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5.5.4 Sampling

The modular dynamic tester was run to sample HC in the Tarbert Fm. It proved difficult to establish seal and to achieve required mobility for sampling. Finally, the sampling was utilized at 7101.5 m MD RKB / 4196 m TVD MSL (corrected for stretch in drill pipe) in the lower part of the Tarbert Fm after cleaning up for 6 hrs. Formation pressure was 790.7 bar, formation temperature was 156.8°C and the mobility was 14.6 mD/cP.

Three samples chambers were filled after pumping 21, 110 and 120 liters. No obvious clean-up could be detected by the down-hole fluid-analyzers.

Table 5.5-1 Fluid fractions of the three MDT chambers sampled at 7101.5 m MD.

Chamber no	Opening press. Bar	Content, ml			Density, kg/m ³	
		Mud filtrate	Formation water	Oil	Water	Oil
MPSR 786	30	ca. 235	Ca. 165	-	1601.6	-
MPSR 929	95	Ca. 87	Ca. 313	-	1254.4	-
MPSR 166	30	Ca. 72	Ca. 318	10	1226.1	819.1


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Table 5.3 Listing of all pre-tests and formation pressure points acquired in well 34/11-5 S.

Run no. IA	Well: 34/11-5 S Date: 03-07.06.2006 Rig: Kvitebjørn RKB: 60.5 m.								PORE PRESSURE (s.g ref. RKB) = 10.195*FORM. PRESSURE / mTVD RKB			
	Test No.	DEPTH m RKB		FORM. PRESSURE (bar)	HYDROSTATIC PRESSURE (bar)		TEMP (°C)	SEAL (Y/N)	REMARKS (Pressure gauge Id.)	MOBILITY (mD/cP)	PORE PRESS (g/cm ³)	HYDROSTATIC PRESSURE (g/cm ³)
		MD	TVD		Before	After						
1	7088	4245.8	-	831.35	831.63	150.6	N	No seal. Set probe twice	-	-	1.996	
2	7092	4248	-	832.46	832.74	151.2	N	No seal. Set probe twice	-	-	1.998	
3	7095	4249.8	806.916	833.93		151.8	Y	Supercharged		1.936	2.001	
6	7100.3	4252.7	791.468	834.38	834.1	152	Y	Guard probe; Supercharged	1.1	1.897	2.000	
7	7101.5	4253.5	790.669	834.37		152.1	Y	Guard probe; Good	8.6	1.895	2.000	
8	7089	4246.7	790.924	832.08	830.01	152	Y	Guard probe; Not stabilized	1	1.899	1.998	
9	7091	4247.4	801	832.7	831.1	152.1	Y	Guard probe; Supercharged	-		1.999	
10	7102	4253.9	790.841	834.2	-	152	Y	Guard probe; Good	1.6	1.895	1.999	
11	7096.7	4250.7	792.032	834.18	-	152	Y	Supercharged	0.4	1.900	2.001	
12	7098.7	4251.9	-	834.31	-	152.6	Y	Tight. Long time to stabilize			2.000	
13	7100.7	4253	-	834.193	-	152.5	Y	Tight. Aborted	-		2.000	
14	7101.8	4253.7	790.864	834.436	-	152.5	Y	Good. Start to clean up.	2.1	1.895	2.000	

Comments: If no comment the large diameter probe used. Comparison of Hydrostatic pressure from guard probe and large diameter probe verifies. Test no 14; Lost communication with tool string after pumping for 1.5 hrs. Unlatch - pull cable and locomotive to surface for trouble shooting

Total number of tests: 14	No. Successful tests: 8	No. Fluid samples: 0
Hydrostatic gradient to surface: 1.999 g/cm ³		
Hydrostatic gradient in logged interval: 2.00 g/cm ³ (Brent)		
Minimum measured pore pressure (ref. RKB): 1.899 g/cm ³		
Maximum measured pore pressure (ref. RKB): 1.895 g/cm ³		

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Comments: Depths rounded off to one decimal

Datum Kvitebjørn Brent (Initial Pressure): 770.5 bars at 4000 m TVD MSL. Water gradient = 0.101 bar/m. Gas gradient = 0.0374 bar/m i.e. rgas = 0.381 g/cm³ at res. conditions.
 Datum Valemon Brent (Initial pressure): 793 bar at 4100 m TVD MSL. Water gradient = 0.101 bar/m. Gas gradient ~0.035 bar/m. i.e. rgas ~ 0.355 g/cm³ at res. conditions.

Run no.: IB	Well: 34/11-5 S Date: 09-11.06.2006 Rig: Kvitebjørn RKB: 60.5 m.							PORE PRESSURE (s.g.ref RKB) = 10.195*FORM PRESSURE / mTVD RKB			
Test No.	DEPTH m RKB		FORM PRESSURE (bar)	HYDROSTATIC PRESSURE (bar)		TEMP. (°C)	SEAL (Y/N)	REMARKS (Pressure gauge Id.)	MOBILITY (mD/cP)	PORE PRESS. (g/cm ³)	HYDROSTATIC PRESSURE (g/cm ³)
	MD	TVD		Before	After						
1	7089	4246.3	791.117	831.661	831.38	152.1	Y	Good	1.4	1.899	1.997
2	7093			832.01	831.35	152.8	N	No seal. Set probe twice			
3	7101.5	4253.5	790.703	833.8		156.8	Y	Good. Sampling 3 x 450cc bottles	14.6	1.895	1.998
4	7171.5			839			N				
5	7172.5			841.1			N				
6	7173.5			840.87			N				
7	7176			841.69			N				
8	7198	4311.5	799.29	844.149	842.495	156.5	Y		4.5	1.890	1.996
9	7214			845.93			N				
10	7215			843.16			N				
11	7227			847.33			N				
12	7228			847.64			Y	Tight - aborted			
13	7162			842.53		145.5	N	No seal			
14	7163			841.81		145.6	N	No seal. set probe twice			
15	7164			842.36		146.1	N	No seal			
16	7173			842.7			N	No seal. Quick Silver probe			

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Run no. IB	Well: 34/11-5 S Date: 09-11.06.2006 Rig: Kvitebjørn RKB: 60.5 m.							PORE PRESSURE (s.g.ref. RKB) = 10.195*FORM. PRESSURE / mTVD RKB			
Test No.	DEPTH m RKB		FORM PRESSURE (bar)	HYDROSTATIC PRESSURE (bar)		TEMP (°C)	SEAL (Y/N)	REMARKS (Pressure gauge Id.)	MOBILITY (mD/cP)	PORE PRESS. (g/cm ³)	HYDROSTATIC PRESSURE (g/cm ³)
	MD	TVD		Before	After						
17	7173			842.1		146.8	N	No seal			
18	7176			843.16		147.5	N	No seal			
19	7178			845.9		147.9	N	No seal			
20	7196.5			843.8		148.4	N	No seal			
21	7198						N	No seal. Quick Silver probe			
22	7197			842.3			N	No seal. Quick Silver probe			
23	7228			848.1	847.4		N	Lost seal. Reset probe. QS			
24	7228						N	Lost seal. Tight, aborted			
25	7223						N	Lost seal. Tight, aborted. QS probe			
26	7198	4311.5	799.45	845.43		152.3	Y	Good. QS probe	0.2	1.890	1.999
27	7198			845.75		152.8	N	No seal (tried with sec probe)			
28	7196			844		152.9	N	No seal			
29	7214			847.3			N	Lost seal. QS probe			
30	7226			848.7			N	Lost seal. QS probe			
31	7127			839.2		150.7	N	No seal			
32	7124			838.5		149.7	N	No seal			
33	7127			834.7			N	Lost seal. QS probe			

Comments: If no comment the large diameter probe used. Comparison of Hydrostatic pressure from guard probe and large diameter probe verifies. Test no 14; Lost communication with tool string after pumping for 1.5 hrs. Unlatch - pull cable and locomotive to surface for trouble shooting

Total number of tests: 33	No. Successful tests: 4	No. Fluid samples: 1 (3x450 cc bottles)
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Test No.	DEPTH m RKB		FORM PRESSURE (bar)	HYDROSTATIC PRESSURE (bar)		TEMP (°C)	SEAL (Y/N)	REMARKS (Pressure gauge Id.)	MOBILITY (mD/cP)	PORE PRESS. (g/cm ³)	HYDROSTATIC PRESSURE (g/cm ³)
	MD	TVD		Before	After						
Hydrostatic gradient to surface: 1.999 g/cm ³											
Hydrostatic gradient in logged interval: 2.02 g/cm ³ (Brent)											
Minimum measured pore pressure (ref. RKB): 1.890 g/cm ³											
Maximum measured pore pressure (ref. RKB): 1.899 g/cm ³											
Comments: Depths rounded off to one decimal											
Datum Kvitebjørn Brent (Initial Pressure): 770.5 bars at 4000 m TVD MSL. Water gradient = 0.101 bar/m. Gas gradient = 0.0374 bar/m i.e. $\rho_{gas} = 0.381$ g/cm ³ at res. conditions.											
Datum Valemon Brent (Initial pressure): 793 bar at 4100 m TVD MSL. Water gradient = 0.101 bar/m. Gas gradient ~0.035 bar/m. i.e. $\rho_{gas} \sim 0.355$ g/cm ³ at res. conditions.											

Run no. Stethoscope	Well: 34/11-5 S Date: 15-16.06.2006 Rig: Kvitebjørn RKB: 60.5 m.						PORE PRESSURE (s.g.ref. RKB) = 10.195*FORM. PRESSURE / mTVD RKB				
Test No.	DEPTH m RKB		FORM PRESSURE (bar)	DYNAMIC PRESSURE (bar)		TEMP (°C)	SEAL (Y/N)	REMARKS (Pressure gauge Id.)	MOBILITY (mD/cP)	PORE PRESS. (g/cm ³)	DYNAMIC PRESSURE (g/cm ³)
	MD	TVD		Before	After						
1	7303	4379.2	810.83	869.64	869.57	136	Y	Good	1.3	1.888	2.025
2	7298	4375.8	808.55	869.02	869.09	135	Y	Good	7.6	1.884	2.025
3	7293	4372.5		868.4		135	N	Lost seal			2.025
4	7294	4373.2		868.19	868.19	134	N	Lost sela			2.024
5	7303	4379.2						Pumps off test. no test taken?			0.000
6	7303	4379.2	810.14				Y	Good. Pumps off test		1.886	0.000
7	7298	4375.8	808.35	868.74	871.23	134	Y	C-test. Good	6.2	1.883	2.024
8	7298	4375.8				134		Pumps off test. Sent same values as test #7 – no test taken?			

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Test No.	DEPTH m RKB		FORM. PRESSURE (bar)	DYNAMIC PRESSURE (bar)		TEMP. (°C)	SEAL (Y/N)	REMARKS (Pressure gauge Id.)	MOBILITY (mD/cP)	PORE PRESS. (g/cm ³)	DYNAMIC PRESSURE (g/cm ³)
	MD	TVD		Before	After						
9	7294.5	4373.5		868.06	874.05	134	N	Poor seal? Test not stabilizing			2.024
10	7292.5	4372.2		868.3	869.85	133	Y	Tight. not stabilized			2.025
11	7292.5	4372.2		865.64		133	N	A-test. No drawdown			2.018
12	7293	4372.5	827.3	865.99		132	Y	A-test. Supercharged?		1.929	2.019
13	7249	4343.7	803.45	863.16	863.09	132	Y	Good	0.8	1.886	2.026
14	7228	4330.3		860.4		132	Y	Tight. slow build up - not stabilized			2.026
15	7227	4329.6	808.9	860.06	859.99	132	Y	Good. Supercharged?	0.7	1.905	2.025
16	7227	4329.2				132		Pumps off test. Sent same values as test #15- no test taken?			
17	7227	4329.6				132		Pumps off test. Sent same values as test #15- no test taken?			
18	7216	4321.4		858.2	858.5	132	N	No seal			2.025
19	7198	4311.4	799.8	856.33	856.27	132	Y	Good	1.1	1.891	2.025
20	7175.5	4297.5		853.7	853.65	131	N	Lost seal			2.025
21	7175.5	4297.5		853.78		131	N	No seal			2.025
22	7162	4289.3		852.4	852.54	131	Y	Tight			2.026
23	7163	4289.9		852.89		131	Y	Tight			2.027
24	7103.5	4254.6	795.5	845.79	845.65	130	Y	Supercharged? No mobility sent up		1.906	2.027
25	7103.5	4254.6	794.2	845.72	846.75	129	Y	Good	1.2	1.903	2.027
26	7101.5	4253.4	791.8	845.37	845.44	129	Y	Good	2.7	1.898	2.026

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Test No.	DEPTH m RKB		FORM. PRESSURE (bar)	DYNAMIC PRESSURE (bar)		TEMP. (°C)	SEAL (Y/N)	REMARKS (Pressure gauge Id.)	MOBILITY (mD/cP)	PORE PRESS. (g/cm ³)	DYNAMIC PRESSURE (g/cm ³)
	MD	TVD		Before	After						
27	7092.5	4248.2	810.7	844.27	844.2	129	Y	Supercharged?	0.1	1.946	2.026
28	7089	4246.2	793.3	843.79	843.72	128	Y	Good	0.4	1.905	2.026
29	7088	4245.6	791.2	843.5	843.6	128	Y	Good	4		2.026
Comments: All tests were performed as type B test and with pumps on (1000 lpm) unless otherwise noted in above table. No hydrostatic measurements since tests done with pumps on.											
Total number of tests: 29				No. Successful tests: 14				No. Fluid samples: 0			
Comments: Depths rounded off to one decimal											
Datum Kvitebjørn Brent (Initial Pressure): 770.5 bars at 4000 m TVD MSL. Water gradient = 0.101 bar/m. Gas gradient = 0.0374 bar/m i.e. $\rho_{gas} = 0.381$ g/cm ³ at res. conditions. Datum Valemon Brent (Initial pressure): 793 bar at 4100 m TVD MSL. Water gradient = 0.101 bar/m. Gas gradient ~0.035 bar/m. i.e. $\rho_{gas} \sim 0.355$ g/cm ³ at res. conditions.											