

Geochemistry Data Report –
Mud Gas Analysis Well 6305/9-2
(Dovregubben)


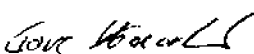


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Table 1. Number of analyses performed

Analysis	Gas	Total
Gas composition	37	37
Stable isotopes of gas	11	11



Table 2. Gas Composition (volume-%)

Well	Sample type	Lower Depth (m)	APT ID	C1 (%THCG)	C2 (%THCG)	C2= (%THCG)	C3 (%THCG)	C3= (%THCG)	iC4 (%THCG)	nC4 (%THCG)	iC5 (%THCG)	nC5 (%THCG)	C6+ (%THCG)	C02 (%THCG)	ppm THCG	N2 (%Total)	O2+Ar (%Total)	ppm Total	C1-nC4 (%THCG)	C2-nC4 (%THCG)
6305/9-2	Mud gas	485	81663	88.3	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	11.7	7999	77.9	21.3	995306	88.3	0.0000
6305/9-2	Mud gas	577	81664	92.1	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	7.87	14605	77.7	20.8	994767	92.1	0.0000
6305/9-2	Mud gas	633	81665	91.4	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	8.64	17820	77.9	20.4	995023	91.4	0.0000
6305/9-2	Mud gas	648	81666	89.4	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	10.6	21947	78.0	19.8	995510	89.4	0.0000
6305/9-2	Mud gas	649	81667	92.8	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	7.22	23080	77.5	20.1	995543	92.8	0.0000
6305/9-2	Mud gas	700	81668	90.7	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	9.30	11579	77.4	21.5	995239	90.7	0.0000
6305/9-2	Mud gas	750	81669	93.3	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	6.70	17077	77.0	21.2	995641	93.3	0.0000
6305/9-2	Mud gas	800	81670	91.2	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	8.79	13906	77.2	21.4	995312	91.2	0.0000
6305/9-2	Mud gas	850	81671	91.5	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	8.53	15395	77.1	21.4	994274	91.5	0.0000
6305/9-2	Mud gas	904	81672	91.4	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	8.65	15941	77.2	21.2	995752	91.4	0.0000
6305/9-2	Mud gas	950	81673	80.7	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	19.3	8258	77.5	21.6	995694	80.7	0.0000
6305/9-2	Mud gas	1000	81674	83.3	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	16.7	11233	77.5	21.3	995906	83.3	0.0000
6305/9-2	Mud gas	1050	81675	75.1	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	24.9	7767	77.9	21.3	995336	75.1	0.0000
6305/9-2	Mud gas	1100	81676	87.4	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	12.6	9030	77.8	21.3	996021	87.4	0.0000
6305/9-2	Mud gas	1150	81677	88.3	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	11.7	7484	78.0	21.3	996041	88.3	0.0000
6305/9-2	Mud gas	1200	81678	86.8	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	13.2	8111	78.0	21.2	995847	86.8	0.0000
6305/9-2	Mud gas	1250	81679	89.2	0.077	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	10.7	11587	77.7	21.2	995466	89.3	0.077
6305/9-2	Mud gas	1419	81680	98.9	0.15	0.0000	0.043	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.88	16332	77.4	21.0	995594	99.1	0.20
6305/9-2	Mud gas	1621	81681	97.7	0.15	0.0000	0.040	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	2.09	30171	76.3	20.7	995379	97.9	0.18
6305/9-2	Mud gas	2770	81682	68.2	0.60	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	31.2	2147	78.3	21.5	995968	68.8	0.60
6305/9-2	Mud gas	2790	81683	74.0	0.64	0.0000	0.26	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	25.1	2323	78.4	21.4	995168	74.9	0.90
6305/9-2	Mud gas	2810	81684	71.7	0.70	0.0000	0.28	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	27.3	2130	78.3	21.5	994402	72.7	0.98
6305/9-2	Mud gas	2830	81685	24.3	0.23	0.0000	0.13	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	75.3	4768	78.2	21.3	994739	24.7	0.35
6305/9-2	Mud gas	2850	81686	26.7	0.33	0.0000	0.18	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	72.7	3282	78.2	21.4	995102	27.3	0.52
6305/9-2	Mud gas	2870	81687	53.1	0.82	0.0000	0.49	0.0000	0.19	0.19	0.082	0.0000	0.0000	45.1	3625	78.1	21.5	994559	54.8	1.70
6305/9-2	Mud gas	2890	81688	44.8	0.74	0.0000	0.55	0.0000	0.26	0.22	0.13	0.0000	0.0000	53.3	3098	78.2	21.5	994946	46.6	1.77
6305/9-2	Mud gas	2898	81689	21.2	0.45	0.0000	0.45	0.0000	0.27	0.27	0.18	0.0000	0.0000	77.1	2189	78.3	21.5	993494	22.7	1.45
6305/9-2	Mud gas	2903	81690	29.5	0.58	0.0000	0.49	0.0000	0.27	0.31	0.18	0.13	0.0000	68.5	2243	78.3	21.5	994898	31.2	1.64



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Well	Sample type	Lower Depth (m)	APT ID	C1 (%THCG)	C2 (%THCG)	C2= (%THCG)	C3 (%THCG)	C3= (%THCG)	iC4 (%THCG)	nC4 (%THCG)	iC5 (%THCG)	nC5 (%THCG)	C6+ (%THCG)	C02 (%THCG)	ppm THCG	N2 (%Total)	O2+Ar (%Total)	ppm Total	C1-nC4 (%THCG)	C2-nC4 (%THCG)
6305/9-2	Mud gas	2910	81691	50.2	0.76	0.0000	0.52	0.0000	0.27	0.24	0.15	0.091	0.0000	47.7	3278	78.2	21.4	994545	52.0	1.79
6305/9-2	Mud gas	2930	81692	40.1	0.60	0.0000	0.43	0.0000	0.27	0.27	0.22	0.16	0.0000	57.9	1833	78.7	21.2	994636	41.7	1.57
6305/9-2	Mud gas	2950	81693	40.8	0.77	0.0000	0.60	0.0000	0.30	0.30	0.26	0.17	0.34	56.5	2334	78.4	21.3	994504	42.7	1.96
6305/9-2	Mud gas	2970	81694	26.9	0.52	0.0000	0.52	0.0000	0.36	0.26	0.31	0.26	0.0000	70.9	1920	78.4	21.4	993930	28.5	1.66
6305/9-2	Mud gas	2990	81695	23.6	0.41	0.0000	0.35	0.0000	0.0000	0.0000	0.24	0.0000	0.41	75.0	1687	78.5	21.3	993500	24.4	0.77
6305/9-2	Mud gas	3010	81696	22.8	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	77.2	1438	78.6	21.2	993683	22.8	0.0000
6305/9-2	Mud gas	3030	81697	25.7	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	74.3	1293	78.6	21.3	993927	25.7	0.0000
6305/9-2	Mud gas	3050	81698	30.8	0.57	0.0000	0.43	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	68.2	1402	78.6	21.2	993850	31.8	0.99
6305/9-2	Mud gas	3070	81699	34.6	0.77	0.0000	0.51	0.0000	0.0000	0.19	0.0000	0.0000	0.0000	64.0	1545	78.8	21.1	994006	36.0	1.48



Table 2. continued, Gas Composition (volume-%)

Well	Sample type	Lower Depth (m)	APT ID	C5+ (%THCG)	Wetness	iC4/nC4
6305/9-2	Mud gas	485	81663	0.0000	0.0000	
6305/9-2	Mud gas	577	81664	0.0000	0.0000	
6305/9-2	Mud gas	633	81665	0.0000	0.0000	
6305/9-2	Mud gas	648	81666	0.0000	0.0000	
6305/9-2	Mud gas	649	81667	0.0000	0.0000	
6305/9-2	Mud gas	700	81668	0.0000	0.0000	
6305/9-2	Mud gas	750	81669	0.0000	0.0000	
6305/9-2	Mud gas	800	81670	0.0000	0.0000	
6305/9-2	Mud gas	850	81671	0.0000	0.0000	
6305/9-2	Mud gas	904	81672	0.0000	0.0000	
6305/9-2	Mud gas	950	81673	0.0000	0.0000	
6305/9-2	Mud gas	1000	81674	0.0000	0.0000	
6305/9-2	Mud gas	1050	81675	0.0000	0.0000	
6305/9-2	Mud gas	1100	81676	0.0000	0.0000	
6305/9-2	Mud gas	1150	81677	0.0000	0.0000	
6305/9-2	Mud gas	1200	81678	0.0000	0.0000	
6305/9-2	Mud gas	1250	81679	0.0000	0.087	
6305/9-2	Mud gas	1419	81680	0.0000	0.20	
6305/9-2	Mud gas	1621	81681	0.0000	0.19	
6305/9-2	Mud gas	2770	81682	0.0000	0.88	
6305/9-2	Mud gas	2790	81683	0.0000	1.20	
6305/9-2	Mud gas	2810	81684	0.0000	1.35	
6305/9-2	Mud gas	2830	81685	0.0000	1.44	
6305/9-2	Mud gas	2850	81686	0.0000	1.89	
6305/9-2	Mud gas	2870	81687	0.082	3.10	1.00
6305/9-2	Mud gas	2890	81688	0.13	3.79	1.14
6305/9-2	Mud gas	2898	81689	0.18	6.40	1.00
6305/9-2	Mud gas	2903	81690	0.31	5.26	0.86
6305/9-2	Mud gas	2910	81691	0.24	3.44	1.13



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Well	Sample type	Lower Depth (m)	APT ID	C5+ (%THCG)	Wetness	iC4/nC4
6305/9-2	Mud gas	2930	81692	0.38	3.78	1.00
6305/9-2	Mud gas	2950	81693	0.77	4.59	1.00
6305/9-2	Mud gas	2970	81694	0.57	5.81	1.40
6305/9-2	Mud gas	2990	81695	0.65	3.14	
6305/9-2	Mud gas	3010	81696	0.0000	0.0000	
6305/9-2	Mud gas	3030	81697	0.0000	0.0000	
6305/9-2	Mud gas	3050	81698	0.0000	3.13	
6305/9-2	Mud gas	3070	81699	0.0000	4.11	

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

Well	Sample type	Lower Depth (m)	APT ID	C1 $\delta^{13}\text{C}$	C2 $\delta^{13}\text{C}$	C3 $\delta^{13}\text{C}$	i-C4 $\delta^{13}\text{C}$	n-C4 $\delta^{13}\text{C}$	i-C5 $\delta^{13}\text{C}$	n-C5 $\delta^{13}\text{C}$	CO2 $\delta^{13}\text{C}$	C1 δD
6305/9-2	Mud gas	649	81667	-74.1	nd	nd	nd	nd	nd	nd	-23.1	-219.0
6305/9-2	Mud gas	750	81669	-73.7	nd	nd	nd	nd	nd	nd	-17.5	-213.0
6305/9-2	Mud gas	904	81672	-74.3	nd	nd	nd	nd	nd	nd	-15.9	-217.0
6305/9-2	Mud gas	1000	81674	-73.5	nd	nd	nd	nd	nd	nd	-24.2	-211.0
6305/9-2	Mud gas	1250	81679	-75.9	nd	nd	nd	nd	nd	nd	-17.0	-214.0
6305/9-2	Mud gas	1419	81680	-72.2	-51.0	nd	nd	nd	nd	nd	-15.1	-219.0
6305/9-2	Mud gas	1621	81681	-68.9	-55.7	-33.4	nd	nd	nd	nd	-16.8	-204.0
6305/9-2	Mud gas	2790	81683	-60.1	nd	nd	nd	nd	nd	nd	-15.2	-207.0
6305/9-2	Mud gas	2870	81687	-58.7	-42.2	-34.5	nd	nd	nd	nd	-15.3	-204.0
6305/9-2	Mud gas	2910	81691	-57.7	-41.3	-34.2	-31.5	-29.5	nd	nd	-15.8	-197.0
6305/9-2	Mud gas	2950	81693	-56.7	-40.1	-34.7	nd	nd	nd	nd	-15.6	-202.0

Experimental Procedures

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

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 Agilent 7890 RGA GC equipped with Molsieve and Poraplot Q columns, a flame ionisation detector (FID) and 2 thermal conductivity detector (TCD). Hydrocarbons were measured by FID. H₂, CO₂, N₂ and O₂/Ar 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).

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).