

WELL TEST RESULTS

WELL: 35/9-1

TEST No.	1	2	3
PERFORATED INTERVAL (m RKB MD)	2285.8-2291.8	2225.4-2249.4	2100.3-2138.3
CHOKE SIZE (mm)	25.4	17.46	25.4
OIL/COND. FLOW RATE (Sm ³ /D)	903	199	179
GAS FLOW RATE (Sm ³ /D)	256777	598291	912528
GOR (Sm ³ /Sm ³)	284	3014	5098
OIL/COND. GRAVITY (g/cc)	0.815	0.728	0.749
GAS GRAVITY (air=1)	0.705	0.681	0.705
FWHP (bar)	73.5	150.6	116.5
SIWHP (bar)	151	95	60
WHT (deg C)	45	46	40
BHT (deg C)	79.9	78.2	74.2
BHFP (bar)	207.5	231.6	227.6
BHSIP (bar)	232.5	233.4	230.2
BS&W (%)	0	0.5	0
CO2 (%)	0	0.4	0.4
H2S (ppm)	0	0	0
K (mD)	870	1395	592
S	16	81.7	24
Pi (bar)	234.5	233.5	230.2
DEPTH OF BH MEASUREMENTS	2238.5m RKB MD	2178.2m RKB MD	2042m RKB MD

Daily mud properties

Date
-1989

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System : BORE

Norsk Well: 35/9-1
Hydro Mud Contractor: M-I,Norge
Data: "Mid depth" from table 3, otherwise from table 14.

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Date	Mid depth m, MD	Mud Dens. (SG)	PV cp	YP Pa	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 Pa	10 Pa					Pf	Pm	Mf					600 rpm	300 rpm	200 rpm	100 rpm	6 rpm	3 rpm		
890329	384	1.48	0	0																			OLD KCL MUD		
890330	384	1.30	12	7																			KCL		
890331	384	1.05	0	0																			SPUDMUD		
890401	456	1.05	0	0																			SPUDMUD		
890402	466	1.05	0	0																			SPUDMUD		
890403	693	1.05	0	0																			SPUDMUD		
890404	815	1.05	0	0																			SPUDMUD		
890405	815	1.08	21	8	1	1	8.0	8.0		42000/42000			0.50						58	31	30	20	2	1	KCL/POLYM
890406	815	1.08	21	8	1	1	8.0	8.0		42000/42000			0.50						58	37	30	20	2	1	KCL/POLY
890407	815	1.08	21	8	1	1	8.0	8.0		42000/42000			0.50						58	37	30	20	2	1	KCL/POLY
890408	886	1.10	13	5	1	1	9.8	10.0		44000/44000	0.35	2.00	1.20					36	23	17	11	1	1	KCL/POLY	
890409	1335	1.20	18	7	1	1	9.8	10.0		51000/51000	0.35	2.00	1.20					36	23	17	11	1	1	KCL/POLY	
890410	1605	1.20	17	8	1	2	8.0	6.4		55000/55000	0.01	0.01	0.80			12		51	34	27	17	3	2	KCL/POLY	
890411	1739	1.20	16	7	1	1	7.6	6.7		55000/55000			0.70			12		45	29	21	14	3	2	KCL/POLYMER	
890412	1850	1.22	17	8	1	3	7.8	6.5		54000/54000			0.80			13		50	33	26	16	4	2	KCL/POLYMER	
890413	1942	1.25	17	8	3	8	7.8	6.8		57000/57000			0.80			15		51	34	28	19	6	4	KCL/POLYMER	
890414	1942	1.25	17	8	3	7	7.7	6.6		57000/57000			0.80			14		50	33	26	18	6	4	KCL/POLYMER	
890415	1942	1.25	16	7	2	5	7.7	6.8		58000/58000			0.80			14		46	30	24	17	4	3	KCL/POLYMER	
890416	1942	1.25	13	5	2	5	10.8	7.8		55000/55000	0.45	3.40	1.30			14		36	23	18	12	3	2	KCL/POLYMER	
890417	1942	1.25	15	6	2	4	8.7	6.0		46000/46000	0.70	1.00	4.80			14		42	27	20	14	3	2	KCL/POLYMER	
890418	1942	1.25	14	6	2	4	9.0	6.0		46000/46000	0.70	1.00	4.00			14		40	26	20	13	3	2	KCL/POLYMER	
890419	1945	1.25	12	6	2	4	10.5	6.2		47000/47000	3.00	4.20	6.50			14		36	24	19	11	3	2	KCL/POLYMER	
890420	1945	1.25	12	6	2	4	10.5	6.2		46000/46000	2.00	3.30	5.00			14		35	23	18	11	3	2	KCL/POLYMER	
890421	1948	1.25	14	6	2	4	10.0	5.4		44000/44000	2.40	5.80	4.50			14		40	26	18	12	3	2	KCL/POLYMER	
890422	2040	1.25	24	6	1	4	11.2	9.5		34000/34000	3.00	6.80	5.90			11		67	43	33	21	3	2	KCL/POLYMER	
890423	2081	1.25	22	9	1	2	11.7	3.8		33000/33000	2.70	6.70	5.20			11		61	39	28	17	3	2	KCL/POLYMER	
890424	2120	1.28	23	8	1	2	11.8	4.0		34000/34000	2.90	7.10	5.80			0	13	87	62	39	28	16	3	2	KCL/POLYMER
890425	2144	1.28	20	6	1	2	8.8	3.8		32000/32000	1.90	2.40	5.80			0	13	87	52	32	23	14	2	1	KCL/POLYMER
890426	2218	1.28	23	8	1	2	8.7	4.0	11.0	26000/26000	0.70	1.30	4.00			0	13	87	63	40	30	18	3	2	KCL/POLYMER
890427	2241	1.28	21	7	1	2	8.7	3.5	11.0	27000/27000	0.70	1.40	3.80			0	13	87	56	35	25	15	2	1	KCL/POLYMER
890428	2269	1.28	24	8	1	2	8.8	3.6	11.4	26000/26000	0.70	1.30	3.60			0	13	87	64	40	30	18	3	2	KCL/POLYMER
890429	2306	1.28	24	7	1	2	8.8	3.1	12.4	27000/27000	0.70	1.20	3.60			0	13	87	62	38	29	18	3	2	KCL/POLYMER
890430	2316	1.28	22	6	1	2	8.8	2.8	10.0	28000/28000	0.70	0.95	3.10			0	13	87	56	34	25	15	2	1	KCL/POLYMER
890501	2350	1.28	24	8	1	2	8.8	3.4	11.0	26000/26000	0.70	1.00	3.40			0	13	87	64	40	30	18	3	2	KCL/POLYMER
890502	2350	1.28	24	8	1	2	8.8	3.6	11.4	26000/26000	0.80	1.20	3.40			0	13	87	65	41	30	17	3	2	KCL/POLYMER
890503	2350	1.28	24	9	1	2	8.8	3.6	11.4	26000/26000	0.80	1.20	3.60			0	13	87	65	41	30	17	3	2	KCL/POLYMER
890504	2350	1.28	23	8	1	2	8.8	3.6	11.2	25000/25000	0.70	1.20	3.40			0	13	87	62	39	30	17	3	2	KCL/POLYMER
890505	2319	1.28	23	8	1	2	9.0	3.6	11.6	25000/25000	0.80	1.40	3.60			0	13	87	61	38	29	16	3	2	KCL/POLYMER
890506	2313	1.28	25	11	2	9	9.5	3.8	11.8	26000/26000	0.50	1.50	1.60			0	13	87	71	46	35	23	5	4	KCL/POLYMER
890706	2308	1.25	15	10	2	5	10.5		1.0	8000/8000	1.90	2.90	4.20			0	11	89	50	35	28	19	4	3	POLYMER
890707	2308	1.25	15	10	2	5	10.5		1.0	8000/8000	1.90	2.90	4.20			0	11	89	50	35	28	19	4	2	POLYMER
890708	2308	1.25	15	10	2	5	10.5		1.0	8000/8000	1.90	2.90	4.20			0	11	89	50	35	28	19	4	2	POLYMER
890709	2308	1.26	0	0																					POLYMER
890710	2308	1.26	0	0																					POLYMER

TABLE B-10: DAILY MUD PROPERTIES

Daily mud properties

Date
6-11-1989

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System : BORE

Norsk Hydro Well: 35/9-1
Mud Contractor: M-I, Norge
Data: "Mid depth" from table 3, otherwise from table 14.

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Date	Mid. depth m, MD	Mud Dens. (SG)	FV cp	YP Pa	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 Pa	10 Pa					Pf	Pm	Mf					600 rpm	300 rpm	200 rpm	100 rpm	6 rpm	3 rpm			
890711	2308	1.25	18	9	1	3	10.5			8000/8000	1.50	2.80	4.30					11		50	40	31	22	7	6	POLYMER
890712	2308	1.25	16	8	1	3	10.5			8000/8000	1.50	2.80	3.50					11		49	33	22	15	4	3	POLYMER
890713	2280	1.25	18	16	4	9	10.5				1.40	2.10	3.10					11		69	51	42	30	9	6	POLYMER
890714	2280	1.25	18	16	4	9	10.5				1.40	2.10	3.10					11		69	57	42	30	9	6	POLYMER
890715	2280	1.25	19	16	4	9	10.5				1.40	2.10	3.00					11		70	51	42	30	10	7	POLYMER
890716	2280	1.25	19	16	4	9	10.5				1.40	2.10	3.00					11		70	51	42	30	10	7	POLYMER
890717	2280	1.25	18	15	3	6	10.2				1.30	2.00	3.00					11		67	49	37	25	9	7	POLYMER
890718	2224	1.25	19	18	4	9	10.0	4.9		8000/8000	0.90	1.70	2.50					11		75	56	48	36	11	8	POLYMER
890719	2224	1.25	18	17	4	8	10.0	5.0		8000/8000	0.90	1.70	2.50					11		71	53	46	34	11	8	POLYMER
890720	2224	1.25	18	17	4	8	10.0	5.0		8000/8000	0.90	1.70	2.50					11		71	53	46	34	10	7	POLYMER
890721	2224	1.25	18	18	4	8	10.0	5.0		8000/8000	0.90	1.70	2.50					11		71	53	46	34	11	8	POLYMER
890722	2224	1.25	18	18	4	8	10.0	5.0		8000/8000	0.90	1.70	2.50					11		71	53	46	35	11	8	POLYMER
890723	2224	1.25	18	15	3	6	10.0	5.2		8000/8000	0.90	1.70	2.50					11		66	48	37	26	8	6	POLYMER
890724	1715	1.25	18	15	3	6	10.0	5.2		8000/8000	0.90	1.70	2.50					11		66	48	37	26	8	6	POLYMER
890725	437	1.25	18	15	3	6	10.0	5.2		8000/8000	0.90	1.70	2.50					11		66	48	37	26	8	6	POLYMER

TABLE B-11: MUD CONSUMPTION

((((ooo)	M u d c o n s u m p t i o n ----- System : BORE	Date 5/11-1989
Norsk Hydro	Well: 35/9-1 Mud company: M-I,Norge	13
		Actual used

Drilling of 36 " hole		

	MAGCOGEL Kg	19000
	CAUSTIC 1	200
Drilling of 26 " hole		

	MAGCOGEL Kg	60000
	CAUSTIC 1	870
Drilling of 17 1/2" hole		

	GYPSUM Kg	1091
	KCL POWDER Kg	17464
	MAGCOBAR Kg	47000
	MAGCOGEL Kg	1000
	MAGCOPOL LV Kg	7416
	MAGCOPOL REG Kg	7211
	POLY PLUS Kg	341
	SOD BICARBONATE Kg	5579
	XANTHAN GUM Kg	717
	CONQOR 404 1	50
	KCL BRINE 1	444000
Drilling of 8 1/2" hole		

	GYPSUM Kg	5613
	KCL-POWDER Kg	4319
	MAGCOBAR Kg	77000
	MAGCOPOL LV Kg	2584
	MAGCOPOL REG Kg	1168
	SOD BICARBONATE Kg	9324
	XC-POLYMER Kg	671
	CONQOR 404 1	278
	OILEX 1	208
	OS-1L 1	208
Test no. 3		

	MACOBAR Kg	13000
	XANTHAN Kg	186
Test no. 2		

	MACOBAR Kg	17000
	MAGCOPOL REG Kg	183
	XANTHAN Kg	352
Test no. 1		

	BENTONITE Kg	5000

((((ooo) ----- Norsk Hydro	M u d c o n s u m p t i o n ----- System : BORE Well: 35/9-1 Mud company: M-I,Norge	Date 5/11-1989 13
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		Actual used
MACOBAR	Kg	90000
MAGCOPOL REG	Kg	1040
SOD BICARB	Kg	1878
XANTHAN	Kg	456
CONQOR 404	l	208

Norsk Hydro a.s Bergen
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Doc. type: Agreement Amendment Report

Storage: 2 years 5 years Permanent archives

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Doc. id
R-040695

Copy no.

Distribution	Title
Statoil (2) Norske Shell (2) Petrobras (2) Deminex (2) NPD (1) Hydro	OIL CHARACTERISATION AND CORRELATION WELL: 35/9-1

Summary/Conclusion//Recommendation

BA-90-725-1
30 MARS 1990
REGISTRERT
OLJEDIREKTORATET

Keywords

Oil, correlation, geochemistry.
Biomarkers, isotopes.

Pages-appendix 6	Amendment no. 0	Revision no.	Revision date
Quadrant/Block-well 35/9-1	Project no. KA 595	Licens no. 153	Date 06.03.90
Department	GEOSECTION		
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INTRODUCTION

In this report the oil produced from well 35/9-1 is characterised by geochemical methods and correlated with oils/condensates from well 35/11-2 using gas chromatography of whole oil and alkane- and aromatic fractions, biological markers and stable isotopes.

The following samples have been included:

- 35/9-1 DST#1
- 35/11-2 DST#3
- 35/11-2 DST#4
- 35/11-2 DST#5

Compilation of this report and all analyses, except stable isotopes, which have been undertaken by GeolabNor, have been carried out at Norsk Hydro Research Center in Bergen.

WELL	DST #	ASPH %	SATURATES %	AROMATICS %	POLARS %
35/9-1	1	0	69	28	3
35/11-2	3	0	72	25	3
35/11-2	4	0	70	25	5
35/11-2	5	0	69	27	4

Table 1: Group type separation data.

Gas chromatography of alkane fraction.

WELL	DST #	Pr/n-C17	Pr/Ph	CPI1	CPI2
35/9-1	1	0.57	2.21	1.11	1.00
35/11-2	3	0.52	2.58	1.12	0.97
35/11-2	4	0.52	2.86	1.12	0.97
35/11-2	5	0.53	2.40	1.12	0.99

Table 2: Molecular data from GC of alkane fractions.

Oil 35/9-1.

Gas chromatography of aromatic fraction.

WELL	DST #	MPI 1	MPI 2
35/9-1	1	0.59	0.68
35/11-2	3	0.57	0.44
35/11-2	4	0.53	0.66
35/11-2	5	0.58	0.69

Table 3: Methylphenanthrene indices.

Biological markers.

The distribution of biological markers of sterane and triterpane type is given in Appendix IV, and the molecular parameters are listed in Table 4. The distribution of mono- and triaromatic steroids is given in Appendix V.

WELL	DST #	20S %	$\alpha\beta$ %	Ts/Tm	Sterane/Titerpane
35/9-1	1	57	68	3.53	0.49
35/11-2	3	61	67	3.69	0.57
35/11-2	4	58	66	3.92	0.58
35/11-2	5	59	66	3.61	0.70

Table 4: Biomarker ratios from GC-MS of alkane fraction.

Oil 35/9-1.

WELL	DST #	STERANE CARBON NUMBER			
		%C30	%C29	%C28	%C27
35/9-1	1	6	36	25	33
35/11-2	3	4	40	21	35
35/11-2	4	4	40	20	36
35/11-2	5	5	37	23	35

Table 5: Sterane carbon number distribution.

Results from metastable ion monitoring of the steranes and triterpanes are presented in bargraph form in Appendix VI.

Oil 35/9-1.

Stable isotopes.

WELL	DST #	OIL $\delta^{13}\text{C}$	SAT $\delta^{13}\text{C}$	ARO $\delta^{13}\text{C}$	POL. $\delta^{13}\text{C}$	ASPH $\delta^{13}\text{C}$
35/9-1	1	-27.2	-28.2	-27.0	-26.9	
35/11-2	3	-27.3	-27.8	-26.5	-26.4	
35/11-2	4	-27.1	-27.8	-26.6	-26.5	
35/11-2	5	-27.6	-28.3	-26.8	-26.6	

Table 6: Stable isotopic composition of oils and fractions.

Oil 35/9-1.