

## **5.6 Fluid sampling and evaluation**

A total of 4 MDT samples from 6406/2-6 were analysed. One of the samples were from Run 6H 4737.4 m MDRKB and three of the samples were from Run 5D 4622.2 m MDRKB.

The well was drilled with oil based mud. An olefin tracer had been used in the base oil in order to establish the mud contamination in the samples. All the samples had a significant contamination of mud. The samples were analysed at Saga's internal laboratory by fingerprinting. Calculation of the contamination level by use of the added olefin tracer did not succeed for these highly contaminated samples. Quantitative estimates of the contamination did not work due to partly break down of the olefin tracer during exposure to the high pressure and temperature in the well. The contamination level in the samples had to be assessed from the change in sample pressure from bottom hole to surface conditions by assuming that the formation fluid was equal to the fluid in well 6406/2-3T3.

Table 5-4 Run 2A Formation Tester Wellsite Worksheet

FORMATION TESTER WELLSITE WORKSHEET - SAGA PETROLEUM ASA														
WELL:		6406/2-6			RUN/TOOLSTRING:		2A MDT/GR			WITNESS:		BKP		
RIG:		DEEP SEA BERGEN			PRESSURE UNITS:		BARA			DATE:		20-sep-98		
KB:		23 m			MUD WEIGHT (SG):		1.85 g/cm <sup>3</sup>							
TEST NO.	STAR T TIME hh:mm	OLD MD RKB	DEPT H MD RKB	DEPTH TVD RKB	DEPT H TVD MSL	IN. HYDROST. PRESSURE		FORMATION PRESSURE		FIN. HYDROST. PRESSURE		TEMP AFTER deg. C	MOB. INDEX mD/cP	COMMENTS
						EMW	HP	EMW	HP	EMW	HP			
1	20:13	4302.1	4297.5	4296.9	4273.9	1.855	782.97	1.852	781.760	1.855	782.93	134.1	0.23	1.8cc, supercharged
2	20:38	4302.2	4297.6	4297.0	4274.0	1.855	783.02			1.855	782.98	134.8		LD 600; 1.7cc. Tight, abort.
3	20:47	4302.0	4297.4	4296.8	4273.8	1.855	782.95			1.855	782.96	135.6	0.03	1.8cc. Tight, abort.
4	21:15	4300.8	4296.2	4295.6	4272.6	1.855	782.76	1.853	781.720	1.855	782.76	136.0	0.13	LD 500; 2.8cc. Supercharged.
5	21:33	4300.7	4296.1	4295.5	4272.5	1.855	782.77	1.853	781.660	1.855	782.76		0.20	LD 500; 3.1cc. 781.66 after 738s (supercharged).
6	21:53	4298.9	4294.3	4293.7	4270.7	1.855	782.43			1.855	782.41			LD 500; 2.7cc. Tight, abort. Check tie. Add 0.5m.
7	22:22	4302.1	4297.5	4296.9	4273.9	1.856	783.33			1.856	783.25		0.08	LD 500; 2.8cc. Tight, aborted.
8	22:36	4301.6	4297.0	4296.4	4273.4	1.856	783.10			1.856	783.08			LD 500; 3.0cc. As above. Aborted.
9	22:52	4307.7	4303.1	4302.5	4279.5	1.856	784.28			1.856	784.24			LD 500; 2.5cc. Tight, aborted.
10	22:59	4307.9	4303.3	4302.7	4279.7	1.856	784.27			1.856	784.25	137.8		As above
11	23:09	4307.3	4302.7	4302.1	4279.1	1.856	784.12			1.855	784.10	138.1		As above
12	23:19	4302.5	4297.9	4297.3	4274.3	1.855	783.15	1.852	781.620	1.855	783.18		1.81	Volumetric 10cc. Supercharged.
13	23:32	4302.0	4297.4	4296.8	4273.8	1.855	783.12			1.855	783.11			Vol. 10cc. Down to 180 bar. Abort.
14	23:41	4301.5	4296.9	4296.3	4273.3	1.855	783.03			1.855	783.04	138.8	0.10	Vol. 10cc. Approaching hydrostatic. Abort.

Table 5-5 Run 4B Formation Tester Wellsite Worksheet

FORMATION TESTER WELLSITE WORKSHEET - SAGA PETROLEUM ASA															
WELL:		6406/2-6			RUN/TOOLSTRING:			4B MDT/GR			WITNESS:		BKP		
RIG:		DEEP SEA BERGEN			PRESSURE UNITS:			BARA			DATE:		04-okt-98		
KB:		23 m			MUD WEIGHT (SG):			2.05 g/cm3							
TEST NO.	STAR T TIME Hh:m m	OLD MD RKB	DEPT H MD RKB	DEPT H TVD RKB	DEPT H TVD MSL	IN. HYDROST. PRESSURE		FORMATION PRESSURE		FIN. HYDROST. PRESSURE		TEMP AFTER deg. C	MOB. INDEX mD/cP	COMMENTS	
						EMW	HP	EMW	HP	EMW	HP				
1	20:58	4487.5	4483.7	4483.7	4460.1	2.033	894.89	1.964	864.810	2.033	894.89	147.8	0.10	1.5cc. Most likely supercharged.	
2	21:22	4487.8	4484.0	4483.4	4460.4	2.032	894.94	1.960	863.060	2.032	894.93	149.2	0.20	1.0cc. Low perm. Probably supercharged.	
3	21:36	4487.3	4483.5	4482.9	4459.9	2.032	894.77	1.960	863.020	2.033	894.85	150.7	0.30	1.6cc. Low perm. Prob. supercharged.	
4	22:07	4488.4	4484.6	4484.0	4461.0	2.033	895.08	1.961	863.450	2.033	895.11	151.3	0.10	1.8cc. Low perm. Prob. supercharged. Re-check tie; OK.	
5	22:36	4497.5	4493.7	4493.0	4470.0	2.033	897.18	1.965	867.020	2.033	897.15	152.2	0.10	1.6cc. Low perm. Probably supercharged.	
6	22:55	4511.2	4507.3	4506.7	4483.7	2.034	900.40	1.943	859.840	2.034	900.20	155.2	0.20	1.6cc. Low perm.	
7	23:25	4510.0	4506.1	4505.5	4482.5	2.034	899.88	1.941	859.055	2.034	899.86	156.6	1.50	20cc. Still low perm..	
8	23:47	4489.5	4485.7	4485.0	4462.1	2.032	894.97							1.6cc. Tight. Abort.	
9	23:55	4487.5	4483.7	4483.1	4460.1	2.032	894.69	1.958	862.098	2.032	894.81	154.7	0.30	1.7cc. Stable	
10	00:10	4485.4	4481.6	4480.9	4457.9	2.032	894.36							1.5cc. Tight. Abort.	

Table 5-6 Run 5C Formation Tester Wellsite Worksheet

FORMATION TESTER WELLSITE WORKSHEET - SAGA PETROLEUM ASA														
WELL:		6406/2-6			RUN/TOOLSTRING:		5C MDT/GR			WITNESS:		ØC		
RIG:		DEEP SEA BERGEN			PRESSURE UNITS:		BARA			DATE:		14-okt-98		
KB:		23 m			MUD WEIGHT (SG):		2.04 g/cm3							
TEST NO.	START TIME hh:mm	OLD MD RKB	DEPTH MD RKB	DEPTH TVD RKB	DEPTH TVD MSL	IN. HYDROST. PRESSURE EMW HP		FORMATION PRESSURE EMW HP		FIN. HYDROST. PRESSURE EMW HP		TEMP AFTER deg. C	MOB. INDEX mD/cP	COMMENTS
1	08:30	4778.5	4774.4	4773.2	4780.2	2.026	949.64	11893	887.580	2.026	949.73	153.0	18.10	1.7cc, not stable
2	08:40	4757.0	4752.9	4751.7	4728.7	2.026	945.21	11897	885.328	2.026	945.37	159.0	243.70	Normal pretest, stable
3	08:50	4749.0	4744.9	4743.8	4720.8	2.026	943.68	11899	884.808	2.026	943.76	155.0	421.50	Normal pretest, stable
4	09:13	4741.0	4736.9	4735.8	4712.8	2.026	942.08	11901	884.134	2.026	942.13	156.0	30.90	Normal pretest, reset probe
5	09:27	4706.0	4701.7	4700.8	4677.8	2.025	935.00	11911	882.308	2.025	935.00	156.0	104.00	Normal pretest
6	09:55	4537.0	4533.1	4532.4	4509.4	2.026	902.00	11985	861.190	2.027	902.20	153.0	41.30	Normal pretest
7	10:05	4529.0	4525.1	4524.4	4501.4	2.027	900.62	11940	862.014	2.027	900.70	152.0	0.30	1.6cc, stable, then decreasing
8	10:22	4516.0	4512.1	4511.6	4488.6	2.028	898.36	11945	861.612	2.028	898.40	151.0	0.80	2.4cc, unstable, then decreasing
9	10:35	4512.0	4508.1	4507.6	4484.6	2.027	897.40			2.027	897.40	150.0		1.9cc, supercharged
10	11:10	4684.0	4679.8	4678.8	4653.8	2.026	930.76	11911	879.662	2.026	930.83	155.0	0.30	2.6cc, stable
11	11:20	4679.0	4674.9	4673.9	4650.9	2.026	929.87	11913	879.147	2.026	929.80	155.0	1.90	3.4cc, almost stable
12	11:35	4671.2	4667.2	4666.8	4643.8	2.026	928.22			2.025	928.21	156.0		Tight, abandon
13	11:45	4649.5	4645.6	4644.8	4621.8	2.025	923.84			2.025	923.85	155.0		Tight, abandon
14	11:50	4637.5	4633.5	4632.7	4609.7	2.026	921.54			2.026	921.63	155.0	0.20	2.2cc, supercharged
15	12:00	4626.5	4622.5	4621.7	4598.7	2.025	919.30	11929	875.600	2.025	919.20	155.0	1.70	2.7cc, stable
16	12:20	4627.5	4623.5	4622.7	4599.7	2.026	919.80	11929	876.000	2.026	919.60	155.0	0.60	1.6cc, stable
17	12:35	4628.0	4624.0	4623.2	4600.2	2.025	919.60	11929	875.674	2.025	919.60	156.0	6.00	3.5cc, stable
18	12:58	4684.0	4679.8	4678.9	4653.9	2.026	930.89	11914	879.684	2.026	930.90	156.0	27.70	Normal pretest
19	13:08	4679.0	4674.9	4674.0	4651.0	2.026	929.76	11915	879.140	2.026	929.80	156.0	48.20	Normal pretest, not stable, supercharged?
20	13:20	4671.2	4667.2	4666.8	4643.8	2.025	928.13			2.025	928.21	156.0		2.1cc, supercharged
21	13:40	4649.5	4645.7	4644.8	4621.8	2.026	923.80			2.026	923.80	156.0		2.4cc, supercharged
22	13:50	4637.5	4633.5	4632.7	4609.7	2.025	921.43			2.026	921.50	156.0		2.8cc, supercharged
23	14:05	4635.5	4631.5	4630.7	4607.7	2.026	921.19			2.026	921.20	155.0		2.7cc, supercharged
24	14:15	4625.5	4621.5	4620.7	4597.7	2.025	919.10			2.026	919.20	156.0		2.7cc, supercharged
25	14:35	4632.0	4628.0	4627.2	4604.2	2.026	920.73			2.026	920.57	155.0		Normal pretest, supercharged
26	14:44	4640.0	4636.0	4635.2	4611.2	2.026	922.34			2.026	922.16	156.0		2.5cc, supercharged
27	15:02	4638.5	4634.5	4633.7	4610.7	2.027	922.21			2.026	922.04	156.0		Tight, abandon
28	15:10	4639.5	4635.5	4634.7	4611.7	2.026	922.19			2.026	922.09	156.0		3.0cc, supercharged
29	15:20	4635.5	4631.5	4630.7	4607.7	2.025	921.21			2.026	921.15	156.0		2.9cc, supercharged
30	15:30	4626.0	4622.0	4621.2	4598.2	2.025	919.20			2.026	919.27	155.0		3.3cc, supercharged
31	15:55	4488.0	4484.2	4483.6	4460.6	2.027	892.60			2.027	892.61	151.0		Tight, abandon

Table 5-7 Run 5D Formation Tester Wellsite Worksheet

FORMATION TESTER WELLSITE WORKSHEET - SAGA PETROLEUM ASA														
WELL:		6406/2-6			RUN/TOOLSTRING:		5D MDT/GR			WITNESS:		ØC		
RIG:		DEEP SEA BERGEN			PRESSURE UNITS:		BARA			DATE:		15-okt-98		
KB:		23 m			MUD WEIGHT (SG):		2.04 g/cm3							
TEST NO.	START TIME hh:mm	OLD MD RKB	DEPTH MD RKB	DEPTH TVD RKB	DEPTH TVD MSL	IN. HYDROST. PRESSURE		FORMATION PRESSURE		FIN. HYDROST. PRESSURE		TEMP AFTER deg. C	MOB. INDEX mD/cP	COMMENTS
						EMW	HP	EMW	HP	EMW	HP			
1	04:50	4627.0	4623.0	4622.2	4599.2	2.024	918.97	1.929	875.553	2.024	918.95	156.0	2.50	Limited drawdown, 1.0cc
2	00:00	4627.5	4623.5	4622.7	4599.7	2.025	919.20	1.929	875.593	2.024	918.85	156.0	1.60	Limited drawdown, 0.9cc
3	05:15	4626.5	4622.5	4621.7	4598.7	2.024	918.86	1.929	875.595	2.024	918.85	156.0	1.90	Limited drawdown, 1.1cc
4	05:30	4628.0	4624.0	4623.2	4600.2	2.025	919.28			2.024	919.20	156.0		Limited drawdown, 0.7cc - supercharged
5	05:38	4625.5	4621.6	4620.8	4597.8	2.024	918.69			2.024	918.70	157.0		Limited drawdown, 0.9cc - supercharged
6	05:55	4626.0	4622.0	4621.2	4598.2	2.025	919.24			2.025	919.19	157.0		Limited drawdown, 1.0cc - supercharged
7	06:20	4628.0	4624.1	4623.2	4600.2	2.025	919.61			2.025	919.58	157.0		Limited drawdown, 0.8cc - supercharged
8	05:30	4627.7	4623.7	4622.9	4599.9	2.025	919.37			2.025	919.21	157.0		Tight
9		4627.5	4623.6	4622.7	4599.7	2.025	919.30	1.929	875.764	2.024	919.08	157.0	1.30	Limited drawdown, 1.1cc
10		4627.3	4623.3	4622.5	4599.5	2.026	919.57	1.930	876.190	2.026	919.52	157.0	7.00	Limited drawdown, 0.8cc - supercharged
11		4626.2	4622.2	4621.4	4598.4	2.025	919.18	1.929	875.547	2.024	918.81	157.0	2.40	1.2cc. Filled 2 3/4 + 2 x 1 G chambers.

Table 5-8 Run 6E Formation Tester Wellsite Worksheet

FORMATION TESTER WELLSITE WORKSHEET - SAGA PETROLEUM ASA														
WELL:		6406/2-6		RUN/TOOLSTRING:		6E MDT/GR		WITNESS:		BKP/SKH				
RIG:		DEEP SEA BERGEN		PRESSURE UNITS:		BARA		DATE:		24-okt-98				
KB:		23 m		MUD WEIGHT (SG):		2.04 g/cm3								
TEST NO.	START TIME hh:mm	OLD MD RKB	DEPTH MD RKB	DEPTH TVD RKB	DEPTH TVD MSL	IN. HYDROST. PRESSURE EMW HP		FORMATION PRESSURE EMW HP		FIN. HYDROST. PRESSURE EMW HP		TEMP AFTER deg. C	MOB. INDEX mD/cP	COMMENTS
1	12:26	4626.0	4622.1	4621.3	4598.3	2047	929.04			2047	928.97		0.50	1.8cc. Abort.
2	12:44	4625.5	4621.6	4620.8	4597.8	2047	928.88			2047	928.84	159.7	0.40	Lim. DD 770 bar. 2.0cc. Little mudcake - supercharging
3	13:16	4625.0	4621.0	4620.2	4597.2	2047	928.80	8930	875.940				0.60	Lim. DD. 1.9cc.
4	13:35	4624.5	4620.5	4619.7	4596.7	2047	928.64			2047	928.65			Lim. DD as above. 2.0cc. Retract.
5	13:57	4624.7	4620.7	4619.9	4596.9									Lim. DD as above. 2.1cc. Tight. Retract.
6	14:08	4624.0	4620.0	4619.2	4596.2									Lim. DD as above. Dry.
7	14:17	4626.8	4622.8	4622.0	4599.0								0.80	Lim. DD as above. Unstable
8	14:43	4625.0	4621.1	4620.3	4597.3								0.40	Same behavior as before.
9	14:54	4625.2	4621.2	4620.4	4597.4	2047	928.81	8922	875.570	2047	928.71	160.5	0.40	Lim. DD as above. Retract
10	15:46	4637.4	4633.4	4632.6	4609.6	2046	931.19			2046	930.99	160.5	0.30	Lim. DD as above. 2.1cc. Too low perm. Retract
11	15:58	4637.1	4633.1	4632.3	4609.3	2046	930.89			2046	930.86			As above.
12	16:06	4637.7	4633.7	4632.9	4609.9					2046	930.95	160.4	0.30	Lim. Drawdown 800bar, 40cc/min. Low perm. Retract.
13	16:16	4638.0	4634.0	4633.2	4610.2	2046	931.09					160.3	1.30	As above. 2.1cc. Retract.
14	16:46	4740.4	4736.3	4735.2	4712.2	2046	951.25	8902	884.440	2045	951.09	162.2	9.80	Lim. DD is 810 bar , 20cc. Not completely stable.
15	17:14	4741.1	4737.0	4735.9	4712.9	2045	951.33			2045	951.23	162.7	5.70	Lim. DD is 810 bar, 60cc. Pressure increasing, abort.
16	17:33	4741.4	4737.3	4736.2	4713.2	2045	951.36					163.1	8.10	Attempt vol pretest. Same result (pressure incr.)
16.1	17:53	4741.4	4737.3	4736.2	4713.2									start pumping, only pumping filtrate
17	19:25	4750.4	4746.3	4745.2	4722.2	2046	953.20	8898	884.746				65.00	Lim. DD 810 bar, 40 cc, stabilizes fast.
17.1	19:37	4750.4	4746.3	4745.2	4722.2							164.0		Attempt pumping. Trouble with pump. Tool Failure - POOH

Table 5-9 Run 6E Formation Tester Wellsite Worksheet

FORMATION TESTER WELLSITE WORKSHEET - SAGA PETROLEUM ASA															
WELL:		6406/2-6			RUN/TOOLSTRING:			6F MDT/GR			WITNESS:		BKP/SKH		
RIG:		DEEP SEA BERGEN			PRESSURE UNITS:			BARA			DATE:		25-okt-98		
KB:		23 m			MUD WEIGHT (SG):			2.04 g/cm3							
TEST NO.	START TIME hh:mm	OLD MD RKB	DEPTH MD RKB	DEPTH TVD RKB	DEPTH TVD MSL	IN. HYDROST. PRESSURE EMW HP		FORMATION PRESSURE EMW HP		FIN. HYDROST. PRESSURE EMW HP		TEMP AFTER deg. C	MOB. INDEX mD/cP	COMMENTS	
1	11:40	4705.0	4700.7	4699.8	4676.8	2.045	944.04	1190.9	881.097	2.045	943.79	162.3	303.50	20cc. Pressure nearly stable at 881.10, then tendency to drop slightly (881.097). Check mobility.	
	11:55													Attempt to pump. Problem. Retract to check pump. POOH.	

Table 5-10 Run 6G Formation Tester Wellsite Worksheet

FORMATION TESTER WELLSITE WORKSHEET - SAGA PETROLEUM ASA															
WELL:		6406/2-6			RUN/TOOLSTRING:			6G MDT/GR			WITNESS:		BKP/SKH		
RIG:		DEEP SEA BERGEN			PRESSURE UNITS:			BARA			DATE:		28-okt-98		
KB:		23 m			MUD WEIGHT (SG):			2.04 g/cm3							
TEST NO.	START TIME hh:mm	OLD MD RKB	DEPTH MD RKB	DEPTH TVD RKB	DEPTH TVD MSL	IN. HYDROST. PRESSURE EMW HP		FORMATION PRESSURE EMW HP		FIN. HYDROST. PRESSURE EMW HP		TEMP AFTER deg. C	MOB. INDEX mD/cP	COMMENTS	
1	01:00	4705.0	4700.7	4699.8	4676.8	2.050	946.01	1190.8	880.645	2.049	945.90	163.6	175.50	DD 820, 20cc. Excellent pretest. Attempt to pump.	
1.1	01:15	4705.0	4700.8	4699.8	4676.8									Problems with pump. Filling 2 x 1 G. SC2:880.237bar,165.3degC; SC1:880.27bar,166.1degC	



Table 5-11 Run 6H Formation Tester Wellsite Worksheet

FORMATION TESTER WELLSITE WORKSHEET - SAGA PETROLEUM ASA															
WELL:		6406/2-6			RUN/TOOLSTRING:				6H MDT/GR		WITNESS:		BKP/SKH/Ems		
RIG:		DEEP SEA BERGEN			PRESSURE UNITS:				BARA		DATE:		29-okt-98		
KB:		23 m			MUD WEIGHT (SG):				2.04 g/cm3						
TEST NO.	START TIME hh:mm	OLD MD RKB	DEPTH MD RKB	DEPTH TVD RKB	DEPTH TVD MSL	IN. HYDROST. PRESSURE EMW	HP	FORMATION PRESSURE EMW	HP	FIN. HYDROST. PRESSURE EMW	HP	TEMP AFTER deg. C	MOB. INDEX mD/cP	COMMENTS	
1	10:05	4705.0	4700.8	4699.8	4676.8	2050	946.10						21.90	Pretest drawdown, probe plugged? Abort.	
2	10:25	4704.5	4700.2	4699.4	4676.4	2050	945.87	1908	880.530	2051	946.30	162.6	82.70	Normal pretest.	
3	11:40	4704.5	4700.2	4699.8	4676.8	2051	946.50							Formation pressure decreases to much when start pumping.	
4	11:50	4704.7	4700.4	4699.5	4676.5	2050	946.14					165.1	30.60	Formation pressure not stable	
5	12:05	4704.5	4700.3	4699.8	4676.8	2049	945.82	1908	879.420			165.0	56.20	Pretest not completely stable.	
6	12:20	4705.0	4700.8	4699.8	4676.8	2049	945.78	1906	879.660			165.0	120.80	Unstable. Pump problem. Sample in 2 3/4 , 1 gal w/o pump.	
6.1	12:55	4705.0	4700.8	4699.8	4676.8									Throttling problem, open valve fully.	
6.2	14:16	4705.0	4700.8	4699.8	4676.8					2049	945.72	166.7		Water indicated on OFA.. Close 2 3/4 (#113), Resist. T=164. Attempt throttle 1 gal (48) at 13:47 - OK.	
7	14:45	4536.5	4532.6	4531.0	4508.0	2041	912.69	1894	861.226	2037	911.06	162.5	34.40	Add 0.8m at 4540. 20cc. Excellent pretest. Pump not working, start sampling w/o pump into 2 3/4 gal chamber.	
8	16:20	4749.0	4744.9	4748.8	4725.8	2050	954.73	1899	884.557				36.30	Add 1.0m at 4728. Lim.DD 820bar, 60cc/min. 20cc.	
9	16:40	4748.5	4744.4	4748.8	4725.8	2050	954.73	1899	884.530			165.9	324.00	Excellent pretest.	
10	17:02	4741.0	4736.9	4741.8	4718.8	2049	952.84			2039	952.97		10.30	Partial seal failure healing up or supercharged bleeding off? Retract.	
11	17:14	4740.5	4736.4	4740.5	4716.5	2049	952.93			2039	952.89		2.80	As above. 7.3cc. Low perm - retract.	
12	17:24	4741.5	4737.4	4741.5	4718.5	2049	953.24	1900	883.959				142.40	20cc. Good test. Attempt to pump. Pump 2.5 liter. Sampling into MS	
13	19:55	4720.0	4715.8	4714.8	4691.8	2050	949.30			2050	948.97	166.5		Low perm (0.4mD/cP est.) Last pressure 883.57. Abort.	
14	20:10	4709.5	4705.3	4704.5	4681.5	2049	946.48	1906	880.724	2039	946.49	166.4	188.60	DD 800 bar, 20cc. Excellent pretest.	
15	20:20	4704.5	4700.3	4699.8	4676.8	2049	945.41	1907	880.215	2039	945.51	166.4	71.80	DD 800 bar, 20cc. Excellent pretest.	
16	20:35	4715.2	4711.0	4710.0	4687.0	2050	948.23			2050	948.00	166.4	0.70	Drv	
17	20:50	4713.0	4708.8	4707.8	4684.8	2049	947.38			2048	947.07	166.5	6.70	20cc. Slightly supercharged	
18	21:15	4700.9	4696.6	4695.6	4672.6	2048	944.47	1908	880.053	2039	944.73	166.6	1.80	20cc. Low perm. Slightly supercharged.	
19	21:30	4671.0	4667.0	4666.0	4643.0	2048	938.57	1899	880.655	2039	938.91	166.4	1.50	as above, stabilizes nicely, but supercharged	
20	21:45	4637.5	4633.5	4632.7	4609.7	2049	932.27			2039	932.31	165.6	0.40	Low perm. Strange pressure response (jumps). Abort.	
21	22:50	4875.0	4870.2	4868.6	4845.6	2041	980.61	1899	897.338	2050	980.15	168.8	204.60	DD 800 bar, 20cc. Excellent pretest.	
22	23:00	4860.5	4855.7	4854.7	4831.7	2049	976.94	1899	895.874	2039	976.80	169.2	33.20	as above	
23	23:12	4835.0	4830.6	4829.1	4806.1	2041	971.38	1899	893.443	2039	971.65	169.3	3.10	Good pretest but lower mobility.	
24	23:25	4810.0	4805.8	4804.5	4781.5	2049	966.63	1898	891.057	2039	966.65	169.1	2.40	as above	
25	23:40	4795.0	4790.9	4789.6	4766.6	2041	963.33	1890	889.211	2039	963.65	168.0	62.50	Excellent pretest.	
26	00:00	4684.0	4679.8	4678.9	4655.9	2041	941.41			2039	941.55		0.30	drv	
27	00:05	4679.0	4674.9	4674.0	4651.0	2049	940.41			2049	940.43		4.90	drv	
28	00:10	4679.2	4675.1	4674.1	4651.1	2049	940.57			2048	940.44	166.6	19.60	20cc; very slowly increasing.	
29	00:55	4533.0	4529.1	4528.2	4505.2	2050	911.61			2050	911.79	164.8	0.40	drv	
30	01:00	4533.2	4529.3	4528.6	4505.6	2050	911.85	1896	860.974	2050	911.79	163.2	1.50	20cc. Stable value after 10 min.	
31	01:30	4487.0	4483.2	4482.6	4459.6	2048	903.67	1891	859.960	2037	902.98	159.1	1.20	20cc. Supercharged.	
32	02:00	4511.0	4507.1	4506.6	4483.6	2052	908.39	1944	860.220	2052	908.17	159.3	0.80	DD 800 bar, 20cc. Near stable (fluctuates slightly). Supercharged.	

Table 5-12 Run 6I Formation Tester Wellsite Worksheet

FORMATION TESTER WELLSITE WORKSHEET - SAGA PETROLEUM ASA														
WELL:		6406/2-6		RUN/TOOLSTRING:				6 I MDT/GR		WITNESS:		BKP/EmS		
RIG:		DEEP SEA BERGEN		PRESSURE UNITS:				BARA		DATE:		31-okt-98		
KB:		23 m		MUD WEIGHT (SG):				2.04 g/cm <sup>3</sup>						
TEST NO.	START TIME hh:mm	OLD MD RKB	DEPTH MD RKB	DEPTH TVD RKB	DEPTH TVD MSL	IN. HYDROST. PRESSURE EMW	HP	FORMATION PRESSURE EMW	HP	FIN. HYDROST. PRESSURE EMW	HP	TEMP AFTER deg. C	MOB. INDEX mD/cP	COMMENTS
1	11:37	4706.0	4701.8	4700.8	4677.8	2047	944.98	2047		2046	944.48			20cc. Flow line partially plugged?
1.1	11:51	4706.0	4701.8	4700.8	4677.8	2047	944.95	2047	880.400	2047	944.83	165.1	91.60	As above (2nd attempt at depth). 20cc. Excellent pretest.
2	12:09	4684.0	4679.8	4678.9	4655.9	2047	940.45	2047	878.680	2047	940.48		12.70	As above. 20 cc. Long time to fully stabilize.
3	12:35	4679.0	4674.9	4675.0	4652.0	2046	939.32	2046	877.666	2046	939.43	165.8	85.10	As above.
4	12:50	4671.0	4667.0	4668.0	4645.0	2046	937.66	2047		2047	937.84	165.9	0.40	As above. Low perm / supercharged. Abort.
5	13:00	4671.3	4667.3	4666.4	4643.4	2047	938.01							Tight, abort.
6	13:15	4646.0	4642.1	4641.5	4618.5	2048	933.41			2048	933.43			(Check tie. Add 0.8m.) Tight, abort.
7	13:21	4646.2	4642.3	4641.5	4618.5	2048	933.71			2048	933.69			Tight, abort.
8	13:28	4645.8	4641.9	4641.1	4618.1	2048	933.37			2048	933.37			Tight, abort.
9	13:37	4626.0	4622.1	4621.3	4598.3	2047	929.16					165.4	0.30	Mobility low, formation pressure slowly increasing.
10	13:55	4626.5	4622.6	4621.8	4598.8	2048	929.43			2048	929.38	165.3		Low perm. / superch. Abort.
11	14:03	4624.8	4620.8	4620.0	4597.0	2047	928.97			2047	928.87			Tight.
12	14:12	4624.5	4620.6	4619.8	4596.8	2047	928.74			2047	928.66	165.1		Tight. Drop down to verify tie. Subtract 0.4m.
13	14:28	4626.1	4622.1	4621.3	4598.3	2047	928.98			2047	929.00		0.80	Tight, abort.
14	14:40	4625.0	4621.1	4620.3	4597.3	2047	928.78			2047	928.76	165.1		Tight, abort.
15	14:50	4625.5	4621.6	4620.8	4597.8	2047	928.95			2048	929.45	165.1		Pretest irregular drawdown. Retract.
16	15:24	4742.5	4738.4	4737.6	4714.6	2048	952.99	1890	883.896				107.10	Tie in prior to Tofte. Add 0.6m. 20cc. Excellent pretest.
16.1	15:40	4742.5	4738.4	4737.6	4714.6									Start pumping. 28 l, T=167.6. Stop pump after 79 l w/o any fluid changes indicated by the OFA
16.2	16:54	4742.5	4738.4	4737.5	4714.5							168.4		Open SC1 (1gal; MRSGA-148) w/o thrott. Fill time: 20.6min, T=166.5.
16.3	17:16	4742.5	4738.4	4737.6	4714.6							168.2		Resume pumping. Add. 25 l. No signs of fluid change from OFA. Abort
17	17:54	4749.0	4744.9	4743.8	4720.8	2048	954.22	1897	883.883				312.80	Added 0.5m to depth to account for assumed stretch. Excellent pretest.
17.1	18:12	4749.0	4744.9	4743.8	4720.8									Start pumping. Pumping approx. 60-100 liter.
17.2	19:35	4749.0	4744.9	4743.8	4720.8							168.6		Open SC2 (1 gal; MRSC-GA 67), P=883.342bar.
17.3	19:55	4749.0	4744.9	4743.8	4720.8	2048	954.22			2046	953.10	169.1		Open SC3 (1 gal; MRSC-GA 165), P=883.59bar.
18	21:02	5196.3	5191.5	5186.8	5163.8	2052	1045.37	1826	930.173	2052	1044.90	177.4	3.00	Check depth: 14cc. Good pretest.
19	21:17	5174.0	5169.2	5164.8	5141.8	2050	1039.90	1839	927.886	2050	1039.89	177.8	1.70	3.5cc. Good pretest.
20	21:31	5162.0	5157.2	5153.0	5130.0	2050	1037.11	1831	926.720	2050	1037.34	177.9	10.00	2.8cc. Good pretest, OG not completely stable.
21	21:45	5111.0	5106.2	5102.6	5079.6	2049	1026.66			2049	1026.73	177.7		Dry test; abort. Check tie.
22	22:05	5111.2	5106.4	5102.8	5079.8	2050	1027.41			2050	1027.30	176.5		Tight, abort. Try further up instead.
23	22:09	5096.5	5091.7	5088.2	5065.2	2049	1023.78						0.70	3.5cc. Supercharged (last read pressure 924.8bar)
24	22:21	5097.0	5092.2	5088.8	5065.8					2049	1023.90	176.4	1.10	3.6cc. Supercharged (last read pressure 924.4bar)
25	22:30	5081.1	5076.3	5073.0	5050.0	2048	1020.24			2049	1020.50	176.4		Lim.DD 840bar, 40cc/min. Dry, retract.
26	22:37	5081.3	5076.5	5073.2	5050.2	2049	1020.67							Lim.DD 840bar, 40cc/min. Dry, retract.
27	22:49	5019.0	5014.2	5011.5	4988.5	2048	1007.93			2048	1008.11	175.7		Lost seal. Retract and set again. Lost seal.
28	23:07	4971.0	4966.2	4963.9	4940.9									Check seal in shale using 3cc volumetric pretest. Seal lost. POOH

## **6.2 Mud Data**

### **6.2.1 Mud Properties, Daily Report**

Table 6.2.1 lists the daily reported mud properties (3 pages)

### **6.2.2 Mud Materials Used**

The mud material consumption is shown in Table 6.2.2 (1 page)

Well: 6406/2-6

Date	Hole size	Hole depth	Mud weight	PV	YP	Gel strength	pH	Alkalinity Pf /Mf	Ca++ mg/l	Cl- mg/l	Sand %	Solids %	Mudtype
980822	PSPUD					/		/					SPUD MUD
980823	PSPUD					/		/					SPUD MUD
980824	PSPUD		1.03			/		/					SPUD MUD
980825	9 7/8"	585.0	1.20	7.0	31.0	24/26	9.2	/		500		7.5	WATER BASED
980826	9 7/8"	660.0	1.20	7.0	62.0	24/26	9.2	/		500		7.5	WATER BASED
980827	9 7/8"	660.0	1.20	7.0	62.0	24/26	9.2	/		500		7.5	WATER BASED
980828	9 7/8"	660.0	1.20	21.0	48.0	24/26	9.0	/		500		7.5	WATER BASED
980829	9 7/8"	660.0	1.20	21.0	47.0	15/36	9.0	/		500		7.0	WATER BASED
980830	24"	685.0	1.03			/		/					SPUD MUD
980831	24"	685.0	1.03			/		/					SPUD MUD
980901	24"	1413.0	1.30	16.0	23.0	11/22	9.0	/		500		10.0	WATER BASED
980902	24"	1413.0	1.30	16.0	23.0	11/22	9.0	/		300		10.0	WATER BASED
980903	24"	1413.0	1.30			/		/					WATER BASED
980904	24"	1413.0	1.30			/		/					WATER BASED
980905	24"	1413.0	1.30			/		/					WATER BASED
980906	17 1/2"	1418.0	1.30	28.0	27.0	5/5	9.5	.1/	480	96000		14.0	WATER BASED
980907	17 1/2"	2118.0	1.60	39.0	37.0	8/11	8.6	/1.1	1500	86000	.3	23.0	WATER BASED
980908	17 1/2"	2549.0	1.69	45.0	45.0	10/24	8.3	/1.1	1600	79000	.3	25.5	WATER BASED
980909	17 1/2"	2760.0	1.69	50.0	44.0	10/28	8.2	/1.0	1560	91000	.3	26.0	WATER BASED
980910	17 1/2"	2760.0	1.69	54.0	43.0	10/32	8.2	/1.0	1560	84000	.2	26.0	WATER BASED
980911	17 1/2"	2760.0	1.69	54.0	43.0	10/32	8.2	/1.0	1560	84000	.2	26.0	WATER BASED
980912	17 1/2"	2760.0	1.69	51.0	41.0	7/15	8.5	/1.0	1560	83000	.2	26.5	WATER BASED
980913	12 1/4"	2760.0	1.69	51.0	41.0	7/15	8.5	/1.0	1560	83000	.2	26.5	WATER BASED
980914	12 1/4"	3236.0	1.65	43.0	18.0	9/15		/		81573	.2	25.0	OIL BASED
980915	12 1/4"	3661.0	1.70	48.0	16.0	9/14		/		75752	.5	26.5	OIL BASED
980916	12 1/4"	3825.0	1.74	47.0	13.0	8/15		/		86539	.5	28.5	OIL BASED
980917	12 1/4"	4053.0	1.74	49.0	17.0	12/16		/		96930	.5	28.5	OIL BASED

Well: 6406/2-6

Date	Hole size	Hole depth	Mud weight	PV	YP	Gel strength	pH	Alkalinity Pf /Mf	Ca++ mg/l	Cl- mg/l	Sand %	Solids %	Mudtype
980918	12 1/4"	4310.0	1.82	51.0	16.0	11/17		/		94100	.5	31.0	OIL BASED
980919	12 1/4"	4310.0	1.85	52.0	17.0	10/19		/		109900		32.0	OIL BASED
980920	12 1/4"	4310.0	1.85	52.0	17.0	10/19		/		109900		32.0	OIL BASED
980921	12 1/4"	4319.0	1.85	52.0	17.0	10/19		/		109932		32.0	OIL BASED
980922	12 1/4"	4415.0	1.85	52.0	17.0	11/20		/		112500	.8		OIL BASED
980923	12 1/4"	4415.0	1.85	52.0	17.0	11/20		/		112466	.8		OIL BASED
980924	12 1/4"	4415.0	1.85	52.0	17.0	11/20		/		112466	.8		OIL BASED
980925	12 1/4"	4415.0	1.85	51.0	19.0	10/18		/		119328	.8		OIL BASED
980926	12 1/4"	4415.0	1.85	53.0	18.0	10/18		/		119328	.8		OIL BASED
980927	12 1/4"	4415.0	1.85	53.0	18.0	10/18		/		119328	.8		OIL BASED
980928	12 1/4"	4415.0	1.86	53.0	18.0	10/18		/		119328	.8	32.4	OIL BASED
980929	12 1/4"	4415.0	1.86	53.0	18.0	10/18		/		119328	.8	32.4	OIL BASED
980930	12 1/4"	4415.0	1.85	53.0	18.0	10/18		/		119328	.8		OIL BASED
981001	12 1/4"	4415.0	1.86	53.0	18.0	10/18		/		119328	.8		OIL BASED
981002	8 1/2"	4430.0	2.05	62.0	14.0	10/18		/		118369	.6	37.0	OIL BASED
981003	8 1/2"	4504.0	2.05	58.0	16.0	10/16		/		103594	.6	36.5	OIL BASED
981004	8 1/2"	4504.0	2.05	58.0	17.0	9/16		/		100376	.5	36.5	OIL BASED
981005	8 1/2"	4525.0	2.05	59.0	15.0	9/15		/		104141	.7	36.5	OIL BASED
981006	8 1/2"	4531.0	2.05	59.0	15.0	9/15		/		104141	.7	36.5	OIL BASED
981007	8 1/2"	4575.0	2.03	58.0	18.0	10/16		/		104141	.6	36.5	OIL BASED
981008	8 1/2"	4665.0	2.04	61.0	17.0	10/18		/		104671	.6	37.0	OIL BASED
981009	8 1/2"	4665.0	2.04	63.0	19.0	11/19		/		104671	.6	37.5	OIL BASED
981010	8 1/2"	4700.0	2.04	63.0	17.0	9/17		/		100623	.6	37.5	OIL BASED
981011	8 1/2"	4796.0	2.03	64.0	17.0	10/17		/		108572	.7	36.5	OIL BASED
981012	8 1/2"	4872.0	2.03	62.0	17.0	9/17		/		101002	.5	37.0	OIL BASED
981013	8 1/2"	4872.0	2.04	62.0	17.0	9/17		/		101002	.5	37.0	OIL BASED
981014	8 1/2"	4872.0	2.04	62.0	17.0	8/17		/		101002	.5	37.0	OIL BASED

Well: 6406/2-6

Date	Hole size	Hole depth	Mud weight	PV	YP	Gel strength	pH	Alkalinity Pf /Mf	Ca++ mg/l	Cl- mg/l	Sand %	Solids %	Mudtype
981015	8 1/2"	4872.0	2.04	62.0	16.0	8/17		/		101002	.5	37.0	OIL BASED
981016	8 1/2"	4913.0	2.04	61.0	14.0	7/16		/		113898	.5	37.5	OIL BASED
981017	8 1/2"	5030.0	2.04	68.0	17.0	9/18		/		122265	.5	38.0	OIL BASED
981018	8 1/2"	5086.0	2.04	72.0	16.0	9/20		/		124766	.8	39.0	OIL BASED
981019	8 1/2"	5086.0	2.04	72.0	15.0	9/20		/		119063	.8	38.0	OIL BASED
981020	8 1/2"	5124.0	2.04	65.0	14.0	7/17		/		110909	.5	38.0	OIL BASED
981021	8 1/2"	5240.0	2.04	71.0	15.0	8/18		/		116500	.5	38.5	OIL BASED
981022	8 1/2"	5263.0	2.04	70.0	16.0	8/17		/		111652	.5	38.5	OIL BASED
981023	8 1/2"	5263.0	2.04	70.0	16.0	8/17		/		111652	.5	38.5	OIL BASED
981024	8 1/2"	5263.0	2.04	70.0	16.0	8/17		/		111652	.5	38.5	OIL BASED
981025	8 1/2"	5263.0	2.04	71.0	17.0	9/19		/		139629	.5	38.5	OIL BASED
981026	8 1/2"	5263.0	2.04	71.0	16.0	9/19		/		139600	.5	38.5	OIL BASED
981027	8 1/2"	5263.0	2.04	71.0	16.0	9/19		/		139600	.5	38.5	OIL BASED
981028	8 1/2"	5263.0	2.04	70.0	17.0	9/19		/		139600	.5	38.5	OIL BASED
981029	8 1/2"	5263.0	2.04	70.0	17.0	9/19		/		139600	.5	38.5	OIL BASED
981030	8 1/2"	5263.0	2.04	70.0	17.0	9/19		/		139600	.5	38.5	OIL BASED
981031	8 1/2"	5263.0	2.04	73.0	19.0	9/20		/		139600	.5	38.5	OIL BASED
981101	8 1/2"	5263.0	2.04	73.0	19.0	9/20		/		139600	.5	38.5	OIL BASED
981102	8 1/2"	5263.0	2.04	79.0	15.0	9/20		/		96900	.5	39.0	OIL BASED
981103	8 1/2"	5263.0	2.04	79.0	17.0	9/20		/		96900	.5	38.5	OIL BASED
981104	T&A		2.04	79.0	17.0	9/20		/		96900	.5	38.5	OIL BASED
981105	T&A		2.04	92.0	23.0	9/21		/		96900	.5		OIL BASED
981106	T&A		2.04	92.0	23.0	9/21		/		96900	.5		OIL BASED
981107	T&A		2.04	92.0	23.0	9/21		/		96900	.5		OIL BASED

**MUD MATERIALS USED**  
**6406/2-6**

**6.2.2**

**WELL**

Material	Unit	36" + 9 7/8" pilot hole	24"	17 1/2"	12 1/4"	8 1/2"	Total
Versapro OBM in	M3				430	492	922
Versapro OBM out	M3				492	435	927
Celpol SL	KG			10000			10000
Versavert Vis	KG				3775	900	4675
Versatrol	KG				5250	6825	12075
Versapro p/s	KG				1900	16150	35150
CaCl <sub>2</sub>	KG			950	7150	2000	10100
Glydril MC	LT			52350			52350
Barite	MT	254	18	646	441	544	1903
Base oil EDC 95/11	M3				163	199	362
Bentonite	MT	90	50				140
Citric Acid	KG			2450			2450
KCL Brine	M3			541			541
KCL Powder	KG			25			25
Lime	KG				10125	10625	20750
Soda Ash	KG	675	225	150			1050
CMC-EHV	KG	625	50	25	225	25	950
Novatec B	KG					11000	11000
Gel mud out	M3	543					543
Gel mud in	M3		543				543
Rhodopol 23P	KG			2775		200	2975
Lampac LV	KG	2075		-100			1975



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Title:

**GEOCHEMICAL ANALYSIS OF WELL  
6406/2-6**

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13 SEPT 1999

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