

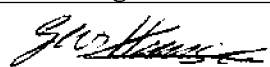

**Geochemistry Data Report –
Gas Analysis well 6405/10-1
(Midnattsol)**



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Table 1. Number of analyses performed

Analysis	Cuttings	Gas	Total
Headspace	9		9
Gas composition		19	19
Stable isotopes of gas	9	19	28



Table 2. Gas Composition (volume-%)

Well	Sample type	Sample info	Upper Depth (m)	Lower Depth (m)	Depth units	APT ID	C1%	C2%	C3%	iC4%	nC4%	iC5%	nC5%	C6+%	CO2%	Sum C1-C5	Wetness	iC4/nC4	ppm
6405/10-1	BAG		1951	1951 m		44477	96.5	0.86	0.04		0.01				2.6	97.4	0.93		10213
6405/10-1	BAG		2275	2275 m		44478	93.6	0.85	0.14		0.02				5.4	94.6	1.1		5453
6405/10-1	BAG		2356	2356 m		44479	88.8	0.90	0.13		0.02				0.42	89.8	1.2		10635
6405/10-1	BAG		2398	2398 m		44480	95.3	1.1	0.17	0.02	0.03				3.4	96.6	1.3	0.50	6737
6405/10-1	BAG		2401	2401 m		44481	96.2	1.1	0.17	0.01	0.03				2.6	97.4	1.3	0.50	8091
6405/10-1	BAG		2434	2434 m		44482	97.7	0.97	0.13	0.01	0.02				1.1	98.9	1.1	0.58	25612
6405/10-1	BAG		2490	2490 m		44483	98.8	0.48	0.04		0.01				0.69	99.3	0.53		19857
6405/10-1	BAG		2600	2600 m		44484	98.0	0.76	0.10	0.01	0.01				1.1	98.9	0.90	0.51	14776
6405/10-1	BAG		2700	2700 m		44485	98.2	0.83	0.11	0.01	0.01				0.85	99.2	0.97	0.66	18312
6405/10-1	BAG		2784	2784 m		44486	93.6	2.2	0.44	0.06	0.05		0.02		3.7	96.3	2.8	1.1	8744
6405/10-1	BAG		2893.50	2893.50 m		44487	98.4	0.76	0.09	0.01	0.02	0.01	0.01		0.66	99.3	0.89	0.88	20356
6405/10-1	BAG		2947	2947 m		44488	97.7	1.0	0.14	0.02	0.02	0.01	0.01		1.1	98.9	1.2	0.91	18644
6405/10-1	BAG		2952	2952 m		44489	97.7	1.1	0.13	0.01	0.01	0.00	0.00		1.0	99.0	1.2	0.96	26467
6405/10-1	BAG		3001.50	3001.50 m		44490	98.1	1.2	0.16	0.02	0.02	0.00	0.01		0.56	99.4	1.4	0.98	26176
6405/10-1	BAG		3004	3004 m		44491	98.1	1.0	0.12	0.01	0.01				0.72	99.3	1.2	1.1	22756
6405/10-1	BAG		3005	3005 m		44492	98.2	0.95	0.13	0.01	0.01		0.01		0.73	99.3	1.1	0.92	28412
6405/10-1	BAG		3035	3035 m		44493	98.6	0.76	0.09	0.01	0.01		0.00		0.52	99.4	0.87	0.64	33127
6405/10-1	DCG		2460	2460 m		44494	98.3	1.3	0.20	0.02	0.03	0.01	0.01	0.05	0.09	99.9	1.5	0.75	52947
6405/10-1	DCG		2540	2540 m		44495	97.6	1.6	0.29	0.03	0.04	0.01	0.01	0.07	0.36	99.6	2.0	0.76	20569
6405/10-1	DCG		2580	2580 m		44496	92.2	5.2	1.7	0.26	0.29	0.07	0.06	0.04	0.04	99.9	7.6	0.92	54560
6405/10-1	Cylinder	TS-118605	2951.50	2951.50 m		45454	94.7	3.2	1.2	0.27	0.26	0.12	0.08	0.03	0.11	99.9	5.0	1.0	895164
6405/10-1	Cylinder	TS-47306	2994.40	2994.40 m		45455	94.8	3.0	1.2	0.30	0.28	0.12	0.09	0.03	0.12	99.9	4.8	1.1	977661
6405/10-1	DCG		2680	2680 m		44497	89.5	6.8	2.5	0.36	0.39	0.10	0.09	0.07	0.23	99.7	10.1	0.91	34460
6405/10-1	DCG		2727	2727 m		44498	96.7	2.2	0.51	0.07	0.08	0.02	0.01	0.11	0.27	99.6	2.9	0.86	15337
6405/10-1	DCG		2808	2808 m		44499	91.3	5.9	1.9	0.33	0.27	0.08	0.05	0.04	0.14	99.8	8.4	1.2	57016
6405/10-1	DCG		2970	2970 m		44500	89.1	6.6	2.8	0.49	0.38	0.10	0.09	0.14	0.40	99.5	10.3	1.3	12449
6405/10-1	DCG		2988	2988 m		44501	77.4	10.6	7.5	1.3	1.2	0.33	0.28	0.35	0.94	98.7	21.1	1.1	4187
6405/10-1	DCG		3042	3042 m		44502	92.2	4.1	1.9	0.29	0.30	0.07	0.07	0.19	0.76	99.0	6.7	0.95	6626

Table 3. Gas Isotopes ($\delta^{13}C$ (‰ PDB) & δD (‰ SMOW))

Well	Sample type	Sample info	Upper Depth (m)	Lower Depth (m)	Depth units	APT ID	C1 $\delta^{13}C$	C2 $\delta^{13}C$	C3 $\delta^{13}C$	i-C4 $\delta^{13}C$	n-C4 $\delta^{13}C$	CO2 $\delta^{13}C$	C1 δD	C2 δD	C3 δD	i-C4 δD	n-C4 δD
6405/10-1	BAG		1951	1951 m		44477	-68.0						-177.0				
6405/10-1	BAG		2275	2275 m		44478	-47.9						-148.0				
6405/10-1	BAG		2356	2356 m		44479	-44.3						-150.0				
6405/10-1	BAG		2398	2398 m		44480	-43.9						-147.0				
6405/10-1	BAG		2401	2401 m		44481	-43.6						-147.0				
6405/10-1	BAG		2434	2434 m		44482	-43.7						-161.0				
6405/10-1	BAG		2490	2490 m		44483	-42.8						-159.0				
6405/10-1	BAG		2600	2600 m		44484	-43.3						-171.0				
6405/10-1	BAG		2700	2700 m		44485	-43.6						-172.0				
6405/10-1	BAG		2784	2784 m		44486	-7.7						-130.0				
6405/10-1	BAG		2893.50	2893.50 m		44487	-45.5						-159.0				
6405/10-1	BAG		2947	2947 m		44488	-44.9						-161.0				
6405/10-1	BAG		2952	2952 m		44489	-45.0						-163.0				
6405/10-1	BAG		3001.50	3001.50 m		44490	-46.7						-156.0				
6405/10-1	BAG		3004	3004 m		44491	-46.1						-152.0				
6405/10-1	BAG		3005	3005 m		44492	-46.6						-154.0				
6405/10-1	BAG		3035	3035 m		44493	-47.6						-154.0				
6405/10-1	DCG		2460	2460 m		44494	-38.5						-178.0				
6405/10-1	DCG		2540	2540 m		44495	-37.4						-177.0				
6405/10-1	DCG		2580	2580 m		44496	-38.9	-30.3					-192.0				
6405/10-1	Cylinder	TS-118605	2951.50	2951.50 m		45454	-44.3	-31.6	-29.4	-28.5	-27.8		-171.0				
6405/10-1	Cylinder	TS-47306	2994.40	2994.40 m		45455	-45.5	-32.2	-29.6	-28.6	-28.0		-170.0				
6405/10-1	DCG		2680	2680 m		44497	-38.6	-28.3					-192.0				
6405/10-1	DCG		2727	2727 m		44498	-38.8						-180.0				
6405/10-1	DCG		2808	2808 m		44499	-39.6	-30.4					-185.0				
6405/10-1	DCG		2970	2970 m		44500	-39.2						-175.0				
6405/10-1	DCG		2988	2988 m		44501	-41.2						-164.0				
6405/10-1	DCG		3042	3042 m		44502	-43.0						-170.0				

Experimental Procedures

All procedures follow NIGOGA, 4th Edition. Below are brief descriptions of procedures/analytical conditions.

Deasphalting

Extracts are evaporated almost to dryness before a small amount of dichloromethane (3 times the amount of EOM) is added. Pentane is added in excess (40 times the volume of EOM and dichloromethane/oil). The solution is stored for at least 12 hours in a dark place before the solution is filtered or centrifuged and the weight of the asphaltenes measured.

GC analysis of gas components

Aliquots of the samples were transferred to exetainers. 0.1-1ml were sampled using a Gerstel MPS2 autosampler and injected into a Hewlett Packard 5890 Series II GC equipped with Porabond Q column, a flame ionisation detector (FID), a thermal conductivity detector (TCD) and a methylation unit. Hydrocarbons were measured by FID, CO₂ by metylation (to CH₄) and then FID and N₂ and O₂ by TCD.

Carbon isotope analysis of hydrocarbon compounds and CO₂

The carbon isotopic composition of the hydrocarbon gas components was determined by a GC-C-IRMS system. Aliquots were sampled with a syringe and analysed on a Trace GC2000, equipped with a Poraplot Q column, connected to a Delta plus XP IRMS. The components were burnt to CO₂ and water in a 1000 °C furnace over Cu/Ni/Pt. The water was removed by Nafion membrane separation. Repeated analyses of standards indicate that the reproducibility of $\delta^{13}\text{C}$ values is better than 1 ‰ PDB (2 sigma).

Carbon isotope analysis of low concentration methane using the Precon.

The carbon isotopic composition of methane was determined by a Precon-IRMS system. Aliquots were sampled with a GCPal autosampler. CO₂, CO and water were removed on chemical traps. Other hydrocarbons than CH₄ and remaining traces of CO₂ were removed by cryotrapping. The methane was burnt to CO₂ and water in a 1000 °C furnace over Cu/Ni/Pt. The water was removed by Nafion membrane separation. The sample preparation system described (Precon) was connected to a Delta plus XP IRMS for $\delta^{13}\text{C}$ analysis. Repeated analyses of standards indicate that the reproducibility of $\delta^{13}\text{C}$ values is better than 1 ‰ PDB (2 sigma).

Hydrogen isotope analysis of methane

The hydrogen isotopic composition of methane was determined by a GC-C-IRMS system. Aliquots were sampled with a GCPal and analysed on a Trace GC2000, equipped with a Poraplot Q column, connected to a Delta plus XP IRMS. The components were decomposed to H₂ and coke in a 1400 °C furnace. The international standard NGS-2 and an in-house standard (Std A) were used for testing accuracy and precision. The “true” value of NGS-2 is given to -172.5 ‰ V-SMOW (<http://deuterium.nist.gov/standards.html>). Repeated analyses of standards indicate that the reproducibility of δD values is better than 10 ‰ PDB (2 sigma).