

L-850

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# Geochemical Evaluation

## Well 36/4-1

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by

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**REGISTRERT**

OLJEDIREKTORATET

## CHAPTER 2 INTERVALS STUDIED

Canned drill cuttings from 1100m to 2700m (depth below RKB) were analysed at approx. 50m intervals for headspace gas content.

The section from 2300m to 2700m was analysed for source rock potential at 10m intervals. This section includes the following stratigraphic intervals:

Depth	Lithology
2300-2361m	Calc. Mudstone
2361-2372m	Silty Mudstone
2372-2390m	Silty Mudstone
2390-2422m	Silty Mudstone
2422-2479m	Silty Mudstone
2479-2540m	Silty Mudstone
2540-2617m	Silty Mudstone
2617-2700m	Silty Mudstone

In addition, picked sandstone intervals from 1910m, 1950m, 1980m, 2009m, 2051m and 2108m were analysed for possible residual oil staining associated with logged gas shows.

TABLE 1.1

## LITHOLOGY AND STRATIGRAPHY

COUNTRY: Norway  
WELL: 36/4-1

DEPTH m	DEPTHRANGE m	FORMATION	AGE	LITHOLOGY	PICKED LITHOLOGY	SAMPLE TYPE
2310	2301-2310			MDST-m gy shale 10%:SST-lt gy 90%	Mudstone	CUT
2319	2313-2319			MDST-m gy silty 60%:SST-lt gy 40%	Mudstone	CUT
2330	2325-2330			MDST-m gy silty 80%:SST-lt gy 20%	Mudstone	CUT
2337	2334-2337			MDST-m gy silty 45%:MDST-dk gy 45%:SST-lt gy 10%	Mudstone	CUT
2349	2346-2349			MDST-m gy slty 100%	Mudstone	CUT
2358	2352-2358			MDST-m-dk gy silty 70%:SST-lt gy 30%	Mudstone	CUT
2367	2364-2367			MDST-m gy slty 100%	Mudstone	CUT
2376	2373-2376			MDST-m gy silty 95%:SST-lt gy 5%	Mudstone	CUT
2385	2382-2385			MDST-m-dk gy silty 95%:SST-lt gy 5%	Mudstone	CUT
2397	2394-2397			MDST-m-dk gy silty 85%:SST-lt gy 5%:LST-10%	Mudstone	CUT
2406	2403-2406			MDST-m-dk gy silty 60%:SST-lt gy 10%:LST-lt gy 30%	Mudstone	CUT
2415	2412-2415			MDST-m-dk gy silty 85%:SST-lt gy 5%:LST-10%	Mudstone	CUT
2424	2421-2424			MDST-m gy slty 70%:MDST-dk gy 30%	Mudstone	CUT
2433	2427-2433			MDST-dk gy 30%:MDST-m gy 70%	Mudstone	CUT
2442	2439-2442			MDST-bn 100%	Mudstone	CUT
2454	2448-2454			MDST-m gy/bn slty 100%	Mudstone	CUT
2460	2454-2460			MDST-m gy/bn slty 100%	Mudstone	CUT
2478	2472-2478			MDST-m gy/bn slty 100%	Mudstone	CUT
2487	2481-2487			MDST-m gy/bn slty 100%:LST-Tr	Mudstone	CUT
2496	2493-2496			MDST-m gy/bn 100%	Mudstone	CUT
2505	2502-2505			MDST-m gy/bn slty 100%:LST-Tr	Mudstone	CUT
2517	2511-2517			MDST-m gy/bn 100%	Mudstone	CUT
2526	2523-2526			MDST-m gy/bn 100%	Mudstone	CUT
2532	2529-2532			MDST-m gy/bn 85%:SST-lt gy 10%:LST-5%	Mudstone	CUT
2547	2541-2547			MDST-m gy/bn 100%	Mudstone	CUT
2559	2553-2559			MDST-m gy/bn 100%	Mudstone	CUT
2573	2556-2573			MDST-m gy/bn 100%	Mudstone	CUT
2584	2581-2584			MDST-m gy/bn 100%	Mudstone	CUT
2593	2590-2593			MDST-m gy/bn 100%	Mudstone	CUT

TABLE 1.2

## LITHOLOGY AND STRATIGRAPHY

**COUNTRY:** Norway  
**WELL:** 36/4-1

DEPTH m	DEPTHRANGE m	FORMATION	AGE	LITHOLOGY	PICKED LITHOLOGY	SAMPLE TYPE
2602	2596-2602			MDST-m gy/bn 100%	Mudstone	CUT
2614	2608-2614			MDST-m gy/bn slty 85%:SST-lt gy 10%:LST-lt gy 5%	Mudstone	CUT
2626	2620-2626			MDST-m gy/bn slty 100%	Mudstone	CUT
2635	2629-2635			MDST-m gy/bn slty 100%	Mudstone	CUT
2644	2638-2644			MDST-m gy/bn slty 90%:LST-lt gy 5%:SST-lt gy 5%	Mudstone	CUT
2656	2650-2656			MDST-m gy/bn slty 90%:LST-lt gy 5%:SST-lt gy 5%	Mudstone	CUT
2665	2662-2665			MDST-m gy/bn slty 90%:LST-lt gy 5%:SST-lt gy 5%	Mudstone	CUT
2677	2671-2677			MDST-m gy/bn slty 100%	Mudstone	CUT
2689	2686-2689			MDST-m gy/bn slty 100%	Mudstone	CUT
2698	2695-2698			MDST-m gy/bn slty 85%:SST-lt gy 10%:LST-lt gy 5%	Mudstone	CUT
2707	2701-2707			MDST-dk gy slty 5%:MDST-m gy/bn 60%:SST-lt gy 30%:LST-lt gy 5	Mudstone	CUT

TABLE 2

## OPTICAL SOURCE ROCK MATURITY INDICATORS

COUNTRY: Norway

WELL: 36/4-1

DEPTH	FORMATION	SPORE COLOUR	VITRINITE (%Ro)	NO. of READINGS	COMMENTS
1120			0.4	20	MOD;IPAR 80% VWPARG+PAR 20% ; BS MOD BW MOD; SP Y/O+L.O TR
1220			0.45	20	L-MOD;IPAR 90% VWPARG+PAR 10% ; BS MOD BW+BBL MOD; SP Y/O TR
1330			0.49	12	L-MOD;IPAR 100% VPAR TR BS LT; BS LT BW TR; ALG TR Y SP TR Y/O
1430			0.46	20	L-MOD;IPAR 100% VWPARG+PAR TR; BS MOD BW TR; SP TR Y-Y/O
1530			0.49	20	L-MOD;IPAR 100% VPAR TR; BS LT BW VL; ALG TR Y/O SP TR L.O
1630			0.52	20	L-MOD;IPAR 100% VPAR TR; BS LT BW TR; SP TR Y/O
1730			0.57	20	MOD;IPAR 100% VAPR TR; BS LT BW VL; ALG TR Y/O SP TR Y/O+L.O
1830			0.6	12	L;IPAR 100% VPAR TR; BS LT BW VL; SP TR Y/O-M.O
1910			0.59	10	L;IPAR 100% VPAR TR; BS TR BW TR; ALG TR Y/O SP TR Y/O-M.O
2006			0.46	13	L-MOD;IPAR 100% VPAR TR; BS VAR LT-MOD/STR BW VL; SP TR Y/O-L.O
2108			0.56	12	L;IPAR 100% VPAR+VWPARG TR; BS TR BW TR; AMORPH TR Y/O ALG TR Y/O SP TR L.O
2207			0.57	20	MOD;IPAR 100% VPAR+VWPARG TR; BS MOD BW L; ALG TR Y+Y/O SP TR L.O
2307			0.64	14	L;IPAR 100% VPAR TR; BS LT BW TR; ALG TR Y+Y/O SP TR Y/O-D.O
2406			0.48	20	MOD;IPAR 100% VWPARG+PAR TR; BS MOD BW MOD/RI; ALG TR Y-Y/O SP L Y/O-L.O
2505			0.42	20	MOD;IPAR 80% VWPARG+VPAR 20%; BSMOD BW MOD/RI; ALG TR Y SP L Y/O
2605			0.43	20	L-MOD;IPAR 100% VPAR+VWPARG TR; BS MOD/STR BW MOD/RI; SP MOD Y/O
2689			0.47	20	L-MOD;IPAR 90% VPAR+VWPARG 10%; BS MOD BW MOD/RI; SPMOD/RI Y/O

TABLE 3.1

## SOURCE ROCK QUALITY INDICATORS

COUNTRY: Norway  
WELL: 36/4-1

DEPTH (M)	DEPTHRANGE (M)	FORMATION	PICKED LITHOLOGY	P1 (kg/t)	P1 (mg/gC)	P2 (kg/t)	TOC (%)	TMAX deg C	HI	GOGI	CARBT (%)	S (%)
2310	2301-2310						0.87				34.3	0.37
2319	2313-2319			0.7	41.3	3.6	1.70	357	212		16.7	0.55
2330	2325-2330			0.9	53.6	2.5	1.68	346	149		13.1	1.10
2337	2334-2337			0.8	50.6	3.3	1.58	358	209		16.3	0.70
2349	2346-2349			0.8	66.3	4.6	1.21	361	381		19.4	0.53
2358	2352-2358			0.7	60.8	3.9	1.15	360	339		21.0	0.63
2367	2364-2367			1.3	32.9	11.6	3.95	429	294		12.0	2.03
2376	2373-2376			2.1	49.2	9.9	4.27	428	232		12.3	2.09
2385	2382-2385			1.2	35.4	7	3.39	429	207		15.8	1.77
2397	2394-2397			1.7	42.5	8.7	4.00	429	217		10.1	2.05
2406	2403-2406			1.1	57.3	4.2	1.92	431	219		13.7	2.60
2415	2412-2415			0	0.0	4.6	1.47	363	313		14.0	0.92
2424	2421-2424			1.4	71.0	8.4	1.97	428	426		11.9	1.93
2433	2427-2433			1	54.6	6	1.83	431	327		8.8	2.45
2442	2439-2442			1.3	59.7	7.1	2.18	433	326		9.6	2.74
2454	2448-2454			1	40.0	7	2.50	431	280		9.9	2.41
2460	2454-2460			1.1	49.1	8.7	2.24	435	389		12.0	2.17
2478	2472-2478			1.6	65.5	8.8	2.44	432	360		10.7	2.13
2487	2481-2487			1.7	55.7	12.3	3.05	430	403		9.2	2.45
2496	2493-2496			1.3	40.0	13.4	3.25	429	413		8.4	2.65
2505	2502-2505			1.2	38.7	11.8	3.10	430	380		9.8	2.85
2517	2511-2517			1.6	43.6	14.5	3.67	432	395		9.0	2.64
2526	2523-2526			1.4	33.8	16.3	4.14	430	394		8.1	2.77
2532	2529-2532			1.3	37.0	13.8	3.51	430	393		8.8	2.88
2547	2541-2547			1.3	44.5	12.1	2.92	434	414		10.0	2.33
2559	2553-2559			1.1	48.4	7.9	2.27	433	347		8.7	2.24
2573	2556-2573			1.3	53.9	9.7	2.41	433	402		9.2	2.23
2584	2581-2584			1.2	42.9	9.2	2.80	433	329		9.4	2.10
2593	2590-2593			1	42.5	8.5	2.35	433	361		11.1	1.94

TABLE 3.2

## SOURCE ROCK QUALITY INDICATORS

COUNTRY: Norway  
WELL: 36/4-1

DEPTH (M)	DEPTHRANGE (M)	FORMATION	PICKED LITHOLOGY	P1 (kg/t)	P1 (mg/gC)	P2 (kg/t)	TOC (%)	TMAX deg C	HI	GOGI	CARBT (%)	S (%)
2602	2596-2602			1.1	38.3	9.7	2.87	433	338		10.0	2.32
2614	2608-2614			1.3	45.1	10.5	2.88	433	364		9.7	2.34
2626	2620-2626			1.4	36.9	15.4	3.80	430	406		10.1	2.78
2635	2629-2635			1.2	46.1	8.9	2.60	433	342		8.9	2.34
2644	2638-2644			1.3	66.1	6.2	1.97	436	315		9.6	2.00
2656	2650-2656			1	50.3	6.1	1.99	439	307		10.9	1.76
2665	2662-2665			0.9	44.7	7.6	2.01	437	378		10.5	1.85
2677	2671-2677			1.1	37.0	11.3	2.97	433	380		12.0	2.00
2689	2686-2689			1.1	36.9	12.6	2.98	433	422		13.3	1.15
2698	2695-2698			1.3	37.6	9	3.45	433	261		12.6	2.33
2707	2701-2707			1	44.1	4.4	2.27	437	194		17.1	2.16

## Headspace Gas Data

Depth (m)	C1	C2	C3	iC4	nC4	C5+	sum(C1-C4)	sum(C2-C4)	%wetness	iC4/nC4
1150	7	0	1	0	0	1	8	2	19.2	0.54
1200	3	0	1	0	0	1	5	2	34	0.71
1250	5	0	1	0	0	1	7	2	26.2	0.56
1300	7	1	2	0	0	2	11	3	31.4	0.5
1350	21	2	5	2	4	70	33	13	38.4	0.52
1400	75	7	11	8	15	99	117	41	35.5	0.51
1450	26	2	7	3	8	76	45	20	43.6	0.42
1500	33	3	9	4	10	120	59	26	43.9	0.43
1550	55	7	23	15	33	162	132	77	58.4	0.44
1600	46	4	13	6	15	107	84	38	45.5	0.39
1650	66	9	28	14	31	141	148	82	55.3	0.45
1700	88	17	24	11	14	38	153	66	42.9	0.76
1750	398	69	90	35	54	155	646	247	38.3	0.65
1800	221	59	83	34	50	154	447	226	50.5	0.69
1850	167	30	46	16	27	128	286	119	41.7	0.59
1900	157	26	61	27	52	190	323	166	51.3	0.53
1950	301	72	133	38	67	287	611	310	50.8	0.57
2000	152	24	40	16	24	86	257	105	40.8	0.7
2021	167	27	41	12	26	79	273	105	38.7	0.44
2051	293	98	102	20	45	96	557	264	47.4	0.44
2126	237	72	81	22	40	92	452	215	47.6	0.54
2144	232	87	93	24	36	54	471	240	50.9	0.67
2171	266	76	65	16	21	46	445	179	40.1	0.78
2207	263	59	42	13	15	54	393	129	32.9	0.83
2225	210	43	43	12	14	48	321	112	34.7	0.87
2243	393	58	44	11	12	49	518	125	24.1	0.89
2261	403	74	59	17	14	49	566	163	28.9	1.17
2307	643	46	47	16	9	14	760	117	15.4	1.76
2325	2520	359	455	171	82	97	3587	1067	29.8	2.1
2343	948	157	243	97	55	94	1500	552	36.8	1.75
2364	13097	917	721	247	134	210	15117	2020	13.4	1.84
2382	17713	1111	859	359	175	290	20216	2502	12.4	2.05
2403	1728	268	447	193	143	330	2778	1050	37.8	1.35
2421	516	128	422	235	166	383	1468	951	64.8	1.42
2448	1925	386	667	275	190	383	3443	1519	44.1	1.45
2481	4147	736	1000	351	285	478	6520	2373	36.4	1.23
2502	4216	783	1466	542	540	1015	7547	3331	44.1	1
2526	768	416	1464	604	705	1367	3958	3189	80.6	0.86
2553	1531	632	1256	416	500	836	4336	2805	64.7	0.83
2573	1767	904	2181	799	985	1677	6636	4869	73.4	0.81
2590	2300	1098	2412	816	1027	1635	7654	5353	69.9	0.79
2605	1493	1200	2938	907	1212	1696	7751	6258	80.7	0.75
2644	1478	859	1716	482	639	943	5173	3696	71.4	0.75
2656	972	751	1878	541	752	971	4894	3923	80.1	0.72
2683	4153	2366	3192	844	1213	1121	11767	7615	64.7	0.7
2704	2136	1125	1664	449	724	1107	6098	3962	65	0.62



Well: 36/4-1

TABLE 3.4  
Isotope GC Analysis of Headspace Gas

Depth (m)	Type	Lithology	C1	C2	C3	iC4	nC4	C5+	CO2	D	Sample
2364	Cut	Bulk	-45	-33.1	-31	-28.3	-29.3	-	-31.5	-	0001-0B
2382	Cut	Bulk	-44.4	-34.1	-32	-28.3	-29.8	-	-31.1	-	0002-0B
2526	Cut	Bulk	-52.4	-31.4	-32.1	-30.6	-32.2	-	-20	-	0031-0B
2605	Cut	Bulk	-46.9	-32	-31.9	-30.4	-31.8	-	-27.7	-	0004-0B
2683	Cut	Bulk	-42	-32.9	-30.9	-29.5	-30.5	-	-23.3	-	0005-0B

# Sediment/Extract Analysis

Well name : 36/4-1  
 Suite name : 36/4-1 SR study, wet ctgs-2nd smp set  
 Country Of Origin : Norway  
 Depth (m) : 2349  
 Sample name : Wet cutting

## Extraction

TSE %wt : 0.149

## HPLC

Saturates %wt :  
 Aromatics %wt :  
 Residues %wt :

Asphaltenes (Micro Method) %wt :

## Inspection Properties

API :  
 Density @ 15 deg C :  
 Wax Content %wt :  
 Wax Melting Point deg C :  
 Pour Point deg C :  
 Viscosity cSt @ 20 deg C :  
 Total Acidity mg KOH/g :  
 Asphaltenes %wt (IP Method) :  
 Nitrogen ppm :  
 Sulphur %wt :  
 Nickel ppm :  
 Vanadium ppm :  
 Nickel/Vanadium :

## Saturates GC

Pristane/Phytane : 1.86  
 Pristane/nC17 : 0.74  
 Phytane/nC18 : 0.19  
 CPI : 1.23  
 ALKIND : 67.23  
 R22 : 1.01

## Biomarker Ratios

H1 :	S1 :	M2 :
H2 :	S2 :	M3 :
H3 :	S3 : ::	M4 :
H4 :	S4 : ::	M5 :
H5 : ::::	S5 :	A1 :
H6 :	S6 :	A2 :
H7 :	S7 :	A3 :
H8 :	S8 :	A4 :
H9 :	S9 :	A5 :
H10 :	S10 :	A6 :
H11 :		MDR :
H12 :		MBP :
H13 :		
H14 :		
H15 :		
H16 :		
H17 :		
H18 :		

## Light Hydrocarbons

MCH % :  
 HER :  
 HXR :

## Stable Carbon Isotopes

Saturates : -28  
 Total Oil :  
 Aromatics : -28.3  
 Residue :  
 Asphaltenes :  
 Kerogen :  
 STANDARD: NBS22 -29.8

# Sediment/Extract Analysis

Well name : 36/4-1  
Suite name : 36/4-1 SR study, wet ctgs-2nd smp set  
Country Of Origin : Norway  
Depth (m) : 2367  
Sample name : Wet cutting

## Extraction

TSE %wt : 0.419

## HPLC

Saturates %wt :

Aromatics %wt :

Residues %wt :

Asphaltenes (Micro Method) %wt :

## Inspection Properties

API :  
Density @ 15 deg C :  
Wax Content %wt :  
Wax Melting Point deg C :  
Pour Point deg C :  
Viscosity cSt @ 20 deg C :  
Total Acidity mg KOH/g :  
Asphaltenes %wt (IP Method) :  
Nitrogen ppm :  
Sulphur %wt :  
Nickel ppm :  
Vanadium ppm :  
Nickel/Vanadium :

## Saturates GC

Pristane/Phytane : 2.34  
Pristane/nC17 : 1.71  
Phytane/nC18 : 0.61  
CPI : 1.15  
ALKIND : 54.73  
R22 : 0.87

## Biomarker Ratios

H1 :	S1 :	M2 :
H2 :	S2 :	M3 :
H3 :	S3 :	M4 :
H4 :	S4 :	M5 :
H5 :	S5 :	A1 :
H6 :	S6 :	A2 :
H7 :	S7 :	A3 :
H8 :	S8 :	A4 :
H9 :	S9 :	A5 :
H10 :	S10 :	A6 :
H11 :		MDR :
H12 :		MBP :
H13 :		
H14 :		
H15 :		
H16 :		
H17 :		
H18 :		

## Light Hydrocarbons

MCH % :  
HER :  
HXR :

## Stable Carbon Isotopes

Saturates : -27.5  
Total Oil :  
Aromatics : -26.7  
Residue :  
Asphaltenes :  
Kerogen :  
STANDARD: NBS22 -29.8

# Sediment/Extract Analysis

Well name : 36/4-1  
Suite name : 36/4-1 SR study, wet ctgs-2nd smp set  
Country Of Origin : Norway  
Depth (m) : 2385  
Sample name : Wet cutting

## Extraction

TSE %wt : 0.292

## HPLC

Saturates %wt :

Aromatics %wt :

Residues %wt :

Asphaltenes (Micro Method) %wt :

## Inspection Properties

API :  
Density @ 15 deg C :  
Wax Content %wt :  
Wax Melting Point deg C :  
Pour Point deg C :  
Viscosity cSt @ 20 deg C :  
Total Acidity mg KOH/g :  
Asphaltenes %wt (IP Method) :  
Nitrogen ppm :  
Sulphur %wt :  
Nickel ppm :  
Vanadium ppm :  
Nickel/Vanadium :

## Saturates GC

Pristane/Phytane : 2.45

Pristane/nC17 : 3.58

Phytane/nC18 : 0.75

CPI : 1.16

ALKIND : 40.94

R22 : 0.95

## Biomarker Ratios

H1 :	S1 :	M2 :
H2 :	S2 :	M3 :
H3 :	S3 :	M4 :
H4 :	S4 :	M5 :
H5 :	S5 :	A1 :
H6 :	S6 :	A2 :
H7 :	S7 :	A3 :
H8 :	S8 :	A4 :
H9 :	S9 :	A5 :
H10 :	S10 :	A6 :
H11 :		MDR :
H12 :		MBP :
H13 :		
H14 :		
H15 :		
H16 :		
H17 :		
H18 :		

## Light Hydrocarbons

MCH % :

HER :

HXR :

## Stable Carbon Isotopes

Saturates : -27.1

Total Oil :

Aromatics : -25.8

Residue :

Asphaltenes :

Kerogen :

STANDARD: NBS22 -29.8

**Sediment/Extract Analysis**

Well name : 36/4-1  
 Suite name : 36/4-1 SR study, wet ctgs-2nd smp set  
 Country Of Origin : Norway  
 Depth (m) : 2424  
 Sample name : Wet cutting

**Extraction**

TSE %wt : 0.163

**HPLC**

Saturates %wt :  
 Aromatics %wt :  
 Residues %wt :

Asphaltenes (Micro Method) %wt :

**Inspection Properties**

API :  
 Density @ 15 deg C :  
 Wax Content %wt :  
 Wax Melting Point deg C :  
 Pour Point deg C :  
 Viscosity cSt @ 20 deg C :  
 Total Acidity mg KOH/g :  
 Asphaltenes %wt (IP Method) :  
 Nitrogen ppm :  
 Sulphur %wt :  
 Nickel ppm :  
 Vanadium ppm :  
 Nickel/Vanadium :

**Saturates GC**

Pristane/Phytane : 2.05  
 Pristane/nC17 : 1.19  
 Phytane/nC18 : 0.15  
 CPI : 1.17  
 ALKIND : 45.85  
 R22 : 1.19

**Biomarker Ratios**

H1 :	S1 :	M2 :
H2 :	S2 :	M3 :
H3 :	S3 : ::	M4 :
H4 :	S4 : ::	M5 :
H5 : ::::	S5 :	A1 :
H6 :	S6 :	A2 :
H7 :	S7 :	A3 :
H8 :	S8 :	A4 :
H9 :	S9 :	A5 :
H10 :	S10 :	A6 :
H11 :		MDR :
H12 :		MBP :
H13 :		
H14 :		
H15 :		
H16 :		
H17 :		
H18 :		

**Light Hydrocarbons**

MCH % :  
 HER :  
 HXR :

**Stable Carbon Isotopes**

Saturates :  
 Total Oil :  
 Aromatics :  
 Residue :  
 Asphaltenes :  
 Kerogen :  
 STANDARD:

# Sediment/Extract Analysis

Well name : 36/4-1  
Suite name : 36/4-1 SR study, wet ctgs-2nd smp set  
Country Of Origin : Norway  
Depth (m) : 2454  
Sample name : Wet cutting

## Extraction

TSE %wt : 0.278

## HPLC

Saturates %wt :  
Aromatics %wt :  
Residues %wt :

Asphaltenes (Micro Method) %wt :

## Inspection Properties

API :  
Density @ 15 deg C :  
Wax Content %wt :  
Wax Melting Point deg C :  
Pour Point deg C :  
Viscosity cSt @ 20 deg C :  
Total Acidity mg KOH/g :  
Asphaltenes %wt (IP Method) :  
Nitrogen ppm :  
Sulphur %wt :  
Nickel ppm :  
Vanadium ppm :  
Nickel/Vanadium :

## Saturates GC

Pristane/Phytane : 3.57  
Pristane/nC17 : 3.53  
Phytane/nC18 : 0.36  
CPI : 1.22  
ALKIND : 25.75  
R22 : 0.88

## Biomarker Ratios

H1 :	S1 :	M2 :
H2 :	S2 :	M3 :
H3 :	S3 : ::	M4 :
H4 :	S4 : ::	M5 :
H5 : ::::	S5 :	A1 :
H6 :	S6 :	A2 :
H7 :	S7 :	A3 :
H8 :	S8 :	A4 :
H9 :	S9 :	A5 :
H10 :	S10 :	A6 :
H11 :		MDR :
H12 :		MBP :
H13 :		
H14 :		
H15 :		
H16 :		
H17 :		
H18 :		

## Light Hydrocarbons

MCH % :  
HER :  
HXR :

## Stable Carbon Isotopes

Saturates : -27.5  
Total Oil :  
Aromatics : -26.5  
Residue :  
Asphaltenes :  
Kerogen :  
STANDARD: NBS22 -29.8

# Sediment/Extract Analysis

Well name : 36/4-1  
 Suite name : 36/4-1 SR study, wet ctgs-2nd smp set  
 Country Of Origin : Norway  
 Depth (m) : 2526  
 Sample name : \Wet cutting

## Extraction

TSE %wt : 0.410

## HPLC

Saturates %wt :  
 Aromatics %wt :  
 Residues %wt :

Asphaltenes (Micro Method) %wt :

## Inspection Properties

API :  
 Density @ 15 deg C :  
 Wax Content %wt :  
 Wax Melting Point deg C :  
 Pour Point deg C :  
 Viscosity cSt @ 20 deg C :  
 Total Acidity mg KOH/g :  
 Asphaltenes %wt (IP Method) :  
 Nitrogen ppm :  
 Sulphur %wt :  
 Nickel ppm :  
 Vanadium ppm :  
 Nickel/Vanadium :

## Saturates GC

Pristane/Phytane : 2.21  
 Pristane/nC17 : 2.69  
 Phytane/nC18 : 1.00  
 CPI : 1.25  
 ALKIND : 36.93  
 R22 : 0.78

## Biomarker Ratios

H11 :	S1 :	M2 :
H12 :	S2 :	M3 :
H13 :	S3 : ::	M4 :
H14 :	S4 : ::	M5 :
H15 : ::::	S5 :	A1 :
H16 :	S6 :	A2 :
H17 :	S7 :	A3 :
H18 :	S8 :	A4 :
	S9 :	A5 :
	S10 :	A6 :
		MDR :
		MBP :

## Light Hydrocarbons

MCH % :  
 HER :  
 HXR :

## Stable Carbon Isotopes

Saturates : -30.1  
 Total Oil :  
 Aromatics : -29.1  
 Residue :  
 Asphaltenes :  
 Kerogen :  
 STANDARD: NBS22 -29.8

# Sediment/Extract Analysis

Well name : 36/4-1  
Suite name : 36/4-1 SR study, wet ctgs-2nd smp set  
Country Of Origin : Norway  
Depth (m) : 2626  
Sample name : Wet cutting

## Extraction

TSE %wt : 0.253

## HPLC

Saturates %wt :  
Aromatics %wt :  
Residues %wt :

Asphaltenes (Micro Method) %wt :

## Inspection Properties

API :  
Density @ 15 deg C :  
Wax Content %wt :  
Wax Melting Point deg C :  
Pour Point deg C :  
Viscosity cSt @ 20 deg C :  
Total Acidity mg KOH/g :  
Asphaltenes %wt (IP Method) :  
Nitrogen ppm :  
Sulphur %wt :  
Nickel ppm :  
Vanadium ppm :  
Nickel/Vanadium :

## Saturates GC

Pristane/Phytane : 2.90  
Pristane/nC17 : 2.48  
Phytane/nC18 : 0.86  
CPI : 1.28  
ALKIND : 47.68  
R22 : 0.75

## Biomarker Ratios

H1 :	S1 :	M2 :
H2 :	S2 :	M3 :
H3 :	S3 : ::	M4 :
H4 :	S4 : ::	M5 :
H5 : ::::	S5 :	A1 :
H6 :	S6 :	A2 :
H7 :	S7 :	A3 :
H8 :	S8 :	A4 :
H9 :	S9 :	A5 :
H10 :	S10 :	A6 :
H11 :		MDR :
H12 :		MBP :
H13 :		
H14 :		
H15 :		
H16 :		
H17 :		
H18 :		

## Light Hydrocarbons

MCH % :  
HER :  
HXR :

## Stable Carbon Isotopes

Saturates : -28.5  
Total Oil :  
Aromatics : -27.3  
Residue :  
Asphaltenes :  
Kerogen :  
STANDARD: NBS22 -29.8



# Sediment/Extract Analysis

Well name : 36/4-1  
 Suite name : 36/4-1 SR study, wet ctgs-2nd smp set  
 Country Of Origin : Norway  
 Depth (m) : 2656  
 Sample name : Wet cutting

## Extraction

TSE %wt : 0.230

## HPLC

Saturates %wt :  
 Aromatics %wt :  
 Residues %wt :

Asphaltenes (Micro Method) %wt :

## Inspection Properties

API :  
 Density @ 15 deg C :  
 Wax Content %wt :  
 Wax Melting Point deg C :  
 Pour Point deg C :  
 Viscosity cSt @ 20 deg C :  
 Total Acidity mg KOH/g :  
 Asphaltenes %wt (IP Method) :  
 Nitrogen ppm :  
 Sulphur %wt :  
 Nickel ppm :  
 Vanadium ppm :  
 Nickel/Vanadium :

## Saturates GC

Pristane/Phytane : 4.12  
 Pristane/nC17 : 2.53  
 Phytane/nC18 : 0.47  
 CPI : 1.31  
 ALKIND : 39.17  
 R22 : 0.79

## Biomarker Ratios

H1 :	S1 :	M2 :
H2 :	S2 :	M3 :
H3 :	S3 : ::	M4 :
H4 :	S4 : ::	M5 :
H5 : ::::	S5 :	A1 :
H6 :	S6 :	A2 :
H7 :	S7 :	A3 :
H8 :	S8 :	A4 :
H9 :	S9 :	A5 :
H10 :	S10 :	A6 :
H11 :		MDR :
H12 :		MBP :
H13 :		
H14 :		
H15 :		
H16 :		
H17 :		
H18 :		

## Light Hydrocarbons

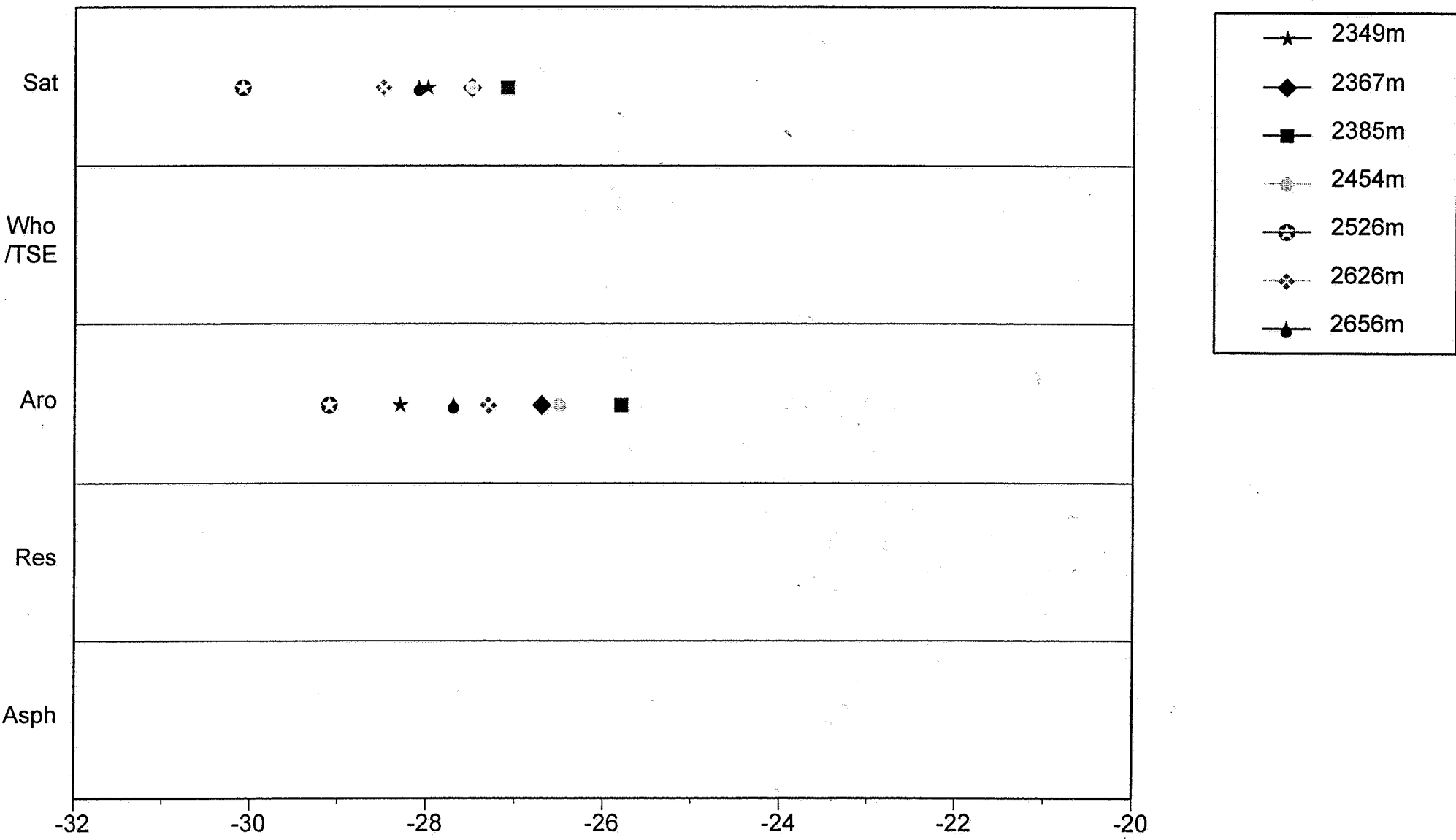
MCH % :  
 HER :  
 HXR :

## Stable Carbon Isotopes

Saturates : -28.1  
 Total Oil :  
 Aromatics : -27.7  
 Residue :  
 Asphaltenes :  
 Kerogen :  
 STANDARD: NBS22 -29.8

# Stable Carbon Isotopic Profiles

Well Name : 36/4-1 Source-Rock  
Extracts



Distance 3

# Oil Analysis

Well name 36/4-1  
Suite name 36/4-1 (Gas) shows - Sst extraction  
Country Of Origin Norway  
Depth (m): 1910  
Sample name  
Test Number :  
G number

## Inspection Properties

API :  
Density @ 15 deg C  
Wax Content %wt  
Wax Melting Point deg C  
Pour Point deg C  
Viscosity cSt @ 20 deg C  
Total Acidity mg KOH/g  
Asphaltenes %wt (IP Method)  
Nitrogen ppm :  
Sulphur %wt  
Nickel ppm  
Vanadium ppm  
Nickel/Vanadium

## Biomarker Ratios

H1 : 0.55	S1 : 0.00	M2 : 0.98
H2 : 0.30	S2 : 0.00	M3 : 0.57
H3 : 0.73	S3 : 36:28:35	M4 : 0.00
H4 : 27	S4 :	M5 :
H5 : 100:116:41:15:5:2	S5 : 30.04	A1 : 0.72
H6 : 0.31	S6 :	A2 : 0.41
H7 : 0.57	S7 : 50.87	A3 : 0.64
H8 :	S8 : 0.00	A4 : 0.24
H9 :	S9 :	A5 : 0.63
H10 :	S10 :	A6 : 2.69
H11 : 33.56		MDR : 6.18
H12 : 19.21		MBP : 34.13
H13 : 186.90		
H14 : 4.41		
H15 : 0.00		
H16 : 0.00		
H17 : 31.31		
H18 : 12.59		

## HPLC

Saturates %wt 0.69  
Aromatics %wt 0.52  
Residues %wt 98.79

## Asphaltenes (Micro Method) %wt

## Saturates GC

Pristane/Phytane  
Pristane/nC17 :  
Phytane/nC18  
CPI :  
ALKIND :  
R22 :

## Light Hydrocarbons

MCH % :  
HER  
HXR :

## Stable Carbon Isotopes

Saturates :  
Total Oil :  
Aromatics :  
Residue :  
Asphaltenes

STANDARD:

# Oil Analysis

Well name 36/4-1  
Suite name 36/4-1 (Gas) shows - Sst extraction  
Country Of Origin Norway  
Depth (m) : 1950  
Sample name  
Test Number :  
G number

## Inspection Properties

API :  
Density @ 15 deg C  
Wax Content %wt  
Wax Melting Point deg C  
Pour Point deg C  
Viscosity cSt @ 20 deg C  
Total Acidity mg KOH/g  
Asphaltenes %wt (IP Method)  
Nitrogen ppm :  
Sulphur %wt  
Nickel ppm  
Vanadium ppm  
Nickel/Vanadium

## Biomarker Ratios

H1 : 0.48	S1 : 0.00	M2 : 0.96
H2 : 0.30	S2 : 0.00	M3 : 0.62
H3 : 0.75	S3 : 34:31:34	M4 : 0.00
H4 : 23	S4 : 0:0:0	M5 :
H5 : 100:128:46:13:6:2	S5 : 36.31	A1 : 0.26
H6 : 0.27	S6 :	A2 : 0.32
H7 : 0.45	S7 : 49.95	A3 : 0.71
H8 :	S8 : 0.00	A4 : 0.33
H9 :	S9 :	A5 : 0.60
H10 :	S10 :	A6 : 2.08
H11 : 18.62		MDR : 6.74
H12 : 13.51		MBP : 29.34
H13 : 136.52		
H14 : 7.90		
H15 : 0.00		
H16 : 0.00		
H17 : 24.97		
H18 : 11.78		

## HPLC

Saturates %wt 1.65  
Aromatics %wt 1.68  
Residues %wt 96.68

Asphaltenes (Micro Method) %wt

## Saturates GC

Pristane/Phytane  
Pristane/nC17 :  
Phytane/nC18  
CPI :  
ALKIND :  
R22 :

## Light Hydrocarbons

MCH % :  
HER  
HXR :

## Stable Carbon Isotopes

Saturates :  
Total Oil :  
Aromatics :  
Residue :  
Asphaltenes

STANDARD:

# Oil Analysis

Well name 36/4-1  
Suite name 36/4-1 (Gas) shows - Sst extraction  
Country Of Origin Norway  
Depth (m) : 1980  
Sample name  
Test Number :  
G number

## Inspection Properties

API :  
Density @ 15 deg C  
Wax Content %wt  
Wax Melting Point deg C  
Pour Point deg C  
Viscosity cSt @ 20 deg C  
Total Acidity mg KOH/g  
Asphaltenes %wt (IP Method)  
Nitrogen ppm :  
Sulphur %wt  
Nickel ppm  
Vanadium ppm  
Nickel/Vanadium

## Biomarker Ratios

H1 :	0.56	S1 :	0.00	M2 :	0.95
H2 :	0.41	S2 :	0.00	M3 :	0.75
H3 :	0.84	S3 :	41:27:31	M4 :	0.00
H4 :	11	S4 :	0:0:0	M5 :	
H5 :	100:70:36:17:8:4	S5 :	32.59	A1 :	0.47
H6 :	0.46	S6 :		A2 :	0.34
H7 :	0.55	S7 :	57.33	A3 :	0.78
H8 :		S8 :		A4 :	0.45
H9 :		S9 :		A5 :	0.49
H10 :		S10 :		A6 :	1.54
H11 :	16.25			MDR :	6.05
H12 :	13.39			MBP :	16.21
H13 :	60.93				
H14 :	10.58				
H15 :	0.00				
H16 :	0.00				
H17 :	35.41				
H18 :	16.19				

## HPLC

Saturates %wt 13.13  
Aromatics %wt 7.40  
Residues %wt 79.46

Asphaltenes (Micro Method) %wt

## Saturates GC

Pristane/Phytane  
Pristane/nC17 :  
Phytane/nC18  
CPI :  
ALKIND :  
R22 :

## Light Hydrocarbons

MCH % :  
HER  
HXR :

## Stable Carbon Isotopes

Saturates :  
Total Oil :  
Aromatics :  
Residue :  
Asphaltenes

STANDARD:

# Oil Analysis

Well name 36/4-1  
Suite name 36/4-1 (Gas) shows - Sst extraction  
Country Of Origin Norway  
Depth (m) : 2009  
Sample name  
Test Number :  
G number

## HPLC

Saturates %wt 39.34  
Aromatics %wt 33.82  
Residues %wt 26.84

## Inspection Properties

API :  
Density @ 15 deg C  
Wax Content %wt  
Wax Melting Point deg C  
Pour Point deg C  
Viscosity cSt @ 20 deg C  
Total Acidity mg KOH/g  
Asphaltenes %wt (IP Method)  
Nitrogen ppm :  
Sulphur %wt  
Nickel ppm  
Vanadium ppm  
Nickel/Vanadium

Asphaltenes (Micro Method) %wt

## Saturates GC

Pristane/Phytane  
Pristane/nC17 :  
Phytane/nC18  
CPI :  
ALKIND :  
R22 :

## Biomarker Ratios

H1 : 0.50	S1 : 0.00	M2 : 1.09
H2 : 0.40	S2 : 0.00	M3 : 0.86
H3 : 0.87	S3 : 37:23:39	M4 : 0.00
H4 : 12	S4 : 0:0:0	M5 :
H5 : 100:66:36:15:9:4	S5 : 40.63	A1 : 0.41
H6 : 0.48	S6 :	A2 : 0.39
H7 : 0.57	S7 : 48.92	A3 : 0.81
H8 :	S8 :	A4 : 0.56
H9 :	S9 :	A5 : 0.41
H10 :	S10 :	A6 : 0.82
H11 : 9.59		MDR : 6.92
H12 : 10.21		MBP : 7.80
H13 : 44.30		
H14 : 9.28		
H15 : 0.00		
H16 : 0.00		
H17 : 33.30		
H18 : 14.45		

## Light Hydrocarbons

MCH % :  
HER  
HXR :

## Stable Carbon Isotopes

Saturates :  
Total Oil :  
Aromatics :  
Residue :  
Asphaltenes

STANDARD:

# Oil Analysis

Well name 36/4-1  
Suite name 36/4-1 (Gas) shows - Sst extraction  
Country Of Origin Norway  
Depth (m) : 2051  
Sample name  
Test Number :  
G number

## Inspection Properties

API :  
Density @ 15 deg C  
Wax Content %wt  
Wax Melting Point deg C  
Pour Point deg C  
Viscosity cSt @ 20 deg C  
Total Acidity mg KOH/g  
Asphaltenes %wt (IP Method)  
Nitrogen ppm :  
Sulphur %wt  
Nickel ppm  
Vanadium ppm  
Nickel/Vanadium

## Biomarker Ratios

H1 :	0.74	S1 :	0.00	M2 :	0.90
H2 :	0.30	S2 :	0.00	M3 :	0.56
H3 :	0.81	S3 :	40:30:29	M4 :	0.00
H4 :	41	S4 :	0:0:0	M5 :	
H5 :	100:98:98:21:8:4	S5 :	31.06	A1 :	0.05
H6 :	0.39	S6 :		A2 :	0.11
H7 :	0.53	S7 :	57.88	A3 :	0.84
H8 :		S8 :		A4 :	0.49
H9 :		S9 :		A5 :	0.59
H10 :		S10 :		A6 :	1.39
H11 :	46.94			MDR :	4.45
H12 :	20.95			MBP :	10.89
H13 :	248.97				
H14 :	0.00				
H15 :	0.00				
H16 :	0.00				
H17 :	35.85				
H18 :	14.31				

## HPLC

Saturates %wt 5.38  
Aromatics %wt 4.98  
Residues %wt 89.64

Asphaltenes (Micro Method) %wt

## Saturates GC

Pristane/Phytane  
Pristane/nC17 :  
Phytane/nC18  
CPI :  
ALKIND :  
R22 :

## Light Hydrocarbons

MCH % :  
HER  
HXR :

## Stable Carbon Isotopes

Saturates :  
Total Oil :  
Aromatics :  
Residue :  
Asphaltenes

STANDARD:

# Oil Analysis

Well name 36/4-1  
Suite name 36/4-1 (Gas) shows - Sst extraction  
Country Of Origin Norway  
Depth (m) : 2108  
Sample name  
Test Number :  
G number

## Inspection Properties

API :  
Density @ 15 deg C  
Wax Content %wt  
Wax Melting Point deg C  
Pour Point deg C  
Viscosity cSt @ 20 deg C  
Total Acidity mg KOH/g  
Asphaltenes %wt (IP Method)  
Nitrogen ppm :  
Sulphur %wt  
Nickel ppm  
Vanadium ppm  
Nickel/Vanadium

## Biomarker Ratios

H1 : 0.57	S1 : 0.42	M2 : 0.87
H2 : 0.35	S2 : 0.50	M3 : 0.29
H3 : 0.81	S3 : 45:23:31	M4 : 58.81
H4 : 26	S4 : 33:31:34	M5 :
H5 : 100:117:57:25:14:12	S5 : 29.60	A1 : 0.11
H6 : 0.43	S6 :	A2 : 0.13
H7 : 0.56	S7 : 59.44	A3 : 0.72
H8 :	S8 :	A4 : 0.34
H9 :	S9 :	A5 : 0.54
H10 :	S10 :	A6 : 1.64
H11 : 69.66		MDR : 3.03
H12 : 27.89		MBP : 11.31
H13 : 23.97		
H14 : 7.00		
H15 : 0.00		
H16 : 0.00		
H17 : 46.40		
H18 : 20.93		

## HPLC

Saturates %wt 34.34  
Aromatics %wt 26.69  
Residues %wt 38.96

Asphaltenes (Micro Method) %wt

## Saturates GC

Pristane/Phytane  
Pristane/nC17 :  
Phytane/nC18  
CPI :  
ALKIND :  
R22 :

## Light Hydrocarbons

MCH % :  
HER  
HXR :

## Stable Carbon Isotopes

Saturates :  
Total Oil :  
Aromatics :  
Residue :  
Asphaltenes

STANDARD:



# Oil Analysis

Well name 36/4-1  
Suite name 36/4-1 wet ctgs, Sst extr'ts- 2nd smp set  
Country Of Origin Norway  
Depth (m) : 1910  
Sample name 2nd sample set  
Test Number :  
G number

## Inspection Properties

API :  
Density @ 15 deg C  
Wax Content %wt  
Wax Melting Point deg C  
Pour Point deg C  
Viscosity cSt @ 20 deg C  
Total Acidity mg KOH/g  
Asphaltenes %wt (IP Method)  
Nitrogen ppm :  
Sulphur %wt  
Nickel ppm  
Vanadium ppm  
Nickel/Vanadium

## Biomarker Ratios

H1 :	S1 :	M2 :
H2 :	S2 :	M3 :
H3 :	S3 :	M4 :
H4 :	S4 :	M5 :
H5 :	S5 :	A1 :
H6 :	S6 :	A2 :
H7 :	S7 :	A3 :
H8 :	S8 :	A4 :
H9 :	S9 :	A5 :
H10 :	S10 :	A6 :
H11 :		MDR :
H12 :		MBP :
H13 :		
H14 :		
H15 :		
H16 :		
H17 :		
H18 :		

## HPLC

Saturates %wt 51.11  
Aromatics %wt 15.62  
Residues %wt 33.27

## Asphaltenes (Micro Method) %wt

## Saturates GC

Pristane/Phytane 1.10  
Pristane/nC17 : 1.27  
Phytane/nC18 0.61  
CPI : 1.24  
ALKIND : 51.42  
R22 : 1.03

## Light Hydrocarbons

MCH % :  
HER  
HXR :

## Stable Carbon Isotopes

Saturates :  
Total Oil : -28.8  
Aromatics :  
Residue :  
Asphaltenes  
STANDARD: NBS22 -29.8

Oil Analysis

Well name 36/4-1  
Suite name 36/4-1wet ctgs,Sst extr'ts- 2nd smp set  
Country Of Origin Norway  
Depth (m) : 1950  
Sample name 2nd sample set  
Test Number :  
G number

HPLC

Saturates %wt  
Aromatics %wt  
Residues %wt

Asphaltenes (Micro Method) %wt

Inspection Properties

API :  
Density @ 15 deg C  
Wax Content %wt  
Wax Melting Point deg C  
Pour Point deg C  
Viscosity cSt @ 20 deg C  
Total Acidity mg KOH/g  
Asphaltenes %wt (IP Method)  
Nitrogen ppm :  
Sulphur %wt  
Nickel ppm  
Vanadium ppm  
Nickel/Vanadium

Saturates GC

Pristane/Phytane  
Pristane/nC17 :  
Phytane/nC18  
CPI :  
ALKIND :  
R22 :

Biomarker Ratios

H1 :	S1 :	M2 :
H2 :	S2 :	M3 :
H3 :	S3 :	M4 :
H4 :	S4 :	M5 :
H5 :	S5 :	A1 :
H6 :	S6 :	A2 :
H7 :	S7 :	A3 :
H8 :	S8 :	A4 :
H9 :	S9 :	A5 :
H10 :	S10 :	A6 :
H11 :		MDR :
H12 :		MBP :
H13 :		
H14 :		
H15 :		
H16 :		
H17 :		
H18 :		

Light Hydrocarbons

MCH % :  
HER :  
HXR :

Stable Carbon Isotopes

Saturates :  
Total Oil : -28.1  
Aromatics :  
Residue :  
Asphaltenes  
STANDARD: NBS22 -29.8

Oil Analysis

Well name 36/4-1  
Suite name 36/4-1 wet ctgs, Sst extr'ts- 2nd smp set  
Country Of Origin Norway  
Depth (m) : 1980  
Sample name 2nd sample set  
Test Number :  
G number

HPLC

Saturates %wt  
Aromatics %wt  
Residues %wt

Asphaltenes (Micro Method) %wt

Inspection Properties

API :  
Density @ 15 deg C  
Wax Content %wt  
Wax Melting Point deg C  
Pour Point deg C  
Viscosity cSt @ 20 deg C  
Total Acidity mg KOH/g  
Asphaltenes %wt (IP Method)  
Nitrogen ppm :  
Sulphur %wt  
Nickel ppm  
Vanadium ppm  
Nickel/Vanadium

Saturates GC

Pristane/Phytane  
Pristane/nC17 :  
Phytane/nC18  
CPI :  
ALKIND :  
R22 :

Biomarker Ratios

H1 : 0.47	S1 : 0.47	M2 : 0.99
H2 : 0.43	S2 : 0.48	M3 : 0.75
H3 : 0.84	S3 : 34:23:43	M4 : 65.46
H4 : 10	S4 : 29:29:42	M5 :
H5 : 100:64:41:20:13:7	S5 : 37.64	A1 : 0.32
H6 : 0.40	S6 :	A2 : 0.43
H7 : 0.57	S7 : 44.01	A3 : 0.74
H8 :	S8 :	A4 : 0.41
H9 :	S9 :	A5 : 0.54
H10 :	S10 :	A6 : 1.72
H11 : 3.06		MDR : 6.60
H12 : 5.32		MBP : 18.48
H13 : 46.84		
H14 : 11.50		
H15 : 0.00		
H16 : 0.24		
H17 : 33.62		
H18 : 14.48		

Light Hydrocarbons

MCH % :  
HER  
HXR :

Stable Carbon Isotopes

Saturates :  
Total Oil : -27.7  
Aromatics : -26.9  
Residue :  
Asphaltenes  
STANDARD: NBS22 -29.8

Oil Analysis

Well name 36/4-1  
 Suite name 36/4-1wet ctgs,Sst extr'ts- 2nd smp set  
 Country Of Origin Norway  
 Depth (m) : 2010  
 Sample name 2nd sample set  
 Test Number :  
 G number

HPLC

Saturates %wt  
 Aromatics %wt  
 Residues %wt

Asphaltenes (Micro Method) %wt

Inspection Properties

API :  
 Density @ 15 deg C  
 Wax Content %wt  
 Wax Melting Point deg C  
 Pour Point deg C  
 Viscosity cSt @ 20 deg C  
 Total Acidity mg KOH/g  
 Asphaltenes %wt (IP Method)  
 Nitrogen ppm :  
 Sulphur %wt  
 Nickel ppm  
 Vanadium ppm  
 Nickel/Vanadium

Saturates GC

Pristane/Phytane  
 Pristane/nC17 :  
 Phytane/nC18  
 CPI :  
 ALKIND :  
 R22 :

Biomarker Ratios

H1 :	S1 :	M2 :
H2 :	S2 :	M3 :
H3 :	S3 :	M4 :
H4 :	S4 :	M5 :
H5 :	S5 :	A1 :
H6 :	S6 :	A2 :
H7 :	S7 :	A3 :
H8 :	S8 :	A4 :
H9 :	S9 :	A5 :
H10 :	S10 :	A6 :
H11 :		MDR :
H12 :		MBP :
H13 :		
H14 :		
H15 :		
H16 :		
H17 :		
H18 :		

Light Hydrocarbons

MCH % :  
 HER  
 HXR :

Stable Carbon Isotopes

Saturates : -27.5  
 Total Oil : -27  
 Aromatics : -26  
 Residue :  
 Asphaltenes  
 STANDARD: NBS22 -29.8

Oil Analysis

Well name 36/4-1  
 Suite name 36/4-1 wet ctgs, Sst extr'ts- 2nd smp set  
 Country Of Origin Norway  
 Depth (m) : 2050  
 Sample name 2nd sample set  
 Test Number :  
 G number

HPLC

Saturates %wt  
 Aromatics %wt  
 Residues %wt

Asphaltenes (Micro Method) %wt

Inspection Properties

API :  
 Density @ 15 deg C  
 Wax Content %wt  
 Wax Melting Point deg C  
 Pour Point deg C  
 Viscosity cSt @ 20 deg C  
 Total Acidity mg KOH/g  
 Asphaltenes %wt (IP Method)  
 Nitrogen ppm :  
 Sulphur %wt  
 Nickel ppm  
 Vanadium ppm  
 Nickel/Vanadium

Saturates GC

Pristane/Phytane  
 Pristane/nC17 :  
 Phytane/nC18  
 CPI :  
 ALKIND :  
 R22 :

Biomarker Ratios

H1 :	S1 :	M2 :
H2 :	S2 :	M3 :
H3 :	S3 :	M4 :
H4 :	S4 :	M5 :
H5 :	S5 :	A1 :
H6 :	S6 :	A2 :
H7 :	S7 :	A3 :
H8 :	S8 :	A4 :
H9 :	S9 :	A5 :
H10 :	S10 :	A6 :
H11 :		MDR :
H12 :		MBP :
H13 :		
H14 :		
H15 :		
H16 :		
H17 :		
H18 :		

Light Hydrocarbons

MCH % :  
 HER  
 HXR :

Stable Carbon Isotopes

Saturates : -28.1  
 Total Oil : -28.8  
 Aromatics :  
 Residue :  
 Asphaltenes  
 STANDARD: NBS22 -29.8

Well name 36/4-1  
 Suite name 36/4-1wet ctgs,Sst extr'ts- 2nd smp set  
 Country Of Origin Norway  
 Depth (m) : 2110  
 Sample name 2nd sample set  
 Test Number :  
 G number

HPLC

Saturates %wt  
 Aromatics %wt  
 Residues %wt

Asphaltenes (Micro Method) %wt

Inspection Properties

API :  
 Density @ 15 deg C  
 Wax Content %wt  
 Wax Melting Point deg C  
 Pour Point deg C  
 Viscosity cSt @ 20 deg C  
 Total Acidity mg KOH/g  
 Asphaltenes %wt (IP Method)  
 Nitrogen ppm :  
 Sulphur %wt  
 Nickel ppm  
 Vanadium ppm  
 Nickel/Vanadium

Saturates GC

Pristane/Phytane  
 Pristane/nC17 :  
 Phytane/nC18  
 CPI :  
 ALKIND :  
 R22 :

Biomarker Ratios

H1 :	S1 :	M2 :
H2 :	S2 :	M3 :
H3 :	S3 :	M4 :
H4 :	S4 :	M5 :
H5 :	S5 :	A1 :
H6 :	S6 :	A2 :
H7 :	S7 :	A3 :
H8 :	S8 :	A4 :
H9 :	S9 :	A5 :
H10 :	S10 :	A6 :
H11 :		MDR :
H12 :		MBP :
H13 :		
H14 :		
H15 :		
H16 :		
H17 :		
H18 :		

Light Hydrocarbons

MCH % :  
 HER  
 HXR :

Stable Carbon Isotopes

Saturates : -27.8  
 Total Oil : -29.2  
 Aromatics :  
 Residue :  
 Asphaltenes  
 STANDARD: NBS22 -29.8

Appendices A

Vitrinite Reflectance Codes

### VITRINITE ABBREVIATIONS

ANS	- Anisotropic	B	- Bitumen
BAR	- Virtually Barren	BL	- Blebs
BS	- Bitumen Staining	BW	- Bitumen Wisps
CARB	- Carbargillite	CAV	- Caved
COR	- Corroded	CTGS	- Cuttings
DD	- Differentiation Difficult	DEC	- Decomposed
DMA	- Drilling Mud Additive	DOM	- Dominant
F	- Few	FL	- Fluorescence
FR	- Fragments	GN	- Gnarled
G	- Good	HAE	- Haematite
HI	- High	I	- Inertinite
IGN	- Igneous Traces	INST	- Interstitial
IRON	- Iron Oxides	L	- Low
LGN	- Lignite	LOW	- Low Reflectances
LT	- Light	MAT	- Maturity
M	- Mostly	MOD	- Moderate
NDP	- No Determination Possible	NTV	- No True Vitrinite
OBS	- Overall Bitumen Staining	OCC	- Occasional
OX	- Indications of Oxidation	P	- Poor
PAR	- Particles	PHY	- Phytoclast content
PL	- Plentiful or Plenty	POS	- Possibly
PY	- Pyrite	R	- Reworked
RES	- Resin	RI	- Rich
RM	- Reworked Material	RO	- Reflectance Measurement
S	- Some	SC	- Scruffy
SH	- Shale	SLT	- Siltstone
SML	- Small	SPE	- Specks
STC	- Structure	STR	- Strongly
SUB	- Subordinate	TB	- Turbo-drilled
TEL	- Telinitic	TR	- Trace
V	- Vitrinite	VAR	- Variable RO
VL	- Very Low Organic Content	VLT	- Very Light
VST	- Vitrinite Stringers	VW	- Vitrinite Wisps
W	- Wisps or Wispy	WH	- Wholly
*	- Allocthonous	=	- Equal Proportions
?	- Questionable		

### SPORE FLUORESCENCE COLOURS UNDER ULTRAVIOLET LIGHT

G	- Green	Y	- Yellow
O	- Orange	R	- Red
LT	- Light	M	- Mid
D	- Deep	P	- Pale
ALG	- Algae	CAR	- Carbonate
HYD	- Hydrocarbon	RES	- Resin
RH	- Rhombs	SP	- Spores



Appendices B  
Molecular Parameters List

MOLECULAR PARAMETER LIST

BP CODE	PARAMETER	USE
H1	C32 HOPANE 22S/(22S+22R)	M
H2	C31 HOPANE 22S/(22S+22R)	M
H3	C30 HOPANE/(C30 HOPANE+C30 MORETANE)	MS
H4	$\beta\beta$ HOPANES PRESENT/ABSENT	M
H5	C30:C31:C32:C33:C34:C35 HOPANE DISTRIBUTION	S
H6	C27 HOPANES Ts/(Ts+Tm)	MS
H7	C33 HOPANE 22S/(22S+22R)	M
H8	C34 HOPANE 22S/(22S+22R)	M
H9	C35 HOPANE 22S/(22S+22R)	M
H10	RESIN DITERPANES % RELATIVE TO C30 HOPANE (PEAK G)	S
H11	C23 EXT TRICYCLIC TERPANE % RELATIVE TO C30 HOPANE (PEAK G)	S
H12	C24 TETRACYCLIC TERPANE % RELATIVE TO C30 HOPANE (PEAK G)	S
H13	28,30 BISNORHOPANE (PEAK X) % RELATIVE TO C30 HOPANE (PEAK G)	S
H14	PENTACYCLANE II % RELATIVE TO C30 HOPANE (PEAK G)	S
H15	OLEANANE % RELATIVE TO C30 HOPANE (PEAK G)	S
H16	GAMMACERANE % RELATIVE TO (PEAK G)	S
H17	HOPANES C35/(C34+C35) %	S
H18	25-NORHOPANE/C30 HOPANE %	B
S1	C29 $\alpha\alpha\alpha$ STERANES 20S/(20S+20R)	M
S2	C29 STERANES $\alpha\beta\beta$ /( $\alpha\beta\beta$ + $\alpha\alpha\alpha$ )	M
S3	STERANES $\alpha\alpha\alpha$ C27:C28:C29	S
S4	STERANES $\alpha\beta\beta$ C27:C28:C29	S
S5	$\beta\alpha$ DIASTERANES/(SAME+ $\alpha\alpha\alpha$ + $\alpha\beta\beta$ STERANES) %	SM
S6	LOW MOLECULAR WEIGHT STERANES RELATIVE TO C29 STERANES	S
S7	STERANE INDEX C27/(C27+C29) % (FROM S3)	S
S8	4-ME C30 STERANE % RELATIVE TO C29 20R $\alpha\alpha\alpha$ STERANE (PEAK 42)	S
S9	4-ME STERANES INDEX C28/(C28+C30) %	S
S10	BICADINANES PRESENT/ABSENT	S
A1	C28 20R TRIAROM. STERANE/(SAME+C29 20R MONOAROM. STERANE)	M
A2	SUM TRIAROM. STERANES/(SAME+SUM MONOAROM. STERANES)	M
A3	C20 TRIAROM. STERANE/(SAME+C28 20R TRIAROM. STERANE)	M
A4	C20+C21 TRIAROM. STERANE/(SAME+SUM C26-C28 TRIAROM. STERANES)	M
A5	C26 20S TRIAROM. STERANE/C28 20S TRIAROM. STERANE	S
A6	C27 20R TRIAROM. STERANE/C28 20R TRIAROM. STERANE	S
M2	PHENANTHRENES (3ME+2ME)/(9ME+1ME)	M
M3	MPI [(3ME+2ME)/(PHENANTHRENE+9ME+1ME)] * 1.5	M
MBP	3-METHYL BIPHENYL/2-METHYL BIPHENYL	M
MDR	4-METHYLDIBENZOTHIOPHENE/1-METHYLDIBENZOTHIOPHENE	M
M4	SUM C27-C35 HOPANES/(SAME+ SUM C27-C29 STERANES) %	S
ALKIND	ALKANE INDEX n-C17/(n-C17+n-C27) %	S
R22	R22 INDEX (2 * n-C22)/(n-C21+n-C23)	SM

NOTES:

- S=SOURCE PARAMETER, M=MATURITY PARAMETER.
- TRIAROM. STERANE=MONOMETHYL TRIAROMATIC STERANES  
MONOAROM. STERANE=DIMETHYL MONOAROMATIC STERANES. (13/11/92)

**Appendices C**

**Biomarker Identification**

BIOMARKER IDENTIFICATION - PENTACYCLIC HYDROCARBONS

BP CODE	TENTATIVE ASSIGNMENT BASED ON MASS SPECTROMETRY (m/e 191)
I	9-DODECYLPERHYDROANTHRACENE [INTERNAL STANDARD]
Ts	18 $\alpha$ (H) -22, 29, 30-TRISNORNEOHOPANE
Tm	17A (H) -22, 29, 30-TRISNORHOPANE
Q	17 $\beta$ (H) -22, 29, 30-TRISNORHOPANE
W	17A (H) -25, 30-BISNORHOPANE
X	17 $\alpha$ (H), 18 $\alpha$ (H), 21 $\beta$ (H) -28, 30-BISNORHOPANE
Y	17 $\alpha$ (H) -25-NORHOPANE
D	17 $\alpha$ (H), 21 $\beta$ (H) -30-NORHOPANE
D2	18 $\alpha$ (H) -30-NORNEOHOPANE
$\pi$	17 $\alpha$ (H), 15 $\alpha$ (Me) -27-NORHOPANE ("DIAHOPANE")
A	17 $\beta$ (H), 21 $\alpha$ (H) -30-NORMORETANE
B	18 $\alpha$ (H) -OLEANANE
G	17 $\alpha$ (H), 21 $\beta$ (H) -HOPANE
H	17 $\beta$ (H), 21 $\beta$ (H) -30-NORHOPANE
K	17 $\beta$ (H), 21 $\alpha$ (H) -MORETANE
N	(22S) -17 $\alpha$ (H), 21 $\beta$ (H) -30-METHYLHOPANE
O	(22R) -17 $\alpha$ (H), 21 $\beta$ (H) -30-METHYLHOPANE
S	GAMMACERANE
P	17 $\beta$ (H), 21 $\beta$ (H) -HOPANE
R	17 $\beta$ (H), 21 $\alpha$ (H) -30-METHYLMORETANE
U	(22S) -17 $\alpha$ (H), 21 $\beta$ (H) -30-ETHYLHOPANE
V	(22R) -17 $\alpha$ (H), 21 $\beta$ (H) -30-ETHYLHOPANE
J	17 $\beta$ (H), 21 $\beta$ (H) -METHYLHOPANE
$\alpha$	(22S) -17 $\alpha$ (H), 21 $\beta$ (H) -30-n-PROPYLHOPANE
$\beta$	(22R) -17 $\alpha$ (H), 21 $\beta$ (H) -30-n-PROPYLHOPANE
L	17 $\beta$ (H), 21 $\beta$ (H) -ETHYLHOPANE
$\gamma$	(22S) -17 $\alpha$ (H), 21 $\beta$ (H) -30-n-BUTYLHOPANE
$\delta$	(22R) -17 $\alpha$ (H), 21 $\beta$ (H) -30-n-BUTYLHOPANE
$\epsilon$	(22S) -17 $\alpha$ (H), 21 $\beta$ (H) -30-n-PENTYLHOPANE
$\zeta$	(22R) -17 $\alpha$ (H), 21 $\beta$ (H) -30-n-PENTYLHOPANE

BIOMARKER IDENTIFICATION - STERANES

BP CODE	TENTATIVE ASSIGNMENT BASED ON MASS SPECTROMETRY (m/e 217)
10	(20S) -13 $\beta$ (H) , 17 $\alpha$ (H) -DIACHOLESTANE
11	(20R) -13 $\beta$ (H) , 17 $\alpha$ (H) -DIACHOLESTANE
13	(20S) -13 $\alpha$ (H) , 17 $\beta$ (H) -DIACHOLESTANE
14	(20R) -13 $\alpha$ (H) , 17 $\beta$ (H) -DIACHOLESTANE
15	(24S/R) - (20S) -13 $\beta$ (H) , 17 $\alpha$ (H) -24-METHYLDIACHOLESTANE
16	(24S/R) - (20S) -13 $\beta$ (H) , 17 $\alpha$ (H) -24-METHYLDIACHOLESTANE
18	(24S/R) - (20R) -13 $\beta$ (H) , 17 $\alpha$ (H) -24-METHYLDIACHOLESTANE
19	(24R/S) - (20R) -13 $\beta$ (H) , 17 $\alpha$ (H) -24-METHYLDIACHOLESTANE
20A	(24S/R) - (20S) -13 $\alpha$ (H) , 17 $\beta$ (H) -24-METHYLDIACHOLESTANE
20B	(20S) -5 $\alpha$ (H) , 14 $\alpha$ (H) , 17 $\alpha$ (H) -CHOLESTANE
21A	(24R+S) - (20S) -13 $\beta$ (H) , 17 $\alpha$ (H) -24-ETHYLDIACHOLESTANE
21B	(20R) -5 $\alpha$ (H) , 14 $\beta$ (H) , 17 $\beta$ (H) -ISOCHOLESTANE
22	(20S) -5 $\alpha$ (H) , 14 $\beta$ (H) , 17 $\beta$ (H) -ISOCHOLESTANE
25	(20R) -5 $\alpha$ (H) , 14 $\alpha$ (H) , 17 $\alpha$ (H) -CHOLESTANE
27	(24S+R) - (20R) -13 $\beta$ (H) , 17 $\alpha$ (H) -24-ETHYLDIACHOLESTANE
29	(24S+R) - (20S) -13 $\alpha$ (H) , 17 $\beta$ (H) -24-ETHYLDIACHOLESTANE
33A	(24S+R) - (20R) -5 $\alpha$ (H) , 14 $\beta$ (H) 17 $\beta$ (H) -24-METHYLISOCHOLESTANE
33B	(24S+R) - (20R) -13 $\alpha$ (H) , 17 $\beta$ (H) -24-ETHYLDIACHOLESTANE
34	(24S+R) - (20S) -5 $\alpha$ (H) , 14 $\beta$ (H) , 17 $\beta$ (H) -24-METHYLISOCHOLESTANE
36	(24S+R) - (20R) -5 $\alpha$ (H) , 14 $\alpha$ (H) , 17 $\alpha$ (H) -24-METHYLCHOLESTANE
39	(24S+R) - (20S) -5 $\alpha$ (H) , 14 $\alpha$ (H) , 17 $\alpha$ (H) -24-ETHYLCHOLESTANE
40	(24S+R) - (20S) -5 $\alpha$ (H) , 14 $\beta$ (H) , 17 $\beta$ (H) -24-ETHYLISOCHOLESTANE
41	(24S+R) - (20R) -5 $\alpha$ (H) , 14 $\beta$ (H) , 17 $\beta$ (H) -24-ETHYLISOCHOLESTANE
42	(24S+R) - (20R) -5 $\alpha$ (H) , 14 $\alpha$ (H) , 17 $\alpha$ (H) -24-ETHYLCHOLESTANE
46	(24S+R) - (20R) C <sub>30</sub> STERANE

**BIOMARKER IDENTIFICATION - AROMATIC STEROIDAL HYDROCARBONS**  
(AROMATIC STERANES)

BP  
CODE TENTATIVE ASSIGNMENT BASED ON MASS SPECTROMETRY  
(m/e 253 mass fragmentogram)

F22 C<sub>21</sub> DIMETHYL MONOAROMATIC STEROID  
F23 C<sub>22</sub> DIMETHYL MONOAROMATIC STEROID  
F2 C<sub>27</sub> (20S) 5 $\beta$  (H) DIMETHYL MONOAROMATIC STEROID  
F3 C<sub>27</sub> (20R) 5 $\beta$  (H) DIMETHYL MONOAROMATIC STEROID  
F4 C<sub>27</sub> (20S) 5 $\alpha$  (H) DIMETHYL MONOAROMATIC STEROID  
F5 C<sub>28</sub> (20S) 5 $\beta$  (H) DIMETHYL MONOAROMATIC STEROID  
F6 C<sub>27</sub> (20R) 5 $\alpha$  (H) DIMETHYL MONOAROMATIC STEROID  
F7 C<sub>28</sub> (20S) 5 $\alpha$  (H) DIMETHYL MONOAROMATIC STEROID  
F8 C<sub>28</sub> (20R) 5 $\beta$  (H) DIMETHYL MONOAROMATIC STEROID  
F9 C<sub>29</sub> (20S) 5 $\beta$  (H) DIMETHYL MONOAROMATIC STEROID  
F10 C<sub>29</sub> (20S) 5 $\alpha$  (H) DIMETHYL MONOAROMATIC STEROID  
F11 C<sub>28</sub> (20R) 5 $\alpha$  (H) DIMETHYL MONOAROMATIC STEROID  
F12 C<sub>29</sub> (20R) 5 $\beta$  (H) DIMETHYL MONOAROMATIC STEROID  
F13 C<sub>29</sub> (20R) 5 $\alpha$  (H) DIMETHYL MONOAROMATIC STEROID

(m/e 231 mass fragmentogram)

F14 C<sub>20</sub> METHYL TRIAROMATIC STEROID  
F15 C<sub>21</sub> METHYL TRIAROMATIC STEROID  
F16 C<sub>26</sub> (20S) METHYL TRIAROMATIC STEROID  
F17 C<sub>26</sub> (20R) METHYL TRIAROMATIC STEROID  
F18 C<sub>27</sub> (20S) METHYL TRIAROMATIC STEROID  
F19 C<sub>28</sub> (20S) METHYL TRIAROMATIC STEROID  
F20 C<sub>27</sub> (20R) METHYL TRIAROMATIC STEROID  
F21 C<sub>28</sub> (20R) METHYL TRIAROMATIC STEROID

**BIOMARKER IDENTIFICATION - NORHOPANES**

BP  
CODE TENTATIVE ASSIGNMENT BASED ON MASS SPECTROMETRY (m/e 177)

W 17 $\alpha$  (H) -25, 30-BISNORHOPANE  
Y 17 $\alpha$  (H) -25-NORHOPANE  
D 17 $\alpha$  (H), 21 $\beta$  (H) -30-NORHOPANE  
C1 (22S) -17 $\alpha$  (H) -25-NOR-30-METHYLHOPANE  
G 17 $\alpha$  (H), 21 $\beta$  (H) HOPANE  
C2 (22R) -17 $\alpha$  (H) -25-NOR-30-METHYLHOPANE  
C3 (22S) -17 $\alpha$  (H) -25-NOR-30-ETHYLHOPANE  
C4 (22R) -17 $\alpha$  (H) -25-NOR-30-ETHYLHOPANE  
C5 (22S) -17 $\alpha$  (H) -25-NOR-30-n-PROPYLHOPANE  
C6 (22R) -17 $\alpha$  (H) -25-NOR-30-n-PROPYLHOPANE  
C7 (22S) -17 $\alpha$  (H) -25-NOR-30-n-BUTYLHOPANE  
C8 (22R) -17 $\alpha$  (H) -25-NOR-30-n-BUTYLHOPANE  
C9 (22S) -17 $\alpha$  (H) -25-NOR-30-n-PENTYLHOPANE  
C10 (22R) -17 $\alpha$  (H) -25-NOR-30-n-PENTYLHOPANE