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HYDRO

FORMATION PRESSURE WORKSHEET

Well No. : 35/9-2

Rig : Vildkat Explorer

Date : 13.02.91

Pressure Units : bar

RKB-MSL : 25 m

Witnessed by : K.Noerve

Run No.	Depth (MD)	Depth TVD (RKB)	Initial Hydrostatic Press		Formation Pressure		Final Hydrostatic Press		Time		Mob-ratio mD/cP	Temp C	pp
			Strain	HP	Strain	HP	Strain	HP	Set	Retract			
3A/1	2103.4	2096.3	253.76	253.87	230.37	230.41	253.77	253.88	07.13	07.17	276.0	63.1	1.12
3A/2	2111.5	2104.3	254.71	254.83	230.53	230.58	254.70	254.85	07.29	07.33	57.3	63.4	1.118
3A/3	2118.0	2110.8	255.55	255.68	230.68	230.74	255.54	255.68	07.42	07.46	405.9	63.8	1.114
3A/4	2124.0	2116.9	256.25	256.40	230.82	230.87	256.25	256.40	07.58	08.02	306.7	64.3	1.112
3A/5	2150.5	2143.3	259.39	259.54	231.33	231.39	259.40	259.55	08.17	08.21	1201.5	64.7	1.101
3A/6	2188.5	2181.4	263.92	264.07	232.19	232.24	263.92	264.08	08.38	08.45	204.0	65.7	1.085
3A/7	2194.0	2187.0	264.58	264.73	232.39	232.46	264.58	264.73	09.00	09.04	230.6	65.8	1.084
3A/8	2201.0	2194.0	265.49	265.63	232.43	232.54	265.50	265.63	09.15	09.22	3.6	66.1	1.081
3A/9	2206.3	2199.2	266.14	266.27	232.50	232.56	266.14	266.27	09.31	09.34	38.3	66.3	1.078
3A/10	2211.0	2203.7	266.71	266.83	232.58	232.64	266.72	266.83	09.45	09.48	205.1	66.4	1.077
3A/11	2248.0	2240.9	271.05	271.26	233.36	233.41	271.05	271.26	09.58	10.01	903.6	67.1	1.062
3A/12	2252.5	2245.3	271.57	271.78	233.45	233.51	271.64	271.85	10.09	10.13	101.2	67.4	1.061
3A/13	2273.0	2265.9	274.07	274.28	233.87	233.92	274.06	274.28	10.21	10.24	213.9	67.7	1.053
3A/14	2284.0	2276.8	275.38	275.60	234.11	234.17	275.38	275.60	10.30	10.34	214.2	68.4	1.049

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Rig : Vildkat Explorer

Date : 13.02.91

Pressure Units : bar

RKB-MSL : 25

Witnessed by : K.Noerve

Run No. Test No.	Depth (MD)	Depth TVD (RKB)	Initial Hydrostatic Press		Formation Pressure		Final Hydrostatic Press		Time		Mob-ratio mD/cP	Temp C	pp
			Strain	HP	Strain	HP	Strain	HP	Set	Retract			
3A/15	2293.5	2286.2	276.52	276.73	234.31	234.37	276.52	276.73	10.41	10.46	28.1	68.7	1.045
3A/16	2299.0	2291.8	777.15	277.35	234.41	234.47	277.13	277.35	11.17	11.21	36.6	69.3	1.043
3A/17	2301.0	2293.9	277.37	277.56	234.46	234.51	277.31	277.58	10.59	11.08	152.9	69.3	1.042
3A/18	2305.0	2297.9	277.85	278.06	234.52	234.59	277.83	278.05	11.30	11.34	37.1	69.5	1.041
3A/19	2307.8	2300.7	278.17	278.38	234.58	234.65	278.18	278.41	11.42	11.48	100.3	69.7	1.040
3A/20	2321.0	2313.7	279.74	279.96	234.87	234.92	279.74	279.96	11.59	12.03	109.3	69.7	1.035
3A/21	2324.0	2316.7	280.10	280.32	234.93	234.97	280.09	280.30	12.10	12.14	502.1	69.9	1.034
3A/22	2327.0	2319.8	280.45	280.67	235.10	235.15	280.44	280.66	12.22	12.26	130.5	70.0	1.034
3A/23	2329.0	2321.9	280.69	280.90	235.18	235.29	280.66	280.89	12.34	12.38	133.6	70.1	1.033
3A/24	2331.5	2323.2	280.99	281.20	235.37	235.45	280.98	280.19	12.45	12.49	158.4	70.1	1.033
3A/25	2334.5	2327.2	281.39	281.60	235.58	235.65	281.37	281.59	12.59	13.04	94.9	70.2	1.033
3A/26	2369.0	2361.8	285.48	285.74	237.87	237.95	285.46	285.69	13.13	13.17	285.1	70.8	1.027
3A/27	2371.5	2364.1	285.77	285.99	238.20	238.18	285.74	285.98	13.23	13.27	154.0	71.2	1.027
3A/28	2397.5	2390.2	288.85	289.12	240.51	240.70	288.80	289.05	13.36	13.45	53.4	72.0	1.027

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FORMATION PRESSURE WORKSHEET

Well No. : 35/9-2

Rig : Vildkat Explorer

Date : 13/2-91

Pressure Units : bar

RKB-MSL : 25m

Witnessed by : A.Waldum

Run No. Test No.	Depth (MD)	Depth TVD (RKB)	Initial Hydrostatic Press		Formation Pressure		Final Hydrostatic Press		Time		Remarks		
			Strain	HP	Strain	HP	Strain	HP	Set	Retract	Mob-rat mD/cp	Temp C	pp
3A/29	2400.0	2392.9	289.12	289.35	240.79	240.99	289.09	289.35	13.53	13.56	5.8	72.2	1.027
3A/30	2482.0	2474.9	298.97	299.10	248.97	249.06	298.83	299.08	14.20	14.25	209.2	74.2	1.026
3A/31	2486.0	2478.9	299.33	299.56	249.33	249.44	299.30	299.54	14.33	14.36	45.5	74.3	1.026
3A/32	2500.2	2493.1	301.00	301.28	250.74	250.85	300.97	301.24	14.44	14.47	50.2	74.8	1.026
3A/33	2509.0	2501.7	302.04	302.29	251.57	251.68	301.99	302.23	14.58	15.02	28.9	75.5	1.026
3A/34	2621.7	-	315.41	315.69	264.67	264.87	315.34	315.64	15.39	15.45	1.9	78.8	-
3A/35	2626.5	-	315.93	316.17	265.13	265.18	315.88	316.11	16.01	16.05	109.1	79.5	-
3A/36	2641.0	2633.5	317.62	317.89	266.46	266.60	317.60	317.84	16.20	16.25	5.2	80.0	1.032
3A/37	2644.9	2637.3	318.06	318.32	266.90	266.96	318.06	318.29	16.38	16.45	91.1	80.3	1.032
3A/38	2697.0	2689.5	324.27	324.60	271.97	272.12	324.23	342.47	17.02	17.12	27.0	82.6	1.032
3A/39	2709.0	2701.4	325.71	325.99	273.15	273.32	325.68	325.92	17.29	17.33	15.0	83.4	1.032
3A/40	2757.3	2749.8	331.40	331.70	286.40	286.60	331.34	331.63	17.57	18.02	4.9	85.7	1.060
3A/41	2760.5	2753.0	331.75	331.89	278.19	278.24	331.68	331.91	18.26	18.35	38.7	86.7	1.031
3A/42	2768.8	2761.0	332.71	333.02	278.98	279.11	332.38	332.60	18.44	18.54	10.8	87.4	1.030

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FORMATION PRESSURE WORKSHEET

Well No. : 35/9-2

Rig : Vildkat Explorer

Date : 16.02.91

Pressure Units : bar

RKB-MSL : 25m

Witnessed by : A. Waldum / E. Tammemagi

Run No.	Depth (MD)	Depth TVD (RKB)	Initial Hydrostatic Press		Formation Pressure		Final Hydrostatic Press		Time		Remarks
			Strain	HP	Strain	HP	Strain	HP	Set	Retract	
3B/1	2368.8		283.06	283.21	----	----	----	----	09:26	09:27	Seal failure 60 C
2	2368.8		283.02	283.21	237.82	237.86	----	----	09:34	11:26	Press. gain ceased because of plugging. Sampling stopped.
3	2368.9		283.02	283.21	237.81	237.89	----	----	11:35	11:39	
4	2367.0		282.75	283.00	Tight		----	----	11:45	11:46	Attempted to sample by opening and closing seal.
5	2368.4		282.93	283.18	Tight		----	----	11:55	11:57	
6	2368.6		282.90	283.18	237.99	237.88			12:00	12:16	Resealed twice
	Seal pressure in 2 3/4 gal chamber				237.77	237.86			12:16	12:28	Chamber appeared full
	Seal pressure in 1.00 gal chamber				237.72	237.82			12.28	12:42	Draw down 211.9/207.0

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FORMATION FLUID SAMPLING

Well : 35/9-2

Rig : Vildkat Explorer

Pretest No. : 1		Sample Depth : 2368.6 mRKB		Witnesses : A.Waldum/E. Tammemagi	
Run No. :3B	Sample No. : 1	1st Chamber	2nd Chamber	3rd Chamber	
Chamber volume (gals/litres)		2-3/4 gal	1 gal		
Chamber No.		RFS BC 12	RES AD 1222		
Filling time (mins.)		Approx 180	14		
Shut in press. (bar)/T deg C		HPG 237.7-9 / 60	HPG 237.82 / 60	/	
Chamber press. (surf bar)/T		39 / 9	14 / 9	/	
Gas volume (SCF/Sm3)		0.2 SCF	0.1 SCF		
Oil volume (litres)		0	0		
Oil gravity (API/gm/cc)		- / -	-		
Water / Filtrate (litres)		9.75	3.0		
Water / Filtrate PPM CL-		34,200	33,500		
Water filtrate pH/pF/Ca++		7.2 / 0 / 460	7.1 / 0 / 420	/ /	
Mud filtrate PPM CL-		46,000			
Mud filtrate pH/pF/Ca++		8.2 / 0 / 380	/ /	/ /	
Gas composition %	C1	50.36	90.02		
	C2	40.72	6.04		
	C3	6.84	2.93		
	IC4	1.09	0.60		
	NC4	1.00	0.41		
	H2S	-	-		
	CO2	-	-		

Remarks :

Upper Chamber - sampled at 2368.8m, plugged off - resampled at 2368.9, 2367, 2368.4 and 2368.6m. Chamber full on second attempt at last depth.

Lower Chamber - sampled and filled at 2368.6m

Rw - Upper Chamber 0.129 @ 9 deg C, Lower Chamber 0.143 @ 8 deg C.

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FORMATION FLUID SAMPLING

Well : 35/9-2

Rig : Vildkat Explorer

Pretest No. : 24		Sample Depth : 2331.5 mRKB		Witnesses : A.Waldum	
Run No. :3A	Sample No. : 1	1st Chamber	2nd Chamber	3rd Chamber	
Chamber volume (gals/litres)		2.75	1		
Chamber No.		RFS BC 12	RES AB 1197		
Filling time (mins.)		126	53		
Shut in press. (bar)/T deg C		HPG 235.23/ 71.8	HPG 235.37/ 72.0	/	
Chamber press. (surf bar)/T		122 / 5	/	/	
Gas volume (SCF/Sm3)		28.5 SCF			
Oil volume (litres)		6.5			
Oil gravity (API/gm/cc)		36/0.851			
Water / Filtrate (litres)		0			
Water / Filtrate PPM CL-					
Water filtrate pH/pF/Ca++		/ /	/ /	/ /	
Mud filtrate PPM CL-		48000			
Mud filtrate pH/pF/Ca++		8.2 / 4.9 / 220	/ /	/ /	
Gas composition %	C1	8.43			
	C2	0.715			
	C3	0.319			
	IC4	0.076			
	NC4	0.041			
	H2S	-----			
	CO2	-----			

Remarks :

Refractometer-reading:1.473: -0.851 g/cc
-36 API

	Max draw down pressure	Shut in pressure	Sampling pressure
2.75 gallon	54 bar	235.10 bar (STG)	70-80 bar
1.00 gallon	68 bar	235.19 bar (STG)	70 bar



WELL TEST RESULT

WELL: 35/9-2

TEST NO.	Family 1	Family 2 gas	3
PERFORATED INTERVAL(m MD RKB)	2329.9-2342.4	2295.5-2310.5	2187.2-2211.2
CHOKE SIZE (mm)	12.7	25.4	25.4
OIL/COND. FLOW RATE /Sm ³ /D)	289	206	205
GAS FLOW RATE (Sm ³ /D)	206300	881000	803000
GOR (Sm ³ /Sm ³)	714	4276	3902
OIL/COND. GRAVITY (g/cc) @ 15°C	0.826	0.72	0.732
GAS GRAVITY (air=1)	0.608	0.668	0.664
FWHP (bar)	144.4	112.7	106.6
SIWHP(bar) (max)	127.7	187.9	183.6
WHT (deg C)	44.6	47.3	43.3
BHT (deg C)	83.8	83.2	79.3
BHFP (bar)	227.0	228.7	212.8
BHSIP (bar)	233.6	232.9	230.1
BS&W (%)	0	0	0
CO2 (%) (Max)	0.6	0.5	0.5
H2S (ppm) (Max)	0	0	0
K (mD)	2562	1558	30
S	37	8.0	-2.6
Pi (bar)	235.8	234.4	232.1
DEPTH OF BH MEASUREMENTS	2304.9m TVD MSL	2270.7m TVD MSL	2167.0m TVD MSL



WELL TEST RESULT

WELL: 35/9-2

TEST NO.	4		
PERFORATED INTERVAL(m MD RKB)	2100.6-2130.6		
CHOKE SIZE (mm)	25.4		
OIL/COND. FLOW RATE /Sm ³ /D)	202		
GAS FLOW RATE (Sm ³ /D)	954000		
GOR (Sm ³ /Sm ³)	4717		
OIL/COND. GRAVITY (g/cc) @ 15°C	0.726		
GAS GRAVITY (air=1)	0.664		
FWHP (bar)	118.8		
SIWHP(bar)	100.6		
WHT (deg C)	43.8		
BHT (deg C)	76.7		
BHFP (bar)	226.1		
BHSIP (bar)	228.9		
BS&W (%)	0		
CO2 (%) (Max)	0.5		
H2S (ppm) (Max)	0		
K (mD)	2809		
S	-2.5		
Pi (bar)	230.6		
DEPTH OF BH MEASUREMENTS	2083.4m TVD MSL		

Daily mud properties															Date								
															29/8-1991								
System : BORE																							
Well: 35/9-2																							
Mud Contractor: BAROID																							
Data: "Mid depth" from table 3, otherwise from table 14.															14.								
Date	m,MD	(SG)	cp	Pa	Pa	Pa	pH	(cc)	(cc)	mg/l	Alkalinity	Ca++	Oil	Sol:H2O	V.G. meter at 115 gr. F:	6:	3:	Mud					
											Pf	Pm	Mf	mg/l	%	%	%	rpm	rpm	rpm	rpm	Type	
910101	464	1.05	1	1																		SPUD	
910102	477	1.05	1	1																		SPUD	
910103	477	1.05	1	1																		SPUD	
910106	478	1.05	1	1			9.0															SPUD	
910107	478	1.05	1	1			9.0															SPUD	
910108	478	1.05	1	1																		SPUD	
910110	994	1.05	1	1																		SPUD	
910111	1018	1.05	1	1																		SPUD	
910112	1018	1.11	19	14	5	8	9.0	5.7		61000/61000	0.20	0.40	0.90	240/240	0			66	47	39	28	12	9:KCL
910113	1018	1.12	19	14	5	7	9.0	5.7		61000/61000	0.20	0.40	0.90	240/240	0			66	47	39	28	12	9:KCL
910114	1060	1.12	10	7	3	4	7.9	6.4		55000/55000			1.00	500/500	0	9	91	33	23	20	16	6	5:KCL
910115	1297	1.13	11	11	4	6	8.4	5.0		57000/57000	0.20	0.20	1.50	320/320	0	10	90	44	33	27	21	8	7:KCL
910116	1310	1.14	10	11	4	6	8.5	5.0		60000/60000	0.20	0.30	1.50	280/280	0	10	90	42	32	27	20	8	6:KCL
910117	1336	1.18	11	10	3	6	8.4	5.4		54000/54000	0.10	0.20	1.20	240/240	0	10	90	42	31	25	18	7	6:KCL
910118	1646	1.19	8	12	3	12	8.6	5.2		60000/60000	0.20	0.30	1.30	340/340	0	11	89	41	33	28	21	7	6:KCL
910119	1759	1.20	15	11	3	12	8.3	5.6		57000/57000	0.10	0.05	1.10	300/300	0	13	87	52	37	30	22	7	7:KCL
910120	1918	1.20	15	11	4	15	8.3	5.6		61000/61000	0.20	0.10	1.20	340/340	0	14	86	52	37	29	21	8	7:KCL
910121	1953	1.22	14	10	4	16	8.4	5.3		61000/61000	0.20	0.30	1.10	250/250	0	15	85	48	34	26	19	7	6:KCL
910122	1953	1.22	14	10	3	15	8.3	5.4		61000/61000	0.10	0.30	1.00	250/250	0	15	85	48	34	25	18	7	6:KCL
910123	1953	1.22	16	11	3	13	8.2	5.4		58000/58000	0.10	0.10	1.00	280/280	0	16	84	52	37	25	18	6	5:KCL
910124	2106	1.22	14	11	3	12	8.5	5.6	14.5	55000/55000	0.20	0.40	1.10	260/260	0	15	85	49	35	25	18	6	5:KCL
910125	2111	1.23	15	9	3	13	8.5	4.8	8.4	54000/54000	0.20	0.40	1.20	300/300	0	14	86	47	32	25	18	5	4:KCL
910126	2142	1.22	16	11	4	16	8.3	4.6	7.4	54000/54000	0.10	0.20	1.20	280/280	0	16	84	54	38	29	21	8	7:KCL
910127	2272	1.22	13	12	3	12	8.3	5.2	7.4	53000/53000	0.05	0.05	1.20	220/220	0	15	85	49	36	29	21	6	5:KCL
910128	2327	1.22	13	11	3	11	8.3	4.8	9.2	53000/53000	0.05	0.05	0.20	220/220	0	15	85	48	35	29	21	6	5:KCL
910129	2350	1.22	13	10	3	10	8.3	4.6	9.2	53000/53000	0.10	0.10	0.20	180/180	0	10	90	46	33	28	20	6	5:KCL
910130	2393	1.22	12	10	3	11	8.3	5.3	9.6	52000/52000	0.10	0.10	0.40	160/160	0	10	90	46	33	27	20	6	5:KCL
910131	2421	1.22	15	10	3	11	8.2	4.8	9.3	52000/52000	0.10	0.10	1.20	180/180	0	10	90	46	33	27	20	7	6:KCL
910201	2483	1.22	11	9	3	12	8.3	4.8	9.4	52000/52000			1.00	220/220	0	10	90	40	20	24	18	6	4:KCL
910202	2537	1.22	12	8	3	10	8.3	4.9	9.5	52000/52000			1.00	200/200	0	13	87	41	29	24	18	5	4:KCL
910203	2564	1.22	12	9	3	10	8.3	4.6	9.6	52000/52000			1.00	200/200	0	9	91	42	28	23	18	6	5:KCL
910204	2621	1.22	13	8	3	10	8.2	5.5	10.0	52000/52000			1.00	200/200	0	9	91	44	31	26	20	6	5:KCL
910205	2666	1.22	12	10	3	11	8.2	5.3	10.0	53000/53000			1.00	180/180	0	9	91	44	32	26	19	6	5:KCL
910206	2694	1.22	12	11	3	10	8.2	5.1	10.0	52000/52000			1.30	200/200	0	9	91	46	34	27	20	7	5:KCL
910207	2732	1.22	13	10	3	9	8.2	4.9	4.9	52000/52000			1.20	200/200	0	9	91	46	33	28	20	7	5:KCL
910208	2765	1.22	13	9	3	10	8.2	5.5	9.6	52000/52000			1.10	200/200	0	9	91	44	31	27	20	7	5:KCL
910209	2778	1.22	11	11	3	9	8.2	5.0	9.3	48000/48000			1.10	200/200	0	9	91	44	33	27	21	6	3:KCL
910210	2856	1.22	12	11	3	9	8.2	4.9	9.3	48000/48000			1.10	200/200	0	9	91	46	34	27	21	6	3:KCL
910211	2885	1.22	13	10	3	8	8.2	5.5	9.8	50000/50000	0.50		1.10	200/200	0	13	87	46	33	27	20	7	5:KCL
910212	2885	1.22	13	10	3	8	8.2	5.4	9.8	50000/50000	0.50		1.20	200/200	0	13	87	46	33	27	21	7	5:KCL
910213	2885	1.22	13	10	3	8	8.2	5.2	9.3	49000/49000	0.50		1.20	220/220	0	13	87	45	32	26	20	7	5:KCL
910214	2885	1.22	12	10	3	8	8.2	5.2	9.3	49000/49000	0.50		1.20	220/220	0	13	87	45	32	26	20	7	5:KCL
910215	2436	1.22	13	5	2	3	8.2	4.4		46000/46000	0.10		2.50	380/380	0	13	87	36	23	19	14	4	3:KCL
910216	2436	1.22	13	5	2	2	8.2	4.4	9.1	46000/46000	0.10		2.50	380/380	0	13	87	36	23	18	14	4	3:KCL

Table B-11: Mud materials consumption.

		Mud consumption	Date
(((29/8-1991
(ooo)		System : BORE	
Well:	35/9-2		
Norsk	Mud company: BAROID		
Hydro			13:
		Actual used	

Drilling of 36 " hole

BARITE	Kg	35000
BENTONITE	Kg	8500
CAUSTIC SODA	Kg	350
NUTPLUG	Kg	150
SODA ASH	Kg	350
XCD-POLYMER	Kg	50

Drilling of 17 1/2" hole

BARITE	Kg	24000
BENTONITE	Kg	21000
CAUSTIC SODA	Kg	375
LIME	Kg	50
SODA ASH	Kg	375
XCD-POLYMER	Kg	50

Drilling of 12 1/4" hole

BARASCAV D	Kg	600
BARITE	Kg	48000
CITRIC ACID	Kg	150
EZ MUD	Kg	760
EZ MUD DP	Kg	1775
KCL	Kg	10000
KOH	Kg	250
PAC-L	Kg	2075
SODA ASH	Kg	1275
SODIUM BICARBO	Kg	375
XCD-POLYMER	Kg	2300
KCL BRINE	l	242000

Drilling of 8 1/2" hole

BARASCAV-D	Kg	200
BARITE	Kg	59000
CITRIC ACID	Kg	775
EZ MUD	Kg	30
EZ MUD DP	Kg	50
PAC-L	Kg	1500
PAC-R	Kg	100
SODA ASH	Kg	575
SODIUM BICARBO	Kg	1800
THERMA-THIN	Kg	1650
XCD-POLYMER	Kg	950
KCL BRINE	l	46000

Test no. 1

BARITE	Kg	57000
--------	----	-------

: : Mud consumption Date :
: (((: ----- : 29/8-1991 :
: (ooo) : System : BORE :
:-----: Well: 35/9-2 :
: Norsk : Mud company: BAROID :
: Hydro : 13: :

		Actual used
CITRIC ACID	Kg	125
SODA ASH	Kg	125
SODIUM BICARBO	Kg	25
XCD POLYMER	Kg	825
BARADEFOAM W300	l	200



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STATOIL (2) SHELL (2) PETROBRAS (2) DEMINEX (2) NPD (1) HYDRO (4)	<div style="border: 1px solid black; padding: 5px; text-align: center;"> <p>BA 91-2091-1</p> <p>15 OKT. 1991</p> <p>REGISTRERT</p> <p>OLJEDIREKTORATET</p> </div> <p>CHARACTERISATION AND CORRELATION OF HYDROCARBONS IN WELLS 35/9-1 AND 35/9-2</p>

Summary/Conclusion/Recommendation

Keywords

Petroleum geochemistry, Oil-oil correlation, Maturity, Biomarkers, Stable isotopes.

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1. INTRODUCTION

Oil test-samples from wells:

35/9-1 DST#1

35/9-2 DST#1

have been analyzed for characterization and correlation purposes by Norsk Hydro Research Centre, Bergen.

Compilation of this report and all analysis, except stable isotope measurements which have been undertaken by GeolabNor, Trondheim, have been carried out at Norsk Hydro Research Centre, Bergen.

The reservoir gas samples from wells 35/9-1 and 35/9-2 have been analysed for stable isotopes by IFE, Kjeller.

Sandstone corechips from the reservoir intervals in wells 35/9-1 and 35/9-2 have been extracted and group type separated. Selected samples have been analysed by GC-MS.

Correlation 35/9.

2.RESULTS AND DISCUSSION

2.1 Oil samples

GC-FID of whole oil samples (C10+ hydrocarbons).

The chromatograms are reported in Appendix I.
Squalane is added to each sample as an internal standard.

%-weight distribution of group type fractions.

The group type separation data are based on standard Iatroscan measurements and reported as %-weight distributions in Table 2.1.

Sample	%-SAT	%-ARO	%-NSO	%-ASPH
35/9-1 DST-1	54	41	4	0.6
35/9-2 DST-1	48	47	4	0.5
Ref.sample	37	51	11	2.1

Table 2.1.: Group type distribution from Iatroscan.

GC-FID of saturated hydrocarbons.

The chromatograms and peak information are given in Appendix II.

Molecular ratios are listed in table 2.2.

Sample	Pr/ n-C17	Pr/Ph	Ph/ n-C18	CPI-1	CPI-2	n-C17/ n-C27
35/9-1 DST-1	0.6	2.2	0.3	1.1	1.1	2.7
35/9-2 DST-1	1.0	1.9	0.6	1.0	1.0	5.4
Ref. sample	0.6	1.6	0.5	1.1	1.0	4.1

Table 2.2.: Molecular ratios from GC of saturated HCs.

GC-FID of aromatic hydrocarbons.

The chromatograms are given in Appendix III.

The methyl-phenanthrenes (3-, 2-, 9- and 1-MP) and phenanthrenes (P) are indicated on the chromatograms.

The MPI-1 and MPI-2 are listed in table 2.3.

Sample	MPI-1	MPI-2
35/9-1 DST-1	0.65	0.72
35/9-2 DST-1	0.62	0.66

Table 2.3.: Methyl phenanthrene indices.

GC/MS LR-VSIR of saturated biomarkers.

Mass chromatograms are given in Appendix IV.

GC/MS-SMIM of saturated biomarkers.

The distribution of standard selected SAT-biomarkers are presented as normalized bargraphs. These bargraphs and listed peak data are given in Appendix V. The compound abbreviations are listed in the experimental section. The samples labelled 'ST...' are the results from the reference sample.

The biomarker maturity parameters are listed in table 2.4.

Sample	%-C29-20S	%-C29- $\alpha\beta\beta$	Ts/Tm
35/9-1 DST-1	47	73	4.6
35/9-2 DST-1	41	59	1.9
Ref.sample	45	63	1.6

Table 2.4.: Biomarker maturity parameters.

The sterane carbon number distribution is listed in table 2.5.

Sample	%-C30	%-C29	%-C28	%-C27
35/9-1 DST-1	4	35	25	35
35/9-2 DST-1	5	38	26	30
Ref.sample	5	32	27	35

Table 2.5.: Sterane carbon number distribution.

The %-distribution of biomarker compound classes are listed in table 2.6.

Sample	%-C20-26 tri-cyclic triterpanes	%-C27-35 penta-cycl. triterpanes	%-C21-23 steranes	%-C27-30 steranes
35/9-1 DST-1	4	46	7	43
35/9-2 DST-1	3	41	6	50
Ref.sample	3	47	9	41

Table 2.6.: Biomarker compound classes.

GC/MS LR-VSIR of aromatic biomarkers.

Mass chromatograms are given in Appendix VI.

The distribution of tri-aromatic steroids are detected by the common fragment ion of 231 m/z. The distribution of mono-aromatic steroids are detected by the common fragment ion of 253 m/z.

The aromatization of mono- to tri-aromatic steroids is highly temperature sensitive. Therefore, tri-/mono-aromatic steroid ratios can be useful maturity parameters.

Stable Isotopic composition.

Sample	SAT	ARO	NSO	ASPH	OIL
35/9-1 DST-1	-28.2	-27.0	-26.9	-	-27.2
35/9-2 TEST-1	-28.9	-27.3	-26.6	-29.3	-27.9

Table 2.7.: $\delta^{13}\text{C}$ values of oil fractions.

3.2. RESERVOIR GASESStable isotopic composition

Molecular and stable carbon isotope compositions of three gases from well 35/9-1 and three gases from well 35/9-2 have been determined by IFE, Kjeller, Norway, and the results are given in table 2.8 and 2.9.

Well	Sample	%							
		C ₁	C ₂	C ₃	iC ₄	nC ₄	iC ₅	nC ₅	iC ₄ /nC ₄
35/9-1	DST#1	77.8	12.9	5.4	0.69	1.8	0.30	0.30	0.39
	DST#2	74.8	14.7	5.9	0.75	1.9	0.41	0.45	0.40
	DST#3	80.6	10.4	4.7	0.66	1.7	0.61	0.58	0.38
35/9-2	DST#2	80.3	8.7	5.6	0.74	2.3	0.45	0.44	0.33
	DST#3	81.9	7.8	5.1	0.73	2.2	0.61	0.72	0.34
	DST#4	81.2	8.5	5.5	0.76	2.1	0.41	0.39	0.37

Table 2.8.: Volume composition of gas samples

Well	Sample	C ₁	C	C ₂	C ₃	iC ₄	nC ₄	CO ₂	CO ₂
		δ ¹³ C	δD	δ ¹³ C	δ ¹³ C	δ ¹³ C	δ ¹³ C	δ ¹³ C	δ ¹⁸ O
		PDB	SMOW	PDB	PDB	PDB	PDB	PDB	PDB
35/9-1	DST#1	-43.5	-193	-30.8	-27.7	-26.1	-27.7	-16.0	-9.6
	DST#2	-43.4	-195	-30.9	-28.0	-26.5	-26.7	-20.5	-6.7
	DST#3	-43.1	-200	-30.5	-27.7	-25.9	-27.3	-26.8	-8.1
35/9-2	DST#2	-41.5	-189	-29.1	-25.0	-27.8	-27.5	-9.9	-7.4
	DST#3	-41.8	-201	-29.3	-24.5	-26.9	-27.2	-9.1	-7.4
	DST#4	-42.2	-179	-29.4	-24.9	-27.9	-27.3	-10.4	-10.6

Table 2.9.: Isotopic composition of gas samples

TABLES

Table 2.10. SOURCE ROCK EXTRACTION DATA WELL 35/9-1



Depth (m)	% Lithology	Type	EOM(mg)	EOM(%)	Hydrocarbons			Non Hydrocarbons		
					SAT(%)	ARO(%)	TOTAL(%)	NSO(%)	ASPH(%)	TOTAL(%)
2047.50	B 100 SST	COCH	1.8	0.03	24.90	15.00	39.90	41.10	18.90	60.00
2049.50	B 100 SST	COCH	2.0	0.03	16.30	13.50	29.80	44.20	26.10	70.30
2051.80	B 100 SST	COCH	1.4	0.02	25.40	7.20	32.60	54.50	12.90	67.40
2053.50	B 100 SST	COCH	1.8	0.02	50.40	6.90	57.30	38.50	4.20	42.70
2096.90	100 SST	COCH	1.4	0.02	31.50	9.70	41.20	49.00	9.80	58.80
2099.50	A 100 SST	COCH	1.0	0.01	29.20	11.50	40.70	46.00	13.30	59.30
2101.80	A 100 SST	COCH	0.5	0.02	6.70	4.50	11.20	65.60	23.10	88.70
2103.50	A 100 SST	COCH	0.9	0.02	29.10	7.70	36.80	56.00	7.10	63.10
2106.30	A 100 SST	COCH	2.6	0.03	23.00	14.90	37.90	53.20	9.00	62.20
2108.50	A 100 SST	COCH	2.4	0.03	18.60	12.30	30.90	60.30	8.70	69.00
2110.50	A 100 SST	COCH	1.3	0.02	27.90	8.10	36.00	53.10	10.90	64.00
2113.20	A 100 SST	COCH	0.7	0.02	30.50	10.00	40.50	52.90	6.70	59.60
2115.50	A 100 SST	COCH	0.6	0.02	32.60	6.60	39.20	52.90	7.90	60.80
2117.70	A 100 SST	COCH	1.1	0.03	29.00	6.60	35.60	59.70	4.80	64.50
2119.70	A 100 SST	COCH	0.7	0.02	27.40	8.10	35.50	52.90	11.60	64.50
2121.80	A 100 SST	COCH	0.3	0.01	26.50	7.60	34.10	59.20	6.90	66.10
2122.80	A 100 SST	COCH	0.4	0.01	23.30	6.40	29.70	53.60	16.60	70.20
2123.70	A 100 SST	COCH	0.3	0.01	25.10	5.80	30.90	34.20	34.90	69.10



Table 2.10. SOURCE ROCK EXTRACTION DATA WELL 35/9-1 (cont'd)

Depth (m)	% Lithology	Type	EOM(mg)	EOM(%)	Hydrocarbons			Non Hydrocarbons		
					SAT(%)	ARO(%)	TOTAL(%)	NSO(%)	ASPH(%)	TOTAL(%)
2126.50	A 100 SST	COCH	0.9	0.03	27.20	13.50	40.70	56.10	3.20	59.30
2127.50	A 100 SST	COCH	1.0	0.03	26.20	7.30	33.50	63.40	3.00	66.40
2129.50	A 100 SST	COCH	8.2	0.26	7.40	23.70	31.10	64.80	4.10	68.90
2133.50	A 100 SST	COCH	1.1	0.03	27.30	10.50	37.80	57.70	4.50	62.20
2228.70	100 SST	COCH	0.9	0.03	26.50	8.80	35.30	51.80	12.80	64.60
2231.30	100 SST	COCH	2.2	0.07	5.60	23.70	29.30	52.70	18.00	70.70
2232.80	100 SST	COCH	0.9	0.03	20.20	9.50	29.70	60.00	10.40	70.40
2236.50	100 SST	COCH	0.7	0.02	25.70	8.00	33.70	48.90	17.40	66.30
2243.70	100 SST	COCH	0.8	0.02	17.50	3.60	21.10	37.10	41.80	78.90
2246.50	100 SST	COCH	0.6	0.02	27.30	8.20	35.50	43.40	21.10	64.50
2250.70	100 SST	COCH	1.6	0.05	35.40	12.80	48.20	38.70	13.00	51.70
2267.50	100 SST	COCH	3.8	0.12	44.40	30.90	75.30	20.70	4.00	24.70
2270.70	100 SST	COCH	4.1	0.13	44.90	31.00	75.90	20.70	3.40	24.10
2275.50	100 SST	COCH	4.1	0.13	64.50	4.00	68.50	26.70	4.80	31.50
2277.20	100 SST	COCH	2.9	0.09	51.00	26.80	77.80	19.20	3.10	22.30
2280.50	100 SST	COCH	37.6	1.11	56.20	35.20	91.40	7.80	0.80	8.60
2281.50	100 SST	COCH	50.3	1.40	55.30	36.20	91.50	7.90	0.60	8.50
2282.50	100 SST	COCH	5.5	0.18	43.00	31.80	74.80	23.20	1.70	24.90
2284.50	100 SST	COCH	19.5	0.61	44.40	31.60	76.00	22.80	1.20	24.00

Table 2.10. SOURCE ROCK EXTRACTION DATA WELL 35/9-1 (cont'd)



Depth (m)	% Lithology	Type	EOM(mg)	EOM(%)	Hydrocarbons			Non Hydrocarbons		
					SAT(%)	ARO(%)	TOTAL(%)	NSO(%)	ASPH(%)	TOTAL(%)
2285.60	100 SST	COCH	28.5	0.81	51.20	36.30	87.50	10.60	1.80	12.40
2287.50	100 SST	COCH	24.1	0.78	55.00	35.70	90.70	8.20	1.10	9.30
2288.90	100 SST	COCH	26.0	0.84	53.70	39.30	93.00	6.30	0.70	7.00
2290.80	100 SST	COCH	11.9	0.38	37.60	24.00	61.60	26.40	12.10	38.50
2294.50	100 SST	COCH	7.8	0.25	55.30	20.60	75.90	22.20	1.90	24.10
2299.20	100 SST	COCH	4.3	0.14	30.30	33.70	64.00	33.30	2.60	35.90

Table 2.11. SOURCE ROCK EXTRACTION DATA WELL 35/9-2



Depth (m)	% Lithology	Type	EOM(mg)	EOM(%)	Hydrocarbons			Non Hydrocarbons		
					SAT(%)	ARO(%)	TOTAL(%)	NSO(%)	ASPH(%)	TOTAL(%)
2114.50	100 SST	COCH	3.7	0.09	50.00	10.00	60.00	11.00	29.00	40.00
2116.50	100 SST	COCH	4.4	0.15	44.00	6.00	50.00	11.00	40.00	51.00
2118.50	100 SST	COCH	2.7	0.07	61.00	15.00	76.00	16.00	9.00	25.00
2120.50	100 SST	COCH	3.1	0.09	66.00	9.00	75.00	13.00	12.00	25.00
2122.30	100 SST	COCH	2.5	0.07	54.00	14.00	68.00	20.00	12.00	32.00
2123.50	100 SST	COCH	2.8	0.06	34.00	12.00	46.00	31.00	23.00	54.00
2124.50	100 SST	COCH	2.6	0.06	69.00	11.00	80.00	15.00	5.00	20.00
2126.70	100 SST	COCH	2.1	0.05	41.00	12.00	53.00	15.00	33.00	48.00
2127.50	100 SST	COCH	2.6	0.08	55.00	8.00	63.00	16.00	22.00	38.00
2128.50	100 SST	COCH	1.4	0.03	34.00	13.00	47.00	22.00	30.00	52.00
2129.60	100 SST	COCH	1.5	0.03	23.00	8.00	31.00	32.00	38.00	70.00
2272.50	100 SST	COCH	1.7	0.03	30.00	8.00	38.00	22.00	41.00	63.00
2274.30	100 SST	COCH	1.5	0.04	44.00	14.00	58.00	29.00	13.00	42.00
2275.30	100 SST	COCH	2.0	0.05	29.00	11.00	40.00	39.00	21.00	60.00
2278.50	100 SST	COCH	3.4	0.09	32.00	10.00	42.00	38.00	20.00	58.00
2280.50	100 SST	COCH	1.7	0.04	24.00	10.00	34.00	41.00	26.00	67.00
2281.50	100 SST	COCH	2.4	0.04	22.00	14.00	36.00	23.00	41.00	64.00
2282.60	100 SST	COCH	2.7	0.06	26.00	5.00	31.00	36.00	33.00	69.00

Table 2.11. SOURCE ROCK EXTRACTION DATA WELL 35/9-2 (cont'd)



Depth (m)	% Lithology	Type	EOM(mg)	EOM(%)	Hydrocarbons			Non Hydrocarbons		
					SAT(%)	ARO(%)	TOTAL(%)	NSO(%)	ASPH(%)	TOTAL(%)
2286.50	100 SST	COCH	3.6	0.09	27.00	14.00	41.00	50.00	9.00	59.00
2290.70	100 SST	COCH	10.4	0.18	14.00	10.00	24.00	69.00	6.00	75.00
2293.50	100 SST	COCH	4.8	0.09	22.00	13.00	35.00	40.00	24.00	64.00
2294.50	100 SST	COCH	1.5	0.03	20.00	13.00	33.00	37.00	30.00	67.00
2296.30	100 SST	COCH	2.4	0.06	24.00	12.00	36.00	38.00	26.00	64.00
2297.30	100 SST	COCH	1.2	0.03	42.00	7.00	49.00	30.00	21.00	51.00
2298.40	100 SST	COCH	1.9	0.04	24.00	10.00	34.00	57.00	9.00	66.00
2300.70	100 SST	COCH	2.7	0.05	41.00	10.00	51.00	32.00	17.00	49.00
2301.50	100 SST	COCH	3.4	0.09	45.00	12.00	57.00	24.00	20.00	44.00
2303.70	100 SST	COCH	4.1	0.08	29.00	16.00	45.00	29.00	27.00	56.00
2304.50	100 SST	COCH	3.2	0.07	25.00	15.00	40.00	45.00	15.00	60.00
2310.50	100 SST	COCH	3.3	0.08	19.00	15.00	34.00	48.00	18.00	66.00
2315.50	100 SST	COCH	4.1	0.09	26.00	19.00	45.00	40.00	16.00	56.00
2318.20	100 SST	COCH	2.5	0.06	40.00	18.00	58.00	18.00	23.00	41.00
2319.70	100 SST	COCH	4.7	0.11	54.00	24.00	78.00	14.00	8.00	22.00
2320.50	100 SST	COCH	6.6	0.12	52.00	32.00	84.00	12.00	4.00	16.00
2321.50	100 SST	COCH	44.9	0.83	49.00	43.00	92.00	6.00	1.00	7.00
2323.30	100 SST	COCH	35.9	0.70	47.00	40.00	87.00	12.00	2.00	14.00
2324.60	100 SST	COCH	51.3	1.25	51.00	38.00	89.00	8.00	3.00	11.00

Table 2.11. SOURCE ROCK EXTRACTION DATA WELL 35/9-2 (cont'd)



Depth (m)	% Lithology	Type	EOM(mg)	EOM(%)	Hydrocarbons			Non Hydrocarbons		
					SAT(%)	ARO(%)	TOTAL(%)	NSO(%)	ASPH(%)	TOTAL(%)
2326.30	100 SST	COCH	45.3	0.87	50.00	39.00	89.00	10.00	1.00	11.00
2327.50	100 SST	COCH	34.6	0.69	47.00	42.00	89.00	9.00	1.00	10.00
2328.60	100 SST	COCH	47.5	0.93	52.00	39.00	91.00	7.00	1.00	8.00
2329.40	100 SST	COCH	78.0	1.50	50.00	40.00	90.00	9.00	1.00	10.00
2331.40	100 SST	COCH	72.6	1.42	53.00	38.00	91.00	8.00	1.00	9.00
2332.50	100 SST	COCH	42.5	1.06	49.00	40.00	89.00	9.00	2.00	11.00
2335.20	100 SST	COCH	42.9	0.91	51.00	39.00	90.00	9.00	2.00	11.00
2336.30	100 SST	COCH	76.4	1.50	52.00	39.00	91.00	8.00	1.00	9.00
2337.60	100 SST	COCH	30.0	0.71	35.00	41.00	76.00	19.00	5.00	24.00
2366.50	100 SST	COCH	5.9	0.17	56.00	28.00	84.00	12.00	3.00	15.00
2368.50	100 SST	COCH	8.3	0.23	54.00	34.00	88.00	11.00	1.00	12.00
2376.30	100 SST	COCH	3.5	0.10	8.00	19.00	27.00	49.00	24.00	73.00
2380.30	100 SST	COCH	0.8	0.02	15.00	7.00	22.00	47.00	31.00	78.00
2383.70	100 SST	COCH	1.2	0.04	5.00	10.00	15.00	59.00	26.00	85.00
2385.30	100 SST	COCH	1.4	0.04	6.00	6.00	12.00	60.00	28.00	88.00
2486.50	100 SST	COCH	0.5	0.01	6.00	7.00	13.00	58.00	29.00	87.00
2489.50	100 SST	COCH	1.7	0.05	5.00	6.00	11.00	41.00	48.00	89.00
2493.50	100 SST	COCH	0.5	0.01	7.00	5.00	12.00	51.00	37.00	88.00
2496.50	100 SST	COCH	0.4	0.01	4.00	2.00	6.00	53.00	40.00	93.00

Table 2.11. SOURCE ROCK EXTRACTION DATA WELL 35/9-2 (cont'd)



Depth (m)	% Lithology	Type	EOM(mg)	EOM(%)	Hydrocarbons			Non Hydrocarbons		
					SAT(%)	ARO(%)	TOTAL(%)	NSO(%)	ASPH(%)	TOTAL(%)
2501.50	100 SST	COCH	2.6	0.07	2.00	4.00	6.00	49.00	45.00	94.00
2506.50	100 SST	COCH	13.4	0.25	2.00	23.00	25.00	64.00	12.00	76.00
2508.50	100 SST	COCH	1.1	0.03	2.00	3.00	5.00	55.00	40.00	95.00
2622.50	100 SST	COCH	1.1	0.03	41.00	6.00	47.00	34.00	19.00	53.00
2637.50	100 SST	COCH	1.0	0.03	26.00	2.00	28.00	48.00	24.00	72.00
2639.50	100 SST	COCH	1.3	0.04	28.00	7.00	35.00	45.00	20.00	65.00
2641.50	100 SST	COCH	0.9	0.02	47.00	5.00	52.00	25.00	23.00	48.00
2644.50	100 SST	COCH	0.5	0.01	11.00	3.00	14.00	59.00	26.00	85.00
2650.50	100 SST	COCH	1.3	0.03	5.00	3.00	8.00	54.00	37.00	91.00
2660.50	100 SST	COCH	1.2	0.04	8.00	4.00	12.00	62.00	25.00	87.00
2686.50	100 SST	COCH	0.8	0.02	6.00	24.00	30.00	51.00	19.00	70.00
2692.50	100 SST	COCH	0.7	0.02	3.00	3.00	6.00	39.00	55.00	94.00
2696.50	100 SST	COCH	1.0	0.03	9.00	19.00	28.00	48.00	24.00	72.00
2699.50	100 SST	COCH	15.8	0.39	23.00	10.00	33.00	65.00	2.00	67.00
2701.50	100 SST	COCH	0.0	0.00	3.00	5.00	8.00	55.00	37.00	92.00
2703.50	100 SST	COCH	0.0	0.00	24.00	4.00	28.00	41.00	30.00	71.00
2705.50	100 SST	COCH	1.4	0.03	8.00	3.00	11.00	63.00	21.00	84.00
2707.50	100 SST	COCH	0.5	0.01	6.00	4.00	10.00	60.00	30.00	90.00
2709.50	100 SST	COCH	0.8	0.02	4.00	10.00	14.00	70.00	16.00	86.00

Table 2.11. SOURCE ROCK EXTRACTION DATA WELL 35/9-2 (cont'd)



Depth (m)	% Lithology	Type	EOM(mg)	EOM(%)	Hydrocarbons			Non Hydrocarbons		
					SAT(%)	ARO(%)	TOTAL(%)	NSO(%)	ASPH(%)	TOTAL(%)
2711.50	100 SST	COCH	0.7	0.02	5.00	4.00	9.00	53.00	38.00	91.00
2714.50	100 SST	COCH	1.6	0.04	2.00	13.00	15.00	56.00	29.00	85.00
2738.30	100 SST	COCH	1.2	0.03	3.00	2.00	5.00	47.00	47.00	94.00
2751.50	100 SST	COCH	0.5	0.01	3.00	2.00	5.00	71.00	24.00	95.00
2753.50	100 SST	COCH	1.2	0.03	2.00	2.00	4.00	67.00	29.00	96.00
2755.30	100 SST	COCH	1.6	0.04	2.00	4.00	6.00	69.00	25.00	94.00
2764.90	100 SST	COCH	1.0	0.04	6.00	67.00	73.00	19.00	8.00	27.00

Appendix I

GC-FID of whole oil (C10+ hydrocarbons).

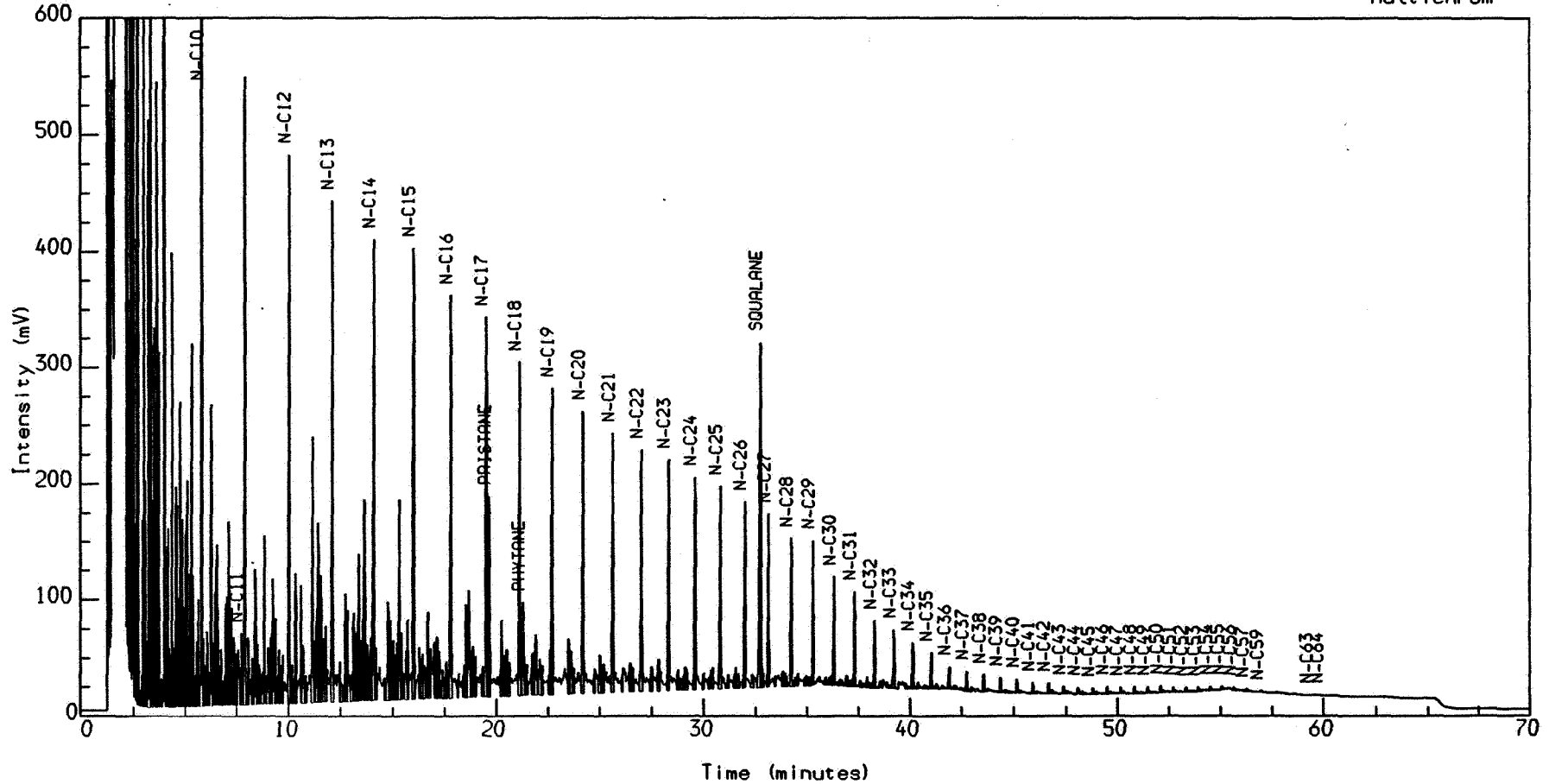
Chromatograms.



Analysis Name : [PVT] 11 VOKS250502,18,1.

35/9-1 DST # 1 Amount : 0.500

HIGH TEMPERATURE GC-ANALYSIS



Instrument : HRGC5300

Channel Title : WAX ANALYSIS

Lims ID :

Acquired on 17-MAY-1991 at 03:47

Reported on 22-MAY-1991 at 10:16

Method : WAX

Calibration : WAX0491

Run Sequence : WAX

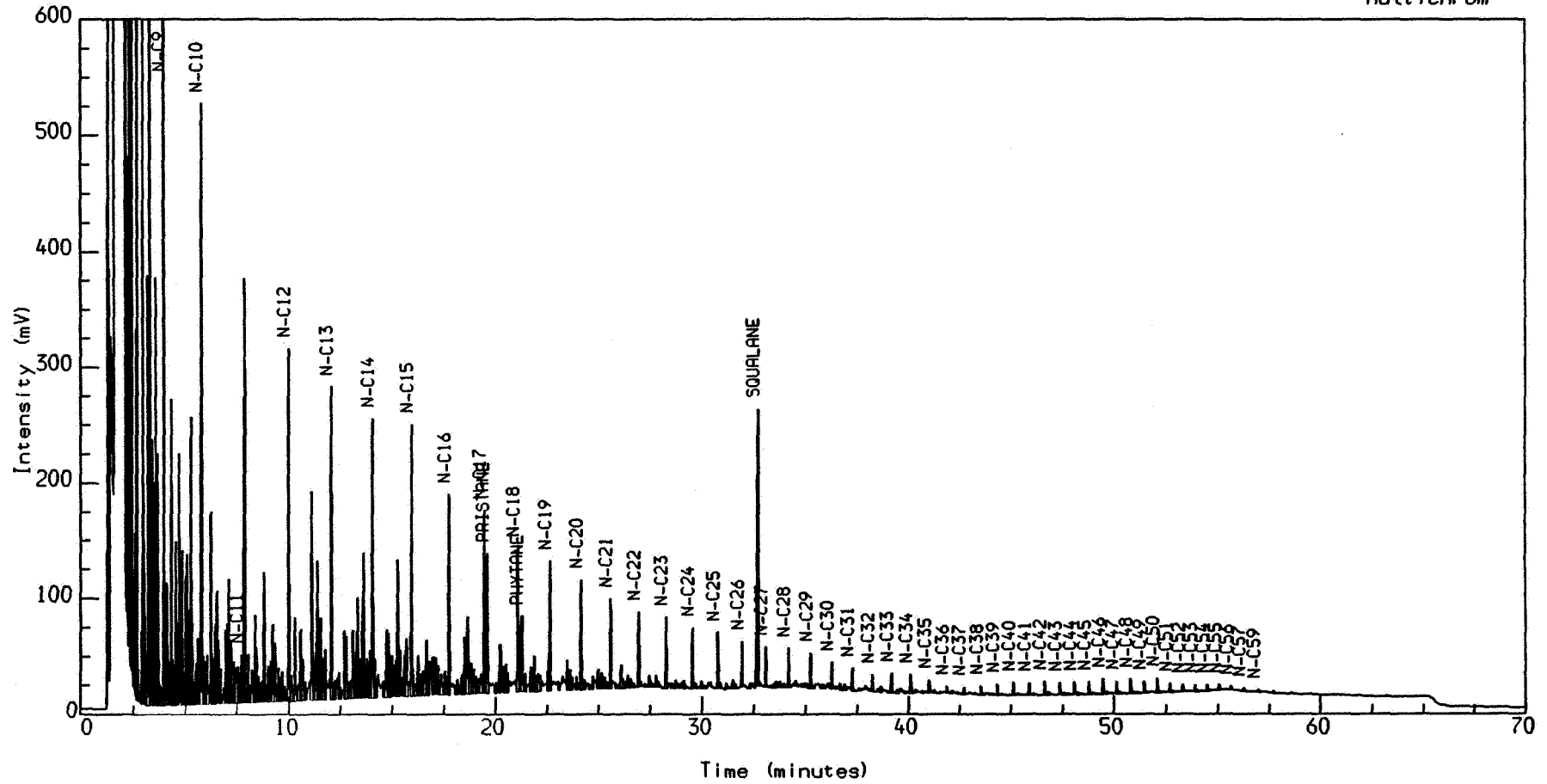


Analysis Name : [PVT] 11 VOKS250502,17,1.

35/9-2 TEST 1 CLEAN UP Amount : 0.500

HIGH TEMPERATURE GC-ANALYSIS

Multichrom



Instrument : HRGC5300

Method : WAX

Channel Title : WAX ANALYSIS

Calibration : WAX0491

Lims ID :

Run Sequence : WAX

Acquired on 17-MAY-1991 at 02:32

Reported on 22-MAY-1991 at 10:21

Appendix II

GC-FID of saturated hydrocarbons.

Chromatograms and peak data.

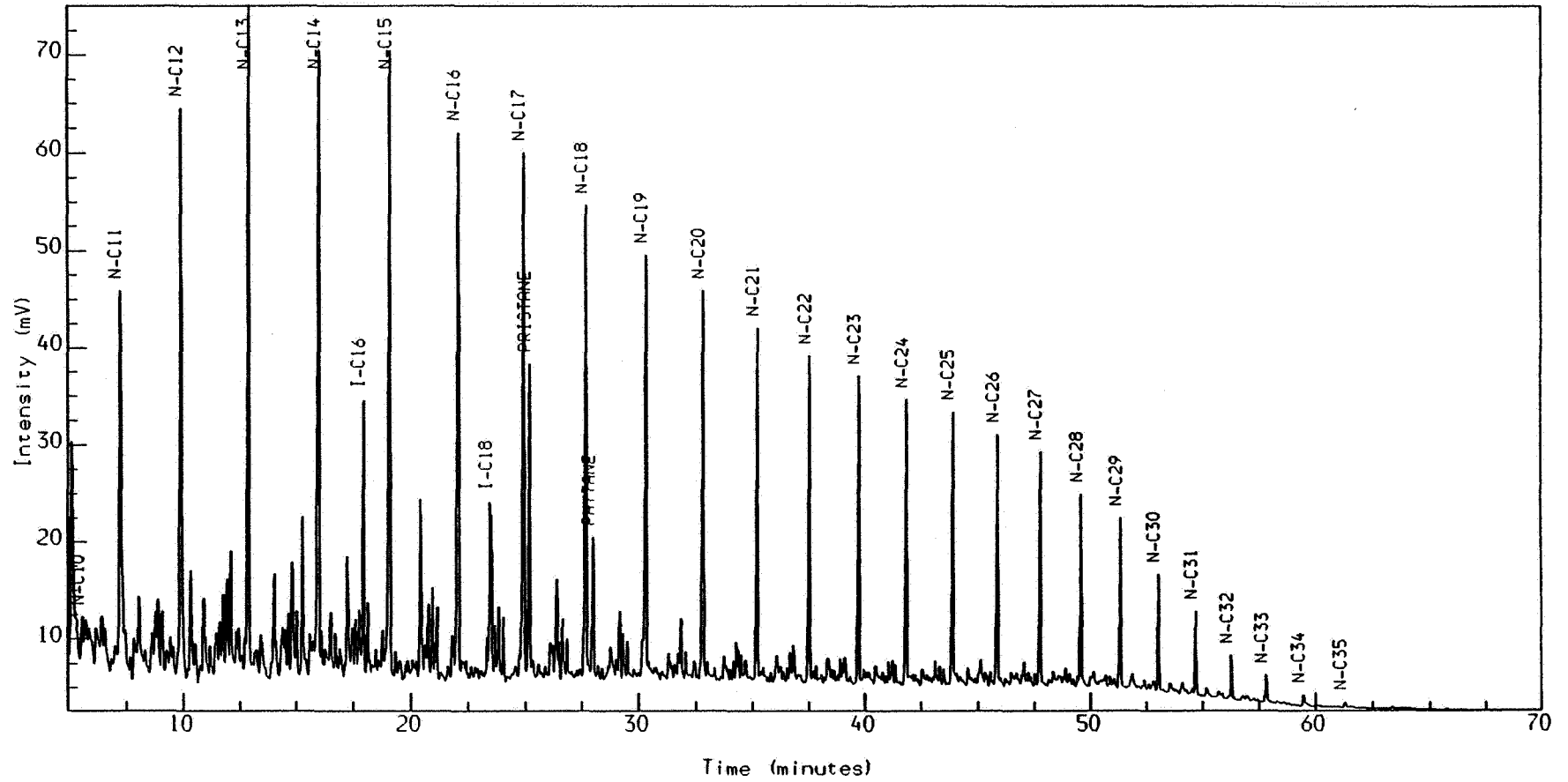
NORSK HYDRO RESEARCH CENTRE

Analysis Name : [PETRO] 7 A7228215.16.1.

35/9-1 DST-1 OIL

GC SATURATED HYDROCARBONS

Multichrom



Instrument : HP5890

Channel Title : MSD

Lims ID :

Acquired on 13-MAY-1991 at 11:13

Reported on 13-MAY-1991 at 12:35

Method : MSDS

Calibration : MSDS

Run Sequence : MSDS

Injection Report

Acquired on 13-MAY-1991 at 11:13

NORSK HYDRO RESEARCH CENTRE

Analyst Name : ARNE
 Lims Id :
 Comment : SAT-GC
 Method Title : GC-MSD SATURATED HYDROCARBONS 4 DEG/MIN.
 Sample Name : 35/9-1 DST-1 OIL
 Sample Id :
 Sample Type : Sample Amount=0.00000
 Bottle No : 16

PEAK INFORMATION

Peak	RT mins	RT Corr	Hght uV	Area uVs	Area %	Peak name	Width
2	5.589	5.558	4413	24202	0.29	N-C10	5.8
10	7.235	7.195	39210	268849	3.18	N-C11	5.8
24	9.901	9.847	58453	333809	3.95	N-C12	4.8
41	12.907	12.835	67861	352411	4.17	N-C13	5.3
56	16.019	15.930	64710	370596	4.38	N-C14	5.3
68	17.955	17.872	28728	118196	1.40	I-C16	3.8
75	19.101	19.022	64608	363708	4.30	N-C15	5.1
91	22.091	22.020	56235	311018	3.68	N-C16	5.3
102	23.472	23.406	18354	76856	0.91	I-C18	4.5A
110	24.965	24.904	54172	291578	3.45	N-C17	5.3
111	25.219	25.158	32485	170999	2.02	FRISTANE	5.3
126	27.709	27.657	48835	249662	2.95	N-C18	5.0
128	28.011	27.959	14717	78778	0.93	HEPTANE	5.1
143	30.339	30.295	43626	219725	2.60	N-C19	5.0
159	32.845	32.810	40096	196737	2.33	N-C20	4.6
174	35.248	35.226	36084	165809	1.96	N-C21	4.6
188	37.549	37.540	33572	157700	1.86	N-C22	4.5
203	39.755	39.757	31776	153106	1.81	N-C23	4.6
216	41.877	41.891	28872	135613	1.60	N-C24	4.6
229	43.917	43.942	28036	134798	1.59	N-C25	4.8
240	45.875	45.910	25882	117984	1.39	N-C26	4.5
251	47.771	47.816	24102	108674	1.28	N-C27	4.3
262	49.589	49.645	19846	89623	1.06	N-C28	4.2
270	51.349	51.414	17575	78464	0.93	N-C29	3.8
277	53.037	53.112	12066	48050	0.57	N-C30	4.0
283	54.685	54.768	8601	33214	0.39	N-C31	3.5
287	56.272	56.364	4375	15937	0.19	N-C32	3.5
291	57.829	57.930	2790	13861	0.16	N-C33	4.0
293	59.464	59.573	1063	5817	0.07	N-C34	4.5
294	61.288	61.407	550	2652	0.03	N-C35	4.8

Totals			
Unknowns	725087	3771425	44.58
Quantified	911694	4688430	55.42
Grand Total	1636781	8459854	100.00

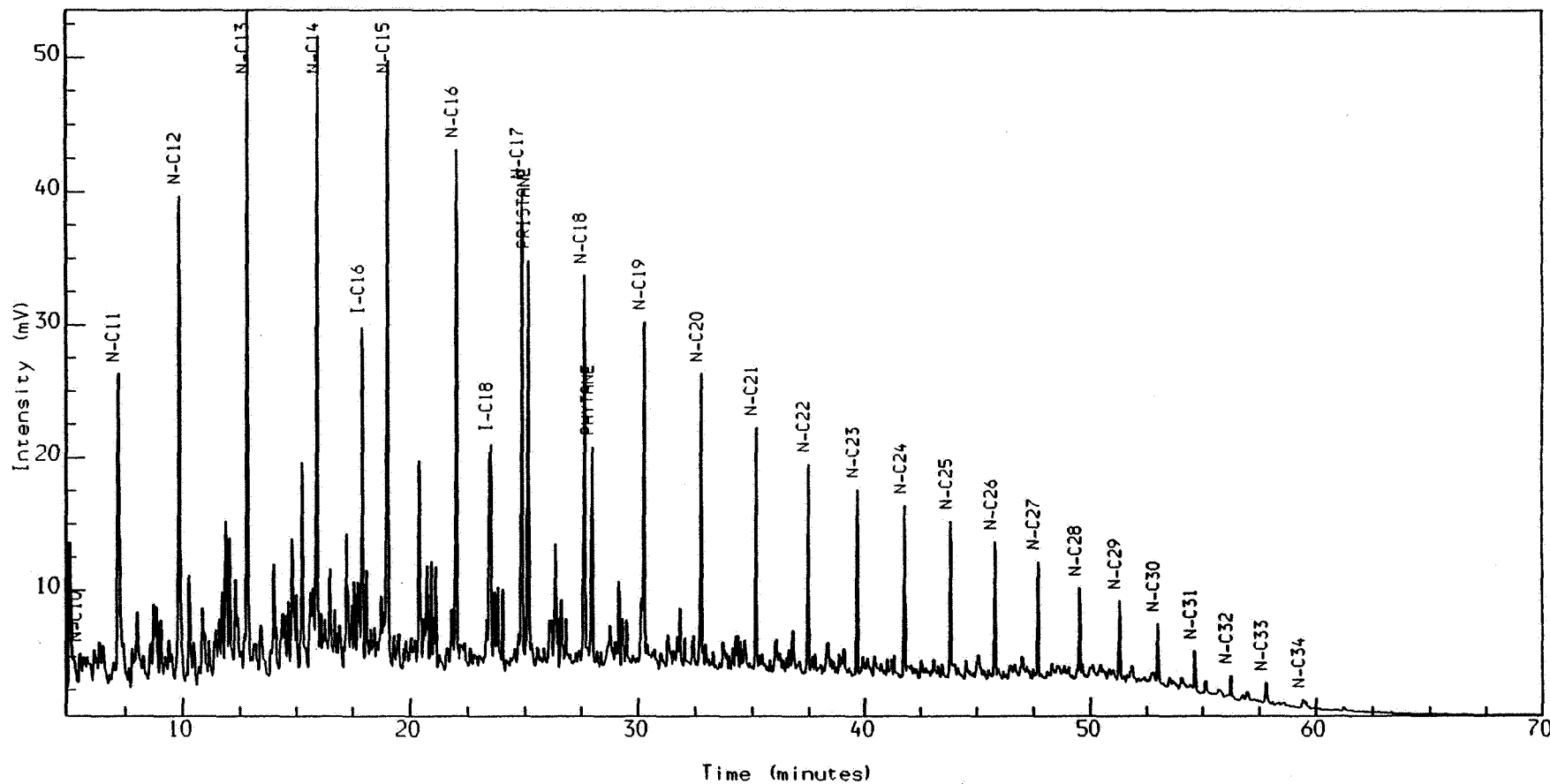
NORSK HYDRO RESEARCH CENTRE

Analysis Name : [PETRO] 7 A722821S.10.1.

35/9-2 OIL

GC SATURATED HYDROCARBONS

Multichrom



Instrument : HP5890

Channel Title : MSD

Lims ID :

Acquired on 8-MAY-1991 at 01:49

Reported on 8-MAY-1991 at 03:11

Method : MSDS

Calibration : MSDS

Run Sequence : MSDS

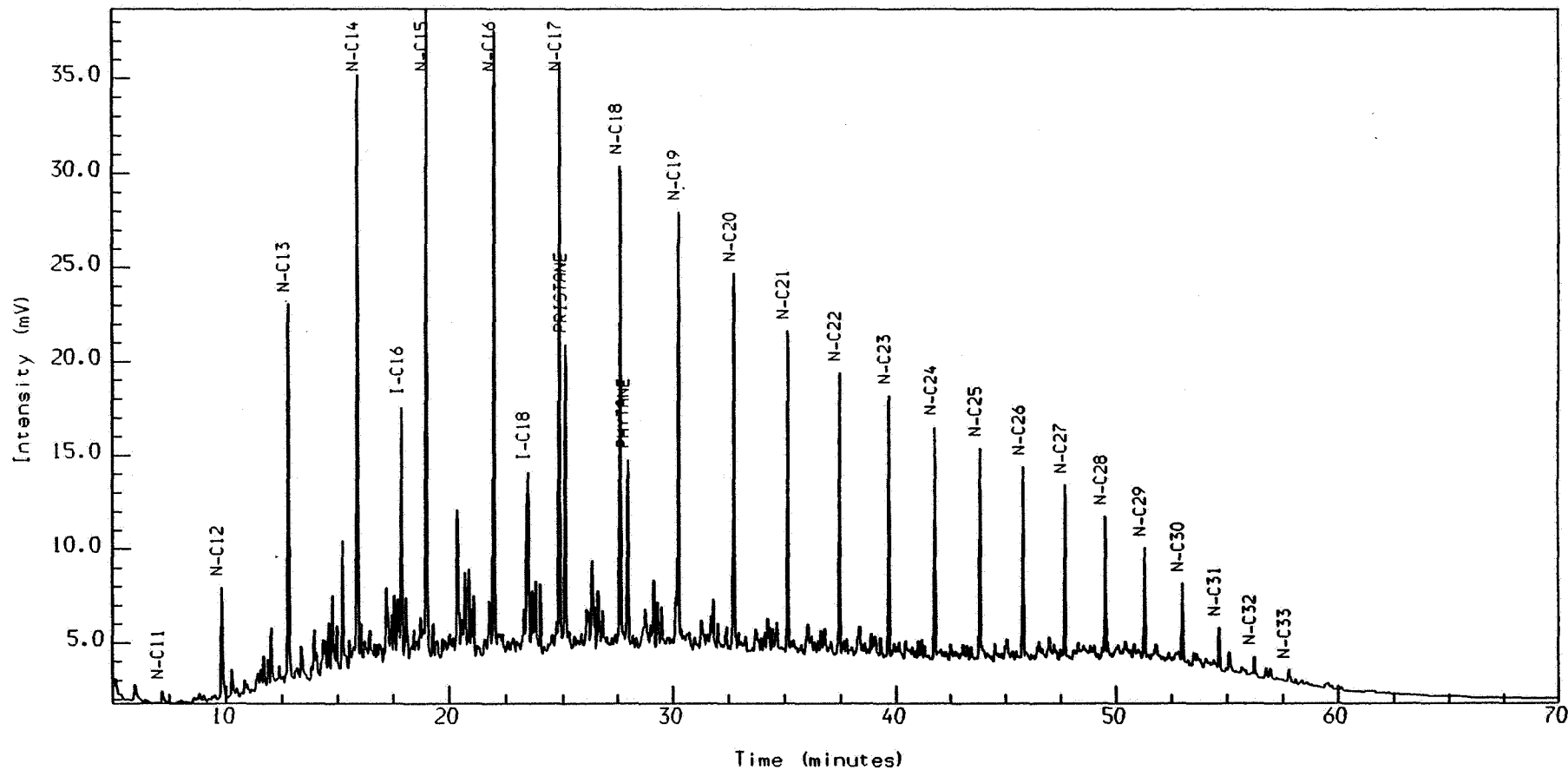
NORSK HYDRO RESEARCH CENTRE

Analysis Name : [PETRO] 7 A722821S.8.1.

BIOM. STD.

GC SATURATED HYDROCARBONS

Multichrom



Instrument : HP5890

Channel Title : MSD

Lims ID :

Acquired on 7-MAY-1991 at 22:46

Reported on 8-MAY-1991 at 00:08

Method : MSDS

Calibration : MSDS

Run Sequence : MSDS

Injection Report

Acquired on 8-MAY-1991 at 01:49

NORSK HYDRO RESEARCH CENTRE

Analyst Name : ARNE
Lims Id :
Comment : SAT-GC
Method Title : GC-MSD SATURATED HYDROCARBONS 4 DEG/MIN.
Sample Name : 35/9-2 OIL
Sample Id :
Sample Type : Sample Amount=0.00000
Bottle No : 10

PEAK INFORMATION

Peak	RT mins	RT Corr	Hght uV	Area uVs	Area %	Peak name	Width
3	5.560	5.550	2292	12844	0.22	N-C10	5.8
11	7.197	7.184	23280	154848	2.60	N-C11	5.6
25	9.848	9.829	36497	201789	3.39	N-C12	4.6
42	12.848	12.824	49052	226519	3.81	N-C13	4.6
58	15.960	15.930	47722	241203	4.06	N-C14	4.6
70	17.923	17.903	25962	106101	1.78	I-C16	3.8
76	19.040	19.026	45775	231017	3.89	N-C15	4.5
93	22.019	22.020	38996	183117	3.08	N-C16	4.3
103	23.504	23.511	16903	57807	0.97	I-C18	2.9A
112	24.896	24.908	35957	164256	2.76	N-C17	4.2
113	25.176	25.189	30624	166771	2.81	FRISTANE	5.3
128	27.637	27.660	29555	138241	2.33	N-C18	4.0
129	27.984	28.008	16592	87763	1.48	HMTANE	5.1
145	30.267	30.299	26161	106044	1.78	N-C19	3.8
160	32.768	32.810	22091	84080	1.41	N-C20	3.5
177	35.168	35.223	18292	66548	1.12	N-C21	3.5
191	37.469	37.536	15752	58960	0.99	N-C22	3.5
207	39.675	39.753	13938	50598	0.85	N-C23	3.5
221	41.797	41.886	12673	45233	0.76	N-C24	3.5
221	43.832	43.932	11342	41862	0.70	N-C25	3.5
243	45.800	45.910	10274	36136	0.61	N-C26	3.4
253	47.696	47.816	8712	30385	0.51	N-C27	3.4
263	49.509	49.639	6794	26025	0.44	N-C28	3.7
273	51.280	51.419	5984	24227	0.41	N-C29	3.7
279	52.987	53.134	4616	19804	0.33	N-C30	3.8
285	54.632	54.788	2966	10709	0.18	N-C31	3.4
288	56.235	56.399	1579	5308	0.09	N-C32	3.4
291	57.787	57.959	1563	8348	0.14	N-C33	4.2
293	59.435	59.616	567	5414	0.09	N-C34	10.9

Totals

Unknowns	630876	3353025	56.40
Quantified	562511	2591957	43.60
Grand Total	1193387	5944982	100.00

Injection Report

Acquired on 7-MAY-1991 at 22:46

NORSK HYDRO RESEARCH CENTRE

Analyst Name : ARNE
 Lims Id :
 Comment : SAT-GC
 Method Title : GC-MSD SATURATED HYDROCARBONS 4 DEG/MIN.
 Sample Name : BIOM.STD.
 Sample Id :
 Sample Type : Standard Amount=0.00000
 Bottle No : 8

PEAK INFORMATION

Peak	RT mins	RT Corr	Hght uV	Area uVs	Area %	Peak name	Width
3	7.176	7.183	606	3259	0.12	N-C11	4.8
6	9.808	9.817	5924	30441	1.12	N-C12	4.2
20	12.797	12.810	20052	81228	2.99	N-C13	3.8
35	15.915	15.930	31198	124389	4.58	N-C14	3.8
49	17.888	17.904	13458	51372	1.89	I-C16	3.7
56	19.008	19.024	34419	142798	5.26	N-C15	4.0
71	22.003	22.020	33183	139142	5.13	N-C16	4.0
81	23.477	23.499	9519	66443	2.45	I-C18	6.9
89	24.880	24.906	31132	127846	4.71	N-C17	4.0
90	25.141	25.168	16280	77654	2.86	FRISTANE	4.6
104	27.627	27.661	25560	106404	3.92	N-C18	4.0
106	27.955	27.990	9855	48238	1.78	HEPTANE	5.0
118	30.253	30.296	22889	86908	3.20	N-C19	3.7
132	32.760	32.810	20024	78433	2.89	N-C20	3.7
146	35.160	35.222	17118	61806	2.28	N-C21	3.7
158	37.464	37.537	15019	56708	2.09	N-C22	3.7
172	39.672	39.755	13924	49059	1.81	N-C23	3.5
183	41.795	41.888	12265	44839	1.65	N-C24	3.7
193	43.829	43.933	11254	46125	1.70	N-C25	3.7
205	45.797	45.910	10141	36185	1.33	N-C26	3.5
216	47.693	47.815	9145	31072	1.14	N-C27	3.4
225	49.517	49.648	7440	26188	0.96	N-C28	3.5
234	51.285	51.424	5899	22362	0.82	N-C29	3.5
241	52.987	53.134	4237	16290	0.60	N-C30	3.7
246	54.637	54.792	2238	8130	0.30	N-C31	3.5
250	56.232	56.395	936	2952	0.11	N-C32	3.2
253	57.787	57.957	618	3407	0.13	N-C33	4.6

Totals			
Unknowns	248756	1144463	42.17
Quantified	384331	1569674	57.83
Grand Total	633087	2714137	100.00

SIMON-ROBERTSON

BA-92-1242-1

REPORT NO. 7115/Ic

REGISTRERT
OLJEDIREKTORATET

**REVIEW OF GEOCHEMICAL DATA
35/9-1 AND 35/9-2 WELLS
NORWEGIAN NORTH SEA**

by

M A BASTOW
C DARLINGTON

PROJECT NO. Ic/21318

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MAY 1992

1 INTRODUCTION

This report is a review of geochemical data for the 35/9-1 and 35/9-2 wells, drilled in the Norwegian North Sea. The study has been carried out on behalf of Norsk Hydro a.s., Oslo, in accordance with contract number NHT-B44-00084, dated 4 March 1992. The scope and purpose of the review study were discussed and agreed during a telephone conversation between Mr B Knudsen of Norsk Hydro a.s., and Mr C Darlington of Simon-Robertson on 27 February 1992.

The main aims of this report are to:

- review the coverage of the drilled Jurassic sections with regard to geochemical maturity analyses, screening analyses for source rocks and migrant hydrocarbons and detailed follow-up analyses of selected source rock and oil stain occurrences, and where appropriate make recommendations for additional analyses;
- consider geochemical analyses of tested oils and of oil stain occurrences with particular regard to maturity parameters;
- consider interpretations regarding the presence of migrant oil within gas zones.

The client contact at Norsk Hydro a.s., Oslo throughout the course of this review study has been Mr B Knudsen. A preliminary interpretation of the geochemical data was forwarded to the client on 20 March 1992 (facsimile reference 2700). A proof copy of this report was issued on 30 April 1992.

1.1 DATABASE

The database for the review study comprised geochemical data and interpretative reports for the 35/9-1 and 35/9-3 wells. Three reports prepared by Norsk Hydro (Petroleum Geochemistry Group Bergen) were made available for review:

Petroleum Geochemistry well 35/9-1
dated 25 August 1989
(no document identifier)

Geochemical evaluation well 35/9-2
dated 12 June 1991
document identifier R-048941

Characterisation and correlation of hydrocarbons in wells 35/9-1 and 35/9-2
dated 25 August 1991
document identifier R-049922

In addition, the following report prepared by IFE (Institutt for Energiteknikk, Kjeller) was made available:

Report on stable isotopes ($\delta^{13}\text{C}$, δD , $\delta^{18}\text{O}$) on natural gas samples from well 35/9-1, DST-1, DST-2 and DST-3
dated 11 September 1989
document identifier IFE/KR/F-89/122 R-040041

TABLE 1 Hydrocarbon composition of gas samples

Well	Test	C ₁	C ₂	C ₃	iC ₄	nC ₄	iC ₅	nC ₅	iC ₄ /nC ₄	C ₂ -C ₄ /C ₁ -C ₄
35/9-1	DST-1	77.8	12.9	5.4	0.69	1.8	0.30	0.30	0.39	0.21
35/9-1	DST-2	74.8	14.7	5.9	0.75	1.9	0.41	0.45	0.40	0.24
35/9-1	DST-3	80.6	10.4	4.7	0.66	1.7	0.61	0.58	0.38	0.18
35/9-2	DST-2	80.3	8.7	5.6	0.74	2.3	0.45	0.44	0.33	0.18
35/9-2	DST-3	81.9	7.8	5.1	0.73	2.2	0.61	0.72	0.34	0.16
35/9-2	DST-4	81.2	8.5	5.5	0.76	2.1	0.41	0.39	0.37	0.17

TABLE 2 Isotope composition of gas samples

Well	Test	C ₁ δ ¹³ C	C ₂ δ ¹³ C	C ₃ δ ¹³ C	iC ₄ δ ¹³ C	nC ₄ δ ¹³ C	CO ₂ δ ¹³ C	CO ₂ δ ¹³ O	δD
35/9-1	DST-1	-43.5	-30.8	-27.7	-26.1	-27.7	-16.0	-9.6	-193
35/9-1	DST-2	-43.4	-30.9	-28.0	-26.5	-26.7	-20.5	-6.7	-195
35/9-1	DST-3	-43.1	-30.5	-27.7	-25.9	-27.3	-26.8	-8.1	-200
35/9-2	DST-2	-41.5	-29.1	-25.0	-27.8	-27.5	-9.9	-7.4	-189
35/9-2	DST-3	-41.8	-29.3	-24.5	-26.9	-27.2	-9.1	-7.4	-201
35/9-2	DST-4	-42.2	-29.4	-24.9	-27.9	-27.3	-10.4	-10.6	-179

Notes:

Carbon isotope compositions are given as ‰ relative to PDB standard. The IFE value on NBS 22 is -29.77 ± 0.06‰ PDB. Confidence limits on δ¹³C values are estimated to be ± 0.3‰ PDB, including all analytical steps.

Deuterium isotope compositions of methane (C₁) are given as ‰ relative to SMOW standard. Confidence limits on δD values are estimated to be ± 5‰, including all analytical steps.

Norsk Hydro a.s Bergen
E&P Research Centre

Doc. type: Agreement Amendment Report

Storage: 2 years 5 years Permanent archives

Grading: Open Internal Confidential Very conf. Strictly conf.

Doc. id
R-048941

Copy no.

Distribution	Shell (2)	Statoil (2)	Petrobras (2)	Deminex (2)	NPD (2)	Hydro
Title	<p>BA91-1377-1 GEOCHEMICAL EVALUATION</p> <p>9 JULI 1991</p> <p>REGISTRERT</p> <p>OLJEDIREKTORATET</p>					
	WELL: 35/9-2					

Summary/Conclusion//Recommendation

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1. INTRODUCTION

Well 35/9-2, operated by Norsk Hydro, was spudded on 6. january 1991 and reached TD at 2885 m in basement.

The well location is given in Fig. 1.1. and a preliminary well summary is given in Fig. 1.2.

This report comprises the petroleum geochemical analyses of sidewall cores (SWC) from 1035.5 m to 2813 m and core chips from cores 1-4. All depths are drillers depth (mRKB).

The vitrinite reflectance work has been undertaken by Geooptics (Newcastle upon Tyne, U.K.). All other analyses, and compilation of this report have been undertaken by Norsk Hydro Research Center in Bergen.



LIST OF ABBREVIATIONS AND TERMS

Kerogen

Insoluble organic matter which is preserved in sedimentary rocks. Under the increasing influence of temperature and time (maturation), most kerogen produce hydrocarbons.

TOC

Total Organic Carbon: a measure of the organic carbon in a rock, expressed as weight per cent. Used as a fundamental parameter in source rock classification.

RockEval

A commercial technique for the anhydrous pyrolysis of source rocks developed by IFP. It enables the chemical composition of kerogen and hence its hydrocarbon potential, to be determined.

S₁

This is a measure of the already generated oil in source rocks, or oil content in a reservoir. In units of kg/t rock.

S₂

This is a measure of the remaining hydrocarbon potential. In units of kg/t rock.

Tmax

The temperature, in °C, at which the pyrolytic yield of hydrocarbons from a rock sample reaches its maximum, using RockEval.

Hydrogen Index (HI)

A parameter derived from RockEval which measures the hydrogen richness of kerogen. $HI = 100 * S_2 / TOC$. It has a direct relationship with the H/C ratio, and is measured in mg of hydrocarbons/g TOC

Production Index (PI)

A maturity parameter derived from RockEval, which is the ratio of already generated hydrocarbons (or migrated hydrocarbons) to potential hydrocarbons. $PI = S_1 / S_1 + S_2$

Immature samples have values of 0.1 or less, mature samples, 0.1 to 0.4. The PI is high in reservoirs.

Maturation

The process of chemical change in sedimentary organic matter induced by increasing time and temperature. These chemical reactions produce oil and hydrocarbon gases from the appropriate organic matter. The major maturity subdivisions are:

- immature
- early mature
- peak mature
- late mature
- post mature

Vitrinite

The type of organic matter derived from the lignified tissues of higher land plants.

Vitrinite reflectance

A maturity parameter based on the change in the reflectance of polished vitrinite particles with increasing time and temperature. Widely used values for maturity zones are:

- <0.55 %. immature
- 0.55-1.3 %. mature for oil generation
- >1.3 %. post mature for oil generation
- 0.7-3.0 %. mature for gas generation

EOM (Extractable Organic Matter)

Oil and oil-like products removed from rock samples using organic solvents. The amount of extract may be used to determine the level of maturation.

Saturated Hydrocarbons

Hydrocarbons which contain only carbon-carbon single bonds (alkanes).

Aromatic hydrocarbons

Unsaturated hydrocarbons and containing one or more rings with conjugated carbon-carbon double and single bonds.

NSO compounds

Fraction of oils or extracts containing heteroatoms like sulphur, oxygen and nitrogen.

Asphaltenes

The heavy molecular weight components of crude oils and sediment extracts which is soluble in CS_2 and insoluble in n-pentane.

n-C₁₇

n-alkane with 17 carbon atoms

n-alkane carbon number maximum

n-C₁₇ maximum indicates algal input

n-C₁₆ to n-C₂₄ indicates bacterial input

n-C₂₇, n-C₂₉, n-C₃₁ indicates higher plant input

Isoprenoids

Isoprenoids are branched and/or cyclic hydrocarbons built from multiples of the isoprene unit and are dominantly derived from plant and bacterial sources.

Pristane

C₁₉ regular acyclic isoprenoid derived from the side chain of chlorophyll.

Phytane

C₂₀ regular acyclic isoprenoid derived mainly from the side chain in chlorophyll. but have also been found in methanogenic bacteria and archaeobacteria.

Pristane/phytane ratio

>3 = oxic conditions

<0.5 = anoxic conditions

The ratio may be affected by many factors

CPI (Carbon Preference Index)

The ratio of abundance of odd carbon number n-alkanes to even number n-alkanes. The preference decreases with increasing maturity until CPI = 1.0.

CPI > 1.1 means oil or extract is of low maturity.

CPI < 1.0 in carbonate source rocks.

Biodegradation

Degradation of oils by bacteria. Normal alkanes are generally the first to be attacked and removed.

GC-MS (Gas chromatography-mass spectrometry)

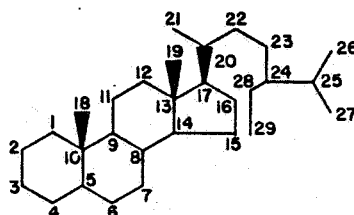
Method for identification of constituents in complex mixtures or for analysis of trace components using Single Ion Monitoring (SIM).

Biomarkers

Compounds found in petroleum or rock extracts which indicate an unambiguous link with a natural product.

Steranes

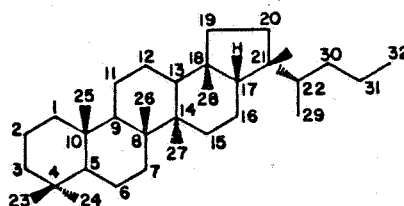
The alkanes derived from steroid natural products. Monitored by GC-MS of M/z 217 and 218.



Sterane

Triterpanes

C_{27} to C_{35} five ring cyclic alkanes derived from triterpenoid hydrocarbons in bacteria, fungi, algae and higher plants. Monitored by GC-MS of M/z 191.



Pentacyclic triterpane

Hopanes

C_{27} to C_{35} pentacyclic alkanes which dominate the triterpanes found in sediments and crude oils. They originate from bacteria.

M/z, m/e

The mass to charge ratio of fragment of molecules from GC-MS.

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TABLE 2.1

Average Vitrinite Reflectance

Table 2.1 VITRINITE REFLECTANCE DATA WELL 35/9-2
Average values

Petroleum Geochemistry Group
Research Centre Bergen



Depth	%	Lithology	Type	Population I	Population II	Population III	SCI
1035.50	100	SH	SWC	0.37 (20)			
1150.00	100	SLTY.SH	SWC	0.36 (20)			
1260.50	100	SLTY.SH	SWC	0.39 (14)			
1304.20	100	SH	SWC	0.40 (12)			
1359.50	100	SH	SWC	0.39 (20)			
1498.60	100	SH	SWC	0.43 (4)			
1600.00	100	SH	SWC	0.36 (5)			
1700.00	100	SLTY.SH	SWC	0.40 (20)			
1830.00	100	SH/SLST	SWC	0.43 (15)			
1880.00	100	SH	SWC	0.42 (2)			
1962.00	100	SH	SWC	0.40 (1)			
2063.00	100	SH	SWC	0.39 (22)			
2159.00	100	SLST	SWC	0.45 (20)			
2246.00	100	SH/SST	SWC	0.45 (20)			
2437.00	100	SST	SWC	0.47 (20)			
2477.00	100	SDY.LST	SWC	0.50 (6)			
2567.50	100	SLST	SWC	0.45 (20)			
2613.00	100	SLST	SWC	0.46 (12)			

Table 2.1 VITRINITE REFLECTANCE DATA WELL 35/9-2 (cont'd)
Average values

Petroleum Geochemistry Group
Research Centre Bergen



Depth	%	Lithology	Type	Population I	Population II	Population III	SCI
2813.00	100	SLTY.SST	SWC	0.00			

TABLE 3.1

Rock Eval/TOC Results

Table 3.1. SOURCE ROCK SCREENING DATA WELL 35/9-2

Depth (m)	%	Lithology	Type	S1 kg/t	S2 kg/t	TOC %	HI	PI	Tmax DegC	Company
1035.50		CLYST	SWC	0.12	1.10	0.8	138	0.10	0	F-BERGEN
1150.00		CLYST	SWC	0.15	0.62	1.0	62	0.19	427	F-BERGEN
1273.00		CLYST	SWC	0.11	0.19	0.7	27	0.37	423	F-BERGEN
1290.20		CLYST	SWC	0.01	0.17	0.6	28	0.06	416	F-BERGEN
1310.50		GLAM SST	SWC	0.05	0.01	0.0	0	0.83	0	F-BERGEN
1348.50		CLYST	SWC	0.00	0.00	0.3	0	0.00	0	F-BERGEN
1498.60		CLYST	SWC	0.11	0.23	0.5	46	0.32	411	F-BERGEN
1700.00		CLYST	SWC	0.11	1.03	1.0	103	0.10	431	F-BERGEN
1830.00		CLYST	SWC	0.08	0.32	0.6	53	0.20	429	F-BERGEN
1868.00		MARL	SWC	0.05	0.31	0.6	52	0.14	431	F-BERGEN
1903.20		MARL/LST	SWC	0.00	0.00	0.1	0	0.00	0	F-BERGEN
1945.00		MARL	SWC	0.03	0.03	0.2	15	0.50	430	F-BERGEN
2013.00		CLYST	SWC	0.17	0.84	0.4	210	0.17	482	F BERGEN
2020.50		CLYST	SWC	1.10	4.88	3.7	132	0.18	434	F BERGEN
2024.00		CLYST	SWC	0.42	1.26	1.4	90	0.25	439	F BERGEN
2030.00		CLYST	SWC	0.55	1.12	1.7	66	0.33	441	F BERGEN
2035.00		CLYST	SWC	0.54	0.81	1.3	62	0.40	435	F BERGEN
2040.00		CLYST	SWC	0.21	0.30	0.5	60	0.41	447	F BERGEN

Table 3.1. SOURCE ROCK SCREENING DATA WELL 35/9-2 (cont'd)

Depth (m)	%	Lithology	Type	S1 kg/t	S2 kg/t	TOC %	HI	PI	Tmax DegC	Company
2042.50		CLYST	SWC	0.48	0.84	1.7	49	0.36	433	F BERGEN
2046.00		CLYST	SWC	0.59	0.95	1.6	59	0.38	434	F BERGEN
2050.00		CLYST	SWC	1.09	2.62	2.8	94	0.29	436	F BERGEN
2053.00		CLYST	SWC	0.32	0.31	0.6	52	0.51	443	F BERGEN
2053.00		CLYST	SWC	0.33	0.29	0.6	48	0.53	434	F BERGEN
2057.00		CLYST	SWC	0.19	0.21	0.7	30	0.47	460	F BERGEN
2063.00		CLYST	SWC	1.07	7.49	2.8	268	0.13	433	F BERGEN
2067.00		CLYST	SWC	3.24	15.04	4.7	320	0.18	423	F BERGEN
2085.00		SLT	SWC	2.03	7.27	3.0	242	0.22	430	F BERGEN
2088.00		SLT	SWC	2.16	10.13	3.7	274	0.18	427	F BERGEN
2094.00		SLT	SWC	2.19	7.45	3.3	226	0.23	426	F BERGEN
2132.80	100	CLYST	COCH	3.12	7.58	3.9	194	0.29	417	F-BERGEN
2134.60	100	CLYST	COCH	5.04	14.81	6.2	239	0.25	414	F-BERGEN
2138.60	100	CLYST	COCH	2.56	6.83	3.5	195	0.27	421	F-BERGEN
2140.50	100	CLYST	COCH	6.40	19.48	7.4	263	0.25	418	F-BERGEN
2159.00		SLT	SWC	2.41	7.64	3.4	225	0.24	427	F BERGEN
2179.00		SLT	SWC	1.95	5.20	2.9	179	0.27	430	F BERGEN
2189.50		SLT/SST	SWC	0.33	1.12	0.5	224	0.23	484	F BERGEN
2197.00		CLYST/SST L	SWC	2.42	5.88	2.9	203	0.29	426	F BERGEN

Table 3.1. SOURCE ROCK SCREENING DATA WELL 35/9-2 (cont'd)

Depth (m)	%	Lithology	Type	S1 kg/t	S2 kg/t	TOC %	HI	PI	Tmax DegC	Company
2205.00		SST	SWC	0.27	0.15	0.2	75	0.64	458	F BERGEN
2212.50		SLT	SWC	1.05	2.81	1.4	201	0.27	434	F BERGEN
2228.00		SLT	SWC	0.71	1.94	0.9	216	0.27	436	F BERGEN
2246.00		CLYST/SLT	SWC	0.69	1.72	1.1	156	0.29	435	
2257.50		SST	SWC	0.31	0.86	0.2	430	0.26	597	
2291.80	100	CLYST	COCH	2.15	14.30	2.8	511	0.13	430	F-BERGEN
2303.40	100	CLYST	COCH	4.54	28.14	6.6	426	0.14	424	F-BERGEN
2340.50	100	CLYST	COCH	0.89	5.46	2.0	273	0.14	430	F-BERGEN
2345.50	100	CLYST	COCH	0.44	2.74	1.1	249	0.14	430	F-BERGEN
2388.00	100	CLYST	COCH	1.25	10.83	3.2	338	0.10	427	F-BERGEN
2397.00	100	CLYST	COCH	0.43	2.89	1.3	222	0.13	427	F-BERGEN
2399.00	100	CLYST	COCH	0.63	4.98	1.9	262	0.11	430	F-BERGEN
2437.00		SLT/SST	SWC	0.17	1.65	0.5	330	0.09	586	
2457.00		SLT/CLYST	SWC	0.31	2.35	0.9	261	0.12	481	
2477.00		CLYST/COAL	SWC	0.05	0.39	0.3	130	0.11	439	
2512.00	100	CLYST	COCH	0.31	2.13	1.0	213	0.13	433	F-BERGEN
2515.50	100	CLYST	COCH	1.18	1.53	0.8	191	0.44	433	F-BERGEN
2519.00	100	CLYST	COCH	0.21	1.53	0.9	170	0.12	436	F-BERGEN
2522.00	100	CLYST	COCH	0.35	4.35	1.5	290	0.07	427	F-BERGEN

Table 3.1. SOURCE ROCK SCREENING DATA WELL 35/9-2 (cont'd)

Depth (m)	% Lithology	Type	S1 kg/t	S2 kg/t	TOC %	HI	PI	Tmax DegC	Company
2525.00	100 CLYST	COCH	0.29	4.45	1.4	318	0.06	429	F-BERGEN
2530.00	100 CLYST	COCH	0.27	1.79	0.9	199	0.13	435	F-BERGEN
2534.00	100 CLYST	COCH	0.09	0.65	0.5	130	0.12	442	F-BERGEN
2537.00	100 CLYST	COCH	0.20	1.86	1.1	169	0.10	435	F-BERGEN
2544.00	100 CLYST	COCH	0.17	1.45	0.8	181	0.10	436	F-BERGEN
2547.00	100 CLYST	COCH	0.09	0.81	0.8	101	0.10	433	F-BERGEN
2549.00	100 CLYST	COCH	0.13	1.32	0.8	165	0.09	439	F-BERGEN
2553.00	100 CLYST	COCH	0.23	3.35	1.4	239	0.06	435	F-BERGEN
2567.50	CLYST/SLT	SWC	0.13	1.82	1.0	182	0.07	438	
2576.00	CLYST	SWC	0.87	6.03	1.8	335	0.13	475	
2588.00	CLYST	SWC	0.68	4.88	1.8	271	0.12	433	
2606.50	CLYST	SWC	0.45	4.71	1.9	248	0.09	434	
2613.00	SLT	SWC	0.25	3.53	1.5	235	0.07	433	
2625.60	100 CLYST	COCH	0.17	4.65	2.5	186	0.04	431	F-BERGEN
2626.30	100 COAL	COCH	3.78	66.19	32.5	204	0.05	436	F-BERGEN
2628.70	100 CLYST	COCH	0.83	20.17	6.2	325	0.04	430	F-BERGEN
2633.60	100 COAL	COCH	6.25	129.93	74.5	174	0.05	433	F-BERGEN
2635.50	100 CLYST	COCH	0.64	14.05	7.9	178	0.04	435	F-BERGEN
2720.50	100 CLYST	COCH	0.21	2.64	1.4	189	0.07	438	F-BERGEN

Table 3.1. SOURCE ROCK SCREENING DATA WELL 35/9-2 (cont'd)



Depth (m)	%	Lithology	Type	S1 kg/t	S2 kg/t	TOC %	HI	PI	Tmax DegC	Company
2743.60	100	CLYST	COCH	0.65	7.80	2.9	269	0.08	426	F-BERGEN
2770.40	100	CLYST	COCH	0.49	4.20	2.4	175	0.10	434	F-BERGEN
2778.80	100	COALY SHALE	COCH	10.85	89.14	25.1	355	0.11	425	F-BERGEN
2789.50		SST KONGL	SWC	0.00	1.23	0.1	1230	0.00	439	
2805.00		SST SLT-LAM	SWC	0.01	1.30	0.1	1300	0.01	462	
2813.00		SLT	SWC	0.09	1.45	0.4	363	0.06	450	

TABLE 3.2

Rock Eval Average Source Rock Data

Table 3 . 2

HYLAB RESULTS MANAGEMENT : Formation Summary Reporting selected from screen

Well	St.Depth	En.Depth	Simple Mean							Weighted Mean				
			S1 kg/t	S2 kg/t	TOC %	HI	PI	Tmax	VRo	S1 kg/t	S2 kg/t	TOC %	HI	
35/9-2	658.00	692.00	NDP	NDP	NDP	NDP	NDP	NDP	NDP	NDP	NDP	NDP	NDP	NDP
35/9-2	692.00	785.00	NDP	NDP	NDP	NDP	NDP	NDP	NDP	NDP	NDP	NDP	NDP	NDP
35/9-2	785.00	1281.00	0.13	0.64	0.8	75	0.2	283	0.37	0.13	0.63	0.8	74	
35/9-2	1281.00	1305.00	0.01	0.17	0.6	28	0.1	416	0.40	NDP	NDP	NDP	NDP	
35/9-2	1305.00	1385.00	0.03	0.00	0.2	0	0.4	0	0.39	0.03	0.00	0.2	NDP	
35/9-2	1385.00	1888.00	0.09	0.47	0.7	63	0.2	425	0.41	0.10	0.52	0.7	66	
35/9-2	1888.00	2016.00	0.07	0.29	0.2	75	0.2	304	0.40	0.08	0.36	0.3	91	
35/9-2	2016.00	2057.00	0.53	1.24	1.5	67	0.4	439	NDP	0.57	1.31	1.6	73	
35/9-2	2057.10	2068.50	2.15	11.27	3.8	293	0.2	428	0.39	2.15	11.27	3.8	293	
35/9-2	2068.50	2099.00	2.13	8.28	3.3	246	0.2	427	NDP	2.14	8.30	3.4	244	
35/9-2	2099.00	2188.00	3.58	10.26	4.5	215	0.3	421	0.45	3.13	9.22	4.1	213	
35/9-2	2188.00	2210.00	1.01	2.38	1.2	167	0.4	456	NDP	1.01	2.37	1.2	165	
35/9-2	2210.00	2246.50	0.82	2.16	1.1	190	0.3	435	0.45	0.81	2.13	1.1	189	
35/9-2	2247.00	2342.00	1.97	12.19	2.9	409	0.2	470	NDP	1.71	10.49	2.6	395	
35/9-2	2342.00	2367.00	0.44	2.74	1.1	249	0.1	430	NDP	NDP	NDP	NDP	NDP	
35/9-2	2367.00	2481.00	0.47	3.85	1.4	257	0.1	465	0.49	0.37	3.05	1.1	259	
35/9-2	2481.00	2512.00	0.31	2.13	1.0	213	0.1	433	NDP	NDP	NDP	NDP	NDP	
35/9-2	2512.00	2615.00	0.35	2.75	1.2	213	0.1	437	0.46	0.40	3.36	1.4	231	
35/9-2	2680.00	2856.00	1.76	15.39	4.6	553	0.1	439	NDP	1.24	11.33	3.6	479	

TABLE 3.3

Extraction Yields and Iatroscan
Group Type Separation

Table 3.3 SOURCE ROCK EXTRACTION DATA WELL 35/9-2



Depth (m)	% Lithology	Type	EOM(mg)	EOM(%)	Hydrocarbons			Non Hydrocarbons		
					SAT(%)	ARO(%)	TOTAL(%)	NSO(%)	ASPH(%)	TOTAL(%)
1035.50	CLYST	SWC	4.0	0.03	3.77	27.38	31.15	48.09	20.73	68.82
1290.20	CLYST	SWC	1.8	0.02	4.27	31.29	35.56	45.10	19.32	64.42
1498.60	CLYST	SWC	1.7	0.02	1.84	8.88	10.72	61.84	27.42	89.26
2053.00	CLYST	SWC	11.3	0.08	10.73	5.40	16.13	41.85	42.02	83.87
2063.00	CLYST	SWC	16.8	0.16	6.79	8.51	15.30	49.29	35.38	84.67
2067.00	CLYST	SWC	41.6	0.41	32.36	23.23	55.59	34.57	9.83	44.40
2085.00	SLT	SWC	30.3	0.32	8.65	24.29	32.94	48.55	18.49	67.04
2088.00	SLT	SWC	36.1	0.31	6.47	22.57	29.04	46.73	24.21	70.94
2132.80	100 CLYST	COCH	41.2	0.39	24.64	7.42	32.06	43.54	24.39	67.93
2159.00	SLT	SWC	50.0	0.38	7.62	20.14	27.76	49.19	23.03	72.22
2291.80	100 CLYST	COCH	37.4	0.35	16.56	6.24	22.80	39.32	37.86	77.18
2553.00	100 CLYST	COCH	12.6	0.09	33.89	12.25	46.14	30.84	23.01	53.85
2576.00	CLYST	SWC	5.2	0.18	15.75	7.20	22.95	47.87	29.16	77.03
2606.50	CLYST	SWC	6.7	0.17	6.33	20.38	26.71	44.36	28.90	73.26
2633.60	100 COAL	COCH	109.5	2.67	1.04	13.44	14.48	65.61	19.89	85.50
2635.50	100 CLYST	COCH	22.7	0.18	1.17	20.98	22.15	61.79	16.04	77.83

TABLE 3.4

Calculated Ratios from Iatroscan
Group Type Separation.

Table 3.4 SOURCE ROCK EXTRACTION DATA WELL 35/9-2



Depth	%	Lithology	Type	TOC (%)	EOM(%) / TOC(%)	SAT(%) / TOC(%)	SAT(%) / ARO(%)	HC / Non HC
1035.50		CLYST	SWC	0.80	0.04	4.71	0.14	0.45
1290.20		CLYST	SWC	0.60	0.03	7.12	0.14	0.55
1498.60		CLYST	SWC	0.50	0.04	3.68	0.21	0.12
2053.00		CLYST	SWC	0.60	0.14	17.88	1.99	0.19
2063.00		CLYST	SWC	2.80	0.06	2.42	0.80	0.18
2067.00		CLYST	SWC	4.70	0.09	6.89	1.39	1.25
2085.00		SLT	SWC	3.00	0.11	2.88	0.36	0.49
2088.00		SLT	SWC	3.70	0.08	1.75	0.29	0.41
2132.80	100	CLYST	COCH	3.90	0.10	6.32	3.32	0.47
2159.00		SLT	SWC	3.40	0.11	2.24	0.38	0.38
2291.80	100	CLYST	COCH	2.80	0.12	5.91	2.65	0.30
2553.00	100	CLYST	COCH	1.40	0.07	24.21	2.77	0.86
2576.00		CLYST	SWC	1.80	0.10	8.75	2.19	0.30
2606.50		CLYST	SWC	1.90	0.09	3.33	0.31	0.36
2633.60	100	COAL	COCH	74.50	0.04	0.01	0.08	0.17
2635.50	100	CLYST	COCH	7.90	0.02	0.15	0.06	0.28

TABLE 3.5

Molecular Ratios Saturated Fraction

Table 3.5 SATURATED FRACTION MOLECULAR RATIOS WELL 35/9-2



Depth	% Lithology	Type	Pristane	Pristane	CPI-I	CPI-II	nC15+	nC20
			----- nC17	----- Phytane			----- Total	----- nC25
1035.50	CLYST	SWC	0.80	0.70	1.70	1.60		
1290.20	CLYST	SWC	0.90	0.60	0.00	0.00		
1498.60	CLYST	SWC	0.70	0.90	0.00	0.00		
2053.00	CLYST	SWC	0.90	2.00	1.10	1.00		
2063.00	CLYST	SWC	1.10	2.10	1.40	1.40		
2067.00	CLYST	SWC	1.20	2.10	1.20	1.00		
2085.00	SLT	SWC	1.30	2.10	1.20	1.09		
2088.00	SLT	SWC	0.92	2.17	1.28	1.18		
2132.80	100 CLYST	COCH	0.68	2.36	1.11	1.03		
2159.00	SLT	SWC	1.02	2.19	1.20	1.10		
2291.80	100 CLYST	COCH	0.94	2.22	0.96	0.72		
2553.00	100 CLYST	COCH	1.90	2.80	0.00	0.00		
2576.00	CLYST	SWC	0.80	1.80	0.00	0.00		
2606.50	CLYST	SWC	0.80	2.00	0.00	0.00		
2633.60	100 COAL	COCH	15.80	8.50	1.90	1.30		
2635.50	100 CLYST	COCH	0.60	3.50	0.00	0.00		

TABLE 3.6

Sterane Isomerisation

TABLE 3.6

BIOMARKER RATIOS WELL 35/9-2
STERANE ISOMERISATION

DEPTH M	LITHOLOGY	TYPE	C29-20S % aaa	C29 20S+R %abb
1035.5	CLYST	SWC	44	57
1290.2	CLYST	SWC	36	57
1498.6	CLYST	SWC	43	60
2053.0	CLYST	SWC	38	55
2063.0	CLYST	SWC	19	26
2067.0	CLYST	SWC	19	27
2085.0	SLT	SWC	22	37
2088.0	SLT	SWC	24	41
2132.8	CLYST	COCH	26	42
2159.0	SLT	SWC	30	46
2291.8	CLYST	COCH	26	33
2553.0	CLYST	COCH	25	31
2576.0	CLYST	SWC	32	43
2606.5	CLYST	SWC	31	40
2633.6	COAL	COCH	32	20
2635.5	CLYST	COCH	19	16
BIOM. STD.		OIL	47	62

TABLE 3.7

Triterpane Ratios and Isomerisation

TABLE 3.7
BIOMARKER RATIOS WELL 35/9-2
TRITERPANE ISOMERISATION

DEPTH M	LITHOLOGY	TYPE	Ts/Tm	BNOR/ BNOR+NOR	NOR/ NOR+HOP	MORET/ HOPAN	C32-22S %
1035.5	CLYST	SWC	0.61	0.00	0.51	0.19	59
1290.2	CLYST	SWC	0.70	0.09	0.50	0.19	58
1498.6	CLYST	SWC	0.76	0.10	0.43	0.19	55
2053.0	CLYST	SWC	1.38	0.19	0.36	0.15	59
2063.0	CLYST	SWC	0.53	0.00	0.35	0.21	44
2067.0	CLYST	SWC	0.78	0.15	0.36	0.20	50
2085.0	SLT	SWC	0.68	0.18	0.31	0.23	51
2088.0	SLT	SWC	0.71	0.19	0.29	0.22	52
2132.8	CLYST	COCH	0.88	0.25	0.32	0.19	56
2159.0	SLT	SWC	0.82	0.27	0.29	0.21	54
2291.8	CLYST	COCH	0.57	0.13	0.29	0.27	53
2553.0	CLYST	COCH	0.07	0.07	0.43	0.45	58
2576.0	CLYST	SWC	0.24	0.05	0.44	0.33	58
2606.5	CLYST	SWC	0.14	0.04	0.43	0.38	58
2633.6	COAL	COCH	0.01	0.00	0.45	0.59	57
2635.5	CLYST	COCH	0.04	0.00	0.45	0.55	58
BIOM. STD		OIL	1.36	0.33	0.31	0.12	59