

Well: 34/4-8

Date	Hole size	Hole depth	Mud weight	PV	YP	Gel strength	pH	Alkalinity Pf /Mf	Ca++ mg/l	Cl- mg/l	Sand %	Solids %	Mudtype
940520	PSPUD					/		/					SPUD MUD
940521	PSPUD					/		/					SPUD MUD
940522	9 7/8"	499.0	1.12			/	9.0	/					GEL MUD
940523	36"	499.0	1.06			/	9.4	/					GEL MUD
940524	36"	499.0	1.12			/	9.5	/					GEL MUD
940525	17 1/2"	502.0	1.12	8.0	22.0	11/23	10.0	/					GEL MUD
940526	17 1/2"	996.0	1.18	15.0	28.0	31/63	9.0	/					GEL MUD
940527	17 1/2"	1410.0	1.18	8.0	24.0	18/32	8.2	/					GEL MUD
940528	17 1/2"	1460.0	1.28	6.0	19.0	16/25	7.0	/					GEL MUD
940529	17 1/2"	1460.0	1.26	5.0	16.0	15/23	7.1	/					GEL MUD
940530	17 1/2"	1460.0	1.30	28.0	23.0	2/3	8.4	/	200	60000	.5	11.0	KCl MUD
940531	12 1/4"	1590.0	1.50	24.0	26.0	4/8	8.4	/ .5	160	68000	.5	18.0	KCl MUD
940601	12 1/4"	2064.0	1.59	30.0	33.0	6/15	8.5	/ .2	120	75000	.5	21.5	KCl MUD
940602	12 1/4"	2179.0	1.59	27.0	28.0	6/15	8.3	/ .4	120	77000	.5	23.0	KCl MUD
940603	12 1/4"	2396.0	1.59	34.0	36.0	7/18	8.0	/ .3	120	76000	.5	22.0	KCl MUD
940604	12 1/4"	2485.0	1.59	29.0	29.0	7/16	7.8	/ .3	80	70000	.5	22.0	KCl MUD
940605	12 1/4"	2655.0	1.59	30.0	30.0	6/19	7.9	/ .3	120	75000	.5	24.0	KCl MUD
940606	12 1/4"	2693.0	1.60	32.0	31.0	8/24	7.9	/ .3	120	71000	.5	23.0	KCl MUD
940607	12 1/4"	2693.0	1.60	32.0	32.0	8/25	7.9	/ .2	160	70000	.5	23.0	KCl MUD
940608	12 1/4"	2693.0	1.60	32.0	32.0	8/26	7.9	/ .2	160	70000	.5	23.0	KCl MUD
940609	8 1/2"	2693.0	1.60	26.0	23.0	6/21	8.0	/ .3	80	72000	.5	23.0	KCl MUD
940610	8 1/2"	2707.0	1.60	28.0	20.0	6/24	8.5	.1/ .4	120	66000	.5	24.0	KCl MUD
940611	8 1/2"	2791.0	1.63	27.0	27.0	7/28	8.4	.1/ .5	120	61000	.6	26.0	KCl MUD
940612	8 1/2"	2829.0	1.63	28.0	26.0	7/27	8.3	.1/ .4	120	61000	.5	26.0	KCl MUD
940613	8 1/2"	2911.0	1.63	27.0	23.0	7/31	8.4	/ .5	120	61000	.5	26.0	KCl MUD
940614	8 1/2"	3048.0	1.63	27.0	25.0	11/38	8.2	/ .4	120	61000	.5	26.0	KCl MUD
940615	8 1/2"	3110.0	1.63	23.0	23.0	11/38	8.2	/ .4	120	60000	.5	26.0	KCl MUD

Well: 34/4-8

Date	Hole size	Hole depth	Mud weight	PV	YP	Gel strength	pH	Alkalinity Pf /Mf	Ca++ mg/l	Cl- mg/l	Sand %	Solids %	Mudtype
940616	8 1/2"	3110.0	1.63	23.0	24.0	10/50	8.1	/.3	120	61000	.5	26.0	KCl MUD
940617	8 1/2"	3110.0	1.63	23.0	24.0	10/49	8.2	/.3	120	61000	.5	26.0	KCl MUD
940618	P&A	3110.0	1.60	23.0	22.0	8/44	8.6	/.4	100	60000	.1	25.0	KCl MUD
940619	P&A	435.0	1.45	26.0	15.0	8/44	8.7	/.6	100	45000	.1	20.0	KCl MUD
940620	P&A	435.0	1.51	26.0	16.0	8/44	8.8	/.6	100	54000	.1	22.0	KCl MUD
940621	P&A	435.0	1.51	26.0	16.0	8/44	8.8	/		54000		33.8	KCl MUD

Table 6.2.2

TOTAL MUDCONSUMPTION WELL 34/4-8

MATERIALS	UNIT	36" HOLE	17 1/2" HOLE	12 1/4" HOLE	8 1/2" HOLE	TOTAL
Bentonite	Tons	49	26	4		79
Barite	Tons	67	85	414	80	646
Soda Ash	Kg	350	125	75	375	925
Prempac EX	Kg	150		6 600	350	7 100
Caustic Soda	Kg	350	200	50		600
Lime	Kg		340	20		360
Defoamer	Ltr		175			175
Sodium Bicarbonate	Kg		275	100		375
Drill Starch	Kg		4 250			4 250
Citric Acid	Kg		200	300	700	1 200
Bentonite(sxs)	Kg			200		200
Kcl-brine 3% Glycol	m ³			337	13	350
Xanvis	Kg			1 425	75	1 500
Glycol	m ³			15.9	6.9	22.8
Prempac LV	Kg			2625	850	3475
Pot.Bicarbonate	Kg				175	175
Renax 100	Ltr			624		624
KCL	Tons			11		11

GEOCHEM



GEOCHEM GROUP LIMITED

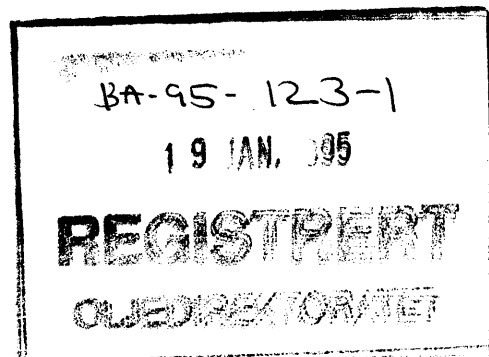
REPORT 94/9365/001/01

**A GEOCHEMICAL EVALUATION OF THE 34/4-8 WELL,
NORTH SEA (NORWEGIAN SECTOR)**

Prepared for

SAGA PETROLEUM a.s.

DECEMBER 1994



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INTRODUCTION

This report presents the results of a geochemical evaluation of well 34/4-8 drilled by Saga Petroleum a.s. in the Norwegian Sector of the North Sea.

ANALYTICAL

Two hundred and fifty eight (258) canned ditch cuttings samples from the section between 510 - 3101 metres and seventy seven (77) bagged cuttings samples from the intervals 2200 - 2505 metres and 2760 - 2810 metres were made available for this study. The canned samples were collected at intervals of ten metres above 2760

metres and every nine metres below this depth, while the bagged ditch cuttings were collected at intervals of five metres (2200 - 2505 metres) and three metres (2760 - 2810 metres). No samples were received from 1010 metres, 1300 metres and 1930 metres. The samples which arrived at the Geochem Group's laboratories in two batches on the 29th July, 1994 and the 9th September, 1994 were assigned the Geochem Group job number 9365. Lists of the samples received by Geochem were submitted to the client by fax within two working days of sample receipt.

Geochem were authorised to perform headspace and occluded gas analyses at intervals of fifty metres but every twenty five metres between 2210 - 2485 metres and to undertake lithological descriptions and total organic carbon and Rock Eval pyrolysis analyses for all bagged samples in the interval 2768 - 2805 metres approximately. Samples for C₁₅₊ extraction with iatroscan and for GC, GC MS and carbon isotope analyses were selected by the client on the basis of screening results generated by the Geochem Group.

The following analyses were carried out during the course of this study:

Analysis	Sample Type			
	Cuttings	SWC	Core	Fluid
Headspace gas	59	-	-	-
Occluded gas	59	-	-	-
Sample preparation, description and picking	18	-	-	-
Total organic carbon content	13	-	-	-
Rock Eval pyrolysis	13	-	-	-
C ₁₅₊ extraction with iatroscan	14	-	-	-
Liquid chromatographic separation	14	-	-	-
GC analysis - saturates fraction	14	-	-	-
GC analysis - aromatics fraction	3	-	-	-

GC MS - saturates fraction	5	-	-	-
GC MS - aromatics fraction	5	-	-	-

TABLE 1
ORGANIC CARBON RESULTS AND GROSS LITHOLOGIC DESCRIPTIONS

JOB 9365				
GEOCHEM SAMPLE NUMBER	DEPTH/ IDENTITY	GROSS LITHOLOGIC DESCRIPTION	G S A COLOUR CODE	TOTAL ORGANIC CARBON (Wt. %)
WELL: 34/4-8				
9365-017	2280m	A100% CLAYSTONE - platy, firm, non-calc, medium dark grey to medium light grey.	N4 N6	-
9365-022	2310m	A100% CLAYSTONE - as 017A, medium dark grey to medium light grey.	N4 N6	-
9365-035	2380m	A100% CLAYSTONE - as 017A, medium dark grey to medium light grey.	N4 N6	-
9365-063	2768m	A 85% SAND - fine grained, sub-angular to rounded, sl haematitic, no F, no C, greyish orange. B 15% CLAYSTONE - platy, mod hard, non-calc, silty, medium grey.	10YR7/4 N5	0.70
9365-064	2771m	A 80% SAND - as 063A, no F, no C, greyish orange. B 10% LCM - metal. C 5% Red claystone. D 5% Limestone.	10YR7/4	
9365-065	2774m	A 60% SAND - fine grained, sub-angular to rounded, haematitic, no F, no C, pale red. B 35% CALC CLAYSTONE - blocky, firm, haematitic, grades to arg limestone, greyish red. C 5% Limestone.	10R6/2 10R4/2	0.15
9365-066	2777m	A 60% SAND - as 065A, no F, no C, pale red. B 20% CALC CLAYSTONE - as 065B, greyish red. C 20% LIMESTONE - blocky, mod hard, yellow F, no C, very pale orange.	10R6/2 10R4/2 10YR8/2	0.11 0.11
9365-067	2780m	A 50% CALC CLAYSTONE - as 065B, greyish red. B 25% CLAYSTONE - blocky, mod soft, sl to mod calc, medium grey. C 20% SAND - as 065A, no F, no C, pale red. D 5% Limestone.	10R4/2 N5 10R6/2	0.15 0.88
9365-068	2783m	A 85% CLAYSTONE - as 067B, medium grey. B 5% Red claystone. C 5% Sand. D 5% Limestone.	N5	1.22
9365-069	2786m	A 90% CLAYSTONE - as 067B, medium grey.	N5	1.20

Abbreviations = arenaceous, argillaceous, calcareous, Cut, dolomite, Fluorescence, foraminifera fossiliferous, Lost Circulation Material, moderately, occasionally, slightly, very

TABLE 1
ORGANIC CARBON RESULTS AND GROSS LITHOLOGIC DESCRIPTIONS

JOB 9365				
GEOCHEM SAMPLE NUMBER	DEPTH/ IDENTITY	GROSS LITHOLOGIC DESCRIPTION	G S A COLOUR CODE	TOTAL ORGANIC CARBON (Wt. %)
		B 5% Sand. C 5% Red claystone, limestone.		
9365-070	2789m	A 95% CLAYSTONE - as 067B, medium grey. B 5% Sand.	N5	1.02
9365-071	2792m	A 60% SAND - fine to med grained, sub- angular, no F, no C, very light grey. B 35% CALC CLAYSTONE - blocky, firm, grades to arg limestone, medium grey. C 5% Limestone.	N8 N5	1.02
9365-072	2795m	A 70% SAND - as 071A, no F, no C, very light grey. B 30% CALC CLAYSTONE - as 071B, medium grey.	N8 N5	0.95
9365-073	2798m	A 80% SAND - as 071A, no F, no C, very light grey. B 10% CALC CLAYSTONE - blocky, firm, grades to arg limestone, dark grey. C 5% Medium grey calc claystone. D 5% Red claystone, limestone.	N8 N3	0.96
9365-074	2801m	A 85% SAND - as 071A, no F, no C, very light grey. B 10% CALC CLAYSTONE - as 073B, dark grey C 5% Medium grey calc claystone.	N8 N3	0.72
9365-075	2804m	A100% SAND - fine to medium grained, sub-angular, translucent, no F, no C, white.	N9	
9365-076	2807m	A100% SAND - as 075A, no F, no C, white.	N9	
9365-077	2810m	A100% SAND - as 075A, no F, no C, white.	N9	

Abbreviations = arenaceous, argillaceous, calcareous, Cut, dolomite, Fluorescence, foraminifera
fossiliferous, Lost Circulation Material, moderately, occasionally, slightly, very

TABLE 2
ROCKEVAL PYROLYSIS DATA

9365									
GEOCHEM SAMPLE NUMBER	DEPTH/ IDENTITY	TOC (%)	S1 (mg/g)	S2 (mg/g)	S3 (mg/g)	PRODUCTION INDEX	HYDROGEN INDEX	OXYGEN INDEX	TMAX (°C)

WELL: 34/4-8

9365-063B	2768m	0.70	1.00	0.60	0.44	0.63	85.7	62.9	381
9365-065B	2774m	0.15	0.44	0.74	0.18	0.37	493.3	120.0	445
9365-066B	2777m	0.11	0.30	0.25	0.16	0.55	227.3	145.5	450
9365-066C	2777m	0.11	0.20	0.32	0.16	0.38	290.9	145.5	441
9365-067A	2780m	0.15	0.86	0.37	0.19	0.70	246.7	126.7	447
9365-067B	2780m	0.88	2.04	1.09	1.03	0.65	123.9	117.0	378
9365-068A	2783m	1.22	2.65	1.88	0.55	0.59	154.1	45.1	439
9365-069A	2786m	1.20	3.51	2.61	0.61	0.57	217.5	50.8	436
9365-070A	2789m	1.02	3.31	1.65	0.76	0.67	161.8	74.5	436
9365-071B	2792m	1.02	3.69	1.49	0.51	0.71	146.1	50.0	433
9365-072B	2795m	0.95	3.05	1.79	0.32	0.63	188.4	33.7	439
9365-073B	2798m	0.96	3.28	1.85	0.25	0.64	192.7	26.0	374
9365-074B	2801m	0.72	2.27	1.21	0.20	0.65	168.1	27.8	372

PRODUCTION INDEX = S1 / (S1 + S2)

HYDROGEN INDEX = 100 x S2 / TOC

OXYGEN INDEX = 100 x S3 / TOC

**TABLE 3
VITRINITE REFLECTANCE DATA (GENERATED BY IFE)**

Well 34/4-8

Depth, mRK	Sample type	Lithology	%Rm	Std. dev.	N	Quality
510	cut	clst				barren
600	cut	clst				barren
700	cut	clst				barren
800	cut	clst	0.22	0.03	13	Mod
900	cut	clst	0.19	0.01	3	Mod
1000	cut	clst	0.26	0.05	8	Mod
1100	cut	clst				barren
1200	cut	clst	0.28	0.04	22	Mod
1310	cut	clst	0.25	0.04	22	Mod
1400	cut	clst	0.29	0.04	14	Mod
1500	cut	clst	0.31	0.04	22	Mod
1600	cut	clst	0.31	0.03	11	Mod
1700	cut	clst	0.38	0.06	28	Poor
1800	cut	clst	0.42	0.07	23	Poor
1900	cut	clst	0.40	0.04	21	Mod
2000	cut	clst	0.42	0.03	20	Mod
2100	cut	clst	0.47	0.06	28	Mod
2195	cut	clst	0.45	0.03	12	Poor
2510	cut	clst	0.57	0.08	27	Poor
2600	cut	clst	0.61	0.07	25	Mod
2700	cut	clst	0.54	0.07	11	Mod
2900	cut	clst				barren
2999	cut	clst	0.49	0.00	1	Poor
3101	cut	clst				barren

TABLE 4

IFE'S INTERPRETED VITRINITE REFLECTANCE VERSUS DEPTH TREND

Well 34/4-8	Depth, mRKB	%Rm-trend
	sea bed	
	400	
	500	
	600	
	700	0.20
	800	0.21
	900	0.22
	1000	0.23
	1100	0.25
	1200	0.26
	1300	0.28
	1400	0.29
	1500	0.31
	1600	0.33
	1700	0.35
	1800	0.38
	1900	0.40
	2000	0.43
	2100	0.45
	2200	0.47
	2300	0.49
	2400	0.52
	2500	0.54
	2600	0.56
	2700	0.59
	2800	0.61
	2900	
	3000	
	3100	

TABLE 5
CONCENTRATION ($\mu\text{L GAS / Kg ROCK}$) OF $\text{C}_1\text{-C}_7$ HYDROCARBONS IN HEAD SPACE GAS

JOB 9365											
GEOCHEM SAMPLE NUMBER	DEPTH/ IDENTITY	C_1 Methane	C_2 Ethane	C_3 Propane	iC_4 Isobutane	nC_4 Butane	TOTAL $\text{C}_1\text{-C}_4$	TOTAL $\text{C}_2\text{-C}_4$	% GAS WETNESS	TOTAL $\text{C}_5\text{-C}_7$	$\frac{\text{iC}_4}{\text{nC}_4}$

WELL: 34/4-8

9365-078	510m	98	2	2	0	2	103	5	4.6	0	0.00
9365-083	560m	3374	2	2	0	0	3378	4	0.1	0	0.00
9365-088	610m	744	0	0	0	0	744	0	0.0	0	0.00
9365-092	660m	104	0	0	0	0	104	0	0.0	0	0.00
9365-097	710m	11791	13	5	2	3	11813	22	0.2	0	0.50
9365-102	760m	12345	7	3	2	0	12357	12	0.1	0	0.00
9365-107	810m	15448	10	4	0	0	15462	13	0.1	0	0.00
9365-112	860m	7243	5	2	0	0	7249	6	0.1	0	0.00
9365-117	910m	11264	7	2	0	0	11272	9	0.1	0	0.00
9365-122	960m	15411	11	4	0	0	15426	15	0.1	0	0.00
9365-126	1000m	15190	7	4	0	0	15200	11	0.1	0	0.00
9365-131	1060m	10328	5	2	0	0	10335	7	0.1	0	0.00
9365-136	1110m	8978	6	2	6	4	8995	17	0.2	0	1.50
9365-141	1160m	7984	7	2	0	0	7993	9	0.1	0	0.00
9365-146	1210m	7017	7	3	0	0	7027	10	0.1	0	0.00
9365-151	1260m	22515	31	9	0	0	22554	40	0.2	0	0.00
9365-155	1310m	11798	32	14	2	5	11852	54	0.5	0	0.33
9365-160	1360m	17365	47	4	0	0	17416	51	0.3	0	0.00
9365-165	1410m	6837	7	5	0	0	6849	12	0.2	0	0.00
9365-170	1460m	8821	5	3	0	0	8830	8	0.1	0	0.00
9365-175	1510m	4921	12	16	2	5	4956	35	0.7	14	0.50
9365-180	1560m	3407	9	15	2	4	3438	31	0.9	39	0.50
9365-185	1610m	2081	5	13	4	4	2107	25	1.2	38	1.00
9365-190	1660m	3268	9	9	2	3	3291	22	0.7	15	0.50
9365-195	1710m	1077	10	9	10	12	1119	42	3.7	21	0.86
9365-200	1760m	8406	37	16	4	4	8467	61	0.7	43	1.00
9365-205	1810m	11500	54	32	13	9	11607	107	0.9	143	1.50
9365-210	1860m	12263	68	44	13	11	12398	135	1.1	68	1.20
9365-215	1910m	6346	52	35	15	15	6462	116	1.8	61	1.00
9365-219	1960m	7723	78	51	21	18	7891	168	2.1	62	1.20
9365-224	2010m	5647	79	72	35	33	5866	219	3.7	85	1.06
9365-229	2060m	6494	102	104	42	40	6782	288	4.2	112	1.05

TABLE 5
CONCENTRATION ($\mu\text{L GAS / Kg ROCK}$) OF $\text{C}_1\text{-C}_7$ HYDROCARBONS IN HEAD SPACE GAS

JOB 9365											
GEOCHEM SAMPLE NUMBER	DEPTH/ IDENTITY	C_1 Methane	C_2 Ethane	C_3 Propane	$i\text{C}_4$ Isobutane	$n\text{C}_4$ Butane	TOTAL $\text{C}_1\text{-C}_4$	TOTAL $\text{C}_2\text{-C}_4$	% GAS WETNESS	TOTAL $\text{C}_5\text{-C}_7$	$\frac{i\text{C}_4}{n\text{C}_4}$
9365-234	2110m	4159	52	56	23	22	4312	153	3.6	45	1.07
9365-239	2160m	6632	124	284	149	251	7440	807	10.9	209	0.59
9365-003	2210m	2461	56	217	151	470	3355	894	26.7	2053	0.32
9365-007	2230m	6712	210	985	687	2048	10642	3930	36.9	5678	0.34
9365-013	2260m	3026	127	971	659	2362	7144	4118	57.6	7656	0.28
9365-017	2280m	3571	186	2182	1537	5551	13028	9457	72.6	14863	0.28
9365-022	2310m	7946	319	3747	2418	9437	23867	15921	66.7	19453	0.26
9365-025	2330m	5710	266	3414	1982	8146	19518	13808	70.7	13042	0.24
9365-031	2360m	5098	224	2532	1322	5015	14191	9093	64.1	9473	0.26
9365-035	2380m	11462	364	2409	893	2782	17910	6448	36.0	4479	0.32
9365-041	2410m	7557	325	1403	399	932	10616	3059	28.8	2433	0.43
9365-045	2430m	2773	87	227	74	177	3338	566	16.9	678	0.42
9365-051	2460m	3041	107	187	77	121	3534	492	13.9	415	0.64
9365-055	2480m	2884	85	135	72	126	3303	419	12.7	425	0.57
9365-243	2510m	723	23	57	28	65	896	173	19.3	255	0.43
9365-248	2560m	181	5	13	2	5	205	23	11.5	28	0.33
9365-253	2610m	1571	26	28	10	15	1649	78	4.7	42	0.67
9365-258	2660m	441	9	13	6	8	477	36	7.5	17	0.80
9365-263	2710m	630	60	78	7	13	787	157	20.0	89	0.50
9365-061	2760m	1244	73	87	50	56	1511	267	17.7	142	0.89
9365-075	2804m	536	29	38	6	11	621	84	13.6	19	0.60
9365-270	2849m	523	46	79	27	30	705	182	25.8	0	0.91
9365-276	2903m	119	7	6	0	6	138	19	14.0	0	0.00
9365-281	2948m	252	9	39	9	39	349	98	28.0	0	0.24
9365-287	3002m	318	7	11	0	15	351	33	9.4	5	0.00
9365-292	3047m	282	9	27	0	29	348	66	18.8	0	0.00
9365-298	3101m	154	3	20	0	19	197	42	21.6	0	0.00

TABLE 6
CONCENTRATION ($\mu\text{L GAS} / \text{Kg ROCK}$) OF C_1 - C_7 HYDROCARBONS IN CUTTINGS GAS

JOB 9365											
GEOCHEM SAMPLE NUMBER	DEPTH/ IDENTITY	C_1 Methane	C_2 Ethane	C_3 Propane	$i\text{C}_4$ Isobutane	$n\text{C}_4$ Butane	TOTAL C_1 - C_4	TOTAL C_2 - C_4	% GAS WETNESS	TOTAL C_5 - C_7	$\frac{i\text{C}_4}{n\text{C}_4}$

WELL: 34/4-8

9365-078	510m	328	3	0	0	0	331	3	1.0	0	0.00
9365-083	560m	1621	11	5	0	0	1637	16	1.0	0	0.00
9365-088	610m	1050	11	7	0	0	1068	18	1.7	0	0.00
9365-092	660m	1110	3	0	0	0	1113	3	0.3	0	0.00
9365-097	710m	1263	5	3	0	0	1271	8	0.6	0	0.00
9365-102	760m	542	5	3	0	0	551	9	1.6	0	0.00
9365-107	810m	503	11	8	0	0	522	19	3.6	0	0.00
9365-112	860m	755	9	3	0	0	767	12	1.6	0	0.00
9365-117	910m	445	7	3	0	0	455	10	2.3	0	0.00
9365-122	960m	509	6	0	0	0	514	6	1.1	0	0.00
9365-126	1000m	645	5	4	0	0	654	9	1.4	0	0.00
9365-131	1060m	472	7	0	0	0	479	7	1.5	0	0.00
9365-136	1110m	521	7	6	0	0	534	13	2.4	0	0.00
9365-141	1160m	495	7	0	0	0	502	7	1.4	0	0.00
9365-146	1210m	352	12	8	2	3	378	25	6.7	0	0.50
9365-151	1260m	490	7	7	0	0	504	13	2.6	0	0.00
9365-155	1310m	386	5	5	0	0	397	11	2.7	0	0.00
9365-160	1360m	1619	10	10	0	0	1639	20	1.2	0	0.00
9365-165	1410m	402	3	3	3	8	420	19	4.4	0	0.40
9365-170	1460m	1601	14	0	0	0	1615	14	0.8	0	0.00
9365-175	1510m	110	5	12	0	0	127	16	12.7	0	0.00
9365-180	1560m	63	4	9	0	0	76	13	17.1	22	0.00
9365-185	1610m	29	2	5	0	2	38	9	23.8	29	0.00
9365-190	1660m	40	2	3	0	3	48	9	17.9	33	0.00
9365-195	1710m	99	5	10	2	10	127	28	21.9	68	0.17
9365-200	1760m	138	6	6	0	0	150	12	8.1	0	0.00
9365-205	1810m	158	6	17	4	9	195	36	18.7	173	0.50
9365-210	1860m	153	4	20	2	7	185	33	17.6	87	0.33
9365-215	1910m	200	7	28	4	7	246	46	18.8	74	0.50
9365-219	1960m	172	12	21	12	25	242	71	29.2	120	0.50
9365-224	2010m	70	4	12	12	8	105	35	33.3	182	1.50
9365-229	2060m	104	4	38	16	22	184	80	43.5	174	0.73

TABLE 6
CONCENTRATION ($\mu\text{L GAS} / \text{Kg ROCK}$) OF $\text{C}_1\text{-C}_7$ HYDROCARBONS IN CUTTINGS GAS

JOB 9365											
GEOCHEM SAMPLE NUMBER	DEPTH/ IDENTITY	C_1 Methane	C_2 Ethane	C_3 Propane	iC_4 Isobutane	nC_4 Butane	TOTAL $\text{C}_1\text{-C}_4$	TOTAL $\text{C}_2\text{-C}_4$	% GAS WETNESS	TOTAL $\text{C}_5\text{-C}_7$	$\frac{\text{iC}_4}{\text{nC}_4}$
9365-234	2110m	202	5	14	11	23	255	53	20.9	81	0.47
9365-239	2160m	100	7	35	18	49	209	109	52.1	215	0.36
9365-003	2210m	172	6	42	47	199	466	294	63.1	4445	0.23
9365-007	2230m	146	6	111	165	770	1197	1051	87.8	16389	0.21
9365-013	2260m	115	3	167	261	1281	1828	1713	93.7	20384	0.20
9365-017	2280m	124	14	310	528	2665	3641	3517	96.6	33174	0.20
9365-022	2310m	218	16	370	458	2771	3833	3615	94.3	27666	0.17
9365-025	2330m	96	6	302	360	2348	3112	3016	96.9	19850	0.15
9365-031	2360m	105	6	209	218	1294	1832	1726	94.2	15681	0.17
9365-035	2380m	130	8	161	110	590	1000	870	87.0	5260	0.19
9365-041	2410m	115	13	194	102	340	765	649	84.9	3216	0.30
9365-045	2430m	166	13	52	21	79	331	165	49.8	1716	0.26
9365-051	2460m	55	3	25	9	36	128	73	56.8	656	0.24
9365-055	2480m	265	10	41	24	73	413	148	35.9	706	0.32
9365-243	2510m	42	2	9	5	16	74	32	42.9	412	0.33
9365-248	2560m	22	2	5	2	5	34	13	36.4	59	0.33
9365-253	2610m	80	2	8	3	7	99	20	19.7	96	0.50
9365-258	2660m	67	3	13	9	19	111	44	39.4	88	0.50
9365-263	2710m	31	2	9	2	9	53	22	41.7	153	0.25
9365-061	2760m	66	5	27	3	14	114	49	42.7	249	0.22
9365-075	2804m	78	4	15	2	8	107	29	27.5	206	0.25
9365-270	2849m	100	8	16	3	14	141	41	28.8	38	0.20
9365-276	2903m	30	3	3	0	0	36	6	16.7	0	0.00
9365-281	2948m	39	4	8	0	0	51	11	22.2	0	0.00
9365-287	3002m	30	1	3	0	0	34	4	12.0	0	0.00
9365-292	3047m	58	4	4	0	0	66	7	11.1	0	0.00
9365-298	3101m	73	3	5	0	0	81	8	10.4	0	0.00

TABLE 7
CONCENTRATION ($\mu\text{L GAS / Kg ROCK}$) OF $\text{C}_1\text{-C}_7$ HYDROCARBONS (A + B)

JOB 9365											
GEOCHEM SAMPLE NUMBER	DEPTH/ IDENTITY	C_1 Methane	C_2 Ethane	C_3 Propane	$i\text{C}_4$ Isobutane	$n\text{C}_4$ Butane	TOTAL $\text{C}_1\text{-C}_4$	TOTAL $\text{C}_2\text{-C}_4$	% GAS WEIENESS	TOTAL $\text{C}_5\text{-C}_7$	$\frac{i\text{C}_4}{n\text{C}_4}$

WELL: 34/4-8

9365-078	510m	426	5	2	0	2	434	8	1.8	0	0.00
9365-083	560m	4995	13	7	0	0	5015	20	0.4	0	0.00
9365-088	610m	1795	11	7	0	0	1812	18	1.0	0	0.00
9365-092	660m	1214	3	0	0	0	1217	3	0.2	0	0.00
9365-097	710m	13054	18	8	2	3	13085	31	0.2	0	0.50
9365-102	760m	12887	12	7	2	0	12908	21	0.2	0	0.00
9365-107	810m	15952	21	11	0	0	15984	32	0.2	0	0.00
9365-112	860m	7998	14	5	0	0	8016	18	0.2	0	0.00
9365-117	910m	11709	14	5	0	0	11727	19	0.2	0	0.00
9365-122	960m	15920	17	4	0	0	15941	21	0.1	0	0.00
9365-126	1000m	15835	12	7	0	0	15855	19	0.1	0	0.00
9365-131	1060m	10800	13	2	0	0	10814	15	0.1	0	0.00
9365-136	1110m	9499	13	7	6	4	9529	30	0.3	0	1.50
9365-141	1160m	8479	14	2	0	0	8495	16	0.2	0	0.00
9365-146	1210m	7369	19	12	2	3	7405	36	0.5	0	0.50
9365-151	1260m	23005	38	16	0	0	23058	53	0.2	0	0.00
9365-155	1310m	12184	38	20	2	5	12248	65	0.5	0	0.33
9365-160	1360m	18983	57	14	0	0	19054	71	0.4	0	0.00
9365-165	1410m	7239	10	8	3	8	7269	31	0.4	0	0.40
9365-170	1460m	10423	19	3	0	0	10445	22	0.2	0	0.00
9365-175	1510m	5032	16	28	2	5	5083	51	1.0	14	0.50
9365-180	1560m	3470	13	24	2	4	3514	44	1.2	61	0.50
9365-185	1610m	2110	7	18	4	5	2145	35	1.6	67	0.67
9365-190	1660m	3308	10	12	2	7	3339	31	0.9	48	0.25
9365-195	1710m	1176	16	19	12	23	1246	70	5.6	89	0.54
9365-200	1760m	8544	43	22	4	4	8617	73	0.8	43	1.00
9365-205	1810m	11658	60	49	17	17	11802	143	1.2	317	1.00
9365-210	1860m	12416	72	63	15	17	12583	168	1.3	155	0.88
9365-215	1910m	6545	59	63	18	22	6708	163	2.4	135	0.83
9365-219	1960m	7895	90	72	34	42	8133	239	2.9	182	0.79
9365-224	2010m	5717	83	83	46	41	5970	254	4.2	267	1.14
9365-229	2060m	6598	106	142	58	62	6966	368	5.3	286	0.94

TABLE 7
CONCENTRATION ($\mu\text{L GAS} / \text{Kg ROCK}$) OF C_1 - C_7 HYDROCARBONS (A + B)

JOB 9365											
GEOCHEM SAMPLE NUMBER	DEPTH/ IDENTITY	C_1 Methane	C_2 Ethane	C_3 Propane	$i\text{C}_4$ Isobutane	$n\text{C}_4$ Butane	TOTAL C_1 - C_4	TOTAL C_2 - C_4	% GAS WETNESS	TOTAL C_5 - C_7	$\frac{i\text{C}_4}{n\text{C}_4}$
9365-234	2110m	4361	56	70	34	45	4567	206	4.5	127	0.76
9365-239	2160m	6732	131	319	166	299	7648	916	12.0	424	0.56
9365-003	2210m	2633	63	258	197	669	3821	1188	31.1	6498	0.30
9365-007	2230m	6858	216	1096	852	2817	11840	4981	42.1	22067	0.30
9365-013	2260m	3141	131	1138	920	3643	8972	5832	65.0	28041	0.25
9365-017	2280m	3695	200	2492	2065	8216	16669	12974	77.8	48037	0.25
9365-022	2310m	8164	335	4117	2877	12208	27700	19536	70.5	47120	0.24
9365-025	2330m	5806	272	3716	2342	10494	22630	16824	74.3	32892	0.22
9365-031	2360m	5203	229	2741	1540	6309	16023	10819	67.5	25154	0.24
9365-035	2380m	11592	372	2570	1004	3373	18910	7318	38.7	9738	0.30
9365-041	2410m	7673	338	1597	501	1272	11381	3708	32.6	5649	0.39
9365-045	2430m	2939	100	279	95	257	3670	730	19.9	2394	0.37
9365-051	2460m	3096	110	212	86	157	3661	565	15.4	1072	0.55
9365-055	2480m	3148	96	176	96	200	3716	567	15.3	1130	0.48
9365-243	2510m	766	25	65	34	81	971	205	21.1	667	0.41
9365-248	2560m	203	6	17	3	9	239	36	15.0	88	0.33
9365-253	2610m	1651	28	36	13	21	1749	98	5.6	138	0.62
9365-258	2660m	508	13	25	16	27	588	80	13.6	105	0.59
9365-263	2710m	661	62	87	9	22	841	180	21.4	242	0.40
9365-061	2760m	1310	78	114	53	70	1626	316	19.4	390	0.76
9365-075	2804m	614	34	53	8	19	728	114	15.6	225	0.44
9365-270	2849m	624	54	95	30	43	846	222	26.3	38	0.69
9365-276	2903m	149	10	9	0	6	174	25	14.5	0	0.00
9365-281	2948m	291	13	47	9	39	400	109	27.2	0	0.24
9365-287	3002m	348	8	14	0	15	385	37	9.6	5	0.00
9365-292	3047m	341	13	31	0	29	413	73	17.6	0	0.00
9365-298	3101m	227	7	25	0	19	278	51	18.3	0	0.00

TABLE 8
 CONCENTRATION (PPM) OF EXTRACTED C₁₅₊ MATERIAL IN ROCK

JOB 9365 GEOCHEM SAMPLE NUMBER	L I T H O	DEPTH/ IDENTITY	TOTAL EXTRACT	HYDROCARBONS			NON HYDROCARBONS			
				Saturates	Aromatics	TOTAL	Preciptd. Asphaltenes	Eluted NSO's	Non-Eluted NSO's	TOTAL

WELL: 34/4-8

9365-017A	2280m	6456	3807	1757	5564	825	51	17	893
9365-022A	2310m	5788	3111	1481	4592	1102	75	20	1196
9365-035A	2380m	5688	3162	1752	4914	724	35	15	774
9365-063B	2768m	34509	1415	547	1962	2189	30151	208	32547
9365-065B	2774m	5664	984	250	1234	742	3664	23	4430
9365-066B/C	2777m	3800	1156	156	1311	1407	1059	22	2489
9365-067A/B	2780m	6282	293	54	347	749	5156	29	5934
9365-068A	2783m	7309	213	66	279	666	6351	14	7031
9365-069A	2786m	7584	110	44	154	257	7150	22	7430
9365-070A	2789m	9444	144	27	170	438	8817	19	9273
9365-071B	2792m	10603	225	64	289	1200	9074	41	10314
9365-072B	2795m	8639	157	66	223	356	8042	17	8416
9365-073B	2798m	7028	292	59	351	391	6258	28	6677
9365-074B	2801m	6489	219	67	286	389	5795	19	6203

TABLE 9
COMPOSITION (NORMALISED %) OF C₁₅₊ MATERIAL

WELL 9365 GEOCHEM SAMPLE NUMBER	L I T H O	DEPTH/ IDENTITY	HYDROCARBONS		NON HYDROCARBONS		
			Saturates	Aromatics	Preciptd. Asphaltenes	Eluted NSO's	Non-Eluted NSO's

WELL: 34/4-8

9365-017A	2280m	58.96	27.21	12.77	0.78	0.27
9365-022A	2310m	53.75	25.58	19.04	1.29	0.34
9365-035A	2380m	55.59	30.80	12.73	0.61	0.27
9365-063B	2768m	4.10	1.59	6.34	87.37	0.60
9365-065B	2774m	17.38	4.41	13.10	64.69	0.41
9365-066B/C	2777m	30.41	4.09	37.04	27.88	0.58
9365-067A/B	2780m	4.66	0.87	11.92	82.08	0.47
9365-068A	2783m	2.91	0.91	9.11	86.88	0.19
9365-069A	2786m	1.45	0.58	3.39	94.29	0.30
9365-070A	2789m	1.52	0.28	4.63	93.36	0.20
9365-071B	2792m	2.12	0.60	11.31	85.58	0.38
9365-072B	2795m	1.82	0.77	4.13	93.09	0.20
9365-073B	2798m	4.15	0.84	5.56	89.04	0.40
9365-074B	2801m	3.37	1.03	5.99	89.31	0.30

TABLE 10
SIGNIFICANT C₁₅₊ RATIOS

JOB 9365	L I T H O	DEPTH/ IDENTITY	TOC (%)	mg/g TOC						HYDROCARBONS % TOTAL EXTRACT	SATURATES AROMATICS
				TOTAL EXTRACT	SATURATES	AROMATICS	TOTAL HYDROCARBONS	ELUTED NSO's	ASPHALTENES		

WELL: 34/4-8

9365-017A	2280m	0.85	759.54	447.83	206.70	654.53	5.96	97.03	86.18	2.17
9365-022A	2310m	0.85	680.92	366.00	174.20	540.20	8.79	129.62	79.33	2.10
9365-035A	2380m	0.82	693.70	385.60	213.65	599.25	4.23	88.33	86.39	1.80
9365-063B	2768m	0.70	4929.92	202.16	78.17	280.32	4307.28	312.67	5.69	2.59
9365-065B	2774m	0.15	3776.04	656.25	166.67	822.92	2442.71	494.79	21.79	3.94
9365-066B/C	2777m	0.11	3454.55	1050.51	141.41	1191.92	962.96	1279.46	34.50	7.43
9365-067A/B	2780m	0.39	1610.70	75.10	13.95	89.05	1322.10	192.04	5.53	5.38
9365-068A	2783m	1.22	599.12	17.42	5.42	22.84	520.54	54.59	3.81	3.21
9365-069A	2786m	1.20	631.98	9.14	3.66	12.80	595.86	21.45	2.02	2.50
9365-070A	2789m	1.02	925.85	14.10	2.60	16.70	864.40	42.90	1.80	5.42
9365-071B	2792m	1.02	1039.48	22.04	6.27	28.31	889.57	117.61	2.72	3.52
9365-072B	2795m	0.95	909.35	16.51	6.96	23.47	846.53	37.51	2.58	2.37
9365-073B	2798m	0.96	732.11	30.41	6.17	36.58	651.89	40.70	5.00	4.93
9365-074B	2801m	0.72	901.23	30.37	9.29	39.65	804.90	53.97	4.40	3.27

TABLE 11
COMPOSITION (NORMALISED %) OF C₁₅₊ SATURATE (PARAFFIN - NAPHTHENE) HYDROCARBONS

GEOCHEM SAMPLE NUMBER	017A	022A	035A	063B	065B	066B/C
DEPTH	2280m	2310m	2380m	2768m	2774m	2777m
SAMPLE TYPE						
nC15	9.98	10.06	6.88	8.43	14.30	7.31
nC16	10.09	10.88	8.13	9.13	11.56	8.71
nC17	9.98	10.39	7.50	6.65	6.88	8.37
nC18	9.39	9.74	6.88	8.05	7.33	9.34
nC19	7.98	8.12	4.38	6.90	9.71	7.92
nC20	7.75	6.49	4.38	4.69	2.56	6.96
nC21	5.87	5.84	3.13	4.33	2.29	5.77
nC22	5.16	5.36	3.13	5.30	3.09	5.58
nC23	4.58	4.71	2.50	5.57	3.97	5.26
nC24	4.11	4.38	2.50	5.38	4.32	5.37
nC25	3.87	3.90	5.00	5.29	4.41	6.52
nC26	2.82	2.92	1.25	4.40	4.06	4.79
nC27	3.05	2.76	3.13	4.94	4.41	4.10
nC28	1.88	2.11	4.38	3.50	3.35	3.51
nC29	3.17	2.76	5.00	5.10	4.59	3.40
nC30	1.53	1.30	5.63	2.52	2.91	2.11
nC31	2.35	2.44	5.63	5.30	4.77	2.18
nC32	1.76	3.25	5.63	1.47	1.85	1.12
nC33	1.76	1.95	3.13	1.90	2.03	0.94
nC34	1.17	0.49	6.25	0.70	0.88	0.49
nC35	1.76	0.16	5.63	0.48	0.71	0.22
Paraffin	11.62	6.53	10.72	7.79	7.25	10.16
Isoprenoid	2.46	1.12	2.85	1.93	2.52	2.13
Naphthene	85.92	92.35	86.43	90.28	90.23	87.71
CPI 1 Index	1.06	1.03	1.22	1.05	1.05	1.04
CPI 2 Index	1.38	1.17	1.24	1.52	1.37	1.22
CPI 3 Index	1.30	1.10	1.11	1.25	1.19	0.99
Prist/Phytane	1.85	1.33	1.11	0.40	0.35	0.53
Prist/nC17	0.87	0.63	0.83	0.60	0.54	0.43
Phytane/nC18	0.50	0.50	0.82	1.23	1.46	0.73

Job Number : 9365

$$C.P.I. 1 = \frac{1}{2} \left[\frac{C_{21} + C_{23} + C_{25} + C_{27}}{C_{20} + C_{22} + C_{24} + C_{26}} + \frac{C_{21} + C_{23} + C_{25} + C_{27}}{C_{22} + C_{24} + C_{26} + C_{28}} \right]$$

$$C.P.I. 2 = \frac{1}{2} \left[\frac{C_{25} + C_{27} + C_{29} + C_{31}}{C_{24} + C_{26} + C_{28} + C_{30}} + \frac{C_{25} + C_{27} + C_{29} + C_{31}}{C_{26} + C_{28} + C_{30} + C_{32}} \right]$$

$$C.P.I. 3 = \frac{2 \times (C_{27})}{C_{26} + C_{28}}$$

CT - ditch cuttings CO - core SWC - sidewall core

TABLE 11
COMPOSITION (NORMALISED %) OF C₁₅₊ SATURATE (PARAFFIN - NAPHTHENE) HYDROCARBONS

GEOCHEM SAMPLE NUMBER	067A/B	068A	069A	070A	071B	072B
DEPTH	2780m	2783m	2786m	2789m	2792m	2795m
SAMPLE TYPE						
nC15	9.15	11.26	9.57	8.27	9.67	7.66
nC16	7.74	9.24	9.45	7.49	9.83	7.02
nC17	6.03	5.51	7.43	5.78	7.83	6.38
nC18	8.34	9.24	8.31	7.18	9.39	9.26
nC19	11.66	8.73	8.57	7.65	12.13	16.28
nC20	4.72	4.75	4.91	4.68	4.70	5.43
nC21	3.92	3.92	4.53	4.61	4.47	4.47
nC22	3.82	3.80	4.16	4.29	4.16	3.83
nC23	5.23	5.00	5.29	5.62	4.51	4.15
nC24	5.03	4.49	4.16	4.45	3.47	3.51
nC25	6.03	6.83	6.93	7.96	5.54	5.27
nC26	4.92	4.43	3.53	4.14	2.71	3.03
nC27	5.53	5.82	5.79	6.79	4.78	4.79
nC28	3.72	3.61	2.52	3.43	2.38	2.55
nC29	4.52	4.18	4.79	5.07	4.28	3.83
nC30	2.51	2.40	2.14	2.42	1.90	2.07
nC31	3.02	2.78	3.02	3.75	3.56	3.51
nC32	1.41	1.33	1.26	1.80	1.23	1.60
nC33	1.81	1.90	2.77	3.43	2.68	3.35
nC34	0.50	0.37	0.29	0.47	0.34	0.96
nC35	0.40	0.40	0.58	0.70	0.47	1.04
Paraffin	8.21	6.47	8.19	9.82	10.10	7.94
Isoprenoid	2.16	3.17	2.17	2.36	3.35	2.09
Naphthene	89.63	90.36	89.64	87.82	86.55	89.97
CPI 1 Index	1.15	1.28	1.46	1.48	1.40	1.31
CPI 2 Index	1.35	1.49	1.92	1.82	1.97	1.72
CPI 3 Index	1.28	1.45	1.91	1.79	1.88	1.72
Prist/Phytane	0.33	1.59	0.78	0.71	0.57	0.46
Prist/nC17	0.47	2.71	0.68	0.73	0.65	0.65
Phytane/nC18	1.02	1.01	0.77	0.83	0.96	0.98

Job Number : 9365

$$C.P.I. 1 = \frac{1}{2} \left[\frac{C_{21} + C_{23} + C_{25} + C_{27}}{C_{20} + C_{22} + C_{24} + C_{26}} + \frac{C_{21} + C_{23} + C_{25} + C_{27}}{C_{22} + C_{24} + C_{26} + C_{28}} \right]$$

$$C.P.I. 2 = \frac{1}{2} \left[\frac{C_{25} + C_{27} + C_{29} + C_{31}}{C_{24} + C_{26} + C_{28} + C_{30}} + \frac{C_{25} + C_{27} + C_{29} + C_{31}}{C_{26} + C_{28} + C_{30} + C_{32}} \right]$$

$$C.P.I. 3 = \frac{2 \times (C_{27})}{C_{26} + C_{28}}$$

CT - ditch cuttings CO - core SWC - sidewall core

TABLE 11
COMPOSITION (NORMALISED %) OF C₁₅₊ SATURATE (PARAFFIN - NAPHTHENE) HYDROCARBONS

GEOCHEM SAMPLE NUMBER	073B	074B
DEPTH	2798m	2801m
SAMPLE TYPE		
nC15	7.91	11.18
nC16	9.89	9.65
nC17	7.44	7.49
nC18	10.36	11.69
nC19	9.23	9.15
nC20	8.48	8.64
nC21	6.97	5.59
nC22	6.03	4.57
nC23	5.65	4.07
nC24	4.61	3.56
nC25	5.09	4.32
nC26	3.11	3.05
nC27	3.67	3.56
nC28	2.35	2.16
nC29	2.64	3.30
nC30	1.51	1.78
nC31	1.88	2.54
nC32	0.94	1.27
nC33	1.13	1.52
nC34	0.50	0.48
nC35	0.61	0.44
Paraffin	10.42	6.43
Isoprenoid	1.98	1.69
Naphthene	87.60	91.88
CPI 1 Index	1.14	1.10
CPI 2 Index	1.41	1.48
CPI 3 Index	1.34	1.37
Prist/Phytane	0.90	0.52
Prist/nC17	0.70	0.56
Phytane/nC18	0.55	0.70

Job Number : 9365

$$C.P.I. 1 = \frac{1}{2} \left[\frac{C_{21} + C_{23} + C_{25} + C_{27}}{C_{20} + C_{22} + C_{24} + C_{26}} + \frac{C_{21} + C_{23} + C_{25} + C_{27}}{C_{22} + C_{24} + C_{26} + C_{28}} \right]$$

$$C.P.I. 2 = \frac{1}{2} \left[\frac{C_{25} + C_{27} + C_{29} + C_{31}}{C_{24} + C_{26} + C_{28} + C_{30}} + \frac{C_{25} + C_{27} + C_{29} + C_{31}}{C_{26} + C_{28} + C_{30} + C_{32}} \right]$$

$$C.P.I. 3 = \frac{2 \times (C_{27})}{C_{26} + C_{28}}$$

CT - ditch cuttings CO - core SWC - sidewall core

TABLE 12

ADDITIONAL SATURATES RATIOS

GEOCHEM SAMPLE NUMBER	DEPTH	SAMPLE TYPE	A/B* A = $\frac{pr}{nC17}$ B = $\frac{Ph}{nC18}$	$\frac{nC_{17}}{nC_{17} + nC_{27}}$
9365-017A	2280m	Cuttings	1.74	0.77
9365-022A	2310m	Cuttings	1.26	0.79
9365-035A	2380m	Cuttings	1.01	0.71
9365-063B	2768m	Cuttings	0.49	0.57
9365-065B	2774m	Cuttings	0.37	0.61
9365-066B + C	2777m	Cuttings	0.59	0.67
9365-067A + B	2780m	Cuttings	0.46	0.52
9365-068A	2783m	Cuttings	2.68	0.49
9365-069A	2786m	Cuttings	0.88	0.56
9365-070A	2789m	Cuttings	0.88	0.46
9365-071B	2792m	Cuttings	0.68	0.62
9365-072B	2795m	Cuttings	0.66	0.57
9365-073B	2798m	Cuttings	1.27	0.67
9365-074B	2801m	Cuttings	0.80	0.68

*Values unreliable due to co-eluting contamination

TABLE 13

AROMATICS RATIOS
(CALCULATED FROM AROMATIC HYDROCARBON BIOMARKER PEAK AREA DATA)

GEOCHEM SAMPLE NUMBER	DEPTH	MPI 1	F1	F2
9365-017A	2280m	0.65	0.44	0.27
9365-022A	2310m	0.63	0.39	0.24
9365-035	2380m	0.60	0.39	0.24
9365-069A	2786m	0.59	0.36	0.19
9365-070A	2789m	0.53	0.39	0.21

$$MPI\ 1 = \frac{3/2(2-MP + 3-MP)}{P + 1-MP + 9-MP}$$

$$F1 = \frac{3-MP + 2MP}{3-MP + 2-MP + 9-MP + 1-MP}$$

$$F2 = \frac{2-MP}{3-MP + 2-MP + 9-MP + 1-MP}$$

TABLE 14

BIOMARKER ABUNDANCES - STERANES (PEAK AREAS), M/Z 217

GEOCHEM SAMPLE NUMBER		9365-017A	9365-022A	9365-035A	9365-069A	9365-070A
DEPTH		2280m	2310m	2380m	2786m	2789m
SAMPLE TYPE		Cuttings	Cuttings	Cuttings	Cuttings	Cuttings
PEAK	27d β S	653	1346	1475	635	1225
	27d β R	487	1004	1093	448	1036
	28daR + 27aaS	749	1382	2258	533	993
	27aaR	344	786	1241	496	989
	29d β S + 27 $\beta\beta$ R	689	1394	1279	870	1622
	29d β R	662	1197	1090	496	1228
	28aaR	344	623	1407	286	674
	29aaS	264	397	196	297	518
	29 $\beta\beta$ R	369	766	901	645	1142
	29 $\beta\beta$ S	313	609	440	268	504
	29aaR	362	738	1165	902	1561

TABLE 15

BIOMARKER ABUNDANCES - STERANES (PEAK AREAS), M/Z 218

GEOCHEM SAMPLE NUMBER		9365-017A	9365-022A	9365-035A	9365-069A	9365-070A
DEPTH		2280m	2310m	2380m	2786m	2789m
SAMPLE TYPE		Cuttings	Cuttings	Cuttings	Cuttings	Cuttings
PEAK	27 $\beta\beta$ R	496	1088	1020	596	1103
	27 $\beta\beta$ S	498	766	822	456	719
	28 $\beta\beta$ R	363	875	1162	249	600
	28 $\beta\beta$ S	423	679	884	280	578
	29 $\beta\beta$ R	475	930	891	546	780
	29 $\beta\beta$ S	399	851	727	367	750
	30 $\beta\beta$ R	111	203	112	29	78
	30 $\beta\beta$ S	152	442	417	37	45

TABLE 16

BIOMARKER ABUNDANCES - TRITERPANES (PEAK AREAS)

GEOCHEM SAMPLE NUMBER		9365-017A	9365-022A	9365-035A	9365-069A	9365-070A
DEPTH		2280m	2310m	2380m	2786m	2789m
SAMPLE TYPE		Cuttings	Cuttings	Cuttings	Cuttings	Cuttings
M/Z 191	23/3	827	1100	1924	1022	2152
	24/3	474	656	889	504	1206
	25/3	455	854	939	634	1315
	24/4	293	528	894	1179	1986
	26/3	371	643	1055	464	1052
	27Ts	611	967	992	688	968
	27Tm	535	1093	1298	6278	12235
	28 $\alpha\beta$	460	667	458	508	948
	29 $\alpha\beta$	1328	2219	2995	7472	13469
	29Ts	536	913	1414	469	702
	30d	176	293	263	310	600
	29 $\beta\alpha$	584	1544	1971	4219	8145
	Oleanane 30 O	0	0	0	0	0
	30 $\alpha\beta$	2367	4293	5099	9423	16405
	30 $\beta\alpha$	352	1084	1205	5041	8499
	30G	60	331	320	0	0
	31 $\alpha\beta$ S	532	1081	1027	6398	10747
	31 $\alpha\beta$ R	1084	3144	3749	4892	8387
	32 $\alpha\beta$ S+32 $\alpha\beta$ R	201 / 185	427 / 677	298 / 468	1260 / 1286	2196 / 2343
	33 $\alpha\beta$ S+33 $\alpha\beta$ R	135 / 80	343 / 332	150 / 225	238 / 341	566 / 683
34 $\alpha\beta$ S+34 $\alpha\beta$ R	46 / 24	143 / 215	73 / 105	84 / 106	176 / 199	
35 $\alpha\beta$ S+35 $\alpha\beta$ R	0 / 0	113 / 231	0 / 0	0 / 0	0 / 0	
25 nor 30 $\alpha\beta$	0	0	0	202	598	
M/Z 177	25 nor 28 $\alpha\beta$	231	467	338	233	513
	25 nor 30 $\alpha\beta$	0	0	0	106	265

TABLE 17

BIOMARKER ABUNDANCES (PEAK AREAS) - MONOAROMATIC STERANES (M/Z 253)

GEOCHEM SAMPLE NUMBER		9365-017A	9365-022A	9365-035A	9365-069A	9365-070A
DEPTH		2280m	2310m	2380m	2786m	2789m
SAMPLE TYPE		Cuttings	Cuttings	Cuttings	Cuttings	Cuttings
PEAK	A1	800	740	872	447	187
	B1	286	281	351	258	133
	C1	184	338	430	321	159
	D1	549	893	1175	478	222
	E1	1676	2440	3588	886	442
	F1	268	325	486	282	145
	G1	1508	3035	4043	1820	880
	H1	1758	2727	3992	1763	810
	I1	32	76	96	242	41

TABLE 18

BIOMARKER ABUNDANCES (PEAK AREAS) - TRIAROMATIC STERANES (M/Z 231)

GEOCHEM SAMPLE NUMBER		9365-017A	9365-022A	9365-035A	9365-059A	9365-070A
DEPTH		2280m	2310m	2380m	2786m	2789m
SAMPLE TYPE		Cuttings	Cuttings	Cuttings	Cuttings	Cuttings
PEAK	a1	175	281	151	586	356
	b1	282	369	367	378	223
	c1	228	180	107	508	282
	d1	888	686	472	1445	802
	e1	647	300	166	1077	418
	f1	674	308	207	656	318
	g1	596	204	126	889	254

TABLE 19

BIOMARKER ABUNDANCES - AROMATICS (PEAK AREAS)

GEOCHEM SAMPLE NUMBER		9365-017	9365-022	9365-035	9365-069A	9365-070A
DEPTH		2280m	2310m	2380m	2786m	2789m
SAMPLE TYPE		Cuttings	Cuttings	Cuttings	Cuttings	Cuttings
M/Z 178 M/Z 192	P	12649	9631	13702	3955	8204
	3	4705	4471	5642	2377	3118
	2	7311	6824	8641	2681	3487
	9	8692	9595	14337	4938	5643
	1	6531	7800	7802	4053	4695

TABLE 20

BIOMARKER MOLECULAR RATIOS

GEOCHEM SAMPLE NUMBER			9365-017A	9365-022A	9365-035A	9365-069A	9365-070A
DEPTH			2280m	2310m	2380m	2786m	2789m
M/Z	PEAKS	IDENTITY					
191	27 Tm/27 Ts		0.88	1.13	1.31	9.13	12.64
191	31 $\alpha\beta$ S/(31 $\alpha\beta$ S+31 $\alpha\beta$ R)	C ₃₁ hH-S/R	0.33	0.26	0.22	0.57	0.56
178 192	MPI 1	MP Index	0.65	0.63	0.60	0.59	0.53
178 192	MPI 2	MP Index	0.79	0.76	0.72	0.62	0.56
217	29 $\alpha\alpha$ S/29 $\alpha\alpha$ R	C ₂₉ $\alpha\alpha$ St	0.73	0.54	0.17	0.33	0.33
217	29 $\beta\beta$ /(29 $\alpha\alpha$ +29 $\beta\beta$)	C ₂₉ St	0.52	0.55	0.50	0.43	0.44
191	29 $\alpha\beta$ /30 $\alpha\beta$	NorH	0.56	0.52	0.59	0.79	0.82
191	28 $\alpha\beta$ /30 $\alpha\beta$	Bisnorh	0.19	0.16	0.09	0.05	0.06
191	hH/(27Ts,27Tm,29 $\alpha\beta$, 30 $\alpha\beta$)	hH/H	0.47	0.78	0.59	0.61	0.59
191	Tricyclic Terpanes/(27Ts, 27Tm, 29 $\alpha\beta$, 30 $\alpha\beta$)	Tricyclics	0.50	0.44	0.55	0.16	0.18
191	24/4:23/3	C ₂₄ /C ₂₃	0.35	0.48	0.46	1.15	0.92
191	35 $\alpha\beta$ /34 $\alpha\beta$	35/34 hH	0.00	0.96	0.00	0.00	0.00
218	27 $\beta\beta$:28 $\beta\beta$:29 $\beta\beta$	$\beta\beta$ St	37:30:33	36:30:34	33:37:29	42:21:37	40:26:34
191 217	(27Ts,27Tm,29 $\alpha\beta$,30 $\alpha\beta$) 27 $\alpha\beta$ S→30 $\alpha\alpha$ R	H/St	0.92	0.84	0.83	4.06	3.75

hH = Homohopanes H = Hopanes M = methyl



Institutt for energiteknikk

ADDRESS KJELLER Box 40, N-2007 Kjeller, Norway TELEPHONE +47 63 806000 TELEX 76 361 isotp n TELEFAX +47 63 815553		HALDEN N-1751 Halden, Norway +47 69 183100 76 335 energ n		AVAILABILITY Private Confidential			
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REVIEWED BY		Torbjørn Throndsen		1994-11-07		<i>Torbjørn Throndsen</i>	
APPROVED BY		Arne Råheim		1994-11-07		<i>Arne Råheim</i>	

1 Introduction

This report gives the result of routine vitrinite reflectance analyses on 24 samples covering the interval from 510 to 3101 mRKB in well 34/4-8 offshore Norway.

2 Material

2.1 Samples

The material was provided from the client as 24 unwashed cuttings samples. The sample positions are indicated in figure 1.

2.2 Geological information and casing points

Information on the stratigraphy and casing points was not supplied from the client.

3 Analytical techniques

3.1 Preparation

The cuttings samples were treated with hydrochloric and hydrofluoric acid prior to further preparation. The aim was to avoid soft and expanding mineral phases in order to ensure good polishing quality.

The sample material resulting from the acid treatment was embedded in an epoxy resin to make briquettes, ground flat and polished using 0.25 micron diamond paste and magnesium oxide as the two final steps.

3.2 Analysis

The analytical equipment being used was a Zeiss MPM 03 photometer microscope equipped with an Epiplan-Neofluar 40/0.90 oil objective. The sensitive measuring spot was kept constant for all measurements at about 2.5 micron in diameter. The measurements were made through a green band pass filter (546 nm) and in oil immersion (refractive index 1.515 at 18°C). The readings were made without a polarizer and using a stationary stage. This procedure is called measurement of random reflectance (%Rm). The photometer is calibrated daily against a standard of known reflectance (%Rm=0.588) and routinely (daily) checked against two other standards of significant different reflectances (%Rm=0.879 and 1.696). A deviation from these values of less than ± 0.01 and ± 0.02 respectively is considered as acceptable. The calibration is routinely checked during the course of measurements at least every hour, and a deviation of less than ± 0.005 is considered as acceptable.

For each sample at least 20 points were measured if possible, and quality ratings are given to various important aspects which may affect the measurements. The aspects are abundance of vitrinite, uncertainties in the identification of indigenous vitrinite, type of vitrinite, particle size, particle surface quality and abundance of pyrite.

Table 1 Vitrinite reflectance data

Well
34/4-8

IFE no.	Depth, mRKB	Sample type	Lithology	%Rm	Std. dev.	N	Quality	Preparation
SA 1312	510	cut	clst				barren	HF
SA 1313	600	cut	clst				barren	HF
SA 1314	700	cut	clst				barren	HF
SA 1315	800	cut	clst	0.22	0.03	13	M	HF
SA 1316	900	cut	clst	0.19	0.01	3	M	HF
SA 1317	1000	cut	clst	0.26	0.05	6	M	HF
SA 1318	1100	cut	clst				barren	HF
SA 1319	1200	cut	clst	0.28	0.04	22	M	HF
SA 1320	1310	cut	clst	0.25	0.04	22	M	HF
SA 1321	1400	cut	clst	0.29	0.04	14	M	HF
SA 1322	1500	cut	clst	0.31	0.04	22	M	HF
SA 1323	1600	cut	clst	0.31	0.03	11	M	HF
SA 1324	1700	cut	clst	0.38	0.06	28	P	HF
SA 1325	1800	cut	clst	0.42	0.07	23	P	HF
SA 1326	1900	cut	clst	0.40	0.04	21	M	HF
SA 1327	2000	cut	clst	0.42	0.03	20	M	HF
SA 1328	2100	cut	clst	0.47	0.06	28	M	HF
SA 1329	2195	cut	clst	0.45	0.03	12	P	HF
SA 1330	2510	cut	clst	0.57	0.08	27	P	HF
SA 1331	2600	cut	clst	0.61	0.07	25	M	HF
SA 1332	2700	cut	clst	0.54	0.07	11	M	HF
SA 1333	2900	cut	clst				barren	HF
SA 1334	2999	cut	clst	0.49	0.00	1	P	HF
SA 1335	3101	cut	clst				barren	HF

G	Good quality	P	Poor quality	A	Mud additive	HF	HF-treated
M	Moderate quality	X	Not vitrinite	Barren	Barren of vitrinite	Bulk	Bulk rock

Table 2 Interpreted vitrinite reflectance versus depth trend

Well 34/4-8	Depth, mRKB	%Rm-trend
	Sea bed	
	400	
	500	
	600	
	700	0.20
	800	0.21
	900	0.22
	1000	0.23
	1100	0.25
	1200	0.26
	1300	0.28
	1400	0.29
	1500	0.31
	1600	0.33
	1700	0.35
	1800	0.38
	1900	0.40
	2000	0.43
	2100	0.45
	2200	0.47
	2300	0.49
	2400	0.52
	2500	0.54
	2600	0.56
	2700	0.59
	2800	0.61
	2900	
	3000	
	3100	
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