

Table 4a: Rock-Eval table for well NOCS 6406/2-2

Depth unit of measure: m

Depth	Typ	Lithology	S1	S2	S3	S2/S3	TOC	HI	OI	PP	PI	Tmax	Sample
2200.00	mud	bulk	4.49	5.73	2.67	2.15	1.53	375	175	10.2	0.44	374	0130-0B
2450.00	cut	Sh/Clst: ol gy to lt gn gy to pl y brn	0.97	2.40	1.13	2.12	0.60	400	188	3.4	0.29	353	0040-1L
2480.00	cut	Sh/Clst: ol gy to lt gy to pl y brn	0.95	2.84	1.14	2.49	0.88	323	130	3.8	0.25	358	0041-1L
2510.00	cut	Sh/Clst: ol gy to lt gy to pl y brn	0.48	1.33	1.06	1.25	0.49	271	216	1.8	0.27	356	0042-1L
2540.00	cut	Sh/Clst: lt gy to pl y brn to drk gy	0.63	2.26	1.12	2.02	0.79	286	142	2.9	0.22	356	0043-1L
2550.00	mud	bulk	5.10	2.83	2.87	0.99	0.69	410	416	7.9	0.64	363	0131-0B
2570.00	cut	Sh/Clst: lt gy to pl y brn to drk gy	0.45	1.44	1.15	1.25	0.53	272	217	1.9	0.24	355	0044-1L
2600.00	cut	Sh/Clst: m gy to pl y brn to drk gy	0.72	2.33	1.17	1.99	0.74	315	158	3.0	0.24	354	0045-1L
2630.00	cut	Sh/Clst: gn gy to m gy to pl y brn to drk gy	3.25	3.38	1.89	1.79	1.17	289	162	6.6	0.49	364	0046-1L
2660.00	cut	Sh/Clst: gn gy to m gy to pl y brn to drk gy	0.58	1.74	1.15	1.51	0.80	218	144	2.3	0.25	353	0047-1L
2690.00	cut	Sh/Clst: m gy to pl y brn to drk gy	0.44	1.58	0.98	1.61	0.78	203	126	2.0	0.22	358	0048-1L

Table 4a: Rock-Eval table for well NOCS 6406/2-2

Depth unit of measure: m

Depth	Typ	Lithology	S1	S2	S3	S2/S3	TOC	HI	OI	PP	PI	Tmax	Sample
2720.00	cut	Sh/Clst: m gy to drk gy	0.35	1.20	0.95	1.26	0.85	141	112	1.6	0.23	351	0049-1L
2750.00	cut	Sh/Clst: m gy to drk gy	0.48	1.63	0.97	1.68	0.86	190	113	2.1	0.23	412	0050-1L
2780.00	cut	Sh/Clst: m gy to drk gy	0.56	2.13	0.94	2.27	0.83	257	113	2.7	0.21	360	0051-1L
2790.00	mud	bulk	4.98	3.04	2.21	1.38	0.98	310	226	8.0	0.62	369	0132-0B
2810.00	cut	Sh/Clst: m gy to drk gy	0.95	2.79	1.07	2.61	1.03	271	104	3.7	0.25	361	0052-1L
2840.00	cut	Sh/Clst: m gy to drk gy	2.18	2.41	0.88	2.74	0.92	262	96	4.6	0.47	357	0053-1L
2860.00	mud	bulk	53.36	7.50	1.96	3.83	1.88	399	104	60.9	0.88	429	0133-0B
2870.00	cut	Sh/Clst: m gy to drk gy	14.49	2.46	1.30	1.89	1.45	170	90	17.0	0.85	422	0054-1L
2900.00	cut	Sh/Clst: m gy to drk gy	32.49	3.54	0.69	5.13	1.99	178	35	36.0	0.90	425	0055-1L
2930.00	cut	Sh/Clst: m gy to drk gy	22.96	3.10	0.65	4.77	1.72	180	38	26.1	0.88	428	0056-1L
2960.00	cut	Sh/Clst: m gy to drk gy	18.88	2.16	0.80	2.70	1.70	127	47	21.0	0.90	422	0057-1L
2990.00	cut	Sh/Clst: m gy to drk gy	20.12	2.76	0.58	4.76	1.63	169	36	22.9	0.88	427	0058-1L
3020.00	cut	Sh/Clst: m gy to drk gy	20.32	2.92	0.64	4.56	1.38	212	46	23.2	0.87	426	0059-1L
3050.00	cut	Sh/Clst: m gy to drk gy	33.90	4.12	0.89	4.63	1.96	210	45	38.0	0.89	428	0060-1L
3080.00	cut	Sh/Clst: m gy to drk gy	26.05	3.79	0.89	4.26	2.01	189	44	29.8	0.87	428	0061-1L
3110.00	cut	Sh/Clst: m gy to drk gy	29.39	3.67	0.49	7.49	2.05	179	24	33.1	0.89	429	0062-1L

Table 4a: Rock-Eval table for well NOCS 6406/2-2

Depth unit of measure: m

Depth	Typ	Lithology	S1	S2	S3	S2/S3	TOC	HI	OI	PP	PI	Tmax	Sample
3140.00	cut	Sh/Clst: m gy to drk gy	17.74	2.44	0.61	4.00	1.66	147	37	20.2	0.88	424	0063-1L
3170.00	cut	Sh/Clst: m gy to drk gy	27.34	3.67	0.50	7.34	1.37	268	36	31.0	0.88	430	0064-1L
3200.00	cut	Sh/Clst: m gy to drk gy	33.25	4.06	0.60	6.77	1.35	301	44	37.3	0.89	427	0065-1L
3230.00	cut	Sh/Clst: m gy to drk gy	32.80	4.26	0.53	8.04	1.96	217	27	37.1	0.89	426	0066-1L
3260.00	cut	Sh/Clst: m gy to drk gy	30.57	3.96	0.61	6.49	1.95	203	31	34.5	0.89	427	0067-1L
3290.00	cut	Sh/Clst: m gy to drk gy	29.56	4.30	0.56	7.68	2.06	209	27	33.9	0.87	422	0068-1L
3320.00	cut	Sh/Clst: m gy to drk gy	37.19	4.97	0.49	10.14	1.75	284	28	42.2	0.88	434	0069-1L
3350.00	cut	Sh/Clst: m gy to drk gy	28.29	3.91	0.50	7.82	1.41	277	35	32.2	0.88	428	0070-1L
3380.00	cut	Sh/Clst: m gy to drk gy	32.09	4.17	0.42	9.93	1.68	248	25	36.3	0.88	432	0071-1L
3400.00	mud	bulk	59.16	7.86	1.17	6.72	2.33	337	50	67.0	0.88	425	0134-0B
3410.00	cut	Sh/Clst: m gy to drk gy	27.69	4.22	0.54	7.81	2.11	200	26	31.9	0.87	429	0072-1L
3440.00	cut	Sh/Clst: m gy to drk gy	32.38	4.38	0.98	4.47	1.87	234	52	36.8	0.88	432	0073-1L
3470.00	cut	Sh/Clst: m gy to drk gy	39.69	5.18	0.48	10.79	1.93	268	25	44.9	0.88	428	0074-1L
3500.00	cut	Sh/Clst: m gy to drk gy	34.65	4.17	0.47	8.87	1.55	269	30	38.8	0.89	429	0075-1L
3530.00	cut	Sh/Clst: m gy to drk gy	40.08	4.29	0.47	9.13	1.43	300	33	44.4	0.90	431	0076-1L
3560.00	cut	Sh/Clst: m gy to drk gy	38.90	5.18	0.50	10.36	1.80	288	28	44.1	0.88	427	0077-1L

Table 4a: Rock-Eval table for well NOCS 6406/2-2

Depth unit of measure: m

Depth	Typ	Lithology	S1	S2	S3	S2/S3	TOC	HI	OI	PP	PI	Tmax	Sample
3590.00	cut	Sh/Clst: m gy to drk gy	57.12	6.80	0.97	7.01	1.64	415	59	63.9	0.89	428	0078-1L
3620.00	cut	Sh/Clst: m gy to drk gy	29.62	3.14	0.53	5.92	1.81	173	29	32.8	0.90	429	0079-1L
3650.00	cut	Sh/Clst: m gy to drk gy	30.99	3.60	0.48	7.50	1.50	240	32	34.6	0.90	430	0080-1L
3680.00	cut	Sh/Clst: m gy to drk gy	16.65	2.28	0.73	3.12	1.21	188	60	18.9	0.88	431	0081-1L
3710.00	cut	Sh/Clst: m gy to drk gy	34.18	4.26	0.46	9.26	1.58	270	29	38.4	0.89	431	0082-1L
3740.00	cut	Sh/Clst: m gy to drk gy	31.23	3.50	0.77	4.55	1.94	180	40	34.7	0.90	423	0083-1L
3770.00	cut	Sh/Clst: m gy to drk gy	26.96	4.31	1.66	2.60	2.17	199	76	31.3	0.86	427	0084-1L
3800.00	cut	Sh/Clst: m gy to drk gy	25.57	4.67	0.84	5.56	1.94	241	43	30.2	0.85	433	0085-1L
3830.00	cut	Sh/Clst: m gy to drk gy	23.76	3.25	0.83	3.92	1.62	201	51	27.0	0.88	433	0086-1L
3860.00	cut	Sh/Clst: m gy to drk gy	31.66	4.31	0.59	7.31	1.70	254	35	36.0	0.88	432	0087-1L
3890.00	cut	Sh/Clst: m gy to drk gy	37.46	4.00	0.45	8.89	1.99	201	23	41.5	0.90	431	0088-1L
3920.00	cut	Sh/Clst: m gy to drk gy	32.42	3.81	0.68	5.60	2.03	188	33	36.2	0.89	432	0089-1L
3950.00	cut	Sh/Clst: m gy to drk gy	29.24	3.31	0.92	3.60	1.88	176	49	32.5	0.90	432	0090-1L
3980.00	cut	Sh/Clst: m gy to drk gy	30.08	3.19	1.06	3.01	1.70	188	62	33.3	0.90	438	0091-1L
4010.00	cut	Sh/Clst: m gy to drk gy	31.85	3.59	0.86	4.17	1.69	212	51	35.4	0.90	431	0092-1L
4040.00	cut	Sh/Clst: m gy to drk gy	36.06	3.76	0.63	5.97	1.72	219	37	39.8	0.91	433	0093-1L

Table 4a: Rock-Eval table for well NOCS 6406/2-2

Depth unit of measure: m

Depth	Typ	Lithology	S1	S2	S3	S2/S3	TOC	HI	OI	PP	PI	Tmax	Sample
4070.00	cut	Sh/Clst: m gy to drk gy	37.71	3.21	0.78	4.12	1.71	188	46	40.9	0.92	431	0094-1L
4100.00	cut	Sh/Clst: m gy to drk gy	33.89	3.40	0.83	4.10	2.13	160	39	37.3	0.91	433	0095-1L
4120.00	cut	Sh/Clst: m gy to drk gy	38.27	3.76	0.78	4.82	1.89	199	41	42.0	0.91	434	0096-1L
4160.00	cut	Sh/Clst: drk gy	33.03	3.73	1.13	3.30	1.92	194	59	36.8	0.90	433	0097-1L
4190.00	cut	Sh/Clst: drk gy	37.01	4.67	0.48	9.73	2.65	176	18	41.7	0.89	434	0098-1L
4210.00	cut	Sh/Clst: drk gy	41.76	5.36	0.74	7.24	2.45	219	30	47.1	0.89	434	0099-1L
4250.00	cut	Sh/Clst: drk gy to brn blk	36.60	3.76	0.96	3.92	2.35	160	41	40.4	0.91	436	0100-1L
4280.00	cut	Sh/Clst: drk gy to brn blk	28.83	4.76	0.86	5.53	2.14	222	40	33.6	0.86	432	0101-1L
4310.00	cut	Sh/Clst: drk gy to brn blk	30.68	2.56	0.84	3.05	2.08	123	40	33.2	0.92	409	0102-1L
4340.00	cut	Sh/Clst: drk gy to brn blk	36.45	3.75	0.64	5.86	2.18	172	29	40.2	0.91	445	0103-1L
4370.00	cut	Sh/Clst: drk gy to brn blk	35.14	3.16	0.78	4.05	1.75	181	45	38.3	0.92	436	0104-1L
4400.00	cut	Sh/Clst: drk gy to brn blk	30.70	3.69	0.91	4.05	3.03	122	30	34.4	0.89	443	0105-1L
4430.00	cut	Sh/Clst: drk gy to brn blk	34.10	4.92	0.97	5.07	3.98	124	24	39.0	0.87	441	0106-1L
4460.00	cut	Sh/Clst: drk gy to brn blk	36.71	6.36	0.70	9.09	3.39	188	21	43.1	0.85	436	0107-1L
4470.00	mud	bulk	42.23	7.76	1.20	6.47	3.50	222	34	50.0	0.84	426	0135-0B
4539.00	mud	bulk	85.17	10.51	0.44	23.89	4.16	253	11	95.7	0.89	435	0136-0B

Table 4a: Rock-Eval table for well NOCS 6406/2-2

Depth unit of measure: m

Depth	Typ	Lithology	S1	S2	S3	S2/S3	TOC	HI	OI	PP	PI	Tmax	Sample
4851.00	mud	bulk	82.55	5.83	0.71	8.21	1.53	381	46	88.4	0.93	429	0137-0B
5202.00	mud	bulk	78.41	12.40	0.87	14.25	2.05	605	42	90.8	0.86	434	0138-0B
5355.00	mud	bulk	67.68	7.21	0.65	11.09	2.33	309	28	74.9	0.90	434	0139-0B

Table 4b: Rock-Eval table for well RE, STD

Depth unit of measure: m

Depth	Typ	Lithology	S1	S2	S3	S2/S3	TOC	HI	OI	PP	PI	Tmax	Sample
1.00	n/a	bulk	0.44	18.60	1.91	9.74	4.11	453	46	19.0	0.02	420	0063-0B
2.00	n/a	bulk	0.43	18.54	1.81	10.24	4.09	453	44	19.0	0.02	422	0064-0B
3.00	n/a	bulk	0.44	18.39	1.80	10.22	3.97	463	45	18.8	0.02	419	0065-0B
4.00	n/a	bulk	0.42	18.85	1.82	10.36	4.14	455	44	19.3	0.02	421	0066-0B
5.00	n/a	bulk	0.43	17.81	1.83	9.73	4.06	439	45	18.2	0.02	421	0067-0B
6.00	n/a	bulk	0.43	17.81	1.80	9.89	4.02	443	45	18.2	0.02	423	0068-0B

Table 5A: Results of TLC-FID analysis: Absolute yields in mg/g rock for well NOCS 6406/2-2

Depth unit of measure: m

<u>Depth</u>	<u>Typ</u>	<u>Lithology</u>	<u>Sat HC</u>	<u>Aro HC</u>	<u>Resins</u>	<u>Asp</u>	<u>Tot HC</u>	<u>Tot Pol</u>	<u>Tot EOM</u>	<u>Sample</u>
2720.00	cut	S/Sst	0.32	0.00	0.24	0.07	0.32	0.31	0.63	0049-2L
2750.00	cut	S/Sst	0.14	0.00	0.34	0.08	0.14	0.42	0.55	0050-2L
2780.00	cut	S/Sst	0.10	0.00	0.29	0.07	0.10	0.36	0.47	0051-2L
2810.00	cut	S/Sst	0.10	0.00	0.45	0.06	0.10	0.51	0.61	0052-2L
2840.00	cut	S/Sst	0.50	0.00	0.39	0.03	0.50	0.42	0.92	0053-2L
2870.00	cut	S/Sst	9.09	0.22	0.54	0.07	9.31	0.62	9.92	0054-2L
2900.00	cut	S/Sst	20.86	0.47	0.74	0.10	21.32	0.84	22.16	0055-2L
2930.00	cut	S/Sst	15.76	0.35	0.69	0.09	16.11	0.78	16.89	0056-2L
2960.00	cut	S/Sst	12.51	0.33	0.56	0.09	12.85	0.65	13.49	0057-2L
2990.00	cut	S/Sst	13.41	0.28	0.63	0.05	13.69	0.68	14.37	0058-2L

Table 5B: Results of TLC-FID analysis: Rel. percentages of sep. fractions for well NOCS 6406/2-2

Depth unit of measure: m

<u>Depth</u>	<u>Typ</u>	<u>Lithology</u>	<u>Sat HC</u>	<u>Aro HC</u>	<u>Resins</u>	<u>Asp</u>	<u>Tot HC</u>	<u>Tot Pol</u>	<u>Sample</u>
2720.00	cut	S/Sst	50.59	0.00	37.74	11.66	50.59	49.41	0049-2L
2750.00	cut	S/Sst	24.87	0.00	61.13	14.00	24.87	75.13	0050-2L
2780.00	cut	S/Sst	21.84	0.00	62.53	15.63	21.84	78.16	0051-2L
2810.00	cut	S/Sst	16.27	0.00	74.20	9.53	16.27	83.73	0052-2L
2840.00	cut	S/Sst	54.46	0.00	42.71	2.83	54.46	45.54	0053-2L
2870.00	cut	S/Sst	91.57	2.23	5.46	0.74	93.80	6.20	0054-2L
2900.00	cut	S/Sst	94.11	2.10	3.34	0.45	96.21	3.79	0055-2L
2930.00	cut	S/Sst	93.29	2.08	4.09	0.53	95.37	4.63	0056-2L
2960.00	cut	S/Sst	92.74	2.47	4.14	0.65	95.21	4.79	0057-2L
2990.00	cut	S/Sst	93.34	1.96	4.37	0.33	95.30	4.70	0058-2L

Table 6 a: Weight of EOM and Chromatographic Fraction for well NOCS 6406/2-2

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
2550.00	mud	bulk	4.1	45.6	1.4	1.4	1.0	41.7	2.9	42.7	0.69	0131-0B
2860.00	mud	bulk	2.7	187.3	175.9	7.9	0.4	3.0	183.8	3.4	1.88	0133-0B
4470.00	mud	bulk	3.3	141.8	127.4	6.1	0.7	7.5	133.6	8.2	3.50	0135-0B
4539.00	mud	bulk	3.0	263.7	235.8	11.1	1.1	15.7	246.9	16.8	4.16	0136-0B

Table 6 b: Concentration of EOM and Chromatographic Fraction (wt ppm rock) for well NOCS 6406/2-2

Depth unit of measure: m

Depth	Typ	Lithology	EOM	Sat	Aro	Asph	NSO	HC	Non-HC	Sample
2550.00	mud	bulk	11009	347	347	231	10082	695	10314	0131-0B
2860.00	mud	bulk	68597	64432	2912	161	1091	67344	1252	0133-0B
4470.00	mud	bulk	42579	38270	1834	222	2252	40105	2474	0135-0B
4539.00	mud	bulk	87900	78600	3710	366	5223	82310	5590	0136-0B

Table 6 c: Concentration of EOM and Chromatographic Fraction (mg/g TOC(e)) for well NOCS 6406/2-2

Depth unit of measure: m

Depth	Typ	Lithology	EOM	Sat	Aro	Asph	NSO	HC	Non-HC	Sample
2550.00	mud	bulk	1595.60	50.41	50.41	33.61	1461.18	100.82	1494.78	0131-0B
2860.00	mud	bulk	3648.78	3427.25	154.90	8.57	58.06	3582.14	66.64	0133-0B
4470.00	mud	bulk	1216.56	1093.44	52.42	6.35	64.35	1145.86	70.70	0135-0B
4539.00	mud	bulk	2112.98	1889.42	89.18	8.81	125.56	1978.61	134.38	0136-0B

Table 6 d: Composition of material extracted from the rock (%) for well NOCS 6406/2-2

Depth unit of measure: m

Depth	Typ	Lithology	Sat	Aro	Asph	NSO	HC	Non-HC	Sat	HC	Sample
			EOM	EOM	EOM	EOM	EOM	EOM	EOM	Aro	
2550.00	mud	bulk	3.16	3.16	2.11	91.58	6.32	93.68	100.00	6.74	0131-0B
2860.00	mud	bulk	93.93	4.25	0.23	1.59	98.17	1.83	2212.58	5375.71	0133-0B
4470.00	mud	bulk	89.88	4.31	0.52	5.29	94.19	5.81	2085.76	1620.75	0135-0B
4539.00	mud	bulk	89.42	4.22	0.42	5.94	93.64	6.36	2118.60	1472.45	0136-0B

Table 7: Saturated Hydrocarbon Ratios for well NOCS 6406/2-2

Depth unit of measure: m

Depth	Typ	Lithology	Pristane	Pristane	Pristane/nC17	Phytane	CPI1	nC17	Sample
			nC17	Phytane	Phytane/nC18	nC18		nC17+nC27	
2550.00	mud	bulk	0.40	1.29	1.24	0.32	1.27	1.00	0131-0B
2860.00	mud	bulk	0.32	1.48	1.30	0.25	-	1.00	0133-0B
4470.00	mud	bulk	0.35	1.42	1.32	0.27	1.37	1.00	0135-0B
4539.00	mud	bulk	0.37	1.32	1.22	0.30	-	1.00	0136-0B

Table 8a: Variation in Triterpane Distribution (peak height) SIR for Well NOCS 6406/2-2

Depth unit of measure: m

Depth	Lithology	Ratio1	Ratio2	Ratio3	Ratio4	Ratio5	Ratio6	Ratio7	Ratio8	Ratio9	Rat.10	Rat.11	Rat.12	Rat.13	Rat.14	Sample
2550.00	bulk	1.13	0.53	0.27	1.02	0.51	-	0.22	0.21	0.18	0.96	1.00	0.55	0.10	47.79	0131-0
2860.00	bulk	0.62	0.38	0.18	0.79	0.44	0.16	0.20	0.26	0.17	0.40	0.83	0.44	0.21	55.59	0133-0
4470.00	bulk	0.82	0.45	0.21	0.66	0.40	0.09	0.18	0.27	0.15	0.46	0.88	0.41	0.16	55.22	0135-0
4539.00	bulk	0.99	0.50	0.24	0.90	0.47	0.10	0.15	0.17	0.13	0.57	0.89	0.47	0.11	58.15	0136-0

List of Triterpane Distribution Ratios

Ratio 1: $27Tm / 27Ts$

Ratio 2: $27Tm / 27Tm+27Ts$

Ratio 3: $27Tm / 27Tm+30a\beta+30\beta a$

Ratio 4: $29a\beta / 30a\beta$

Ratio 5: $29a\beta / 29a\beta+30a\beta$

Ratio 6: $30d / 30a\beta$

Ratio 7: $28a\beta / 30a\beta$

Ratio 8: $28a\beta / 29a\beta$

Ratio 9: $28a\beta / 28a\beta+30a\beta$

Ratio 10: $24/3 / 30a\beta$

Ratio 11: $30a\beta / 30a\beta+30\beta a$

Ratio 12: $29a\beta+29\beta a / 29a\beta+29\beta a+30a\beta+30\beta a$

Ratio 13: $29\beta a+30\beta a / 29a\beta+30a\beta$

Ratio 14: $32a\beta S / 32a\beta S+32a\beta R$ (%)

Table 8b: Variation in Sterane Distribution (peak height) SIR for Well NOCS 6406/2-2

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>Ratio6</u>	<u>Ratio7</u>	<u>Ratio8</u>	<u>Ratio9</u>	<u>Ratio10</u>	<u>Sample</u>
2550.00	bulk	0.66	33.06	63.03	1.74	0.72	0.65	0.50	0.46	0.49	1.27	0131-0
2860.00	bulk	0.50	43.38	68.44	1.45	0.71	0.43	0.30	0.52	0.77	1.92	0133-0
4470.00	bulk	0.53	42.46	65.74	1.69	0.69	0.58	0.40	0.49	0.74	1.67	0135-0
4539.00	bulk	0.51	46.26	76.06	1.63	0.77	0.46	0.32	0.61	0.86	2.96	0136-0

Table 8c. Raw triterpane data (peak height) m 191 SIR for Well NOCS 6406/2-2

Depth unit of measure: m

Depth	Lithology	23/3	24/3	25/3	24/4	26/3	27Ts	27Tm	28aβ	25nor30aβ	Sample
		29aβ	29Ts	30d	29βa	300	30aβ	30βa	30G	31aβS	
		31aβR	32aβS	32aβR	33aβS	33aβR	34aβS	34aβR	35aβS	35aβR	
2550.00	bulk	322.4	205.9	89.0	106.9	44.6	67.9	77.0	46.3	0.0	0131-0
		218.5	64.5	0.0	44.6	0.0	213.6	0.0	0.0	78.9	
		103.4	57.0	62.2	0.0	0.0	0.0	0.0	0.0	0.0	
2860.00	bulk	311.1	112.0	92.4	99.7	81.2	119.7	74.4	55.5	0.0	0133-0
		217.6	83.2	43.0	47.8	0.0	277.2	55.6	0.0	107.0	
		86.6	63.9	51.1	54.2	54.2	0.0	0.0	0.0	0.0	
4470.00	bulk	378.5	116.8	67.6	119.5	55.9	92.3	75.9	45.1	0.0	0135-0
		167.2	74.7	22.2	30.4	0.0	251.9	34.9	0.0	97.7	
		90.4	66.7	54.1	36.5	31.7	0.0	0.0	0.0	0.0	
4539.00	bulk	1712.3	576.4	318.3	550.7	254.7	370.4	365.2	153.1	124.9	0136-0
		918.4	311.0	101.6	86.8	0.0	1018.4	127.4	0.0	433.6	
		301.9	224.5	161.6	165.2	119.2	90.2	77.7	63.5	57.3	

List of Sterane Distribution Ratios

Ratio 1: $27d\beta S / 27d\beta S + 27aaR$

Ratio 2: $29aaS / 29aaS + 29aaR$ (%)

Ratio 3: $2 * (29\beta\beta R + 29\beta\beta S) / (29aaS + 29aaR + 2 * (29\beta\beta R + 29\beta\beta S))$ (%)

Ratio 4: $27d\beta S + 27d\beta R + 27daS + 27daR / 29d\beta S + 29d\beta R + 29daS + 29daR$

Ratio 5: $29\beta\beta R + 29\beta\beta S / 29\beta\beta R + 29\beta\beta S + 29aaS$

Ratio 6: $21a + 22a / 21a + 22a + 29aaS + 29\beta\beta R + 29\beta\beta S + 29aaR$

Ratio 7: $21a + 22a / 21a + 22a + 28daR + 28aaS + 29daR + 29aaS + 29\beta\beta R + 29\beta\beta S + 29aaR$

Ratio 8: $29\beta\beta R + 29\beta\beta S / 29aaS + 29\beta\beta R + 29\beta\beta S + 29aaR$

Ratio 9: $29aaS / 29aaR$

Ratio 10: $29\beta\beta R + 29\beta\beta S / 29aaR$

Table 8d: Raw sterane data (peak height) m/z 217 SIR for Well NOCS 6406/2-2

Depth unit of measure: m

Depth	Lithology	21a	22a	27d β S	27d β R	27daS	27daR	28d β S	28d β R	28daS*	Sample
		29d β S*	28daR*	27aaR	29d β R	29daS*	28aaS	29daR	28 β BS		
		28aaR	29aaS	29 β BR	29 β BS	29aaR					
2550.00	bulk	246.4 49.2	88.5 31.6	169.5 43.7	111.1 37.6	40.9 63.9	47.1 32.0	53.2 38.4	57.9 53.1	61.6 34.3	0131-0
2860.00	bulk	123.8 46.7	59.3 49.6	214.2 69.9	100.4 54.1	41.2 64.8	46.1 38.9	69.4 37.7	51.0 58.2	151.2 63.8	0133-0
4470.00	bulk	150.7 31.5	74.2 35.6	209.8 36.0	128.6 44.3	62.8 48.2	63.4 33.9	75.4 30.6	60.4 54.3	149.6 52.2	0135-0
4539.00	bulk	399.0 109.4	241.1 135.7	957.5 267.9	558.6 197.9	236.4 157.6	209.9 121.2	311.7 99.6	99.1 231.1	533.5 205.2	0136-0

* 28daS coel with 27 β BS, 29d β S coel with 27 β BR, 28daR coel with 27aaS, 29daS coel with 28 β BR

Table 8e: Raw sterane data (peak height) m/z 218 SIR for Well NOCS 6406/2-2

Depth unit of measure: m

Depth	Lithology	27 β BR	27 β BS	28 β BR	28 β BS	29 β BR	29 β BS	30 β BR	30 β BS	Sample
2550.00	bulk	79.9	68.4	61.3	64.0	52.2	51.0	0.0	0.0	0131-0
2860.00	bulk	106.6	84.6	75.8	67.9	102.9	69.4	30.7	33.5	0133-0
4470.00	bulk	116.6	104.3	63.3	60.9	81.2	69.9	33.3	22.6	0135-0
4539.00	bulk	508.6	386.7	280.6	302.5	298.9	266.7	83.8	84.6	0136-0

Table 8f: Raw triterpane data (peak height) m/z 177 SIR for Well NOCS 6406/2-2

Depth unit of measure: m

<u>Depth</u>	<u>Lithology</u>	<u>25nor28aß</u>	<u>25nor30aß</u>	<u>Sample</u>
2550.00	bulk	0.0	0.0	0131-0
2860.00	bulk	62.3	0.0	0133-0
4470.00	bulk	49.3	0.0	0135-0
4539.00	bulk	208.9	96.6	0136-0

Table 9A: Tabulation of carbon isotope data for EOM/EOM - fractions for well NOCS 6406/2-2

Depth unit of measure: m

<u>Depth</u>	<u>Typ</u>	<u>Lithology</u>	<u>EOM</u>	<u>Saturated</u>	<u>Aromatic</u>	<u>NSO</u>	<u>Asphaltenes</u>	<u>Kerogen</u>	<u>Sample</u>
2550.00	mud	bulk	-	-26.68	-21.19	-	-	-	0131-0
2860.00	mud	bulk	-	-20.03	-21.00	-	-	-	0133-0
4470.00	mud	bulk	-	-21.40	-23.50	-	-	-	0135-0
4539.00	mud	bulk	-	-25.99	-21.37	-	-	-	0136-0

Table B: Tabulation of cv values from carbon isotope data for well NOCS 6406/2

Depth unit of measure: m

<u>Depth</u>	<u>Typ</u>	<u>Lithology</u>	<u>Saturated</u>	<u>Aromatic</u>	<u>cv value</u>	<u>Sample</u>
2550.00	mud	bulk	-26.68	-21.19	8.81	0131-0
2860.00	mud	bulk	-20.03	-21.00	-7.59	0133-0
4470.00	mud	bulk	-21.40	-23.50	-9.68	0135-0
4539.00	mud	bulk	-25.99	-21.37	6.66	0136-0

Table 9a: Tabulation of carbon isotope data on oils for Saga, Norwegian Sector

Well	Descript.	Whole oil	Topped oil	Saturated	Aromatic	NSO	Asphaltenes	Sample
NOCS 6406/2-2	DST.1	-	-	-28.66	-26.78	-	-	N13/0140
NOCS 6406/2-2	DST.2	-	-	-28.72	-26.90	-	-	N13/0141

Table 9b: Tabulation of cv values from carbon isotope data for Saga, Norwegian Sector

<u>Well</u>	<u>Descript.</u>	<u>Saturated</u>	<u>Aromatic</u>	<u>cv value</u>	<u>Sample</u>
NOCS 6406/2-2	DST.1	-28.66	-26.78	1.41	N13/0140
NOCS 6406/2-2	DST.2	-28.72	-26.90	1.29	N13/0141

Table 10A : Isotope GC of Whole Oil for Saga, Norwegian Sector

Well	Description	iC4	nC4	iC5	nC5	2,3DMC4	CyC5	2,3DMC4 +CyC5	2MC5	3MC5	nC6	Sample
NOCS 6406/2-2	DST.1	-	-	-	-	-	-	-	-	-	-	N13/0140
NOCS 6406/2-2	DST.2	-	-	-	-	-	-	-	-	-	-	N13/0141

Table 10B : Isotope GC of Whole Oil for Saga, Norwegian Sector

<u>Well</u>	<u>Description</u>	<u>MCyC5</u>	<u>Benz</u>	<u>CyC6</u>	<u>2MC6</u>	<u>3MC6</u>	<u>1,3ciDMCyC5</u>	<u>1,3trDMCyC5</u>	<u>1,2trDMCyC5</u>	<u>Sample</u>
NOCS 6406/2-2	DST.1	-	-	-	-	-	-	-	-	N13/0140
NOCS 6406/2-2	DST.2	-	-	-	-	-	-	-	-	N13/0141

Table 10C : Isotope GC of Whole Oil for Saga, Norwegian Sector

Well	Description	nC7	MCyC6	Tol	2MC7	3MC7+1,2 3MCyC5	nC8	n-PrCyC5	1-cis-2 DMCyC6	1,1,3 TMCyC6	EtBenz	Sample
NOCS 6406/2-2	DST.1	-27.70	-24.80	-	-	-	-	-	-	-	-	N13/0140
NOCS 6406/2-2	DST.2	-27.40	-24.50	-	-	-	-	-	-	-	-	N13/0141

Table 10D : Isotope GC of Whole Oil for Saga, Norwegian Sector

Well	Description	p/m-Xyl	2+4MC8	3MC8	o-Xyl	nC9	TeBuCyC5	SeBUCyC5	n-PrCyC6	2MC9	Sample
NOCS 6406/2-2	DST.1	-	-	-	-	-	-	-	-	-	N13/0140
NOCS 6406/2-2	DST.2	-	-	-	-	-	-	-	-	-	N13/0141

Table 10E : Isotope GC of Whole Oil for Saga, Norwegian Sector

<u>Well</u>	<u>Description</u>	<u>o-EtTol</u>	<u>3,6DMC8</u>	<u>iC10</u>	<u>nC10</u>	<u>4MC10</u>	<u>iC11</u>	<u>nC11</u>	<u>4MC11</u>	<u>iC12</u>	<u>Sample</u>
NOCS 6406/2-2	DST.1	-	-	-	-27.50	-	-	-	-	-	N13/0140
NOCS 6406/2-2	DST.2	-	-	-	-27.50	-	-	-	-	-	N13/0141

Table 10F : Isotope GC of Whole Oil for Saga, Norwegian Sector

Well	Description	nC12	iC13	iC14	nC13	iC15	nC14	iC16	nC15	nC16	iC18	Sample
NOCS 6406/2-2	DST.1	-	-	-	-	-	-	-	-	-	-28.40	N13/0140
NOCS 6406/2-2	DST.2	-	-	-	-	-	-	-	-	-	-28.60	N13/0141

Table 10G : Isotope GC of Whole Oil for Saga, Norwegian Sector

Well	Description	nC17	Pristane	nC18	Phytane	nC19	nC20	nC21	nC22	nC23	nC24	Sample
NOCS 6406/2-2	DST.1	-28.20	-29.70	-28.20	-29.40	-	-28.20	-	-	-	-	N13/0140
NOCS 6406/2-2	DST.2	-28.20	-29.70	-28.40	-29.30	-	-28.30	-	-	-	-	N13/0141

Table 10H : Isotope GC of Whole Oil for Saga, Norwegian Sector

<u>Well</u>	<u>Description</u>	<u>nC25</u>	<u>nC26</u>	<u>nC27</u>	<u>nC28</u>	<u>nC29</u>	<u>nC30</u>	<u>nC31</u>	<u>nC32</u>	<u>nC33</u>	<u>nC34</u>	<u>Sample</u>
HOCS 6406/2-2	DST.1	-	-	-	-	-	-	-	-	-	-	N13/0140
HOCS 6406/2-2	DST.2	-	-	-	-	-	-	-	-	-	-	N13/0141

Appendix VI

Data report on stable isotope gas (IFE)



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REPORT TYPE	REPORT NO. IFE/KR/F-96/079		DATE 1996-05-06	
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	CLIENT Saga Petroleum as		NUMBER OF PAGES 7	
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SUMMARY 5 gas samples from well 6406/2-2 are analysed for gas and isotopic composition. The work is done in accordance with the "The Norwegian Industry Guide to Organic Geochemical Analyses", Third Edition 1993.			DISTRIBUTION Saga (3) Andresen, B. Bjørnstad, T. Johansen, H. Sieglé, S. File (2)	
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1 Introduction

Five gas samples from well 6406/2-2 are analysed for gas and isotopic composition.

On the samples C₁ - C₅ and CO₂ are quantified. The δ¹³C value is measured on methane, ethane, propane, the butanes and CO₂. In addition the δD value is measured on methane.

2 Analytical procedures

Aliquots of 1.0 ml of the gas samples are sampled with a syringe for analysis on a Porapak Q column connected with flame ionisation (FID) and thermal conductivity (TCD) detectors. The detection limit for the hydrocarbon gas components is 0.01 µl/ml and for CO₂ 0.5 µl/ml.

For the isotope analysis 3 - 10 ml are sampled with a syringe and then separated into the different gas components by a Carlo Erba 4200 gas chromatograph. The hydrocarbon gas components are oxidised in separate CuO-ovens in order to prevent cross contamination. The combustion products CO₂ and H₂O are frozen into collection vessels and separated.

The combustion water is reduced with zinc metal in sealed quartz tubes to prepare hydrogen for isotopic analysis. The isotopic measurements are performed on a Finnigan MAT 251 and a Finnigan Delta mass spectrometer.

IFEs value on NBS 22 is $-29.77 \pm .06\text{‰}$ PDB.

The uncertainty in the δ¹³C value is estimated to be $\pm 0.3\text{‰}$ PDB and includes all the different analytical steps. The estimate is based on repeated analysis of a laboratory standard gas mixture. The uncertainty in the δD value is likewise estimated to be $\pm 10\text{‰}$.

3 Results

The volume composition of the gas samples is shown in Table 1 (normalised composition), and the stable isotope composition of the same gas samples is shown in Table 2.

In both DST 1-samples one unidentified component is eluted between C₃ and iC₄ in a concentration of about 3 and 1 µl/ml (based on the assumption of the same response as C₃ and iC₄). This unidentified component is not included in the gas composition shown in Table 1.

The FMT-sample is characterised by a stable isotope composition quite opposite to what is usually found in natural gases and what is found in the DST- samples. Methane is the heaviest component and the butanes are the isotopically lightest components. In addition the concentration of the different components in the FMT-sample is lower than the corresponding from the DST samples (between 10 to 50% of the corresponding values in the DST samples).

The same isotopic fractionation as found in the FMT sample has been found in some previously analysed samples at IFE. We believe that this fractionation is due to bacterial attack on the hydrocarbon gas components, with methane as the first and most severe attacked component (unpublished research at IFE). Ethane is the next attacked component, then propane and the butanes. However, isotopic fractionation due to diffusion or leakage cannot be excluded.

The isotope analysis of the FMT sample were repeated 2 weeks after the first determination with both values reported in Table 2. The difference in isotope values between the two measurements are about what can be expected due to the analytical procedures. The results indicate that most likely the fractionation has taken place before the gas was collected in the present gas bottle.

The molecular composition related to carbon isotope variations in methane from the DST samples are plotted in Figure 1 (Schoell, 1983), the carbon and hydrogen variations in methane are plotted in Figure 2 (Schoell, 1983) and the carbon isotope variations in ethane related to the carbon isotope variations in methane in Figure 3 (Schoell, 1983).

Table 1 Volume composition (normalised values) of gas samples from well 6406/2-2

Sample	IFE no GEO	C ₁ %	C ₂ %	C ₃ %	iC ₄ %	nC ₄ %	iC ₅ %	nC ₅ %	CO ₂ %	ΣC ₁ -C ₅ %	Wet- ness	iC ₄ / nC ₄
FMT: 1900ZC331461, 4654.3m, TS-11-21	960518	61.0	15.9	8.0	1.59	2.45	0.93	0.93	9.3	90.7	0.33	0.65
DST2 sample no 2.13a	960519	79.6	8.9	3.5	0.56	0.91	0.24	0.20	6.0	94.0	0.15	0.61
DST2, sample no 2.45	960520	78.4	10.0	3.7	0.54	0.92	0.25	0.23	6.0	94.0	0.17	0.59
DST1, sample no 1.20	960521	78.6	9.3	3.5	0.56	0.90	0.26	0.26	6.5	93.5	0.16	0.62
DST1, sample no 1.21	960522	78.1	9.6	3.8	0.65	1.05	0.32	0.31	6.1	93.9	0.17	0.62

Table 2 Isotopic composition of gas samples from well 6406/2-2

Sample	IFE no GEO	C ₁ δ ¹³ C ‰PDB	C ₁ δD ‰ SMOW	C ₂ δ ¹³ C ‰PDB	C ₃ δ ¹³ C ‰PDB	iC ₄ δ ¹³ C ‰PDB	nC ₄ δ ¹³ C ‰PDB	CO ₂ δ ¹³ C ‰PDB	CO ₂ δ ¹⁸ O ‰PDB
FMT: 1900ZC331461, 4654.3m, TS-11-21	960518	-7.5	-173	-19.8	-22.8	-25.6	-25.2	-3.0	-3.1
		-6.9		-19.2	-21.8	-25.4	-23.8	-2.1	-3.6
DST2 sample no 2.13a	960519	-40.8	-193	-29.1	-27.0	-28.0	-27.8	-7.8	-13.8
DST2, sample no 2.45	960520	-42.4	-192	-29.8	-27.5	-27.3	-27.9	-7.0	-16.8
DST1, sample no 1.20	960521	-42.7	-192	-29.9	-27.0	-29.9	-27.7	-7.4	-13.9
DST1, sample no 1.21	960522	-42.6	-204	-29.7	-27.5	-28.8	-27.8	-8.4	-16.0

4 Literature

- James, A.T. (1983). Correlation of natural gas by use of carbon isotopic distribution between hydrocarbon components. *The American Association of Petroleum Geologists Bulletin*, 67, 1176-1191
- Robert, P. (1985). Methods and means of paleothermal analysis. *Organic Methamorphism and Geothermal History*, Elf-Aquitaine and D. Reidel Publishing Company.
- Schoell, M. (1983). Genetic characterisation of natural gases. *The American Association of Petroleum Geologists Bulletin*, 67, 2225-2238.