439	15983	2002	386	49	79	159	18499	2516	13.6	0.63
4439-4448	12569	2214	463	63	99	261	15407	2839	18.4	0.64
4448-4457	26000	3207	544	68	101	307	29921	3921	13.1	0.67
4457-4466	2797	756	190	33	49	140	3826	1028	26.9	0.67
4466-4475	3366	1034	209	24	33	92	4467	1300	27.9	0.75
4475-4484	1822	427	86	9	17	55	2362	540	22.9	0.54
4484-4493	1394	473	136	19	38	93	2060	666	32.3	0.51
4493-4542	2587	817	143	16	22	78	3586	999	27.8	0.70
4502-4511	3878	928	188	24	36	73	5054	1176	23.3	0.65
4511-4520	3757	1067	250	29	62	208	5165	1407	27.2	0.47
4520-4529	7089	1498	165	24	32	100	8808	1719	19.5	0.74
4529-4538	2784	964	191	20	32	79	3992	1208	30.2	0.63

Table I B - p. 5

Depth (m)	C <sub>1</sub>	C <sub>2</sub>	C <sub>3</sub>	iC <sub>4</sub>	nC <sub>4</sub>	C <sub>5</sub> <sup>+</sup>	ΣC <sub>1</sub> -C <sub>4</sub>	ΣC <sub>2</sub> -C <sub>4</sub>	% Gas wetness	$\frac{iC_4}{nC_4}$
4538-4547	1769	574	146	21	38	51	2548	779	30.6	0.56
4547-4566	7492	2159	227	20	25	102	9923	2432	24.5	0.79
4556-4565	20452	4620	403	35	39	90	25549	5097	20.0	0.91
4565-4574	17643	3757	309	34	36	68	21780	4137	19.0	0.95
4574-4583	22181	8816	362	28	23	63	31409	9228	29.4	1.21
4583-4592	4014	945	82	5	4	8	5050	1036	20.5	1.12
4592-4601	2893	788	108	9	9	20	3808	915	24.0	1.00
4601-4610	1787	388	55	6	7	25	2242	456	20.3	0.86
4610-4629	1419	384	70	10	11	31	1894	475	25.1	0.84
4619-4628	15951	2401	272	38	49	22	18711	2760	14.8	0.77
4638-4637	14705	2214	251	35	45	27	17250	2544	14.8	0.77
4637-4646	12876	2151	234	25	29	81	15316	2439	15.9	0.88
4646-4655	17260	5548	342	27	22	61	23199	5938	25.6	1.23
4655-4664	34584	4619	176	11	7	18	39397	4813	12.2	1.60
4664-4673	29331	4640	161	14	7	20	34154	4823	14.1	1.90
4673-4682	25543	3499	192	25	16	57	29275	3732	12.8	1.53

Table I B - p. 6

Depth (m)	C <sub>1</sub>	C <sub>2</sub>	C <sub>3</sub>	iC <sub>4</sub>	nC <sub>4</sub>	C <sub>5</sub> <sup>+</sup>	$\Sigma C_1-C_4$	$\Sigma C_2-C_4$	Gas % wetness	$\frac{iC_4}{nC_4}$
4682-4691	23251	3361	215	34	25	69	26887	3635	13.5	1.38
4691-4700	11568	1943	154	12	8	19	13685	2117	15.5	1.60
4700-4709	22774	3471	214	25	9	17	26494	3720	14.0	2.75
4709-4718	25163	3251	176	21	11	14	28622	3459	12.1	1.82
4718-4727	28431	3947	219	32	22	20	32650	4220	12.9	1.41
4727-4736	13008	3863	195	25	19	30	17109	4101	24.0	1.33
4736-4745	12458	3406	164	20	14	29	16161	3703	22.9	1.41
4745-4754	11390	1426	70	9	9	15	12904	1515	11.7	1.00
4751-4760	38054	4806	306	25	18	36	43209	5155	11.9	1.45
4760-4769	No bid on can									
4769-4778	9289	3055	139	18	13	10	12514	3225	25.8	1.38
4778-4787	9227	1216	120	18	19	11	10600	1373	13.0	0.92
4787-4796	10955	2724	144	18	16	8	13857	2902	20.9	1.12
4796-4805	6050	1667	78	10	7	4	7812	1762	22.6	1.31
4805-4814	12080	1625	117	11	8	9	13841	1761	13.7	1.39

Table I B - p. 7

Depth (m)	C <sub>1</sub>	C <sub>2</sub>	C <sub>3</sub>	iC <sub>4</sub>	nC <sub>4</sub>	C <sub>5</sub> <sup>+</sup>	$\Sigma C_1-C_4$	$\Sigma C_2-C_4$	Gas % wetness	$\frac{iC_4}{nC_4}$
4814-4823	9406	2464	120	15	11	12	12016	2610	21.7	1.30
4823-4825	38450	4453	238	12	10	2	43163	4713	10.9	1.16

Table 1.C.

Concentration ( $\mu\text{l gas/kg rock}$ ) of  $C_1 - C_2$  hydrocarbons in cuttings (Headspace + Absorbed)

Depth (m)	$C_1$	$C_2$	$C_3$	$iC_4$	$nC_4$	$C_5^+$	$\Sigma C_1-C_4$	$\Sigma C_2-C_4$	% Gas wetness	$iC_4/nC_4$
3980-3989	5255	1160	852	31.5	107	352	7407	2151	29.0	0.29
3989-3998	2913	1053	762	112	296	1342	5136	2224	43.3	0.37
3998-4007	7392	2338	1488	279	845	1732	12342	4950	40.1	0.33
4007-4016	5672	1676	1476	1415	260	1059	2934	10082	43.7	0.25
4016-4025	10210	4349	6882	1285	4827	11236	27553	17342	62.9	0.27
4025-4034	12947	4578	6835	1361	4792	12061	30512	17565	57.6	0.28
4034-4043	7836	1982	2862	565	1849	3708	18803	7258	38.6	0.31
4043-4052	5565	1557	2486	523	1644	3217	11776	6210	52.7	0.32
4052-4061	7301	8346	9932	1456	4642	5214	31677	24377	77.0	0.31
4061-4070	7523	14035	16713	2680	8460	12162	49312	41788	84.7	0.32
4070-4079	4937	1937	1886	284	982	2479	10062	5125	50.9	0.29
4079-4088	8733	4643	1820	688	3213	12902	22514	13781	61.2	0.21
4088-4097	33222	12422	9856	1345	5009	12303	61802	28631	46.3	0.27
4097-4106	5029	2194	1876	256	967	2716	10323	5295	51.3	0.26

Table 1.C. -p. 2

Depth (m)	C <sub>1</sub>	C <sub>2</sub>	C <sub>3</sub>	iC <sub>4</sub>	nC <sub>4</sub>	C <sub>5</sub> <sup>+</sup>	ΣC <sub>1</sub> -C <sub>4</sub>	ΣC <sub>2</sub> -C <sub>4</sub>	% Gas wetness	iC <sub>4</sub> /nC <sub>4</sub>
4106-4115	5374	2448	1962	229	913	5028	10925	5551	50.8	0.25
4115-4124	8963	4166	3411	528	1929	3539	19008	10044	52.8	0.27
4124-4133	8235	3680	3221	533	1980	4024	17650	9415	53.3	0.27
4133-4142	17596	9809	8543	1358	4745	11294	42051	24455	58.2	0.29
4142-4151	13603	7659	6720	1029	3553	12215	32564	18960	58.2	0.29
4151-4160	23814	12188	7367	835	2406	6563	46610	22796	48.9	0.35
4160-4169	5173	2915	2743	621	1526	7902	12979	7806	60.1	0.41
4169-4178	2925	1991	1381	228	552	2562	7077	4152	58.7	0.41
4178-4187	9058	6812	5802	792	2251	5253	24716	15657	63.3	0.35
4187-4196	4026	2517	1907	308	772	3346	9530	5505	57.8	0.40
4196-4205	9470	3971	2070	367	804	3917	16682	7213	43.2	0.46
4205-4214	1430	1009	952	187	548	4245	4125	2695	65.3	0.34
4214-4223	8854	3745	2579	325	1048	8731	16549	7695	46.5	0.31
4223-4232	19492	4793	2188	335	928	7611	27738	8245	29.7	0.36
4232-4241	3566	1369	806	1129	349	3214	6219	2652	42.6	0.37
4241-4250	11588	3926	2472	349	1002	2270	19338	7750	40.1	0.35

Table 1.C. -p.3

Depth (m)	C <sub>1</sub>	C <sub>2</sub>	C <sub>3</sub>	iC <sub>4</sub>	nC <sub>4</sub>	C <sub>5</sub> <sup>+</sup>	ΣC <sub>1-C<sub>4</sub></sub>	ΣC <sub>2-C<sub>4</sub></sub>	Gas wetness %	iC <sub>4</sub> /nC <sub>4</sub>
4250-4259	2687	1095	1027	179	522	3040	5512	2825	51.3	0.34
4259-4268	7275	3130	1938	254	785	3200	13381	6106	45.6	0.32
4268-4277	8723	5440	4306	723	2046	7404	21239	21517	58.9	0.35
4277-4286	9525	5932	4772	542	1669	3555	22440	12915	57.5	0.32
4286-4295	6448	3908	3482	541	1730	5735	16110	9661	60.0	0.31
4295-4304	7346	3282	1960	252	823	3591	13643	6298	46.2	0.31
4304-4313	21034	6022	2543	324	980	3999	30902	9867	31.9	0.33
4313-4322	19310	10533	6714	782	2332	5057	39669	20359	51.3	0.34
4322-4331	4239	1114	474	82	206	3499	6113	1874	30.7	0.40
4331-4340	6539	1826	1062	203	433	1657	10065	3525	35.0	0.47
4340-4349	27807	4116	1151	152	354	881	33651	5843	17.4	0.43
4349-4358	22300	3826	724	165	366	1184	27381	5081	18.6	0.45
4358-4367	30051	4122	1334	68	138	442	35262	5212	14.8	0.49
4367-4376	19014	4015	1091	136	254	906	24513	5498	22.4	0.54
4376-4385	26075	5528	1562	166	366	1024	33699	7622	22.6	0.45
4385-4394	25160	4062	929	103	218	795	30472	5312	17.4	0.47



Table 1.C. -p. 4

Depth (m)	C <sub>1</sub>	C <sub>2</sub>	C <sub>3</sub>	iC <sub>4</sub>	nC <sub>4</sub>	C <sub>5</sub> <sup>+</sup>	ΣC <sub>2</sub> -C <sub>4</sub>	ΣC <sub>2</sub> -C <sub>4</sub>	% Gas wetness	iC <sub>4</sub> /nC <sub>4</sub>
4394-4403	23690	5446	1739	231	449	1343	31557	11447	36.3	0.51
4403-4412	9390	2332	781	110	252	1115	12866	3475	27.0	0.44
4412-4421	9990	2157	782	66	185	1024	13179	3189	24.2	0.36
4421-4430	19806	2932	654	75	165	1101	23632	3826	16.2	0.45
4430-4439	18548	2686	765	124	238	727	22360	3813	17.1	0.52
4439-4448	14852	2727	759	123	225	798	18684	3833	20.5	0.55
4448-4457	27868	3859	1028	160	318	1022	33234	5366	16.1	0.50
4457-4466	3495	948	292	43	79	338	4858	1362	28.0	0.54
4466-4475	3970	1237	290	32	60	458	5590	1619	29.0	0.53
4475-4484	6480	1745	438	36	84	881	8784	2304	26.2	0.43
4484-4493	4344	2218	359	36	80	605	6127	1783	29.1	0.45
4493-4502	5454	1647	382	32	51	533	7567	2113	27.9	0.63
4502-4511	7736	1750	366	49	79	476	9980	2244	22.5	0.62
4511-4520	10734	272=	650	45	111	736	14231	3496	24.6	0.41
4520-4529	9783	2318	426	47	104	496	12678	2895	22.8	0.45
4529-4538	5887	2034	642	51	122	593	8737	2850=	32.6	0.42
4538-4547	5685	1592	425	49	98	310	7849	2164	27.6	0.50

Table 1.C -p. 5

Depth (m)	C <sub>1</sub>	C <sub>2</sub>	C <sub>3</sub>	iC <sub>4</sub>	nC <sub>4</sub>	C <sub>5</sub> <sup>+</sup>	ΣC <sub>1</sub> -C <sub>4</sub>	ΣC <sub>2</sub> -C <sub>4</sub>	Gas wetness %	iC <sub>4</sub> /nC <sub>4</sub>
4547-4556	12810	3414	617	64	106	726	16711	4202	25.1	0.60
4556-4565	25254	5730	783	81	128	624	31976	6722	21.0	0.63
4565-4574	23350	5587	1171	152	239	1510	30500	7150	23.4	0.64
4574-4583	27101	10469	1032	125	158	1330	38885	11784	30.3	0.79
4583-4592	5171	1227	262	29	40	464	6729	1557	23.1	0.73
4592-4601	7485	1299	675	117	21	254	8987	1502	16.7	0.81
4601-4610	13661	1868	218	26	43	207	15815	2155	13.6	0.60
4610-4619	11122	1489	193	19	29	313	12854	1731	13.5	0.66
4619-4628	24956	3376	366	47	65	139	28809	3853	13.4	0.72
4628-4637	19943	3411	650	86	159	912	24250	4306	17.8	0.54
4646-4655	18500	7345	1140	102	191	1197	27277	8776	32.2	0.53
4655-4664	38741	9809	2169	171	385	929	51276	12535	24.4	0.44
4664-4673	34839	8524	1586	149	282	672	45380	10541	23.2	0.53
4673-4682	29131	6233	1304	150	251	680	37069	7939	21.4	0.60
4682-4691	26143	4212	685	118	166	671	31324	5181	16.5	0.71

Table 1.C - p. 6

Depth (m)	C <sub>1</sub>	C <sub>2</sub>	C <sub>3</sub>	iC <sub>4</sub>	nC <sub>4</sub>	C <sub>5</sub> <sup>+</sup>	ΣC <sub>7</sub> -C <sub>4</sub>	ΣC <sub>2</sub> -C <sub>4</sub>	% Gas wetness	iC <sub>4</sub> /nC <sub>4</sub>
4691-4700	15709	3586	1090	194	279	1065	20857	5148	24.7	0.70
4700-4709	25876	5153	1852	439	546	1317	33867	8001	23.6	0.80
4709-4718	28440	5219	1282	266	352	853	35559	7119	20.0	0.76
4718-4727	32904	5145	778	125	170	672	39121	6218	15.9	0.74
4727-4736	15550	4718	583	74	121	549	21045	5495	26.1	0.61
4736-4745	15208	5019	807	89	133	447	21355	6146	28.8	0.70
4745-4754	14441	3631	1189	137	237	552	19635	5195	26.5	0.58
4751-4760	41724	6145	1109	137	222	1193	49337	7613	15.4	0.62
4760-4769										
4769-4778	10910	4391	717	84	160	976	16032	5152	32.1	0.53
4778-4787	10101	1452	273	31	32	679	11889	1787	15.0	0.97
4787-4796	11833	3103	408	41	67	50	15457	3624	23.4	0.61
4796-4805	7142	2237	372	37	75	41	9863	2721	27.6	0.49
4805-4814	12883	2447	606	16	15	102	15966	3083	19.3	1.07
4814-4823	11738	4500	1233	150	308	71	17930	6191	34.5	0.49
4823-4825	42046	8275	1910	147	328	88	52706	10660	20.2	0.45

Table II

Lithology and Total Organic Carbon (TOC) Measurements.

Depth (m)	TOC (%)	Lithology
3980-89	2.84	92% Claystone, grey, light grey, brownish, greenish grey. 5% Coal. 3% Quartz. Sm.am. Limestone; Pyrite; Siltstone.
3989-98	1.77	100% Claystone, grey, some brown and green fragments. Sm.am. Marl; Coal; Limestone.
3998-4007	2.41	95% Claystone, grey, some brownish fragments. 5% Marl, light grey (slightly brownish). Sm.am. Limestone; Sandstone/Siltstone; Pyrite; Coal; Quartz.
4007-16	2.08	83% Claystone, grey, some brown and green fragments. 15% Marl, light grey (slightly brownish). 2% Coal. Obs. Quartz.
4016-25	0.71 1.57	70% Marl, light grey (slightly brownish). 27% Claystone, grey. 3% Coal. Obs. Pyrite.
4025-34	0.59 2.45	60% Marl, light grey (slightly brownish). 40% Claystone, grey. Obs. Pyrite.

Table II - p. 2

Depth (m)	TOC (%)	Lithology
4034-43	1.17	68% Marl, light grey (slightly brownish).
	1.45	30% Claystone, grey. 2% Coal. Sm.am. Pyrite.
4043-52	1.45	65% Claystone, grey, some brown fragments.
	0.62	35% Marl, light grey (slightly brownish). Obs. Limestone.
4052-61	3.58	97% Claystone, grey to dark grey, some brown fragments. 3% Marl, light grey (slightly brownish).
4061-70	4.36	100% Claystone, grey to dark grey, some brown fragments. Obs. Limestone; Marl; Pyrite.
4070-79	3.46	100% Claystone, grey to dark grey, some brown fragments. Sm.am. Marl.
4079-88	3.95	100% Claystone, grey to dark grey, some brown fragments. Obs. Marl.
4088-97	3.27	100% Claystone, grey to dark grey, some brown fragments. Sm.am. Marl.
4097-4106	3.65	100% Claystone, grey to dark grey, some brown fragments. Obs. Marl.

Table II ~ p. 3

Depth (m)	TOC (%)	Lithology
4106-15	3.19	100% Claystone, grey to dark grey, some brown fragments. Sm.am. Marl.
4115-24	3.14	100% Claystone, grey to dark grey, some brown fragments. Obs. Marl; Limestone.
4124-33	3.85	100% Claystone, grey to dark grey, some brown fragments. Obs. Marl.
4133-42	3.54	100% Claystone, as above. Sm.am. Marl.
4142-51	1.71	100% Claystone, as above. Sm.am. Marl. Obs. Limestone; Quartz.
4151-60	6.50	100% Claystone and silty Claystone, grey to dark grey, some brown fragments. Sm.am. Marl.
4160-69	0.40	90% Sandstone, very fine to fine, brownish light grey to clear.
		5% Sand, coarse to very coarse, clear.
	1.42	5% Claystone.
4169-78	0.75	97% Sandstone, very fine to fine, brownish light grey to clear. 3% Claystone.

Table II - p. 4

Depth (m)	TOC (%)	Lithology
4178-87	0.57	80% Sandstone, very fine to medium, brownish light grey to clear.
	1.49	20% Claystone, grey to dark grey.
4187-96	0.48	75% Sandstone, very fine to medium, brownish light grey to clear.
	2.46	25% Claystone.
4196-4205	0.62	97% Sandstone, very fine to coarse, brownish light grey to clear.
		3% Claystone.
4205-14	0.70	97% Quartz Sand/Sandstone, fine to very coarse, angular/subangular, poorly sorted, light grey to clear and brownish.
		2% Claystone.
		1% Coal.
4214-23	1.34	100% Claystone, grey to light grey and dark grey, some redbrown fragments.
		Sm.am. Quartz Sandstone.
4223-32	1.96	100% Claystone, grey to black.
4232-41	1.33	85% Claystone, light grey to black, some red-brown fragments.
		15% Quartz Sand/Sandstone.
4241-50	1.15	100% Claystone, light grey to black.
		Sm.am. Sandstone.
4250-59	1.31	75% Coal.
		20% Claystone, grey.
		0.57 5% Sandstone.

Table II - p. 5

Depth (m)	TOC (%)	Lithology
4259-68	1.35	70% Coal. 30% Claystone, grey. Sm.am. Sandstone.
4268-77	1.90	100% Claystone, grey to light grey, some redbrown fragments. Obs. Quartz; Pyrite.
4277-86	2.00	93% Claystone, grey to light grey, some redbrown fragments. 7% Sandstone. Obs. Coal; Pyrite.
4286-95	1.73	100% Claystone, light grey to dark grey, some redbrown fragments. Sm.am. Quartz. Obs. Pyrite.
4295-4304	2.40	100% Claystone, dark grey to grey.
4304-13	6.20	100% Claystone, dark grey, some grey.
4313-22	4.54	100% Claystone, light grey to dark grey, partly greenish grey and brownish. Obs. Coal; Quartz; Pyrite.
4322-31	0.34	90% Sandstone, fine to medium, angular/subangular, moderately sorted, brownish light grey. 10% Mica. Obs. Claystone; Coal.



Table II - p. 6

Depth (m)	TOC (%)	Lithology
4331-40	0.77	75% Silty Claystone, redbrown, from drilling mud.
	1.74	15% Claystone, grey to dark grey. 10% Mica, from drilling mud. Sm.am. Quartz Sandstone.
4340-49	3.51	85% Claystone, dark grey to black. 15% Mica (from drilling mud).
4349-58	1.99	70% Claystone, dark grey to black, some grey fragments. 25% Mica (from drilling mud).
	0.42	5% Quartz Sandstone.
4358-67	1.42	55% Claystone, dark grey to black, some grey. 30% Mica (from drilling mud).
	0.35	15% Quartz Sandstone. Sm.am. Coal.
4367-76	1.73	53% Claystone, dark grey to black, grey.
	0.39	40% Quartz Sand/Sandstone, fine to coarse, angular/subangular, poorly sorted, light grey to clear. 7% Coal. Sm.am. Mica (from drilling mud).
4376-85	2.04	90% Claystone, dark grey to black, grey. 10% Coal. Sm.am. Sand/Sandstone; Mica.

Table II - p. 7

Depth (m)	TOC (%)		Lithology
4385-94	3.73	65%	Claystone, dark grey to black, light grey to grey.
	0.57	30%	Quartz Sand, fine to coarse, angular/sub-angular, poorly sorted, light grey to clear.
		5%	Coal.
4394-4403	1.91	93%	Claystone, dark grey to black, light grey to grey.
	0.67	5%	Sand/Sandstone.
		2%	Coal.
4403-12	2.03	97%	Claystone, light grey to grey, dark grey.
		3%	Sand/Sandstone.
		Sm.am.	Coal.
4412-21	1.85	96%	Claystone, light grey to grey, some dark grey to black.
		3%	Quartz Sandstone.
		1%	Coal.
		Sm.am.	Mica.
4421-30	0.53	75%	Quartz Sandstone, mainly fine to medium, but also some coarse/very coarse grains, angular/subangular, light grey to clear.
	1.66	20%	Claystone, dark grey, grey.
		5%	Coal.
4430-39	0.34	68%	Quartz Sandstone, fine to very coarse, angular/subangular, poorly sorted, light grey to clear.
	1.76	30%	Claystone, grey to dark grey, partly brownish.
		2%	Coal.

Table II - p. 8

Depth (m)	TOC (%)		Lithology
4439-48	0.31	70%	Sandstone, mainly fine to medium, but also some coarse/very coarse grains, angular/subangular, light grey to clear.
	2.07	28%	Claystone, dark grey to black, grey, some greenish grey.
		2%	Coal.
4448-57	0.47	50%	Sandstone, as above.
	1.73	49%	Claystone, dark grey to black, partly brownish, grey.
		1%	Coal.
4457-66	0.47	91%	Quartz Sand, medium to very coarse, very angular to subangular, poorly sorted, clear to light grey.
		7%	Claystone.
		2%	Quartz Sandstone, very fine to fine.
		Obs.	Coal.
4466-75	0.47	90%	Quartz Sand, as above.
	1.92	10%	Claystone, grey, dark grey, brownish grey.
		Obs.	Sandstone, very fine to fine; Pyrite; Coal.
4475-84	0.39	82%	Quartz Sand, as above.
		15%	Coal.
		3%	Claystone.
4484-93	1.42	90%	Claystone, partly silty, grey, light grey, dark grey to black.
		7%	Coal.
		3%	Quartz Sand/Sandstone.
		Obs.	Pyrite.

Table II - p. 9

Depth (m)	TOC (%)		Lithology
4493-4502	1.33	60%	Claystone, as above.
	0.46	40%	Quartz Sand, as above.
		Obs.	Sandstone, very fine to fine; Coal.
4502-11	1.62	100%	Claystone, grey, light grey, dark grey to black.
		Obs.	Sandstone; Coal; Pyrite.
4511-20	1.47	100%	Claystone, as above.
		Obs.	Sandstone; Coal.
-4520-29	2.13	65%	Claystone, grey, light grey, some dark fragments.
	0.26	35%	Sand, medium to coarse, angular to sub-angular, moderate sorted, clear to light grey.
		Sm.am.	Coal; Sandstone, very fine to fine.
		Obs.	Pyrite.
4529-38	4.05	70%	Claystone, grey, light grey, some dark grey fragments.
	0.39	28%	Sand.
		2%	Coal.
4538-47	4.31	97%	Claystone, grey, dark grey to black.
		3%	Quartz Sand/Sandstone.
		Obs.	Coal.
4547-56	4.79	100%	Claystone, grey, dark grey.
		Obs.	Coal.
4556-65	4.83	99%	Claystone, grey, dark grey to black.
		1%	Coal.

Table II - p. 10

Depth (m)	TOC (%)	Lithology
4565-74	4.90	85% Claystone, grey, dark grey to black. 15% Coal. Sm.am. Sand/Sandstone.
4574-83	4.62	98% Claystone, grey, dark grey. 2% Coal. Obs. Sand.
4583-92	7.64	98% Claystone, light grey, grey, dark grey. 2% Coal.
4592-4601	2.14	100% Claystone, grey, dark grey to black, light grey. Sm.am. Quartz Sandstone.
4601-10	3.02	100% Claystone, dark grey to black, grey.
4610-19	4.02	100% Claystone, grey, dark grey to black.
4619-28	1.85	100% Claystone, grey, dark grey to black. Obs. Sandstone.
4628-37	2.65	85% Claystone, grey, dark grey to black. 15% Quartz Sand. Sm.am. Coal. Obs. Pyrite.
4637-46	3.66	50% Claystone, grey, dark grey to black, brownish grey.
	0.53	50% Quartz Sand, medium to coarse, moderate sorted, angular to subangular, clear to light grey. Sm.am. Coal.

Table II - p. 11

Depth (m)	TOC (%)	Lithology
4646-55	0.49	58% Quartz Sand, as above.
	6.00	40% Claystone, brownish grey, dark grey to black. 2% Coal.
4655-64	0.84	77% Claystone, grey, brownish grey, dark grey.
		15% Coal.
		8% Quartz Sandstone, fine to very fine, light grey.
		Sm.am. Quartz, coarse grained. Obs. Pyrite.
4664-73	0.65	65% Claystone, grey, brownish grey, dark grey to black.
		30% Coal.
		5% Quartz Sandstone, fine to very fine, light grey.
4673-82	0.31	50% Quartz Sandstone, fine to very fine, light grey.
	0.45	40% Claystone, grey, brownish grey, dark grey. 10% Coal.
	Obs. Pyrite.	
4682-91	0.29	70% Quartz Sandstone, fine to very fine, light grey.
	3.75	25% Claystone, grey, brownish grey, dark grey. 5% Coal.
4691-4700	0.37	75% Quartz Sandstone, as above.
	0.65	20% Claystone, grey, brownish grey, dark grey. 5% Coal.

Table II - p. 12

Depth (m)	TOC (%)		Lithology	
4700-09	0.46	50%	Claystone, grey, brownish grey, dark grey.	
	0.11	45%	Quartz Sandstone, as above.	
		5%	Coal.	
		Obs.	Pyrite.	
4709-18	0.78	75%	Claystone, grey, brownish grey, light grey, dark grey.	
		18%	Quartz Sandstone, fine to very fine, light grey, brown grey.	
		7%	Coal.	
		Obs.	Pyrite.	
4718-27	0.30	50%	Quartz Sandstone, as above and with some coarser grains, light grey, brown grey.	
		0.42	35%	Claystone, brownish grey, grey, dark grey, light grey.
		15%	Coal.	
		Obs.	Pyrite.	
4727-36	0.25	50%	Quartz Sandstone, fine to very fine, light.	
		0.46	45%	Claystone, brownish grey, grey, dark grey.
		5%	Coal.	
		Obs.	Pyrite.	
4736-45	0.23	50%	Quartz Sandstone, very fine to fine, light.	
		0.64	35%	Claystone, grey, brownish grey, some dark grey.
		15%	Coal.	
4745-51	0.14	45%	Quartz Sandstone, as above and with some coarser quartz grains.	
		0.41	48%	Claystone, brownish grey, grey, some dark grey.
		7%	Coal.	
		Obs.	Limestone, light; Pyrite.	

Table II - p. 13

Depth (m)	TOC (%)	Lithology	
4751-60	0.62	60%	Claystone, brownish grey, grey, some dark grey.
	0.11	25%	Quartz Sandstone, very fine to fine, light, some brownish.
		15%	Coal.
		Obs.	Pyrite, coarse; Quartz grains.
4760-69	0.95	65%	Claystone, grey, brownish grey.
	0.13	30%	Quartz Sandstone, fine to very fine, light, some brownish.
		5%	Coal.
4769-78	0.49	55%	Claystone, grey, brownish grey, light grey, some silty fragments.
	0.13	35%	Quartz Sandstone, fine to very fine, and some coarse grained quartz (very angular/angular).
		10%	Coal.
		Obs.	Pyrite.
4778-87	0.58	95%	Claystone, grey, greenish grey, brownish grey, redbrown.
		3%	Quartz Sand/Sandstone.
		2%	Coal.
		Obs.	Pyrite.
4787-96	1.12	99%	Claystone, grey, greenish grey, redbrown.
		1%	Coal.
		Sm.am.	Quartz.
4796-4805	0.43	95%	Claystone, grey, greenish grey, redbrown, brownish grey.
		3%	Quartz Sandstone, very fine to fine, light, with carbonate.
		2%	Coal.



Table II - p. 14

Depth (m)	TOC (%)	Lithology
4805-14	1.36	75% Claystone, grey, greenish grey, redbrown.
	0.27	24% Quartz Sandstone, as above.
		1% Coal.
		Obs. Limestone, light.
4814-23	0.75	90% Claystone, grey, redbrown.
		5% Quartz Sandstone, as above.
		5% Coal.
		Obs. Limestone.
4823-25	0.37	77% Claystone, grey, redbrown.
		20% Quartz Sandstone, as above.
		3% Coal.

TABLE III

Weight (mg) of EOM and chromatographic fractions.

Depth (m)	Rock extracted (g)	EOM	SAT	Aro	Hydrocarbons HC	Non Hydrocarbons	TOC
3980-3989	100.00	55.1	5.0	5.3	10.3	44.6	2.84
4016-4025	100.00	271.0	94.3	68.4	162.8	102.8	3.33
4061-4070	100.00	682.2	160.7	214.7	375.4	303.0	4.36
4097-4106	100.00	311.6	113.7	76.2	189.9	116.2	3.65
4133-4142	100.00	427.5	139.9	139.9	120.1	260.0	3.54
4151-4160	100.00	405.7	147.6	108.0	255.6	143.7	6.50
4205-4214	100.00	96.3	19.9	41.5	61.4	27.5	1.90
4250-4259	100.00	257.8	42.0	43.2	85.2	162.4	1.31
4295-4304	100.00	354.9	133.8	86.3	220.1	131.2	2.40
4304-4313	102.00	218.5	73.1	59.5	132.6	77.3	6.20
4313-4322	100.00	208.1	67.1	44.4	111.5	91.5	4.54
4331-4340	100.00	150.8	16.2	45.3	61.5	86.3	1.74
4340-4349	100.00	84.1	24.9	4.7	29.6	53.5	3.34
4367-4376	100.00	567.1	36.8	180.8	217.6	342.1	7.60
4412-4421	100.00	85.9	9.9	14.0	29.9	51.3	4.00
4439-4448	100.00	96.3	10.0	14.8	24.8	68.2	3.92
4484-4493	100.80	113.9	20.9	9.1	30.0	79.8	1.42
4529-4538	109.10	103.9	9.8	20.3	30.1	69.9	4.05
4610-4619	100.40	97.1	8.4	11.7	20.1	74.2	4.02
4646-4655	100.30	191.2	25.7	76.4	102.1	86.1	6.00
4682-4691	109.70	95.6	12.5	23.4	35.9	56.3	4.71
4736-4745	107.70	138.1	14.8	40.4	55.2	80.3	5.96
4769-4778	101.00	129.7	10.4	17.3	27.7	96.9	8.05
4814-4823	101.7	102.1	12.5	39.2	51.7	49.4	6.61
4823-4825	100.2	86.8	14.1	25.5	39.6	42.3	7.23

TABLE IV

Concentration of EOM and chromatographic fractions (Weight ppm of rock).

Depth (m)	EOM	Sat	Aro	Total hydrocarb.	Non hydrocarb.
3980 - 3989	551	50	53	103	446
4016 - 4025	2710	943	684	1627	1028
4061 - 4070	6810	1607	2147	3754	3030
4097 - 4106	3116	1337	762	1899	1162
4133 - 4142	4275	1399	1201	2600	1613
4151 - 4160	4057	1476	1080	2556	1437
4205 - 4214	963	199	415	614	275
4250 - 4259	2578	420	432	852	1624
4295 - 4304	3549	1138	863	2201	1312
4304 - 4313	2142	717	583	1300	758
4313 - 4322	2081	671	444	1115	913
4331 - 4340	1508	162	453	615	863
4340 - 4349	841	249	47	296	535
4367 - 4376	5671	368	1808	2176	3421
4412 - 4421	859	99	140	239	513
4439 - 4448	963	100	148	248	682
4484 - 4493	1130	207	90	298	792
4529 - 4538	952	90	186	276	641
4610 - 4619	967	84	117	200	739
4646 - 4655	1906	256	762	1018	858
4682 - 4691	871	114	213	327	513
4736 - 4745	1282	137	375	513	746
4769 - 4778	1284	103	171	274	959
4814 - 4823	1004	123	385	508	486
4823 - 4825	866	141	254	395	422

TABLE V

Concentration of EOM and chromatographic fractions (mg/g TOC).

Depth (m)	EOM	Sat	Aro	Total hydrocarb.	Non hydrocarb.		
3980 - 3989	19.4	1.8	1.9	3.7	15.7	0.8	35
4016 - 4025	81.4	28.3	20.5	48.8	30.9		
4061 - 4070	156.2	36.9	49.2	86.1	69.5		
4097 - 4106	85.4	31.2	20.9	52.2	31.8		
4133 - 4142	120.8	39.5	33.9	73.5	45.6		
4151 - 4160	62.4	22.7	16.6	39.3	22.1	0.9	50
4205 - 4214	50.7	10.5	21.8	32.3	14.5		
4250 - 4259	198.3	32.3	33.2	65.5	124.9		
4295 - 4304	147.9	55.8	36.0	91.8	54.7		
4304 - 4313	34.6	11.6	9.4	21.0	12.2	1.0	70
4313 - 4322	45.8	14.8	9.8	24.6	20.1		
4331 - 4340	86.7	9.3	26.0	35.3	49.6		
4340 - 4349	25.2	7.5	1.4	8.9	16.0		
4367 - 4376	74.6	4.8	23.8	28.6	45.0		
4412 - 4421	21.4	2.5	3.5	7.5	12.8		
4439 - 4448	24.6	2.6	3.8	6.3	17.4		
4484 - 4493	79.6	14.6	6.4	21.0	55.8		
4529 - 4538	23.5	2.2	4.6	6.8	15.8		
4610 - 4619	24.1	2.1	2.9	5.0	18.4		
4646 - 4655	31.8	4.3	12.7	17.0	14.3	1.3	160
4682 - 4691	18.5	2.4	4.5	7.0	10.9		
4736 - 4745	21.5	2.3	6.3	8.6	12.5		
4769 - 4778	16.0	1.3	2.1	3.4	11.9		
4814 - 4823	15.2	1.9	5.8	7.7	7.4		
4823 - 4825	12.0	2.0	3.5	5.5	5.8		

TABLE VI

Composition in % of the organic material extracted from the rock.

Depth (m)	Sat EOM	Aro EOM	HC EOM	Sat Aro	Non HC EOM	HC Non HC
3980-3989	9.1	9.6	18.7	94.3	80.9	23.1
4016-4025	34.8	25.2	60.0	137.9	37.9	158.3
4061-4070	23.6	31.5	55.1	74.9	44.5	123.9
4097-4106	36.5	24.5	60.9	149.2	37.3	163.4
4133-4142	32.7	28.1	60.8	116.5	37.7	161.2
4151-4160	36.4	26.6	63.0	136.7	35.4	177.9
4205-4214	20.7	43.1	63.8	48.0	28.6	223.3
4250-4259	16.3	16.8	33.1	97.2	63.0	52.5
4295-4304	37.7	24.3	62.0	155.0	37.0	167.8
4304-4313	33.5	27.2	60.7	122.9	35.4	171.5
4313-4322	32.2	21.3	53.6	151.1	43.9	122.1
4331-4340	10.7	30.0	40.8	35.8	57.2	71.3
4340-4349	29.6	5.6	35.2	529.8	63.6	55.3
4367-4376	6.5	31.9	38.4	20.4	60.3	63.6
4412-4421	11.5	16.3	34.8	70.7	59.7	58.3
4439-4448	10.4	15.4	25.8	67.6	70.8	36.4
4484-4493	18.4	8.0	26.3	229.7	70.1	37.6
4529-4538	9.4	19.5	29.0	48.3	67.3	43.1
4610-4619	8.7	12.1	20.7	71.8	76.4	27.1
4646-4655	13.4	40.0	53.4	33.6	45.0	118.6
4682-4691	13.1	24.5	37.6	53.4	58.9	63.8
4736-4745	10.7	29.3	40.0	36.6	58.2	68.7
4769-4778	8.0	13.3	21.4	60.1	74.7	28.6
4814-4823	12.2	38.4	50.6	31.9	48.4	104.7
4823-4825	16.2	29.4	45.6	55.3	48.7	93.6

Table VII

Tabulation of data from the gaschromatograms.

Depth (m)	Pristane/nC <sub>17</sub>	Pristane/Phytane	CPI
3980 - 3989	0.38	0.96	0.97
4016 - 4025	0.39	0.99	1.00
4061 - 4070	0.31	1.05	1.00
4097 - 4106	0.22	0.84	0.96
4133 - 4142	0.32	1.40	0.98
4151 - 4160	0.31	1.43	1.03
4205 - 4214	0.35	1.17	1.01
4250 - 4259	0.14	1.40	1.23
4295 - 4304	0.15	1.00	1.03
4304 - 4313	0.20	1.41	1.07
4313 - 4322	0.13	1.75	0.96
4331 - 4340	0.28	2.35	1.03
4340 - 4349	0.30	1.53	1.06
4367 - 4376	0.27	2.05	1.02
4412 - 4421	0.22	1.28	1.03
4439 - 4448	0.24	1.53	1.05
4484 - 4493	0.25	1.31	1.14
4529 - 4538	0.29	1.63	1.15
4610 - 4619	0.26	1.43	1.19
4646 - 4655	0.21	2.45	1.07
4682 - 4691	0.23	1.92	1.07
4736 - 4745	0.20	2.42	1.06
4769 - 4778	0.26	2.22	1.06
4814 - 4823	0.20	2.46	1.08
4823 - 4825	0.23	2.40	1.08

T A B L E VIII.

## Vitrinite Reflection and Visual Kerogen Estimation

Depth (m)	Vitrinite reflectance		Colour index		Type of Organic Matter	
3980 - 3989			1.25(11)	1.70(1)	3	Am/He
4016 - 4025		1.02(6)		1.49(4)	3	Am/He
4061 - 4070	0.79(4)		1.29(3)		3+ - 4-	Am/He
4097 - 4106	0.81(12)	1.13(2)			3+ - 4-	Am/He
4109 - 4112					3+ - 4-	Am/He
4130 - 4133					3+ - 4-	Am/He
4133 - 4142	0.77(16)	1.15(6)			3+ - 4-	He/Am
4148 - 4159					3+ - 4-	He/Am
<del>4152</del>	0.81(20)					
4205 - 4214	0.72(3)				4-	He/Am
4214 - 4217					4-	He/Am
4250 - 4259	0.91(2)			1.71(4)	4-	He/Am
4262 - 4265					4-	He/Am
<del>4297</del>	0.80(17)					
4310 - 4313					4-	He/Am
4334 - 4337					4-	He/Am
4340 - 4349	No determination possible				4-	He/Am
4358 - 4367	0.88(20)				4-	He/Am
4376 - 4385		1.04(19)		1.54(2)	4-	He/Am
4412 - 4421		1.07(16)			4-	Am/He
4439 - 4442					4-	Am/He

T A B L E VIII p. 2

Depth (m)	Vitrinite reflectance		Colour index	Type of Organic Matter
4448 - 4457	1.07(21)		4-	Am/He
4483 - 4492	1.00(19)	1.57(1)	4	He/Am
4529 - 4538	1.12(22)		4	He/Am
4557		1.41(24)	4	He(w)
4574 - 4583	1.24(20)		4	He/Am
4583 - 4586			4	He/Am
4610 - 4619	No determination possible		4	Am/He
4627		1.58(20)		
4646 - 4655	1.28(21)		4+	Am/He
4655 - 4658			4+	Am/He
4676 - 4679			4+	He
4736 - 4745	No determination possible		4+ - 5-	He/Am
4745	1.18(30)		4+ - 5-	
4763 - 4766				He/Am
4769 - 4778	1.23(22)		4+ - 5-	He/Am
4781		1.34(22)		
4814 - 4817			4+ - 5-	barren
4823 - 4875		1.33(19)	1.90(1)	4+ - 5- He



REGIONAL PETROLEUM GEOCHEMISTRY  
BLOCK 24/12 AND  
SURROUNDING AREAS

Well NOCS 24/12-1

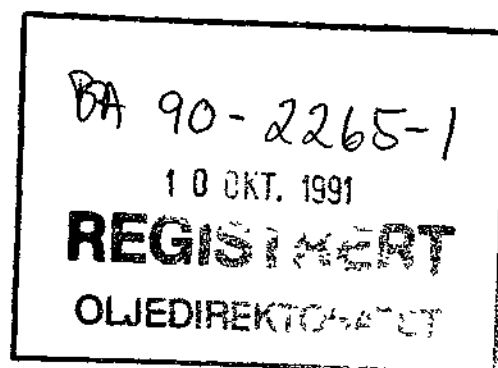
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Date :

11.04.90



## INTRODUCTION

The well NOCS 24/12-1 is situated in the south-east section of block 24/12, in the southern part of the Viking Graben, Norwegian North Sea. The well was drilled in 1978 and plugged and abandoned as a dry well, having TD at 4825 m RKB in the Triassic.

A total of 139 samples was collected at the Norwegian Petroleum Directorate in Stavanger. The samples between 2361 m and 4825 m RKB were washed and lithologically described. The analysed interval is from 2361 m to 4825 m RKB

From the 139 samples examined, 61 lithologies from 61 samples were selected for screening analysis (TOC and Rock-Eval pyrolysis). Due to lack of material the 16 Palaeocene samples were analysed by thermal extraction/pyrolysis gas chromatography directly. Based on the results of these, the following number of samples were selected for further analyses:

Thermal extraction - pyrolysis gas chromatography	37 samples
Extraction, MPLC fractionation, saturated and aromatic hydrocarbon - gas chromatography	8 samples
Vitrinite reflectance microscopy	12 samples
Visual kerogen composition	8 samples
Gas chromatography - mass spectrometry of saturated and aromatic hydrocarbons	6 samples

Stable carbon isotope  
analysis of C<sub>15</sub>+ fractions

6 samples

Samples lists and tabulated analytical data are displayed in  
Appendix 1.

General well data is as follows:

Position : 59°02'29.80"N  
Elevation : 01°52'57.93"E  
Water depth: 113 m  
Status : Dry, P & A

Table 1 : Lithology description for well NOCS 24/12-1

Depth unit of measure: m

Depth	Type	Grp	Frm	Age	Trb	Sample
Int	Cvd	TOC%	%	Lithology description		
4031.00						0119
	1.36			50 Sh/Clst: m gy to drk gy, calc		0119-1L
				50 Ca : lt gy to pl y brn		0119-2L
				tr Cont : prp, fib		0119-3L
				tr Other : pyr		0119-4L
				tr Sh/Clst: gy red, calc		0119-5L
4034.00						0120
				60 Ca : lt gy to pl y brn		0120-2L
				35 Sh/Clst: m gy to drk gy, calc		0120-1L
				5 Cont : prp, fib		0120-3L
				tr Other : pyr		0120-4L
				tr Sh/Clst: gy red, calc		0120-5L
4037.00						0121
	0.61			70 Ca : lt gy to pl y brn		0121-2L
				20 Sh/Clst: m gy to drk gy, calc		0121-1L
				10 Cont : Coal-ad, prp, fib		0121-3L
				tr Other : pyr		0121-4L
				tr Sh/Clst: gy red, calc		0121-5L
4040.00						0122
				65 Ca : lt gy to pl y brn		0122-2L
				25 Sh/Clst: m gy to drk gy, calc		0122-1L
				10 Cont : Coal-ad, prp, fib		0122-3L
				tr Other : pyr		0122-4L
				tr Sh/Clst: gy red, calc		0122-5L

Table 1 : Lithology description for well NOCS 24/12-1

Depth unit of measure: m

Depth	Type	Grp	Frm	Age	Trb	Sample
Int	Cvd	TOC%	%	Lithology description		
4043.00						0123
				55 Ca : lt gy to pl y brn, st		0123-2L
				30 Sh/Clst: m gy to drk gy		0123-1L
				15 Cont : Coal-ad, prp, fib		0123-3L
				tr Other : pyr		0123-4L
				tr Sh/Clst: gy red, calc		0123-5L
4046.00						0124
				50 Sh/Clst: m gy to drk gy		0124-1L
				30 Cont : Coal-ad, prp, fib		0124-3L
				20 Ca : lt gy to pl y brn, st		0124-2L
				tr Other : pyr		0124-4L
				tr Sh/Clst: gy red, calc		0124-5L
4049.00						0125
	1.25			75 Sh/Clst: m gy to drk gy		0125-1L
				15 Cont : prp, fib		0125-3L
				10 Ca : lt gy to pl y brn, st		0125-2L
				tr Other : pyr		0125-4L
				tr Sh/Clst: gy red, calc		0125-5L
4052.00						0126
				70 Sh/Clst: m gy to drk gy		0126-1L
				25 Ca : lt gy to pl y brn, brn gy		0126-2L
				5 Cont : prp, fib		0126-3L
				tr Other : pyr		0126-4L
4055.00						0127
				60 Cont : Coal-ad, prp, fib		0127-3L
				35 Sh/Clst: m gy to drk gy, gn gy, st		0127-1L
				5 Sh/Clst: dsk y brn to brn blk, carb		0127-4L
				tr Ca : lt gy to pl y brn, brn gy		0127-2L

Table 1 : Lithology description for well NOCS 24/12-1

Depth unit of measure: m

Depth	Type	Grp	Frm	Age	Trb	Sample
Int	Cvd	TOC%	%	Lithology description		
4061.00						0128
	7.34	90		Sh/Clst: dsk y brn to brn blk, carb		0128-4L
		10		Cont : Coal-ad, prp, dd, fib		0128-3L
				tr Sh/Clst: m gy to drk gy, gn gy, st		0128-1L
				tr Ca : lt gy to pl y brn, brn gy		0128-2L
4067.00						0129
	6.42	100		Sh/Clst: dsk y brn to brn blk, carb		0129-4L
				tr Sh/Clst: m gy to drk gy, gn gy		0129-1L
				tr Ca : lt gy to pl y brn, brn gy		0129-2L
				tr Cont : prp, dd, fib		0129-3L
4070.00						0130
	6.81	100		Sh/Clst: dsk y brn to brn blk, carb		0130-4L
				tr Sh/Clst: m gy to drk gy, gn gy		0130-1L
				tr Ca : lt gy to pl y brn, brn gy		0130-2L
				tr Cont : prp, dd, fib		0130-3L
4073.00						0131
		60		Sh/Clst: m gy to drk gy, gn gy		0131-1L
		20		Cont : prp, dd, fib		0131-3L
		10		Ca : lt gy to pl y brn, brn gy		0131-2L
		10		Sh/Clst: dsk y brn to brn blk, carb		0131-4L
				tr Sh/Clst: gy red, calc		0131-5L
4076.00						0132
		40		Sh/Clst: m gy to drk gy, gn gy		0132-1L
		35		Cont : prp, dd, fib		0132-3L
	5.13	20		Sh/Clst: dsk y brn to brn blk, carb		0132-4L
		5		Ca : lt gy to pl y brn, brn gy		0132-2L
				tr Sh/Clst: gy red, calc		0132-5L

Table 1 : Lithology description for well NOCS 24/12-1

Depth unit of measure: m

Depth	Type	Grp	Frm	Age	Trb	Sample
Int	Cvd	TOC%	%	Lithology description		
4079.00						0133
	5.86	45	Sh/Clst:	dsk y brn to brn blk, carb		0133-4L
		35	Cont	: prp, dd, fib		0133-3L
		20	Sh/Clst:	m gy to drk gy, gn gy		0133-1L
		tr	Ca	: lt gy to pl y brn, brn gy		0133-2L
		tr	Sh/Clst:	gy red, calc		0133-5L
4085.00						0134
	6.37	50	Cont	: prp, dd, fib		0134-3L
		40	Sh/Clst:	dsk y brn to brn blk, carb		0134-4L
		10	Sh/Clst:	m gy to drk gy, gn gy		0134-1L
		tr	Ca	: lt gy to pl y brn, brn gy		0134-2L
		tr	Sh/Clst:	gy red, calc		0134-5L
4091.00						0135
	5.25	45	Cont	: prp, dd, fib		0135-3L
		35	Sh/Clst:	dsk y brn to brn blk, carb		0135-4L
		20	Sh/Clst:	m gy to drk gy, gn gy		0135-1L
		tr	Ca	: lt gy to pl y brn, brn gy		0135-2L
		tr	Sh/Clst:	gy red, calc		0135-5L
4097.00						0136
		45	Cont	: prp, dd, fib		0136-3L
		40	Sh/Clst:	m gy to drk gy		0136-1L
		10	Sh/Clst:	dsk y brn to brn blk, carb		0136-4L
		5	Ca	: lt gy to pl y brn, brn gy		0136-2L
		tr	Sh/Clst:	gy red, calc		0136-5L
4100.00						0137
		55	Sh/Clst:	m gy to drk gy		0137-1L
		30	Cont	: prp, dd, fib		0137-3L
		10	Sh/Clst:	dsk y brn to brn blk, carb		0137-4L
		5	Ca	: lt gy to pl y brn, brn gy		0137-2L
		tr	Sh/Clst:	gy red, calc		0137-5L

Table 1 : Lithology description for well NOCS 24/12-1

Depth unit of measure: m

Depth	Type	Grp	Frm	Age	Trb	Sample
Int	Cvd	TOC%	%	Lithology description		
4103.00						0138
	3.45			45 Cont : prp, dd, fib 40 Sh/Clst: m gy to drk gy 15 Sh/Clst: dsk y brn to brn blk, carb tr Ca : lt gy to pl y brn, brn gy tr Sh/Clst: gy red, calc		0138-3L 0138-1L 0138-4L 0138-2L 0138-5L
4106.00						0139
				50 Cont : prp, dd, fib 40 Sh/Clst: m gy to drk gy 5 Ca : lt gy to pl y brn, brn gy 5 Sh/Clst: dsk y brn to brn blk, carb tr Sh/Clst: gy red, calc		0139-3L 0139-1L 0139-2L 0139-4L 0139-5L
4109.00						0140
				50 Sh/Clst: m gy to drk gy 35 Cont : Coal-ad, prp, dd, fib 10 Sh/Clst: dsk y brn to brn blk, carb 5 Ca : lt gy to pl y brn, brn gy tr Sh/Clst: gy red, calc		0140-1L 0140-3L 0140-4L 0140-2L 0140-5L
4115.00				--		0141
				60 Cont : Coal-ad, prp, dd, fib 35 Sh/Clst: m gy to drk gy 5 Ca : lt gy to pl y brn, brn gy tr Sh/Clst: dsk y brn to brn blk, carb tr Sh/Clst: gy red, calc		0141-3L 0141-1L 0141-2L 0141-4L 0141-5L
4118.00						0142
	6.27			50 Sh/Clst: dsk y brn to brn blk, carb 40 Cont : prp, dd, fib 10 Sh/Clst: m gy to drk gy tr Ca : lt gy to pl y brn, brn gy tr Sh/Clst: gy red, calc		0142-4L 0142-3L 0142-1L 0142-2L 0142-5L



Table 1 : Lithology description for well NOCS 24/12-1

Depth unit of measure: m

Depth	Type	Grp	Frm	Age	Trb	Sample
Int	Cvd	TOC%	%	Lithology description		
4121.00						0143
	5.00			50 Cont : prp, dd, fib 35 Sh/Clst: dsk y brn to brn blk, carb 10 Sh/Clst: m gy to drk gy 5 Ca : lt gy to pl y brn, brn gy tr Sh/Clst: gy red, calc		0143-3L 0143-4L 0143-1L 0143-2L 0143-5L
4124.00						0144
	4.81			45 Sh/Clst: dsk y brn to brn blk, carb 40 Cont : prp, dd, fib 15 Sh/Clst: m gy to drk gy tr Ca : lt gy to pl y brn, brn gy tr Sh/Clst: gy red, calc		0144-4L 0144-3L 0144-1L 0144-2L 0144-5L
4130.00						0145
	4.03			65 Cont : prp, dd, fib 20 Sh/Clst: dsk y brn to brn blk, carb 10 Sh/Clst: m gy to drk gy 5 Ca : lt gy to pl y brn, brn gy tr Sh/Clst: gy red, calc		0145-3L 0145-4L 0145-1L 0145-2L 0145-5L
4136.00						0146
	4.63			50 Cont : prp, dd, fib 50 Sh/Clst: dsk y brn to brn blk, carb tr Sh/Clst: m gy to drk gy tr Ca : lt gy to pl y brn, brn gy tr Sh/Clst: gy red, calc		0146-3L 0146-4L 0146-1L 0146-2L 0146-5L
4139.00						0147
	5.32			65 Sh/Clst: dsk y brn to brn blk, carb, mic 35 Cont : prp, dd, fib tr Sh/Clst: m gy to drk gy tr Ca : lt gy to pl y brn, brn gy tr Sh/Clst: gy red, calc		0147-4L 0147-3L 0147-1L 0147-2L 0147-5L

Table 1 : Lithology description for well NOCS 24/12-1

Depth unit of measure: m

Depth	Type	Grp	Frm	Age	Trb	Sample	
Int Cvd	TOC%	%	Lithology description				
4142.00						0148	
	4.87		50	Cont	: prp, dd, fib	0148-3L	
			50	Sh/Clst:	dsk y brn to brn blk, carb, mic	0148-4L	
				tr Sh/Clst:	m gy to drk gy	0148-1L	
				tr Ca	: lt gy to pl y brn, brn gy	0148-2L	
				tr Sh/Clst:	gy red, calc	0148-5L	
4154.00						0149	
	1.83		55	Sh/Clst:	dsk y brn to brn blk, carb, mic	0149-4L	
			25	Cont	: Coal-ad, prp, dd, fib	0149-3L	
			10	Sh/Clst:	m gy to drk gy	0149-1L	
			10	Ca	: lt gy to pl y brn, brn gy	0149-2L	
				tr Sh/Clst:	gy red, calc	0149-5L	
4169.00						0150	
			100	S/Sst	: pl y brn, st, cem	0150-6L	
				tr Sh/Clst:	m gy to drk gy	0150-1L	
				tr Ca	: lt gy to pl y brn, brn gy	0150-2L	
				tr Cont	: Coal-ad, prp, dd, fib	0150-3L	
				tr Sh/Clst:	dsk y brn to brn blk, carb, mic	0150-4L	
				tr Sh/Clst:	gy red, calc	0150-5L	
4170.50	ccp					0112	
	0.14		100	S/Sst	: gy brn, crs, cem	0112-1L	
4172.30	ccp					0113	
	0.19		100	S/Sst	: gy brn, crs, cem	0113-1L	

Table 1 : Lithology description for well NOCS 24/12-1

Depth unit of measure: m

Depth	Type	Grp	Frm	Age	Trb	Sample
Int	Cvd	TOC%	%	Lithology description		
4174.60	ccp					0114
	0.27	100	Sltst	: gy brn to lt y brn, s		0114-1L
4176.40	ccp					0115
	0.52	100	S/Sst	: gy brn to lt y brn, cem		0115-1L
4178.40	ccp					0116
	0.08	100	S/Sst	: pl brn to gy brn, crs, cem		0116-1L
4180.73	ccp					0117
	0.17	100	S/Sst	: brn gy, cem		0117-1L
4181.00						0151
			80	Sh/Clst: dsk y brn to brn blk, carb, st		0151-4L
			15	Cont : Coal-ad, prp, dd, fib		0151-3L
			5	Ca : lt gy to pl y brn, brn gy		0151-2L
			tr	Sh/Clst: m gy to drk gy		0151-1L
			tr	Sh/Clst: gy red, calc		0151-5L
			tr	S/Sst : pl y brn, st, cem		0151-6L
4181.63	ccp					0118
	0.05	100	S/Sst	: lt gy to pl brn, crs, cem		0118-1L
4196.00						0152
	0.30	100	S/Sst	: lt y brn to pl y brn, cem		0152-1L
			tr	Sh/Clst: m gy to drk gy		0152-2L
			tr	Sh/Clst: dsk y brn to brn blk, carb		0152-3L
			tr	Other : carb		0152-4L
			tr	Cont : prp		0152-5L

Table 1 : Lithology description for well NOCS 24/12-1

Depth unit of measure: m

Depth	Type	Grp	Frm	Age	Trb	Sample
Int	Cvd	TOC%	%	Lithology description		
4211.00						0153
				75 S/Sst : lt gy to pl y brn, crs, l		0153-1L
				15 Sh/Clst: gn gy to m gy to drk gy		0153-2L
				10 Cont : prp, fib, tar-ad		0153-4L
				tr Sh/Clst: dsk y brn to brn blk, carb		0153-3L
4223.00						0154
	1.33			70 S/Sst : lt gy to pl y brn, l		0154-1L
				20 Sh/Clst: gn gy to m gy to drk gy		0154-2L
				10 Cont : prp, fib, tar-ad		0154-4L
				tr Sh/Clst: dsk y brn to brn blk, carb		0154-3L
4235.00						0155
				75 S/Sst : lt gy to pl y brn, l		0155-1L
				15 Sh/Clst: gn gy to m gy to drk gy		0155-2L
				10 Cont : prp, fib, tar-ad		0155-4L
				tr Sh/Clst: dsk y brn to brn blk, carb		0155-3L
4250.00						0156
				45 Sh/Clst: dsk y brn to brn blk, carb		0156-3L
				25 Other : m gy to drk gy, trbofgs		0156-5L
				15 S/Sst : lt gy to pl y brn, cem		0156-1L
				10 Sh/Clst: lt gy to m gy to brn gy		0156-2L
				5 Cont : Coal-ad, prp, fib		0156-4L
4265.00						0157
				100 Cont : st, Coal-ad, prp, dd, fib		0157-1L
				tr S/Sst : lt gy to pl y brn, st, cem		0157-2L
				tr Sh/Clst: dsk y brn to brn blk, carb		0157-3L
				tr Sh/Clst: lt gy to m gy to brn gy		0157-4L
				tr Other : m gy, trbofgs		0157-5L

Table 1 : Lithology description for well NOCS 24/12-1

Depth unit of measure: m

Depth	Type	Grp	Frm	Age	Trb	Sample
Int	Cvd	TOC%	%	Lithology description		
4280.00						0158
	0.47	80	Sh/Clst:	lt gy to m gy to brn gy, st		0158-4L
		20	Sh/Clst:	dsk y brn to brn blk, carb, st		0158-3L
			tr Cont	: st, Coal-ad, prp, dd, fib		0158-1L
			tr S/Sst	: lt gy to pl y brn, st, cem		0158-2L
4289.00						0159
	0.50	75	Sh/Clst:	lt gy to m gy to brn gy		0159-4L
		15	Sh/Clst:	dsk y brn to brn blk, carb		0159-3L
		10	Cont	: prp, dd, fib		0159-1L
			tr S/Sst	: lt gy to pl y brn, cem		0159-2L
4307.00						0160
		90	Other	: drk gy, trbofgs		0160-5L
		10	Cont	: Coal-ad, prp, dd, fib		0160-1L
			tr S/Sst	: lt gy to pl y brn, cem		0160-2L
			tr Sh/Clst:	dsk y brn to brn blk, carb		0160-3L
			tr Sh/Clst:	lt gy to m gy to brn gy		0160-4L
4322.00						0161
		60	Other	: drk gy, trbofgs		0161-5L
		20	Cont	: Coal-ad, prp, dd, fib		0161-1L
		15	Sh/Clst:	lt gy to m gy to brn gy		0161-4L
		5	Sh/Clst:	dsk y brn to brn blk, carb		0161-3L
			tr S/Sst	: lt gy to pl y brn, cem		0161-2L
4331.00						0162
	0.22	90	S/Sst	: lt gy to pl y brn, mic, cem		0162-2L
		10	Cont	: Mica-ad		0162-1L
			tr Sh/Clst:	dsk y brn to brn blk, carb		0162-3L
			tr Sh/Clst:	lt gy to m gy to brn gy		0162-4L
			tr Other	: drk gy, trbofgs		0162-5L
			tr Coal	: blk		0162-6L

Table 1 : Lithology description for well NOCS 24/12-1

Depth unit of measure: m

Depth	Type	Grp	Frm	Age	Trb	Sample
Int	Cvd	TOC%	%	Lithology description		
4355.00						0163
			100	Cont : Mica-ad		0163-1L
			tr	S/Sst : lt gy to pl y brn, mic, cem		0163-2L
			tr	Sh/Clst: dsk y brn to brn blk, carb		0163-3L
			tr	Sh/Clst: lt gy to m gy to brn gy		0163-4L
			tr	Coal : blk		0163-5L
4370.00						0164
			70	Cont : st, Coal-ad, Mica-ad, prp, fib		0164-1L
			30	S/Sst : lt gy to pl y brn, mic, st, l		0164-2L
			tr	Sh/Clst: dsk y brn to brn blk, carb		0164-3L
			tr	Sh/Clst: lt gy to m gy to brn gy		0164-4L
			tr	Coal : blk		0164-5L
4385.00						0165
			100	Other : m gy to drk gy, trbofgs		0165-5L
			tr	Cont : Coal-ad, Mica-ad, prp, fib		0165-1L
			tr	S/Sst : lt gy to pl y brn, mic, l		0165-2L
			tr	Sh/Clst: dsk y brn to brn blk, carb		0165-3L
			tr	Sh/Clst: lt gy to m gy to brn gy		0165-4L
4397.00						0166
			50	S/Sst : lt gy to pl y brn, mic, l		0166-2L
			50	Other : m gy to drk gy, trbofgs		0166-5L
			tr	Cont : Coal-ad, Mica-ad, prp, fib		0166-1L
			tr	Sh/Clst: dsk y brn to brn blk, carb		0166-3L
			tr	Sh/Clst: lt gy to m gy to brn gy		0166-4L
4409.00						0167
			100	Other : m gy, trbofgs		0167-5L
			tr	Cont : Coal-ad, Mica-ad, prp, fib		0167-1L
			tr	S/Sst : lt gy to pl y brn, mic, l		0167-2L
			tr	Sh/Clst: dsk y brn to brn blk, carb		0167-3L
			tr	Sh/Clst: lt gy to m gy to brn gy		0167-4L

Table 1 : Lithology description for well NOCS 24/12-1

Depth unit of measure: m

Depth	Type	Grp	Frm	Age	Trb	Sample
Int	Cvd	TOC%	%	Lithology description		
4427.00						0168
	0.11	70	S/Sst	: lt gy to pl y brn, mic, st, cem, l		0168-2L
		30	Cont	: st, Coal-ad, Mica-ad, prp, fib		0168-1L
			tr Sh/Clst:	dsk y brn to brn blk, carb		0168-3L
			tr Sh/Clst:	lt gy to m gy to brn gy		0168-4L
			tr Other	: m gy, trbofgs		0168-5L
4439.00						0169
		90	S/Sst	: lt gy to pl y brn, st, l		0169-2L
		10	Cont	: st, Coal-ad, Mica-ad, prp, fib		0169-1L
			tr Sh/Clst:	dsk y brn to brn blk, carb		0169-3L
			tr Sh/Clst:	lt gy to m gy to brn gy		0169-4L
4454.00						0170
	0.19	55	S/Sst	: lt gy to pl y brn, mic, st, cem, l		0170-2L
		30	Sh/Clst:	brn gy to dsk y brn, carb		0170-3L
		10	Cont	: st, Coal-ad, Mica-ad, prp, fib		0170-1L
		5	Coal	: blk, cly		0170-5L
			tr Sh/Clst:	lt gy to m gy to brn gy		0170-4L
4463.00						0171
	0.14	95	S/Sst	: lt gy to pl y brn, st, cem, l		0171-2L
		5	Cont	: st, Coal-ad, Mica-ad, prp, fib		0171-1L
			tr Sh/Clst:	brn gy to dsk y brn, carb		0171-3L
			tr Sh/Clst:	lt gy to m gy to brn gy		0171-4L
			tr Coal	: blk, cly		0171-5L

Table 1 : Lithology description for well NOCS 24/12-1

Depth unit of measure: m

Depth	Type	Grp	Frm	Age	Trb	Sample
Int	Cvd	TOC%	%	Lithology description		
4478.00						0172
			100	S/Sst : lt gy to pl y brn, st, l		0172-2L
				tr Cont : st, Coal-ad, Mica-ad, prp, fib		0172-1L
				tr Sh/Clst: brn gy to dsk y brn, carb		0172-3L
				tr Sh/Clst: lt gy to m gy to brn gy		0172-4L
				tr Coal : blk, cly		0172-5L
4499.00						0173
			65	S/Sst : lt gy to pl y brn, l		0173-2L
			35	Other : m gy, trbofgs		0173-6L
				tr Cont : Coal-ad, Mica-ad, prp, fib		0173-1L
				tr Sh/Clst: brn gy to dsk y brn, carb		0173-3L
				tr Sh/Clst: lt gy to m gy to brn gy		0173-4L
				tr Coal : blk, cly		0173-5L
4505.00						0174
			100	Other : m gy to drk gy, trbofgs		0174-5L
				tr Cont : Coal-ad, Mica-ad, prp, fib		0174-1L
				tr S/Sst : lt gy to pl y brn, l		0174-2L
				tr Sh/Clst: brn gy to dsk y brn, carb		0174-3L
				tr Sh/Clst: lt gy to m gy to brn gy		0174-4L
4511.00						0175
			100	Other : m gy to drk gy, trbofgs		0175-5L
				tr Cont : Coal-ad, Mica-ad, prp, fib		0175-1L
				tr S/Sst : lt gy to pl y brn, l		0175-2L
				tr Sh/Clst: brn gy to dsk y brn, carb		0175-3L
				tr Sh/Clst: lt gy to m gy to brn gy		0175-4L



Table 1 : Lithology description for well NOCS 24/12-1

Depth unit of measure: m

Depth	Type	Grp	Frm	Age	Trb	Sample
Int	Cvd	TOC%	%	Lithology description		
4517.00						0176
			100	Other : m gy to drk gy, trbofgs		0176-5L
			tr	Cont : Coal-ad, Mica-ad, prp, fib		0176-1L
			tr	S/Sst : lt gy to pl y brn, l		0176-2L
			tr	Sh/Clst: brn gy to dsk y brn, carb		0176-3L
			tr	Sh/Clst: lt gy to m gy to brn gy		0176-4L
4520.00						0177
			100	Other : m gy to drk gy, trbofgs		0177-5L
			tr	Cont : st, Coal-ad, Mica-ad, prp, fib		0177-1L
			tr	S/Sst : lt gy to pl y brn, l		0177-2L
			tr	Sh/Clst: brn gy to dsk y brn, carb		0177-3L
			tr	Sh/Clst: lt gy to m gy to brn gy		0177-4L
4526.00						0178
			100	S/Sst : lt gy to pl y brn, l		0178-2L
			tr	Cont : st, Coal-ad, Mica-ad, prp, fib		0178-1L
			tr	Sh/Clst: brn gy to dsk y brn, carb		0178-3L
			tr	Sh/Clst: lt gy to m gy to brn gy		0178-4L
			tr	Other : m gy to drk gy, trbofgs		0178-5L
4529.00						0179
			95	S/Sst : lt gy to pl y brn, l		0179-2L
			5	Cont : st, Coal-ad, Mica-ad, prp, fib		0179-1L
			tr	Sh/Clst: brn gy to dsk y brn, carb		0179-3L
			tr	Sh/Clst: lt gy to m gy to brn gy		0179-4L
			tr	Other : m gy to drk gy, trbofgs		0179-5L
4535.00						0180
			100	Other : m gy to drk gy, trbofgs		0180-5L
			tr	Cont : st, Coal-ad, Mica-ad, prp, fib		0180-1L
			tr	S/Sst : lt gy to pl y brn, l		0180-2L
			tr	Sh/Clst: brn gy to dsk y brn, carb		0180-3L
			tr	Sh/Clst: lt gy to m gy to brn gy		0180-4L

Table 1 : Lithology description for well NOCS 24/12-1

Depth unit of measure: m

Depth	Type	Grp	Frm	Age	Trb	Sample
Int Cvd	TOC%	%	Lithology description			
4550.00						0181
		100	Other	: m gy to drk gy, trbofgs		0181-5L
			tr Cont	: st, Coal-ad, Mica-ad, prp, fib		0181-1L
			tr S/Sst	: lt gy to pl y brn, l		0181-2L
			tr Sh/Clst:	brn gy to dsk y brn, carb		0181-3L
			tr Sh/Clst:	lt gy to m gy to brn gy		0181-4L
4553.00						0182
		100	Other	: m gy to drk gy, trbofgs		0182-5L
			tr Cont	: st, Coal-ad, Mica-ad, prp, fib		0182-1L
			tr S/Sst	: lt gy to pl y brn, l		0182-2L
			tr Sh/Clst:	brn gy to dsk y brn, carb		0182-3L
			tr Sh/Clst:	lt gy to m gy to brn gy		0182-4L
4559.00						0183
		100	Other	: m gy to drk gy, trbofgs		0183-5L
			tr Cont	: st, Coal-ad, Mica-ad, prp, fib		0183-1L
			tr S/Sst	: lt gy to pl y brn, l		0183-2L
			tr Sh/Clst:	brn gy to dsk y brn, carb		0183-3L
			tr Sh/Clst:	lt gy to m gy to brn gy		0183-4L
4565.00						0184
		95	Other	: m gy to drk gy to blk, trbofgs		0184-5L
		5	Coal	: blk		0184-6L
			tr Cont	: st, Coal-ad, Mica-ad, prp, fib		0184-1L
			tr S/Sst	: lt gy to pl y brn, l		0184-2L
			tr Sh/Clst:	brn gy to dsk y brn, carb		0184-3L
			tr Sh/Clst:	lt gy to m gy to brn gy		0184-4L

Table 1 : Lithology description for well NOCS 24/12-1

Depth unit of measure: m

Depth	Type	Grp	Frm	Age	Trb	Sample	
Int Cvd	TOC%	%	Lithology description				
4571.00						0185	
		100	Other	: m gy to drk gy to blk, trbofgs		0185-5L	
			tr Cont	: st, Coal-ad, Mica-ad, prp, fib		0185-1L	
			tr S/Sst	: lt gy to pl y brn, l		0185-2L	
			tr Sh/Clst:	brn gy to dsk y brn, carb		0185-3L	
			tr Sh/Clst:	lt gy to m gy to brn gy		0185-4L	
			tr Coal	: blk		0185-6L	
4577.00						0186	
		100	Other	: m gy to drk gy to blk, trbofgs		0186-5L	
			tr Cont	: st, Coal-ad, Mica-ad, prp, fib		0186-1L	
			tr S/Sst	: lt gy to pl y brn, l		0186-2L	
			tr Sh/Clst:	brn gy to dsk y brn, carb		0186-3L	
			tr Sh/Clst:	lt gy to m gy to brn gy		0186-4L	
			tr Coal	: blk		0186-6L	
4580.00						0187	
	13.60	50	Other	: m gy to drk gy to blk, trbofgs		0187-5L	
		50	Coal	: blk		0187-6L	
			tr Cont	: st, Coal-ad, Mica-ad, prp, fib		0187-1L	
			tr S/Sst	: lt gy to pl y brn, l		0187-2L	
			tr Sh/Clst:	brn gy to dsk y brn, carb		0187-3L	
			tr Sh/Clst:	lt gy to m gy to brn gy		0187-4L	
4586.00						0188	
		100	Other	: m gy to drk gy to blk, trbofgs		0188-5L	
			tr Cont	: st, Coal-ad, Mica-ad, prp, fib		0188-1L	
			tr S/Sst	: lt gy to pl y brn, l		0188-2L	
			tr Sh/Clst:	brn gy to dsk y brn, carb		0188-3L	
			tr Sh/Clst:	lt gy to m gy to brn gy		0188-4L	
			tr Coal	: blk		0188-6L	

Table 1 : Lithology description for well NOCS 24/12-1

Depth unit of measure: m

Depth	Type	Grp	Frm	Age	Trb	Sample
Int	Cvd	TOC%	%	Lithology description		
4589.00						0189
				100 Other : m gy to drk gy to blk, trbofgs		0189-5L
				tr Cont : st, Coal-ad, Mica-ad, prp, fib		0189-1L
				tr S/Sst : lt gy to pl y brn, l		0189-2L
				tr Sh/Clst: brn gy to dsk y brn, carb		0189-3L
				tr Sh/Clst: lt gy to m gy to brn gy		0189-4L
				tr Coal : blk		0189-6L
4595.00						0190
				100 Other : m gy to drk gy, trbofgs		0190-5L
				tr Cont : st, Coal-ad, Mica-ad, prp, fib		0190-1L
				tr S/Sst : lt gy to pl y brn, l		0190-2L
				tr Sh/Clst: brn gy to dsk y brn, carb		0190-3L
				tr Sh/Clst: lt gy to m gy to brn gy		0190-4L
				tr Coal : blk		0190-6L
4598.00						0191
				100 Other : m gy to drk gy, trbofgs		0191-5L
				tr Cont : st, Coal-ad, Mica-ad, prp, fib		0191-1L
				tr S/Sst : lt gy to pl y brn, l		0191-2L
				tr Sh/Clst: brn gy to dsk y brn, carb		0191-3L
				tr Sh/Clst: lt gy to m gy to brn gy		0191-4L
				tr Coal : blk		0191-6L
4601.00						0192
				100 Other : m gy to drk gy, trbofgs		0192-5L
				tr Cont : st, Coal-ad, Mica-ad, prp, fib		0192-1L
				tr S/Sst : lt gy to pl y brn, l		0192-2L
				tr Sh/Clst: brn gy to dsk y brn, carb		0192-3L
				tr Sh/Clst: lt gy to m gy to brn gy		0192-4L
				tr Coal : blk		0192-6L

Table 1 : Lithology description for well NOCS 24/12-1

Depth unit of measure: m

Depth	Type	Grp	Frm	Age	Trb	Sample
Int	Cvd	TOC%	%	Lithology description		
4607.00						0193
			100	Other : m gy to drk gy to blk, trbofgs		0193-5L
				tr Cont : st, Coal-ad, Mica-ad, prp, fib		0193-1L
				tr S/Sst : lt gy to pl y brn, l		0193-2L
				tr Sh/Clst: brn gy to dsk y brn, carb		0193-3L
				tr Sh/Clst: lt gy to m gy to brn gy		0193-4L
				tr Coal : blk		0193-6L
4610.00						0194
			100	Other : m gy to drk gy to blk, trbofgs		0194-5L
				tr Cont : st, Coal-ad, Mica-ad, prp, fib		0194-1L
				tr S/Sst : lt gy to pl y brn, l		0194-2L
				tr Sh/Clst: brn gy to dsk y brn, carb		0194-3L
				tr Sh/Clst: lt gy to m gy to brn gy		0194-4L
				tr Coal : blk		0194-6L
4616.00						0195
			100	Other : m gy to drk gy to blk, trbofgs		0195-5L
				tr Cont : st, Coal-ad, Mica-ad, prp, fib		0195-1L
				tr S/Sst : lt gy to pl y brn, l		0195-2L
				tr Sh/Clst: brn gy to dsk y brn, carb		0195-3L
				tr Sh/Clst: lt gy to m gy to brn gy		0195-4L
				tr Coal : blk		0195-6L
4619.00						0196
			100	Other : m gy to drk gy to blk, trbofgs		0196-5L
				tr Cont : st, Coal-ad, Mica-ad, prp, fib		0196-1L
				tr S/Sst : lt gy to pl y brn, l		0196-2L
				tr Sh/Clst: brn gy to dsk y brn, carb		0196-3L
				tr Sh/Clst: lt gy to m gy to brn gy		0196-4L
				tr Coal : blk		0196-6L

Table 1 : Lithology description for well NOCS 24/12-1

Depth unit of measure: m

Depth	Type	Grp	Frm	Age	Trb	Sample
Int	Cvd	TOC%	%	Lithology description		
4625.00						0197
			100	Other : m gy to drk gy to blk, trbofgs		0197-5L
				tr Cont : st, Coal-ad, Mica-ad, prp, fib		0197-1L
				tr S/Sst : lt gy to pl y brn, l		0197-2L
				tr Sh/Clst: brn gy to dsk y brn, carb		0197-3L
				tr Sh/Clst: lt gy to m gy to brn gy		0197-4L
				tr Coal : blk		0197-6L
4628.00						0198
			100	Other : m gy to drk gy to blk, trbofgs		0198-5L
				tr Cont : st, Coal-ad, Mica-ad, prp, fib		0198-1L
				tr S/Sst : lt gy to pl y brn, l		0198-2L
				tr Sh/Clst: brn gy to dsk y brn, carb		0198-3L
				tr Sh/Clst: lt gy to m gy to brn gy		0198-4L
				tr Coal : blk		0198-6L
4634.00						0199
	5.68		75	Cont : st, Mica-ad, prp, fib, tar-ad		0199-1L
	2.45		25	Sh/Clst: brn gy to dsk y brn, carb		0199-3L
				tr S/Sst : lt gy to pl y brn, l		0199-2L
				tr Sh/Clst: lt gy to m gy to brn gy		0199-4L
				tr Other : m gy to drk gy to blk, trbofgs		0199-5L
				tr Coal : blk		0199-6L
4637.00						0200
	0.35		95	S/Sst : lt gy to pl y brn, l		0200-2L
			5	Cont : st, Mica-ad, prp, fib		0200-1L
				tr Sh/Clst: brn gy to dsk y brn, carb		0200-3L
				tr Sh/Clst: lt gy to m gy to brn gy		0200-4L
				tr Other : m gy to drk gy to blk, trbofgs		0200-5L

Table 1 : Lithology description for well NOCS 24/12-1

Depth unit of measure: m

Depth	Type	Grp	Frm	Age	Trb	Sample
Int	Cvd	TOC%	%	Lithology description		
4643.00						0201
	0.32			50 S/Sst : w to pl y brn, l 50 Sh/Clst: brn gy to dsk y brn tr Cont : Mica-ad, prp, fib tr Sh/Clst: lt gy to m gy to brn gy		0201-2L 0201-3L 0201-1L 0201-4L
4646.00						0202
				55 Sh/Clst: brn gy to dsk y brn 40 S/Sst : w to pl y brn, l 5 Coal : blk, cly tr Cont : prp, ns, fib tr Sh/Clst: lt gy to m gy to brn gy		0202-3L 0202-2L 0202-5L 0202-1L 0202-4L
4652.00						0203
	0.59			50 S/Sst : w to pl y brn, l 40 Sh/Clst: brn gy to dsk y brn 10 Coal : blk, cly tr Cont : prp, ns, fib tr Sh/Clst: lt gy to m gy to brn gy		0203-2L 0203-3L 0203-5L 0203-1L 0203-4L
4655.00						0204
				75 S/Sst : w to pl y brn, l 10 Sh/Clst: brn gy to dsk y brn 10 Other : m gy, trbofgs 5 Coal : blk, cly tr Cont : prp, ns, fib tr Sh/Clst: lt gy to m gy to brn gy		0204-2L 0204-3L 0204-6L 0204-5L 0204-1L 0204-4L
4661.00						0205
	1.02			65 Sh/Clst: brn gy to dsk y brn, st 20 Other : m gy, trbofgs 15 Coal : blk, cly tr Cont : st, prp, ns, fib tr S/Sst : w to pl y brn, l tr Sh/Clst: lt gy to m gy to brn gy		0205-3L 0205-6L 0205-5L 0205-1L 0205-2L 0205-4L

Table 1 : Lithology description for well NOCS 24/12-1

Depth unit of measure: m

Depth	Type	Grp	Frm	Age	Trb	Sample
Int	Cvd	TOC%	%	Lithology description		
4664.00						0206
				60 Sh/Clst: brn gy to dsk y brn, st		0206-3L
				20 Coal : blk, cly		0206-5L
				10 S/Sst : w to pl y brn, st, l		0206-2L
				10 Other : m gy, trbofgs		0206-6L
				tr Cont : st, prp, ns, fib		0206-1L
				tr Sh/Clst: lt gy to m gy to brn gy		0206-4L
4667.00						0207
				40 Sh/Clst: brn gy to dsk y brn, st		0207-3L
		33.34		25 Coal : blk, cly		0207-5L
				25 Other : m gy, trbofgs		0207-6L
				10 S/Sst : w to pl y brn, st, l		0207-2L
				tr Cont : st, prp, ns, fib		0207-1L
				tr Sh/Clst: lt gy to m gy to brn gy		0207-4L
4673.00						0208
				40 S/Sst : w to pl y brn, st, l		0208-2L
				35 Sh/Clst: brn gy to dsk y brn, st		0208-3L
				25 Coal : blk, cly		0208-5L
				tr Cont : st, prp, ns, fib		0208-1L
				tr Sh/Clst: lt gy to m gy to brn gy		0208-4L
				tr Other : m gy, trbofgs		0208-6L
4679.00						0209
		0.15		60 S/Sst : w to pl y brn, st, cem, l		0209-2L
				35 Sh/Clst: brn gy to dsk y brn, st		0209-3L
				5 Coal : blk, cly		0209-5L
				tr Cont : st, prp, ns, fib		0209-1L
				tr Sh/Clst: lt gy to m gy to brn gy		0209-4L
				tr Other : m gy, trbofgs		0209-6L



Table 1 : Lithology description for well NOCS 24/12-1

Depth unit of measure: m

Depth	Type	Grp	Frm	Age	Trb	Sample
Int	Cvd	TOC%	%	Lithology description		
4682.00						0210
	0.15			60 S/Sst : w to pl y brn, st, cem 35 Sh/Clst: brn gy to dsk y brn, st 5 Coal : blk, cly tr Cont : st, prp tr Sh/Clst: lt gy to m gy to brn gy tr Other : m gy, trbofgs		0210-2L 0210-3L 0210-5L 0210-1L 0210-4L 0210-6L
4688.00						0211
				90 S/Sst : w to pl y brn, st, cem 10 Sh/Clst: brn gy to dsk y brn, st tr Cont : st, prp tr Sh/Clst: lt gy to m gy to brn gy tr Coal : blk, cly		0211-2L 0211-3L 0211-1L 0211-4L 0211-5L
4691.00						0212
	0.18			85 S/Sst : w to pl y brn, st, cem 10 Sh/Clst: brn gy to dsk y brn, st 5 Coal : blk, cly tr Cont : st, prp tr Sh/Clst: lt gy to m gy to brn gy		0212-2L 0212-3L 0212-5L 0212-1L 0212-4L
4697.00						0213
				90 S/Sst : w to pl y brn, st, cem 10 Sh/Clst: brn gy to dsk y brn, st tr Cont : st, prp tr Sh/Clst: lt gy to m gy to brn gy tr Coal : blk, cly		0213-2L 0213-3L 0213-1L 0213-4L 0213-5L

Table 1 : Lithology description for well NOCS 24/12-1

Depth unit of measure: m

Depth	Type	Grp	Frm	Age	Trb	Sample
Int	Cvd	TOC%	%	Lithology description		
4703.00						0214
	1.03			50 S/Sst : w to pl y brn, st, cem		0214-2L
				45 Sh/Clst: brn gy to dsk y brn, slt, st		0214-3L
				5 Coal : blk, cly		0214-5L
				tr Cont : st, prp, fib		0214-1L
				tr Sh/Clst: lt gy to m gy to brn gy		0214-4L
4706.00						0215
				75 S/Sst : w to pl y brn, st, cem		0215-2L
				15 Coal : blk, cly		0215-5L
				10 Sh/Clst: brn gy to dsk y brn, slt, st		0215-3L
				tr Cont : st, prp, fib		0215-1L
				tr Sh/Clst: lt gy to m gy to brn gy		0215-4L
4712.00						0216
	0.71			50 Sh/Clst: brn gy to dsk y brn, slt, st		0216-3L
				40 S/Sst : w to pl y brn, st, cem		0216-2L
				10 Coal : blk, cly		0216-5L
				tr Cont : st, prp, fib		0216-1L
				tr Sh/Clst: lt gy to m gy to brn gy		0216-4L
4715.00						0217
				50 S/Sst : w to pl y brn, st, cem		0217-2L
				40 Sh/Clst: brn gy to dsk y brn, slt, st		0217-3L
				10 Coal : blk, cly		0217-5L
				tr Cont : st, prp, fib		0217-1L
				tr Sh/Clst: lt gy to m gy to brn gy		0217-4L
4721.00						0218
	0.75			55 S/Sst : w to pl y brn, st, cem, l		0218-2L
				25 Sh/Clst: brn gy to dsk y brn, slt, st		0218-3L
				20 Coal : blk, cly		0218-5L
				tr Cont : st, prp, fib		0218-1L
				tr Sh/Clst: lt gy to m gy to brn gy		0218-4L

Table 1 : Lithology description for well NOCS 24/12-1

Depth unit of measure: m

Depth	Type	Grp	Frm	Age	Trb	Sample
Int	Cvd	TOC%	%	Lithology description		
4724.00						0219
				50 S/Sst : w to pl y brn, st, cem, l		0219-2L
				25 Sh/Clst: brn gy to dsk y brn, st		0219-3L
				25 Coal : blk, cly		0219-5L
				tr Cont : st, prp, fib		0219-1L
				tr Sh/Clst: lt gy to m gy to brn gy		0219-4L
4730.00						0220
	0.14			55 S/Sst : pl y brn, cem		0220-2L
				40 Sh/Clst: brn gy to dsk y brn to m gy		0220-3L
				5 Coal : blk, cly		0220-4L
				tr Cont : st, prp, fib		0220-1L
4733.00						0221
	0.55			45 S/Sst : pl y brn, cem, l		0221-2L
				35 Sh/Clst: brn gy to dsk y brn to m gy		0221-3L
				20 Coal : blk, cly		0221-4L
				tr Cont : st, prp, fib		0221-1L
4739.00						0222
				55 S/Sst : pl y brn, cem, l		0222-2L
				30 Sh/Clst: brn gy to dsk y brn to m gy, st		0222-3L
				15 Coal : blk, cly		0222-4L
				tr Cont : st, prp, fib		0222-1L
4742.00						0223
	1.23			55 S/Sst : pl y brn, cem, l		0223-2L
				35 Sh/Clst: brn gy to dsk y brn to m gy, st		0223-3L
				10 Coal : blk, cly		0223-4L
				tr Cont : st, prp, fib		0223-1L

Table 1 : Lithology description for well NOCS 24/12-1

Depth unit of measure: m

Depth	Type	Grp	Frm	Age	Trb	Sample
Int	Cvd	TOC%	%	Lithology description		
4745.00						0224
				60 S/Sst : pl y brn, cem, l		0224-2L
				30 Sh/Clst: brn gy to dsk y brn to m gy, st		0224-3L
				10 Coal : blk, cly		0224-4L
				tr Cont : st, prp, fib		0224-1L
4751.00						0225
				55 S/Sst : pl y brn, cem, l		0225-2L
	34.54			30 Coal : blk, cly		0225-4L
				15 Sh/Clst: brn gy to dsk y brn to m gy, st		0225-3L
				tr Cont : st, prp, fib		0225-1L
4760.00						0226
				45 S/Sst : pl y brn, cem, l		0226-2L
	1.34			45 Sh/Clst: brn gy to dsk y brn to m gy, slt		0226-3L
				10 Coal : blk, cly		0226-4L
				tr Cont : st, prp, fib		0226-1L
4766.00						0227
				55 S/Sst : pl y brn, cem, l		0227-2L
				35 Sh/Clst: brn gy to dsk y brn to m gy, slt		0227-3L
				10 Coal : blk, cly		0227-4L
				tr Cont : st, prp, fib		0227-1L
4769.00						0228
				55 Sh/Clst: brn gy to dsk y brn to m gy, carb, slt		0228-3L
	0.90			25 S/Sst : pl y brn, cem, l		0228-2L
				20 Coal : blk, cly		0228-4L
				tr Cont : st, prp, fib		0228-1L

Table 1 : Lithology description for well NOCS 24/12-1

Depth unit of measure: m

Depth	Type	Grp	Frm	Age	Trb	Sample
Int	Cvd	TOC%	%	Lithology description		
4775.00						0229
				50 S/Sst : pl y brn, st, cem, l		0229-2L
				30 Sh/Clst: brn gy to dsk y brn to m gy, carb, slt, st		0229-3L
				20 Coal : blk, cly		0229-4L
				tr Cont : st, prp, fib		0229-1L
4778.00						0230
	0.41			55 Sh/Clst: gn gy to lt gy, slt		0230-5L
				20 Sh/Clst: brn gy to dsk y brn to m gy, carb, slt, st		0230-3L
				20 Coal : blk, cly		0230-4L
				5 S/Sst : pl y brn, st, cem, l		0230-2L
				tr Cont : st, prp, fib		0230-1L
4781.00						0231
				75 Sh/Clst: gn gy to lt gy, slt, s		0231-5L
				15 Sh/Clst: brn gy to dsk y brn to m gy, st		0231-3L
				10 Coal : blk, cly		0231-4L
				tr Cont : st, prp, fib		0231-1L
				tr S/Sst : pl y brn, st, cem, l		0231-2L
4787.00						0232
	0.10			90 Sh/Clst: gn gy to gy gn, gy red		0232-5L
				10 Sh/Clst: brn gy to dsk y brn to m gy		0232-3L
				tr Cont : prp, fib		0232-1L
				tr S/Sst : pl y brn, cem, l		0232-2L
				tr Coal : blk, cly		0232-4L

Table 1 : Lithology description for well NOCS 24/12-1

Depth unit of measure: m

Depth	Type	Grp	Frm	Age	Trb	Sample	
Int Cvd	TOC%	%	Lithology description				
4790.00						0233	
			90	Sh/Clst:	gn gy to gy gn, gy red	0233-5L	
			5	Sh/Clst:	brn gy to dsk y brn to m gy	0233-3L	
			5	Coal	: blk, cly	0233-4L	
			tr	Cont	: st, prp, fib	0233-1L	
			tr	S/Sst	: pl y brn, cem, l	0233-2L	
4796.00						0234	
	0.25		75	Sh/Clst:	gn gy to gy gn, gy red	0234-5L	
			10	Sh/Clst:	brn gy to dsk y brn to m gy	0234-3L	
			10	Coal	: blk, cly	0234-4L	
			5	S/Sst	: w, cem, l	0234-2L	
			tr	Cont	: st, prp, fib	0234-1L	
4799.00						0235	
			70	Sh/Clst:	gn gy to gy gn, gy red	0235-5L	
			10	S/Sst	: w, cem, l	0235-2L	
			10	Sh/Clst:	brn gy to dsk y brn to m gy	0235-3L	
			10	Coal	: blk, cly	0235-4L	
			tr	Cont	: st, prp, fib	0235-1L	
4805.00						0236	
			50	Sh/Clst:	brn gy to dsk y brn to m gy	0236-3L	
			20	Sh/Clst:	gn gy to gy gn, gy red	0236-5L	
			15	S/Sst	: w, cem, l	0236-2L	
			15	Coal	: blk, cly	0236-4L	
			tr	Cont	: st, prp, fib	0236-1L	
4808.00						0237	
	0.12		75	Sh/Clst:	gn gy to gy gn, gy red, s	0237-5L	
			20	S/Sst	: w, cem, l	0237-2L	
			5	Sh/Clst:	brn gy to dsk y brn to m gy	0237-3L	
			tr	Cont	: st, prp, fib	0237-1L	
			tr	Coal	: blk, cly	0237-4L	

Table 1 : Lithology description for well NOCS 24/12-1

Depth unit of measure: m

Depth	Type	Grp	Frm	Age	Trb	Sample
Int	Cvd	TOC%	%	Lithology description		
4815.00						0238
	0.38			40 Sh/Clst: gn gy to gy gn, gy red, s		0238-5L
				35 S/Sst : w, st, cem, l		0238-2L
				20 Sh/Clst: brn gy to dsk y brn to m gy		0238-3L
				5 Coal : blk, cly		0238-4L
				tr Cont : st, prp, fib		0238-1L
4817.00						0239
				55 Sh/Clst: brn gy to dsk y brn to m gy, st		0239-3L
				20 Coal : blk, cly		0239-4L
				15 S/Sst : w, st, cem, l		0239-2L
				10 Sh/Clst: gn gy to gy gn, gy red, st		0239-5L
				tr Cont : st, prp, fib		0239-1L
4823.00						0240
				35 S/Sst : w, st, cem, l		0240-2L
				30 Sh/Clst: brn gy to dsk y brn to m gy		0240-3L
				30 Sh/Clst: gn gy to gy gn, gy red		0240-5L
				5 Coal : blk, cly		0240-4L
				tr Cont : st, prp, fib		0240-1L
4825.00						0241
	0.25			50 S/Sst : w, st, cem, l		0241-2L
				20 Sh/Clst: brn gy to dsk y brn to m gy		0241-3L
				20 Sh/Clst: gn gy to gy gn, gy red		0241-5L
				10 Coal : blk, cly		0241-4L
				tr Cont : st, prp, fib		0241-1L

Table 2 : Rock-Eval table for well NOCS 24/12-1

Depth unit of measure: m

Depth	Typ	Lithology	S1	S2	S3	S2/S3	TOC	HI	OI	PP	PI	Tmax	Sample
4031.00	cut	Sh/Clst: m gy to drk gy	0.87	1.12	0.22	5.09	1.36	82	16	2.0	0.44	446	0119-1L
4037.00	cut	Ca : lt gy to pl y brn	0.41	0.36	0.91	0.40	0.61	59	149	0.8	0.53	413	0121-2L
4049.00	cut	Sh/Clst: m gy to drk gy	0.67	0.75	0.18	4.17	1.25	60	14	1.4	0.47	447	0125-1L
4061.00	cut	Sh/Clst: dsk y brn to brn blk	4.39	7.13	1.36	5.24	7.34	97	19	11.5	0.38	441	0128-4L
4067.00	cut	Sh/Clst: dsk y brn to brn blk	3.72	9.14	0.85	10.75	6.42	142	13	12.9	0.29	440	0129-4L
4070.00	cut	Sh/Clst: dsk y brn to brn blk	4.07	10.32	0.90	11.47	6.81	152	13	14.4	0.28	443	0130-4L
4076.00	cut	Sh/Clst: dsk y brn to brn blk	2.83	6.64	0.81	8.20	5.13	129	16	9.5	0.30	443	0132-4L
4079.00	cut	Sh/Clst: dsk y brn to brn blk	4.38	8.92	0.92	9.70	5.86	152	16	13.3	0.33	446	0133-4L
4085.00	cut	Sh/Clst: dsk y brn to brn blk	3.53	7.10	1.10	6.45	6.37	111	17	10.6	0.33	446	0134-4L
4091.00	cut	Sh/Clst: dsk y brn to brn blk	2.24	3.71	1.37	2.71	5.25	71	26	6.0	0.38	438	0135-4L
4100.00	com	bulk	3.03	5.99	0.69	8.68	5.41	111	13	9.0	0.34	443	0260-0B
4103.00	cut	Sh/Clst: dsk y brn to brn blk	2.54	5.52	0.79	6.99	3.45	160	23	8.1	0.32	445	0138-4L
4118.00	cut	Sh/Clst: dsk y brn to brn blk	3.53	7.92	0.79	10.03	6.27	126	13	11.4	0.31	446	0142-4L
4121.00	cut	Sh/Clst: dsk y brn to brn blk	2.43	5.19	0.90	5.77	5.00	104	18	7.6	0.32	446	0143-4L
4124.00	cut	Sh/Clst: dsk y brn to brn blk	2.75	5.78	1.08	5.35	4.81	120	22	8.5	0.32	444	0144-4L



Table 2 : Rock-Eval table for well NOCS 24/12-1

Depth unit of measure: m

Depth	Typ	Lithology	S1	S2	S3	S2/S3	TOC	HI	OI	PP	PI	Tmax	Sample
4130.00	cut	Sh/Clst: dsk y brn to brn blk	2.00	4.45	0.94	4.73	4.03	110	23	6.4	0.31	447	0145-4L
4136.00	cut	Sh/Clst: dsk y brn to brn blk	1.83	4.46	0.83	5.37	4.63	96	18	6.3	0.29	449	0146-4L
4139.00	cut	Sh/Clst: dsk y brn to brn blk	3.20	6.79	0.90	7.54	5.32	128	17	10.0	0.32	455	0147-4L
4142.00	cut	Sh/Clst: dsk y brn to brn blk	3.62	6.99	0.55	12.71	4.87	144	11	10.6	0.34	452	0148-4L
4154.00	cut	Sh/Clst: dsk y brn to brn blk	1.33	2.87	0.47	6.11	1.83	157	26	4.2	0.32	454	0149-4L
4170.50	ccp	S/Sst : gy brn	0.18	0.15	0.14	1.07	0.14	107	100	0.3	0.55	447	0112-1L
4172.30	ccp	S/Sst : gy brn	0.27	0.44	0.20	2.20	0.19	232	105	0.7	0.38	411	0113-1L
4174.60	ccp	Sltst : gy brn to lt y brn	0.58	0.40	0.23	1.74	0.27	148	85	1.0	0.59	401	0114-1L
4176.40	ccp	S/Sst : gy brn to lt y brn	0.53	0.87	0.13	6.69	0.52	167	25	1.4	0.38	450	0115-1L
4178.40	ccp	S/Sst : pl brn to gy brn	0.21	0.10	0.13	0.77	0.08	125	163	0.3	0.68	412	0116-1L
4180.73	ccp	S/Sst : brn gy	0.45	0.23	0.21	1.10	0.17	135	124	0.7	0.66	431	0117-1L
4181.63	ccp	S/Sst : lt gy to pl brn	0.06	0.01	0.24	0.04	0.05	20	480	0.1	0.86	460	0118-1L
4196.00	cut	S/Sst : lt y brn to pl y brn	0.24	0.32	0.12	2.67	0.30	107	40	0.6	0.43	447	0152-1L
4223.00	cut	Sh/Clst: gn gy to m gy to drk gy	1.52	1.26	0.44	2.86	1.33	95	33	2.8	0.55	445	0154-2L
4280.00	cut	Sh/Clst: lt gy to m gy to brn gy	0.27	0.27	0.33	0.82	0.47	57	70	0.5	0.50	357	0158-4L

Table 2 : Rock-Eval table for well NOCS 24/12-1

Depth unit of measure: m

Depth	Typ	Lithology	S1	S2	S3	S2/S3	TOC	HI	OI	PP	PI	Tmax	Sample
4289.00	cut	Sh/Clst: lt gy to m gy to brn gy	0.33	0.29	0.33	0.88	0.50	58	66	0.6	0.53	365	0159-4L
4331.00	cut	S/Sst : lt gy to pl y brn	0.17	0.12	0.08	1.50	0.22	55	36	0.3	0.59	414	0162-2L
4427.00	cut	S/Sst : lt gy to pl y brn	0.08	0.04	0.35	0.11	0.11	36	318	0.1	0.67	348	0168-2L
4454.00	cut	S/Sst : lt gy to pl y brn	0.12	0.13	0.14	0.93	0.19	68	74	0.3	0.48	403	0170-2L
4463.00	cut	S/Sst : lt gy to pl y brn	0.11	0.07	0.19	0.37	0.14	50	136	0.2	0.61	355	0171-2L
4580.00	cut	Coal : blk	1.84	12.15	0.46	26.41	13.60	89	3	14.0	0.13	473	0187-6L
4634.00	cut	Cont	21.22	13.66	2.40	5.69	5.68	240	42	34.9	0.61	328	0199-1L
4634.00	cut	Sh/Clst: brn gy to dsk y brn	2.25	4.79	0.44	10.89	2.45	196	18	7.0	0.32	448	0199-3L
4637.00	cut	S/Sst : lt gy to pl y brn	0.27	0.47	0.30	1.57	0.35	134	86	0.7	0.36	393	0200-2L
4643.00	cut	Sh/Clst: brn gy to dsk y brn	0.12	0.38	0.16	2.38	0.32	119	50	0.5	0.24	459	0201-3L
4652.00	cut	Sh/Clst: brn gy to dsk y brn	0.36	0.66	0.26	2.54	0.59	112	44	1.0	0.35	460	0203-3L
4661.00	cut	Sh/Clst: brn gy to dsk y brn	0.40	1.15	0.13	8.85	1.02	113	13	1.5	0.26	463	0205-3L
4667.00	cut	Coal : blk	3.52	55.88	1.37	40.79	33.34	168	4	59.4	0.06	472	0207-5L
4679.00	cut	S/Sst : w to pl y brn	0.06	0.02	0.35	0.06	0.15	13	233	0.1	0.75	456	0209-2L
4682.00	cut	S/Sst : w to pl y brn	0.05	0.05	0.17	0.29	0.15	33	113	0.1	0.50	434	0210-2L

Table 2 : Rock-Eval table for well NOCS 24/12-1

Depth unit of measure: m

Depth	Typ	Lithology	S1	S2	S3	S2/S3	TOC	HI	OI	PP	PI	Tmax	Sample
4691.00	cut	S/Sst : w to pl y brn	0.07	0.13	0.19	0.68	0.18	72	106	0.2	0.35	436	0212-2L
4703.00	cut	Sh/Clst: brn gy to dsk y brn	0.42	0.78	0.24	3.25	1.03	76	23	1.2	0.35	463	0214-3L
4712.00	cut	Sh/Clst: brn gy to dsk y brn	0.36	0.45	0.22	2.05	0.71	63	31	0.8	0.44	461	0216-3L
4721.00	cut	Sh/Clst: brn gy to dsk y brn	0.20	0.55	0.21	2.62	0.75	73	28	0.8	0.27	452	0218-3L
4730.00	cut	S/Sst : pl y brn	0.03	-	0.08	-	0.14	-	57	-	1.00	433	0220-2L
4733.00	cut	Sh/Clst: brn gy to dsk y brn to m gy	0.12	0.40	0.06	6.67	0.55	73	11	0.5	0.23	461	0221-3L
4742.00	cut	Sh/Clst: brn gy to dsk y brn to m gy	0.25	0.81	0.46	1.76	1.23	66	37	1.1	0.24	462	0223-3L
4751.00	cut	Coal : blk	4.11	60.88	2.50	24.35	34.54	176	7	65.0	0.06	470	0225-4L
4760.00	cut	Sh/Clst: brn gy to dsk y brn to m gy	0.46	1.37	0.49	2.80	1.34	102	37	1.8	0.25	459	0226-3L
4769.00	cut	Sh/Clst: brn gy to dsk y brn to m gy	0.44	0.70	0.04	17.50	0.90	78	4	1.1	0.39	465	0228-3L
4778.00	cut	Sh/Clst: gn gy to lt gy	0.36	0.09	0.32	0.28	0.41	22	78	0.5	0.80	351	0230-5L
4787.00	cut	Sh/Clst: gn gy to gy gn, gy red	0.23	0.08	0.04	2.00	0.10	80	40	0.3	0.74	261	0232-5L
4796.00	cut	Sh/Clst: gn gy to gy gn, gy red	0.50	0.06	0.17	0.35	0.25	24	68	0.6	0.89	262	0234-5L

Table 2 : Rock-Eval table for well NOCS 24/12-1

Depth unit of measure: m

Depth	Typ	Lithology	S1	S2	S3	S2/S3	TOC	HI	OI	PP	PI	Tmax	Sample
4808.00	cut	S/Sst : w	0.34	0.25	0.06	4.17	0.12	208	50	0.6	0.58	323	0237-2L
4815.00	cut	Sh/Clst: gn gy to gy gn, gy red	1.04	0.32	0.20	1.60	0.38	84	53	1.4	0.76	349	0238-5L
4825.00	cut	S/Sst : w	0.48	0.33	0.23	1.43	0.25	132	92	0.8	0.59	410	0241-2L

Table 3 : Pyrolysis GC Data (S2 peak) as Percentage of Total Area for Well NOCS 24/12-1

Depth unit of measure: m

Depth	Typ	Lithology	C1	C2-C5	C6-C14	C15+	S2 from Rock-Eval	Sample
2361.00	cut	S/Sst : w to lt gy	8.85	12.33	71.96	6.86	-	0242-1L
2376.00	cut	S/Sst : w to lt gy	4.61	12.59	74.58	8.20	-	0243-1L
2385.00	cut	S/Sst : w to lt gy	4.68	16.34	72.15	6.83	-	0244-1L
2394.00	cut	S/Sst : w to lt gy	11.67	11.06	73.11	4.17	-	0245-1L
2403.00	cut	S/Sst : w to lt gy	10.05	15.70	70.25	4.00	-	0246-1L
2415.00	cut	S/Sst : w to lt gy	17.36	8.49	71.11	3.03	-	0247-1L
2595.00	cut	S/Sst : w to lt gy	14.58	16.70	66.11	2.61	-	0248-1L
2631.00	com	bulk	19.39	17.21	60.80	2.58	-	0258-0B
2643.00	cut	S/Sst : w to lt gy	12.81	10.75	73.78	2.66	-	0251-1L
2670.00	com	bulk	-	-	-	-	-	0259-0B
2679.00	cut	S/Sst : w to lt gy	-	-	-	-	-	0255-1L
2688.00	cut	S/Sst : w to lt gy	-	-	-	-	-	0256-1L
2697.00	cut	S/Sst : w to lt gy	15.30	17.58	58.06	9.06	-	0257-1L
4061.00	cut	Sh/Clst: dsk y brn to brn blk	4.82	20.28	44.38	30.52	7.13	0128-4L

Table 3 : Pyrolysis GC Data (S2 peak) as Percentage of Total Area for Well NOCS 24/12-1

Depth unit of measure: m

Depth	Typ	Lithology	C1	C2-C5	C6-C14	C15+	S2 from Rock-Eval	Sample
4070.00	cut	Sh/Clst: dsk y brn to brn blk	3.33	15.68	37.79	43.21	10.32	0130-4L
4079.00	cut	Sh/Clst: dsk y brn to brn blk	1.97	22.49	39.04	36.50	8.92	0133-4L
4091.00	cut	Sh/Clst: dsk y brn to brn blk	5.63	24.42	48.16	21.78	3.71	0135-4L
4103.00	cut	Sh/Clst: dsk y brn to brn blk	7.61	15.39	42.09	34.91	5.52	0138-4L
4121.00	cut	Sh/Clst: dsk y brn to brn blk	-	-	-	-	5.19	0143-4L
4130.00	cut	Sh/Clst: dsk y brn to brn blk	13.02	14.66	41.06	31.26	4.45	0145-4L
4139.00	cut	Sh/Clst: dsk y brn to brn blk	0.67	16.77	38.90	43.66	6.79	0147-4L
4154.00	cut	Sh/Clst: dsk y brn to brn blk	11.69	14.52	38.88	34.92	2.87	0149-4L
4172.30	ccp	S/Sst : gy brn	3.27	12.78	47.87	36.08	0.44	0113-1L
4176.40	ccp	S/Sst : gy brn to lt y brn	0.77	25.51	54.59	19.13	0.87	0115-1L
4180.73	ccp	S/Sst : brn gy	2.75	22.26	37.20	37.79	0.23	0117-1L
4223.00	cut	Sh/Clst: gn gy to m gy to drk gy	7.03	49.36	41.41	2.20	1.26	0154-2L
4454.00	cut	S/Sst : lt gy to pl y brn	7.22	54.21	38.20	0.37	0.13	0170-2L
4580.00	cut	Coal : blk	19.49	14.09	28.01	38.42	12.15	0187-6L

Table 3 : Pyrolysis GC Data (S2 peak) as Percentage of Total Area for Well NOCS 24/12-1

Depth unit of measure: m

Depth	Typ	Lithology	C1	C2-C5	C6-C14	C15+	S2 from Rock-Eval	Sample
4643.00	cut	Sh/Clst: brn gy to dsk y brn	5.56	49.18	42.18	2.70	0.38	0201-3L
4667.00	cut	Coal : blk	27.12	8.85	26.34	37.70	55.88	0207-5L
4703.00	cut	Sh/Clst: brn gy to dsk y brn	-	-	-	-	0.78	0214-3L
4751.00	cut	Coal : blk	18.00	10.76	23.65	47.59	60.88	0225-4L
4769.00	cut	Sh/Clst: brn gy to dsk y brn to m gy	18.87	42.53	36.75	1.85	0.70	0228-3L
4815.00	cut	Sh/Clst: gn gy to gy gn, gy red	2.66	32.12	54.43	10.80	0.32	0238-5L
4825.00	cut	S/Sst : w	6.67	35.39	49.75	8.20	0.33	0241-2L

Table 4 a: Weight of EOM and Chromatographic Fraction for well NOCS 24/12-1

Depth unit of measure: m

Depth	Typ	Lithology	Rock Extracted (g)	EOM (mg)	Sat (mg)	Aro (mg)	Asph (mg)	NSO (mg)	HC (mg)	Non-HC (mg)	TOC(e) (%)	Sample
4085.00	com	Composite sample - see table 4 e	10.4	90.6	46.1	18.8	0.6	25.2	64.9	25.8	5.49	0261-0B
4124.00	com	Composite sample - see table 4 e	5.9	17.9	9.6	2.9	0.1	5.3	12.6	5.3	2.23	0262-0B
4154.00	com	Composite sample - see table 4 e	6.5	35.1	20.5	7.2	0.7	6.7	27.7	7.4	4.25	0263-0B
4180.73	com	Composite sample - see table 4 e	9.7	7.0	3.3	0.9	0.6	2.2	4.2	2.8	0.20	0264-0B
4634.00	cut	Sh/Clst: brn gy to dsk y brn	2.4	19.9	9.1	3.0	0.4	7.4	12.1	7.8	2.78	0199-3L
4667.00	cut	Coal : blk	0.9	18.6	1.0	2.6	7.9	7.1	3.6	14.9	32.40	0207-5L
4721.00	com	Composite sample - see table 4 e	8.4	19.7	8.2	4.2	2.9	4.4	12.4	7.3	3.59	0265-0B
4751.00	cut	Coal : blk	0.7	18.6	1.3	2.6	9.2	5.4	4.0	14.6	40.00	0225-4L



Table 4 b: Concentration of EOM and Chromatographic Fraction (wt ppm rock) for well NOCS 24/12-1

Depth unit of measure: m

Depth	Typ Lithology	EOM	Sat	Aro	Asph	NSO	HC	Non-HC	Sample
4085.00	com Composite sample - see table 4 e	8728	4437	1810	57	2422	6247	2480	0261-0B
4124.00	com Composite sample - see table 4 e	3018	1623	492	16	885	2116	902	0262-0B
4154.00	com Composite sample - see table 4 e	5375	3136	1102	107	1029	4238	1136	0263-0B
4180.73	com Composite sample - see table 4 e	723	337	96	61	227	433	289	0264-0B
4634.00	cut Sh/Clst: brn gy to dsk y brn	8432	3860	1254	169	3148	5114	3317	0199-3L
4667.00	cut Coal : blk	21882	1223	3070	9294	8294	4294	17588	0207-5L
4721.00	com Composite sample - see table 4 e	2350	982	503	346	519	1485	865	0265-0B
4751.00	cut Coal : blk	28181	2000	4000	13939	8242	6000	22181	0225-4L

Table 4 c: Concentration of EOM and Chromatographic Fraction (mg/g TOC(e)) for well NOCS 24/12-1

Depth unit of measure: m

Depth	Typ	Lithology	EOM	Sat	Aro	Asph	NSO	HC	Non-HC	Sample
4085.00	com	Composite sample - see table 4 e	158.99	80.83	32.97	1.05	44.13	113.80	45.19	0261-0B
4124.00	com	Composite sample - see table 4 e	135.36	72.82	22.08	0.76	39.70	94.90	40.46	0262-0B
4154.00	com	Composite sample - see table 4 e	126.48	73.80	25.94	2.52	24.21	99.74	26.74	0263-0B
4180.73	com	Composite sample - see table 4 e	361.57	168.90	48.04	30.99	113.64	216.94	144.63	0264-0B
4634.00	cut	Sh/Clst: brn gy to dsk y brn	303.32	138.86	45.12	6.10	113.25	183.97	119.35	0199-3L
4667.00	cut	Coal : blk	67.54	3.78	9.48	28.69	25.60	13.25	54.28	0207-5L
4721.00	com	Composite sample - see table 4 e	65.48	27.36	14.03	9.64	14.46	41.38	24.10	0265-0B
4751.00	cut	Coal : blk	70.45	5.00	10.00	34.85	20.61	15.00	55.45	0225-4L

Table 4 d: Composition of material extracted from the rock (%) for well NOCS 24/12-1

Depth unit of measure: m

Depth	Typ	Lithology	Sat	Aro	Asph	NSO	HC	Non-HC	Sat	HC	Sample
			EOM	EOM	EOM	EOM	EOM	EOM	Aro	Non-HC	
4085.00	com	Composite sample - see table 4 e	50.84	20.74	0.66	27.76	71.58	28.42	245.13	251.84	0261-0B
4124.00	com	Composite sample - see table 4 e	53.80	16.31	0.56	29.33	70.11	29.89	329.79	234.58	0262-0B
4154.00	com	Composite sample - see table 4 e	58.35	20.51	1.99	19.15	78.86	21.14	284.44	373.05	0263-0B
4180.73	com	Composite sample - see table 4 e	46.71	13.29	8.57	31.43	60.00	40.00	351.61	150.00	0264-0B
4634.00	cut	Sh/Clst: brn gy to dsk y brn	45.78	14.87	2.01	37.34	60.65	39.35	307.77	154.15	0199-3L
4667.00	cut	Coal : blk	5.59	14.03	42.47	37.90	19.62	80.38	39.85	24.41	0207-5L
4721.00	com	Composite sample - see table 4 e	41.78	21.42	14.72	22.08	63.20	36.80	195.02	171.72	0265-0B
4751.00	cut	Coal : blk	7.10	14.19	49.46	29.25	21.29	78.71	50.00	27.05	0225-4L

Depth unit of measure: m

NOTE: Depths shown in tables 4 a to d correspond to the composite samples' lower depth.

Upper depth	Lower depth	Typ	Sample	Depth	Typ	Lithology	Sample
4067.00	4085.00	com	0261-0B is composed of:	4067.00	cut	Sh/Clst: dsk y brn to brn blk, carb	0129-4L
				4070.00	cut	Sh/Clst: dsk y brn to brn blk, carb	0130-4L
				4076.00	cut	Sh/Clst: dsk y brn to brn blk, carb	0132-4L
				4079.00	cut	Sh/Clst: dsk y brn to brn blk, carb	0133-4L
				4085.00	cut	Sh/Clst: dsk y brn to brn blk, carb	0134-4L
4103.00	4124.00	com	0262-0B is composed of:	4103.00	cut	Sh/Clst: dsk y brn to brn blk, carb	0138-4L
				4118.00	cut	Sh/Clst: dsk y brn to brn blk, carb	0142-4L
				4121.00	cut	Sh/Clst: dsk y brn to brn blk, carb	0143-4L
				4124.00	cut	Sh/Clst: dsk y brn to brn blk, carb	0144-4L
4130.00	4154.00	com	0263-0B is composed of:	4130.00	cut	Sh/Clst: dsk y brn to brn blk, carb	0145-4L
				4136.00	cut	Sh/Clst: dsk y brn to brn blk, carb	0146-4L
				4139.00	cut	Sh/Clst: dsk y brn to brn blk, carb, mic	0147-4L
				4142.00	cut	Sh/Clst: dsk y brn to brn blk, carb, mic	0148-4L
				4154.00	cut	Sh/Clst: dsk y brn to brn blk, carb, mic	0149-4L
4176.40	4180.73	com	0264-0B is composed of:	4176.40	ccp	S/Sst : gy brn to lt y brn, cem	0115-1L
				4178.40	ccp	S/Sst : pl brn to gy brn, crs, cem	0116-1L
				4180.73	ccp	S/Sst : brn gy, cem	0117-1L

Depth unit of measure: m

NOTE: Depths shown in tables 4 a to d correspond to the composite samples' lower depth.

<u>Upper depth</u>	<u>Lower depth</u>	<u>Typ</u>	<u>Sample</u>	<u>Depth</u>	<u>Typ</u>	<u>Lithology</u>	<u>Sample</u>
4703.00	4721.00	com	0265-0B is composed of:	4703.00	cut	Sh/Clst: brn gy to dsk y brn, slt, st	0214-3L
				4712.00	cut	Sh/Clst: brn gy to dsk y brn, slt, st	0216-3L
				4721.00	cut	Sh/Clst: brn gy to dsk y brn, slt, st	0218-3L

Table 5 : Saturated Hydrocarbon Ratios for well NOCS 24/12-1

Depth unit of measure: m

Depth	Typ	Lithology	Pristane	Pristane	Pristane + Phytane	Phytane	CPI	Sample
			nC17	Phytane	nC17 + nC18	nC18		
4085.00	com	bulk	0.39	1.05	0.40	0.41	1.08	0261-0B
4124.00	com	bulk	0.45	1.30	0.43	0.41	1.06	0262-0B
4154.00	com	bulk	0.49	1.45	0.44	0.38	1.03	0263-0B
4180.73	com	bulk	0.41	1.12	0.36	0.33	1.03	0264-0B
4634.00	cut	Sh/Clst: brn gy to dsk y brn	0.23	1.41	0.20	0.18	1.02	0199-3L
4667.00	cut	Coal : blk	0.30	2.38	0.22	0.13	1.18	0207-5L
4721.00	com	bulk	0.34	1.85	0.27	0.20	1.13	0265-0B
4751.00	cut	Coal : blk	0.33	2.10	0.26	0.18	1.21	0225-4L

Table 6 : Aromatic Hydrocarbon Ratios for well NOCS 24/12-1

Depth unit of measure: m

Depth	Typ	Lithology	MNR	DMNR	BPhR	2/1MP	MPI1	MPI2	Rc	DBT/P	4/1MDBT (3+2) /1MDBT	Sample	
4085.00	com	bulk	0.92	1.55	0.19	0.87	0.67	0.76	0.80	0.33	30.19	1.47	0261-0B
4124.00	com	bulk	0.48	1.47	0.15	0.89	0.67	0.76	0.80	0.33	29.48	1.84	0262-0B
4154.00	com	bulk	0.95	1.73	0.20	0.94	0.73	0.84	0.84	0.27	22.44	1.72	0263-0B
4180.73	com	bulk	-	0.85	-	1.08	0.83	0.94	0.90	0.26	15.54	1.43	0264-0B
4634.00	cut	Sh/Clst: brn gy to dsk y brn	-	2.25	0.06	1.16	0.85	0.99	0.91	0.17	6.83	0.99	0199-3L
4667.00	cut	Coal : blk	1.25	-	0.29	2.00	1.23	1.57	1.14	0.13	84.24	12.10	0207-5L
4721.00	com	bulk	1.49	4.41	0.22	1.69	1.12	1.40	1.07	0.14	-	-	0265-0B
4751.00	cut	Coal : blk	1.47	-	0.28	1.87	1.20	1.51	1.12	0.12	-	-	0225-4L

Table 7 : Thermal Maturity Data for well NOCS 24/12-1

Depth unit of measure: m

Depth	Typ	Lithology	Vitrinite Reflectance (%)	Number of Readings	Standard Deviation	Spore Fluorescence Colour	SCI	T <sub>max</sub> (°C)	Sample
4052.00	cut	bulk	1.04	1	0.00	6-7	-	-	0126-0B
4061.00	cut	bulk	0.99	3	0.03	6 (?)	-	-	0128-0B
4067.00	cut	Sh/Clst: dsk y brn to brn blk	-	-	-	-	6.5-7.0	440	0129-4L
4118.00	cut	bulk	0.89	10	0.08	6 (?)	-	-	0142-0B
4124.00	cut	Sh/Clst: dsk y brn to brn blk	-	-	-	-	7.0	444	0144-4L
4139.00	cut	bulk	1.01	15	0.11	7 (?)	-	-	0147-0B
4154.00	cut	Sh/Clst: dsk y brn to brn blk	-	-	-	-	6.0-6.5	454	0149-4L
4250.00	cut	bulk	0.97	16	0.07	6-7 (?)	-	-	0156-0B
4280.00	cut	Sh/Clst: lt gy to m gy to brn gy	-	-	-	-	7.0	357	0158-4L
4289.00	cut	bulk	1.11	4	0.09	7-8	-	-	0159-0B
4580.00	cut	bulk	1.27	31	0.11	NDP	-	-	0187-0B
4634.00	cut	Sh/Clst: brn gy to dsk y brn	-	-	-	-	6.0-6.5	448	0199-3L
4661.00	cut	bulk	1.11	34	0.10	9	-	-	0205-0B
4667.00	cut	Coal : blk	-	-	-	-	6.5-7.0	472	0207-5L



Table 7 : Thermal Maturity Data for well NOCS 24/12-1

Depth unit of measure: m

Depth	Typ Lithology	Vitrinite Reflectance (%)	Number of Readings	Standard Deviation	Spore Fluorescence Colour	SCI	Tmax (°C)	Sample
4673.00	cut bulk	1.19	29	0.10	9	-	-	0208-0B
4703.00	cut Sh/Clst: brn gy to dsk y brn	-	-	-	-	6.0-6.5	463	0214-3L
4724.00	cut bulk	1.19	17	0.08	0	-	-	0219-0B
4751.00	cut bulk	1.21	37	0.10	0	-	-	0225-0B
4751.00	cut Coal : blk	-	-	-	-	6.0-6.5	470	0225-4L
4817.00	cut bulk	1.13	28	0.10	0	-	-	0239-0B

Table 8 : Visual Kerogen Composition Data for well NOCS 24/12-1

Depth unit of measure: m

Depth	Typ	Lithology	L	A	L	S	C	D	I	S	I	M	S	V	C	V	A	Sample
			P	m	i	p	u	R	A	n	F	e	n	i	c	I	T	
			T	r	D	P	i	s	E	F	D	d	r	R	e	l	D	
			%	L	t	o	l	n	%	n	u	r	e	%	i	n	r	
4067.00	cut	Sh/Clst: dsk y brn to brn blk	55	**	*	*		*	TR		*			45	*	**	**	0129-4I
4124.00	cut	Sh/Clst: dsk y brn to brn blk	50	**		*		*	TR		*			50	*	**	**	0144-4L
4154.00	cut	Sh/Clst: dsk y brn to brn blk	25	*	**	*		*	10	**	*			65	**	**	*	0149-4L
4280.00	cut	Sh/Clst: lt gy to m gy to brn gy	TR	?		*		*	5		*			95	*	**		0158-4L
4634.00	cut	Sh/Clst: brn gy to dsk y brn	25		*	*		*	15	*	**			60	**	**	*	0199-3L
4667.00	cut	Coal : blk	10	*	*	**			10	*	*			80	*	*	*	0207-5L
4703.00	cut	Sh/Clst: brn gy to dsk y brn	35	*		**	*	**	5		*			60	**	*		0214-3L
4751.00	cut	Coal : blk	15	?		**			5	*	*			80	**	*	*	0225-4L

Table 9a : Tabulation of carbon isotope data for EOM/EOM - fractions or Oils for well NOCS 24/12-1

Depth unit of measure: m

Depth	Typ	Lithology	EOM/Oil	Saturated	Aromatic	NSO	Asphaltenes	Kerogen	Sample
4085.00	com	Composite sample	-28.83	-29.33	-28.20	-28.96	-28.73	-	0261-0B
4154.00	com	Composite sample	-27.24	-27.75	-26.18	-26.57	-27.31	-	0263-0B
4180.73	com	Composite sample	-28.53	-28.39	-27.49	-27.70	-27.61	-	0264-0B
4634.00	cut		-26.94	-27.17	-26.18	-26.63	-26.38	-	0199-3L
4667.00	cut		-23.75	-25.41	-23.31	-23.99	-23.82	-	0207-5L
4721.00	com	Composite sample	-25.35	-27.36	-25.42	-25.31	-24.15	-	0265-0B

Table 9b : Tabulation of cv values from carbon isotope data for well NOCS 24/12-1

Depth unit of measure: m

Depth	Typ	Lithology	Saturated	Aromatic	cv value	Sample
4085.00	com	Composite sample	-29.33	-28.20	-0.05	0261-0B
4154.00	com	Composite sample	-27.75	-26.18	0.44	0263-0B
4180.73	com	Composite sample	-28.39	-27.49	-0.85	0264-0B
4634.00	cut		-27.17	-26.18	-1.03	0199-3L
4667.00	cut		-25.41	-23.31	0.89	0207-5L
4721.00	com	Composite sample	-27.36	-25.42	1.14	0265-0B

Table 10A: Variation in Triterpane Distribution for Well NOCS 24/12-1

Depth unit of measure: m

Depth	Lithology	B/A	B/B+A	B		C/E	C/C+E	X/E	Z/E	Z/C	Z/Z+E	Q/E	E/E+F	C+D		J1		Sample
				B+E+F										C+D+E+F	D+F/C+E	J1+J2%		
4085.00	Sh/Clst	0.22	0.18	0.21	0.68	0.41	0.79	0.24	0.35	0.19	1.41	0.86	0.40	0.16	64.28	0261-0		
4154.00	Sh/Clst	0.31	0.24	0.18	0.73	0.42	0.61	0.19	0.26	0.16	0.84	0.96	0.45	0.10	62.47	0263-0		
4180.73	S/Sst	0.26	0.21	0.11	0.47	0.32	0.52	0.44	0.93	0.31	0.68	0.92	0.37	0.18	61.40	0264-0		
4634.00	Sh/Clst	1.32	0.57	0.20	0.87	0.47	0.04	0.16	0.18	0.14	0.42	0.89	0.48	0.14	59.38	0199-3		
4667.00	Coal	0.86	0.46	0.28	1.26	0.56	1.49	0.25	0.20	0.20	0.56	0.84	0.55	0.18	52.84	0207-5		
4721.00	Sh/Clst	0.80	0.45	0.32	1.05	0.51	0.26	0.15	0.14	0.13	0.72	0.94	0.52	0.09	58.52	0265-0		

Table 10B: Variation in Sterane Distribution (peak height) for Well NOCS 24/12-1

Depth unit of measure: m

Depth	Lithology	Ratio1	Ratio2	Ratio3	Ratio4	Ratio5	Ratio6	Ratio7	Ratio8	Ratio9	Ratio10	Sample
4085.00	Sh/Clst	0.94	52.75	80.35	1.92	0.79	0.69	0.53	0.67	1.12	4.33	0261-0
4154.00	Sh/Clst	0.88	49.04	77.03	1.15	0.77	0.62	0.47	0.63	0.96	3.29	0263-0
4180.73	S/Sst	0.95	50.96	78.68	1.52	0.78	0.53	0.41	0.65	1.04	3.76	0264-0
4634.00	Sh/Clst	0.42	42.20	77.19	0.68	0.80	0.36	0.25	0.63	0.73	2.93	0199-3
4667.00	Coal	0.51	39.51	73.56	0.83	0.78	0.48	0.39	0.58	0.65	2.30	0207-5
4721.00	Sh/Clst	0.58	45.85	74.11	0.97	0.76	0.52	0.38	0.59	0.85	2.64	0265-0

Ratio1:  $a / a + j$ Ratio2:  $q / q + t * 100\%$ Ratio3:  $2(r + s) / (q + t + 2(r + s)) * 100\%$ Ratio4:  $a + b + c + d / h + k + l + n$ Ratio5:  $r + s / r + s + q$ Ratio6:  $u + v / u + v + q + r + s + t$ Ratio7:  $u + v / u + v + i + m + n + q + r + s + t$ Ratio8:  $r + s / q + r + s + t$ Ratio9:  $q / t$ Ratio10:  $r + s / t$

Table 10C: Raw GCMS triterpane data (peak height) for Well NOCS 24/12-1

Depth unit of measure: m

Depth	Lithology	p		q		r		s		t		a		b		z		c		Sample
		x		d		e		f		g		h		i		j1				
		j2		k1		k2		l1		l2		m1		m2						
4085.00	Sh/Clst	55.34	40.80	27.10	15.17	8.56	41.56	9.01	6.95	19.75	0261-0									
		22.90	3.15	28.96	4.80	11.02	10.21	3.97	11.39											
		6.33	9.95	3.68	4.07	2.03	1.73	2.46												
4154.00	Sh/Clst	68.13	32.54	20.16	13.41	11.60	28.04	8.75	7.30	28.22	0263-0									
		23.81	4.63	38.86	1.79	13.14	9.42	4.31	10.22											
		6.14	11.66	4.70	3.80	4.11	2.35	0.89												
4180.73	S/Sst	35.35	22.96	11.76	5.97	6.09	18.18	4.73	14.86	15.96	0264-0									
		17.54	5.90	33.74	2.91	7.09	5.90	2.68	6.92											
		4.35	9.98	0.00	4.99	3.21	0.00	0.00												
4634.00	Sh/Clst	605.08	265.16	235.81	123.47	133.01	130.74	171.95	100.13	545.08	0199-3									
		22.10	95.05	624.42	73.61	263.55	206.69	25.15	169.78											
		116.13	149.80	74.97	88.47	55.12	97.97	62.39												
4667.00	Coal	8.75	4.30	2.27	3.85	1.99	4.14	3.57	1.90	9.66	0207-5									
		11.40	1.57	7.66	1.47	3.02	3.67	0.94	2.23											
		1.99	2.60	1.08	0.00	0.00	0.00	0.00												

Depth unit of measure: m

Depth	Lithology	p	q	r	s	t	a	b	z	c	Sample
		x	d	e	f	g	h	i	j1		
		j2	k1	k2	l1	l2	m1	m2			
4721.00	Sh/Clst	114.33	48.65	37.26	41.15	18.59	41.27	33.22	10.08	70.62	0265-0
		17.63	8.20	67.17	4.39	25.13	19.44	4.00	11.75		
		8.33	9.93	4.35	4.82	3.55	5.73	2.56			



Table 10D: Raw GCMS sterane data (peak height) for Well NOCS 24/12-1

Depth unit of measure: m

Depth	Lithology	u	v	a	b	c	d	e	f	g	Sample
		h	i	j	k	l	m	n	o		
		p	q	r	s	t					
4085.00	Sh/Clst	69.48 49.62 2.87	20.42 21.40 7.00	91.79 6.15 14.97	54.78 28.73 12.16	20.59 14.24 6.27	36.23 3.27	37.07 13.25	30.58 13.49	16.55	0261-0
4154.00	Sh/Clst	41.07 42.12 3.80	13.09 15.02 6.10	46.07 6.15 10.75	27.31 25.16 10.11	9.13 8.44 6.34	14.94 2.86	15.97 8.95	13.95 10.18	12.20	0263-0
4180.73	S/Sst	56.02 59.09 5.83	14.32 18.07 11.10	84.51 4.79 21.95	53.49 38.24 18.24	20.66 14.58 10.68	33.33 5.78	37.56 14.78	33.69 21.51	16.53	0264-0
4634.00	Sh/Clst	155.96 173.94 65.75	86.60 132.91 68.38	91.44 126.56 160.42	66.78 89.35 113.72	26.32 15.39 93.64	66.85 56.59	61.89 92.49	54.41 107.15	122.99	0199-3
4667.00	Coal	8.19 4.75 1.36	2.58 2.28 1.92	3.14 3.06 3.71	3.93 3.45 3.05	1.14 1.10 2.94	1.38 0.85	1.39 2.20	1.40 2.41	2.46	0207-5

Table 10D: Raw GCMS sterane data (peak height) for Well NOCS 24/12-1

Depth unit of measure: m

Depth	Lithology	u	v	a	b	c	d	e	f	g	Sample
		h	i	j	k	l	m	n	o		
		p	q	r	s	t					
4721.00	Sh/Clst	57.65	25.53	39.60	22.47	10.74	17.97	16.42	14.78	23.07	0265-0
		46.85	30.45	28.29	19.95	6.60	11.24	20.21	21.63		
		12.16	14.24	25.45	19.00	16.82					

Table 10E: Aromatisation of Steranes for Well NOCS 24/12-1

Depth unit of measure: m

<u>Depth</u>	<u>Lithology</u>	<u>Ratio1</u>	<u>Ratio2</u>	<u>Sample</u>
4085.00	Sh/Clst	0.51	0.87	0261-0
4154.00	Sh/Clst	0.80	0.53	0263-0
4180.73	S/Sst	0.46	0.91	0264-0
4634.00	Sh/Clst	0.37	0.89	0199-3
4667.00	Coal	1.00	-	0207-5
4721.00	Sh/Clst	0.96	0.35	0265-0

$$\text{Ratio1: } \frac{\text{C1+D1+E1+F1+G1+H1+I1}}{\text{C1+D1+E1+F1+G1+H1+I1} + \text{c1+d1+e1+f1+g1}}$$

$$\text{Ratio2: } \text{g1} / \text{g1} + \text{I1}$$

Depth unit of measure: m

<u>Depth</u>	<u>Lithology</u>	<u>Ratio1</u>	<u>Ratio2</u>	<u>Ratio3</u>	<u>Ratio4</u>	<u>Ratio5</u>	<u>Sample</u>
4085.00	Sh/Clst	0.88	0.83	0.64	0.69	0.74	0261-0
4154.00	Sh/Clst	0.88	0.81	0.70	0.72	0.81	0263-0
4180.73	S/Sst	0.84	0.81	0.62	0.64	0.71	0264-0
4634.00	Sh/Clst	0.41	0.40	0.20	0.18	0.26	0199-3
4667.00	Coal	1.00	1.00	1.00	1.00	1.00	0207-5
4721.00	Sh/Clst	0.78	0.80	0.64	0.56	0.70	0265-0

Ratio1:  $a1 / a1 + g1$ Ratio2:  $b1 / b1 + g1$ Ratio3:  $a1 + b1 / a1 + b1 + c1 + d1 + e1 + f1 + g1$ Ratio4:  $a1 / a1 + e1 + f1 + g1$ Ratio5:  $a1 / a1 + d1$

Table 10G: Variation in Monoaromatic Sterane Distribution for Well NOCS 24/12-1

Depth unit of measure: m

<u>Depth</u>	<u>Lithology</u>	<u>Ratio1</u>	<u>Ratio2</u>	<u>Ratio3</u>	<u>Ratio4</u>	<u>Sample</u>
4085.00	Sh/Clst	0.75	0.56	0.47	0.24	0261-0
4154.00	Sh/Clst	0.53	0.43	0.14	0.07	0263-0
4180.73	S/Sst	0.71	0.60	0.36	0.25	0264-0
4634.00	Sh/Clst	0.15	0.11	0.06	0.05	0199-3
4667.00	Coal	-	-	-	-	0207-5
4721.00	Sh/Clst	0.08	-	0.02	0.01	0265-0

Ratio1: A1 / A1 + E1  
 Ratio2: B1 / B1 + E1

Ratio3: A1 / A1 + E1 + G1  
 Ratio4: A1+B1 / A1+B1+C1+D1+E1+F1+G1+H1+I1

Table 10H: Raw GCMS monoaromatic sterane data (peak height) for Well NOCS 24/12-1

Depth unit of measure: m

Depth	Lithology	a1	b1	c1	d1	e1	f1	g1	h1	i1	Sample
4085.00	Sh/Clst	28.54	11.92	28.55	3.42	9.29	2.09	23.45	59.16	2.78	0261-0
4154.00	Sh/Clst	19.58	13.01	50.63	5.75	17.31	10.08	100.56	212.77	17.74	0263-0
4180.73	S/Sst	118.42	73.92	89.23	18.15	48.58	22.61	163.89	220.17	11.98	0264-0
4634.00	Sh/Clst	12.36	8.65	36.03	26.91	72.34	11.18	132.64	126.45	17.08	0199-3
4667.00	Coal	0.00	0.00	52.80	20.52	35.35	17.05	160.31	177.71	7.36	0207-5
4721.00	Sh/Clst	2.78	0.00	28.88	30.32	30.80	5.77	121.39	180.16	8.29	0265-0

Table 10I: Raw GCMS trioaromatic sterane data (peak height) for Well NOCS 24/12-1

Depth unit of measure: m

Depth	Lithology	a1	b1	c1	d1	e1	f1	g1	Sample
4085.00	Sh/Clst	135.07	88.40	17.28	47.07	18.60	23.33	17.88	0261-0
4154.00	Sh/Clst	148.10	85.15	10.34	34.57	20.02	16.71	19.74	0263-0
4180.73	S/Sst	602.33	511.32	83.56	241.36	115.26	112.34	117.85	0264-0
4634.00	Sh/Clst	91.65	88.81	51.78	257.58	115.16	160.06	133.63	0199-3
4667.00	Coal	20.56	12.00	0.00	0.00	0.00	0.00	0.00	0207-5
4721.00	Sh/Clst	15.44	17.75	0.00	6.75	3.17	4.61	4.38	0265-0

## EXPERIMENTAL PROCEDURES

### Headspace gas analysis

The analysis is performed using a gas chromatograph with a 50 m capillary column, loop injector and flame ionisation detector. Helium is used as carrier gas.

Two cm<sup>3</sup> of headspace gas are removed from each sample can for chromatographic analysis of the C<sub>1</sub> to C<sub>7</sub> range of hydrocarbons.

### Occluded gas analysis

The analysis is performed using a gas chromatograph with a 50 m capillary column, loop injector and flame ionisation detector. Helium is used as carrier gas.

The canned samples are washed in thermostatted water to remove drilling contaminants and sieved on a 2 mm mesh sieve to remove large, caved rock fragments. An aliquot (ca 25 mg) of sieved sample is crushed with 25 cm<sup>3</sup> water in an airtight ball mill. After crushing, 2 cm<sup>3</sup> of the released gas are removed from the ball mill for gas chromatographic analysis.

### Total organic carbon (TOC) and total carbon analysis

This analysis is performed using a LECO CS244 Carbon Analyser.

Hand-picked lithologies from cutting samples are crushed with a mortar and pestle and approximately 200 mg (50 mg for coals) are accurately weighed into LECO crucibles. The samples are then treated three times with dilute hydrochloric acid, to remove oxidised (carbonate) carbon, and



washed four times with distilled water. The samples are dried on a hotplate at 60-70°C before analysis of total organic carbon. Total carbon is analysed on the same instrument using approximately 200 mg of untreated crushed whole rock. Oxidised (carbonate) carbon is calculated by difference.

Total organic carbon can also be determined on the ROCK EVAL II Pyrolyser.

Extractable Organic Matter (EOM) Analysis

Samples are selected for extraction on the basis of screening analysis. Approximately 10 - 20 g of whole rock are accurately weighed.

Extraction is carried out in a Tecator Soxtec HT system, using dichloromethane as extraction solvent and in the presence of activated copper. A 1 hr. boiling period followed by 2 hrs. rinsing is used. The extract is filtered into a tared flask and the solvent is removed by rotary evaporation at 35°C and 200 mB. The dry residue is weighed in the flask to determine the amount of EOM.

Separation of asphaltenes

Asphaltenes are removed from the EOM by precipitation in n-pentane. The amount of n-pentane to be used is prescribed by the formula:

$$\frac{\text{wt of EOM(g)} \times 40}{\text{density of n-pentane (g/cm}^{-3}\text{)} \times 1000} = \text{Volume of n-pentane(cm}^3\text{)}$$

The n-hexane and EOM are poured into a pre-weighed plastic column containing a small amount of activated silica. The column is allowed to run and then dried and weighed. The amount of asphaltenes recovered is calculated by weight difference.

After the removal of asphaltenes the solvent is evaporated from the remaining EOM by rotary evaporation, at 35°C. If the dried sample is not to be processed immediately, it is stored in a freezer.

#### Liquid chromatographic separation

Chromatographic separation is performed using an MPLC system developed by the company. The EOM (after removal of asphaltenes) is injected into the MPLC and chromatographed using hexane as eluent. This effects a separation into saturated and aromatic fractions which are collected and concentrated on a rotary evaporator, at 35°C and 200 mB, to remove the bulk of the hexane. The fractions are then transferred to small tared vials and evaporated to dryness in a stream of nitrogen. The vials are re-weighed to obtain the weights of both fractions. The weight of the NSO fraction, which is retained on the chromatography column, is obtained by difference.

#### Gas chromatographic analyses

##### Saturated fraction

The instrument used for this analysis is a gas chromatograph with a 25 m OV1 column, split injector and FID detector. The carrier gas is helium and the temperature program runs isothermally at 60°C, for 2 minutes and then rises to 290°C at a rate of 4°C/min.

The sample of saturated fraction is diluted by 1:20 with hexane and a 1 microlitre aliquot of this is injected into the instrument.

#### Aromatic fraction

The instrument used is a gas chromatograph with a 25 m SE-54 capillary column, split injector and effluent splitter leading to FID and FPD detectors, allowing simultaneous analysis of hydrocarbons and sulphur compounds. The carrier gas is helium and the temperature program runs from 60°C to 300°C at a rate of 4°C/min.

The sample of aromatic fraction is diluted by 1:20 with hexane and a 1 microlitre aliquot of this is injected into the instrument.

#### Whole Oil

Whole oil chromatograms are determined on a gas chromatograph fitted with a split injector, 25m SE54 capillary column and effluent splitter connected to FID and sulphur mode FPD detectors allowing simultaneous determination of hydrocarbons and sulphur compounds. Approximately 0.1 microlitres of whole oil are injected and the temperature program on the chromatograph runs from -10°C to 300°C at 4°C/min.

#### Rock Eval pyrolysis

This analysis is performed using a ROCK EVAL II Pyrolyser into which approximately 100 mg of crushed whole rock is loaded. Analysis involves heating the sample, from 300°C to 600°C, in an inert atmosphere (helium) to release naturally generated hydrocarbons (S1 peak) and then pyrolytically

generated hydrocarbons (S2 peak), both of which are detected by an FID. In the temperature interval between 300°C and 390°C, the released gases are split and a proportion passed through a carbon dioxide trap, which is connected to a thermal conductivity detector (TCD). The value obtained from the TCD corresponds to the amount of oxygen contained in the kerogen of the sample and is reported as the S3 peak. The temperature corresponding to the maximum of the S<sub>2</sub> peak, T<sub>max</sub>, is also recorded.

The ROCK EVAL II Pyrolyser also determines the TOC of each sample subsequent to pyrolysis.

#### Thermal extraction/pyrolysis gas chromatography

The instrument used for this analysis is a gas chromatograph connected to a pyrolysis oven. A very small amount ( 2 mg) of whole rock sample is loaded into the oven and heated isothermally, at 300°C, for 3 minutes, during which time thermal extraction of the generated hydrocarbons occurs (equivalent to the S1 peak of Rock Eval). The released gases pass to a 15 m OV1 column with a nitrogen-cooled trap.

After 3 minutes the pyrolysis oven heats up to 510°C, at a rate of 40°C per minute, causing bound hydrocarbons to be released from the kerogen of the sample (equivalent to the S2 peak of Rock Eval). These gases are passed through a 25m DB1 capillary column with a nitrogen-cooled trap.

The temperature program for the chromatographic oven, in which both columns are situated, rises from 0°C to 290°C at a rate of 4°C/min. Both columns are linked to FID detectors.

#### Vitrinite reflectance analysis

Samples, in the form of small granules, are mounted in a

fast setting resin. The resin blocks are ground on coarse corundum paper to expose the rock granule surfaces and then on three finer grades of corundum paper to improve these surfaces and reduce scratches. The resin blocks are finally polished on a rotating Selvyt-covered lap using two grades of polishing alumina. Isopropyl alcohol is used to lubricate the entire grinding and polishing process except in the case of coal samples, when water is used.

Reflectance measurements are taken under oil immersion ( $n = 1.518$ ) using a ZEISS MPM03 microscope photometer with a 546nm interference filter. The polished blocks are mounted on the microscope stage and scanned manually in order to locate and measure particles of vitrinite. An attempt is made to obtain readings from 20 individual particles per sample but this is not always possible in samples with low amounts of phytoclasts.

Spore fluorescence colour

Samples are also analysed microscopically in U.V. light, using an exciter filter with a band pass of 400 - 440 nm and a barrier filter with a long pass of 470 nm, and the colour of the spore fluorescence is determined. This is used as an alternative maturity parameter to verify the result obtained from vitrinite reflectance and is reported on a numerical scale from 1 to 9:

<u>Fluorescence Colour</u>	<u>Colour Index</u>	<u>Corresp. Vitrinite Reflectance</u>
Green	1	0.2%
Green/Yellow	2	0.2/0.3%
Yellow	3	0.3%
Yellow/Orange	4	0.4%
Light Orange	5	0.5%
Mid-Orange	6	0.6%
Dark Orange	7	0.8%
Orange/Red	8	1.0%
Red	9	1.1%

NB. This table only provides a rough correlation as vitrinite reflectance and spore fluorescence colour are both independently affected by factors such as depositional environment and catagenic history.

Preparation of Kerogen Concentrates

Samples are stirred for 16 h with 25 cm<sup>3</sup> concentrated hydrochloric acid at 35 - 40°C. The acid is decanted and the residue washed by stirring for 3 hrs. with 25 cm<sup>3</sup> distilled water. The washing is repeated twice more.

If the concentrate is not being prepared for slides the residue is washed, rapidly, at this point, with 25 cm<sup>3</sup> dichloromethane.

25 cm<sup>3</sup> hydrofluoric acid are then added to the residue and the mixture stirred for 16 hrs. at room temperature. The acid is decanted and the residue washed by stirring for 3 hrs. with distilled water. The water washing is repeated three times with fresh aliquots of distilled water each time. The water is then decanted and the residue either dried in an oven at 40 - 50°C to constant weight, or, if slides are to be made, it is transferred to a microscope cover slip and dried on a hot bench at 40 -50°C.

Preparation of Slides

The dry kerogen concentrate is mounted on a slide in glycerine/gelatine and left to dry at room temperature overnight.

List of abbreviations used for lithology description  
(sorted alphabetically)

ang	= angular
bar	= Baryte (mud additive)
bl	= blue/blueish
blk	= black
br	= brittle
brn	= brown/brownish
Ca	= Carbonate (Limestone/Chalk/Dolomite/Siderite)
calc	= calcareous
carb	= carbonaceous
cem	= cement used as additive (under "Cont") or to describe cemented S/Sst
Chert	= Chert
chk	= Chalk/chalky
cly	= clayey/shaley
cngl	= conglomeratic
Coal	= Coal
Coal-ad	= Coal-like additive (e.g. chromlignosulfonate)
Congl	= Conglomerate
Cont	= Contamination
crs	= coarse grained
cvd	= caved
dd	= dried drilling mud
dol	= Dolomite/dolomitic
drk	= dark (colour)
dsk	= dusky (colour)
evap	= Salt/Gypsum/Halite (natural "Other" or as additive "Cont")
f	= fine grained
fib	= fibres (mud additive/contamination)
fis	= fissile
fos	= fossiliferous
glauc	= Glauconite/glauconitic
gn	= green/greenish
gy	= grey/greyish
hd	= hard
ign	= Igneous (material derived from igneous source)
int	= percentage interpreted from logs
Kaolin	= Kaolin(ite)
kln	= kaolinitic
l	= loose
lam	= laminated/laminae
lt	= light (colour)
m	= medium (colour or grain size)



List of abbreviations used for lithology description  
 (sorted alphabetically)

Marl	= Marl (calcareous claystone/mudstone)
mic	= micaceous
Mica-ad	= Mica used as mud additive
mrl	= marly
No Mat.	= No material left after washing
ns	= nutshells (mud additive)
ol	= olive
ool	= Oolite/oolitic
or	= orange
Other	= Other lithology/mineral, specified after this word
pi	= pink/pinkish
pl	= pale (colour)
prp	= paint/rust/plastic contamination/additives
pu	= purple
pyr	= Pyrite/pyritic
red	= red/reddish
rnd	= round/rounded
s	= sandy
S/Sst	= Sand and/or sandstone
Sh/Clst	= Shale and/or claystone
sid	= Siderite/sideritic
sil	= siliceous/cherty
slt	= silty
Sltst	= Siltstone
st	= stained (with natural oil or oil-like additive)
tar-ad	= Tar-like additive (e.g. "Black Magic")
Tuff	= Tuff
tuff	= tuffaceous
v col	= Various colours
w	= white
wx	= waxy
y	= yellow/yellowish

Experimental, combined gas chromatography - mass spectrometry (GC-MS)

The GC-MS analyses were performed on a VG TS250 system interfaced to a Hewlett Packard 5890 gas chromatograph. The GC was fitted with a fused silica OV-1 capillary column (25m x 0.22 mm i.d.) directly into the ion source. Helium (10psi) was used as carrier gas and the injections were performed in splittless mode. The GC oven was programmed from 50°C to 150°C at 35°C/min. at which point the programme rate was 4°C/min up to 280° where the column was held isothermally for 37 min. For the aromatic hydrocarbons, the GC oven was programmed from 50°C to 280°C at 5°C/min. and held isothermally at 280°C for 22 min. The mass spectrometer was operated in electron impact (EI) mode at 70 eV electron energy, a trap current of 500 uA and a source temperature of 220°C. The instrument resolution was 2500 (10% valley) for most of the samples, but had to be decreased to 1000 for some samples to improve the sensitivity of some mass fragmentograms.

The datasystem used was a VG PDP11/73 system. The samples were analysed in multiple ion detection mode (MID) at a scan cycle time of approximately 1,8 sec.

Calculation of peak ratios was done from peak height in the appropriate mass fragmentograms.

Saturated Fractions:

Terpanes:

The most commonly used fragmentations for detection of terpanes are M/Z 163 for detection of 25,28,30 trisnor-moretane or 25,28,30 trisnorhopane, M/Z 177 for detection of demethylated hopanes or moretanes, M/Z 191 for detection of tricyclic, tetracyclic- and pentacyclic terpanes and M/Z 205 for methylated hopanes or moretanes. The molecular ions M/Z 370, 384, 398, 412 and 426 are also recorded for identification of C<sub>27</sub>, C<sub>28</sub>, C<sub>29</sub>, C<sub>30</sub> and C<sub>31</sub> triterpanes respectively.

Steranes:

The most commonly used fragmentations for detection of steranes are M/Z 149 to distinguish between 5  $\alpha$  and 5  $\beta$  steranes, M/Z 189 and 259 for detection of rearranged steranes, M/Z 217 for detection of rearranged and normal steranes and M/Z 218 for detection of 14  $\beta$  (H), 17  $\beta$  (H) steranes. The molecular ions M/Z 372, 386, 400 and 414 are also recorded for identification of C<sub>27</sub>, C<sub>28</sub>, C<sub>29</sub> and C<sub>30</sub> steranes respectively.

Aromatic Fractions:

Alkyl-substituted Benzenes:

The M/Z 106 fragmentation is often used to detect the alkyl-substituted benzenes. It is especially useful for the detection of di-substituted benzenes. M/Z 134 can also be used for the detection of C<sub>4</sub>-alkylbenzenes, but benzothiophene will also give a signal with this fragmentation. M/Z 148 can be used for the detection of C<sub>5</sub>-alkylbenzenes, but will also give signals for methyl-substituted benzothiophenes.

Naphthalenes:

Methylnaphthalenes are normally detected by the M/Z 142 fragmentation while C<sub>2</sub>-naphthalenes are detected by M/Z 156 and C<sub>3</sub>-naphthalenes by M/Z 170.

Benzothiophenes and Dibenzothiophenes:

Benzothiophene can be detected, as mentioned above, by M/Z 134. The M/Z 198 and M/Z 212 fragmentations are used for methyl-substituted dibenzothiophenes and dimethyl-substituted dibenzothiophenes respectively.

#### Phenanthrenes:

Phenanthrene is detected using the M/Z 178 fragmentation. Anthracene will, if present also give a signal in the M/Z 178 fragmentation. Methyl-substituted phenanthrenes give signals in the M/Z 192 fragmentation while the M/Z 206 fragmentation shows the dimethyl-substituted phenanthrenes.

#### Aromatic Steranes:

Monoaromatic steranes are detected using the M/Z 253 fragmentation while the triaromatic steranes are detected using the M/Z 231 fragmentation.

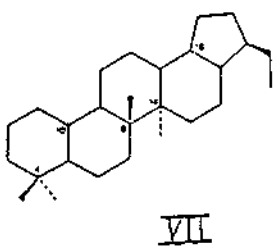
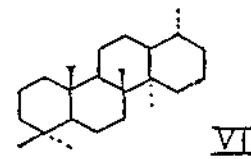
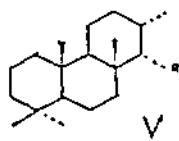
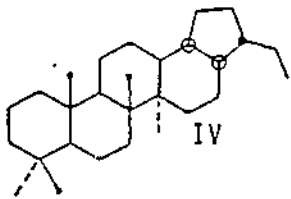
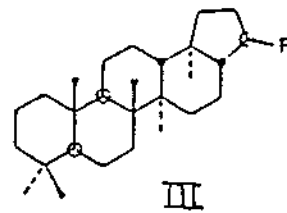
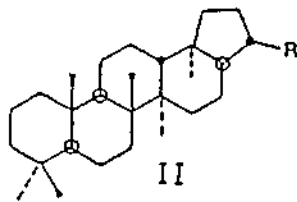
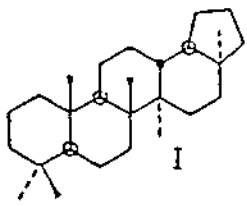
2a. Mass Fragmentograms representing Terpanes

(M/Z 163, 177, 191, 205, 370, 384, 398, 412 and 426)

Peak identification: ( $\alpha$  and  $\beta$  refer to hydrogen atoms at C-17 and C-21 respectively unless indicated otherwise).

A.	18 $\alpha$ trisnorneohopane ( $T_S$ )	$C_{27}H_{44}$	( I )
B.	17 $\alpha$ trisnorhopane ( $T_M$ )	$C_{27}H_{46}$	( II, R=H )
Z.	Bisnorhopane	$C_{28}H_{48}$	( IV )
C.	$\alpha\beta$ norhopane	$C_{29}H_{50}$	( II, R= $C_2H_5$ )
D.	$\beta\alpha$ norhopane	$C_{29}H_{50}$	( III, R= $C_2H_5$ )
E.	$\alpha\beta$ hopane	$C_{30}H_{52}$	( II, R=i- $C_3H_7$ )
F.	$\beta\alpha$ hopane	$C_{30}H_{52}$	( III, R=i- $C_3H_7$ )
G.	22S $\alpha\beta$ homohopane	$C_{31}H_{54}$	( II, R=i- $C_4H_9$ )
H.	22R $\alpha\beta$ homohopane	$C_{31}H_{54}$	( II, R=i- $C_4H_9$ )
I.	$\beta\alpha$ homomoretane	$C_{31}H_{54}$	( III, R=i- $C_4H_9$ )
J.	22S $\alpha\beta$ bishomohopane	$C_{32}H_{56}$	( II, R=i- $C_5H_{11}$ )
	22R $\alpha\beta$ bishomohopane	$C_{32}H_{56}$	( II, R=i- $C_5H_{11}$ )
K.	22S $\alpha\beta$ trishomohopane	$C_{33}H_{58}$	( II, R=i- $C_6H_{13}$ )
	22R $\alpha\beta$ trishomohopane	$C_{33}H_{58}$	( II, R=i- $C_6H_{13}$ )
L.	22S $\alpha\beta$ tetrakishomohopane	$C_{34}H_{60}$	( II, R=i- $C_7H_{15}$ )
	22R $\alpha\beta$ tetrakishomohopane	$C_{34}H_{60}$	( II, R=i- $C_7H_{15}$ )
M.	22S $\alpha\beta$ pentakishomohopane	$C_{35}H_{62}$	( II, R=i- $C_8H_{17}$ )
	22R $\alpha\beta$ pentakishomohopane	$C_{35}H_{62}$	( II, R=i- $C_8H_{17}$ )
P.	Tricyclic terpene	$C_{23}H_{42}$	( V, R=i- $C_4H_9$ )
Q.	Tricyclic terpene	$C_{24}H_{44}$	( V, R=i- $C_5H_{11}$ )
R.	Tricyclic terpene (17R, 17S)	$C_{25}H_{66}$	( V, R=i- $C_6H_{13}$ )
S.	Tetracyclic terpene	$C_{24}H_{42}$	( VI )
T.	Tricyclic terpene (17R, 17S)	$C_{26}H_{48}$	( V, R=i- $C_7H_{15}$ )
N.	Tricyclic terpene	$C_{21}H_{38}$	( V, R= $C_2H_5$ )
O.	Tricyclic terpene	$C_{22}H_{40}$	( V, R= $C_3H_7$ )
Y.	25,28,30 trisnorhopane/moretane	$C_{27}H_{46}$	( VII )
X.	Unknown triterpene	$C_{30}H_{52}$	

STRUCTURES REPRESENTING TERPANES



2b. Mass Fragmentograms representing Steranes

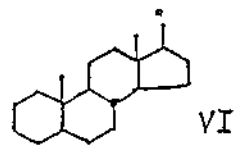
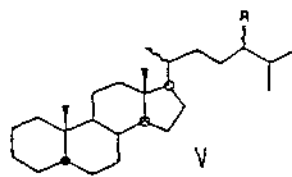
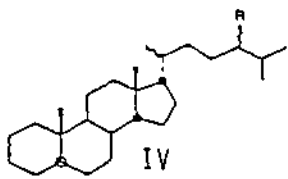
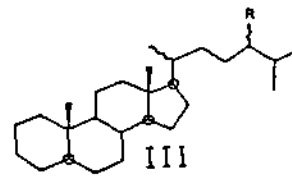
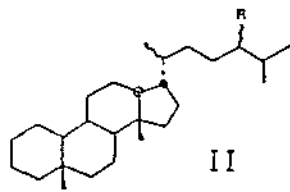
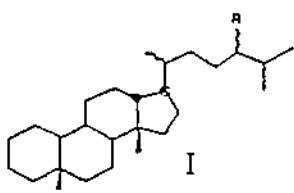
(M/Z 149, 189, 217, 218, 259, 372, 386, 400 and 414)

Peak identifications. ( $\alpha$  and  $\beta$  refer to hydrogen atoms at C-5, C-14 and C-17 in regular steranes and at C-13 and C-17 in diasteranes).

a.	20S $\beta\alpha$ diacholestane	$C_{27}H_{48}$	( I, R=H)
b.	20R $\beta\alpha$ diacholestane	$C_{27}H_{48}$	( I, R=H)
c.	20S $\alpha\beta$ diacholestane	$C_{27}H_{48}$	( II, R=H)
d.	20R $\alpha\beta$ diacholestane	$C_{27}H_{48}$	( II, R=H)
e.	20S $\beta\alpha$ 24 methyl diacholestane	$C_{28}H_{50}$	( I, R=CH <sub>3</sub> )
f.	20R $\beta\alpha$ 24 methyl diacholestane	$C_{28}H_{50}$	( I, R=CH <sub>3</sub> )
g.	20S $\alpha\beta$ 24 methyl diacholestane	$C_{28}H_{50}$	( II, R=CH <sub>3</sub> )
	+ 20S $\alpha\alpha\alpha$ cholestane	$C_{27}H_{48}$	( III, R=H)
h.	20S $\beta\alpha$ 24 ethyl diacholestane	$C_{29}H_{52}$	( II, R=C <sub>2</sub> H <sub>5</sub> )
	+20R $\alpha\beta\beta$ cholestane	$C_{27}H_{48}$	( IV, R=H)
i.	20S $\alpha\beta\beta$ cholestane	$C_{27}H_{48}$	( IV, R=H)
	+20R $\alpha\beta$ 24 methyl diacholestane	$C_{28}H_{50}$	( II, R=CH <sub>3</sub> )
j.	20R $\alpha\alpha\alpha$ cholestane	$C_{27}H_{48}$	( III, R=H)
k.	20R $\beta\alpha$ 24 ethyl diacholestane	$C_{29}H_{52}$	( I, R=C <sub>2</sub> H <sub>5</sub> )
l.	20S $\alpha\beta$ 24 ethyl diacholestane	$C_{29}H_{52}$	( II, R=C <sub>2</sub> H <sub>5</sub> )
m.	20S $\alpha\alpha\alpha$ 24 methyl cholestane	$C_{28}H_{50}$	( III, R=CH <sub>3</sub> )
n.	20R $\alpha\beta\beta$ 24 methyl cholestane	$C_{28}H_{50}$	( IV, R=CH <sub>3</sub> )
	+ 20R $\alpha\beta$ 24 ethyl diacholestane	$C_{29}H_{52}$	( II, R=C <sub>2</sub> H <sub>5</sub> )
o.	20S $\alpha\beta\beta$ 24 methyl cholestane	$C_{28}H_{50}$	( IV, R=CH <sub>3</sub> )
p.	20R $\alpha\alpha\alpha$ 24 methyl cholestane	$C_{28}H_{50}$	( III, R=CH <sub>3</sub> )
q.	20S $\alpha\alpha\alpha$ 24 ethyl cholestane	$C_{29}H_{52}$	( III, R=C <sub>2</sub> H <sub>5</sub> )
r.	20R $\alpha\beta\beta$ 24 ethyl cholestane	$C_{29}H_{52}$	( IV, R=C <sub>2</sub> H <sub>5</sub> )
s.	20S $\alpha\beta\beta$ 24 ethyl cholestane	$C_{29}H_{52}$	( IV, R=C <sub>2</sub> H <sub>5</sub> )
t.	20R $\alpha\alpha\alpha$ 24 ethyl cholestane	$C_{29}H_{52}$	( III, R=C <sub>2</sub> H <sub>5</sub> )
u.	5 $\alpha$ sterane	$C_{21}H_{36}$	( VI, R=C <sub>2</sub> H <sub>5</sub> )
v.	5 $\alpha$ sterane	$C_{22}H_{38}$	( VI, R=C <sub>3</sub> H <sub>7</sub> )



STRUCTURES REPRESENTING STERANES  
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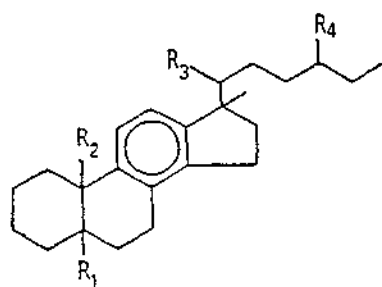
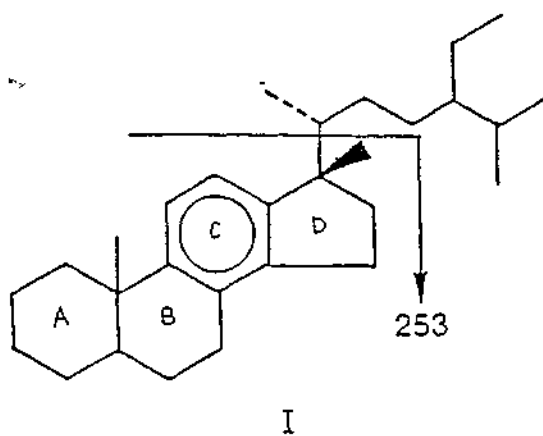


Mass Fragmentograms representing Monoaromatic Steranes  
(M/Z 253)

Description of C-ring monoaromatic steroid hydrocarbons

Peak	Substituents				Abbreviation of Compound
	R <sub>1</sub>	R <sub>2</sub>	R <sub>3</sub>	R <sub>4</sub>	
A1					C <sub>21</sub> MA
B1					C <sub>22</sub> MA
C1	β(H)	CH <sub>3</sub>	S(CH <sub>3</sub> )	H	βSC <sub>27</sub> MA
	CH <sub>3</sub>	H	S(CH <sub>3</sub> )	H	SC <sub>27</sub> DMA
D1	β(H)	CH <sub>3</sub>	R(CH <sub>3</sub> )	H	βRC <sub>27</sub> MA
	CH <sub>3</sub>	H	R(CH <sub>3</sub> )	H	RC <sub>27</sub> DMA
	α(H)	CH <sub>3</sub>	S(CH <sub>3</sub> )	H	αSC <sub>27</sub> MA
E1	β(H)	CH <sub>3</sub>	S(CH <sub>3</sub> )	CH <sub>3</sub>	βSC <sub>28</sub> MA
	CH <sub>3</sub>	H	S(CH <sub>3</sub> )	CH <sub>3</sub>	SC <sub>28</sub> DMA
F1	α(H)	CH <sub>3</sub>	R(CH <sub>3</sub> )	H	αRC <sub>27</sub> MA
	α(H)	CH <sub>3</sub>	S(CH <sub>3</sub> )	CH <sub>3</sub>	αSC <sub>28</sub> MA
G1	β(H)	CH <sub>3</sub>	R(CH <sub>3</sub> )	CH <sub>3</sub>	βRC <sub>28</sub> MA
	CH <sub>3</sub>	H	R(CH <sub>3</sub> )	CH <sub>3</sub>	RC <sub>28</sub> DMA
	β(H)	CH <sub>3</sub>	S(CH <sub>3</sub> )	C <sub>2</sub> H <sub>5</sub>	βSC <sub>29</sub> MA
	CH <sub>3</sub>	H	S(CH <sub>3</sub> )	C <sub>2</sub> H <sub>5</sub>	SC <sub>29</sub> DMA
H1	α(H)	CH <sub>3</sub>	R(CH <sub>3</sub> )	CH <sub>3</sub>	αRC <sub>28</sub> MA
	β(H)	CH <sub>3</sub>	R(CH <sub>3</sub> )	C <sub>2</sub> H <sub>5</sub>	βRC <sub>29</sub> MA
	CH <sub>3</sub>	H	R(CH <sub>3</sub> )	C <sub>2</sub> H <sub>5</sub>	RC <sub>29</sub> DMA
I1	α(H)	CH <sub>3</sub>	R(CH <sub>3</sub> )	C <sub>2</sub> H <sub>5</sub>	αRC <sub>29</sub> MA

STRUCTURES REPRESENTING MONOAROMATIC STERANES:



Mass Fragmentograms representing Triaromatic Steranes  
 (M/Z 231)

Description of ABC-ring triaromatic steroid hydrocarbons

Peak	Substituents		Abbreviation of Compound
	R <sub>1</sub>	R <sub>2</sub>	
a1	CH <sub>3</sub>	H	C <sub>20</sub> TA
b1	CH <sub>3</sub>	CH <sub>3</sub>	C <sub>21</sub> TA
c1	S(CH <sub>3</sub> )	C <sub>6</sub> H <sub>13</sub>	SC <sub>26</sub> TA
d1	R(CH <sub>3</sub> )	C <sub>6</sub> H <sub>13</sub>	RC <sub>26</sub> TA
	S(CH <sub>3</sub> )	C <sub>7</sub> H <sub>15</sub>	SC <sub>27</sub> TA
e1	S(CH <sub>3</sub> )	C <sub>8</sub> H <sub>17</sub>	SC <sub>28</sub> TA
f1	S(CH <sub>3</sub> )	C <sub>7</sub> H <sub>15</sub>	RC <sub>27</sub> TA
g1	R(CH <sub>3</sub> )	C <sub>8</sub> H <sub>17</sub>	RC <sub>28</sub> TA

STRUCTURES REPRESENTING TRIAROMATIC STERANES:

