

Table 4-8 MDT pressure summary, Run 2A, pretests and water sampling.

Test No	Formation	Depth mTVD RKB	Depth mMSL	Hydro pressure before (Bar)	Hydro pressure after (Bar)	Formation Pressure (Bar)	Gradient g/cm ³	Temp (°C)	Mobility mD/cp	Comments
1	Snadd	2759.5	2736.5	351.200	351.30			81.0		Tight
2	Snadd	2715.6	2692.6	345.54	345.64			81.0		Tight
3	Snadd	2646.5	2623.5	336.95	336.97			80.3		Tight
4	Snadd	2644.7	2621.7	336.70	336.70			80.1		Tight
5	Snadd	2581.7	2558.7	328.70	328.90			79.8		Tight
6	Snadd	2541.8	2518.8	323.72	323.77			79.1	0.2	Tight
7	Snadd	2532.7	2509.7	322.56	322.6			78.3	0.2	Tight
8	Snadd	2532.9	2509.9	322.63	322.60	275.16	1.107	77.5	1.2	Good
9	Snadd	2527.8	2504.8	321.92	321.96			77.5		Tight - seal leaking
10	Snadd	2525.8	2502.8	321.67	321.69			77.5		Tight
11	Snadd	2525.7	2502.7	321.67	321.69			77.4	0.5	Tight
12	Snadd	2466.8	2443.8	314.24	314.24	277.486	1.147	76.7	0.2	Stable but supercharged.
13	Snadd	2452.1	2429.1	312.28	312.40	268.489	1.116	75.4	0.7	Not stable
14	Snadd	2452.1	2429.1	312.34	312.39	268.36	1.116	75.1	0.7	Not stable
15	Snadd	2449.8	2426.8	312.09	312.11			75.1		Tight/supercharged
16	Snadd	2448.3	2425.3	311.89	311.94			75.2	0.4	Supercharged
17	Snadd	2397.1	2374.1	305.50	305.56			74.1		Tight/supercharged
18	Snadd	2395.7	2372.7	305.37	305.39			73.6		Tight/supercharged
19	Snadd	2393.1	2370.1	305.05	305.11	262.50	1.118	73.2		Not stable
20	Snadd	2393.0	2370.0	305.07	305.13	262.80	1.119	73.3	0.5	Good
21	Snadd	2220.1	2197.1	283.27	283.46			71.5		Tight
22	Snadd	2206.6	2183.6	281.638	281.74			70.5		Tight
23	Snadd	2228.7	2205.7	284.55	284.58			70.1		Tight
24	Fruholmen	2154.9	2131.9	275.175	275.27	236.01	1.116	69.6	43.5	Good
25	Fruholmen	2135.9	2112.9	272.8	272.88	233.92	1.116	69.5	562.4	Good
26	Fruholmen	2126.8	2103.8	271.7	271.73	232.97	1.117	69.3		Good
27	Tubåen	2108.0	2085.0	269.3	269.37	230.93	1.117	69	275.9	Good
28	Stø	2087.4	2064.4	266.719	266.77	228.68	1.117	68.7	1546.7	Good
29	Stø	2080.5	2057.5	265.881	265.90	227.94	1.117	68.4	1887.9	Good
30	Stø	2073.8	2050.8	264.997	265.05	227.22	1.117	68.3	208.3	Good
31	Stø	2066.9	2043.9	264.132	264.18	226.48	1.117	68.2	915.9	Good
32	Stø	2061.9	2038.9	263.497	263.54	225.95	1.117	68.1	1062.1	Good
33	Stø	2060.2	2037.2	263.294	263.33	225.76	1.117	67.9	239.3	Good
34	Stø	2057.4	2034.4	262.945	262.98	225.46	1.117	67.8	316.8	Good
35	Stø	2054.9	2031.9	262.616	262.65	225.45	1.118	67.5	5.8	Good
36	Stø	2051.0	2028.0	262.124	262.12	224.83	1.117	67.4	8.6	Good
37	Stø	2049.9	2026.9	261.962	261.99	224.72	1.117	67.2	15.4	Good
38	Stø	2054.9	2031.9	262.66	262.61	225.44	1.118	67.2	6	Good
39	Stø	2052.1	2029.1	262.204	262.24	225.02	1.118	67.3	1.8	Good
40	Snadd	2695.2	2672.2	343.473	288.855	288.87	1.093	77.6	0.6	Unstable pressure.
41	Stø	2049.9	2026.9	261.84	261.855	224.68	1.117	69.6	13.3	Water sample with single probe. Approx. 47% contamination.

Table 4-9 MDT dual packer pressure summary, Run 2B, pretests before sampling.

Test No	Formation	Depth mTVD RKB	Depth mMSL	Hydro pressure before (Bar)	Hydro pressure after (Bar)	Formation Pressure (Bar)	Gradient g/cm ³	Temp (°C)	Mobility mD/cp	Comments
1	Snadd	2393.2	2370.2	304.81	304	262.79	1.12	75	0.2	Pretest, sampling. HC sample taken with dual packer. Good sample
2	Snadd	2452.2	2429.2	312.76	312.57	266.4	1.11	77.9	-	Pretest, sampling. HC sample taken with dual packer. Good sample

Table 4-10 MDT dual packer pressure summary, Run 2C, pretests and water sampling.

Test No	Formation	Depth mTVD RKB	Depth mMSL	Hydro pressure before (Bar)	Hydro pressure after (Bar)	Formation Pressure (Bar)	Gradient g/cm ³	Temp (°C)	Mobility mD/cp	Comments
1	Snadd	2533.2	2510.2	322.62	-	275.17	1.11	82	1.5	Sampling point, no pretest. Hc sample taken with dual packer. Good sample
2	Snadd	2695.2	2672.2	340.3	-	286.7	1.08	88	0.8	Sampling point, no pretest. Water sample taken with dual packer. High contamination, approximately 50%.
3	Kobbe	3026.7	3003.7	384.7	384.384	-	-	95.2	-	Tight
4	Kobbe	3031.6	3008.6	385.102	384.916	-	-	96.8	-	Tight
5	Kobbe	3032.7	3009.7	385.088	385.003	-	-	97.2	-	Tight
6	Kobbe	3033.6	3010.6	385.162	385.125	-	-	97.5	-	Tight
7	Kobbe	3037.1	3014.1	385.647	385.661	-	-	97.8	-	Tight

4.9 Reservoir fluid sampling

Fluid samples were collected in both the Stø and the Snadd Formations. Two levels of water sampling, one in the Stø Formation and one in the Snadd Formation. Tritium was used as tracer. The water sample in the Stø Formation was collected with a single probe. Due to very tight sandstones in the Triassic Formations, it was decided to use dual packer instead of probe to collect the water fluid sample here. All water samples were highly contaminated.

Gas samples were taken with dual packer in Snadd Formation at 2393.4 mTVD RKB, 2452.4 mTVD RKB and 2533.4 mTVD RKB. A long clean up period was necessary due to the low permeability below 1 mD. The gas samples are of good quality and it seems to be a dry gas with a high content of Methane approximately 90%. See Appendix G for reports regarding analysis of HC samples

Table 4-11 Samples collected from Run 2A

Sample depth	Run No	Bottle number	Chamber	Dead volume	Draw down	Formation Pressure	Temp.	Pump Volume	Opening Pressure	Transfer bottle nr
m MD		Schlumberger	Volume	cc	Bar	Bar	°C	Litres	Bar @ 15°C	Petrotech
2049.9	2A	MRMS-758	420 cc	13.9	82	224.679	59.6	35	64	PT-2146
2049.9	2A	MRMS-610	420 cc	10.9	83	224.679	59.6	39	60	PT-2118
2049.9	2A	MRMC-166	1 G	30.45	82	224.679	59.6	43	145	TS-46703

Table 4-12 Samples collected from Run 2B

Sample depth	Run No	Bottle number	Chamber	Dead volume	Draw down	Formation Pressure	Temp.	Pump Volume	Opening Pressure	Transfer bottle nr
m MD		Schlumberger	Volume	cc	Bar	Bar	°C	Litres	Bar @ 15°C	Petrotech
2393.2	2B	MRMS-770	450 cc	12.5	13	262.79	73	47	265	PT-2138
2393.2	2B	MRSC-228	2 ¾ G	30.45	23	262.79	74.4	83	300	PT-4000 PT-4006 PT-4005
2393.2	2B	MRSC-172	1 G	30.45	11	262.79	74.9	117	n/a	-
2393.2	2B	MRMS-719	450 cc	10.2	14	262.79	74.9	179	306	TS-37504
2393.2	2B	MRMS-768	450 cc	7.2	14	262.79	75	193	294	PT-2121
2452.2	2B	MFMS-779	450 cc	12	4	268.36	78.0	62	244	TS-43805
2452.2	2B	MRMS-855	450 cc	10.3	6.9	268.36	78.2	90	280	PT-2113
2452.2	2B	MRMS-710	450 cc	11.1	9.8	268.36	78.3	101	282	PT-1079
2452.2	2B	MRSC-100	2 ¾ G	30.45	16	268.36	78.4	117	280	PT-4002 TS-52002 TS-52104

Table 4-13 Samples collected from Run 2C

Sample depth	Run No	Bottle number	Chamber	Dead volume	Draw down	Formation Pressure	Temp.	Pump Volume	Opening Pressure	Transfer bottle nr
m MD		Schlumberger	Volume	cc	Bar	Bar	°C	Litres	Bar @ 15°C	Petrotech
2533.2	2C	MPSR - 970	450cc	12.5	75	275.15	82	50	n/a	-
2533.2	2C	MPSR -2516	450cc	12	75	275.15	82	54.8	60	PT-3165
2533.2	2C	MRSC - 170	1 G	30.45	83	275.15	82.1	67.3	225	TS-47401
2533.2	2C	MPSR - 969	450cc	7.2	84	275.15	82.3	74.3	246	PT-5118
2695.2	2C	MPSR - 756	450cc	10.2	80	278.5	88.4	69.3	37	PT-2134
2695.2	2C	MRSC - 189	1 G	30.45	80	278.5	88.4	76.3	40	TS-47503



5.9.5 Drilling fluids data

Table 5-2 Summary of drilling fluids programme

DRILLING FLUIDS SUMMARY - END OF WELL																						
Well:		7122/6-2																				
Field:		Tornerose																				
Rig:		Polar Pioneer																				
HOLE SIZE	TVD MD	CASING/LINER SIZE		MUD TYPE	MW [SG]	LGS [KG/m ³]	10 sec. [Pa]	10 min. [Pa]	Fann 100 rpm	Fann 3 rpm	Sulphate mg/l	PV [mPa]	API FL [ml]	HTHP FL [ml]	MBT [KG/m ³]	pH	KCl [KG/m ³]	Glyc. [%]	ES	Funnel Visc. [%]	Usage Volume [m ³]	
		SIZE	TVD MD																			
36"	482 482	30"	479 479	SW/ Bentonite Spec #1	1.03 - 1.45											9					>200	472
<p>Cleaned hole with hi-vis bentonite pills as required. Displaced hole at TD to 1,35 sg bentonite mud by 1,5 times hole volume. Wipertrip 1: Displaced hole at TD to 1,45 sg bentonite mud by 1,8 times hole volume. Wipertrip 2: Displaced hole at TD to 1,45 sg bentonite mud by 1,8 times hole volume. The use of high viscous Bentonite/CMC EHV sweeps to clean the hole, worked satisfactorily for this section.</p>																						
17 1/2"	1104 1104	13 3/8"	1098 1098	Bentonite Spec #1 Sildril (displ. fluid)	1.03 - 1.35											8 - 10					80 - 110	959
<p>Sweeps performed well. A total of 785 m³ Bentonite/CMC mud was used in this section. 130 m³ 1,30 sg Sildril mud was received from shore to be used as Kill/Displacement mud. Diluted Sildril Kill fluid to a total of 174 m³ 1,35 sg prior to displace the open hole. The Sildril mud was charged off as spec. # 17.</p>																						
12 1/4"	2044 2044	9 5/8"	2043 2043	Glydrl Spec #74	1.25 - 1.30	23 - 99	3 - 5	4 - 7.5		4 - 8	100 - 125	19 - 24	2.5 - 3.8		0 - 14	8.5 - 10.3	150 - 170	4				346
<p>The 99% KCl Glydrl mud was mixed new on the rig, due to required low sulphate content in the mud (<200 mg/ltr) when performing logging in the 8 1/2" section. It was decided to use this system from 12 1/4" due to logistic limitations. Premix additions maintained a low solids mud with good inhibition. The top screens should be dressed with 10 mesh. The flow rate and volume of cuttings means that finer mesh top screens blind, causing mud losses. It is recommended to dress the shakers with 10 mesh top screens for future wells. This will prevent losses over the shakers.</p>																						
8 1/2" & P&A	3070 3070			Glydrl Spec #74	1.28 - 1.19	41 - 119	3.5 - 5	4.5 - 7.5		6 - 8	167 - 195	17 - 22	3 - 4		11 - 14	8 - 9	155 - 168	3 - 4				145
<p>The fluid from the previous section was carried over. The fluid properties were maintained by adding premix to the active. Overall, the mud properties proved to be remarkable stable and only small adjustments were needed to maintain rheology and other parameters. Because of pit leakage Active 2 was used as active. Mud was taken out of the active pit and transferred to Reserve pits. The centrifuge was then used to reduce the mud weight before it was bled back into active to maintain weight. Pretreated the mud system C. Acid and S. Bicarbonate before displacing the cement plugs. The usage of mud is for both 8 1/2" (69 m³) and P&A (76 m³) section.</p>																						