

OPERATOR STATOIL

WELL NO. 15/9-11

MATERIAL CONSUMPTION & COST ANALYSIS

36" HOLE DRILLED TO 175 Meters
~~Feet~~ 30 CASING SET AT 174 Meters
~~Feet~~

ACTUAL AMOUNT OF HOLE DRILLED 63 Meters
~~Feet~~ DAYS ON INTERVAL 2

DRILLING FLUID SYSTEM SPUD MUD-SEAWATER

MATERIAL	UNIT SIZE	PROG.	USED	VARIANCE ±	COST US\$
BENTONITE	M/T	10	10	0	3.240,00
SODA ASH	50 kg	5	7	+ 2	129,50
CAUSTIC	25 kg	8	14	+ 6	266,00
BARITE	M/T	10	0	-10	-

COST/DAY US\$ 1.817,75 TOTAL COST FOR INTERVAL US\$ 3.635,50

COST/Mt. or ~~FF~~ US\$ 57,71 PROG. COST FOR INTERVAL US\$ 4.824,00

ENGR. COST US\$ 1.425,00 COST VARIANCE FOR INTERVAL US\$ 1.188,50

OPERATOR STATOIL

WELL NO. 15/9-11

MATERIAL CONSUMPTION & COST ANALYSIS

26" HOLE DRILLED TO 585 Meters Feet 20 CASING SET AT 569 Meters Feet

ACTUAL AMOUNT OF HOLE DRILLED 410 Meters Feet DAYS ON INTERVAL 6

DRILLING FLUID SYSTEM BENTONITE/SEA WATER

MATERIAL	UNIT SIZE	PROG.	USED	VARIANCE ±	COST US\$
BENTONITE	M/T	32	30	- 2	9.720,00
BENTONITE	50 kg	0	82	+ 82	1.451,40
BARITE	M/T	30	130	+100	17.420,00
CAUSTIC	25 kg	40	97	+ 57	1.843,00
SODA ASH	50 kg	12	24	+ 12	444,00

COST/DAY US\$ 5.146,40 TOTAL COST FOR INTERVAL US\$ 30.878,40

COST/Mt. or Ft. US\$ 75,31 PROG. COST FOR INTERVAL US\$ 15.370,00

ENGR. COST US\$ 4.275,00 COST VARIANCE FOR INTERVAL US\$ 15.508,40

OPERATOR

STATOIL

WELL NO.

15/9-11

MATERIAL CONSUMPTION & COST ANALYSIS

17 1/2" HOLE DRILLED TO 1176 Meters 13 3/8" CASING SET AT 1160 Meters
X Feet X Feet

ACTUAL AMOUNT OF HOLE DRILLED 591 Meters 65 DAYS ON INTERVAL
Feet

DRILLING FLUID SYSTEM GEL/LIGNO/SEAWATER

MATERIAL	UNIT SIZE	PROG.	USED	VARIANCE ±	COST US\$
BARITE	M/T	50	24	- 26	3.216,00
BENTONITE	M/T	30	34	+ 4	11.016,00
BENTONITE	50 kg	0	10	+ 10	177,00
CHR.LIGNO	25 kg	150	73	- 77	1.255,60
CAUSTIC	25 kg	80	66	- 14	1.254,00
SODA ASH	50 kg	12	34	+ 22	629,00
CMC LV	-25 kg	50	67	+ 17	3.953,00
CMC HV	25 kg	0	5	+ 5	305,00
DRISPAC REG.	25 kg	20	8	- 12	1.354,40

COST/DAY US\$ 3.860,00 TOTAL COST FOR INTERVAL US\$ 23.160,00

COST/Mt. or Ft. US\$ 39,19 PROG. COST FOR INTERVAL US\$ 27.174,25

ENGR. COST US\$ 4.275,00 COST VARIANCE FOR INTERVAL US\$ 4.014,25

OPERATOR STATOIL

WELL NO. 15/9-11

MATERIAL CONSUMPTION & COST ANALYSIS

12 1/4" HOLE DRILLED TO 2590 ^{Meters} ~~Feet~~ 9 5/8" CASING SET AT 2575 ^{Meters} ~~Feet~~

ACTUAL AMOUNT OF HOLE DRILLED 1414 ^{Meters} ~~Feet~~ DAYS ON INTERVAL 22

DRILLING FLUID SYSTEM GEL/LIGNO/SEAWATER

MATERIAL	UNIT SIZE	PROG.	USED	VARIANCE ±	COST US\$
BENTONITE SX	50 kg	600	148	- 452	2.619,60
BENTONITE BULK	M/T	0	4	+ 4	1.296,00
BARITE	M/T	200	150	- 50	20.100,00
SODA ASH	50 kg	10	11	+ 1	203,50
CAUSTIC	25 kg	250	267	+ 17	5.073,00
SODIUM BICARB.	50 kg	4	8	+ 4	154,00
CHROME LIGNOSULF.	25 kg	550	288	- 262	4.953,60
CMC LV	25 kg	50	328	+ 278	19.352,00
AL. STEARATE	25 kg	10	0	- 10	
DRLG. DETERGENT	200 ltr	10	8	- 2	2.800,00
DRISPAC REG.	50 lbs	15	50	+ 35	8.465,00
CMC H.V	25 kg	0	34	+ 34	2.074,00
LIGNITE	25 kg	0	41	+ 41	1.230,00

COST/DAY US\$ 3.105,49 TOTAL COST FOR INTERVAL US\$ 68.320,70

COST/Mt. of Ft. ^{xx} US\$ 48,32 PROG. COST FOR INTERVAL US\$ 61.681,50
 coring not included

ENGR. COST US\$ 15.675,00 COST VARIANCE FOR INTERVAL US\$ 6.639,20

OPERATOR STATOIL

WELL NO. 15/9-11

MATERIAL CONSUMPTION & COST ANALYSIS

8 1/2" HOLE DRILLED TO 2.950 Meters ~~Feet~~ 7" LINER CASING SET AT 2.950 Meters ~~Feet~~

ACTUAL AMOUNT OF HOLE DRILLED 675 Meters ~~Feet~~ DAYS ON INTERVAL 11

DRILLING FLUID SYSTEM GEL/LIGNO/SEAWATER

MATERIAL	UNIT SIZE	PROG.	USED	VARIANCE ±	COST
BENTONITE SX	50 kg	60	24	- 36	US\$ 424,80
BENTONITE BULK	M/T				-
BARITE	M/T	15	21	+ 6	2.814,00
SODA ASH	50 kg	1	1	NIL	18,50
CAUSTIC	25 kg	25	27	+ 2	513,00
SODIUM BICARB	50 kg	NIL	19	+ 19	365,75
CHROME LIGNOSULF	25 kg	55	90	+ 35	1.548,00
CMC LV	25 kg	10	113	+ 103	6.667,00
AL. STEARATE	25 kg	1		- 1	
DRLG. DETERGENT	200 ltr				
DRISPAC REG	50 lbs	NIL	14	+ 14	2.370,20

COST/DAY	US\$ 1.338,29	TOTAL COST FOR INTERVAL	US\$ 14.721,25
COST/Mt. αα Ft.	US\$ 21,81	PROG. COST FOR INTERVAL Estimated to 2.800 m	US\$ 5.181,50
ENGR. COST	US\$ 6.056,25	COST VARIANCE FOR INTERVAL	US\$ 9.539,75

OPERATOR STATOIL

WELL NO. 15/9-11

MATERIAL CONSUMPTION & COST ANALYSIS

TESTING AND ABANDONMENT

DAYS ON INTERVAL 33

DRILLING FLUID SYSTEM

BENTONITE/S.W./LIGNOSULPHONATE

MATERIAL	UNIT SIZE	PROG.	USED	VARIANCE ±	COST US \$
BENTONITE	50 kg		101		1787,70
BARITE	M/T		40		5360,00
LIGNOSULPHONATE	25 kg		8		137,60
DRISPAC REGULAR	50 lbs		41		6941,30
CMC LoVis	25 kg		12		708,00
CAUSTIC	25 kg		19		361,00
SODA ASH	50 kg		3		55,50
SOD. BICARBONAT	50 kg		19		365,75

COST/DAY	US \$ 476,27	TOTAL COST FOR INTERVAL	US \$ 15.716,85
COST/Mt. or Ft.		PROG. COST FOR INTERVAL	
ENGR. COST		COST VARIANCE FOR INTERVAL	

OPERATOR STATOIL

WELL NO. 15/9-11

TOTAL CONSUMPTION & COST ANALYSIS

TOTAL DEPTH 2.950 Meters
~~Feet~~

TOTAL HOLE DRILLED 2.950 Meters
~~Feet~~

TOTAL DAYS 47

MATERIAL	UNIT SIZE	PROG.	USED	VARIANCE ±	COST US\$
BENTONITE	M/T	72	78	+ 6	25.272,-
BENTONITE	50 kg	660	264	- 396	4.672,80
BARITE	M/T	305	325	+ 20	43.550,00
LIGNOSULPHONATE CHR	25 kg	755	451	- 304	7.757,20
CHROME LIGNITE	25 kg	0	41	+ 41	1.230,00
CMC LV	25 kg	110	508	+ 398	29.972,00
CMC HV	25 kg	0	39	+ 39	2.379,00
DRISPAC REGULAR	50 lbs	35	72	+ 37	12.189,00
CAUSTIC SODA	50 kg	403	471	+ 67	8.949,00
SODA ASH	50 kg	40	77	+ 37	1.424,50
SODIUM BICARB.	50 kg	9	27	+ 8	519,75
DETERGENT	200 ltr	10	8	- 2	2.800,00

COST/DAY US\$ 2.993,95

TOTAL COST FOR ~~INTERVAL~~ ^{the well} US\$ 140.715,25

COST/Mt. or ~~Feet~~ US\$ 47,70

PROG. COST FOR ~~INTERVAL~~ ^{the well} US\$ 114.231,75

ENGR. COST US\$ 31.706,25

COST VARIANCE FOR INTERVAL US\$ 26.483,50



ANCHOR DRILLING FLUIDS AS

OSLO - STAVANGER

Drilling Fluid & Material Consumption Report

SYSTEM BENTONITE/LIGNOSULFONATE/SEA WATER

WELL NAME 15/9-11 AREA NORTH SEA NORWAY
 OPERATOR STATOIL RIG ROSS RIG
 ENGINEERS FORD/KORSVOLD/HANNAN/AASE

DATE	ESTIMATED DAILY MUD VOLUMES			BULK MATERIALS		SACK MATERIALS			MATERIALS ADDED TO CONTROL PROPERTIES																			
	LOOSSES SURFACE	LOSSES SURFACE	VOLUME MUD BUILT	BARITE	BENTONITE	BENTONITE	THINNERS				POLYMERS					CAUSTIC	SODA ASH	SOD. BICARB.	DETERGENT	OTHERS								
							LIGNO CHR.	LIGNITE	CMC	LOVIS	CMC	HIVIS	DRISPAC	REG.	CAUSTIC					SODA ASH	SOD. BICARB.	DETERGENT	MICA FINE	MICA COARSE	NUT	PLUG F	QUICK SEAL	
15 1.10		391	180	4	2	10											5	2										
16 2.10		38														2												
17 3.10		970	600	52	4	86	10							27		3	9	8	8									
18 4.10		135	370				36							31			26				1							
19 5.10		1138	1200	7			83							57		5	43				3							
20 6.10		1509	1800	38			54							42	22	8	41				3							
21 7.10		688	700	12			26							9	12	6	25				1							
22 8.10		229	250	7			4	2						4		3	13											
23 9.10		73	40	7.5			14	12						21		2	17											
24 10.10		10	88	4			1	10						16			7											
25 11.10		65	40					3						14			6											
26 12.10		19	100	2.5			2	7						17		2	13											
27 13.10		132	180			23	10	5						11		2	6	1										
28 14.10		49	45	9			13	2						17		1	11											
FORWARD	700	607	3646	150	72	82	73	0						67	5	8	172	63	0	0	110	3	100	15				
ESTIMATED TOTALS	700	6053	10859	293	78	201	320	41						333	59	42	394	74	8	8	110	3	100	15				
REMARKS																												



ANCHOR DRILLING FLUIDS AS

OSLO - STAVANGER

WELL NAME 15/9-11 AREA NORTH SEA NORWAY

Drilling Fluid & Material Consumption Report

OPERATOR STATOIL RIG ROSS RIG

ITEM BENTONITE/LIGNOSULFONATE/SEA WATER

ENGINEERS FORD/KORSVOLD HANNAN

	ESTIMATED DAILY MUD VOLUMES			BULK MATERIALS		SACK MATERIALS		MATERIALS ADDED TO CONTROL PROPERTIES																		
	LOSSES SURFACE	LOSSES SURFACE	VOLUME MUD BUILT	BARITE	BENTONITE	BENTONITE	LIGNO-CHR.	LIGNITE	THINNERS	CMC LOVIS	CMC	HIVIS	DRISPAC	REG.	CAUSTIC	SODA	ASH	SOD.	BICARB.	DETERGENT	MICA FINE	MICA COARSE	NUT	PLUG F	QUICK SEAL	
1981																										
43	29.10	62		5			9			9					4											
44	30.10	28	67	4						11		3			5											
45	31.10	30	40				13			17		1			4											
46	1.11						NIL USAGE																			
47	2.11	12	29	4																						
48	3.11		62									1						3								
49	4.11	90										1						1								
50	5.11	90					NIL USAGE																			
51	6.11	12					NIL USAGE																			
52	7.11											1						1								
53	8.11						NIL USAGE																			
FORWARD	907	7524	11947	312	78	264		429	41		471	39	67		458	77	24	8	110	3	100	15				
ESTIMATED TOTALS	907	7849	12145	325	78	264		451	41		508	39	74		471	77	29	8	110	3	100	15				

REMARKS



ANCHOR DRILLING FLUIDS AS

OSLO -- STAVANGER

Drilling Fluid & Material Consumption Report

SYSTEM BENTONITE/LIGNOSULFONATE/SEA WATER

WELL NAME 15/9-11 AREA NORTH SEA NORWAY

OPERATOR STATOIL RIG ROSS RIG

ENGINEERS AASE

DATE	ESTIMATED DAILY MUD VOLUMES			BULK MATERIALS			SACK MATERIALS			MATERIALS ADDED TO CONTROL PROPERTIES																				
	LOSSES SURFACE	LOSSES SURFACE	VOLUME MUD BUILT	BARITE	BENTONITE	BENTONITE	LIGNO CHR.	LIGNITE	THINNERS	CMC	LOVIS	CMC	HIVIS	DRISPAC	REG.	POLYMERS	CAUSTIC	SODA	ASH	SOD.	BICARB.	DETERGENT	MICA	FINE	MICA	COARSE	NUT	PLUG F.	QUICK SEAL	OTHERS
1981																														
54, 23.11		43		N I L	U S A G E																									
55, 24.11				N I L	U S A G E																									
56, 25.11		93		N I L	U S A G E																									
57, 26.11		48		4																										
58, 27.11		125	12										2							3										
59, 28.11		53	130	17	22	4							4				2	1	9											
60, 29.11		102	10		15								1				1	1	2											
61, 30.11				N I L	U S A G E																									
62, 1.12				N I L	U S A G E																									
63, 2.12		130				2							1																	
64, 3.12		15	25	3						6			1																	
65, 4.12		16	58	3						1										2										
66, 5.12			53	3	13	2				5			4				1	1	1											
FORWARD	907	7849	12145	325	78	264		451	41				508	39	74		471	77	29	8	110	3	100	15						
ESTIMATED TOTALS	907	8474	12433	355	78	314		459	41				520	39	87		475	80	46	8	110	3	100	15						

REMARKS



ANCHOR DRILLING FLUIDS AS

OSLO - STAVANGER

WELL NAME 15/9-11

AREA NORTH SEA NORWAY

Drilling Fluid & Material Consumption Report

OPERATOR STATOIL

RIG. ROSS RIG

WELL SYSTEM

BENTONITE/LIGNOSULFONATE/SEA WATER

ENGINEERS AASE/HANNAN

DATE	ESTIMATED DAILY MUD VOLUMES			BULK MATERIALS		SACK MATERIALS		MATERIALS ADDED TO CONTROL PROPERTIES																				
	LOSSES TO SURFACE	LOSSES SURFACE	VOLUME MUD BUILT	BARITE	BENTONITE	BENTONITE		LIGNO CHR.	LIGNITE	THINNERS	CMC	LOVIS	CMC	HVLS	DRISPAC	REG.	CAUSTIC	SODA	ASH	SOD.	BICARB.	DETERGENT	MICA FINE	MICA COARSE	NUT	PLUG F	QUICK SEAL	
1981																												
67	6.12	35	697	3		10								15			3			5								
68	7.12																											
69	8.12													2														
70	9.12	150	20	3										3			8											
71	10.12													2														
72	11.12	130	20											3			4											
73	12.12																											
74	13.12																											
75	14.12																											
76	15.12			2										1														
77	16.12	136		2																								
78	17.12																											
79	18.12																											
80	19.12	152																										
FORWARD	907	8474	12433	355	78	314		459	41			520	39	87			475	80	46	8	110	100	15	3				
ESTIMATED TOTALS	907	9077	13170	365	78	324		459	41			520	39	113			490	80	51	8	110	100	15	3				

REMARKS



ANCHOR DRILLING FLUIDS AS
OSLO – STAVANGER

Drilling Mud Properties Record

MUD SYSTEM BENTONITE/LIGNO/SEAWATER

WELL NAME 15/9-11 AREA North Sea Norw

OPERATOR STATOIL RIG ROSS RIG

ENGINEERS A. AASE/J. HANNAN/E. KORSVOLD

Day No	DATE	DEPTH FEET METERS	MUD PROPERTIES																		OPERATION REMARKS			
			DENSITY PPG SG	VISCOSITY			GELS		FLUID LOSS 30 Min cc's	CAKE 32 hrs	H.T.H.P. cc's	pH	Filtrate Analysis			RETORT		BENTONITE #/BBL	POTASH #/BBL	POLYMER #/BBL		"N"	"K"	
sec/qt	A.V. cps	P.V. cps	Y.P. #/100 sq.ft.	0	10	Cl ⁻ ppm	Ca ⁺⁺ ppm	Pf					% OIL	% SOLIDS	% SAND	% OIL	% SOLIDS							
1	17.9	-																						
2	18.9	175	1.03	150	46	17	58	32 47	N/C															
3	19.9	175	1.03	70	33.5	15	37	25 28	N/C															
4	20.9	177	1.05	71	33.5	15	37	25 28	N/C															
5	21.9	465	1.10	48	19	9	20	22 34	N/C															
6	22.9	550	1.10	46	20	8	24	16 20	N/C															
7	23.9	585	1.10	43	27.5	10	35	24 26	N/C															
8	24.9	585	1.25	42	23.5	7	33	21 25	N/C															
9	25.9	585	1.25	42	23.5	7	33	21 25	N/C															
10	26.9	585	1.07	55	30	12	36	25 35																
11	27.9	585	1.07	57	31	11	40	24 30																
12	28.9	588	1.06	48	30.5	7	47	23 28	N/C															
13	29.9	956	1.13	43	18	16	17	12 20	11.5															
14	30.9	1176	1.12	41	16	11	11	8 16	11.5															

REMARKS



ANCHOR DRILLING FLUIDS AS

OSLO - STAVANGER

Drilling Mud Properties Record

MUD SYSTEM GEL/LIGNO/SEAWATER

WELL NAME 15/9-11 AREA North Sea Norway

OPERATOR STATOIL RIG ROSS RIG

ENGINEERS FORD/KORSVOLD/AASE/HANNAN

Day No	DATE	DEPTH <small>FEET U METERS D</small>	MUD PROPERTIES																		OPERATION REMARKS						
			DENSITY PPG □ SG □	VISCOSITY				GELS 0	FLUID LOSS 30 Min cc's	CAKE 32 rds	H.T.H.P. cc's	PH	Filtrate Analysis			RETORT			BENTONITE #/BBL	POTASH #/BBL		POLYMER #/BBL	"N"	"K"			
				sec/qt	A.V. cps	P.V. cps	Y.P. #/100 sq.ft. 10						CF ppm	Ca. +- ppm	PI	% OIL	% SOLIDS	% SAND									
1981																											
15	1.10	1134	1.12	44	18.5	12	13	7 24	11.6	1.5	-	10.8	12800	160	.40	8	1/4	22.5									
16	2.10	1134	1.12	43	17	12	10	6 24	9.5	1.0	-	10.8	12000	160	.30	9	1/4	22.5									
17	3.10	1361	1.20	80	26	17	18	13 75	9.5	2.0	-	10.2	1200	240	.12	10	tr	22.5									
18	4.10	1663	1.17	66	24	16	16	9 65	8.9	1.0	-	9.8	15500	300	.15	10	tr	30.8									
19	5.10	1924	1.20	68	30.5	23	25	5 32	6.5	1.0	-	10.0	15800	360	.10	10	tr	35.0									
20	6.10	2127	1.21	59	28	20	16	3 16	6.0	1.0	11.2	9.9	19800	480	.10	9	1/4	25.0									
21	7.10	2261	1.20	42	22.5	16	13	2 10	5.9	1.0	11.4	10.7	19600	280	.22	9	tr	25.0									
22	8.10	2349	1.21	64	28	19	18	5 28	6.3	1.0	14.3	10.4	18200	280	.20	12	1/4	25.0									
23	9.10	2370	1.22	46	26	19	14	3 22	5.8	1.0	13.4	10.5	20500	300	.20	14	1/4	27.0									
24	10.10	2375	1.22	45	26	19	13	3 18	5.7	1.0	13.5	10.5	21000	280	.24	14	tr	30.0									
25	11.10	2395	1.22	45	24	17	14	3 18	5.6	1.0	13.8	10.7	21800	260	.30	13	tr	30.0									
26	12.10	2425	1.22	46	27	19	15	3 18	5.5	1.0	14.1	10.6	21500	260	.25	10	tr	32.0									
27	13.10	2428	1.22	46	25	18	14	3 16	5.3	1.0	11.1	10.5	21500	270	.23	12	tr	30.0									
28	14.10	2460	1.22	46	25	18	14	3 12	4.9	1.0	12.2	10.6	22000	160	.25	12	tr	32.5									
REMARKS																											



ANCHOR DRILLING FLUIDS AS

OSLO — STAVANGER

Drilling Mud Properties Record

MUD SYSTEM GEL/LIGNO/SEAWATER

WELL NAME 15/9-11

AREA North Sea Norway

OPERATOR STATOIL

RIG ROSS RIG

ENGINEERS HANNAN/AASE/KORSVOLD

Day No	DATE	DEPTH FEET U METERS X	MUD PROPERTIES																		OPERATION REMARKS				
			DENSITY PPG \square SG \square	VISCOSITY				GELS 0 10	FLUID LOSS 30 Min ccs	CAKE 32 nds	H.T.H.P. ccs	PH	Filtrate Analysis			RETORT		BENTONITE #/BBL	POTASH #/BBL	POLYMER #/BBL		"N"	"K"		
				Sec/qt	A.V. cps	P.V. cps	Y.P. #/100 sq.ft.						Ca ++ ppm	Cl ppm	Pt	% OIL	% SOLIDS							% SAND	
1981																									
29	15.10	2485	1.22	46	25	18	14	2 9	4.9	1	12.1	10.6	21500	220	.35		12	tr	28						
30	16.10	2510	1.22	50	28	20	16	3 10	4.8	1	11.9	10.3	21000	280	.30		12	tr	27.5						
31	17.10	2475	1.22	45	24	17	14	2 8	4.9	1	11.9	10.3	21200	200	.25		10	tr	25						
32	18.10	2538	1.22	45	23	16	14	3 10	4.9	1	11.9	10.4	20500	220	.30		11	tr	25						
33	19.10	2576	1.22	45	23	16	14	3 12	5.0	1	12.1	10.2	21000	220	.25		10	tr	25						
34	20.10	2590	1.22	46	23	16	14	3 11	5.0	1	12.1	10.2	20500	220	.25		10	tr	24						
35	21.10	2590	1.22	49	23	16	14	3 12	5.0	1	12.0	10.2	20500	220	.25		10	tr	23						
36	22.10	2590	1.23	47	23	16	14	3 11	5.0	1	12.0	10.1	20500	160	.20		10	tr	24						
37	23.10	2590	1.23	50	27	19	16	3 15	5.0	1	12.1	10.0	20500	180	.20		11	tr	25						
38	24.10	2590	1.22	45	25	18	14	3 13	5.6	1	12.4	11.6	21100	340	2.15		10	1/4	20						
39	25.10	2652	1.22	50	30	21	18	2 9	4.8	1	11.8	11.8	20000	220	1.70		10	tr	25						
40	26.10	2686	1.22	48	26.5	20	13	2 9	5.5	1	12.6	10.8	19000	160	0.45		10	tr	25						
41	27.10	2745	1.23	45	31	24	14	4 13	5.4	1	13.8	11.0	20600	220	0.85		11	tr	25						
42	28.10	2833	1.23	45	28	21	14	3 13	5.4	1	14.0	11.2	21200	180	0.35		10	tr	22.5						
REMARKS																									



ANCHOR DRILLING FLUIDS AS

OSLO — STAVANGER

Drilling mud Properties Record

MUD SYSTEM GEL/LIGNO/SEAWATER

WELL NAME 15/9-11 AREA NORTH SEA NORWAY

OPERATOR STATOIL RIG ROSS RIG

ENGINEERS D.FORD/A.AASE

Day No	DATE	DEPTH FEET () METERS (X)	MUD PROPERTIES																			OPERATION REMARKS					
			DENSITY PPG \square SG \square	VISCOSITY				GELS 0	FLUID LOSS 30 Min cc's	CAKE 32 nds	H.T.H.P. cc's	PH	Filtrate Analysis			RETORT			BENTONITE #/BBL	POTASH #/BBL	POLYMER #/BBL		"N"	"K"			
				sec/qt	A.V. cps	P.V. cps	Y.P. #/100 sq.ft.						10	CI ppm	Ca. ++ ppm	PI	% OIL	% SOLIDS							% SAND		
1981																											
43	29.10	2850	1.27	50	29	21	15	3	16	5.6	1	14:0	10.52	20000	320	.2	-	11	tr	20							
44	30.10	2891	1.27	45	28	21	14	3	10	5.2	1	14.0	10.52	22000	240	.3	-	12	tr	25							
45	31.10	2950	1.27	46	28	21	14	4	8	4.6	1	12.6	11.01	19000	180	.5	-	11	tr	32.5							
46	1.11	2950	1.27	46	28	21	14	4	9	4.6	1	12.6	11.02	21000	180	.5	-	11	tr	32.5							
47	2.11	2950	1.27	50	28	21	14	3	9	4.7	1	13.2	11.02	21000	160	.5	-	11	tr	35.0							
48	3.11	2950	1.27	50	28	22	12	3	9	4.7	1	13.4	11.52	21000	180	.5	-	11	tr	35.0							
49	4.11	2950	1.27	49	29	22	14	5	12	4.8	1	13.4	11.52	21000	240	.5	-	11	tr	35.0							
50	5.11	2950	1.27	48	28	22	13	3	5	4.6	1	13.6	11.52	21000	200	.5	-	11	tr	32.5							
51	6.11	2950	1.27	47	29	22	14	3	8	4.7	1	13.5	11.42	21000	200	.5	-	11	tr	32.5							
52	7.11	2950	1.27	48	29	22	14	3	7	4.8	1		11.5														Pulled the riser
53	8.11	2950	1.27	48	29	22	14	2	7	4.8	1		11.5														RIG ON STRIKE
REMARKS																											



ANCHOR DRILLING FLUIDS AS

OSLO - STAVANGER

WELL NAME 15/9-11

AREA NORTH SEA NORWAY

Drilling Mud Properties Record

OPERATOR STATOIL

RIG ROSS RIG

MUD SYSTEM GEL/ LIGNO / SEA WATER

ENGINEERS A. AASE

Day No	DATE	DEPTH FEET ^U METERS ^X	MUD PROPERTIES																				OPERATION REMARKS	
			DENSITY PPG ^D SG ^B	VISCOSITY				GELS 0	FLUID LOSS 30 Min cc's	CAKE 32 nds	H.T.H.P. cc's	PH	Filtrate Analysis			RETORT		BENTONITE #/BBL	POTASH #/BBL	POLYMER #/BBL	"N"	"K"		
				sec/qt	A.V. cps	P.V. cps	Y.P. #/100 sq.ft.						Ca. ++ ppm	PI	% OIL	% SOLIDS	% SAND							
1981																								
54	23/11	2950	1,27	45	28,5	22	13	2 7	4,8	1	13,2	11,0	21	320	0,5	11	TR	32,5						
55	24/11	2950	1,27	45	28,5	22	13	2 7	4,8	1	13,2	11,0	21	320	0,5	11	TR	32,5						
56	25/11	2950	1,27	47	28,5	22	13	2 7	4,8	1	13,2	11,0	21	320	0,5	11	TR	32,5						
57	26/11	2950	1,27	47	28,5	22	13	2 7	4,7	1	13,2	11,0	22	320	0,55	11	TR	32,5						
58	27/11	2068	1,27	47	26,5	19	15	3 11	4,8	1	13,2	11,0	21	320	0,7	11	TR	30,0						
59	28/11	2950	1,27	45	26,0	19	14	3 11	4,8	1	13,2	10,5	20	280	0,6	11	TR	27,5						
60	29/11	2925	1,27	49	28,5	21	15	3 12	4,9	1	13,5	11,0	18	200	1,15	11	TR	25,-						
61	30/11	2925	1,27	47	28,-	21	14	3 10	4,9	1	13,5	11,-	19	180	0,85	11	TR	25,-						
62	1/12	2925	1,27	46	25,5	19	13	2 8	4,9	1	13,5	11,-	19,2	180	0,8	11	TR	23,-						
63	2/12	2807	1,27	47	24,5	18	13	3 12	4,9	1	13,5	11,-	19	160	0,8	11	TR	25,-						
64	3/12	2738	1,27	47	25,5	19	13	3 12	5,0	1	13,8	11,-	20	180	0,6	11	TR	25,-						
65	4/12	2430	1,27	48	27,-	20	14	3 10	4,9	1	13,7	10,5	20,1	100	0,56	11	TR	25,-						
66	5/12	2450	1,27	47	26,5	20	13	3 10	4,9	1	13,9	11,-	20	150	0,7	11		22,5						
67	6/12	2450	1,15	43	20,5	14	13	2 7	5,-	1	14,1	10,0	20	240	0,3	6		10,-						
REMARKS																								



ANCHOR DRILLING FLUIDS AS

OSLO - STAVANGER

Drilling Mud Properties Record

MUD SYSTEM SEA WATER / LIGNO

WELL NAME 15/9-8 AREA NORTH SEA NORWAY

OPERATOR STATOIL RIG ROSS RIG

ENGINEERS HANNAN

Day No	DATE	DEPTH FEET METERS	MUD PROPERTIES																			OPERATION REMARKS			
			DENSITY PPG SG	VISCOSITY				GELS 0	FLUID LOSS 30 Min cc's	CAKE 32 rds	H.T.H.P. cc's	PH	Filtrate Analysis			RETORT		BENTONITE #/BBL	POTASH #/BBL	POLYMER #/BBL	"N"		"K"		
				sec/qt	A.V. cps	P.V. cps	Y.P. #/100 sq.ft.						Ca ++ ppm	PI	% OIL	% SOLIDS	% SAND								
1981																									
68	7/12	2450	1,15	41	19,5	13	13	2	5	5,0	1	14,1	10	20	220	0,3		6		10,-					
69	8/12	2450	1,15	49	25,5	18	15	2	6	5,0	1	14,1	10	20	220	0,2		6		10,-					
70	9/12	2450	1,15	47	22,5	15	15	3	10	5,0	1	14,2	11	21	280	0,6		6		10,-					
71	10/12	2450	1,16	46	24,-	17	14	2	7	5,0	1	14,1	10,5	20	240	0,25		6		10,-					
72	11/12	2427	1,16	46	24,-	17	14	2	7	5,1	1	14,2	11,-	20	310	0,26		6		10,-					
73	11/12	2427	1,16	44	22,5	16	13	2	5	5,1	1	14,2	11,-	20	310	0,25		6		10,-					
74	13/12	2427	1,16	44	23,-	16	14	2	4	5,1	1	14,2	11,-	20	290	0,25		6		10,-					
75	14/12	2427	1,16	44	24,-	17	14	2	4	5,0	1	14,1	11,-	19	200	0,41		6		10,-					
76	15/12	2427	1,16	43	20,5	14	13	2	4	5,1	1	14,1	10,5	20	210	0,22		6		10,-					
77	16/12	2427	1,16	44	23,-	16	14	2	4	5,1	1	14,1	10,5	20	180	0,21		6		10,-					
78	17/12	2360	1,16	44	22,5	16	13	2	5	5,1	1	-	10,5	20	180	0,25		6		10,-					
79	18/12	2360	1,16	44	22,5	16	13	2	5	5,1	1		10,5	20	180	0,25		6		10,-					
80	19/12	140	1,16	45	23,-	16	14	2	6	5,1	1		11,-	20	210	0,30		6		10,-					

REMARKS

VI RFT AND TEST SUMMARY

REPEAT FORMATION TESTER (RFT)

Two RFT runs were conducted in the Heimdal Formation, and two RFT runs were completed in Lower Mesozoic (Jurassic/Triassic). A listing of the RFT pressure points are given in table 1.

Run no. 1. Heimdal Formation:

2349.5 - 2522.0 m RKB

31 pretests records out of 35 were obtained.

One segregated sample was taken at 2387.5 m RKB.

Run no. 2. Heimdal Formation:

The purpose of run 2 was sampling, but was not successful due to slow response. Two sampling attempts at 2434.0 m RKB and 2431.5 m RKB were done.

Run no. 1. Mesozoic:

2790.5 - 2830.5 m RKB

22 pretests records out of 23 were obtained.

One segregated sample was taken at 2812.0 m RKB.

Run no. 2. Mesozoic:

2925.0 - 2938.0 m RKB

6 pretests records out of 8 were obtained.

One segregated sample was taken at 2825.8 - 2826.5 m RKB

CONCLUSION

Heimdal Formation:

No reliable gas gradient can be established from the RFT plot in Fig. 1. From fig. 2, where the RFT pressure points from well 15/9-9 and 15/9-11 are plotted, it is reasonable to assume the same gas gradient in these two wells (0.0276 bar/m, 0.122 psi/ft or 0.281 g/cc). The RFT indicates a gas/water contact at 2425 m RKB. The log analysis indicates a 100 % water saturation at 2442 m RKB and 50 - 80 % water saturation between 2425 and 2442 m RKB. The log interpretation was confirmed by DST no. 2, perforated interval 2432 - 2440 m RKB, where both gas/condensate and water were produced in large quantities. The gas/water contact is therefore picked at 2442 m RKB.

Mesozoic Formation:

A gas gradient of 0.0400 bar/m (0.177 psi/ft) or a gas density of 0.409 g/cc may be established down to the gas/water contact at 2825 m RKB. No reliable water gradient can be established out of the pretest points from 2825 m to 2831 m RKB and in the interval 2925 to 2932.5 m RKB. See Fig. 3.

Table 1: RFT pressure points 15/9-11

<u>Depth, m RKB</u>	<u>Pressure, kPa - g/cc</u>	<u>Run no.</u>	<u>Comments</u>
2349.5	24152.3 - 1.049	1	
2351.0	24662.5 - 1.070	1	Supercharge
2361.0	24193.7 - 1.045	1	
2387.5	24276.4 - 1.037	1	
2388.5	24338.5 - 1.039	1	
2388.5	24366.0 - 1.040	1	
2388.5	24269.5 - 1.036	1	
2388.5	24276.4 - 1.037	1	
2395.0	24283.3 - 1.034	1	
2401.0	24324.7 - 1.033	1	
2405.0	24393.6 - 1.035	1	Supercharge
2410.0	24359.1 - 1.031	1	
2416.0	24455.7 - 1.032	1	
2423.0	24448.8 - 1.029	1	
2431.0	24662.5 - 1.027	1	
2431.5	24359.2 - 1.022	2	
2432.0	24407.4 - 1.024	1	
2434.0	24424.3 - 1.023	1	
2434.0	24393.7 - 1.022	2	
2435.0	24386.7 - 1.021	1	
2436.0	24428.1 - 1.023	1	
2436.5	24490.1 - 1.025	1	
2436.5	24386.7 - 1.021	1	
2437.0	24421.2 - 1.022	1	
2439.0	24483.3 - 1.024	1	
2444.0	24566.0 - 1.025	1	
2446.0	24572.9 - 1.025	1	
2469.5	24786.6 - 1.024	1	
2475.5	24800.4 - 1.022	1	
2483.0	24896.9 - 1.023	1	
2488.5	24986.6 - 1.024	1	
2495.3	24044.4 - 1.024	1	
2500.0	25096.6 - 1.024	1	
2517.0	25214.1 - 1.022	1	
2790.8	29985.3 - 1.096	3	
2791.0	29895.7 - 1.090	3	
2796.0	29937.0 - 1.094	3	
2798.0	29902.5 - 1.090	3	

Table 1 continued.

<u>Depth, m RKB</u>	<u>Pressure, kPa - g/cc</u>	<u>Run no.</u>	<u>Comments</u>
2801.0	29916.3 - 1.089	3	
2804.0	29916.3 - 1.089	3	
2806.0	29930.1 - 1.088	3	
2809.0	29937.0 - 1.087	3	
2812.0	29943.9 - 1.086	3	
2816.0	29964.6 - 1.085	3	
2820.0	29985.3 - 1.085	3	
2823.0	30006.0 - 1.084	3	
2825.8	29985.3 - 1.082	4	
2826.0	30026.7 - 1.084	3	
2826.0	30012.9 - 1.083	4	
2826.5	30047.4 - 1.084	4	
2827.0	30040.5 - 1.084	3	
2828.0	30068.0 - 1.085	3	
2829.0	30102.5 - 1.085	3	
2830.0	30102.5 - 1.085	3	
2830.5	30109.4 - 1.085	3	
2927.5	31398.7 - 1.094	4	
2929.0	31405.6 - 1.093	4	
2932.5	31433.2 - 1.093	4	
2934.0	31426.3 - 1.092	4	
2936.0	31481.4 - 1.093	4	
2938.0	31474.5 - 1.093	4	

Fig. 1

15/9-11 FORMATION PRESSURE HEIMDAL FM

DEPTH
m RKB

2350

2400

2450

2500

2550

- RFT
- ★ DST No. 2
(PRESSURE AT GAUGE
DEPTH)

WATER GRADIENT: 0.0941 bar/m
0.960 g/cc
0.416 psi/ft

242.5

245

247.5

250

252.5 bar

3500

3520

3540

3560

3580

3600

3620

3640

3660

psig

PRESSURE

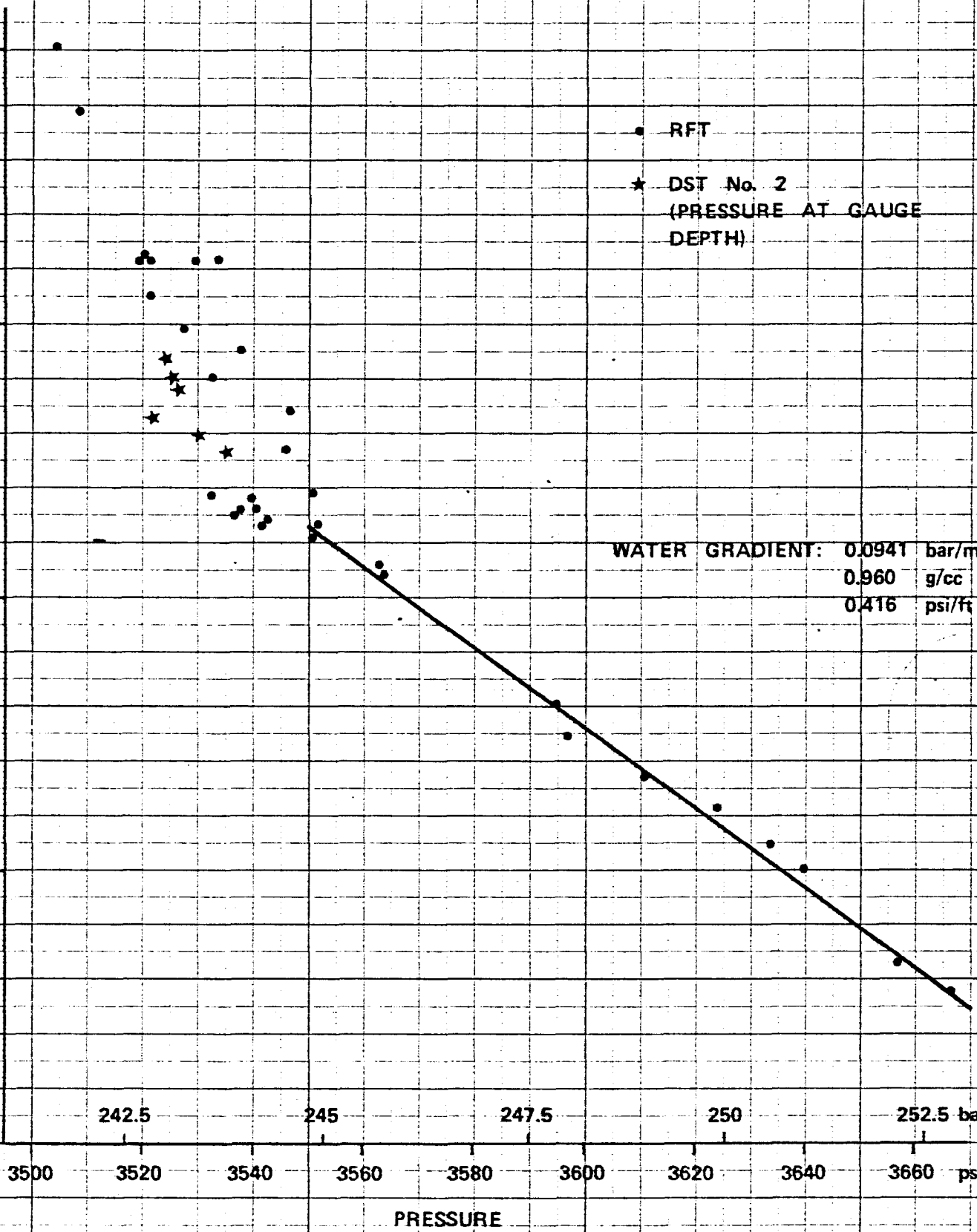


Fig. 2.

FORMATION PRESSURE COMPARISON 15/9-9 AND 15/9-11, HEIMDAL FM

DEPTH
m RKB

2300

2350

2400

2450

2500

- ★ 15/9-9
- 15/9-11

GAS GRADIENT: 0.0276 bar/m
0.281 g/cc
0.122 psi/ft

WATER GRADIENT: 0.0941 bar/m
0.960 g/cc
0.416 psi/ft

240

242.5

245

247.5

250

bar

3480

3500

3520

3540

3560

3580

3600

3620

3640

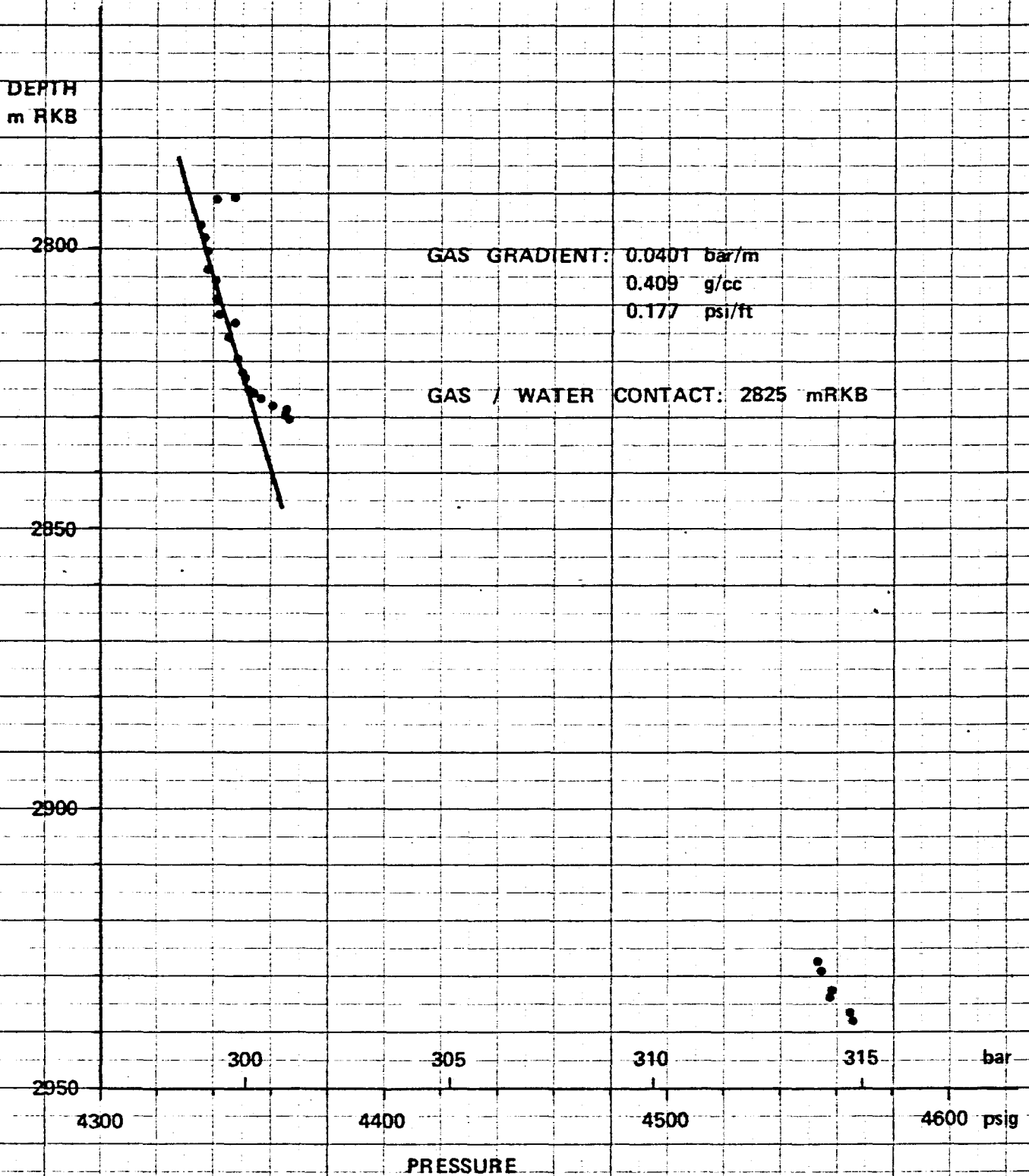
psig

PRESSURE



Fig. 3.

15/9-11 FORMATION PRESSURE JURASSIC / TRIASSIC FM



Testing 15/9-11

Three DST-tests were carried out in this well, one in the Mesozoic sandstone and two in the Heimdal sandstone formation. Results of the tests are presented in the attached tables.

DST no. 1

The objective of this test, perforated from 2797 - 2807 m RKB, was to obtain fluid samples and investigate reservoir properties of the hydrocarbon bearing Mesozoic sandstone. No sand was produced and CO₂ was 0.5 - 1.0%, H₂S negative. The well was flowed on 42/64" choke for a longer period producing gas and condensate with no water. Three sets of PVT-samples were taken at the separator.

DST no. 2

The objective of test no. 2, perforated at 2430 - 2442 m RKB, was to obtain fluid samples, to test the potential gas/water contact, investigate reservoir properties, test for possible water-cut (water saturation from logs up to 80%) and to check for sand production. After a long flow period on 32/64" choke the test had to be aborted due to leakage in the heater gas outlet. One good set of PVT samples was taken at the separator.

The well produced gas, condensate and water (680 BPD), and good samples of formation water were obtained. The well was opened on a 1" choke and sand was produced. This was reduced by choking back to 28/64" after a clean-up period. To be able to produce water a final flow on 32/64" choke was necessary. No H₂S was produced and the CO₂-content in the gas was 0.1 - 0.5%.

DST no. 3

The objective of test no. 3, perforated from 2395 - 2415 m RKB, was to obtain fluid samples, investigate reservoir properties and check for sand production in the main pay section of the Heimdal formation. The test was mechanically successful, opened up on 48/64" choke for a longer period, then shut-in for a longer period and then a multirate flow on three chokes with increasing sizes. The well was then shut-in for a final build-up. The well produced gas and condensate and PVT-samples were taken at the separator in both flow periods. No H₂S was produced and the CO₂-content was 0.7%. The BS+W was 0.8% and there was no sand produced.

DST NO 1-15/9-11

Interval Stratigraphy Unit	2789,5-2830 m RKB Mesozoic ---	
PETROPHYSICAL EVALUATION Net Pay Av. Vsh Av. Ø Av. Sw	30m 5,5% 21,2% 16,2%	
PERFORATED INTERVAL	2797-2807 m RKB	
FLOW DATA Choke size (mm) Gas Rate ($10^3 \text{ SM}^3/\text{D}$) Cond. Rate (SM^3/D) BHFP (Bars)	16.67 (42/64") 571 238 283.31	
BUILD UP ANALYSIS P* (Bars) kh ($\mu\text{m}^2\text{m}$) k (μm^2) S	Horner 299.48 16.008 (53266 md-ft) 0.534 (541 md) 147	
REMARKS 		

DST NO 2 - 15/9-11

Interval Stratigraphy Unit	2430 - 2442 m RKB Heimdal ----	
PETROPHYSICAL EVALUATION Net Pay Av. Vsh Av. Ø Av. Sw	-- 0,067 fractions 0,244 " " 0.801 " "	
PERFORATED INTERVAL	2432-2440 m RKB	
FLOW DATA Choke size (mm) Gas Rate ($10^3 \text{ SM}^3/\text{D}$) Cond. Rate (SM^3/D) BHFP (Bars)	12.70 (32/64") $233.785 \cdot 10^3 \text{ m}^3/\text{D}$ $104 \text{ m}^3/\text{D}$ 236.814	
'BUILD UP ANALYSIS P* (Bars) kh ($\mu\text{m}^2\text{m}$) k (μm^2) S	Horner 244.213 --- --- 55	
REMARKS Two-phase flow $q_w = 680 \text{ BPD} = 108 \text{ M}^3/\text{D}$ $K_w = 555 \text{ md} \rightarrow \left(\frac{k}{\mu}\right)_w = 1500 \frac{\text{md}}{\text{cp}}$ $k_g = 425 \text{ md} \rightarrow \left(\frac{k}{\mu}\right)_g = 14638 \frac{\text{md}}{\text{cp}}$ $h_f = 12\text{m} = 39.37 \text{ ft}$		

DST NO 3 -15/9-11

Interval Stratigraphy Unit	2386 - 2442 m RKB Heimdal ---	
PETROPHYSICAL EVALUATION		
Net Pay	40m	
Av. Vsh	16,4%	
Av. Ø	20,0%	
Av. Sw	23,0%	
PERFORATED INTERVAL	2395-2415 m RKB	
FLOW DATA	FIRST FLOW	MULTIPLE FLOW (last rate)
Choke size (mm)	19,05 (48/64")	31,75 (80/64")
Gas Rate ($10^3 \text{ SM}^3/\text{D}$)	570,867	890,848
Cond. Rate (SM^3/D)	265,67	434,67
BHFP (Bars)	236,835	234,077
BUILD UP ANALYSIS	HORNER	MULTIRATE
P* (Bars)	242,847	242,88
kh ($\mu\text{m}^2\text{m}$)	15,564	.16.05
k (μm^2)	0.410 (415 md)	0.422 (428 md)
S	57	54
REMARKS		