

FORMATION PRESSURE
REPEAT FORMATION TESTER, STRAIN GAUGE

RUN/ TEST NO	DEPTH (m RKB)	INITIAL HYDROSTATIC PRESSURE (bar)	FORMATION PRESSURE (bar)	FINAL HYDROSTATIC PRESSURE (bar)	EST PERM/ REMARKS
2A/1	2120.3	252.38	-9999.00	252.33	TIGHT
2	2145.0	255.27	-9999.00	255.24	TIGHT
3	2151.5	256.03	-9999.00	255.96	TIGHT
4	2168.5	258.19	-9999.00	258.19	TIGHT
5	2170.5	258.23	-9999.00	258.21	TIGHT
6	2170.6	258.23	218.25	261.19	POOR
7	2171.5	258.33	218.36	-9999.00	V GOOD
8	2173.0	258.52	218.49	258.50	V GOOD
9	2176.6	258.94	218.83	258.94	GOOD
10	2178.5	259.15	219.07	259.14	FAIR
11	2186.0	260.02	219.80	260.02	FAIR
12	2194.0	260.95	220.54	260.97	V GOOD
13	2199.1	261.09	221.09	261.59	V GOOD
14	2202.5	261.95	221.41	261.97	V GOOD
15	2372.5	281.77	238.60	281.75	V GOOD
16	2381.5	282.84	239.48	282.79	V GOOD
17	2394.5	284.35	-9999.00	284.35	TIGHT
18	2409.5	286.06	242.26	286.08	V GOOD

NOTE: Values of -9999.00 indicate missing data
(tight formation or tool failure)

Analysis of RFT samples from runs 2A, 2BRaw data from wellsiteRUN No 2A

			<u>1st chamber</u>	<u>2nd Chamber</u>
Depth	m RKB	:	2171.5	
Chamber volume	gal	:	6	
Filling time	min	:	-	
P _{shut in} /Temp	bar/°C	:	7.5*	
P _{opening} /Temp	bar/°C	:	-	
Gas volume	Sm ³	:	0.3	
Oil volume	litre	:	0.25	
Oil gravity	API	:	37	
Water/filtrate	litre	:	0.65	
Water/filtrate	ppm C ₁	:	107000	
Mud filtrate	ppm C ₁	:	136000	
Gas composition %	C ₁	:	9.5070	
	C ₂	:	1.4479	
	C ₃	:	8.9091	
	IC ₄	:	1.4095	
	NC ₄	:	1.2134	
	H ₂ S	:	0	

Remarks: *Chamber was not filled due to plugging.

RUN No 2B

			<u>1st chamber</u>	<u>2nd Chamber</u>
Depth	m RKB	:	2171.5	2171.5
Chamber volume	gal	:	2.75	1
Filling time	min	:	90	60
P _{shut in} /Temp	bar/ ^o C	:	216.8	
P _{opening} /Temp	bar/ ^o C	:	-	*
Gas volume	Sm ³	:	10.5	
Oil volume	litre	:	4.0	
Oil gravity	API	:	37	
Water/filtrate	litre	:	4.5	
Water/filtrate	ppm C ₁	:	106000	
Mud filtrate	ppm C ₁	:	136000	
Gas composition %	C ₁	:	10.5336	
	C ₂	:	7.9888	
	C ₃	:	3.7912	
	IC ₄	:	0.5984	
	NC ₄	:	0.8136	
	H ₂ S	:	0	

Remarks: *Chamber not opened on rig.

DST RESULTS		WELL: 31/4-9	
DST NO.	1		
Perforated Interval	2193.1-2208.1 mRKB		
	Main flow	Inj Flow	
Choke (mm)	50.8		
N ₂ Inj.Rate (m ³ /hr)	840.0		
N ₂ Inj.depth (m RKB)	2108.0		
Water rate (m ³ /D)	575.0	576.0	
Flowing BHP (Bar)*	203.07	245.67	
Flowing BHT (Deg C)*	90.8	24.2	
Flowing WHP (Bar)	5.62	161.36	
Flowing WHT (Deg C)	48.4	23.2	
BSW (%)	Tr of sand		
CO ₂ (%)	0.4		
H ₂ S (ppm)	< 0.5		
Water gravity S.G	1.037		
* SDP/Strain 85 381, sensor depth at 2158.1 mRKB.			
Checked: B.E. Knudsen Date: 17.11.87			

DST RESULTS	WELL: 31/4-9
DST NO.	2
Perforated Interval	2169.6-2171.6 mRKB
Choke (mm)	12.7
Oil rate (Sm ³ /D)	311.1
Gas rate (Sm ³ /D)	23 253.0
GOR (Sm ³ /Sm ³)	74.7
Flowing BHP (Bar) *	195.75
Flowing BHT (Deg. C) *	88.1
Flowing WHP (Bar)	48.78
Flowing WHT (Deg. C)	19.9
P _{sep} (Bar)	11.9
T _{sep} (Deg. C)	32.5
H ₂ S (ppm)	0
CO ₂ (%)	0.5 - 1
BSW (%) **	7 - 8
Oil gravity (g/cc)	0.875
Gas gravity (air=1)	0.769

* SDP Strain 85 381, sensor depth at 2116.7 m RKB.

** Average amount of water + emulsion during main flow period.

RFT RESULTS

WELL: 31/4-9

Run no.2A

Segregated sample at 2171.5m – Results from drainage on rig floor.
6 gal chamber : 0.3 Sm³ gas (9.5% C1, 1.4%C2, 8.9%C3, 1.4%IC4, 1.2%nC4),
0 l oil
0.65 l filtrate

Remarks: Chamber was not filled due to plugging.

Run no.2B

Segregated sample at 2171.5m – Results from drainage on rig floor.
2 ³/₄ gal chamber : 10.5 Sm³ gas (10.5%C1, 8.0%C2, 3.8%C3,
0.6%IC4, 0.8%NC4)

4.0 l oil

4.5 l filtrate

Remarks: 1 gal chamber was not opened on the rig.

Checked: B.E.Knudsen
Date: 19.11.87

((((ooo)	Daily mud properties										Date			Date		
	System : Boredata Sandnes										10/8-1987			10/8-1987		
	Well: 31/4-9 Mud Contractor: Dresser Data: "Mid depth" from table 3, otherwise from table 14													14		

Date	Mid. depth m, MD	Mud dens. (SG)	PV cps	YP mPa	GEL 0 mPa	GEL 10 mPa	Ph	100 psi (cc)	HP/HT (cc)	Cl- inn/out mg/l	Alkalinity			Ca++ inn/out mg/l	Oil %	Sol %	H2O %	V.G. meter at 115 gr. F						Mud type			
											Pf	Pm	Mf					600 rpm	300 rpm	200 rpm	100 rpm	6 rpm	3 rpm				
870121	170	1.03	0	0																				Spud mud			
870122	170	1.03	0	0																					Spud mud		
870123	253	1.03	0	0																					Spud mud		
870124	466	1.03	0	0																					Spud mud		
870125	920	1.03	0	0																					Spud mud		
870126	970	1.03	0	0																					Spud mud		
870127	974	1.03	99	99																					Spud mud		
870128	974	1.25	25	15	1	1	9.3	4.6		59000/59000		0.3	0.3				9			80	55	44	28	3	2	KCl/Polymer	
870129	1087	1.25	27	18	2	2	9.7	4.9	21	59000/59000	0.1	0.3	0.4				9			90	63	49	31	5	4	KCl/Polymer	
870130	1363	1.25	25	17	2	2	9.1	5	23	74000/74000	0	0.2	0.3				10			84	59	43	29	4	2	KCl/Polymer	
870131	1458	1.4	27	15	2	2	8.7	5.4	24	78000/78000	0	0.2	0.3							83	56	42	27	3	2	KCl/Polymer	
870201	2027	1.4	34	20	3	4	8.9	5.1	22	76000/76000	0	0.3	0.4							16							KCl/Polymer
870202	2027	1.4	31	18	2	4	8.5	5.2	24	74000/74000	0	0.2	0.3							16	97	66	50	23	6	3	KCl/Polymer
870203	2027	1.4	30	17	2	4	8.4	5.3	24	76000/76000	0	0.2	0.3							16	94	64	48	22	5	3	NaCl/CaCo3/
870204	2033	1.2	28	9	2	3	10	3.6	16	133000/133000	0	0.5	0.3							73	45	34	20	3	2	NaCl/CaCo3/	
870205	2104	1.2	30	11	1	1	9.6	3.2	13.8	130000/130000	0	0.9	0.3							81	51	38	22	2	1	NaCl/CaCo3/	
870206	2115	1.2	27	8	1	1	9.8	2.9	14.2	127000/127000	0	1.2	0.3							10	70	43	30	18	2	1	NaCl/CaCo3/
870207	2141	1.2	28	9	1	1	9.9	3.1	14.4	128000/128000	0	0.9	0.3							10	73	45	34	20	2	1	NaCl/CaCo3/
870208	2177	1.21	25	7	1	1	10.5	3	14.4	126000/126000	0.1	1.4	0.4							10	64	39	29	18	2	1	NaCl/CaCo3/
870209	2222	1.21	27	10	1	2	9.9	2.6	14.2	130000/130000	0.1	0.9	0.4							10	73	46	35	22	3	2	NaCl/CaCo3/
870210	2377	1.21	29	10	1	2	10.5	2.8	13.4	140000/140000	0.1	1.2	0.4							11	79	50	39	24	3	2	NaCl/CaCo3/
870211	2480	1.2	26	10	1	2	10.5	3	14.6	138000/138000	0.1	1.5	0.6							11	71	45	35	22	3	2	NaCl/CaCo3/
870212	2480	1.2	26	10	1	2	9.7	3.2	14.8	136000/136000	0.1	1.4	0.7							11	71	45	33	20	3	2	NaCl/CaCo3/
870213	2480	1.2	26	10	1	2	9.7	3.2	14.8	136000/136000	0.1	1.4	0.7							11	71	45	33	20	3	2	NaCl/CaCo3/
870214	2479	1.2	26	8	1	2	9.6	2.4	14.4	132000/132000	0	1.1	0.4							11	66	41	31	19	3	2	NaCl/CaCo3/
870215	2479	1.2	25	8	1	2	9.7	2.2	14.8	132000/132000	0	0.9	0.6							11	66	41	31	19	3	2	NaCl/CaCo3/
870216	2479	1.2	25	7	1	2	11.2	3.2		122000/122000	0.9	5.8	1.5							11	63	38	28	17	2	1	NaCl/CaCo3/
870217	2479	1.2	31	10	1	3	11.2	3.4		120000/120000	0.8	5.6	1.4							11	84	51	36	26	4	3	NaCl/CaCo3/
870218	2394	1.2	31	10	1	3	11.2	3.4		120000/120000	0.8	5.6	1.4							11	84	51	36	26	4	3	NaCl/CaCo3/
870219	2242	1.2	33	10	1	3	11.1	3		121000/121000	0.7	5.4	1.5							11	86	53	39	23	3	2	NaCl/CaCo3/
870220	2242	1.2	33	10	1	3	11.1	3		121000/121000	0.7	5.4	1.5							11	86	53	39	23	3	2	NaCl/CaCo3/
870221	2242	1.2	33	10	1	3	11.1	3		121000/121000	0.7	5.4	1.5							11	86	53	39	23	3	2	NaCl/CaCo3/
870222	2242	1.2	33	10	1	3	11.1	3		121000/121000	0.7	5.4	1.5							11	86	53	39	23	3	2	NaCl/CaCo3/
870223	2242	1.2	33	10	1	3	11	3.2		122000/122000	0.7	5.4	1.4							11	86	52	40	23	3	2	NaCl/CaCo3/
870224	2242	1.2	30	10	1	3	11	3.4		120000/120000	0.7	5.3	1.3							11	84	52	39	22	3	2	NaCl/CaCo3/
870225	2242	1.2	36	12	1	3	11.1	3.9		117000/117000	0.8	5.9	1.7							11	96	60	44	27	3	2	NaCl/CaCo3/
870226	2177	1.2	36	12	1	3	11.2	3.8		116000/116000	0.8	5.9	1.7							11	96	60	44	27	3	2	NaCl/CaCo3/
870227	2177	1.2	35	11	1	3	11.2	3.8		114000/114000	0.8	5.9	1.7							11	93	58	43	26	3	2	NaCl/CaCo3/
870228	2177	1.2	35	12	1	3	11.2	3.8		140000/140000	0.8	5.9	1.7							11	93	58	43	26	3	2	NaCl/CaCo3/
870301	2177	1.2	35	11	1	2	11.2	3.9		113000/113000	0.8	5.9	1.7							11	79	57	42	23	3	2	NaCl/CaCo3/

((((ooo)	Daily mud properties			Date	Date
	System : Boredata Sandnes			10/8-1987	10/8-1987
Norsk	Well: 31/4-9				
Hydro	Mud Contractor: Dresser				
	Data: "Mid depth" from table 3, otherwise from table 14			3	14 3

Date	Mid. depth m,MD	Mud dens. (SG)	PV cps	YP mPa	GEL		Ph	100 psi (cc)	HP/HT (cc)	Cl- inn/out mg/l	Alkalinity			Ca++ inn/out mg/l	Oil %	Sol %	H2O %	V.G. meter at 115 gr. F						Mud type	
					0	10					Pf	Pm	Mf					600 rpm	300 rpm	200 rpm	100 rpm	6	3		
870302	2177	1.2	29	10	1	2	11.1	4.5		101000/101000	0.7	4.5	1.5					11	78	49	36	21	2	1	NaCl/CaCo3/
870303	2159	1.2	29	10	1	2	11.1	4.5		101000/101000	0.7	5	1.5					11	78	49	36	21	2	1	NaCl/CaCo3/
870304	1800	1.2	29	10	1	2	11.2	4.5		100000/100000	0.7	5.2	1.6					11	78	49	36	21	2	1	NaCl/CaCo3/
870305	849	1.2	29	10	1	2	11.2	4.5		100000/100000	0.7	5.2	1.6					11	78	49	36	21	2	1	NaCl/CaCo3/
870306	169	1.2	29	10	1	2	11.2	4.5		100000/100000	0.7	5.2	1.6					11	78	49	36	21	2	1	NaCl/CaCo3/
870307	0	1.2	29	10	1	2	11.2	4.5		100000/100000	0.7	5.2	1.6					11	78	49	36	21	2	1	NaCl/CaCo3/
870308	0	1.2	29	10	1	2	11.2	4.5		100000/100000	0.7	5.2	1.6					11	78	49	36	21	2	1	NaCl/CaCo3/

TABLE B-6

TOTAL MATERIAL CONSUMPTION

<u>Product</u>	<u>Units</u>	<u>Unit size</u>
Magcobar	265	mT
Magcogel	52	mT
CaCO ₃	36488	Kg
NaCl-powder	11274	Kg
KCl-powder	39897	Kg
NaCl brine	254	m ³
KCl brine	191	m ³
A/S FL30000	4531	Kg
A/S FL100	3478	Kg
XCD polymer	1409	Kg
Drispac SL	1816	Kg
Bicarbonate	1656	Kg
Soda Ash	316	Kg
Lime	1799	Kg
Caustic	1252	Ltr
SAPP	155	Kg