

Table 1-1 : Casing programme summary

Casing	Shoe depth [mMD RKB, drillers depth]	LOT / FIT [Equivalent mud weight]
Well 6403/6-1		
30"	1837.7 / 1843	
20"	2394	LOT : 1.19 g/cm ³ @ 2403 mMD
16"	2548.2	LOT : 1.29 g/cm ³ @ 2563mMD
13 3/8"	2740.8	LOT : 1.34 g/cm ³ @ 2752 mMD
9 5/8"	2982.8	LOT : 1.46 g/cm ³ @ 2986 mMD
7"	3768	LOT : 1.50 g/cm ³ @ 3768 mMD
	4120 TD	

1.4.2 Drilling fluids

Table 1-2 : Drilling fluids summary

Section	Section TD [m MD RKB]	Max mud weight [g/cm ³]	Mud type
Pilot hole 6403/6-U-1			
8 1/2"	2400	1.03	Seawater/Bentonite
Main hole 6403/6-1			
36"	1845	1.03	Seawater/CMC
26"	2394	1.03	Seawater/CMC
17 1/2"x20"	2560	1.08 (2403 - 2413mMD) 1.10 (2413 - 2560 mMD)	Ultradrill
14 3/4"x17 1/2"	2748	1.13 (2560 - 2563 mMD) 1.15 (2563 - 2673 mMD) 1.17 (2673 - 2697 mMD) 1.19 (2697 - 2748 mMD)	Ultradrill
12 1/4"	2983	1.19 (2749 - 2775 mMD) 1.24 (2775 - 2878 mMD) 1.22 (2878 - 2983 mMD)	Ultradrill DW
8 1/2"	3775	1.23 (2983 - 2986 mMD) 1.25-1.23 (2986 - 3138 mMD) 1.19 (3138 - 3775 mMD)	Ultradrill DW Ultradrill
6"	4120	1.21 (3775 - 3782 mMD) 1.22 (3782 - 3960 mMD) 1.29 (3960 - 4120 mMD)	Ultradrill

5.11.6 Drilling fluids

Table 5-2: Summary of Drilling fluids program

CASING		MUD TYPE	MW [SG]	LGS [KG/m ³]	10 sec. [P+]	10 min. [P+]	Fann 100 rpm	Fann 3 rpm	FV [+/-]	PV [+/-]	API FL [=0]	pH	MBT [KG/m ³]	NaCl [WPS]	Kcl [WPS]	Glqc. [%]	MEG %	Ca++ mg/l	Total volume Old volume New volume Usage [m ³]	
SIZE	TYD MD																			
30"	1838	Sea Water High vis. Sweeps Sildril/KCl displ.fluid	1.03						200			8								1319
	1838		-	1.35								<12	9							
<p>COMMENTS: 8 1/2" pilot hole hole is included under the 36" section. Sections were drilled by use of sea water pumping hi vis pills. Pills 10-12 m3 pumped every 15 m drilled or as hole condition dictated. In the pilot hole pill size were reduced to 6-8 m3. Pills were mixed up by CMC-EHW - this was used in order to improve quality of MWD readings. At TD the holes were circulated clean by pumping a 30 m3 CMC hiviis pill around and then the holes were displaced to 1,35 sg Sildril/KCl fluid used on previous well in the Barentssea. A total of 182 m3 of this mud was re-used on these two sections.</p> <p>For further details please see M-1 detailed Drilling Fluid Program</p>																				
20"	2394	Sea Water High vis. Sweeps Sildril/KCl displ.fluid Kill fluid	1.03						200			8								1160
	2394		-	1.35								<12	9							
<p>COMMENTS: The section was drilled by using sea water - pumping hiviis CMC-EHW sweeps. Pill size 10-12 m3 pumped every 10 m drilled (3 pills per stand). At TD the hole was cleaned by pumping a 30 m3 hiviis pill around and thereafter the hole was displaced to 1,35 sg Sildril/KCl fluid (used on the previous well drilled in the Barentssea) by pumping 1,3 the hole volume. Before start drilling the section, 100 m3 of Sildril/KCl fluid (Barentssea fluid) was weighed up to 1,8 sg and stored as Kill fluid.</p> <p>For further details please see M-1 detailed Drilling Fluids Summary</p>																				
16"	2548	Ultradril	1.08	0	4.5	6.5		8		13	2.9	8.9	0		n/a	n/a	n/a	n/a	<1000	830
	2548		1.125	34	5.5	7.5	<30	10		18	3.8	9.4	7							0
<p>COMMENTS: The section was drilled by use of Ultradril. Due to required fingerprint operation, the fluid was displaced to the well when drilling out the shoe track, therefore the system was pre-treated with Sodium Bicarbonate and Citric Acid in order to avoid cement contamination. Start weight was 1,08 sg and final density at the end of the section was 1,125. The Ultradril fluid was not designed as hydrate inhibitive fluid - due to density limitation - prognosed frac. gradient. Therefore - as a contingency in case of a kick, 70 m3 of Ultradril DW mud was prepared. Very low dilution rates were encountered, only the EMI 939 was depleting when drilling, and the system was maintained by smaller addition of fresh premix and smaller additions of EMI 939. The shakers were dressed with 84 mesh while displacing and later upgraded to 140 and finally to 165 mesh. Very good cuttings integrity and the hole was reported to be in gauge. No problems when running logs - casing and cementing.</p> <p>For further details please see M-1 detailed Drilling Fluids Summary</p>																				

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13 3/8"	2741	Ultradril	1.15	34	5	6	10	17	2.4	9.4	9	n/a	n/a	n/a	n/a	<1000	802
	2741		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
			1.19	46	7	9	<30	11	19	2.6	9.8	9	n/a	n/a	n/a	n/a	45
			-	-	-	-	-	-	-	-	-	-	-	-	-	-	171
			<p>COMMENTS: The section was drilled by use of Ultradril drilling fluid transferred from previous section. Start weight was 1,15 sg and final density at the end of the section was 1,19. The Ultradril fluid was not designed as hydrate inhibitive fluid - therefore the 70 m3 of Ultradril D/W mud mixed up in the previous section was transferred to this section. Very low dilution rates were encountered, only the EMI 933 was depleting when drilling, and the system was maintained by smaller addition of fresh premix and smaller additions of EMI 933. The shakers were dressed with 84 mesh while drilling the cement and later upgraded to 140 and finally to 165 mesh. Very good cuttings integrity and the hole was reported to be in gauge. No problems when running logs - casing and cementing.</p> <p>For further details please see M-I detailed Drilling Fluids Summary</p>														
9 5/8"	2983	Ultradril D/W	1.19	12	3.5	5	7	15	2.8	9.3	0	244	n/a	n/a	19,5	<1000	872
	2983		-	-	-	-	-	-	-	-	-	-	-	-	-	-	0
			1.23	47	3.5	5	<30	8	16	1.6	9.4	9	258	n/a	n/a	20	872
			-	-	-	-	-	-	-	-	-	-	-	-	-	-	186
			<p>COMMENTS: The section was drilled by use of Ultradril D/W, displaced to the well when drilling shoe track. Treatment with Citric Acid (1,23 kg/m3) and Sodium Bicarbonate (1,2 kg/m3) maintained the pH at +/- 9,5 when drilling out the shoe track. The concentrations of the inhibitors varied little from the make up, and addition of new mud and premix was sufficient to maintain programmed specs. The filtrate was initially 2,8 ml, but dropped to 1,6 ml when a small amount of drilled solids were picked up in the system. Losses occurred at 2844 m and a 3 m3 seepage pill (80 kg/m3 LCM) were pumped every few hours. Addition of polymers directly to active is not recommended due to problems with blinding of shaker screens - preferably all chemicals (except Ultrafree NS) should be premixed and bled into active. Very good rheology profile recorded, gauge hole, good hole cleaning.</p> <p>Ref. M-I Detailed Drilling Fluids Summary for further details.</p>														
7"	3855	Ultradril D/W Ultradril	1.19	34	5	6	10	15	2.4	9.4	9	220	n/a	n/a	20	<1000	2438
	3855		-	-	-	-	-	-	-	-	-	-	-	-	-	-	2131
			1.25	46	7	9	<30	11	19	2.6	9.8	10	240	n/a	n/a	20	307
			-	-	-	-	-	-	-	-	-	-	-	-	-	-	198
			<p>COMMENTS: The section was started out drilled by use of Ultradril D/W transferred from the previous section. The system was weighted up to 1,25 sg and pre-treated with Citric Acid and Sodium Bicarbonate in order to reduce cement contamination when drilling out the shoe track. Due to oversized high ECD, probably as an effect of some accretion problems (two BHA was covered with sticky clay when pulled to surface), it was decided to displace the hole to the standard Ultradril system used in the 20" and the 17 1/2" sections. Increased the concentration of Ultracap from original 2,2 kg/m3 to 6,5 kg/m3, the EMI 933 from 3,5 % to 4,5 % and the Ultrafree NS from 2% to 2,5 %. The ECD readings were still higher than simulated/acceptable - and the displacement (to 1,19 standard Ultradril) were performed. Both Ultradril D/W and Ultradril is easily maintained by smaller addition of new mud and premixes, very stable fluid with very good rheology profile even at low temperatures, good hole cleaning (despite the accretion problems), gauge hole, no problems with logging - coring - casing/liner running and no problem with cementing operations. Good cuttings integrity. OOC measurements performed by independent lab show only 0,03 % OOC as an average - and therefore this concern is not an actual subject any longer.</p> <p>Ref. M-I Detailed Drilling Fluids Summary for further details.</p>														
N/A		Ultradril	1.22	49	4	6	9	15	2.6	9.7	14	35	n/a	n/a	n/a	<1000	1580
			-	-	-	-	-	-	-	-	-	-	-	-	-	-	1429
			1.29	32	5	9	<30	10	16	3.4	9.8	16	50	n/a	n/a	n/a	151
			-	-	-	-	-	-	-	-	-	-	-	-	-	-	473
			<p>COMMENTS: The section was drilled by use of the Ultradril system transferred from previous section. The system was pretreated with Citric Acid and Sodium Bicarbonate in order to reduce cement contamination and control the pH below 10 when drilling out the shoe track and rat hole. Also a premix with high concentrations of the two inhibitors was prepared and bled into active after the cement was drilled out. The mud properties remained stable during drilling and logging operations. Some variations in ECD might have been caused by sticking, and Ultrafree NS was added. After that there were no tendencies to sticking.</p> <p>Ref. M-I Detailed Drilling Fluids Summary for further details.</p>														