

COMPANY: Norsk Hydro

WELL: 30/12-1, T2

LOCATION: Offshore Norway

General Data		Gas Chromatography-Mass Spectrometry Biomarker Ratios									
		Biomarker Ratio No.									
DEPTH (m)	Sample Type	1	2	3	4	5	6	7	8	9	10
2796	SWC	0.38	0.20	46.6	29.2	24.2	26.0	35.0	39.0	1.93	1.93
2812	SWC	0.40	0.45	50.8	25.7	23.6	23.5	34.3	42.3	2.16	1.72
2820	SWC	0.41	0.40	50.0	25.3	24.7	24.4	33.4	42.3	2.02	2.09
2830	SWC	0.40	0.42	47.2	27.1	25.7	23.4	34.5	42.1	1.83	1.66
2836	SWC	0.41	0.43	48.9	26.5	24.6	23.4	34.7	41.9	1.99	1.63
2840-2842	Ctgs	0.44	0.46	50.3	26.4	23.3	25.3	33.9	40.8	2.16	1.54
2857-2860	Ctgs	0.48	0.44	55.7	20.1	24.2	22.1	34.6	43.2	2.30	2.94
2865	SWC	0.50	0.42	60.4	15.6	24.0	22.8	29.4	47.8	2.52	4.25
2870-2872	Ctgs	0.46	0.43	59.6	14.0	26.4	22.7	28.4	48.9	2.25	2.76
2886	SWC	0.48	0.40	57.4	14.5	28.1	23.8	27.8	48.4	2.04	4.37
2955	Core	0.43	0.55	49.5	18.6	31.9	22.8	30.4	46.9	1.55	2.02
2964.1-2964.3	Core	0.46	0.43	12.6	33.3	54.1	23.2	29.2	47.5	0.23	2.65

Key to GC-MS Biomarker Ratios

1. $[20S/(20S+20R)]$ of C₂₉ 5 α (H), 14 α (H), 17 α (H) steranes
2. $[(20S+20R) \text{ of C}_{29} \text{ 5}\alpha\text{(H), 14}\beta\text{(H), 17}\beta\text{(H) steranes}] / [(20S+20R) \text{ of C}_{29} \text{ 5}\alpha\text{(H), 14}\alpha\text{(H), 17}\alpha\text{(H) plus 5}\alpha\text{(H), 14}\beta\text{(H), 17}\beta\text{(H) steranes}]$
3. $\%[C_{27}/(C_{27}+C_{28}+C_{29})]$ of 5 α (H), 14 α (H), 17 α (H) 20R steranes
4. $\%[C_{28}/(C_{27}+C_{28}+C_{29})]$ of 5 α (H), 14 α (H), 17 α (H) 20R steranes
5. $\%[C_{29}/(C_{27}+C_{28}+C_{29})]$ of 5 α (H), 14 α (H), 17 α (H) 20R steranes
6. $\%[C_{27}/(C_{27}+C_{28}+C_{29})]$ of 5 α (H), 14 β (H), 17 β (H) 20(S+R) isosteranes
7. $\%[C_{28}/(C_{27}+C_{28}+C_{29})]$ of 5 α (H), 14 β (H), 17 β (H) 20(S+R) isosteranes
8. $\%[C_{29}/(C_{27}+C_{28}+C_{29})]$ of 5 α (H), 14 β (H), 17 β (H) 20(S+R) isosteranes
9. $[C_{27}/C_{29}]$ of 5 α (H), 14 α (H), 17 α (H) 20R steranes
10. C₃₀ 17 α (H), 21 β (H) hopane/total C₂₉ steranes

TABLE 8.2 Alkane GC-MS biomarker ratios (steranes, m/e 217, 218)



COMPANY: Norsk Hydro

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LOCATION: Offshore Norway

General Data		Gas Chromatography-Mass Spectrometry Biomarker Ratios									
		Biomarker Ratio No.									
DEPTH (m)	Sample Type	1	2	3	4	5	6	7	8	9	10
2796	SWC	79.2	13.1	7.7	50.0	34.8	15.2				
2812	SWC	51.9	32.7	15.4	44.4	46.3	9.3				
2820	SWC	50.9	33.6	15.5	47.6	44.0	8.4				
2830	SWC	47.1	33.9	19.0	49.3	41.3	9.4				
2836	SWC	47.7	35.6	16.7	47.7	43.6	8.8				
2840-2842	Ctgs	49.3	34.4	16.3	45.6	45.3	9.0				
2857-2860	Ctgs	47.6	38.2	14.2	46.9	44.0	9.0				
2865	SWC	46.9	39.1	14.0	46.4	44.1	9.5				
2870-2872	Ctgs	45.7	40.1	14.2	45.7	45.7	8.7				
2886	SWC	61.3	19.9	18.8	49.4	42.0	8.6				
2955	Core	49.6	33.8	16.6	37.8	57.2	5.0				
2964.1-2964.3	Core	37.7	30.9	31.4	40.1	38.0	21.9				

Key to GC-MS Biomarker Ratios

1. $\%[C_{27}/(C_{27}+C_{28}+C_{29})]$ of $13\beta(H)$, $17\alpha(H)$ 20 (S+R) diasteranes
2. $\%[C_{28}/(C_{27}+C_{28}+C_{29})]$ of $13\beta(H)$, $17\alpha(H)$, 20 (S+R) diasteranes
3. $\%[C_{29}/(C_{27}+C_{28}+C_{29})]$ of $13\beta(H)$, $17\alpha(H)$ 20 (S+R) diasteranes
4. $\%[5\alpha(H), 14\alpha(H), 17\alpha(H)/(5\alpha(H), 14\alpha(H), 17\alpha(H) + 5\alpha(H), 14\beta(H), 17\beta(H) + 13\beta(H), 17\alpha(H))]$ of C₂₉ 20 (S+R) steranes
5. $\%[5\alpha(H), 14\beta(H), 17\beta(H)/(5\alpha(H), 14\alpha(H), 17\alpha(H) + 5\alpha(H), 14\beta(H), 17\beta(H) + 13\beta(H), 17\alpha(H))]$ of C₂₉ 20(S+R) steranes
6. $\%[13\beta(H), 17\alpha(H)/(5\alpha(H), 14\alpha(H), 17\alpha(H) + 5\alpha(H), 14\beta(H), 17\beta(H) + 13\beta(H), 17\alpha(H))]$ of C₂₉ 20(S+R) steranes

TABLE 8.3 Alkane GC-MS biomarker ratios (steranes m/e 217, 218, 259)



COMPANY: NORSK HYDRO

WELL: 30/12-1,T2

LOCATION: OFFSHORE NORWAY

Depth(m)	2796	2812	2820	2830	2836	2840	2857	2865	2870	2886	2955	2964.1
2MN	141920	198528	39500	0	1297	134176	7012	1460	9654	1228	1130	531484
1MN	314240	466432	134624	5692	1530	3663336	40056	14054	12072	4217	1634	806448
2,6-27-MN	376176	539584	272912	0	1823	515408	87544	71200	54364	12956	1882	667344
1,5-DMN	491856	673088	421376	1226	300	708448	214432	210288	172256	96096	0	1120096
136DMN	611344	835488	756192	6652	15908	978176	390432	795776	349856	151568	2263	795776
135,46DM	536448	737760	695856	2696	16280	921664	353408	232864	346080	115968	1795	732608
236DMN	317120	432640	401088	500	10636	490432	235152	194128	246816	100400	1812	506720
125DMN	615184	852544	823488	11515	40229	866176	684704	508640	860160	293176	10869	1376700
P	3160490	3807830	4411000	298592	855856	4136190	4616410	3149050	7011640	2901530	402080	6396990
3MP	907936	1186550	1489370	116292	355452	1574010	1444780	833600	2070430	660624	123092	1542830
2MP	982608	1220590	1553980	121048	387520	1593400	1574940	881120	2631510	740880	175280	1948190
9MP	1576230	2049340	2760150	204384	642976	2859260	2866940	1420790	3976310	1004600	196680	2925560
1MP	1677080	2305050	2706270	247008	686144	2779230	2536410	1470710	3840830	1193990	218584	2677820
DBT	1015580	1344970	1454940	78641	214868	1373240	1100540	737712	1025290	355224	41738	1062760
4-MDBT	581720	890352	1004750	84544	204192	1089590	631728	313816	504576	184205	27196	434960
1-MDBT	901984	1211050	1434920	107702	254808	1557420	764416	394224	493896	190919	17899	449592
TAS20	390432	461174	700544	62034	202088	764896	419424	160720	322336	95624	15308	275328
TAS21	272393	313020	502720	47854	128359	538912	204716	67627	115712	48435	3548	84672
TAS26S	815536	61932	1231610	95223	250410	1101880	436063	167940	189277	67432	66380	151328
TS26R,7S	2321900	1646170	3091670	292307	741616	3072060	1151580	411440	517862	157599	11389	408089
TAS28S	871900	650560	1345560	118904	306000	1329150	640896	293955	514944	127408	9140	377376
TAS27R	1214010	824896	1538810	152832	396832	1602360	594784	205312	276624	79256	6657	218880
TAS28R	1053310	991648	1749590	154563	350134	1641080	704656	297792	513168	133490	8869	380967

AROMATIC GC-MS BIOMARKER PEAK AREAS

TABLE 9

COMPANY: Norsk Hydro

WELL: 30/12-1, T2

LOCATION: Offshore Norway

General Data		Gas Chromatography-Mass Spectrometry Biomarker Ratios									
		Biomarker Ratio No.									
DEPTH (m)	Sample Type	1	2	3	4	5	6	7	8	9	10
2796	SWC	2.21	0.76	0.59	1.01	0.44	0.46	0.37	0.19	0.64	0.32
2812	SWC	2.35	0.80	0.59	1.02	0.44	0.45	0.36	0.18	0.74	0.35
2820	SWC	3.41	0.65	0.58	1.09	0.46	0.47	0.36	0.18	0.70	0.33
2830	SWC	-	-	0.19	1.73	0.47	0.48	0.34	0.18	0.78	0.26
2836	SWC	1.18	6.08	0.65	2.53	0.51	0.53	0.36	0.19	0.80	0.25
2840-2842	Ctgs	27.30	0.73	0.53	0.89	0.49	0.49	0.36	0.18	0.70	0.33
2857-2860	Ctgs	5.71	0.41	0.67	1.75	0.45	0.47	0.36	0.19	0.83	0.24
2865	SWC	9.63	0.34	0.83	0.64	0.43	0.44	0.37	0.19	0.80	0.23
2870-2872	Ctgs	1.25	0.32	0.71	2.46	0.48	0.53	0.38	0.21	1.02	0.15
2886	SWC	3.43	0.13	0.87	1.93	0.41	0.44	0.39	0.21	0.96	0.12
2955	Core	1.45	-	1.01	4.80	0.55	0.64	0.42	0.25	1.52	0.10
2964.1-2964.3	Core	1.52	0.60	0.69	1.73	0.44	0.49	0.38	0.21	0.97	0.17

Key to GC-MS Biomarker Ratios

1. MNR - 2-MN/1-MN (m/e 142)
2. DNR - (2, 6-DMN + 2, 7-DMN)/1, 5,-DMN (m/e 156)
3. TNR-1 - 2, 3, 6-TMN/(1, 4, 6-TMN + 1, 3, 5-TMN) (m/e 170)
4. TNR-2 - 1, 2, 5-TMN/1, 3, 6-TMN (m/e 170)
5. MPR-1 - 1.5 (2-MP + 3-MP)/P+1-MP+9-MP (P-m/e 178; MP-m/e 192)
6. MPR-2 - 3 (2-MP)/(P+1-MP+9-MP) (P-m/e 178; MP-m/e 192)
7. MPDF1 - (2-+3-MP)/(1-MP+2-MP+3-MP+9-MP) (m/e 192)
8. MPDF2 - 2-MP/(1-MP+2-MP+3-MP+9-MP) (m/e 192)
9. MDR - 4-MDBT/1-MDBT (m/e 198)
10. DBT/P - (DBT - m/e 184; P-m/e 178)

TABLE 10.1 Aromatic GC-MS biomarker ratios (phenanthrenes & dibenzothiophenes)



COMPANY: Norsk Hydro

WELL: 30/12-1, T2

LOCATION: Offshore Norway

General Data		Gas Chromatography-Mass Spectrometry Biomarker Ratios									
		Biomarker Ratio No.									
DEPTH (m)	Sample Type	1	2	3	4	5	6	7	8	9	10
2796	SWC	0.10	0.21	0.94	1.15						
2812	SWC	0.16	0.24	0.10	0.83						
2820	SWC	0.12	0.22	0.92	0.88						
2830	SWC	0.12	0.24	0.80	0.99						
2836	SWC	0.14	0.27	0.82	1.13						
2840-2842	Ctgs	0.13	0.25	0.83	0.98						
2857-2860	Ctgs	0.15	0.23	0.68	0.84						
2865	SWC	0.14	0.19	0.57	0.69						
2870-2872	Ctgs	0.18	0.18	0.37	0.54						
2886	SWC	0.20	0.27	0.53	0.59						
2955	Core	0.16	0.29	0.77	0.75						
2964.1-2964.3	Core	0.19	0.18	0.40	0.57						

Key to GC-MS Biomarker Ratios

1. TASC-1 - $(TA_{20}+TA_{21})/(TA_{20}+TA_{21}+TA_{26}+TA_{27}+TA_{28})$ (m/e 231)
2. TASC-2 - $TA_{21}/(TA_{21}+TA_{28R})$ (m/e 231)
3. C₂₆/C₂₈ - TA_{26S}/TA_{28S} (m/e 231)
4. C₂₇/C₂₈ - TA_{27R}/TA_{28R} (m/e 231)

TABLE 10.2 Aromatic GC-MS biomarker ratios (aromatic steranes)



COMPANY: Norsk Hydro

WELL: 30/12-1, T2

LOCATION: Offshore Norway

Depth (m)	Alkanes	Aromatics	Polars	Asphaltenes	Kerogen
2796	-31.3	-30.1	-29.2	-28.5	-24.3
2812	-31.2	-31.3	-30.4	-30.0	-27.9
2820	-31.6	-31.2	-30.5	-29.3	-29.9
2830	-31.7	-32.0	-29.7	-30.0	-29.6
2836	N.D.	N.D.	-28.8	N.S.	-27.8
2840-2842	-30.9	-30.4	-29.9	-29.7	-29.5
2857-2860	-29.0	-27.1	-28.1	-26.4	-25.4
2865	N.D.	-25.6	-26.3	N.S.	-24.3
2870-2872	-27.9	-25.6	-27.7	-24.7	-24.9
2886	-27.7	-26.7	-27.9	N.S.	N.D.
2955	N.D.	N.D.	-27.4	N.S.	N.D.
2964.1-2964.3	-27.5	-25.7	-27.8	-25.6	-24.1

N.D. - No data due to small sample size

N.S. - Insufficient sample for analysis

NB: All values in ‰ relative to the Pee Dee belemnite (PDB)

TABLE 11 Stable carbon isotope ratios

