

Formation multi tester:

A total of 9 FMT runs were run; 2 to obtain pressure points and 7 to obtain segregated samples. The first run resulted in 32 pretest pressure points of 38 attempts, in the interval: 2323.5 - 2369.0 m RKB (Fig. 3.1). 18 points were in the gas zone, 6 in the tight zone, 4 in the oil zone and 4 were in the water zone. The second run resulted in 9 pretest pressure points of nine attempts in the interval: 2358 - 2361 m RKB. Seven attempts to obtain segregated samples resulted in 5 good samples.

Pretest pressure recorded:

Run no.	Test no.	Depth m RKB	Formation pressure kPa	Formation pressure g/cm ³	Permeability	Comments
2A	1	2323.5	25773	1.133	Tight	Not used
2A	2	2325.0	25761	1.132	Good	Used
2A	3	2326.0	25766	1.131	Excellent	Used
2A	4	2327.0	25770	1.131	Excellent	Used
2A	5	2328.0	25773	1.131	Excellent	Used
2A	6	2329.0	25777	1.130	Excellent	Used
2A	7	2330.0	25779	1.130	Good	Used
2A	8	2331.5	25794	1.130	Poor	Used
2A	9	2332.0	25790	1.129	Fair	Used
2A	10	2332.5	25794	1.129	Good	Used
2A	11	2334.0	25794	1.129	Good	Used
2A	12	2337.0	25799	1.127	Excellent	Used
2A	13	2339.0	25805	1.127	Excellent	Used
2A	14	2341.0	25809	1.126	Fair	Used
2A	15	2341.5	25814	1.126	Good	Used
2A	16	2343.0	25811	1.125	Fair	Used
2A	17	2344.0	25818	1.125	Good	Used
2A	18	2345.0	25821	1.124	Poor	Used
2A	19	2345.7	25877	1.127	Tight	Not used
2A	20	2347.5	25899	1.127	Tight	Not used
2A	21	2348.0	-	-	Supercharged	Not used
2A	22	2349.0	-	-	Supercharged	Not used
2A	23	2350.0	-	-	Supercharged	Not used
2A	24	2351.5	25853	1.123	Tight	Not used
2A	25	2353.0	25830	1.121	Good	Used
2A	26	2354.0	25837	1.121	Poor	Used
2A	27	2355.0	25844	1.121	Excellent	Used
2A	28	2357.0	25857	1.120	Excellent	Used
2A	29	2359.0	25875	1.120	Excellent	Used
2A	30	2361.0	25895	1.120	Excellent	Used
2A	31	2365.0	25938	1.120	Good	Used
2A	32	2369.0	25982	1.120	Good	Used
2B	1	2353.0	25818	1.121	Fair	Used
2B	2	2354.0	25830	1.121	Excellent	Used
2B	3	2355.0	25840	1.121	Good	Used
2B	4	2356.0	25847	1.120	Good	Used
2B	5	2357.0	25853	1.120	Excellent	Used
2B	6	2358.0	25966	1.120	Good	Used
2B	7	2359.0	25875	1.120	Good	Used
2B	8	2360.0	25886	1.120	Good	Used
2B	9	2361.0	25897	1.120	Good	Used

SAMPLING

Sample no. 1

Segregated sample taken at 2355 m RKB. The 2 3/4 gallon chamber was bled off at wellsite:

Opening pressure : 9754 kPa at 15.5°C

Gas : 118.9 l, H₂S = 500 ppm

Oil : 1.0 l

Water/mudfiltrate: 7.5 l

s.g. = 1.07, chlorides = 50000 ppm, pH = 6.4, H₂S = 350 ppm

Gas composition from chromatograph

Methane : 79896 ppm

Ethane : 2761 ppm

Propane : 1143 ppm

i-butane: 164 ppm

n-butane: 308 ppm

Pentane : 65 ppm

The 1 gallon chamber was sent onshore for analysis:

Opening pressure : 9750 kPa at 15.5°C
Gas : None observed
Oil : None observed
Water/mudfiltrate: 1.0 l (approx.)

	<u>Water analysis</u>	<u>Mud filtrate</u>
Chloride content	46970 ppm	47140 ppm
pH	6.5	7.71
Specific gravity	1.065	1.073
H ₂ S	None detected	None detected
Resistivity	0.117 ohm-m	0.117 ohm-m

Sample no. 2:

Segregated sample taken at 2355 m RKB. The 2 3/4 gallon chamber was bled off at wellsite:

Opening pressure : 12512 kPa
Gas : 28.3 l, H₂S = 107 ppm, CO₂ = 1 %
Oil : 2.1 l
Water/mudfiltrate: 6.2 l
s.g. = 1.07, chlorides = 48000 ppm, pH 6.2, H₂S = 150-200 ppm

Gas composition from chromatograph:

Methane : 40858 ppm
Ethane : 2994 ppm
Propane : 1734 ppm
i-butane: 276 ppm
n-butane: 583 ppm
Pentane : 123 ppm

The 1 gallon chamber was sent onshore for analysis:

Opening pressure : 11820 kPa at 15.5°C
Gas : None observed
Oil : None observed
Water/mudfiltrate: 1.3 l (approx.)

	<u>Water analysis</u>	<u>Mudfiltrate</u>
Chloride content	47020 ppm	47140 ppm
pH	7.0	7.71
Specific gravity	1.064	1.073
H ₂ S	None detected	None detected
Resistivity	0.118 ohm-m	0.117 ohm-m

Sample no. 3:

Segregated sample taken at 2328 m RKB. The 2 3/4 gallon chamber was bled off at wellsite:

Opening pressure : 15270 kPa
Gas : 835 l. H₂S = 1ppm, CO₂ = 1.5 %
Oil : 0.2 l
Water/mudfiltrate: 4.0 l

s.g. = 1.07, chlorides = 48000 ppm, pH = 6.15, H₂S = 0-10 ppm

Gas composition from chromatograph:

Methane : 104550 ppm
Ethane : 4125 ppm
Propane : 2051 ppm
i-butane: 348 ppm
n-butane: 704 ppm
Pentane : 191 ppm

The 1 gallon chamber was sent onshore for laboratory analysis:

Opening pressure : 100 kPa at 15.5°C (leaking)

Gas : None observed

Oil : 0.03 l

Water/mudfiltrate: 0.8 l (approx.)

	<u>Water analysis</u>	<u>Mudfiltrate</u>
Chloride content	42100 ppm	47140 ppm
pH	7.0	7.71
Specific gravity	1.057	1.073
H ₂ S	None detected	None detected
Resistivity	0.129 ohm-m	0.117 ohm-m

Hydrocarbon analysis:

<u>Component</u>	<u>Mol %</u>
Butanes -	0.24
i-pentane	0.62
n-pentane	1.17
Hexanes	4.46
Heptanes	1.57
Cyclohexanes	2.13
Methylcyclohexane	3.71
Toluene	2.77
Octanes	6.56
Ethylbenzene	0.61
Meta and Para Xylenes	1.69
Ortho-Xylene	0.50
Nonanes	5.27
Decanes +	61.88

<u>Total</u>	<u>100.00</u>

Average density: 813.4 kg/m³ at 15.5°C

Sample no. 4:

Segregated sample at 2353.5 m RKB. The 2 3/4 gallon chamber was bled of at wellsite:

Opening pressure : 8375 kPa
Gas : 42.5 l, H₂S = 30 ppm, CO₂ = 0.5 %
Oil : 0.1 l
Water/mudfiltrate: 8.4 l

s.g. = 1.07, chlorides = 50000 ppm, pH = 6.3, H₂S = 75-100 ppm

Gas composition from chromatograph:

Methane : 61399 ppm
Ethane : 2386 ppm
Propane : 1090 ppm
i-butane: 154 ppm
n-butane: 303 ppm
Pentane : 64 ppm

The 1 gallon chamber was sent onshore for laboratory analysis:

Opening pressure : 100 kPa at 15.5°C (leaking)
Gas : None observed
Oil : None observed
Water/mudfiltrate: 3.0 l

	<u>Water analysis</u>	<u>Mudfiltrate</u>
Chloride content	44610 ppm	47140 ppm
pH	7.0	7.71
Specific gravity	1.061	1.073
H ₂ S	None detected	None detected
Resistivity	0.123 ohm-m	0.117 ohm-m

Sample no. 5:

Segregated sample taken at 2353.5 m RKB. Two 2 3/4 gallon chambers were used for this run, and both were bled off at wellsite:

Opening pressure top chamber: 13546 kPa

Gas : 232 l, H₂S = 5 ppm, CO₂ = 0.5 %

Oil : 0.1 l

Water/mudfiltrate: 7.5 l

s.g. = 1.07, chlorides = 49000 ppm, pH = 6.6, H₂S = 100 ppm

Gas composition from chromatograph:

Methane : 76564 ppm

Ethane : 2928 ppm

Propane : 1456 ppm

i-butane: 235 ppm

n-butane: 506 ppm

Pentane : 149 ppm

Opening pressure bottom chamber: 15270 kPa

Gas : 600 l, H₂S=4 ppm, CO₂=1%

Oil : 0.3 l

Water/mudfiltrate : 5.2 l

s.g. = 1.07, chlorides = 49000 ppm, pH = 6.2, H₂S = None detected

Gas composition from chromatograph:

Methane : 112700 ppm

Ethane : 4229 ppm

Propane : 2140 ppm

i-butane: 364 ppm

n-butane: 671 ppm

Pentane : 137 ppm

Opening pressure bottom chamber: 15270 kPa

Gas : 600 l. $H_2S = 4$ ppm, $CO_2 = 18$

Condensate/oil : 0.3 l

Water/mudfiltrate : 7.5 l

s.g. = 1.07, chlorides = 49000 ppm, pH = 6.6, $H_2S = 100$ ppm

Gas composition from chromatograph:

Methane : 112700 ppm

Ethane : 4229 ppm

Propane : 2140 ppm

i-butane: 346 ppm

n-butane: 671 ppm

Pentane : 137 ppm

MATERIAL COST AND CONSUMPTION ANALYSIS

RIGG: ROSS ISLE

PRODUCT	UNIT SIZE	UNIT PRICE \$	36" SECTION	COST	26" SECTION	COST	17.5" SECTION	COST	12.25" SECTION	COST	TRST P & A	COST	TOTAL USED	TOTAL COST
BARITE	N.T.	148.00		.00	103	15244.00	45	6660.00	47	6956.00	18	2664.00	213	31524.00
BENTONITE	N.T.	388.00	29	11020.00	69	26220.00	2	760.00	15	5700.00		.00	115	43700.00
CAUSTIC SODA	25 KG	20.00	19	380.00	81	1620.00	63	1260.00	81	1620.00	5	100.00	249	4980.00
BICARBONATE	50 KG	24.00		.00		.00		.00	12	288.00		.00	12	288.00
SODA ASH	30 KG	21.00	8	168.00	13	273.00		.00		.00		.00	21	441.00
GYPSEUM	40 KG	13.20		.00		.00	856	11299.20	150	1980.00		.00	1006	13279.20
CALSIUM CHL.	50 KG.	30.00		.00		.00		.00	26	780.00		.00	26	780.00
BENTONITE	50 KG.	20.00		.00		.00		.00		.00		.00	0	.00
IC-POLYMER	50 LBS.	480.00		.00		.00	76	36480.00	5	2400.00		.00	81	38880.00
DRISPAC REG	50 LBS.	154.00		.00		.00	14	2156.00	62	9548.00		.00	76	11704.00
DRISPAC SL	50 LBS.	162.00		.00		.00	517	83754.00	136	22032.00		.00	653	105786.00
CMC LV	25 KG.	65.00		.00		.00		.00		.00		.00	0	.00
CMC HV	25 KG.	67.00		.00		.00		.00		.00		.00	0	.00
SPERCELL C	25 KG	19.50		.00		.00		.00	1	19.50		.00	1	19.50
SOLTEX	50 LBS.	115.00		.00		.00		.00	225	25875.00		.00	225	25875.00
NUT PLUG F.	25 KG.	22.00		.00		.00	15	330.00	13	286.00		.00	28	616.00
DETERGENT	200 LIT	495.00		.00	1	495.00	2	990.00		.00		.00	3	1485.00
AL. STEARATH	25 KG.	89.00		.00		.00		.00		.00		.00	0	.00
STAFLO REG.	25 KG	185.00		.00		.00	115	21275.00	5	925.00		.00	120	22200.00
ZINNCARBONAT	25 KG	90.00		.00		.00	30	2700.00	18	1620.00		.00	48	4320.00
STAFLO EXLO	25 KG	176.00		.00		.00		.00	124	21824.00		.00	124	21824.00
SOD. CHLOR.	50.00	12.00		.00		.00		.00	687	8244.00		.00	687	8244.00
DEGREASER	25 LIT.	66.00		.00		.00		.00	1	66.00		.00	1	66.00

TOTALS 11568.00 43852.00 167664.20 110163.50 2764.00 336011.70

NOLE DRILLED (METRE) 101 399 1127 566 2193

COST PR. METRE 114.53 109.90 148.77 194.64 153.22

TOTAL DAYS 4 10 11 14 3 42

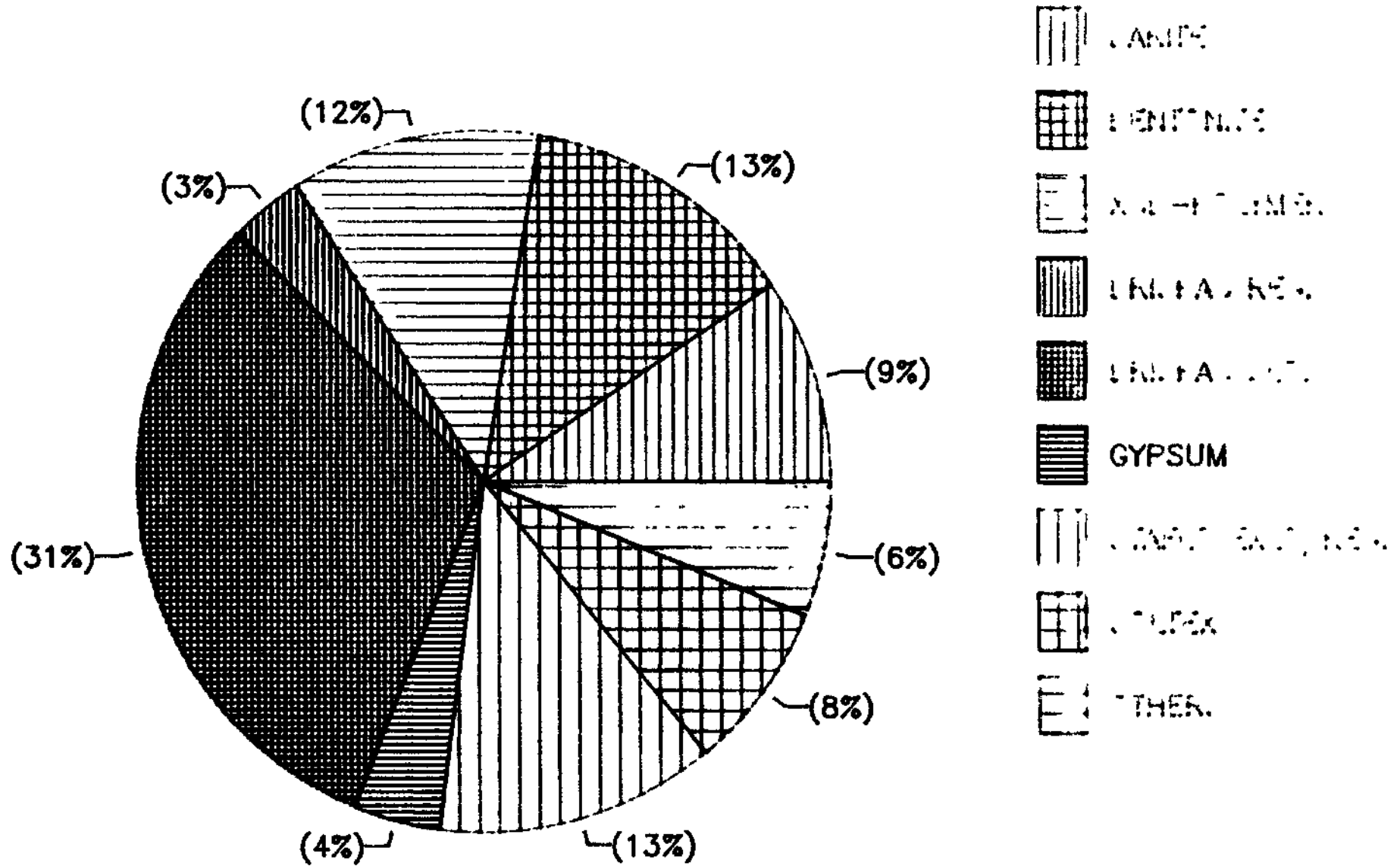
COST PR. DAY 2892.00 4385.20 15242.20 7868.82 921.33 8000.28

MUD MIXED (CU.M) 653 934 1480 548 124 3739

COST PR. CU.M 17.72 46.95 113.29 201.63 22.29 89.87

STATOIL WELL NO.7121/5-2

MATERIAL COST AND CONSUMPTION ANALYSIS



MUD VOLUME DISTRIBUTION SUMMARY

WELL: 7121/5-2 RIG: ROSS ISLE

HOLE SIZE	HOLE FROM-TO	HOLE LENGTH	MUD/BRINE BUILT	DUMPED	LOST TO FORMATION (SEABED)	LOST OVER SOLIDS CONTROL EQUIPMENT	MUD LEFT BETWEEN CSG/CSG	CUTTINGS VOLUME DRILLED	MUD TRANSF. TO NEXT SEC.	MUD TYPE USED FOR INTERVAL
36"	350-449M	99 M	653 M ³	0 M ³	338 M ³	0 M ³	0 M ³	65 M ³	315 M ³	BENT/D.W
26"	449-850M	401 M	934 M ³	50 M ³	947 M ³	88 M ³	0 M ³	137 M ³	164 M ³	BENT/D.W & SW/HIVIS
17.5"	850-1977M	1127 M	1480 M ³	578 M ³	0 M ³	524 M ³	79 M ³	175 M ³	463 M ³	GYP/POLYMER
12.25"	1977-2544 M	566 M	548 M ³	274 M ³	0 M ³	253 M ³	0 M ³	43 M ³	484 M ³	GYP/POLYMER/NaCl
Plug and Abandon			124 M ³	484 M ³	8 M ³	5 M ³	111 M ³			

PROD.
TEST

TOTALS:

Mud/Brine built	: 3739 m ³	Total Mud/Brine left in hole/+ between csg/csg:	190 m ³
Mud/Brine dumped	: 1386 m ³	Total Mud/Brine to sea	: 2279 m ³
Mud/Brine lost to formation	: 1293 m ³	Total cuttings volume drilled	: 420 m ³
Mud/Brine lost over solids control equipment	: 870 m ³		
Mud/Brine left between csg/csg	: 79 m ³		

STATOIL WELL NO.7121/5-2

DRILLING MUD PROPERTIES RECORD

MUD SYSTEM:		SPUD MUD/GYP POLYMER.										AREA RIG	TROMSOFLAKET ROSS ISLE									
DAY No.	DATE 1986	DEPTH metre	M.W. sg	F.V. s/qt	A.V. cps	P.V. cps	Y.P. cps	Gel 0	Gel 10	API Filt.	Cake 32nds	HPMT Filt.	pH	Chl.ppm *1000	Calc. g/lit	Pf	%Oil	%Sol.	%Sand	MBT ppb	GYP ppb	
1	25.5	449	1.08	130									10.8									
2	26.5	451	1.08	130									10.8									
3	27.5	449	1.06	52	21	8	26						10									
4	28.5	524	1.1	46	21	6	30						10.1						.25			
5	29.5	848	1.1	47	23.5	6	35	21	24				10.1						.25			
6	30.5	1035	1.17	47	21	5	32	21	21				9.9						Tr.			
7	31.5	537	1.14	43	43	8	70	26	33				11.8						Tr.			
8	1.6	689	1.1	100	50	9	72	28	33				11.9						Tr.			
9	2.6	689	1.1	100	50	9	72	28	33				11.9									
10	3.6	710	1.08	100	46	10	72	28	32				11.7									
11	4.6	782	1.08	95	43.5	10	67	25	30				11.7									
12	5.6	850	1.08	95	43	9	68	27	32				11.5									
13	6.6	840	1.1	60	32.5	9	17	2	2	6.5	1		9.5	19.00	4.8	.05		7				
14	7.6	840	1.1	60	32.5	24	17	2	2	6.5	1		9	19.00	4.8	.05		8		5		
15	8.6	1156	1.11	60	33.5	24	19	2	2	3.8	1		9.3	19.50	4.6	.05		8	.25	7.5	2.9	
16	9.6	1415	1.13	54	34	23	22	2	2	4.3	1		9.7	20.00	4.6	.1		8	.25	12.5	2.2	
17	10.6	1580	1.14	58	34	22	24	4	8	4.3	1		8.5	20.00	4.68	0		9	Tr.	14	2.3	
18	11.6	1744	1.15	57	31.5	20	23	4	9	4.3	1		8.7	19.00	4.72	.02		9	.25	16	2.7	
19	12.6	1874	1.16	58	33	22	22	4	10	4.3	1		8.6	19.00	4.44	.02		10	Tr.	15	2.6	
20	13.6	1977	1.16	58	31	20	22	4	10	4.5	1		8.6	19.00	4.68	.02		10	.25	15	2.5	
21	14.6	1977	1.17	58	30.5	21	19	3	9	4.1	1		8.6	19.00	4.6	.02		10	.25	15	3	
22	15.6	1977	1.3	64	36	26	20	3	10	3.9	1		8.9	19.00	4.6	.05		12	.5	15	2.5	
23	16.6	1977	1.3	64	33	24	18	3	8	4.2	1		8.4	19.50	4.2	0		12	.5	15	3.1	
24	17.6	2074	1.3	66	30.5	22	17	3	11	4.5	1	14	9.6	29.50	3.8	.01		12	.25	14	3.1	
25	18.6	2147	1.28	63	27.5	19	17	3	23	4.8	1	18	9.5	29.00	3.2	.01		13.5	Tr.	16	2.9	
26	19.6	2220	1.26	69	26.5	19	15	3	18	4.2	1	17	9.6	32.00	3	.01		13	Tr.	16	3.2	
27	20.6	2301	1.25	67	25	19	12	2	16	4.5	1	18	9.4	34.00	3.6	.01		12	Tr.	16	2.9	
28	21.6	2324	1.28	71	26.5	20	13	2	18	4	1	16	9.2	35.00	3.8	.01		12	Tr.	16.5	3.2	
29	22.6	2363	1.27	73	26	19	14	2	18	4	1	16	9.9	33.00	3.2	.1		12	.25	16	3.5	

STATOIL WELL NO.7121/5-2

DRILLING MUD PROPERTIES RECORD

MUD SYSTEM:		SPUD MUD/GYP POLYMER.										AREA	TROMSOFLAKET									
												RIG	ROSS ISLE									
DAY	DATE	DEPTH	M.W.	F.V.	A.V.	P.V.	Y.P.	Gel	Gel	API	Clay	HPHT	pH	Chl.ppm	Calc.	Pf	%Oil	%Sol.	%Sand	MBT	GYP	
No.	1986	metre	sg	s/qt	cps	cps		0	10	Filt.	32nds	Filt.		*1000	g/lit					ppb	ppb	
30	23.6	2399	1.27	78	24	18	12	2	21	4.6	1	14	10.5	45.00	2.6	.05	12	.25	17	3.4		
31	24.6	2431	1.27	69	26.5	19	15	2	18	4.5	1	14	9.5	50.00	2.4	.05	12	.25	16	3.2		
32	25.6	2470	1.26	76	27.5	20	15	2	18	3.9	1	14	9.5	49.00	2.2	.01	12	.25	15	2.6		
33	26.6	2507	1.26	79	28.5	21	15	3	19	4	1	14	9.5	49.00	2.2	.05	12	.25	16	2		
34	27.6	2543	1.26	75	30	22	16	3	25	3.9	1	14	9.6	50.00	2	.05	12	.25	15	1.1		
35	28.6	2543	1.26	80	33	24	18	3	23	3.9	1	14	9.6	50.00	1.92	.05	12	Tr.	14			
36	29.6	2543	1.26	80	33	24	18	4	24	3.9	1	14	9.5	50.00	1.94	.05	12	Tr.	15			
37	30.6	2543	1.26	95	31	22	18	3	19	3.9	1	14	9.3	48.00	1.92	.05	12		14			
38	1.7	2200	1.26	95	33.5	24	19	4	28	4.3	1	13	11.3	48.00	2.1	.25	12	.25	15			
39	2.7	1650	1.26	100	36	26	20	5	35	5.1	1	17	11.5	49.00	2.1	.05	12	.25	15			
40	3.7	454	1.12	45	18.5	14	9	2	8	6	1		10.9	20.00	1.12	.1	7		7			

ADDRESS KJELLER N-2007 Kjeller, Norway TELEPHONE +47 2 712560 - 713560 TELEX 74 573 energ n TELEFAX +47 2 715553		HALDEN N-1751 Halden, Norway +47 31 83100 76 335 energ n	AVAILABILITY Private Confidential
REPORT TYPE	REPORT NO. IFE/KR/F-86/102	DATE 1986-09-02	
	REPORT TITLE REPORT ON STABLE ISOTOPES ($\delta^{13}\text{C}$, δD , $\delta^{18}\text{O}$) ON A NATURAL GAS FROM WELL 7121/5-2	DATE OF LAST REV.	
	CLIENT Statoil	REV. NO.	
	CLIENT REF. T-6269, avrop nr. 79	NUMBER OF PAGES 5	
		NUMBER OF ISSUES 15	
SUMMARY The gas components C_1 - C_4 and CO_2 have been separated from a natural gas of well 7121/5-2, and the $\delta^{13}\text{C}$ values of these components have been measured. The isotopic composition of hydrogen from CH_4 has also been measured.		DISTRIBUTION Statoil (10) Andresen, B. Brevik, E.M. Råheim, A.	
<div style="border: 1px solid black; padding: 10px; width: fit-content; margin: 0 auto;"> <p>86-5805-BA</p> <p>25 SEPT. 1986</p> <p>REGISTRERT</p> <p>OLJEDIREKTORATET</p> </div>			
KEYWORDS			
	NAME	DATE	SIGNATURE
PREPARED BY	Björg Andresen Einar M. Brevik Arne Råheim	1986-09-02 1986-09-02 1986-09-02	Björg Andresen Einar M. Brevik Arne Råheim
REVIEWED BY			
APPROVED BY	Karen Garder	1986-09-02	Karen Garder

1. INTRODUCTION

One sample of flashed gas obtained from FMT chamber no. ST023 run no. 4 taken at 2355 m RKB from well 7121/5-2 was received late August 1986.

On the sample C_1-C_4 and CO_2 are quantified, and the $\delta^{13}C$ value is measured on methane, ethane, propane, the butanes and CO_2 . The δD value is also measured on methane.

2. ANALYTICAL PROCEDURE

The natural gas has been quantified and separated into the different gas components by a Carlo-Erba 4200 instrument. This gas chromatograph is equipped with a special injection loop in order to concentrate the samples, in the case of low concentration of the gas components. The hydrocarbon gas components were oxidized in separate CuO-ovens in order to prevent cross contamination. The combustion products CO_2 and H_2O were frozen into collection vessels and separated.

The water was reduced with zinc metal in a sealed tube to prepare hydrogen for isotopic analysis. The isotopic measurements were performed on a Finnigan Mat 251 mass spectrometer. Our $\delta^{13}C$ value on NBS-22 is $-29.77 \pm .06$ o/oo PDB.

3. RESULTS

The volume composition of the sample are given in Table 1. The results have been normalized to 100%. The stable isotope results are given in Table 2.

Our uncertainty on the $\delta^{13}C$ value is estimated to be ± 0.3 o/oo and includes all the different analysis step. The uncertainty on the δD value is likewise estimated to be ± 5 o/oo.

Table 1 Volume composition of a natural gas from well 7121/5-2

Sample	IFE no.	C ₁ %	C ₂ %	C ₃ %	i-C ₄ %	n-C ₄ %	CO ₂ %	∑C ₁ -C ₄	$\frac{\sum C_2-C_4}{\sum C_1-C_4}$	$\frac{i-C_4}{n-C_4}$
7121/5-2 2355 m RKB	5237	77.0	10.7	6.3	1.0	2.6	2.6	97.4	0.21	0.38

Table 2 Isotopic composition of a natural gas from well 7121/5-2

Sample	IFE no.	C ₁ $\delta^{13}C$ PDB	C ₁ δD SMOW	C ₂ $\delta^{13}C$ PDB	C ₃ $\delta^{13}C$ PDB	i-C ₄ $\delta^{13}C$ PDB	n-C ₄ $\delta^{13}C$ PDB	CO ₂ $\delta^{13}C$ $\delta^{18}O$ PDB PDB	
7121/5-2 2355 m RKB	5237	-43.8	-158	-32.4	-30.8	-22.7	-30.1	-13.1	-7.0

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**GEOLOGICAL
LABORATORIES**

Grading

Title GEOCHEMICAL EVALUATION OF THE 7121/5-2 WELL		
Requested by	Project	
Date 21 November 1986	Number of pages 251	No. of encs. 2

Key words Geochemistry, 7121/5-2, source rock, maturity, migration hydrocarbons, oilstaining core extractions

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Prepared by Geochem Labs Steinar ULvøen, Statoil
Textoperator

Approved by 2/12-86 <i>Ingvare Meyer</i>
2/12-86 <i>Per Ole</i>



No serious contamination was observed during the sample washing process.

Geochem were instructed (telex 19.8.86) to analyse 109 samples as follows:

600-934m	4 samples
934-977m	1 sample
977-TD	104 samples

and to include specified samples for TOC, Rockeval vitrinite reflectance, TAI, and extraction.

The total number of analyses performed in this study are listed below:

ANALYSIS	NUMBER OF ANALYSES
Headspace and cuttings gas	112
Sample preparation	214
Total organic carbon	172
Pyrolysis	138
Vitrinite reflectance	49
Kerogen type and spore colouration	48



C ₁₅₊ extraction and chromatography	107
Capillary GC - paraffin-naphthenes	107
Capillary GC - aromatics	49
Pyrolysis-GC	21
Carbon isotopes - extract fractions	234
Carbon isotopes - kerogen	29
GC-MS biomarker analysis	48
Detailed gasoline analysis	2

The data are listed in tables 1 to 13 and presented graphically in figures 1 to 22. A brief description of the analytical techniques employed is included in the back of this report.

TABLE 1
ORGANIC CARBON RESULTS AND GROSS LITHOLOGIC DESCRIPTIONS



GEOCHEM SAMPLE NUMBER	DEPTH	GROSS LITHOLOGIC DESCRIPTION	G S A Colour Code	TOTAL ORGANIC CARBON (Wt % of Rock)
1399-004	500-515m	A 98% Shaly mudstone, subfissile to platy mod. hard, non-calc, light grey	N7	
1399-011	605-620m	A 98% Shale, subfissile, mod. hard, non- calc, medium light grey - light grey	N6-7	0.72
1399-017	695-710m	A 90% Shale, subfissile, mod. hard non-calc, light grey	N7	0.87
1399-024	800-825m	A 90% Shale, sl. silty, subfissile, mod. hard, non-calc, light grey B 10% Shale, subfissile, mod. hard, non- calc.	N7	0.67 1.00,0.96
1399-031	905-920m	A 90% Shale, as 1399-024B B 10% Shale, as 1399-024A		0.69 0.50
1399-034	950-965m	A 50% Shale, subfissile, mod. hard, non- calc. medium olive grey B 50% Sandstone v. fine grained, limestone cement, supported in part. sl. glauconitic, blocky, mod. hard	5Y5/1 10YR8/2	0.59
1399-036	980-995m	A 60% Shale, subfissile, mod. hard, non- calc B 40% Sandstone as 1399-034B	5Y4/1	1.16
1399-037	995-1010m	A 75% Shale as 1399-036A B 25% Sandstone as 1399-034B		1.69
1399-038	1010-1025m	A 70% Shale as 1399-036A B 30% Sandstone as 1399-034B		1.59,1.60
1399-039	1025-1035m	A 90% Shale, fissile to subfissile, mod. hard, non-calc. B 10% Sandstone as 1399-034B	5Y4/1	1.04
1399-040	1035-1050m	A 98% Shale as 1399-039A		1.15
1399-041	1050-1065m	A 98% Shale, subfissile, mod. hard, non- calc. medium dark grey	N4-5Y4/1	1.22
1399-042	1065-1080m	A 98% Shale as 1399-041A		1.06
1399-043	1080-1095m	A 98% Shale as 1399-041A		1.11,1.14
1399-044	1095-1110m	A 98% Shale as 1399-041A		1.06
1399-045	1110-1125m	A 98% Shale as 1399-041A		1.15
1399-046	1125-1140m	A 98% Shale, subfissile, mod. hard, non- calc. medium grey	N5	1.18
1399-047	1140-1155m	A 98% Shale, subfissile, mod. hard, non- calc. min. silty mudstone medium grey	N5	1.08
1399-048	1155-1170m	A 98% Shale as 1399-047A		1.10
1399-049	1170-1185m	A 98% Shale as 1399-047A		1.11,1.09
1399-050	1185-1200m	A 98% Shale as 1399-047A		1.07
1399-051	1200-1215m	A 98% Shale as 1399-047A		1.02
1399-052	1215-1230	A 98% Shale, fissile, mod. hard, non-calc. medium dark grey - medium grey	N4-5	0.99

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

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GEOCHEM SAMPLE NUMBER	DEPTH	GROSS LITHOLOGIC DESCRIPTION	G S A Colour Code	TOTAL ORGANIC CARBON (Wt. % of Rock)
1399-053	1230-1245m A	98% Shale, fissile, mod. hard, non-calc. medium dark grey - medium grey	N4-5	1.03
1399-054	1245-1260m A	98% Shale as 1399-052A		1.19,1.19
1399-055	1260-1275m A	98% Shale as 1399-052A		0.93
1399-056	1275-1290m A	98% Shale, fissile, mod. hard, non-calc. medium dark grey - medium grey	N4-5	0.93
1399-057	1290-1305m A	98% Shale as 1399-056A		0.86
1399-058	1305-1320m A	98% Shale as 1399-056A		0.97
1399-059	1320-1335m A	98% Shale as 1399-056A		0.86
1399-060	1335-1350m A	98% Shale as 1399-056A		0.98,1.00
1399-062	1365-1380m A	98% Shale, fissile, mod. hard, non-calc., medium dark grey - medium grey	N4-5	0.82
1399-063	1380-1395m A	98% Shale as 1399-062A		0.77
1399-064	1395-1410m A	98% Shale as 1399-062A		0.64
1399-065	1410-1425m A	95% Shale as 1399-062A		0.72
		B 5% LCM - walnut shell		
1399-066	1425-1440m A	98% Shale as 1399-062A		0.76,0.78
1399-067	1440-1455m A	98% Shale, fissile, mod. hard, non-calc. medium grey - medium dark grey	N5-4	0.70
1399-068	1455-1470m A	98% Shale as 1399-067A		0.61
1399-069	1470-1485m A	98% Shale as 1399-067A		0.76
1399-070	1485-1500m A	98% Shale as 1399-067A		0.73
1399-071	1500-1515m A	98% Shale as 1399-067A		0.80
1399-072	1515-1530m A	98% Shale fissile, mod. hard, non-calc. medium dark grey - medium grey	N4-5	0.81,0.83
1399-073	1530-1545m A	98% Shale as 1399-072A		0.75
1399-074	1545-1560m A	98% Shale as 1399-072A		0.79
1399-075	1560-1575m A	98% Shale as 1399-072A		0.78
1399-076	1575-1590m A	98% Shale as 1399-072A		0.89
1399-077	1590-1605m A	98% Shale fissile, mod. hard, non-calc. Medium dark grey	N4	0.81,0.85
1399-078	1605-1620m A	98% Shale as 1399-077A		0.89
1399-079	1620-1635m A	98% Shale as 1399-077A		0.88
1399-080	1635-1650m A	98% Shale as 1399-077A		0.86
1399-081	1650-1665m A	98% Shale as 1399-077A		1.03
1399-082	1665-1680m A	98% Shale fissile, mod. hard, non-calc. medium dark grey - medium grey	N4-5	0.99
1399-083	1680-1695m A	98% Shale as 1399-082A		0.91
1399-084	1695-1710m A	98% Shale as 1399-082A		0.97
1399-085	1710-1725m A	98% Shale as 1399-082A		1.04

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GEOCHEM SAMPLE NUMBER	DEPTH	GROSS LITHOLOGIC DESCRIPTION	G S A Colour Code	TOTAL ORGANIC CARBON (Wt. % of Rock)
1399-086	1725-1740m	A 98% Shale fissile, mod. hard, non-calc. medium dark grey - medium grey	N4-5	0.98
1399-087	1740-1755m	A 98% Shale fissile, mod. hard, non-calc. medium dark grey - medium grey	N4-5	1.03, 0.98
1399-088	1755-1770m	A 98% Shale as 1399-087A		0.91
1399-089	1770-1785m	A 98% Shale as 1399-087A		1.03
1399-090	1785-1800m	A 98% Shale as 1399-087A		1.13
1399-091	1800-1815m	A 98% Shale as 1399-087A		1.16
1399-092	1815-1830m	A 98% Shale fissile, mod hard, non-calc. medium dark grey	N4	1.18
1399-093	1830-1845m	A 98% Shale as 1399-092A		1.20, 1.20
1399-094	1845-1860m	A 98% Shale as 1399-092A		0.97
1399-095	1860-1875m	A 98% Shale as 1399-092A		1.16
1399-096	1875-1890m	A 98% Shale as 1399-092A		1.13
1399-097	1890-1905m	A 98% Shale fissile, mod. hard non-calc medium dark grey	N4	1.08
1399-098	1905-1920m	A 98% Shale as 1399-097A		1.18, 1.14
1399-099	1920-1935m	A 98% Shale as 1399-097A		1.12
1399-100 SWC	1927.5m	A 98% Shale fissile, mod. hard, non-calc. medium dark grey	N4	
1399-101	1935-1950m	A 98% Shale as 1399-100A		1.34
1399-102	1950-1965m	A 98% Shale as 1399-100A		1.24
1399-103	1965-1980m	A 98% Shale as 1399-100A		1.35
1399-104	1982m	A 98% Shale as 2399-100A		
1399-105	1980-1995m	A 65% Shale as 1399-100A B 25% Mudstone, blocky, mod. soft, non- calc. light grey C 10% LCM - cement	N7	1.46 1.37, 1.36
1399-106	1995-2010m	A 75% Shale fissile, mod. hard, non calc medium dark grey B 25% Mudstone as 1399-105B	N4	1.37 1.43
1399-107	2010-2025m	A 85% Shale as 1399-106A B 15% Mudstone as 1399-105B		1.33 1.41
1399-108	2025-2040m	A 80% Shale as 1399-100A B 20% Mudstone as 1399-105B		1.60, 1.64 1.52
1399-109	2040-2055m	A 70% Shale as 1399-106A B 30% Mudstone as 1399-105B		2.12 1.92
1399-110 SWC	2045m	A 98% Shale as 1399-106A		
1399-111 SWC	2062m	A 98% Shale as 1399-106A		1.55

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

TABLE 1
ORGANIC CARBON RESULTS AND GROSS LITHOLOGIC DESCRIPTIONS



GEOCHEM SAMPLE NUMBER	DEPTH	GROSS LITHOLOGIC DESCRIPTION	G S A Colour Code	TOTAL ORGANIC CARBON (Wt. % of Rock)
1399-112	2055-2070m	A 80% Shale fissile, mod. hard, non-calc. medium dark grey	N4	1.46
		B 20% Mudstone, blocky, mod. soft, non-calc. light grey - medium light grey	N7-6	1.50
1399-113	2070-2085m	A 80% Shale fissile, mod. hard, non-calc. medium dark grey	N4	1.59, 1.60
		B 20% Mudstone, blocky, mod. soft, non-calc. light grey - medium light grey	N7-6	1.39
1399-114 SWC	2080m	A 98% Shale as 1399-112A		
1399-115	2085-2100m	A 55% Shale as 1399-112A		1.27
		B 45% Mudstone as 1399-112B		1.17
1399-116	2100-2115m	A 70% Shale as 1399-112A		1.25, 1.25
		B 30% Mudstone as 1399-112B		1.05
1399-117 SWC	2121m	A 98% Shale as 1399-112A		0.91
1399-118	2115-2130m	A 95% Shale as 1399-112A		1.19
		B 5% Walnut shell		
1399-119	2130-2145m	A 85% Shale, fissile, mod. hard, non-calc., medium-dark grey	N4	1.03
		B 15% Mudstone, blocky, mod. soft, none calc. light grey - very light grey	N7-6	0.89
1399-120	2145-2160m	A 70% Shale as 1399-119A		0.86, 0.82
		B 30% Mudstone as 1399-119B		0.76
1399-121	2160-2175m	A 70% Shale as 1399-119A		0.73
		B 30% Mudstone as 1399-119B		0.67
1399-122 SWC	2168m	A 98% Shale as 1399-119A		
1399-123 SWC	2175m	A 98% Shale as 1399-119A		0.96
1399-124 SWC	2178m	A 98% Shale fissile, mod. hard, non-calc. medium dark grey	N4	1.00, 0.99
1399-125	2175-2190m	A 98% Shale fissile, mod. hard, non-calc. sl. carbonaceous dark grey	N3	2.79
1399-126 SWC	2184m	A 98% Shale as 1399-125A		4.57
1399-127 SWC	2187m	A 98% Shale as 1399-125A		3.94
1399-128	2190-2205m	A 85% Shale fissile, mod. hard, non-calc. medium dark grey - light grey	N4-7	1.89
		B 15% Mudstone, blocky, soft, non-calc. Minor limestone	5YR4/2	0.40, 0.41
1399-129	2205-2220m	A 60% Shale as 1399-128A		1.46
		B 30% Mudstone as 1399-128B		0.36
		C 10% Walnut shell		

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

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ORGANIC CARBON RESULTS AND GROSS LITHOLOGIC DESCRIPTIONS



GEOCHEM SAMPLE NUMBER	DEPTH	GROSS LITHOLOGIC DESCRIPTION	G S A Colour Code	TOTAL ORGANIC CARBON (Wt. % of Rock)
1399-130 SWC	2220.5m	A 98% Mudstone, sub platy mod. soft	5B7/1	
1399-131	2220-2235m	A 40% Shale as 1399-128A B 30% Claystone grading to marl, blocky, mod. soft, mod. to sl. calc. light grey C 30% Mudstone as 1399-128B	N7	1.19 0.26,0.26 0.26
1399-132	2235-2250m	A 75% Claystone grading to marl, blocky, mod. soft, to sl. calc. light grey B 25% Shale as 1399-128A marl	N7	0.34 0.16
1399-133	2249m	A 98% Shale, subfissile, mod. hard, non- calc. medium dark grey	N4	0.41
1399-134	2256.5m	A 98% Mudstone, sub platy mod. soft, non- calc. olive grey	5Y4/1	0.84
1399-135	2259.5m	A 98% Mudstone, sub platy mod. soft, non- calc. olive grey	5Y4/1	0.99,0.99
1399-136	2250-2265m	A 75% Shale fissile, mod. hard, non-calc. medium dark grey - dark grey B 25% Mudstone grading to marl. sub platy light grey	N4-3 N7	2.45,2.65 0.43
1399-137 SWC	2262m	A 98% Shale as 1399-136A		1.18
1399-138 SWC	2264.5m	A 98% Mudstone, sub-platy, mod. soft, non- calc.	5Y4/1	2.74
1399-139	2268m	A 98% Shale fissile, mod. hard, non-calc dark grey	N3	4.21
1399-140	2271m	A 98% Shale as 1399-139A		4.78
1399-141	2265-2280m	A 98% Shale as 1399-139A		4.89
1399-142 SWC	2277m	A 98% Shale as 1399-139A		4.55,4.97
1399-143 SWC	2280.5m	A 98% Shale, carbonaceous, mod. hard, non-calc. dark grey - greyish black	N3-2	11.50
1399-144 SWC	2282.5m	A 98% Shale as 1399-143A		12.60
1399-145 SWC	2286m	A 98% Shale as 1399-143A		8.46
1399-146	2280-2295m	A 98% Carbonaceous shale, fissile, mod. hard, non-calc. grayish black	N2	10.40
1399-147 SWC	2289m	A 98% Carbonaceous shale as 1399-146A		12.00,12.00
1399-148	2293.5m	A 98% Carbonaceous shale as 1399-146A		18.20
1399-149	2298m	A 98% Carbonaceous shale as 1399-146A		14.90
1399-150	2302m	A 98% Carbonaceous shale as 1399-146A		7.29

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GEOCHEM SAMPLE NUMBER	DEPTH	GROSS LITHOLOGIC DESCRIPTION	G S A Colour Code	TOTAL ORGANIC CARBON (Wt. % of Rock)
1399-151	2295-2310m	A 98% Carbonaceous shale as 1399-146A		9.12
1399-152 SWC	2312.5m	A 98% Shale, fissile, mod. hard, non-calc. medium grey	N5	1.19
1399-153	2311-2314m	A 60% Shale, fissile, mod. hard, non-calc. greyish black - dark grey B 40% Silty mudstone, sub-platy, mod. hard, non-calc. medium dark grey	N2-3 N4	4.25, 4.30 1.34
1399-154	2314-2317m	A 65% Shale, fissile, mod. hard, non-calc. grayish black - dark grey B 35% Silty mudstone, sub-platy, mod. hard, non-calc. medium dark grey	N2-3 N4	3.20 1.22
1399-155	2317-2320m	A 60% Shale as 1399-154A B 40% Mudstone, sl. silty, blocky, mod. hard, non-calc.	5YR4/1	5.43 1.40, 1.42
1399-156 SWC	2321m	A 98% Silty mudstone, subfissile, mod. hard, non-calc.	5Y5/1	0.85
1399-157	2320-2323m	A 60% Silty mudstone, subfissile, mod. hard, non-calc. B 40% Shale, fissile, mod. hard, non-calc., dark grey - medium dark grey	5Y5/1 N3-4	1.31 1.59
1399-158 CORE	2324.00- .05m	A 98% Sandstone, v. fine grained, sub-angular to sub-rounded, well sorted, very light grey	N8	
1399-201	2325.00- .05m	A 98% Sandstone, fine grained, sub-angular to sub-round, well sorted, very light grey	N8	
1399-202	2326.00- .03m	A 98% Sandstone, fine grained, well sorted, rare broken, argillaceous laminae, very light grey	N8	
1399-203	2327.00- .03m	A 98% Sandstone as 1399-202A		
1399-204	2328.20- 28m	A 98% Sandstone, v. fine grained, sub-angular to sub-round, well sorted v. sl. argillaceous light grey	N7	
1399-159 CORE	2329.49- .53m	A 90% Sandstone as 1399-158A B 10% Carbonaceous, mudstone, silty, platy, mod. hard, non-calc. grayish black	N2	4.24,
1399-160	2323-2338m	A 85% Shale, fissile, mod. hard, non-calc., medium dark grey B 15% Sandstone as 1399-158A	N4	
1399-205	2330.70- .80m	A 98% Sandstone, v. fine grained, sub-angular to sub-rounded, well sorted occ broken, argillaceous laminae very light grey	N8	
1399-206	2331.75- .80m	A 98% Sandstone as 1399-205A		

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GEOCHEM SAMPLE NUMBER	DEPTH	GROSS LITHOLOGIC DESCRIPTION	G S A Colour Code	TOTAL ORGANIC CARBON (Wt % of Rock)
1399-207	2332.83- .90m	A 98% Sandstone as 1399-205A		
1399-208	2333.83- .90m	A 98% Sandstone as 1399-205A		
1399-161 CORE	2335.15- .20m	A 98% Sandstone as 1399-158A minor coaly fragments		
1399-209	2336.20- .25m	A 98% Sandstone as 1399-205A		
1399-210	2337.20- .26m	A 98% Sandstone, v. fine grained, sub- angular to sub-rounded, well sorted broken argillaceous partings. very light grey	N8	
1399-211	2338.00- .10m	A 98% Sandstone, v. fine grained, sub- angular to sub-rounded, well sorted broken argillaceous partings. very light grey	N8	
1399-162 CORE	2340.80- .85m	A 98% Sandstone as 1399-158A		
1399-212	2339.00- 2340.00m	A 98% Sandstone, v. fine grained, sub- angular to sub-rounded, well sorted very light grey	N8	
1399-213	2341.80- .85m	A 98% Sandstone, v. fine grained, sub- angular to sub-rounded, mod. well, sorted, argillaceous partings generally broken, very light grey - white	N8-7	
1399-214	2343.88- .92m	A 98% Sandstone as 1399-213A		
1399-163 CORE	2344.20- .24m	A 98% Sandstone, fine grained, sub-rounded to sub-angular, clay matrix	5Y8/1	
1399-215	2345.00- .07m	A 98% Sandstone as 1399-213A		
1399-216	2346.10- .14m	A 98% Sandstone, v. fine grained, sub- angular to sub-rounded, mod. well sorted frequent argillaceous laminae very light yellow - light grey	N8-7	
1399-164 CORE	2347.18- .22m	A 98% Sandstone, v. fine grained, sub- rounded to sub-angular, well sorted, with mud laminae	N8	
1399-165	2338-2353m	A 85% Shale, fissile, mod. hard, non- calc. dark grey - medium dark grey B 10% Sandstone, fine grained, sub-rounded to sub-angular, well sorted, clay matrix in part very light grey C 5% Shale, fissile, mod. hard, non- calc, greyish red	N3-4 N8 5R4/2	1.49, 1.49 0.23

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

TABLE 1
ORGANIC CARBON RESULTS AND GROSS LITHOLOGIC DESCRIPTIONS



GEOCHEM SAMPLE NUMBER	DEPTH	GROSS LITHOLOGIC DESCRIPTION	G S A Colour Code	TOTAL ORGANIC CARBON (Wt. % of Rock)
1399-217	2348.23- .30m	A 98% Sandstone as 1399-216A		
1399-218	2349.31- .40m	A 60% Sandstone, v. fine grained, sub- angular to sub-rounded, well sorted, occ. broken argillaceous partings B 40% Sandstone, coarse grained, sub- rounded to rounded, mudstone, lithoclasts, mod sorted, light grey	N8 N7	
1399-166 CORE	2350.63- .68m	A 98% Sandstone, v. fine grained, sub- angular to sub-round, well sorted, white F, milky Cut, very pale orange	10YR8/2	
1399-219	2351.51- .57m	A 98% Sandstone, v. fine grained, sub- angular to sub-round, well sorted poorly developed, argillaceous laminae white F, milky Cut, pale orange	107R7/2	
1399-220	2352.46- .54m	A 98% Sandstone as 1399-219A white F milky Cut		
1399-221	2353.50- 57m	A 98% Sandstone as 1399-219A white F milky Cut		
1399-167	2354.58- .62m	A 98% Sandstone, v. fine grained, sub- angular to sub-rounded, well sorted white F, milky Cut	10YR7/2	
1399-222	2355.46- .55m	A 98% Sandstone, v. fine grained, sub- angular to sub-rounded, well sorted white F milky Cut	10YR7/2	
1399-223	2356.50- .57m	A 98% Sandstone, v. fine grained, sub- angular to sub-rounded, well sorted poorly developed, argillaceous laminae white F milky Cut	10YR7/2	
1399-168	2357.65- .70m	A 98% Sandstone, v. fine grained, sub- angular to subrounded, well sorted, white F, milky Cut	10YR8/2	
1399-169	2358.94- .99m	A 98% Sandstone, v. fine grained, sub- angular to sub-rounded, well sorted milky Cut. very light grey	N8	
1399-170	2353-2368m	A 70% Shale as 1399-165A B 30% Sandstone, v. fine grained, sub- angular to sub-rounded, well sorted	N8	1.48
1399-224	2360.00- .03m	A 98% Sandstone, v. fine grained, sub- angular to sub-rounded, mod. sorted sl. argillaceous matrix Pale yellow F Milky Cut light grey	N7	
1399-225	2360.92- .60m	A 98% Sandstone as 1399-224A Milky Cut		
1399-226	2361.92- 2362.00m	A 98% Sandstone as 1399-224A Milky Cut		

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



**TABLE 1
ORGANIC CARBON RESULTS AND GROSS LITHOLOGIC DESCRIPTIONS**

GEOCHEM SAMPLE NUMBER	DEPTH	GROSS LITHOLOGIC DESCRIPTION	G S A Colour Code	TOTAL ORGANIC CARBON (Wt. % of Rock)
1399-227	2362.80- .85m	A 98% Sandstone, fine grained, sub-rounded to sub-angular, well sorted, Milky Cut, pale orange	10YR7/2	
1399-228	2363.73- .80m	A 98% Sandstone as 1399-227A Milky Cut		
1399-229	2364.60- .67m	A 98% Sandstone as 1399-277A Milky Cut		
1399-171	2365.66- .71m	A 98% Sandstone, v. fine grained, sub-angular to sub-rounded, well sorted, milky Cut. very light grey	N8	
1399-230	2366.72- .78m	A 98% Sandstone as 1399-227A Milky Cut		
1399-231	2368.80- .87m	A 98% Sandstone, fine grained, subrounded to subangular, well sorted, Milky cut, pale orange	10YR7/2	
1399-232	2369.90- .95m	A 98% Sandstone as 1399-231A weak Milky Cut		
1399-172	2370.95- 2371.00m	A 98% Sandstone, v. fine grained, sub-rounded to sub-angular, well sorted Milky Cut. very light grey	N8	
1399-233	2372.00- .04m	A 98% Sandstone, fine grained, sub-angular to sub-rounded, well sorted Milky Cut	10YR7/2	
1399-234	2372.95- .00m	A 98% Sandstone as 1399-233A milky Cut		
1399-235	2373.80- .84m	A 98% Sandstone as 1399-233A milky Cut		
1399-236	2374.70- .74m	A 98% Sandstone as 1399-233A milky Cut		
1399-237	2375.57- .63m	A 98% Sandstone as 1399-233A milky Cut		
1399-238	2376.50 .55m	A 98% Sandstone as 1399-233A milky Cut		
1399-173	2377.55- .60m	A 98% Sandstone, v. fine grained, sub-angular to sub-rounded, well sorted Milky Cut, very light grey	N8	
1399-174	2368-2383m	A 90% Shale, fissile, mod. hard, non-calc. very light grey B 10% Sandstone, v. fine grained, sub-angular to sub-rounded, well sorted white F milky Cut, dark grey to medium dark grey - minor red shale	N3-4 N8	0.98
1399-239	2378.50- .56m	A 98% Sandstone, fine grained, sub-angular to sub-rounded, well sorted milky Cut	10YR7/2	

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

TABLE 1
ORGANIC CARBON RESULTS AND GROSS LITHOLOGIC DESCRIPTIONS



GEOCHEM SAMPLE NUMBER	DEPTH	GROSS LITHOLOGIC DESCRIPTION	G S A Colour Code	TOTAL ORGANIC CARBON (Wt. % of Rock)
1399-240	2379.50- .57m	A 98% Sandstone as 1399-239A milky Cut	10YR7/2	
1399-241	2380.50- .58m	A 98% Sandstone as 1399-239A milky Cut	10YR7/2	
1399-242	2381.47- .53m	A 98% Sandstone as 1399-239A milky Cut	10YR7/2	
1399-243	2382.52- .58m	A 98% Sandstone, fine grained, sub-angular to sub-rounded, well sorted milky Cut, very light grey	N8-10YR7/2	
1399-244	2383.51- .60m	A 98% Sandstone, fine grained, sub-angular to sub-rounded, well sorted, milky Cut	10YR7/2- 10YR6/2	
1399-245	2384.50- .56m	A 98% Sandstone as 1399-244A milky Cut		
1399-246	2385.50- .58m	A 98% Sandstone as 1399-244A milky Cut		
1399-175	2386.52- .57m	A 98% Sandstone, fine grained, sub-angular to sub-rounded, well sorted, white F, Milky Cut	10YR4/2	
1399-176	2382-2397m	A 90% Shale as 1399-174A B 5% Sandstone, fine grained, sub-rounded to sub-angular, well sorted very light grey C 5% Shale, fissile, mod. hard, none calc.	N8 5R4/2	0.99 0.25
1399-247	2386.60- .76m	A 98% Sandstone, fine grained, sub-angular to sub-rounded, well sorted White F milky Cut	10YR3/2	
1399-248	2388.63- .70m	A 98% Sandstone fine grained, sub-angular to sub-rounded, well sorted white F milky Cut	10YR7/2	
1399-249	2389.60- .65m	A 98% Sandstone as 1399-248A white F milky Cut		
1399-250	2390.60- .66m	A 98% Sandstone, v. fine grained, sub angular to sub-rounded, well sorted white F milky Cut	10YR5/2	
1399-251	2391.50- .57m	A 98% Sandstone as 1399-250A white F milky Cut		
1399-252	2392.60- .69m	A 98% Sandstone, fine to med. grained, sub-angular to sub-rounded containing shell debris, sorted white F milky Cut	10YR7/2	
1399-177 CORE	2393.65- .70m	A 98% Sandstone, fine to med. grained, sub-angular to sub-rounded, mod sorted white F, milky Cut	10YR4/2	

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

TABLE 1
ORGANIC CARBON RESULTS AND GROSS LITHOLOGIC DESCRIPTIONS



GEOCHEM SAMPLE NUMBER	DEPTH	GROSS LITHOLOGIC DESCRIPTION	G S A Colour Code	TOTAL ORGANIC CARBON (Wt. % of Rock)
1399-253	2394.72-.79m	A 98% Sandstone, fossiliferous, med. to coarse grained, sub-angular to sub-rounded, mod. sorted, white F milky Cut	10YR7/2	
1399-178	2395.70-.75m	A 90% Sandstone, fine to med. grained, sub-angular to sub-rounded, mod. sorted white F milky Cut B 10% Sandstone, mod. hard grayish black - dark grey	10YR7/2 N2-3	
1399-254	2396.70-.75m	A 98% Sandstone as 1399-253A white F milky Cut		
1399-255	2397.38-.43m	A 98% Sandstone, v. fine grained, sub-angular to sub-rounded, mod. sorted, sl. micaceous with argill/micaceous partings. light grey	N7	
1399-179	2398.01-.05m	A 98% Sandstone sl. micaceous fine grained, sub-angular to sub-rounded, mod. sorted, pale yellow F, milky Cut light grey	N7	
1399-256	2398.90-.94m	A 98% Sandstone, v. fine grained, sub-angular to sub-rounded, well sorted very light grey	N8	
1399-180	2397-2417m	A 65% Sandstone, sl. micaceous fine to med, grained, mod. sorted Pale yellow F milky Cut B 35% Shale, fissile, mod. hard, non-calc. dark grey - medium dark grey	107R8/2 N3-4	1.33, 1.37
1399-181 SWC	2414m	A 98% Sandstone, v. fine grained, well sorted, milky Cut, sl. micaceous	N9	
1399-182	2412-2427m	A 65% Sandstone, fine to med. grained, sub-angular to sub-rounded, mod. sorted milky cut, very light grey B 25% Shale, fissile, mod. hard, non-calc medium dark grey C 10% Carbonaceous shale, fissile, mod. hard, non-calc. black	N8-10YR8/2 N4 N1	1.35 17.70
1399-183 SWC	2426m	A 98% Sandstone, v. fine grained, sub-angular to sub-rounded, Pale yellow F, milky Cut,	5Y8/1	
1399-184 SWC	2432m	A 95% Sandstone as 1399-183A Pale yellow F, milky Cut B 5% Siltstone, sl. arenaceous, sub platy, mod hard, non-calc.	5Y5/1	1.46
1399-185	2427-2442m	A 90% Sandstone, fine grained, sub-rounded to sub-angular, fairly well sorted, Pale yellow F, milky C, very light grey. B 10% Shale, fissile, mod. hard, non-calc. dark grey	N8 N3	

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

TABLE 1
ORGANIC CARBON RESULTS AND GROSS LITHOLOGIC DESCRIPTIONS



GEOCHEM SAMPLE NUMBER	DEPTH	GROSS LITHOLOGIC DESCRIPTION	G S A Colour Code	TOTAL ORGANIC CARBON (Wt. % of Rock)
1399-186 SWC	2449m	A 98% Sandstone, v. fine grained, sub-rounded to sub-angular, mod. sorted, sl. argillaceous, coaly fragments, light grey - very light grey	N7-8	
1399-187	2442-2457m	A 70% Sandstone, v. fine grained, sub-angular to sub-rounded, mod to fairly well sorted, very light grey	N8	
		B 10% Siltstone, sub-platy, mod. hard, non-calc, light grey	N7	1.08
		C 10% Shale, fissile, mod. hard, non-calc medium grey	N5	0.92
		D 10% Carbonaceous, shale, subfissile, mod. hard, non-calc. greyish black	N2	22.9
1399-188 SWC	2460m	A 98% Sandstone unconsolidated, fine to mod grained, sub-angular to sub-rounded, mod. sorted white	N9	
1399-189	2457-2472m	A 60% Sandstone, fine grained, sub-angular to sub-rounded, fairly well sorted very light grey - white	N8-9	
		B 40% Shale, fissile, mod. hard, non-calc dark grey, min siltstone, carbonaceous shale	N3	1.33, 1.29
1399-190	2472-2487m	A 85% Sandstone as 1399-189A B 15% Shale as 1399-189B		1.70
1399-191	2487-2502m	A 70% Sandstone, unconsolidated in part, fine grained, sub-angular to sub-rounded, mod sorted, white	N9	
		B 20% Carbonaceous shale, subfissile, mod hard, non-calc. greyish black	N2	48.4
		C 10% Shale, fissile, mod. hard, non-calc dark grey - medium dark grey	N3-4	1.39
1399-192	2502-2517m	A 70% Sandstone, fine to med. grained, sub-angular to sub-rounded, fairly well sorted, very light grey	N8-10YR8/2	
		B 20% Shale, fissile, mod. hard, non-calc dark grey	N3	1.38, 1.40
		C 10% Silty mudstone, platy, mod soft, non-calc, light grey	N7	0.68
1399-193 SWC	2503.5m	A 98% Sandstone, sl argill, v. fine grained sub-rounded, mod. sorted, very light grey	N8	
1399-194 SWC	2512.5m	A 98% Sandstone, argill, v. fine grained, mod. sorted. very light grey	N8	0.46
1399-195 SWC	2518m	A 98% Siltstone, sl. arenaceous, poorly laminated, mod. soft, non-calc. medium grey	N5	1.21

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

TABLE 1
ORGANIC CARBON RESULTS AND GROSS LITHOLOGIC DESCRIPTIONS



GEOCHEM SAMPLE NUMBER	DEPTH	GROSS LITHOLOGIC DESCRIPTION	G S A Colour Code	TOTAL ORGANIC CARBON (Wt % of Rock)
1399-196	2517-2532m	A 70% Sandstone sl. argill, v. fine grained sl. micaceous, mod sorted, very light grey	N8-10YR8/2	
		B 20% Siltstone, sub-platy, mod. soft non-calc, light grey	N7	1.10
		C 10% Shale subfissile, mod. hard, non-calc dark grey	N3	1.11
1399-197 SWC	2534m	A 98% Mudstone, sl. silty, platy, mod. soft, non-calc. light grey	N7	0.74
1399-198	2532-2539m	A 60% Sandstone as 1399-196A		
		B 30% Mudstone, silty in parts, sub- platy, mod. soft, non-calc light grey - very light grey	N7-8	0.65
		C 5% Shale, subfissile, mod. soft, non-calc.	5GY6/1	0.48
		D 5% Shale as 1399-196C		1.02
1399-199	2358m	FMT sample run # 5		
1399-200	2355m	FMT sample run #4		

TABLE 2A
CONCENTRATION (μ L GAS/KG ROCK) OF C₁ - C₇ HYDROCARBONS IN HEAD SPACE GAS

GEOCHEM SAMPLE NUMBER	DEPTH	C ₁ Methane	C ₂ Ethane	C ₃ Propane	iC ₄ Isobutane	nC ₄ Butane	TOTAL C ₁ - C ₄	TOTAL C ₂ - C ₄	% GAS WETNESS	TOTAL C ₅ - C ₇	$\frac{iC_4}{nC_4}$
1399-011	605-620	91906	358	302	129	126	92821	915	1.0	159	1.02
1399-017	695-710	40708	82	78	18	65	40951	243	0.6	79	0.28
1399-024	800-825	31086	393	405	198	187	32269	1183	3.7	198	1.06
1399-031	905-920	55045	1092	505	140	146	56928	1883	3.3	276	0.96
1399-034	950-965	11477	540	639	208	329	13193	1716	13.0	186	0.63
1399-036	980-995	28884	5104	5489	707	1023	41207	12323	29.9	245	0.69
1399-037	995-1010	30355	3945	4494	693	1020	40507	10152	25.1	177	0.68
1399-038	1010-1025	9839	296	475	574	343	11527	1688	14.6	660	1.67
1399-039	1025-1035	28598	1587	1537	231	284	32237	3639	11.3	98	0.81
1399-040	1035-1050	25690	835	634	91	131	27381	1691	6.2	24	0.69
1399-041	1050-1065	67718	1981	1586	181	188	71654	3936	5.5	167	0.96
1399-042	1065-1080	30364	588	345	92	84	31473	1109	3.5	36	1.10
1399-043	1080-1095	16982	220	99	18	15	17334	352	2.0	14	1.20
1399-044	1095-1110	40252	781	418	90	56	41597	1345	3.2	55	1.61
1399-045	1110-1125	44749	823	575	296	295	46738	1989	4.3	17	1.00
1399-046	1125-1140	45480	547	431	201	169	46828	1348	2.9	61	1.19
1399-047	1140-1155	13506	369	424	354	357	15010	1504	10.0	66	0.99
1399-048	1155-1170	28322	485	430	150	179	29566	1244	4.2	109	0.84
1399-049	1170-1185	20994	335	204	201	148	21882	888	4.1	109	1.36
1399-050	1185-1200	32107	403	439	263	213	33425	1318	3.9	43	1.23
1399-051	1200-1215	38198	473	426	375	272	39744	1546	3.9	235	1.38
1399-052	1215-1230	35295	485	368	901	464	37513	2218	5.9	125	1.94
1399-053	1230-1245	23225	253	157	200	126	23961	736	3.1	72	1.59
1399-054	1245-1260	14933	259	74	193	151	15610	677	4.3	60	1.28
1399-055	1260-1275	36887	636	653	238	145	38559	1672	4.3	357	1.64
1399-056	1275-1290	15261	338	342	126	115	16182	921	5.7	122	1.10
1399-057	1290-1305	52754	1777	1756	120	459	56866	4112	7.2	32	0.26
1399-058	1305-1320	96411	3111	5709	211	945	106387	9976	9.4	215	0.22
1399-059	1320-1335	115842	1202	1468	214	600	119326	3484	2.9	172	0.36
1399-060	1335-1350	183361	8718	7743	15	732	200569	17208	8.6	327	0.02



TABLE 2A
CONCENTRATION (μ L GAS/KG ROCK) OF C₁ - C₇ HYDROCARBONS IN HEAD SPACE GAS

GEOCHEM SAMPLE NUMBER	DEPTH	C ₁ Methane	C ₂ Ethane	C ₃ Propane	iC ₄ Isobutane	nC ₄ Butane	TOTAL C ₁ - C ₄	TOTAL C ₂ - C ₄	% GAS WETNESS	TOTAL C ₅ - C ₇	$\frac{iC_4}{nC_4}$
1399-062	1365-1380	204427	4612	4176	403	708	214326	9899	4.6	310	0.57
1399-063	1380-1395	32808	867	1049	33	153	34910	2102	6.0	6	0.22
1399-064	1395-1410	44086	1585	1073	87	311	47142	3056	6.5	14	0.28
1399-065	1410-1425	940782	8531	4949	459	3946	958667	17885	1.9	579	0.12
1399-066	1425-1440	111563	2750	3099	346	1604	119362	7799	6.5	147	0.22
1399-067	1440-1455	85753	1302	1097	78	503	88733	2980	3.4	60	0.16
1399-068	1455-1470	96170	2265	1497	117	435	100484	4314	4.3	27	0.27
1399-069	1470-1485	56190	3445	1209	76	414	61334	5144	8.4	64	0.18
1399-070	1485-1500	63585	2144	1498	124	248	67599	4014	5.9	233	0.50
1399-071	1500-1515	78129	3211	2712	222	746	85020	6891	8.1	98	0.30
1399-072	1515-1530	260538	14689	23008	1494	2084	301813	41275	13.7	852	0.72
1399-073	1530-1545	199731	6230	5111	945	1819	213836	14105	6.6	79	0.52
1399-074	1545-1560	60538	2901	1917	154	255	65765	5227	7.9	60	0.60
1399-075	1560-1575	116520	5119	5606	357	891	128493	11973	9.3	71	0.40
1399-076	1575-1590	152888	13924	6727	778	2115	176432	23544	13.3	273	0.37
1399-077	1590-1605	88718	4178	3477	335	798	97506	8788	9.0	138	0.42
1399-078	1605-1620	34281	1184	976	545	206	37192	2911	7.8	69	2.65
1399-079	1620-1635	45009	1582	1353	613	314	48871	3862	7.9	101	1.95
1399-080	1635-1650	26125	753	470	235	78	27661	1536	5.6	73	3.01
1399-081	1650-1665	13774	796	552	120	67	15309	1535	10.0	140	1.79
1399-082	1665-1680	17950	854	477	200	95	19576	1626	8.3	121	2.11
1399-083	1680-1695	13623	976	389	131	74	15193	1570	10.3	58	1.77
1399-084	1695-1710	16267	983	748	255	169	18422	2155	11.7	197	1.51
1399-085	1710-1725	9507	460	291	69	48	10375	868	8.4	99	1.44
1399-086	1725-1740	14493	976	343	88	115	16015	1522	9.5	57	0.77
1399-087	1740-1755	13090	699	360	107	46	14302	1212	8.5	132	2.33
1399-088	1755-1770	15021	1190	808	237	364	17620	2599	14.8	202	0.65
1399-089	1770-1785	21581	1925	1201	259	223	25189	3608	14.3	334	1.16
1399-090	1785-1800	13560	1142	586	94	46	15428	1868	12.1	153	2.04
1399-091	1800-1815	29724	3805	711	104	38	34382	4658	13.5	101	2.74



TABLE 2A
CONCENTRATION (μ L GAS/KG ROCK) OF C₁ - C₇ HYDROCARBONS IN HEAD SPACE GAS

GEOCHEM SAMPLE NUMBER	DEPTH	C ₁ Methane	C ₂ Ethane	C ₃ Propane	iC ₄ Isobutane	nC ₄ Butane	TOTAL C ₁ - C ₄	TOTAL C ₂ - C ₄	% GAS WETNESS	TOTAL C ₅ - C ₇	$\frac{iC_4}{nC_4}$
1399-092	1815-1830	234346	84595	61456	1488	8752	390637	156291	40.0	1711	0.17
1399-093	1830-1845	89887	33145	37645	1362	10670	172709	82822	48.0	968	0.13
1399-094	1845-1860	65892	30572	32611	938	8279	138292	72400	52.4	612	0.11
1399-095	1860-1875	52428	16310	13755	455	3894	86842	34414	39.6	388	0.12
1399-096	1875-1890	102697	29458	27245	792	3948	164140	61443	37.4	460	0.20
1399-097	1890-1905	148596	42528	51440	1687	7879	252130	103534	41.1	853	0.21
1399-098	1905-1920	85984	21572	25299	775	3224	136854	50870	37.2	364	0.24
1399-099	1920-1935	91748	29097	35777	1078	4934	162634	70886	43.6	625	0.22
1399-101	1935-1950	165715	57214	74430	2250	9602	309211	143496	46.4	1027	0.23
1399-102	1950-1965	150674	50619	66991	2176	9771	280231	129557	46.2	855	0.22
1399-103	1965-1980	85999	29805	28095	867	3915	148681	62682	42.2	417	0.22
1399-105	1980-1995	93239	40563	66055	2434	12897	215188	121949	56.7	1223	0.19
1399-106	1995-2010	22457	5646	8969	1948	2791	41811	19354	46.3	1392	0.70
1399-107	2010-2025	24985	5739	7471	1616	2484	42295	17310	40.9	1448	0.65
1399-108	2025-2040	33445	8157	11253	2670	4078	59603	26158	43.9	1871	0.65
1399-109	2040-2055	45126	10415	12553	2708	3915	74717	29591	39.6	1965	0.69
1399-112	2055-2070	19251	4509	5302	1226	1593	31881	12630	39.6	676	0.77
1399-113	2070-2085	25659	6026	4490	642	910	37727	12068	32.0	256	0.71
1399-115	2085-2100	14525	4684	4523	905	1028	25665	11140	43.4	40	0.88
1399-116	2100-2115	12364	4066	2935	532	575	20472	8108	39.6	201	0.93
1399-118	2115-2130	12207	4487	3395	587	711	21387	9180	42.9	399	0.83
1399-119	2130-2145	13141	10175	7333	986	1253	32888	19747	60.0	1154	0.79
1399-120	2145-2160	9502	5653	3169	297	346	18967	9465	49.9	137	0.86
1399-121	2160-2175	9460	6071	3792	409	563	20295	10835	53.4	220	0.73
1399-125	2175-2190	86962	25365	6485	221	424	119457	32495	27.2	147	0.52
1399-128	2190-2205	37444	15150	6083	291	688	59656	22212	37.2	372	0.42
1399-129	2205-2220	29755	11902	173	306	574	42710	12955	30.3	327	0.53
1399-131	2220-2235	32964	7788	2769	357	599	44477	11513	25.9	341	0.60
1399-132	2235-2250	11926	4014	2527	330	831	19628	7702	39.2	402	0.40
1399-136	2250-2265	30171	18180	18364	2167	5675	74557	44386	59.5	1878	0.38



TABLE 2A
CONCENTRATION (μ L GAS/KG ROCK) OF C₁ - C₇ HYDROCARBONS IN HEAD SPACE GAS

GEOCHEM SAMPLE NUMBER	DEPTH	C ₁ Methane	C ₂ Ethane	C ₃ Propane	iC ₄ Isobutane	nC ₄ Butane	TOTAL C ₁ - C ₄	TOTAL C ₂ - C ₄	% GAS WETNESS	TOTAL C ₅ - C ₇	$\frac{iC_4}{nC_4}$
1399-141	2265-2280	10243	63299	81483	10693	32081	197799	187556	94.8	10628	0.33
1399-146	2280-2295	78914	54266	51296	7769	21741	213986	135072	63.1	5492	0.36
1399-151	2295-2310	655655	216970	259190	29542	85841	1247198	591543	47.4	23641	0.34
1399-153	2311-2314	67478	24214	36846	5192	15646	149376	81898	54.8	5250	0.33
1399-154	2314-2317	92781	55393	73653	6101	26413	254341	161560	63.5	5511	0.23
1399-155	2317-2320	79305	42700	51311	4189	18124	195629	116324	59.5	4091	0.23
1399-157	2320-2323	73934	26199	30352	2885	11231	144601	70667	48.9	2699	0.26
1399-160	2323-2338	54521	15428	10704	606	3170	84429	29908	35.4	781	0.19
1399-165	2338-2353	22741	6825	4502	247	1253	35568	12827	36.1	364	0.20
1399-170	2353-2368	44382	18528	11284	988	3136	78318	33936	43.3	933	0.32
1399-174	2368-2383	28326	11059	6769	681	1963	48798	20472	42.0	652	0.35
1399-176	2382-2397	45358	15020	8029	612	1829	70848	25490	36.0	578	0.33
1399-180	2397-2412	60133	13916	7135	662	1731	83577	23444	28.1	538	0.38
1399-182	2412-2427	375048	68410	19168	966	2432	466024	90976	19.5	497	0.40
1399-185	2427-2442	42409	17613	15289	2601	5516	83428	41019	49.2	2237	0.47
1399-187	2442-2457	205111	42892	15262	855	2126	266246	61135	23.0	406	0.40
1399-189	2457-2472	155012	35125	11632	606	1302	203677	48665	23.9	223	0.47
1399-190	2472-2487	132154	25421	10745	870	1557	170747	38593	22.6	370	0.56
1399-191	2487-2502	52884	15635	7331	396	951	77197	24313	31.5	179	0.42
1399-192	2502-2517	49076	17652	7253	415	848	75244	26168	34.8	180	0.49
1399-196	2517-2532	45570	24917	13034	907	1873	86301	40731	47.2	503	0.48
1399-198	2532-2539	21202	22463	23824	3250	4766	75505	54303	71.9	1114	0.68



TABLE 2B
CONCENTRATION (μ L GAS/KG ROCK) OF C₁ - C₇ HYDROCARBONS IN CUTTINGS GAS

GEOCHEM SAMPLE NUMBER	DEPTH	C ₁ Methane	C ₂ Ethane	C ₃ Propane	iC ₄ Isobutane	nC ₄ Butane	TOTAL C ₁ - C ₄	TOTAL C ₂ - C ₄	% GAS WETNESS	TOTAL C ₅ - C ₇	$\frac{iC_4}{nC_4}$
1399-011	605-620	17582	128	617	265	300	18892	1310	6.9	609	0.88
1399-017	695-710	8089	67	319	278	215	8968	879	9.8	438	1.29
1399-024	800-825	12775	269	263	516	950	14773	1998	13.5	324	0.54
1399-031	905-920	7941	635	413	228	193	9410	1469	15.6	377	1.18
1399-034	950-965	6600	1018	402	401	462	8883	2283	25.7	751	0.87
1399-036	980-995	12138	3524	9966	2456	4580	32664	20526	62.8	1890	0.54
1399-037	995-1010	6614	1198	3942	1352	2786	15892	9278	58.4	1344	0.49
1399-038	1010-1025	5454	894	3644	1258	2705	13955	8501	60.9	1284	0.47
1399-039	1025-1035	7015	894	2925	730	1431	12995	5980	46.0	1005	0.51
1399-040	1035-1050	5221	448	1152	435	541	7797	2576	33.0	338	0.80
1399-041	1050-1065	8262	881	1565	539	610	11857	3595	30.3	44	0.88
1399-042	1065-1080	10159	1638	1065	457	383	13702	3543	25.9	427	1.19
1399-043	1080-1095	7496	511	1041	677	753	10478	2982	28.5	713	0.90
1399-044	1095-1110	15491	810	1198	470	295	18264	2773	15.2	511	1.59
1399-045	1110-1125	12634	1046	1301	834	744	16559	3925	23.7	1030	1.12
1399-046	1125-1140	21589	7067	1962	943	907	32468	10879	33.5	674	1.04
1399-047	1140-1155	4470	793	271	45	53	5632	1162	20.6	406	0.85
1399-048	1155-1170	7493	1155	842	112	129	9731	2238	23.0	803	0.87
1399-049	1170-1185	18152	342	547	39	391	19471	1319	6.8	508	0.10
1399-050	1185-1200	16261	1067	1068	458	395	19249	2988	15.5	802	1.16
1399-051	1200-1215	16757	1396	4328	701	607	23789	7032	29.6	913	1.15
1399-052	1215-1230	10996	388	493	207	121	12205	1209	9.9	275	1.71
1399-053	1230-1245	20645	1115	1096	840	644	24340	3695	15.2	550	1.30
1399-054	1245-1260	9981	273	432	245	141	11072	1091	9.9	269	1.74
1399-055	1260-1275	130785	8746	12272	8014	7248	167065	36280	21.7	9530	1.11
1399-056	1275-1290	21761	3901	5472	540	3621	35295	13534	38.3	993	0.15
1399-057	1290-1305	34328	7249	8437	1430	5355	56799	22471	39.6	887	0.27
1399-058	1305-1320	39996	4222	7621	709	6473	59021	19025	32.2	1304	0.11
1399-059	1320-1335	53735	1481	3717	312	1569	60814	7079	11.6	630	0.20
1399-060	1335-1350	34124	2469	3288	344	2915	43140	9016	20.9	1075	0.12



TABLE 2B
CONCENTRATION (μ L GAS/KG ROCK) OF C₁ - C₇ HYDROCARBONS IN CUTTINGS GAS

GEOCHEM SAMPLE NUMBER	DEPTH	C ₁ Methane	C ₂ Ethane	C ₃ Propane	iC ₄ Isobutane	nC ₄ Butane	TOTAL C ₁ - C ₄	TOTAL C ₂ - C ₄	% GAS WETNESS	TOTAL C ₅ - C ₇	$\frac{iC_4}{nC_4}$
1399-062	1365-1380	81268	4660	12097	1014	4825	103864	22596	21.8	1243	0.21
1399-063	1380-1395	26777	1369	3175	383	972	32676	5899	18.1	279	0.39
1399-064	1395-1410	13446	873	1554	151	520	16544	3098	18.7	207	0.29
1399-065	1410-1425	209143	8825	14131	795	5970	238864	29721	12.4	1103	0.13
1399-066	1425-1440	28462	1812	2123	450	482	33329	4867	14.6	291	0.93
1399-067	1440-1455	38989	1253	2941	203	1372	44758	5769	12.9	367	0.15
1399-068	1455-1470	18614	3690	4307	300	2191	29102	10488	36.0	143	0.14
1399-069	1470-1485	11504	2042	2953	184	965	17648	6144	34.8	79	0.19
1399-070	1485-1500	15419	1407	4329	376	1460	22991	7572	32.9	303	0.26
1399-071	1500-1515	16411	4470	9464	655	3026	34026	17615	51.8	389	0.22
1399-072	1515-1530	18837	3963	10893	1574	5100	40367	21530	53.3	602	0.31
1399-073	1530-1545	26507	2758	6445	746	2034	38490	11983	31.1	659	0.37
1399-074	1545-1560	24003	2592	6280	800	3115	36790	12787	34.8	378	0.26
1399-075	1560-1575	30079	4863	14138	1287	3991	54358	24279	44.7	700	0.32
1399-076	1575-1590	33463	10602	15466	1147	4571	65249	31786	48.7	743	0.25
1399-077	1590-1605	34330	4514	15213	849	3777	58683	24353	41.5	906	0.22
1399-078	1605-1620	5888	1007	1681	655	425	9656	3768	39.0	434	1.54
1399-079	1620-1635	5361	998	1981	554	622	9516	4155	43.7	655	0.89
1399-080	1635-1650	11268	973	1263	753	743	15000	3732	24.9	268	1.01
1399-081	1650-1665	3892	617	797	427	355	6088	2196	36.1	152	1.20
1399-082	1665-1680	3161	520	1003	658	427	5769	2608	45.2	152	1.54
1399-083	1680-1695	2865	669	1078	461	394	5467	2602	47.6	213	1.17
1399-084	1695-1710	3449	891	1596	508	350	6794	3345	49.2	191	1.45
1399-085	1710-1725	4301	777	908	327	289	6602	2301	34.9	201	1.13
1399-086	1725-1740	5782	1139	1410	325	533	9189	3407	37.1	127	0.61
1399-087	1740-1755	7733	1809	1106	323	357	11328	3595	31.7	380	0.90
1399-088	1755-1770	4175	967	1246	507	349	7244	3069	42.4	365	1.45
1399-089	1770-1785	2441	569	845	186	233	4274	1833	42.9	356	0.80
1399-090	1785-1800	6918	1573	1774	290	511	11066	4148	37.5	223	0.57
1399-091	1800-1815	6435	4790	2595	210	38	14068	7633	54.3	564	5.53



TABLE 2B
CONCENTRATION (μ L GAS/KG ROCK) OF C₁ - C₇ HYDROCARBONS IN CUTTINGS GAS

GEOCHEM SAMPLE NUMBER	DEPTH	C ₁ Methane	C ₂ Ethane	C ₃ Propane	iC ₄ Isobutane	nC ₄ Butane	TOTAL C ₁ - C ₄	TOTAL C ₂ - C ₄	% GAS WETNESS	TOTAL C ₅ - C ₇	$\frac{iC_4}{nC_4}$
1399-092	1815-1830	35738	34501	77993	1989	25444	175665	139927	79.7	1674	0.08
1399-093	1830-1845	34725	19862	39774	1324	22988	118673	83948	70.7	3169	0.06
1399-094	1845-1860	30022	22683	49160	1455	20855	124175	94153	75.8	2144	0.07
1399-095	1860-1875	24632	21047	33487	1019	11964	92149	67517	73.3	916	0.09
1399-096	1875-1890	46600	35682	92866	3830	20433	199411	152811	76.6	1891	0.19
1399-097	1890-1905	61772	62009	142463	3902	30366	300512	238740	79.4	2268	0.13
1399-098	1905-1920	50423	43665	96813	2379	16740	210020	159597	76.0	1168	0.14
1399-099	1920-1935	29499	29294	70088	1745	14486	145112	115613	79.7	1103	0.12
1399-101	1935-1950	12697	16388	45626	1255	9300	85266	72569	85.1	949	0.13
1399-102	1950-1965	32346	31439	7693	1874	15278	88630	56284	63.5	1170	0.12
1399-103	1965-1980	73528	66885	155509	4637	33433	333992	260464	78.0	2428	0.14
1399-105	1980-1995	22136	19612	67522	2521	27738	139529	117393	84.1	2624	0.09
1399-106	1995-2010	11989	3472	10335	2474	6092	34362	22373	65.1	2923	0.41
1399-107	2010-2025	6991	3078	5574	1668	3162	20473	13482	65.9	2017	0.53
1399-108	2025-2040	473330	15245	34676	11444	23337	558032	84702	15.2	13635	0.49
1399-109	2040-2055	13854	5268	14134	3548	7867	44671	30817	69.0	4189	0.45
1399-112	2055-2070	8392	6036	12292	2392	4549	33661	25269	75.1	1597	0.53
1399-113	2070-2085	12186	8906	19250	3895	7095	51332	39146	76.3	2347	0.55
1399-115	2085-2100	11604	7087	12284	2327	4965	38267	26663	69.7	2124	0.47
1399-116	2100-2115	7422	5573	7518	1319	2568	24400	16978	69.6	1090	0.51
1399-118	2115-2130	5729	4722	6931	1209	2623	21214	15485	73.0	1070	0.46
1399-119	2130-2145	754	1393	2396	420	703	5666	4912	86.7	409	0.60
1399-120	2145-2160	767	1035	1494	169	548	4013	3246	80.9	218	0.31
1399-121	2160-2175	3793	6607	8361	575	1820	21156	17363	82.1	685	0.32
1399-125	2175-2190	137197	127576	59535	1990	6311	332609	195412	58.8	1490	0.32
1399-128	2190-2205	17755	23253	21905	937	4315	68165	50410	74.0	1093	0.22
1399-129	2205-2220	8209	10898	8798	681	1478	30064	21855	72.7	570	0.46
1399-131	2220-2235	8758	4337	3122	560	1340	18117	9359	51.7	904	0.42
1399-132	2235-2250	5332	3512	4703	687	2305	16539	11207	67.8	1393	0.30
1399-136	2250-2265	23441	14986	30719	6505	21640	97291	73850	75.9	12488	0.30



TABLE 2B
CONCENTRATION (μ L GAS/KG ROCK) OF C₁ - C₇ HYDROCARBONS IN CUTTINGS GAS

GEOCHEM SAMPLE NUMBER	DEPTH	C ₁ Methane	C ₂ Ethane	C ₃ Propane	iC ₄ Isobutane	nC ₄ Butane	TOTAL C ₁ - C ₄	TOTAL C ₂ - C ₄	% GAS WETNESS	TOTAL C ₅ - C ₇	$\frac{iC_4}{nC_4}$
1399-141	2265-2280	175628	116942	291452	71509	238790	894321	718693	80.4	111490	0.30
1399-146	2280-2295	99849	89203	243400	40493	125755	598700	498851	83.3	40937	0.32
1399-151	2295-2310	209241	200255	561416	94846	302073	1367831	1158590	84.7	98204	0.31
1399-153	2311-2314	130420	49969	181519	45514	164060	571482	441062	77.2	84354	0.28
1399-154	2314-2317	120982	64990	180307	26324	139205	531808	410826	77.3	48155	0.19
1399-155	2317-2320	100324	58414	144684	21221	11236	335879	235555	70.1	40691	1.89
1399-157	2320-2323	135169	66470	153915	23599	114871	494024	358855	72.6	14767	0.21
1399-160	2323-2338	24325	16116	25837	3624	15284	85186	60861	71.4	6081	0.24
1399-165	2338-2353	29896	18335	22084	1897	10450	82662	52766	63.8	3557	0.18
1399-170	2353-2368	52359	17127	30970	6592	17017	124065	71706	57.8	11203	0.39
1399-174	2368-2383	26118	21930	28271	3732	14001	94052	67934	72.2	5647	0.27
1399-176	2382-2397	22181	13955	17991	2375	8910	65412	43231	66.1	3593	0.27
1399-180	2397-2412	20709	9926	8165	1222	3661	43683	22974	52.6	1749	0.33
1399-182	2412-2427	274341	273706	174938	10771	37087	770843	496502	64.4	6940	0.29
1399-185	2427-2442	38946	24104	23824	3871	9760	100505	61559	61.2	4491	0.40
1399-187	2442-2457	147222	96304	45958	2204	9550	301238	154016	51.1	1812	0.23
1399-189	2457-2472	139333	133824	65103	2248	10705	351213	211880	60.3	1538	0.21
1399-190	2472-2487	133085	119965	58194	17392	10366	339002	205917	60.7	1458	1.68
1399-191	2487-2502	195938	99703	38472	1950	5821	341884	145946	42.7	1048	0.33
1399-192	2502-2517	47602	36734	26619	2758	9034	122747	75145	61.2	4108	0.31
1399-196	2517-2532	17659	24308	34178	2447	9752	88344	70685	80.0	1924	0.25
1399-198	2532-2539	4107	9465	17362	1413	9559	41906	37799	90.2	1565	0.15



TABLE 2C
TOTAL CONCENTRATION (μ L GAS/KG ROCK) OF C₁ - C₇ HYDROCARBONS (A + B)

GEOCHEM SAMPLE NUMBER	DEPTH	C ₁ Methane	C ₂ Ethane	C ₃ Propane	iC ₄ Isobutane	nC ₄ Butane	TOTAL C ₁ - C ₄	TOTAL C ₂ - C ₄	% GAS WETNESS	TOTAL C ₅ - C ₇	$\frac{iC_4}{nC_4}$
1399-011	605-620	109488	486	919	394	426	111713	2225	2.0	768	0.92
1399-017	695-710	48797	149	397	296	280	49919	1122	2.2	516	1.06
1399-024	800-825	43861	662	668	714	1137	47042	3181	6.8	522	0.63
1399-031	905-920	62986	1727	918	368	339	66338	3352	5.1	653	1.09
1399-034	950-965	18077	1558	1041	609	791	22076	3999	18.1	937	0.77
1399-036	980-995	41022	8628	15455	3163	5603	73871	32849	44.5	2135	0.56
1399-037	995-1010	36969	5143	8436	2045	3806	56399	19430	34.5	1520	0.54
1399-038	1010-1025	15293	1190	4119	1832	3048	25482	10189	40.0	1944	0.60
1399-039	1025-1035	35613	2481	4462	961	1715	45232	9619	21.3	1103	0.56
1399-040	1035-1050	30911	1283	1786	526	672	35178	4267	12.1	362	0.78
1399-041	1050-1065	75980	2862	3151	720	798	83511	7531	9.0	211	0.90
1399-042	1065-1080	40523	2226	1410	549	467	45175	4652	10.3	463	1.18
1399-043	1080-1095	24478	731	1140	695	768	27812	3334	12.0	726	0.90
1399-044	1095-1110	55743	1591	1616	560	351	59861	4118	6.9	566	1.60
1399-045	1110-1125	57383	1869	1876	1130	1039	63297	5914	9.3	1046	1.09
1399-046	1125-1140	67069	7614	2393	1144	1076	79296	12227	15.4	736	1.06
1399-047	1140-1155	17976	1162	695	399	410	20642	2666	12.9	471	0.97
1399-048	1155-1170	35815	1640	1272	262	308	39297	3482	8.9	912	0.85
1399-049	1170-1185	39146	677	751	240	539	41353	2207	5.3	617	0.45
1399-050	1185-1200	48368	1470	1507	721	608	52674	4306	8.2	845	1.19
1399-051	1200-1215	54955	1869	4754	1076	879	63533	8578	13.5	1148	1.22
1399-052	1215-1230	46291	873	861	1108	585	49718	3427	6.9	400	1.89
1399-053	1230-1245	43870	1368	1253	1040	770	48301	4431	9.2	622	1.35
1399-054	1245-1260	24914	532	506	438	292	26682	1768	6.6	329	1.50
1399-055	1260-1275	167672	9382	12925	8252	7393	205624	37952	18.5	9887	1.12
1399-056	1275-1290	37022	4239	5814	666	3736	51477	14455	28.1	1115	0.18
1399-057	1290-1305	87082	9026	10193	1550	5814	113665	26583	23.4	919	0.27
1399-058	1305-1320	136407	7333	13330	920	7418	165408	29001	17.5	1519	0.12
1399-059	1320-1335	169577	2683	5185	526	2169	180140	10563	5.9	803	0.24
1399-060	1335-1350	217485	11187	11031	359	3647	243709	26224	10.8	1402	0.10



TABLE 2C
TOTAL CONCENTRATION (μ L GAS/KG ROCK) OF C₁ - C₇ HYDROCARBONS (A + B)

GEOCHEM SAMPLE NUMBER	DEPTH	C ₁ Methane	C ₂ Ethane	C ₃ Propane	iC ₄ Isobutane	nC ₄ Butane	TOTAL C ₁ - C ₄	TOTAL C ₂ - C ₄	% GAS WETNESS	TOTAL C ₅ - C ₇	$\frac{iC_4}{nC_4}$
1399-062	1365-1380	285695	9272	16273	1417	5533	318190	32495	10.2	1553	0.26
1399-063	1380-1395	59585	2236	4224	416	1125	67586	8001	11.8	286	0.37
1399-064	1395-1410	57532	2458	2627	238	831	63686	6154	9.7	221	0.29
1399-065	1410-1425	1149925	17356	19080	1254	9916	1197531	47606	4.0	1682	0.13
1399-066	1425-1440	140025	4562	5222	796	2086	152691	12666	8.3	438	0.38
1399-067	1440-1455	124742	2555	4038	281	1875	133491	8749	6.6	426	0.15
1399-068	1455-1470	114784	5955	5804	417	2626	129586	14802	11.4	170	0.16
1399-069	1470-1485	67694	5487	4162	260	1379	78982	11288	14.3	143	0.19
1399-070	1485-1500	79004	3551	5827	500	1708	90590	11586	12.8	536	0.29
1399-071	1500-1515	94540	7681	12176	877	3772	119046	24506	20.6	488	0.23
1399-072	1515-1530	279375	18652	33901	3068	7184	342180	62805	18.4	1453	0.43
1399-073	1530-1545	226238	8988	11556	1691	3853	252326	26088	10.3	738	0.44
1399-074	1545-1560	84541	5493	8197	954	3370	102555	18014	17.6	438	0.28
1399-075	1560-1575	146599	9982	19744	1644	4882	182851	36252	19.8	771	0.34
1399-076	1575-1590	186351	24526	22193	1925	6686	241681	55330	22.9	1015	0.29
1399-077	1590-1605	123048	8692	18690	1184	4575	156189	33141	21.2	1044	0.26
1399-078	1605-1620	40169	2191	2657	1200	631	46848	6679	14.3	504	1.90
1399-079	1620-1635	50370	2580	3334	1167	936	58387	8017	13.7	756	1.25
1399-080	1635-1650	37393	1726	1733	988	821	42661	5268	12.3	340	1.20
1399-081	1650-1665	17666	1413	1349	547	422	21397	3731	17.4	292	1.30
1399-082	1665-1680	21111	1374	1480	858	522	25345	4234	16.7	273	1.64
1399-083	1680-1695	16488	1645	1467	592	468	20660	4172	20.2	271	1.26
1399-084	1695-1710	19716	1874	2344	763	519	25216	5500	21.8	388	1.47
1399-085	1710-1725	13808	1237	1199	396	337	16977	3169	18.7	300	1.18
1399-086	1725-1740	20275	2115	1753	413	648	25204	4929	19.6	184	0.64
1399-087	1740-1755	20823	2508	1466	430	403	25630	4807	18.8	512	1.07
1399-088	1755-1770	19196	2157	2054	744	713	24864	5668	22.8	567	1.04
1399-089	1770-1785	24022	2494	2046	445	456	29463	5441	18.5	690	0.98
1399-090	1785-1800	20478	2715	2360	384	557	26494	6016	22.7	377	0.69
1399-091	1800-1815	36159	8595	3306	314	76	48450	12291	25.4	665	4.13



TABLE 2C
TOTAL CONCENTRATION ($\mu\text{L GAS/KG ROCK}$) OF $\text{C}_1 - \text{C}_7$ HYDROCARBONS (A + B)

GEOCHEM SAMPLE NUMBER	DEPTH	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 $\text{C}_5 - \text{C}_7$	$\frac{i\text{C}_4}{n\text{C}_4}$
1399-092	1815-1830	270084	119096	139449	3477	34196	566302	296218	52.3	3385	0.10
1399-093	1830-1845	124612	53007	77419	2686	33658	291382	166770	57.2	4136	0.08
1399-094	1845-1860	95914	53255	81771	2393	29134	262467	166553	63.5	2757	0.08
1399-095	1860-1875	77060	37357	47242	1474	15858	178991	101931	56.9	1303	0.09
1399-096	1875-1890	149297	65140	120111	4622	24381	363551	214254	58.9	2351	0.19
1399-097	1890-1905	210368	104537	193903	5589	38245	552642	342274	61.9	3121	0.15
1399-098	1905-1920	136407	65237	122112	3154	19964	346874	210467	60.7	1532	0.16
1399-099	1920-1935	121247	58391	105865	2823	19420	307746	186499	60.6	1728	0.15
1399-101	1935-1950	178412	73602	120056	3505	18902	394477	216065	54.8	1976	0.19
1399-102	1950-1965	183020	82058	74684	4050	25049	368861	185841	50.4	2025	0.16
1399-103	1965-1980	159527	96690	183604	5504	37348	482673	323146	66.9	2845	0.15
1399-105	1980-1995	115375	60175	133577	4955	40635	354717	239342	67.5	3847	0.12
1399-106	1995-2010	34446	9118	19304	4422	8883	76173	41727	54.8	4315	0.50
1399-107	2010-2025	31976	8817	13045	3284	5646	62768	30792	49.1	3466	0.58
1399-108	2025-2040	506775	23402	45929	14114	27415	617635	110860	17.9	15506	0.51
1399-109	2040-2055	58980	15683	26687	6256	11782	119388	60408	50.6	6154	0.53
1399-112	2055-2070	27643	10545	17594	3618	6142	65542	37899	57.8	2273	0.59
1399-113	2070-2085	37845	14932	23740	4537	8005	89059	51214	57.5	2603	0.57
1399-115	2085-2100	26129	11771	16807	3232	5993	63932	37803	59.1	2164	0.54
1399-116	2100-2115	19786	9639	10453	1851	3143	44872	25086	55.9	1291	0.59
1399-118	2115-2130	17936	9209	10326	1796	3334	42601	24665	57.9	1469	0.54
1399-119	2130-2145	13895	11568	9729	1406	1956	38554	24659	64.0	1563	0.72
1399-120	2145-2160	10269	6688	4663	466	894	22980	12711	55.3	355	0.52
1399-121	2160-2175	13253	12678	12153	984	2383	41451	28198	68.0	905	0.41
1399-125	2175-2190	224159	152941	66020	2211	6735	452066	227907	50.4	1637	0.33
1399-128	2190-2205	55199	38403	27988	1228	5003	127821	72622	56.8	1465	0.25
1399-129	2205-2220	37964	22800	8971	987	2052	72774	34810	47.8	897	0.48
1399-131	2220-2235	41722	12125	5891	917	1939	62594	20872	33.3	1245	0.47
1399-132	2235-2250	17258	7526	7230	1017	3136	36167	18909	52.3	1795	0.32
1399-136	2250-2265	53612	33166	49083	8672	27315	171848	118236	68.8	14367	0.32



TABLE 2C
TOTAL CONCENTRATION (μ L GAS/KG ROCK) OF C₁ - C₇ HYDROCARBONS (A + B)

GEOCHEM SAMPLE NUMBER	DEPTH	C ₁ Methane	C ₂ Ethane	C ₃ Propane	iC ₄ Isobutane	nC ₄ Butane	TOTAL C ₁ - C ₄	TOTAL C ₂ - C ₄	% GAS WETNESS	TOTAL C ₆ - C ₇	$\frac{iC_4}{nC_4}$
1399-141	2265-2280	185871	180241	372935	82202	270871	1092120	906249	83.0	122118	0.30
1399-146	2280-2295	178763	143469	294696	48262	147496	812686	633923	78.0	46429	0.33
1399-151	2295-2310	864896	417225	820606	124388	387914	2615029	1750133	66.9	121845	0.32
1399-153	2311-2314	197898	74183	218365	50706	179706	720858	522960	72.5	89605	0.28
1399-154	2314-2317	213763	120383	253960	32425	165618	786149	572386	72.8	53666	0.20
1399-155	2317-2320	179629	101114	195995	25410	29360	531508	351879	66.2	44782	0.87
1399-157	2320-2323	209103	92669	184267	26484	126102	638625	429522	67.3	17466	0.21
1399-160	2323-2338	78846	31544	36541	4230	18454	169615	90769	53.5	6862	0.23
1399-165	2338-2353	52637	25160	26586	2144	11703	118230	65593	55.5	3920	0.18
1399-170	2353-2368	96741	35655	42254	7580	20153	202383	105642	52.2	12136	0.38
1399-174	2368-2383	54444	32989	35040	4413	15964	142850	88406	61.9	6299	0.28
1399-176	2382-2397	67539	28975	26020	2987	10739	136260	68721	50.4	4171	0.28
1399-180	2397-2412	80842	23842	15300	1884	5392	127260	46418	36.5	2287	0.35
1399-182	2412-2427	649389	342116	194106	11737	39519	1236867	587478	47.5	7437	0.30
1399-185	2427-2442	81355	41717	39113	6472	15276	183933	102578	55.8	6729	0.42
1399-187	2442-2457	352333	139196	61220	3059	11676	567484	215151	37.9	2218	0.26
1399-189	2457-2472	294345	168949	76735	2854	12007	554890	260545	47.0	1761	0.24
1399-190	2472-2487	265239	145386	68939	18262	11923	509749	244510	48.0	1828	1.53
1399-191	2487-2502	248822	115338	45803	2346	6772	419081	170259	40.6	1226	0.35
1399-192	2502-2517	96678	54386	33872	3173	9882	197991	101313	51.2	4288	0.32
1399-196	2517-2532	63229	49225	47212	3354	11625	174645	111416	63.8	2427	0.29
1399-198	2532-2539	25309	31928	41186	4663	14325	117411	92102	78.4	2679	0.33





TABLE 3

ROCKEVAL PYROLYSIS DATA

GEOCHEM SAMPLE NUMBER	DEPTH	S1 (mg/g)	S2 (mg/g)	S3 (mg/g)	Production INDEX	Hydrogen INDEX	Oxygen INDEX	Tmax (%C)
1399-011A	605-620	0.12	0.40	1.00	0.23	55.6	138.9	422
1399-017A	695-710	0.14	0.57	0.77	0.20	65.5	88.5	424
1399-024A	800-825	0.03	0.08	1.28	0.27	11.9	191.0	393
1399-031A	905-920	0.13	0.24	0.38	0.35	34.8	55.1	420
1399-034A	950-965	0.06	0.39	0.86	0.13	66.1	145.8	405
1399-036A	980-995	0.10	0.69	0.55	0.13	59.5	47.4	422
1399-037A	995-1010	0.11	1.80	0.53	0.06	106.5	31.4	424
1399-038A	1010-1025	0.07	0.62	0.73	0.10	39.0	45.9	426
1399-039A	1025-1035	0.09	0.34	0.44	0.21	32.7	42.3	421
1399-041A	1050-1065	0.08	0.59	0.62	0.12	48.4	50.8	424
1399-042A	1065-1080	0.06	0.43	0.51	0.12	40.6	48.1	422
1399-043A	1080-1095	0.05	0.47	0.55	0.10	42.0	49.1	427
1399-045A	1110-1125	0.05	0.54	1.14	0.08	43.2	91.2	427
1399-046A	1125-1140	0.05	0.56	0.77	0.08	47.5	65.3	428
1399-047A	1140-1155	0.08	0.73	0.95	0.10	67.6	88.0	424
1399-048A	1155-1170	0.06	0.50	1.01	0.11	45.5	91.8	425
1399-049A	1170-1185	0.08	0.63	0.77	0.11	57.3	70.0	427
1399-050A	1185-1200	0.07	0.51	0.79	0.12	47.7	73.8	424
1399-052A	1215-1230	0.07	0.47	0.63	0.13	47.5	63.6	424
1399-053A	1230-1245	0.06	0.47	0.61	0.11	45.6	59.2	427
1399-054A	1245-1260	0.09	0.56	0.73	0.14	47.1	61.3	427
1399-055A	1260-1275	0.08	0.35	0.75	0.19	37.6	80.6	426
1399-056A	1275-1290	0.08	0.26	0.50	0.24	28.0	53.8	421
1399-057A	1290-1305	0.04	0.28	0.83	0.13	33.7	100.0	425
1399-058A	1305-1320	0.09	0.29	0.99	0.24	29.9	102.1	427
1399-059A	1320-1335	0.05	0.32	0.57	0.14	37.2	66.3	423
1399-060A	1335-1350	0.04	0.24	0.70	0.14	24.2	70.7	426
1399-062A	1365-1380	0.03	0.19	0.55	0.14	23.2	67.1	420
1399-063A	1380-1395	0.02	0.16	0.48	0.11	20.8	62.3	422
1399-064A	1395-1410	0.02	0.17	0.45	0.11	26.6	70.3	392
1399-065A	1410-1425	0.02	0.13	0.40	0.13	18.1	55.6	422
1399-066A	1425-1440	0.02	0.14	0.47	0.13	18.2	61.0	413
1399-067A	1440-1455	0.04	0.10	0.54	0.29	14.3	77.1	431
1399-068A	1455-1470	0.03	0.11	0.44	0.21	18.0	72.1	386
1399-069A	1470-1485	0.04	0.12	0.46	0.25	15.8	60.5	422
1399-070A	1485-1500	0.01	0.09	0.44	0.10	12.3	60.3	428
1399-071A	1500-1515	0.04	0.15	0.49	0.21	18.7	61.2	422
1399-072A	1515-1530	0.04	0.14	0.48	0.22	17.1	58.5	427
1399-073A	1530-1545	0.05	0.14	0.41	0.26	18.7	54.7	423
1399-074A	1545-1560	0.03	0.11	0.57	0.21	13.9	72.2	430
1399-075A	1560-1575	0.04	0.16	0.59	0.20	20.5	75.6	429
1399-076A	1575-1590	0.04	0.21	0.55	0.16	23.6	61.8	428
1399-077A	1590-1605	0.04	0.25	0.65	0.14	30.1	78.3	432
1399-078A	1605-1620	0.02	0.24	0.47	0.08	27.0	52.8	431
1399-079A	1620-1635	0.03	0.23	0.54	0.12	26.1	61.4	429
1399-080A	1635-1650	0.02	0.17	0.42	0.11	19.8	48.8	430
1399-081A	1650-1665	0.03	0.33	0.39	0.08	32.0	37.9	432
1399-082A	1665-1680	0.03	0.30	0.51	0.09	30.3	51.5	429
1399-083A	1680-1695	0.02	0.20	0.59	0.09	22.0	64.8	429
1399-084A	1695-1710	0.03	0.31	0.85	0.09	32.0	87.6	432



TABLE 3

ROCKEVAL PYROLYSIS DATA

GEOCHEM SAMPLE NUMBER	DEPTH	S1 (mg/g)	S2 (mg/g)	S3 (mg/g)	Production INDEX	Hydrogen INDEX	Oxygen INDEX	Tmax (°C)
1399-085A	1710-1725	0.04	0.34	0.44	0.11	32.7	42.3	430
1399-086A	1725-1740	0.02	0.23	0.57	0.08	23.5	58.2	433
1399-087A	1740-1755	0.03	0.30	0.74	0.09	30.0	74.0	431
1399-088A	1755-1770	0.03	0.20	0.59	0.13	22.0	64.8	433
1399-089A	1770-1785	0.04	0.31	0.53	0.11	30.1	51.5	431
1399-090A	1785-1800	0.04	0.25	0.59	0.14	22.1	52.2	433
1399-091A	1800-1815	0.04	0.26	0.58	0.13	22.4	50.0	433
1399-092A	1815-1830	0.04	0.29	0.58	0.12	24.6	49.2	431
1399-093A	1830-1845	0.11	0.29	0.58	0.28	24.2	48.3	430
1399-094A	1845-1860	0.06	0.26	0.51	0.19	26.8	52.6	430
1399-095A	1860-1875	0.08	0.30	0.49	0.21	25.9	42.2	432
1399-096A	1875-1890	0.06	0.18	0.72	0.25	15.9	63.7	441
1399-097A	1890-1905	0.08	0.28	0.54	0.22	25.9	50.0	432
1399-098A	1905-1920	0.08	0.39	0.58	0.17	33.6	50.0	434
1399-099A	1920-1935	0.13	0.51	0.42	0.20	45.5	37.5	431
1399-101A	1935-1950	0.22	0.64	0.62	0.26	47.8	46.3	435
1399-102A	1950-1965	0.18	0.55	0.59	0.25	44.4	47.6	436
1399-103A	1965-1980	0.14	0.67	0.63	0.17	49.6	46.7	436
1399-105A	1980-1995	0.14	0.91	1.00	0.13	62.3	68.5	442
1399-106B	1995-2010	0.27	2.03	1.83	0.12	142.0	128.0	434
1399-107A	2010-2025	0.15	1.54	0.68	0.09	115.8	51.1	437
1399-108B	2025-2040	0.19	2.29	1.94	0.08	150.7	127.6	434
1399-109A	2040-2055	0.22	2.51	0.84	0.08	118.4	39.6	438
1399-112A	2055-2070	0.14	1.16	0.64	0.11	78.9	43.5	438
1399-111A	2062	0.06	0.72	1.49	0.08	46.5	96.1	440
1399-113A	2070-2085	0.11	1.21	0.83	0.08	76.1	52.2	439
1399-115A	2085-2100	0.10	0.85	0.73	0.11	66.9	57.5	439
1399-116A	2100-2115	0.10	0.83	0.74	0.11	66.4	59.2	440
1399-118A	2115-2130	0.11	0.81	0.70	0.12	68.1	58.8	440
1399-117A	2121	0.03	0.34	1.12	0.08	37.4	123.1	438
1399-119A	2130-2145	0.09	0.50	0.59	0.15	48.5	57.3	438
1399-120A	2145-2160	0.06	0.30	0.54	0.17	35.7	64.3	437
1399-121B	2160-2175	0.07	0.27	1.90	0.21	37.0	260.3	436
1399-123A	2175	0.07	0.49	0.53	0.13	51.0	55.2	435
1399-125A	2175-2190	0.24	2.00	0.63	0.11	71.7	22.6	446
1399-124A	2178	0.13	0.37	0.48	0.26	37.4	48.5	439
1399-126A	2184	0.38	4.13	0.84	0.08	90.4	18.4	440
1399-127A	2187	0.30	4.13	4.25	0.07	104.8	107.9	441
1399-128A	2190-2205	0.23	1.36	0.58	0.14	72.0	30.7	444
1399-129A	2205-2220	0.13	1.04	0.43	0.11	71.2	29.5	443
1399-131A	2220-2235	0.11	0.55	0.41	0.17	46.2	34.5	443
1399-132A	2235-2250	0.13	0.14	1.26	0.48	41.2	370.6	415
1399-133A	2249	0.04	0.14	0.33	0.22	34.1	80.5	460
1399-136A	2250-2265	0.63	3.77	0.54	0.14	142.3	20.4	445
1399-134A	2256.5	0.15	0.49	0.72	0.23	58.3	85.7	438
1399-135A	2259.5	0.30	0.91	0.63	0.25	91.9	63.6	441
1399-137A	2262	0.41	1.43	0.40	0.22	121.2	33.9	444
1399-138A	2264.5	1.29	4.81	0.60	0.21	175.5	21.9	444
1399-139A	2268	2.23	8.63	0.71	0.21	205.0	16.9	445
1399-140A	2271	2.88	11.37	0.84	0.20	237.9	17.6	439



TABLE 3

ROCKEVAL PYROLYSIS DATA

GEOCHEM SAMPLE NUMBER	DEPTH	S1 (mg/g)	S2 (mg/g)	S3 (mg/g)	Production INDEX	Hydrogen INDEX	Oxygen INDEX	Tmax (°C)
1399-141A	2265-2280	1.95	13.18	0.90	0.13	269.5	18.4	445
1399-142A	2277	3.68	11.12	0.81	0.25	244.4	17.8	440
1399-146A	2280-2295	5.72	29.68	1.05	0.16	285.4	10.1	445
1399-143A	2280.5	7.36	30.48	1.27	0.19	265.0	11.0	441
1399-144A	2282.5	6.26	23.94	0.94	0.21	190.0	7.5	445
1399-145A	2286	5.49	19.49	1.05	0.22	230.4	12.4	443
1399-147A	2289	6.37	24.60	1.10	0.21	205.0	9.2	444
1399-148A	2293.5	8.70	43.13	1.19	0.17	237.0	6.5	444
1399-151A	2295-2310	4.20	21.45	1.05	0.16	235.2	11.5	444
1399-149A	2298	8.18	37.07	1.33	0.18	248.8	8.9	444
1399-150A	2303	5.15	16.67	0.93	0.24	228.7	12.8	441
1399-153B	2311-2314	0.44	1.76	0.73	0.20	131.3	54.5	442
1399-152A	2312.5	0.37	1.53	0.59	0.19	128.6	49.6	442
1399-154A	2314-2317	0.63	3.36	0.66	0.16	105.0	20.6	444
1399-155B	2317-2320	0.36	2.35	1.61	0.13	166.7	114.2	441
1399-157A	2320-2323	0.38	1.89	2.03	0.17	144.3	155.0	441
1399-156A	2321	0.24	0.77	1.37	0.24	90.6	161.2	436
1399-160A	2323-2338	0.19	1.03	0.61	0.16	76.3	45.2	443
1399-159B	2329.49	1.23	8.79	0.47	0.12	207.3	11.1	440
1399-165A	2338-2353	0.16	1.04	0.45	0.13	69.8	30.2	443
1399-170A	2353-2368	0.12	0.88	0.39	0.12	59.5	26.4	445
1399-174A	2368-2383	0.09	0.57	0.48	0.14	58.2	49.0	434
1399-176A	2382-2397	0.10	0.49	0.42	0.17	49.5	42.4	445
1399-180B	2397-2412	0.19	0.95	0.47	0.17	70.4	34.8	442
1399-182C	2412-2427	4.22	73.75	1.03	0.05	416.7	5.8	443
1399-184B	2432	0.38	2.27	0.52	0.14	155.5	35.6	440
1399-187B	2442-2457	0.18	1.19	0.51	0.13	110.2	47.2	445
1399-187D	2442-2457	4.47	61.07	1.71	0.07	266.7	7.5	443
1399-186A	2449	0.24	1.34	0.27	0.15	132.7	26.7	449
1399-189B	2457-2472	0.14	0.98	0.67	0.13	74.8	51.1	441
1399-190B	2472-2487	0.21	1.44	0.77	0.13	84.7	45.3	444
1399-191B	2487-2502	13.62	188.23	4.06	0.07	388.9	8.4	446
1399-192B	2502-2517	0.16	0.82	0.87	0.16	59.0	62.6	445
1399-194A	2512.5	0.03	0.15	2.56	0.17	32.6	556.5	520
1399-196B	2517-2532	0.11	0.51	1.36	0.18	46.4	123.6	450
1399-195A	2518	0.18	1.38	0.27	0.12	114.0	22.3	441
1399-198B	2532-2539	0.08	0.30	1.21	0.21	46.2	186.2	453
1399-197A	2534	0.06	0.62	5.49	0.09	83.8	741.9	445

TABLE 4
GAS - OIL INDEX



GEOCHEM SAMPLE NUMBER	DEPTH	DRY GAS	WET GAS	GASOLINES KEROSENES	GAS OIL DISTILLATE	GAS-OIL INDEX
		% C ₁	% C ₂ - C ₅	% C ₆ - C ₁₄	% C ₁₅₊	% $\frac{C_1 - C_5}{\text{TOTAL}}$
1399-077A	1590-1605	6.15	53.57	40.28	0.00	59.72
1399-093A	1830-1845	5.10	61.25	33.65	0.00	66.35
1399-099A	1920-1935	11.56	46.17	42.27	0.00	57.73
1399-107A	2010-2025	6.85	43.73	48.34	1.08	50.57
1399-117A	2121	12.57	49.90	37.38	0.15	62.47
1399-123A	2175	13.84	48.13	38.02	0.00	61.98
1399-126A	2184	30.61	37.34	31.94	0.12	67.94
1399-136A	2250-2265	12.87	51.23	35.78	0.11	64.10
1399-140A	2271	11.78	26.61	56.19	5.42	38.39
1399-143A	2280.5	19.73	28.24	48.01	4.01	47.97
1399-147A	2289	25.32	35.19	37.94	1.54	60.51
1399-150A	2303	19.50	22.77	54.60	3.13	42.26
1399-152A	2312.5	13.71	31.86	53.06	1.37	45.57
1399-154A	2314-2317	30.33	27.71	40.86	1.09	58.04
1399-156A	2321	7.94	53.17	38.78	0.11	61.11
1399-159B	2329.49	35.07	19.64	42.12	3.17	54.71
1399-170A	2353-2368	17.26	52.40	30.30	0.03	69.66
1399-180B	2397-2412	19.83	42.76	36.79	0.62	62.59
1399-186A	2449	5.29	33.71	60.80	0.21	39.00
1399-191B	2487-2502	33.81	7.46	43.91	14.82	41.27
1399-195A	2518	15.15	49.19	35.13	0.52	64.34

TABLE 5
KEROGEN TYPE AND MATURATION

GEOCHEM SAMPLE NUMBER	DEPTH	ORGANIC MATTER DESCRIPTION					THERMAL MATURATION	
		TYPES > 35%; 10-35%; < 10%	REMARKS	RE- WORKED (%)	PARTICLE SIZE	PRESERV- ATION	THERMAL ALTERATION INDEX	1 - 10 SCALE
1399-004A	500-515m	I-W;H;Al-Am	contamination	80	F-M	F	1+	1.5
1399-011A	605-620m	W-I;H;Al	contamination significant H at 2- and 2- to 2	80	F-M	F	1+/1+ to 2-	1.7
1399-017A	695-710m	W-I;H;Al	dominant H at 2-	65	F-M	F-G	1+ to 2-	2
1399-024A	800-825m	I;W-H;Al	H at 2- through 2	80	M	G	1+ to 2-	2
1399-031A	905-920m	W-I;H;Al	H at 2- and 2- to 2	70	F-M	F-G	1+ to 2-	2
1399-034A	950-965m	W-I;H;Al	frequent contamination H at 2- through 2 to 2+	80	F-M	F	1+ to 2-(?)	2(?)
1399-038A	1010-1025m	I-W;H;Al	H at 2-	70	F-M	F	1+ to 2-	2
1399-041A	1050-1065m	I;W-H;Al		75	F-M	F	1+ to 2-	2
1399-045A	1110-1125m	I-W;Al-H;-	abundant contamination,H at 2-	80	F-M	F	1+ to 2-(?)	2(?)
1399-048A	1155-1170m	I;W-H;Al	H at 2- through 2	80	F-M	F	1+ to 2-	2
1399-052A	1215-1230m	I-W;H;Al	contamination, H at 2- through 2 to 2+	85	M	F	1+ to 2-	2
1399-055A	1260-1275m	I;W;H-Al	contamination, H at 2- through 2	90	M	F-G	1+ to 2-	2
1399-058A	1305-1320m	I;W-H;Al	lean, contamination dominant H at 2-	90	F-M	F	1+ to 2-(?)	2(?)
1399-062A	1365-1380m	I;W;H-Al	H at 2-	95	F-M	F	1+ to 2-	2
1399-065A	1410-1425m	I-W;-;H-Al	abundant contamination	95	F-M	F	2-(?)	3(?)
1399-068A	1455-1470m	I;W;H-Al	contamination	95	F-M	F	2-(??)	3(??)
1399-071A	1500-1515m	I-W;-;H-Al	contamination	95	F-M	F	2-(?)	3(?)
1399-074A	1545-1560m	I;W-H;Al		90	F-M	G	2-(?)	3(?)
1399-077A	1590-1605m	I-W;-;H-Al		90	F-M	F-G	2-	3

Algal, Amorphous, Herbaceous, Inertinite, Resin, Wood

preservation = Poor, Fair, Good size = Fine, Medium, Coarse

TA1 SCALE 1 | 1+ to 2- | 2- | 2 | 2 to 2+ | 2+ to 3- | 3 | 3+ | 4 | 5
1 - 10 SCALE 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10



TABLE 5
KEROGEN TYPE AND MATURATION

GEOCHEM SAMPLE NUMBER	DEPTH	ORGANIC MATTER DESCRIPTION				THERMAL MATURATION		
		TYPES > 35%; 10-35%; < 10%	REMARKS	RE- WORKED (%)	PARTICLE SIZE	PRESERV ATION	THERMAL ALTERATION INDEX	1 - 10 SCALE
1399-080A	1635-1650m	I;W;H-A1		85	M	G	2-	3
1399-083A	1680-1695m	W-I;H;A1	dominant H at 2	85	F-M	G	2-(?)	3(?)
1399-086A	1725-1740m	W-I;H;A1	H generally reworked	85	M	G	2-(?)	3(?)
1399-089A	1770-1785m	I-W;-;H-A1	H at 2- to 2 through 2+	85	F-M	G	2_ (?)	3(?)
1399-093A	1830-1845m	I-W;-;H-A1-Am	H at 2 and 2 to 2+	85	M	G	2- to 2	3.5
1399-096A	1875-1890m	W-I;-;H-A1	H at 2	85	F-M	F-G	2- to 2(?)	3.5(?)
1399-100A	1927.5m	W;I-H;A1		75	M	G	2- to 2	3.5
1399-104A	1982m	W;I-H;A1		40	M	G	2- to 2	3.5
1399-107A	2010-2025m	-;W-I-H-A1-Am			M-C	G	2- to 2	
1399-110A	2054m	W;I-H;A1-Am	good H at 2	75	F-M	F	2- to 2/2(?)	3.7(?)
1399-114A	2080m	W;I-H;A1-Am		80	F-M	F-G	2- to 2/2(?)	3.7(?)
1399-117A	2121m	W;I;H	lean	80	F-M	F	2(??)	4(??)
1399-122A	2160-2175m	I;W;H	lean		F-M	F	-	-
1399-126A	2184m	Am ⁺ ;Al [*] ;W-I-H	+ includes incompletely developed material	F-C	G		2 to 2/2(?)	3.8(?)
1399-130A	2220.5m	(W-I;H;A1-Am)	<u>virtually barren, extremely unreliable</u>		F-M	F	2(??)	4(??)
1399-135A	2259.5m	W;I-H;A1-Am	contamination, close to 2	50	F-M	F	2- to 2/2(?)	3.8(?)
1399-138A	2264.5m	Al ⁺ -Am [*] ;W;H-I	+ includes material passing to amorphous * frequently incompletely developed	-	M-C	F-G	2	4
1399-140A	2271m	Al ⁺ ;Am [*] ;H-I-W	+ includes material passing to amorphous * incompletely developed	-	M	F-G	2	4

Algal, Amorphous, Herbaceous, Inertinite, Resin, Wood

preservation = Poor, Fair, Good size = Fine, Medium, Coarse

TA1 SCALE	1	1+ to 2-	2-	2	2 to 2+	2+ to 3-	3	3+	4	5
1 - 10 SCALE	1	2	3	4	5	6	7	8	9	10



TABLE 5
KEROGEN TYPE AND MATURATION

GEOCHEM SAMPLE NUMBER	DEPTH	ORGANIC MATTER DESCRIPTION					THERMAL MATURATION	
		TYPES >35%; 10-35%; <10%	REMARKS	RE- WORKED (%)	PARTICLE SIZE	PRESERV- ATION	THERMAL ALTERATION INDEX	1-10 SCALE
1399-143A	2280.5m	Al ⁺ ; Am [*] ; W-I-H	differentiation difficult + as 104A	-	M-C	F	2(?)	4(?)
1399-148A	2293.5m	Am [*] ; Al ⁺ ; (W-I)	* degraded, includes incom- pletely developed material + includes material passing to amorphous	-	F-C	F	2(?)	4(?)
1399-150A	2303m	Al ⁺ -Am [*] ; -; I-H	+ includes material passing to amorphous * degraded, frequently incompletely developed	-	F-C	F	2	4
1399-152A	2312.5m	W; I-H; Al-Am		-	M	G	2	4
1399-156A	2321m	W; I-H; Al-Am		-	F-M	F-G	2	4
1399-170A	2353-2368m	(W-I; -; H-Al-Am)	<u>virtually barren, extremely unreliable</u>	-	F	P-F	-	-
1399-180B	2393-2414m	-; W-Al ⁺ -H-I-Am ⁺ ; -	differentiation difficult, cavings apparent + includes material passing to amorphous	-	F-C	G	2(?)	4(?)
1399-182C	2412-2427m	(W-H; -; Am-I)	differentiation extremely difficult	-	F-C	F-G	2	4
1399-186A	2449m	W; I; H	W/I differentiation difficult	-	M-C	G	2	4
1399-193A	2503.5m	W; I; H	W/I differentiation difficult H at 2 to 2+	-	M	F	2(?)	4(?)
1399-197A	2534m	W; I-H; Al	dominant H at 2+, frequent contamination	70	M	F-G	2 to 2+(?)	5(?)

Algal, Amorphous, Herbaceous, Inertinite, Resin, Wood

preservation = Poor, Fair, Good size = Fine, Medium, Coarse

TA1 SCALE 1 | 1+ to 2- | 2- | 2 | 2 to 2+ | 2+ to 3- | 3 | 3+ | 4 | 5
1-10 SCALE 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10



TABLE 6
VITRINITE REFLECTANCE DATA



GEOCHEM SAMPLE NUMBER	DEPTH	SAMPLE TYPE	AVERAGE REFLECTIVITY R _o (%), (NUMBER OF PARTICLES)			REMARKS
			1	2	3	
1399-004A	500-515m	WR	0.94 (16)			
1399-011A	605-620m	WR	0.80 (15)			
1399-017A	695-710m	WR	0.49 (6) ;	0.93 (9)		
1399-024A	800-825m	WR	0.48 (9) ;	0.74 (10)		
1399-031A	905-920m	WR	0.38 (5) ;	0.58 (4) ;	0.74 (10)	
1399-034A	950-965m	WR	0.44 (5) ;	0.66 (2)	0.92 (5)	
1399-038A	1010-1025m	WR	0.40 (6) ;	0.59 (11) ;	0.83 (3)	
1399-041A	1050-1065m	WR	0.40 (7) ;	0.59 (19) ;	0.90 (2)	
1399-045A	1110-1125m	WR	0.39 (1) ;	0.62 (11) ;	0.79 (3)	
1399-048A	1155-1170m	WR	0.66 (6) ;	1.34 (13)		
1399-052A	1215-1140m	WR	0.67 (7) ;	1.28 (11)		
1399-055A	1260-1275m	WR	0.73 (1) ;	1.33 (13)		
1399-058A	1305-1320m	WR	0.70 (5) ;	1.33 (9)		
1399-062A	1365-1380m	WR	0.66 (3) ;	1.33 (14)		
1399-065A	1410-1425m	WR	1.39 (11)			
1399-068A	1455-1470m	WR	0.71 (1) ;	1.34 (13)		
1399-071A	1500-1515m	WR	0.68 (2) ;	1.35 (13)		
1399-074A	1545-1560m	WR	0.62 (2) ;	1.38 (8)		
1399-077A	1590-1605m	WR	0.69 (6) ;	1.35 (11)		
1399-080A	1635-1650m	WR	0.67 (5) ;	1.42 (11)		
1399-083A	1680-1695m	WR	0.76 (1) ;	1.41 (13)		
1399-086A	1725-1740m	WR	0.45 (4) ;	0.63 (17) ;	1.01 (9)	
1399-089A	1770-1785m	WR	0.58 (5) ;	0.76 (3)		
1399-093A	1830-1845m	WR	0.65 (6) ;	1.34 (13)		
1399-096A	1875-1890m	WR	0.47 (1) ; 1.14 (9)	0.64 (10) ;	0.88 (10) ;	
1399-100	1927-5	WR	0.82 (17) ;	1.31 (22)		
1399-104A	1982	WR	0.43 (4) ;	0.68 (28) ;	1.01 (7)	
1399-107A	2010-2050m	WR	0.61 (17) ;	0.82 (5) ;	1.13 (8)	
1399-110A	2054	WR	0.48 (5) ;	0.75 (23) ;	0.99 (2)	
1399-114A	2080	WR	0.50 (7)			
1399-117A	2121	WR	0.43 (2) ;	0.71 (9) ;	1.06 (9)	
1399-122	2168	WR	0.78 (5) ;	1.21 (25)		
1399-126A	2184	WR	0.36 (4) ;	0.67 (14) ;	1.09 (2)	
1399-130A	2220.5	WR	0.67 (3) ;	0.98 (6) ;	1.70 (5)	
1399-135A	2259.5	WR	0.54 (7) ;	0.73 (14) ;	1.07 (19)	
1399-138A	2264.5	WR	0.49 (34) ;	0.72 (6)		
1399-140A	2271	WR	0.52 (29) ;	0.97 (1)		

CT—ditch cuttings; CO—core; WR—whole rock; KC—kerogen concentrate.

Preferred values underlined. *Reworked

TABLE 6
VITRINITE REFLECTANCE DATA



GEOCHEM SAMPLE NUMBER	DEPTH	SAMPLE TYPE	AVERAGE REFLECTIVITY R _o (%), (NUMBER OF PARTICLES)			REMARKS
			1	2	3	
1399-143A	2280.5	KC	0.52 (38) ;	0.86 (2)		
1399-149A	2298	KC	0.62 (25)			
1399-150A	2303	WR	0.53 (40)			
1399-152A	2312.5	WR	0.55 (19) ;	0.69 (10)		
1399-156	2321	WR	0.52 (13) ;	0.70 (15)	0.98 (1)	
1399-170	2353-2368m	WR	1.39 (17)			
1399-180B	2397-2414m	WR	0.67 (5) ;	1.42 (6)		
1399-181A	2414	WR	0.56 (14) ;	0.71 (4)		
1399-182C	2412-2427m	KC	0.68 (30)			
1399-186A	2449	WR	0.70 (22) ;	1.52 (7)		
1399-193A	2503.5	WR	0.81 (22)			
1399-197A	2534	WR	0.76 (9) ;	1.03 (9) ;	1.33 (12)	

CT—ditch cuttings; CO—core; WR—whole rock; KC—kerogen concentrate.

Preferred values underlined. *Reworked



TABLE 7

METHYL PHENANTHRENE INDEX (1)

SAMPLE NUMBER	DEPTH	% AREA	% HEIGHT
1399-038A	1010-1025	0.36	0.41
1399-045A	1110-1125	0.14	0.19
1399-052A	1215-1230	0.42	0.42
1399-058A	1305-1320	0.48	0.05
1399-065A	1410-1425	0.28	0.31
1399-071A	1500-1515	0.26	0.10
1399-077A	1590-1605	0.50	0.48
1399-083A	1680-1695	0.40	0.19
1399-089A	1770-1785	0.85	0.43
1399-093A	1830-1845	0.27	0.35
1399-096A	1875-1890	0.45	0.53
1399-099A	1920-1935	0.74	0.40
1399-103A	1965-1980	0.57	0.72
1399-113A	1965-1980	0.54	0.74
1399-108	2025-2040	0.50	0.41
1399-117A	2121	0.42	0.40
1399-123A	2175	0.70	0.67
1399-126A	2184	0.59	0.71
1399-136A	2250-2265	0.60	0.25
1399-141A	2265-2280	0.62	1.01
1399-139A	2268	0.51	0.95
1399-143A	2280.5	0.68	0.69
1399-147A	2289	0.64	0.66
1399-152A	2312.5	0.51	0.70
1399-156A	2321	0.57	0.66
1399-158A	2324-.05	0.88	0.86
1399-161A	2335.15-2	0.93	1.10
1399-166A	2350.63-6	1.14	0.87
1399-170A	2353-2368	0.68	0.56
1399-173A	2377.55-6	0.67	1.10



TABLE 7
METHYL PHENANTHRENE INDEX (1)

SAMPLE NUMBER	DEPTH	% AREA	% HEIGHT
1399-177A	2393.65-7	0.67	0.71
1399-181A	2414	0.70	0.79
1399-183A	2426	0.49	0.63
1399-186A	2449	0.57	0.63
1399-190A	2472-2487	0.58	0.77
1399-195A	2518	0.70	0.90
1399-198A	2532-2539	0.66	0.45
1399-199	2328.5	0.59	0.74
1399-200	2355.4	0.63	0.64



TABLE 7

METHYL PHENANTHRENE INDEX (1)

SAMPLE NUMBER	DEPTH	% AREA	% HEIGHT
1399-167	2354.58-.62m	0.74	0.79
1399-213A	2341.80-.85m	0.66	0.79
1399-224A	2360.00-.03m	0.54	0.70
1399-227A	2362.80-.85m	0.60	0.66
1399-233A	2372.00-.04m	0.56	0.67
1399-235A	2373.80-.84m	0.57	0.70
1399-243A	2382.52-.58m	0.74	0.67
1399-247A	2386.60-.76m	0.60	0.59
1399-249A	2389.60-.65m	0.61	0.67
1399-254A	2396.70-.75m	0.75	0.74



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

JOB	LITHO	DEPTH	TOTAL EXTRACT	HYDROCARBONS			NON HYDROCARBONS			
				Saturates	Aromatics	TOTAL	Precipitd. Asphaltenes	Eluted NSO's	Non-eluted NSO's	TOTAL
1399-038A		1010-1025	729	116	63	179	242	305	2	550
1399-045A		1110-1125	527	129	43	172	143	210	2	356
1399-052A		1215-1230	1124	330	52	382	601	137	3	742
1399-058A		1305-1320	361	53	17	70	176	108	7	292
1399-065A		1410-1425	213	67	23	90	43	77	3	123
1399-071A		1500-1515	303	68	36	105	72	123	4	198
1399-077A		1590-1605	554	102	43	145	183	220	5	409
1399-083A		1680-1695	307	72	55	127	70	105	4	180
1399-089A		1770-1785	172	35	19	54	35	79	4	118
1399-093A		1830-1845	219	32	23	55	71	91	2	164
1399-096A		1875-1890	571	76	45	121	179	268	3	450
1399-099A		1920-1935	367	44	42	86	125	151	5	281
1399-103A		1965-1980	597	56	94	150	228	213	5	446
1399-108A		2025-2040	1012	342	178	520	250	238	5	493
1399-113A		2070-2085	834	159	152	311	205	311	7	523
1399-117A		2121	1899	284	110	394	1128	358	18	1505
1399-123A		2175	2567	166	102	267	2053	235	11	2299
1399-126A		2184	1918	316	351	667	844	397	11	1252
1399-136A		2250-2265	4220	1030	955	1985	1340	884	11	2235
1399-141A		2265-2280	1602	560	370	931	383	285	4	672
1399-139A		2268	5462	2110	1218	3328	1064	1059	12	2134
1399-143A		2280	11718	4627	3661	8287	1319	2099	13	3431
1399-147A		2289	9791	4020	2918	6939	967	1869	16	2852
1399-152A		2312.5	1173	276	238	514	318	332	9	659
1399-156A		2321	1677	204	156	359	1162	144	12	1317
1399-158A		2324.0	490	77	17	94	350	42	4	396
1399-161A		2335.15	242	114	22	135	61	42	4	107
1399-166A		2350.63	2396	1711	382	2093	121	179	3	303
1399-170		2353-2368	1028	459	149	608	170	245	5	420
1399-173A		2377.55	637	413	112	525	50	58	3	112
1399-177A		2393.65	6703	4276	1181	5457	704	538	3	1246
1399-181A		2414	2217	1257	183	1440	517	251	9	777
1399-183A		2426	1361	781	127	908	317	134	2	452
1399-186A		2449	1739	169	106	275	1232	218	14	1465
1399-190		2472-2487	685	81	72	154	444	85	3	532
1399-195A		2518	1443	148	186	333	896	202	11	1109
1399-198		2532-2539	273	32	22	54	186	32	1	219

S - shale, SS - sandstone, L - limestone, D - dolomite, M - mixed, see Table 1.



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

JOB	LITHO	DEPTH	TOTAL EXTRACT	HYDROCARBONS			NON HYDROCARBONS			
				Saturates	Aromatics	TOTAL	Precipitd. Asphaltenes	Eluted NSO's	Non-eluted NSO's	TOTAL
1399-158A		2324.00-.05	490	77	17	94	350	42	4	396
1399-201A		2325.00-.05	157	80	14	95	44	17	1	62
1399-202A		2326.00-.03	177	93	18	111	46	19	1	66
1399-203A		2327.00-.03	157	81	15	97	45	15	0	60
1399-204A		2328.20-.28	111	51	13	65	32	13	2	47
1399-159		2329.49-.53	132	59	12	71	38	21	1	60
1399-205A		2330.70-.80	255	140	21	161	67	26	2	95
1399-206A		2331.75-.80	243	135	27	162	54	24	3	81
1399-207A		2332.83-.90	293	176	26	202	50	39	1	91
1399-208A		2333.83-.90	201	95	22	117	51	31	2	84
1399-161A		2335.15-.20	242	114	22	135	61	42	4	107
1399-209A		2336.20-.25	199	98	22	120	51	27	1	79
1399-210A		2337.20-.26	183	95	22	117	44	22	1	67
1399-211A		2338.00-.10	242	122	28	150	64	28	0	92
1399-212A		2339.90-40.00	117	55	11	66	33	17	2	51
1399-162		2340.80-.85	127	51	11	62	46	17	2	66
1399-213A		2341.80-.85	639	415	86	501	69	68	1	138
1399-214A		2343.88-.92	770	537	85	622	73	70	6	149
1399-163		2344.20-.24	752	533	65	598	59	95	1	154
1399-215A		2345.00-.07	416	238	47	285	63	62	6	131
1399-216A		2346.10-.14	672	391	106	497	101	71	4	175
1399-164		2347.18-.22	872	571	99	669	114	84	5	203
1399-217A		2348.23-.30	792	507	117	624	88	79	1	168
1399-218B		2349.31-.40	2224	1516	297	1814	226	181	3	410
1399-166A		2350.63-.68	2396	1711	382	2093	121	179	3	303
1399-219A		2351.51-.57	4262	3164	672	3836	143	276	7	426
1399-220A		2352.46-.54	1811	1383	255	1638	63	110	0	173
1399-221A		2353.50-.57	3174	2428	419	2848	65	261	1	327
1399-167		2354.58-.62	7424	5751	901	6652	217	533	22	772
1399-222A		2355.46-.55	5298	4069	818	4887	88	318	6	412
1399-223A		2356.50-.57	1947	1492	297	1789	55	102	1	158
1399-168		2357.65-.70	447	335	46	382	34	31	1	65
1399-169		2358.94-.99	607	426	58	484	83	36	4	123
1399-224A		2360.00-.03	2047	1420	323	1742	149	152	4	305

S - shale, SS - sandstone, L - limestone, D - dolomite, M - mixed, see Table 1.

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



JOB	LITHO	DEPTH	TOTAL EXTRACT	HYDROCARBONS			NON HYDROCARBONS			
				Saturates	Aromatics	TOTAL	Precipd. Asphaltenes	Eluted NSO's	Non-eluted NSO's	TOTAL
1399-225A		2360.92-61.00	2257	1633	281	1914	176	166	0	343
1399-226A		2361.92-62.00	2393	1594	408	2003	185	192	14	391
1399-227A		2362.80-.85	2090	1559	273	1832	98	159	0	258
1399-228A		2363.73-.80	149	86	21	107	31	11	1	42
1399-229A		2364.60-.67	493	328	86	415	41	36	1	78
1399-171		2365.66-.71	222	131	22	152	53	15	1	69
1399-230A		2366.72-.78	352	222	56	278	45	28	1	74
1399-231A		2368.80-.87	246	143	36	180	47	19	0	66
1399-232A		2369.90-.95	247	157	40	197	30	19	1	50
1399-172		2370.95-71.00	1062	774	114	888	76	90	7	174
1399-233A		2372.00-.04	964	654	156	810	82	68	4	154
1399-234A		2372.95-.73	899	646	110	756	55	82	6	143
1399-235A		2373.80-.84	874	577	144	721	73	76	3	152
1399-236A		2374.70-.74	895	633	122	755	69	63	9	140
1399-237A		2375.57-.63	160	64	15	78	66	13	2	81
1399-238A		2376.50-.55	967	684	143	827	59	80	1	140
1399-173A		2377.55-.60	637	413	112	525	50	58	3	112
1399-239A		2378.50-.56	1028	665	149	815	109	103	2	213
1399-240A		2379.50-.57	994	659	144	804	101	88	1	190
1399-241A		2380.50-.58	1074	730	166	896	78	99	1	178
1399-242A		2381.47-.53	47	21	5	26	15	6	0	21
1399-243A		2382.52-.58	1353	913	171	1084	157	110	3	270
1399-244A		2383.51-.60	1379	958	180	1139	126	112	2	241
1399-245A		2384.50-.56	1110	787	136	923	80	97	10	187
1399-246A		2385.50-.58	2908	2133	369	2503	172	232	1	405
1399-175		2386.52-.57	684	495	90	585	41	58	1	99
1399-247A		2386.60-.76	4195	3023	565	3588	299	306	3	607
1399-248A		2388.63-.70	1803	1114	236	1350	309	143	1	453
1399-249A		2389.60-.65	5334	3802	755	4557	264	502	11	777
1399-250A		2390.60-.66	1342	940	193	1133	87	120	2	209
1399-251A		2391.50-.57	1831	1279	264	1544	114	172	2	288
1399-252A		2392.60-.69	1712	1176	244	1420	137	153	2	292
1399-177		2393.65-.70	6703	4276	1181	5457	704	538	3	1246
1399-253A		2394.72-.79	5096	3820	637	4458	192	426	20	639
1399-178		2395.70-.75	482	363	58	421	14	47	1	61
1399-254A		2396.70-.75	2018	1593	189	1782	87	143	6	236
1399-255		2397.38-.43	520	321	57	378	78	63	1	142
1399-179		2398.01-.05	166	98	14	113	40	13	1	53
1399-256A		2398.90-.84	55	28	4	32	15	8	1	24



TABLE 8b
COMPOSITION (NORMALISED %) OF C₁₅₊ MATERIAL

JOB	LITHO	DEPTH	HYDROCARBONS		NON HYDROCARBONS		
GEOCHEM SAMPLE NUMBER			Saturates	Aromatics	Precipitd. Asphaltenes	Eluted NSO's	Non eluted NSO's
1399-038A		1010-1025	15.95	8.64	33.22	41.86	0.33
1399-045A		1110-1125	24.43	8.14	27.15	39.82	0.45
1399-052A		1215-1230	29.36	4.65	53.49	12.21	0.29
1399-058A		1305-1320	14.67	4.67	48.67	30.00	2.00
1399-065A		1410-1425	31.54	10.77	20.00	36.15	1.54
1399-071A		1500-1515	22.62	11.90	23.81	40.48	1.19
1399-077A		1590-1605	18.45	7.77	33.01	39.81	0.97
1399-083A		1680-1695	23.57	17.83	22.93	34.39	1.27
1399-089A		1770-1785	20.22	11.24	20.22	46.07	2.25
1399-093A		1830-1845	14.58	10.42	32.29	41.67	1.04
1399-096A		1875-1890	13.36	7.83	31.34	47.00	0.46
1399-099A		1920-1935	12.03	11.39	34.18	41.14	1.27
1399-103A		1965-1980	9.42	15.79	38.23	35.73	0.83
1399-108A		2025-2040	33.74	17.60	24.69	23.47	0.49
1399-113A		2070-2085	19.05	18.25	24.60	37.30	0.79
1399-117A		2121	14.98	5.80	59.42	18.84	0.97
1399-123A		2175	6.46	3.96	80.00	9.17	0.42
1399-126A		2184	16.45	18.30	43.99	20.70	0.55
1399-136A		2250-2265	24.40	22.63	31.74	20.95	0.27
1399-141A		2265-2280	34.97	23.12	23.92	17.77	0.23
1399-139A		2268	38.63	22.29	19.47	19.38	0.22
1399-143A		2280-5	39.48	31.24	11.25	17.91	0.11
1399-147A		2289	41.06	29.80	9.88	19.09	0.17
1399-152A		2312.5	23.51	20.32	27.09	28.29	0.80
1399-156A		2321	12.14	9.29	69.29	8.57	0.71
1399-158A		2324.0	15.69	3.53	71.37	8.63	0.78
1399-161A		2335.15	46.84	8.95	25.26	17.37	1.58
1399-166A		2350.63	71.41	15.93	5.04	7.49	0.14
1399-170		2353-2368	44.71	14.46	16.54	23.85	0.45
1399-173A		2377.55	64.92	17.54	7.85	9.16	0.52
1399-177A		2393.65	63.79	17.62	10.51	8.03	0.05
1399-181A		2414	56.70	8.24	23.32	11.31	0.42
1399-183A		2426	57.42	9.33	23.31	9.82	0.12
1399-186A		2449	9.72	6.07	70.85	12.55	0.81
1399-190		2472-2487	11.85	10.56	64.81	12.41	0.37
1399-195A		2518	10.23	12.88	62.12	14.02	0.76
1399-198		2532-2539	11.71	8.11	68.02	11.71	0.45
1399-199		FMT 5	78.49	9.71	0.89	10.70	0.22
1399-200		FMT 4	76.91	16.75	0.88	5.34	0.12

S - shale, SS - sandstone, L - limestone, D - dolomite, M - mixed, see Table 1.

TABLE 8b
COMPOSITION (NORMALISED %) OF C₁₅₊ MATERIAL

JOB		DEPTH	HYDROCARBONS		NON HYDROCARBONS		
GEOCHEM SAMPLE NUMBER	LITHO		Saturates	Aromatics	Precipd. Asphaltenes	Eluted NSO's	Non eluted NSO's
1399-158A		2324.00 -.05	15.69	3.53	71.37	8.63	0.78
1399-201A		2325.00 -.05	51.01	9.22	28.24	10.95	0.58
1399-202A		2326.00 -.03	52.56	10.00	26.05	10.93	0.47
1399-203A		2327.00 -.03	51.94	9.72	28.61	9.44	0.28
1399-204A		2328.20 -.28	46.15	11.74	28.74	11.34	2.02
1399-159		2329.49 -.53	44.77	9.39	28.88	16.25	0.72
1399-205A		2330.70 -.80	54.65	8.32	26.26	10.11	0.65
1399-206A		2331.75 -.80	55.56	11.28	22.22	9.78	1.16
1399-207A		2332.83 -.90	60.12	8.74	17.18	13.50	0.46
1399-208A		2333.83 -.90	47.16	11.14	25.55	15.28	0.87
1399-161A		2335.15 -.20	46.84	8.95	25.26	17.37	1.58
1399-209A		2336.20 -.25	49.04	11.06	25.72	13.70	0.48
1399-210A		2337.20 -.26	51.78	11.88	23.99	11.88	0.48
1399-211A		2338.00 -.10	50.19	11.75	26.49	11.38	0.19
1399-212A		2339.90 -40.00	46.72	9.49	28.10	14.23	1.46
1399-162		2340.80 -.85	40.15	8.39	36.13	13.50	1.82
1399-213A		2341.80 -.85	64.97	13.45	10.82	10.59	0.17
1399-214A		2343.88 -.92	69.71	11.00	9.46	9.13	0.71
1399-163		2344.20 -.24	70.87	8.61	7.80	12.60	0.12
1399-215A		2345.00 -.07	57.31	11.21	15.11	15.01	1.36
1399-216A		2346.10 -.14	58.19	15.70	14.96	10.61	0.54
1399-164		2347.18 -.22	65.42	11.30	13.08	9.62	0.58
1399-217A		2348.23 -.30	64.00	14.82	11.07	9.92	0.18
1399-218B		2349.31 -.40	68.17	13.37	10.17	8.16	0.12
1399-166A		2350.63 -.68	71.41	15.93	5.04	7.49	0.14
1399-219A		2351.51 -.57	74.25	15.76	3.36	6.48	0.16
1399-220A		2352.46 -.54	76.35	14.09	3.47	6.07	0.02
1399-221A		2353.50 -.57	76.49	13.21	2.05	8.22	0.03
1399-167		2354.58 -.62	77.47	12.13	2.92	7.18	0.30
1399-222A		2355.46 -.55	76.80	15.43	1.66	5.99	0.11
1399-223A		2356.50 -.57	76.64	15.24	2.84	5.24	0.04
1399-168		2357.65 -.70	75.00	10.36	7.59	6.88	0.18
1399-169		2358.94 -.99	70.26	9.48	13.73	5.92	0.61
1399-224A		2360.00 -.03	69.35	15.76	7.27	7.41	0.21

TABLE 8b
COMPOSITION (NORMALISED %) OF C₁₅₊ MATERIAL

JOB	LITHO	DEPTH	HYDROCARBONS		NON HYDROCARBONS		
			Saturates	Aromatics	Precipd. Asphaltenes	Eluted NSO's	Non eluted NSO's
1399-225A		2360.92-61.00	72.37	12.45	7.81	7.37	0.01
1399-226A		2361.92-62.00	66.62	17.06	7.72	8.01	0.59
1399-227A		2362.80-.85	74.61	13.05	4.71	7.62	0.02
1399-228A		2363.73-.80	57.44	14.29	20.54	7.14	0.60
1399-229A		2364.60-.67	66.67	17.52	8.26	7.35	0.20
1399-171		2365.66-.71	59.03	9.74	23.73	6.90	0.61
1399-230A		2366.72-.78	63.05	15.89	12.84	8.00	0.21
1399-231A		2368.80-.87	58.23	14.77	19.19	7.64	0.17
1399-232A		2369.90-.95	63.82	16.08	12.06	7.71	0.34
1399-172		2370.95-71.00	72.90	10.74	7.20	8.52	0.64
1399-233A		2372.00-.04	67.84	16.15	8.55	7.03	0.43
1399-234A		2372.95-.73	71.87	12.19	6.16	9.07	0.70
1399-235A		2373.80-.84	66.11	16.45	8.37	8.67	0.40
1399-236A		2374.70-.74	70.70	13.66	7.66	6.99	0.98
1399-237A		2375.57-.63	39.83	9.19	41.50	8.36	1.11
1399-238A		2376.50-.55	70.70	14.81	6.09	8.26	0.14
1399-173A		2377.55-.60	64.92	17.54	7.85	9.16	0.52
1399-239A		2378.50-.56	64.70	14.54	10.59	10.00	0.17
1399-240A		2379.50-.57	66.35	14.52	10.17	8.88	0.07
1399-241A		2380.50-.58	67.95	15.45	7.28	9.25	0.06
1399-242A		2381.47-.53	44.85	11.03	31.62	11.76	0.74
1399-243A		2382.52-.58	67.43	12.64	11.61	8.13	0.19
1399-244A		2383.51-.60	69.48	13.08	9.16	8.15	0.14
1399-245A		2384.50-.56	70.94	12.24	7.25	8.71	0.86
1399-246A		2385.50-.58	73.37	12.69	5.92	7.99	0.02
1399-175		2386.52-.57	72.38	13.10	5.97	8.41	0.13
1399-247A		2386.60-.76	72.06	13.46	7.13	7.29	0.06
1399-248A		2388.63-.70	61.80	13.08	17.14	7.93	0.05
1399-249A		2389.60-.65	71.28	14.16	4.95	9.41	0.20
1399-250A		2390.60-.66	70.03	14.40	6.49	8.95	0.13
1399-251A		2391.50-.57	69.86	14.44	6.23	9.37	0.11
1399-252A		2392.60-.69	68.73	14.24	7.98	8.92	0.13
1399-177		2393.65-.70	63.79	17.62	10.51	8.03	0.05
1399-253A		2394.72-.79	74.96	12.50	3.77	8.37	0.40
1399-178		2395.70-.75	75.28	11.99	2.88	9.67	0.19
1399-254A		2396.70-.75	78.95	9.37	4.30	7.07	0.32
1399-255		2397.38-.43	61.71	10.93	15.06	12.20	0.10
1399-179		2398.01-.05	59.27	8.71	23.88	7.58	0.56
1399-256A		2398.90-.94	50.00	7.25	26.81	13.77	2.17

TABLE 9
SIGNIFICANT RATIOS (%) OF C₁₅₊ FRACTIONS AND ORGANIC CARBON



JOB	LITHO	DEPTH	ORGANIC CARBON (wt. %)	HYDROCARBONS / TOTAL EXTRACT	HYDROCARBONS / ORG. CARBON	TOTAL EXTRACT / ORG. CARBON	SATURATES / AROMATICS
1399-038A		1010-1025	1.06	24.58	1.69	6.88	1.85
1399-045A		1110-1125	0.97	32.58	1.77	5.44	3.00
1399-052A		1215-1230	0.82	34.01	4.66	13.71	6.31
1399-058A		1305-1320	0.76	19.33	0.92	4.76	3.14
1399-065A		1410-1425	0.77	42.31	1.17	2.77	2.93
1399-071A		1500-1515	0.76	34.52	1.38	3.98	1.90
1399-077A		1590-1605	0.87	26.21	1.67	6.37	2.37
1399-083A		1680-1695	0.97	41.40	1.31	3.16	1.32
1399-089A		1770-1785	1.01	31.46	0.54	1.70	1.80
1399-093A		1830-1845	0.98	25.00	0.56	2.23	1.40
1399-096A		1875-1890	1.07	21.20	1.13	5.34	1.71
1399-099A		1920-1935	1.22	23.42	0.70	3.00	1.06
1399-103A		1965-1980	1.47	25.21	1.02	4.06	0.60
1399-108A		2025-2040	1.85	51.34	2.81	5.47	1.92
1399-113A		2070-2085	1.59	37.30	1.96	5.25	1.04
1399-117A		2121	0.88	20.77	4.48	21.58	2.58
1399-123A		2175	1.33	10.42	2.01	19.30	1.63
1399-126A		2184	3.89	34.75	1.71	4.93	0.90
1399-136A		2250-2265	2.47	47.04	8.04	17.09	1.08
1399-141A		2265-2280	4.33	58.09	2.15	3.70	1.51
1399-139A		2268	3.60	60.92	9.24	15.17	1.73
1399-143A		2280-5	9.51	70.72	8.71	12.32	1.26
1399-147A		2289	9.83	70.87	7.06	9.96	1.38
1399-152A		2312.5	1.15	43.82	4.47	10.20	1.16
1399-156A		2321	0.81	21.43	4.44	20.70	1.31
1399-158A		2324.0	0.05	19.22	18.85	98.08	4.44
1399-161A		2335.15	0.07	55.79	19.31	34.62	5.24
1399-166A		2350.63	0.07	87.34	299.00	342.34	4.48
1399-170		2353-2368	1.25	59.17	4.86	8.22	3.09
1399-173A		2377.55	0.09	82.46	58.33	70.74	3.70
1399-177A		2393.65	0.13	81.41	419.75	515.59	3.62
1399-181A		2414	0.26	64.94	55.37	85.26	6.88
1399-183A		2426	0.14	66.75	64.87	97.19	6.16
1399-186A		2449	0.71	15.79	3.87	24.50	1.60
1399-190		2472-2487	1.18	22.41	1.30	5.81	1.12
1399-195A		2518	1.11	23.11	3.00	13.00	0.79
1399-198		2532-2539	0.67	19.82	0.81	4.08	1.44

S - shale, SS - sandstone, L - limestone, D - dolomite, M - mixed, see Table 1.

TABLE 9
SIGNIFICANT RATIOS (%) OF C₁₅₊ FRACTIONS AND ORGANIC CARBON

JOB	LITHO	DEPTH	ORGANIC CARBON (wt. %)	HYDROCARBONS	HYDROCARBONS	TOTAL EXTRACT	SATURATES
GEOCHEM SAMPLE NUMBER				TOTAL EXTRACT	ORG. CARBON	ORG. CARBON	AROMATICS
1399-158A		2324.00-.05	0.05	19.22	18.85	98.08	4.44
1399-201A		2325.00-.05	0.05	60.23	18.92	31.42	5.53
1399-202A		2326.00-.03	0.05	62.56	22.18	35.45	5.26
1399-203A		2327.00-.03	0.04	61.67	24.13	39.13	5.34
1399-204A		2328.20-.28	0.06	57.89	10.76	18.58	3.93
1399-159		2329.49-.53	0.06	54.15	11.87	21.92	4.77
1399-205A		2330.70-.80	0.08	62.97	20.10	31.93	6.57
1399-206A		2331.75-.80	0.07	66.83	23.18	34.68	4.93
1399-207A		2332.83-.90	0.08	68.87	25.19	36.58	6.88
1399-208A		2333.83-.90	0.08	58.30	14.64	25.11	4.24
1399-161A		2335.15-.20	0.07	55.79	19.31	34.62	5.24
1399-209A		2336.20-.25	0.07	60.10	17.09	28.43	4.43
1399-210A		2337.20-.26	0.10	63.66	11.67	18.34	4.36
1399-211A		2338.00-.10	0.10	61.94	15.00	24.22	4.27
1399-212A		2339.90-40.00	0.06	56.20	10.93	19.45	4.92
1399-162		2340.80-.85	0.07	48.54	8.83	18.19	4.78
1399-213A		2341.80-.85	0.21	78.42	23.87	30.44	4.83
1399-214A		2343.88-.92	0.11	80.70	56.50	70.01	6.34
1399-163		2344.20-.24	0.23	79.48	25.98	32.69	8.23
1399-215A		2345.00-.07	0.10	68.52	28.48	41.57	5.11
1399-216A		2346.10-.14	0.20	73.90	24.83	33.60	3.71
1399-164		2347.18-.22	0.13	76.72	51.47	67.09	5.79
1399-217A		2348.23-.30	0.17	78.83	36.73	46.59	4.32
1399-218B		2349.31-.40	0.07	81.55	259.10	317.73	5.10
1399-166A		2350.63-.68	0.07	87.34	299.00	342.34	4.48
1399-219A		2351.51-.57	0.06	90.01	639.29	710.27	4.71
1399-220A		2352.46-.54	0.19	90.44	86.19	95.31	5.42
1399-221A		2353.50-.57	0.11	89.70	258.87	288.59	5.79
1399-167		2354.58-.62	0.04	89.60	16.63	1855.99	6.39
1399-222A		2355.46-.55	0.08	92.23	610.84	662.28	4.98
1399-223A		2356.50-.57	0.24	91.88	74.54	81.13	5.03
1399-168		2357.65-.70	0.12	85.36	31.82	37.27	7.24
1399-169		2358.94-.99	0.12	79.74	40.31	50.54	7.41
1399-224A		2360.00-.03	0.13	85.11	134.03	157.47	4.40

TABLE 9
SIGNIFICANT RATIOS (%) OF C₁₅₊ FRACTIONS AND ORGANIC CARBON



JOB	LITHO	DEPTH	ORGANIC CARBON (wt. %)	HYDROCARBONS TOTAL EXTRACT	HYDROCARBONS ORG. CARBON	TOTAL EXTRACT ORG. CARBON	SATURATES AROMATICS
1399-225A		2360.92-61.00	0.14	84.81	136.73	161.22	5.81
1399-226A		2361.92-62.00	0.15	83.68	133.52	159.56	3.90
1399-227A		2362.80-.85	0.13	87.66	140.92	160.76	5.72
1399-228A		2363.73-.80	0.16	71.73	6.69	9.33	4.02
1399-229A		2364.60-.67	0.13	84.19	31.90	37.89	3.80
1399-171		2365.66-.71	0.14	68.76	10.89	15.83	6.06
1399-230A		2366.72-.78	0.11	78.95	25.29	32.03	3.97
1399-231A		2368.80-.87	0.08	73.01	22.47	30.78	3.94
1399-232A		2369.90-.95	0.08	79.90	24.63	30.82	3.97
1399-172		2370.95-71.00	0.05	83.64	177.57	212.30	6.79
1399-233A		2372.00-.04	0.07	83.99	115.65	137.69	4.20
1399-234A		2372.95-.73	0.08	84.07	94.48	112.39	5.90
1399-235A		2373.80-.84	0.08	82.56	90.15	109.20	4.02
1399-236A		2374.70-.74	0.07	84.37	107.85	127.84	5.17
1399-237A		2375.57-.63	0.10	49.03	7.82	15.96	4.33
1399-238A		2376.50-.55	0.07	85.51	118.18	138.21	4.78
1399-173A		2377.55-.60	0.09	82.46	58.33	70.74	3.70
1399-239A		2378.50-.56	0.07	79.24	116.37	146.86	4.45
1399-240A		2379.50-.57	0.08	80.88	100.47	124.22	4.57
1399-241A		2380.50-.58	0.08	83.40	111.94	134.22	4.40
1399-242A		2381.47-.53	0.09	55.88	2.91	5.21	4.07
1399-243A		2382.52-.58	0.04	80.07	270.93	338.36	5.34
1399-244A		2383.51-.60	0.07	82.55	162.67	197.04	5.31
1399-245A		2384.50-.56	0.08	83.18	115.38	138.72	5.79
1399-246A		2385.50-.58	0.08	86.07	312.82	363.46	5.78
1399-175		2386.52-.57	0.20	85.48	29.23	34.19	5.52
1399-247A		2386.60-.76	0.12	85.52	298.98	349.60	5.35
1399-248A		2388.63-.70	0.16	74.88	84.38	112.69	4.72
1399-249A		2389.60-.65	0.11	85.44	414.27	484.88	5.03
1399-250A		2390.60-.66	0.21	84.43	53.94	63.89	4.86
1399-251A		2391.50-.57	0.25	84.29	61.74	73.25	4.84
1399-252A		2392.60-.69	0.19	82.97	74.75	90.10	4.83
1399-177		2393.65-.70	0.13	81.41	419.75	515.59	3.62
1399-253A		2394.72-.79	0.13	87.47	342.88	392.02	5.99
1399-178		2395.70-.75	0.17	87.27	24.75	28.36	6.28
1399-254A		2396.70-.75	0.14	88.31	127.29	144.13	8.43
1399-255		2397.38-.43	0.61	72.64	6.19	8.53	5.65
1399-179		2398.01-.05	0.13	67.98	8.67	12.75	6.81
1399-256A		2398.96-.94	0.10	57.25	3.17	5.53	6.90



TABLE 10
COMPOSITION (NORMALISED %) OF C₁₅₊ SATURATE (PARAFFIN – NAPHTHENE) HYDROCARBONS

GEOCHEM SAMPLE NUMBER	038A	045A	052A	058A	065A	071A	077A	083A
DEPTH	1010-1025m	1110-1125m	1215-1230m	1305-1320m	1410-1425m	1500-1515m	1590-1605m	1680-1595m
SAMPLE TYPE								
nC ₁₅	15.01	14.69	6.35	8.61	19.58	3.85	5.87	5.02
nC ₁₆	13.04	12.11	7.72	11.21	10.90	6.19	8.72	9.49
nC ₁₇	11.20	11.61	7.72	9.11	10.66	10.51	10.34	1.76
nC ₁₈	8.25	10.40	8.38	8.71	10.34	9.95	9.47	11.27
nC ₁₉	3.95	6.06	6.48	5.88	10.18	7.56	9.19	8.36
nC ₂₀	4.37	5.85	5.56	6.84	6.92	5.69	6.41	7.85
nC ₂₁	2.94	3.71	3.20	4.10	4.90	4.08	4.86	7.17
nC ₂₂	3.16	3.69	3.28	5.03	3.78	4.65	4.69	7.24
nC ₂₃	2.64	3.52	3.14	3.42	5.28	3.66	4.79	5.86
nC ₂₄	2.54	2.44	5.74	4.76	3.84	3.17	3.82	5.12
nC ₂₅	3.65	3.45	8.87	4.15	3.55	5.00	3.15	6.31
nC ₂₆	5.09	3.45	5.52	4.23	3.90	2.97	3.95	4.13
nC ₂₇	6.69	4.91	3.60	5.72	3.47	3.09	4.73	4.19
nC ₂₈	4.45	2.65	5.15	3.38	3.12	2.20	2.79	3.24
nC ₂₉	3.73	2.94	4.02	4.73	1.91	3.13	4.54	3.04
nC ₃₀	1.72	1.60	1.37	1.56	2.33	1.91	2.41	1.50
nC ₃₁	1.57	1.92	2.23	3.33	1.72	3.18	4.29	2.27
nC ₃₂	2.45	0.50	2.28	1.54	1.42	4.03	2.30	1.83
nC ₃₃	1.14	1.53	3.38	2.10	0.51	4.41	1.43	1.83
nC ₃₄	1.77	1.36	3.59	0.82	0.24	5.17	0.78	1.55
nC ₃₅	0.66	1.61	1.41	0.75	0.47	5.48	1.47	0.99
PARAFFIN	12.69	11.47	5.22	11.59	9.29	21.29	14.64	12.06
ISOPRENOID	2.04	1.97	0.57	1.34	1.33	2.25	1.70	2.33
NAPHTHENE	85.27	86.56	94.21	87.07	89.38	76.46	83.67	85.62
CPI INDEX 1	1.05	1.14	0.95	0.92	1.05	1.09	1.04	1.08
CPI INDEX 2	1.14	1.46	1.24	1.48	0.90	1.35	1.37	1.30
CPI INDEX 3	1.40	1.61	0.67	1.50	0.99	1.19	1.40	1.13
PRISTANE/PHYTANE	1.72	2.05	1.02	1.65	1.11	1.06	1.05	2.02
PRISTANE/nC ₁₇	0.91	0.99	0.72	0.79	0.71	0.51	0.57	7.30
PHYTANE/nC ₁₈	0.72	0.54	0.65	0.50	0.65	0.52	0.60	0.57

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

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

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



TABLE 10
COMPOSITION (NORMALISED %) OF C₁₅₊ SATURATE (PARAFFIN - NAPHTHENE) HYDROCARBONS

GEOCHEM SAMPLE NUMBER	089A	093A	096A	099A	103A	108A	113A	117A
DEPTH	1770- 1785m	1830- 1845m	1875- 1890m	1920- 1935m	1965- 1980m	2025- 2040m	2070- 2085m	2121m
SAMPLE TYPE								
nC ₁₅	1.35	1.88	5.32	19.91	10.53	4.51	6.37	4.93
nC ₁₆	5.19	4.49	6.81	13.75	8.06	5.76	6.50	5.30
nC ₁₇	5.38	10.75	9.73	8.63	7.10	7.17	6.94	7.54
nC ₁₈	6.02	9.93	9.79	6.18	6.77	6.65	7.09	7.81
nC ₁₉	5.25	8.44	9.19	4.68	6.87	7.99	7.81	7.12
nC ₂₀	5.57	6.34	6.90	5.29	6.18	7.41	6.43	6.56
nC ₂₁	3.26	4.46	5.94	3.75	5.81	6.33	5.54	6.47
nC ₂₂	42.93	5.37	5.35	4.23	5.16	6.46	5.26	6.95
nC ₂₃	3.25	4.37	5.33	3.74	5.57	6.43	5.61	5.53
nC ₂₄	2.54	4.64	4.26	3.57	6.19	5.92	4.52	5.81
nC ₂₅	2.88	9.41	5.83	5.64	6.17	6.54	5.01	7.99
nC ₂₆	1.43	5.04	4.44	3.12	3.34	5.29	4.63	5.18
nC ₂₇	1.52	5.16	4.02	2.47	4.28	4.66	4.12	3.62
nC ₂₈	1.18	5.10	4.75	2.50	2.78	3.94	3.50	3.10
nC ₂₉	1.58	4.01	3.73	3.03	3.73	3.97	6.71	3.76
nC ₃₀	0.90	1.91	2.36	1.46	2.84	2.27	3.66	1.74
nC ₃₁	1.78	1.91	2.95	2.24	2.08	2.66	3.46	2.01
nC ₃₂	0.76	2.64	0.90	1.47	2.53	2.20	1.89	1.77
nC ₃₃	0.85	1.34	1.58	2.01	1.42	1.79	1.65	2.43
nC ₃₄	5.85	2.00	0.58	1.27	1.46	1.40	1.00	2.58
nC ₃₅	0.52	0.70	0.23	0.09	1.12	0.62	2.30	1.81
PARAFFIN	23.06	17.05	20.10	15.46	15.67	17.48	18.64	10.34
ISOPRENOID	1.75	1.65	2.74	1.70	2.18	3.24	2.87	0.98
NAPHTHENE	75.19	81.30	77.16	82.83	82.15	79.28	78.49	88.68
CPI INDEX 1	0.22	1.12	1.07	1.13	1.15	1.03	1.05	1.04
CPI INDEX 2	1.55	1.31	1.19	1.52	1.24	1.16	1.30	1.28
CPI INDEX 3	1.17	1.02	0.88	1.24	1.40	1.01	1.01	0.87
PRISTANE/PHYTANE	1.03	1.14	1.44	2.58	3.15	1.64	2.32	1.26
PRISTANE/nC ₁₇	0.71	0.48	0.83	0.92	1.48	1.61	1.55	0.70
PHYTANE/nC ₁₈	0.62	0.46	0.57	0.50	0.49	1.05	0.65	0.54

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

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

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



TABLE 10
COMPOSITION (NORMALISED %) OF C₁₅₊ SATURATE (PARAFFIN - NAPHTHENE) HYDROCARBONS

GEOCHEM SAMPLE NUMBER	123A	126A	136A	139A	141A	143A	147A	152A
DEPTH	2175m	2184m	2250- 2265m	2268m	2265- 2280m	2280- 5m	2289m	2312- 5m
SAMPLE TYPE								
nC ₁₅	3.70	4.60	9.32	9.58	10.08	10.76	12.08	3.00
nC ₁₆	5.74	6.16	8.54	7.58	9.92	10.60	10.75	4.78
nC ₁₇	8.21	8.05	9.03	8.27	9.08	9.80	11.13	7.18
nC ₁₈	8.64	7.46	7.95	7.41	8.37	8.70	8.86	8.18
nC ₁₉	9.19	8.16	8.65	8.10	6.38	8.96	7.53	10.24
nC ₂₀	8.46	7.79	6.43	7.22	7.18	7.26	9.39	7.45
nC ₂₁	6.57	7.95	6.38	5.84	6.98	5.84	5.96	6.75
nC ₂₂	6.52	6.64	5.62	5.40	5.73	6.40	5.33	6.94
nC ₂₃	5.44	6.33	6.02	6.25	5.69	5.43	4.28	6.34
nC ₂₄	4.95	5.56	4.57	5.24	4.41	4.52	3.56	6.07
nC ₂₅	5.67	6.15	4.88	5.19	3.98	4.76	4.42	6.79
nC ₂₆	5.54	4.00	3.50	4.15	3.15	3.57	2.70	5.30
nC ₂₇	4.13	4.08	3.40	3.34	3.86	2.37	2.32	4.56
nC ₂₈	3.07	3.77	2.75	3.23	2.75	2.32	2.41	3.76
nC ₂₉	3.47	3.48	3.18	3.45	2.71	1.77	1.96	3.41
nC ₃₀	2.46	2.01	2.15	2.31	2.54	1.38	1.31	2.26
nC ₃₁	2.30	1.30	1.50	2.44	1.72	1.06	0.84	2.27
nC ₃₂	1.54	2.16	1.03	1.16	1.01	1.34	0.81	1.08
nC ₃₃	1.90	1.51	2.01	1.71	1.44	1.00	1.00	1.72
nC ₃₄	1.05	1.40	1.84	1.46	1.67	1.21	1.21	1.12
nC ₃₅	1.45	1.46	1.25	0.68	1.35	0.95	2.15	0.81
PARAFFIN	14.29	20.71	15.10	15.58	15.96	10.91	11.47	23.39
ISOPRENOID	1.98	2.16	2.60	2.54	3.08	1.99	2.34	1.98
NAPHTHENE	83.73	77.13	82.30	81.88	80.95	87.10	86.19	74.63
CPI INDEX 1	0.97	1.12	1.14	1.04	1.14	0.97	1.01	1.03
CPI INDEX 2	1.10	1.12	1.19	1.15	1.13	1.00	1.14	1.18
CPI INDEX 3	0.96	1.05	1.09	0.91	1.31	0.80	0.91	1.01
PRISTANE/PHYTANE	2.87	2.90	2.86	2.63	2.07	1.57	1.63	2.16
PRISTANE/nC ₁₇	1.25	0.96	1.41	1.43	1.43	1.13	1.14	0.80
PHYTANE/nC ₁₈	0.41	0.36	0.56	0.60	0.75	0.81	0.87	0.33

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

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

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



TABLE 10
COMPOSITION (NORMALISED %) OF C₁₅₊ SATURATE (PARAFFIN - NAPHTHENE) HYDROCARBONS

GEOCHEM SAMPLE NUMBER	156A	158A	161A	166A	170A	173A	177A	181A
DEPTH	2321m	2324.00 -05m	2335.15 -20m	2350.63 -68m	2353- 2368m	2377.55 -60m	2393.65 -70m	2414m
SAMPLE TYPE								
nC ₁₅	3.29	0.69	1.15	6.22	7.50	3.92	6.55	0.55
nC ₁₆	4.74	0.76	2.80	7.97	8.39	6.01	7.34	2.17
nC ₁₇	6.78	3.07	4.87	8.79	9.88	7.65	8.20	5.21
nC ₁₈	8.52	6.93	7.60	8.85	8.94	7.90	7.93	7.08
nC ₁₉	8.47	10.77	11.28	8.26	9.01	8.07	9.45	9.19
nC ₂₀	8.42	11.62	11.13	7.95	7.95	7.85	7.52	9.12
nC ₂₁	6.75	10.65	10.39	6.84	6.50	7.17	7.04	9.00
nC ₂₂	6.83	10.18	10.25	6.71	6.79	7.15	6.87	8.90
nC ₂₃	6.04	8.29	8.22	6.00	5.37	6.13	6.19	8.53
nC ₂₄	6.02	7.06	7.89	5.47	4.96	5.83	4.70	7.39
nC ₂₅	5.84	7.52	5.74	5.25	5.03	6.05	5.11	7.40
nC ₂₆	4.94	4.44	4.17	3.96	4.34	4.69	3.61	5.78
nC ₂₇	4.14	3.79	3.06	3.38	2.95	3.90	3.50	4.54
nC ₂₈	3.73	3.10	3.27	2.80	2.40	3.54	3.07	3.65
nC ₂₉	3.14	2.80	2.13	2.65	2.79	3.17	2.43	3.31
nC ₃₀	2.14	1.65	1.34	2.04	1.60	2.44	2.29	2.20
nC ₃₁	2.73	1.71	1.13	1.43	1.14	2.10	1.77	1.80
nC ₃₂	1.88	1.43	0.94	1.27	0.99	1.77	1.42	1.16
nC ₃₃	1.78	1.44	0.93	1.56	0.93	1.78	1.64	1.27
nC ₃₄	1.61	1.29	0.91	1.68	1.42	1.86	1.65	0.93
nC ₃₅	2.21	0.81	0.70	0.94	1.13	1.02	1.72	0.81
PARAFFIN	24.92	20.45	22.43	23.60	16.83	24.42	21.72	26.89
ISOPRENOID	1.29	1.32	1.82	2.77	2.55	2.61	2.66	1.53
NAPHTHENE	73.79	78.22	75.75	73.62	80.62	72.97	75.62	71.58
CPI INDEX 1	0.96	1.06	0.94	1.01	0.95	1.10	1.08	1.05
CPI INDEX 2	1.10	1.23	0.98	1.08	1.08	1.16	1.08	1.11
CPI INDEX 3	0.96	1.01	0.82	1.00	0.88	0.98	1.05	0.96
PRISTANE/PHYTANE	1.82	0.53	0.85	1.35	1.71	1.13	1.52	1.33
PRISTANE/nC ₁₇	0.49	0.73	0.77	0.77	0.97	0.55	0.90	1.33
PHYTANE/nC ₁₈	0.22	0.61	0.58	0.56	0.62	0.61	0.61	0.35

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

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

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

CT - ditch cuttings CO - core SWC - sidewall core



TABLE 10
COMPOSITION (NORMALISED %) OF C₁₅₊ SATURATE (PARAFFIN – NAPHTHENE) HYDROCARBONS

GEOCHEM SAMPLE NUMBER	183A	186A	190A	195A	198A
DEPTH	2426m	2449m	2472- 2487m	2518m	2532- 2539m
SAMPLE TYPE					
nC ₁₅	0.38	3.05	3.20	2.19	6.25
nC ₁₆	2.99	5.24	4.52	4.57	6.88
nC ₁₇	8.43	8.73	6.08	8.15	6.58
nC ₁₈	9.25	7.74	6.89	8.75	7.03
nC ₁₉	13.09	6.05	7.41	7.16	5.90
nC ₂₀	10.90	6.91	6.48	6.96	6.76
nC ₂₁	8.64	4.66	6.29	6.36	5.52
nC ₂₂	8.31	4.50	7.13	6.96	5.79
nC ₂₃	6.10	3.93	6.29	5.96	5.34
nC ₂₄	6.42	3.44	5.74	5.77	4.63
nC ₂₅	4.87	8.50	6.36	7.16	4.20
nC ₂₆	3.17	6.95	5.32	4.97	4.71
nC ₂₇	2.90	6.51	5.01	4.37	4.61
nC ₂₈	4.17	6.39	3.98	4.17	3.18
nC ₂₉	2.54	5.12	4.30	3.58	4.13
nC ₃₀	2.05	3.77	3.03	2.58	3.33
nC ₃₁	1.47	2.96	2.47	2.78	3.98
nC ₃₂	2.24	2.18	1.32	2.58	1.97
nC ₃₃	1.00	1.95	3.34	1.19	2.12
nC ₃₄	0.50	0.83	3.33	0.99	2.70
nC ₃₅	0.58	0.59	1.52	2.78	4.40
PARAFFIN	24.76	25.97	30.36	23.93	15.85
ISOPRENOID	2.85	2.37	2.51	1.67	1.58
NAPHTHENE	72.40	71.66	67.13	74.41	82.57
CPI INDEX 1	0.90	1.10	1.03	1.03	0.99
CPI INDEX 2	0.88	1.16	1.17	1.14	1.18
CPI INDEX 3	0.79	0.98	1.08	0.96	1.17
PRISTANE/PHYTANE	1.24	1.13	2.84	1.50	1.57
PRISTANE/nC ₁₇	0.75	0.55	1.00	0.51	0.92
PHYTANE/nC ₁₈	0.55	0.55	0.31	0.32	0.55

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

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

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



TABLE 10
COMPOSITION (NORMALISED %) OF C₁₅₊ SATURATE (PARAFFIN – NAPHTHENE) HYDROCARBONS

GEOCHEM SAMPLE NUMBER	158A	201A	202A	203A	204A	159	205A	206A
DEPTH	2324.00 -05	2325.00 -05	2326.00 -03	2327.00 -03	2328.02 -28	2329.49 -53	2330.70 -80	2331.75 -80
SAMPLE TYPE								
nC ₁₅	8.61	4.43	8.72	5.49	6.86	4.92	0.49	6.79
nC ₁₆	11.21	7.58	9.92	8.62	9.83	7.91	9.52	8.73
nC ₁₇	9.11	9.51	9.48	9.55	9.87	10.88	10.55	9.82
nC ₁₈	8.71	10.41	9.70	9.85	11.13	11.54	10.27	9.25
nC ₁₉	5.88	11.50	10.93	10.03	8.83	13.17	11.39	11.80
nC ₂₀	6.84	9.37	8.93	10.09	9.43	10.07	10.74	9.11
nC ₂₁	4.10	8.03	7.01	8.43	8.43	7.27	7.15	6.78
nC ₂₂	5.03	6.98	6.38	6.62	6.73	6.15	7.08	6.41
nC ₂₃	3.42	6.24	5.13	6.46	5.72	4.81	5.97	5.23
nC ₂₄	4.76	4.90	5.16	4.64	5.02	4.21	5.52	4.87
nC ₂₅	4.15	5.16	4.50	4.25	4.24	4.26	3.38	4.84
nC ₂₆	4.23	3.54	2.74	3.43	3.52	3.02	3.45	3.01
nC ₂₇	5.72	2.79	2.45	2.53	2.82	2.60	2.38	2.76
nC ₂₈	3.38	2.13	1.92	2.32	1.81	1.82	1.92	2.21
nC ₂₉	4.73	1.87	1.62	1.65	1.62	1.71	1.69	1.85
nC ₃₀	1.56	1.27	1.21	1.14	1.19	1.30	4.24	1.53
nC ₃₁	3.33	1.08	0.99	0.94	1.07	1.11	1.06	1.22
nC ₃₂	1.54	1.09	0.60	0.61	0.49	0.81	0.85	0.78
nC ₃₃	2.10	0.93	0.95	1.04	0.81	0.86	0.93	0.99
nC ₃₄	0.82	0.82	1.11	0.82	0.42	-0.86	0.67	1.15
nC ₃₅	0.75	0.37	0.55	1.47	0.17	0.69	0.75	0.86
PARAFFIN	11.59	23.34	22.35	22.62	30.28	24.85	27.78	22.68
ISOPRENOID	1.34	4.13	3.42	3.96	4.16	4.67	4.81	3.45
NAPHTHENE	87.07	71.52	74.22	63.42	65.56	70.48	67.41	73.87
CPI INDEX 1	0.92	1.08	1.00	1.07	1.05	1.03	0.88	1.01
CPI INDEX 2	1.48	1.14	1.17	1.03	1.12	1.16	0.69	1.17
CPI INDEX 3	1.50	0.98	1.05	0.88	1.06	1.07	0.89	1.06
PRISTANE/PHYTANE	1.65	1.33	1.45	1.50	1.18	1.49	1.62	1.49
PRISTANE/nC ₁₇	0.79	1.02	0.96	1.10	0.75	1.03	1.01	0.93
PHYTANE/nC ₁₈	0.61	0.70	0.64	0.71	0.57	0.65	0.64	0.66

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

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

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

CT – ditch cuttings CO – core SWC – sidewall core



TABLE 10
COMPOSITION (NORMALISED %) OF C₁₅+ SATURATE (PARAFFIN – NAPHTHENE) HYDROCARBONS

GEOCHEM SAMPLE NUMBER	207A	208A	161A	209A	210A	211A	212A	162
DEPTH	2332.83 -.90	2333.83 -.90	2335.15 -.20	2336.20 -.25	2337.2 -.26	2328.00 -.10	2339.90 -234900	2340.80 -.85
SAMPLE TYPE								
nC ₁₅	6.45	8.25	1.15	6.76	7.91	6.58	8.30	3.22
nC ₁₆	8.24	10.11	2.80	10.05	13.67	9.56	11.70	6.84
nC ₁₇	11.25	10.47	4.87	11.18	12.15	11.02	11.10	9.21
nC ₁₈	10.07	10.14	7.60	10.72	11.90	10.60	9.43	10.81
nC ₁₉	10.66	9.39	11.28	10.93	7.89	9.83	9.55	14.88
nC ₂₀	9.32	8.79	11.13	8.53	9.36	3.91	8.86	9.77
nC ₂₁	8.04	7.20	10.39	6.94	7.73	7.71	7.22	8.07
nC ₂₂	6.71	6.52	10.25	6.86	5.89	6.50	6.52	6.31
nC ₂₃	6.54	5.03	8.22	5.12	5.50	5.50	5.26	5.21
nC ₂₄	4.24	4.35	7.89	4.44	3.57	4.96	4.38	4.32
nC ₂₅	4.21	3.92	5.74	4.57	3.57	4.98	3.63	4.61
nC ₂₆	2.55	2.74	4.17	2.74	2.63	3.37	2.79	3.83
nC ₂₇	2.95	2.58	3.06	2.56	1.82	2.96	2.51	3.06
nC ₂₈	1.61	2.00	3.27	2.00	1.56	2.55	2.40	2.13
nC ₂₉	1.48	1.80	2.13	1.63	1.17	2.41	1.55	1.82
nC ₃₀	1.95	1.23	1.34	1.01	0.92	1.57	1.43	1.54
nC ₃₁	0.98	1.28	1.13	0.80	0.22	1.47	0.84	1.07
nC ₃₂	0.41	0.73	0.94	0.64	0.45	1.05	0.51	0.94
nC ₃₃	0.40	1.08	0.93	0.97	0.87	1.40	0.68	0.82
nC ₃₄	0.49	1.15	0.91	1.03	0.58	1.35	0.77	1.20
nC ₃₅	1.43	1.23	0.70	0.52	0.57	0.70	0.58	0.34
PARAFFIN	21.78	24.52	22.43	25.74	23.65	21.31	30.48	24.65
ISOPRENOID	3.44	3.82	1.82	4.16	5.04	3.50	5.46	4.53
NAPHTHENE	74.77	71.66	75.75	70.10	71.31	75.19	64.06	70.81
CPI INDEX 1	1.20	1.02	1.01	1.02	1.12	1.17	0.99	1.06
CPI INDEX 2	1.20	1.18	1.08	1.22	1.00	1.17	0.99	1.07
CPI INDEX 3	1.42	1.09	1.00	1.08	0.87	1.00	0.97	1.03
PRISTANE/PHYTANE	1.62	1.45	1.35	1.46	1.81	1.47	1.75	1.69
PRISTANE/nC ₁₇	0.87	0.88	0.77	0.86	1.13	0.88	1.03	1.26
PHYTANE/nC ₁₈	0.60	0.63	0.58	0.61	0.64	0.63	0.69	0.63

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

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

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



TABLE 10
COMPOSITION (NORMALISED %) OF C₁₅₊ SATURATE (PARAFFIN – NAPHTHENE) HYDROCARBONS

GEOCHEM SAMPLE NUMBER	213A	214A	163	215A	216A	164	217A	218A
DEPTH	2341.80 -.85	2343.88 -.92	2344.20 -.24	2345.00 -.07	2346.10 -.14	2347.18 -.22	2348.23 -.30	2349.31 -.40
SAMPLE TYPE								
nC ₁₅	10.59	4.20	8.12	11.90	6.64	6.09	10.10	8.52
nC ₁₆	10.21	5.66	10.24	5.22	8.59	7.95	10.64	9.82
nC ₁₇	9.52	7.06	11.34	11.15	9.60	8.95	10.37	10.28
nC ₁₈	9.05	9.57	10.41	10.01	8.86	8.59	9.68	10.26
nC ₁₉	10.10	9.98	9.60	10.56	8.48	8.37	8.71	9.83
nC ₂₀	8.47	10.55	8.73	8.74	8.67	8.32	8.40	8.36
nC ₂₁	6.40	8.36	7.21	6.64	6.85	7.10	6.94	7.24
nC ₂₂	5.90	7.83	6.13	6.44	6.47	6.65	6.55	6.21
nC ₂₃	5.01	6.00	5.10	4.91	5.49	5.82	5.39	5.39
nC ₂₄	4.54	5.94	4.43	5.26	5.12	5.21	4.89	4.40
nC ₂₅	4.58	5.29	3.82	4.59	5.16	5.16	4.73	4.15
nC ₂₆	3.30	4.31	3.33	3.23	3.61	3.55	2.92	3.18
nC ₂₇	2.84	2.94	2.59	2.52	3.34	3.57	2.79	2.77
nC ₂₈	2.27	2.92	1.95	1.95	2.91	2.97	2.03	2.06
nC ₂₉	1.91	2.03	2.21	2.01	2.57	2.54	1.67	1.97
nC ₃₀	1.49	1.57	1.25	1.34	1.99	2.14	1.20	1.41
nC ₃₁	1.10	1.14	1.03	1.17	1.46	1.55	0.85	1.07
nC ₃₂	1.06	1.78	0.68	0.59	1.34	0.98	0.75	0.66
nC ₃₃	0.93	0.97	0.60	0.77	1.37	1.65	0.65	0.91
nC ₃₄	0.46	1.47	0.79	0.63	0.80	2.07	0.46	0.90
nC ₃₅	0.27	0.44	0.45	0.37	0.67	0.76	0.28	0.61
PARAFFIN	24.05	23.22	40.70	21.87	33.29	28.84	24.22	34.34
ISOPRENOID	3.54	4.31	6.41	3.65	4.40	3.57	3.28	5.44
NAPHTHENE	72.41	72.47	52.88	74.49	62.31	67.59	72.50	60.22
CPI INDEX 1	1.01	0.93	1.05	0.95	1.01	0.95	1.04	1.06
CPI INDEX 2	1.09	0.93	1.13	1.16	1.10	1.01	1.18	1.13
CPI INDEX 3	1.02	0.81	1.09	0.97	1.03	0.90	1.13	1.05
PRISTANE/PHYTANE	1.54	0.44	1.38	1.68	1.33	1.50	1.33	1.51
PRISTANE/nC ₁₇	0.94	0.81	0.80	0.94	0.79	0.90	0.75	0.93
PHYTANE/nC ₁₈	0.64	1.35	0.61	0.62	0.64	0.60	0.60	0.61

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

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

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

TABLE 10
COMPOSITION (NORMALISED %) OF C₁₅+ SATURATE (PARAFFIN - NAPHTHENE) HYDROCARBONS

GEOCHEM SAMPLE NUMBER	166A	219A	220A	221A	167	222A	223A	168
DEPTH	2350.63 -.68	2351.51 -.57	2352.46 -.54	2353.50 -.57	2354.58 -.62	2355.46 -.55	2356.50 -.57	2357.65 -.70
SAMPLE TYPE								
nC ₁₅	6.22	9.39	5.89	8.27	8.63	7.85	5.35	7.01
nC ₁₆	7.97	10.87	7.07	9.93	9.02	8.79	7.82	8.29
nC ₁₇	8.79	11.61	7.98	10.89	9.17	9.23	9.53	9.88
nC ₁₈	8.85	10.25	7.24	10.05	9.19	9.02	10.24	9.70
nC ₁₉	8.26	9.35	7.27	9.88	8.25	8.60	11.82	5.66
nC ₂₀	7.95	9.25	7.78	8.74	7.86	8.73	10.55	9.72
nC ₂₁	6.84	6.99	6.67	7.36	6.89	7.87	8.85	8.10
nC ₂₂	6.71	6.09	6.38	6.43	7.36	7.36	7.51	7.01
nC ₂₃	6.00	4.86	5.58	5.50	5.34	6.09	5.97	6.29
nC ₂₄	5.47	4.24	5.43	4.83	4.53	5.40	5.04	5.64
nC ₂₅	5.25	3.85	5.34	3.90	4.40	5.12	3.70	4.82
nC ₂₆	3.96	2.55	4.05	3.27	3.55	3.26	2.87	3.89
nC ₂₇	3.38	2.23	3.82	2.84	2.88	2.77	2.31	3.05
nC ₂₈	2.80	1.90	3.42	2.11	2.85	2.26	2.11	2.48
nC ₂₉	2.65	1.62	3.01	1.81	2.12	1.91	1.70	2.26
nC ₃₀	2.04	1.17	2.44	1.16	1.65	1.49	1.21	1.61
nC ₃₁	1.43	0.98	1.84	0.93	1.32	1.07	0.93	1.40
nC ₃₂	1.27	1.03	3.16	0.62	1.10	0.95	0.72	0.91
nC ₃₃	1.56	0.68	1.88	0.51	1.18	0.97	0.96	0.80
nC ₃₄	1.68	0.59	2.16	0.60	1.52	0.75	0.45	1.04
nC ₃₅	0.94	0.52	1.60	0.36	1.18	0.50	0.37	0.42
PARAFFIN	22.43	30.06	32.26	46.13	22.99	27.24	42.32	38.67
ISOPRENOID	2.77	4.89	3.61	6.91	3.15	3.52	5.54	5.37
NAPHTHENE	73.62	65.05	64.14	46.96	73.86	69.23	52.14	55.95
CPI INDEX 1	1.01	1.01	1.01	1.01	0.95	1.04	1.00	1.01
CPI INDEX 2	1.08	1.09	0.99	1.08	1.01	1.12	1.01	1.07
CPI INDEX 3	1.00	1.00	1.02	1.06	0.90	1.00	0.93	0.96
PRISTANE/PHYTANE	1.35	1.50	1.39	1.57	1.50	1.27	1.35	1.39
PRISTANE/nC ₁₇	0.77	0.84	0.81	0.84	0.90	0.78	0.79	0.82
PHYTANE/nC ₁₈	0.56	0.64	0.65	0.58	0.60	0.63	0.54	0.60

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

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

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



TABLE 10
COMPOSITION (NORMALISED %) OF C₁₅₊ SATURATE (PARAFFIN - NAPHTHENE) HYDROCARBONS

GEOCHEM SAMPLE NUMBER	169	224A	225A	226A	227A	228A	229A	171
DEPTH	2358.94 -.99	2360.00 -.03	2360.92 -.00	2361.92 2362,00	2362,80 -.85	2363,73 -.80	2364,60 -.67	2365,66 -.77
SAMPLE TYPE								
nC ₁₅	3.18	1.89	3.30	5.71	4.71	3.43	4.49	4.14
nC ₁₆	5.91	4.48	5.58	7.67	7.08	6.05	6.78	6.85
nC ₁₇	7.58	2.53	7.56	8.84	8.57	7.72	8.20	8.11
nC ₁₈	7.81	2.84	7.71	9.10	8.91	8.45	8.96	8.90
nC ₁₉	9.40	11.75	7.94	8.60	8.94	9.46	9.14	8.60
nC ₂₀	7.60	9.14	8.77	8.88	9.40	8.79	8.78	9.19
nC ₂₁	6.97	11.45	7.34	7.40	7.80	7.93	8.00	8.56
nC ₂₂	7.07	11.34	6.88	6.99	7.69	6.97	7.38	7.33
nC ₂₃	6.18	9.98	6.17	5.76	6.63	6.23	6.52	6.17
nC ₂₄	5.29	8.80	5.85	5.27	5.82	5.76	6.02	5.64
nC ₂₅	5.53	6.78	5.80	4.73	4.79	5.57	4.65	4.61
nC ₂₆	4.95	5.24	4.27	3.54	3.69	4.03	4.22	4.12
nC ₂₇	4.13	4.15	3.91	3.22	3.28	3.69	3.60	3.90
nC ₂₈	3.55	2.90	3.36	2.78	2.26	3.28	2.86	3.08
nC ₂₉	3.14	2.69	2.93	2.47	2.59	3.02	2.83	2.53
nC ₃₀	2.67	1.54	2.23	1.91	1.85	2.14	1.78	2.01
nC ₃₁	2.24	1.16	1.59	1.55	1.43	1.94	1.44	1.69
nC ₃₂	1.33	0.75	2.81	1.37	0.99	1.48	0.91	1.05
nC ₃₃	1.83	0.26	2.54	1.47	1.34	1.60	1.19	1.17
nC ₃₄	2.13	0.20	2.11	1.58	1.37	1.36	1.22	1.56
nC ₃₅	1.51	0.12	1.34	1.16	0.85	1.08	1.03	0.79
PARAFFIN	27.76	89.67	43.17	28.34	30.19	27.36	56.90	30.28
ISOPRENOID	2.95	4.81	4.77	3.75	4.08	3.11	6.80	3.78
NAPHTHENE	69.29	5.52	52.06	67.91	65.74	69.53	36.30	65.94
CPI INDEX 1	1.00	1.04	1.02	1.00	1.00	1.04	0.99	1.02
CPI INDEX 2	1.06	1.11	1.01	1.07	1.13	1.12	1.06	1.05
CPI INDEX 3	0.97	1.02	1.02	1.02	1.10	1.01	1.02	1.08
PRISTANE/PHYTANE	1.33	0.89	1.24	1.30	1.36	1.25	1.38	1.34
PRISTANE/nC ₁₇	0.80	1.00	0.81	0.84	0.91	0.82	0.84	0.88
PHYTANE/nC ₁₈	0.58	1.00	0.64	0.63	0.64	0.60	0.56	0.60

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

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

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

TABLE 10
COMPOSITION (NORMALISED %) OF C₁₅+ SATURATE (PARAFFIN - NAPHTHENE) HYDROCARBONS

GEOCHEM SAMPLE NUMBER	230A	231A	232A	172	233A	234A	235A	236A
DEPTH	2366,72 -.78	2368,80 -.87	2369,90 -.95	2370,95 2371.00	2372,00 -.04	2372,95 -.00	2373,80 -.85	2374,70 -.84
SAMPLE TYPE								
nC ₁₅	3.19	1.70	4.46	4.98	4.90	3.91	3.92	3.68
nC ₁₆	5.26	3.80	7.89	4.76	7.16	6.65	5.26	5.01
nC ₁₇	7.28	6.20	10.25	8.83	9.06	8.76	7.27	6.41
nC ₁₈	8.30	8.74	10.48	9.42	9.56	9.83	7.38	7.27
nC ₁₉	8.60	9.02	11.10	8.10	11.12	10.64	10.09	10.06
nC ₂₀	9.50	10.08	9.33	9.21	9.68	10.54	8.85	9.26
nC ₂₁	7.86	9.30	7.57	8.69	7.53	8.67	7.66	8.16
nC ₂₂	7.54	9.09	7.17	7.99	6.78	8.22	7.06	7.39
nC ₂₃	6.26	8.32	5.38	6.96	5.88	6.51	5.88	7.10
nC ₂₄	5.82	7.22	5.56	5.97	5.07	5.75	6.41	6.91
nC ₂₅	5.28	5.34	4.10	5.92	4.61	4.31	5.72	6.32
nC ₂₆	4.00	4.14	3.20	4.60	3.24	3.53	4.24	4.51
nC ₂₇	3.74	3.50	2.58	3.50	2.95	2.73	4.08	3.38
nC ₂₈	3.21	2.80	1.98	2.56	2.45	1.99	3.40	2.80
nC ₂₉	3.02	2.47	1.87	2.62	2.18	1.85	2.95	2.59
nC ₃₀	2.49	1.63	1.65	1.59	1.76	1.28	2.52	1.94
nC ₃₁	1.91	1.78	1.08	1.40	1.35	0.96	2.11	1.56
nC ₃₂	1.73	0.93	1.10	0.83	1.18	0.79	1.36	1.42
nC ₃₃	1.69	1.42	1.36	0.84	1.36	1.05	1.56	1.47
nC ₃₄	1.78	1.86	1.00	0.68	1.32	1.11	1.62	1.57
nC ₃₅	1.54	0.65	0.87	0.54	0.85	0.91	0.69	1.19
PARAFFIN	32.19	36.15	61.09	55.07	27.64	49.77	30.79	25.39
ISOPRENOID	3.80	3.49	8.49	7.13	3.84	6.59	3.54	2.80
NAPHTHENE	64.01	60.36	30.42	37.80	68.52	43.63	65.67	71.81
CPI INDEX 1	0.99	1.00	0.94	1.04	1.02	0.97	0.99	1.02
CPI INDEX 2	1.06	1.10	1.00	1.16	1.09	1.04	1.09	1.08
CPI INDEX 3	1.04	1.01	1.00	0.98	1.04	0.99	1.07	0.92
PRISTANE/PHYTANE	1.22	1.07	1.48	1.44	1.25	1.31	1.26	1.20
PRISTANE/nC ₁₇	0.89	0.81	0.81	0.87	0.85	0.86	0.88	0.94
PHYTANE/nC ₁₈	0.64	0.53	0.54	0.56	0.65	0.58	0.69	0.69

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

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

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



TABLE 10
COMPOSITION (NORMALISED %) OF C₁₅+ SATURATE (PARAFFIN - NAPHTHENE) HYDROCARBONS

GEOCHEM SAMPLE NUMBER	237A	238A	173A	239A	240A	241A	242A	243A
DEPTH	2375,57 -.63	2376,50 -.55	2377,55 -.60	2378,50 -.56	2379,50 -.57	2380,50 -.58	2381,47 -.53	2382,52 -.58
SAMPLE TYPE								
nC ₁₅	3.09	4.28	3.92	3.68	4.90	4.30	1.78	3.43
nC ₁₆	5.95	5.88	6.01	5.75	7.02	5.63	5.01	5.07
nC ₁₇	8.58	7.11	7.65	7.69	8.43	6.92	8.64	6.57
nC ₁₈	9.82	7.58	7.90	9.43	8.55	7.70	9.44	6.89
nC ₁₉	9.93	9.05	8.07	10.90	9.00	8.14	11.04	7.37
nC ₂₀	10.19	8.46	7.85	10.07	9.11	9.77	9.67	8.28
nC ₂₁	7.61	7.53	7.17	8.61	7.79	7.50	7.68	7.44
nC ₂₂	6.69	7.86	7.15	7.96	7.27	6.95	1.04	7.30
nC ₂₃	5.70	7.21	6.13	6.88	6.05	6.45	5.93	6.74
nC ₂₄	6.09	5.72	5.83	6.08	5.50	7.66	5.95	6.32
nC ₂₅	5.15	5.32	6.05	5.66	5.15	5.82	6.01	6.27
nC ₂₆	3.91	4.41	4.69	4.04	3.76	4.08	4.17	4.69
nC ₂₇	3.18	3.66	3.90	3.36	3.29	3.60	3.89	4.47
nC ₂₈	2.62	3.22	3.54	2.34	2.80	3.34	3.25	3.78
nC ₂₉	2.61	2.92	3.17	3.29	2.41	2.60	3.43	3.36
nC ₃₀	1.90	2.26	2.44	1.55	1.87	1.94	2.70	2.73
nC ₃₁	2.00	1.85	2.10	1.01	1.36	1.70	2.66	2.08
nC ₃₂	1.37	1.27	1.77	0.69	1.83	1.54	2.11	1.99
nC ₃₃	1.67	1.43	1.78	0.42	1.54	1.51	2.16	1.80
nC ₃₄	1.35	1.58	1.86	0.34	1.31	1.47	1.93	1.93
nC ₃₅	0.60	1.39	1.02	0.24	1.05	1.38	1.50	1.49
PARAFFIN	32.59	29.10	24.42	74.02	31.65	27.84	26.18	32.75
ISOPRENOID	4.61	3.42	2.61	9.86	4.27	3.17	3.20	3.48
NAPHTHENE	62.80	67.48	72.97	16.12	64.08	69.00	70.61	63.76
CPI INDEX 1	0.96	1.01	1.00	1.04	1.01	0.94	1.38	1.03
CPI INDEX 2	1.11	1.06	1.07	1.25	1.03	1.03	1.15	1.08
CPI INDEX 3	0.98	0.96	0.95	1.05	1.00	0.97	1.05	1.06
PRISTANE/PHYTANE	1.31	1.43	1.22	1.34	1.40	1.34	1.10	1.28
PRISTANE/nC ₁₇	0.94	0.97	0.77	0.99	0.94	0.94	0.74	0.91
PHYTANE/nC ₁₈	0.62	0.64	0.61	0.60	0.66	0.63	0.62	0.68

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

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

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



TABLE 10
COMPOSITION (NORMALISED %) OF C₁₅+ SATURATE (PARAFFIN – NAPHTHENE) HYDROCARBONS

GEOCHEM SAMPLE NUMBER	244A	245A	246A	175	247A	248A	249A	250A
DEPTH	2383,51 -.61	2384,50 -.56	2385,50 -.58	2386,52 -.57	2387,60 -.67	2388,63 -.70	2389,60 -.65	2390,60 -.16
SAMPLE TYPE								
nC ₁₅	3.29	3.93	5.67	6.02	3.01	5.73	6.04	2.97
nC ₁₆	5.09	5.93	6.46	7.19	4.73	7.40	6.70	4.88
nC ₁₇	6.37	7.41	7.50	8.21	6.32	8.14	7.21	6.06
nC ₁₈	7.92	8.74	7.68	7.51	6.74	8.84	7.35	6.61
nC ₁₉	8.25	11.01	8.15	8.88	7.57	9.40	7.77	8.57
nC ₂₀	9.37	9.01	8.19	7.88	8.37	8.54	8.12	8.15
nC ₂₁	9.25	7.50	7.46	6.75	7.69	6.97	7.78	7.59
nC ₂₂	8.56	7.15	7.38	6.50	7.66	6.77	7.75	7.76
nC ₂₃	2.54	6.08	6.38	5.89	6.62	5.71	7.04	6.41
nC ₂₄	6.73	5.71	6.02	5.34	7.29	5.15	6.66	6.39
nC ₂₅	6.78	5.69	5.70	5.89	6.64	4.98	6.26	5.66
nC ₂₆	5.46	3.95	4.20	4.09	4.83	3.75	4.34	4.37
nC ₂₇	4.23	3.46	3.86	3.83	4.77	3.41	3.73	4.27
nC ₂₈	3.31	2.87	3.14	3.27	3.41	2.73	2.94	3.72
nC ₂₉	3.09	2.75	2.72	2.97	3.19	3.12	2.46	3.83
nC ₃₀	2.44	2.16	2.19	2.32	2.50	1.85	1.94	2.92
nC ₃₁	1.71	1.96	1.66	1.80	2.13	1.56	1.46	2.58
nC ₃₂	1.46	1.15	1.35	1.26	1.46	1.03	1.31	2.03
nC ₃₃	1.45	1.29	1.34	1.78	1.56	1.28	1.21	1.86
nC ₃₄	1.55	1.46	1.53	1.77	1.80	2.00	1.05	2.13
nC ₃₅	1.16	0.78	1.43	0.88	1.71	1.63	0.89	1.23
PARAFFIN	25.32	34.93	31.65	36.13	39.74	60.47	26.72	41.15
ISOPRENOID	2.89	4.37	3.63	3.85	3.88	7.48	2.99	3.79
NAPHTHENE	71.79	60.70	64.72	60.02	56.37	32.05	70.29	55.06
CPI INDEX 1	0.85	1.02	1.02	1.05	1.01	1.01	1.03	0.99
CPI INDEX 2	1.06	1.16	1.09	1.14	1.15	1.18	1.10	1.10
CPI INDEX 3	0.96	1.01	1.05	1.04	1.16	1.05	1.03	1.05
PRISTANE/PHYTANE	1.13	1.22	1.27	1.42	1.24	1.42	1.27	1.20
PRISTANE/nC ₁₇	0.95	0.93	0.86	0.76	0.86	0.89	0.87	0.83
PHYTANE/nC ₁₈	0.68	0.65	0.66	0.59	0.65	0.58	0.67	0.63

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

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

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



TABLE 10
COMPOSITION (NORMALISED %) OF C₁₅+ SATURATE (PARAFFIN – NAPHTHENE) HYDROCARBONS

GEOCHEM SAMPLE NUMBER	251A	252A	177	253A	178	254A	255	179
DEPTH	2391,50 -.57	2392,60 -.69	2393,65 -.70	2394,72 -.79	2395,70 -.75	2396,70 -.75	2397,38 -.47	2398,01 -.05
SAMPLE TYPE								
nC ₁₅	5.17	6.74	6.55	5.84	5.24	7.22	6.81	1.96
nC ₁₆	6.31	8.03	7.34	7.42	6.66	7.91	7.88	6.19
nC ₁₇	8.21	9.52	8.20	8.83	7.67	9.29	8.68	7.82
nC ₁₈	7.88	8.82	7.93	8.95	8.12	9.06	7.94	9.17
nC ₁₉	8.17	10.06	9.45	9.45	7.96	9.81	8.45	8.52
nC ₂₀	8.38	8.76	7.52	9.32	8.86	10.11	8.83	10.28
nC ₂₁	7.35	7.16	7.04	8.17	7.00	8.23	7.38	9.03
nC ₂₂	7.05	6.43	6.87	7.47	6.44	7.12	6.94	8.51
nC ₂₃	6.34	5.88	6.19	6.51	5.81	5.55	6.05	6.89
nC ₂₄	5.80	5.42	4.70	5.58	5.02	4.62	4.81	5.56
nC ₂₅	5.84	2.48	5.11	4.98	5.52	5.24	5.03	6.02
nC ₂₆	4.40	3.75	3.61	3.50	3.78	3.17	3.13	4.35
nC ₂₇	3.96	3.72	3.50	3.22	3.66	2.71	2.99	3.47
nC ₂₈	3.00	2.86	3.07	2.47	3.31	2.22	2.60	2.60
nC ₂₉	3.03	2.68	2.43	2.07	3.23	1.61	2.17	2.95
nC ₃₀	2.23	2.08	2.29	1.46	2.52	1.48	1.67	1.96
nC ₃₁	1.63	1.93	1.77	1.15	2.78	1.32	1.53	1.81
nC ₃₂	1.06	1.18	1.42	0.70	1.75	0.99	2.34	1.06
nC ₃₃	1.50	0.86	1.64	1.10	1.76	0.86	1.73	0.79
nC ₃₄	1.46	1.06	1.65	1.27	1.65	0.76	1.61	0.67
nC ₃₅	1.22	0.57	1.72	0.54	1.27	0.73	1.43	0.39
PARAFFIN	51.44	38.54	21.72	24.75	24.71	23.23	32.65	54.92
ISOPRENOID	5.85	5.44	2.66	3.19	2.45	3.04	3.38	5.62
NAPHTHENE	42.71	56.02	75.62	72.06	72.84	73.74	63.97	39.46
CPI INDEX 1	1.04	0.92	1.08	1.04	1.05	1.07	1.07	1.05
CPI INDEX 2	1.14	0.93	1.08	1.14	1.19	1.17	1.08	1.21
CPI INDEX 3	1.07	1.13	1.05	1.08	1.03	1.01	1.04	1.00
PRISTANE/PHYTANE	1.38	1.39	1.52	1.35	1.39	1.47	1.47	1.32
PRISTANE/nC ₁₇	0.80	0.86	0.90	0.84	0.75	0.84	0.71	0.74
PHYTANE/nC ₁₈	0.61	0.67	0.61	0.61	0.51	0.59	0.71	0.48

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

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

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



TABLE 10
COMPOSITION (NORMALISED %) OF C₁₅₊ SATURATE (PARAFFIN – NAPHTHENE) HYDROCARBONS

GEOCHEM SAMPLE NUMBER	256A
DEPTH	2998,90 -.94
SAMPLE TYPE	
nC ₁₅	1.22
nC ₁₆	3.71
nC ₁₇	6.58
nC ₁₈	8.48
nC ₁₉	9.69
nC ₂₀	10.83
nC ₂₁	8.60
nC ₂₂	7.82
nC ₂₃	6.51
nC ₂₄	5.20
nC ₂₅	5.72
nC ₂₆	4.54
nC ₂₇	3.41
nC ₂₈	3.09
nC ₂₉	3.22
nC ₃₀	2.57
nC ₃₁	2.69
nC ₃₂	1.66
nC ₃₃	1.71
nC ₃₄	1.52
nC ₃₅	1.24
PARAFFIN	27.88
ISOPRENOID	2.74
NAPHTHENE	69.38
CPI INDEX 1	1.01
CPI INDEX 2	1.12
CPI INDEX 3	0.89
PRISTANE/PHYTANE	1.07
PRISTANE/nC ₁₇	0.77
PHYTANE/nC ₁₈	0.56

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

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

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

NBS 22 STANDARD -29.75 -29.82

TABLE 11
CARBON ISOTOPE COMPOSITIONS (‰, PDB)

GEOCHEM SAMPLE NUMBER	DEPTH	TOTAL EXTRACT WHOLE OIL	SATURATES	AROMATICS	NSO	ASPHALTENES	KEROGEN	PYROLYSATE S2
1399-038A	1010-1025m	-27.22	-28.05	*	-27.31	-28.07	-24.93	
1399-045A	1110-1125m	-27.72	-28.04	*	-28.27	-28.94	-26.37	
1399-052A	1215-1230m	-28.05	-28.78	*	-28.55	-28.27	-25.94	
1399-058A	1305-1320m	-28.98	-28.44	-27.54	-29.11	-29.82	-25.30	
1399-065A	1410-1425m	-27.56	-27.77	-28.08	-27.86	-28.72	-24.89	
1399-071A	1500-1515m	-27.70	-28.30	-27.36	-28.31	-28.96	-25.58	
1399-077A	1590-1605m	-28.40	*			-29.08	-25.55	
1399-083A	1680-1695m	-28.42	-27.90	-27.52	-28.17	-27.81	-25.48	
1399-089A	1770-1785m	-27.79	-28.38	-28.12	-28.06	-28.62	-25.33	
1399-093A	1830-1845m	-28.33	*	*	-27.40	-27.80	-24.87	
1399-096A	1875-1890m	-27.21	-28.08	*	-28.48	-28.47	-24.46	
1399-099A	1920-1935m	-27.48	-27.71	*	-27.45	-28.16	-24.68	
1399-103A	1965-1980m	-25.47	-27.09	*	-26.07	-26.09	-23.62	
1399-108A	2025-2040m	-28.78	-30.38	-28.78	-28.20	-27.98	-26.12	
1399-113A	2070-2085m	-27.36	-29.38	-27.19	-27.45	-26.48	-24.47	
1399-117A	2121	-27.41	-28.29	-26.71	-28.49	-28.51	-24.84	
1399-123A	2175	-28.03	-28.13	-27.00	-28.52	-27.52	-26.68	

* SAMPLE LIMITED



NBS 22 STANDARD	-29.78	-29.71
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TABLE 11
CARBON ISOTOPE COMPOSITIONS (‰, PDB)

GEOCHEM SAMPLE NUMBER	DEPTH	TOTAL EXTRACT WHOLE OIL	SATURATES	AROMATICS	NSO	ASPHALTENES	KEROGEN	PYROLYSATE S2
1399-126A	2184m	-26.94	-28.11	-26.89	-27.24	-26.75	-26.24	
1399-136A	2250-2265m	-27.89	-29.52	-28.01	-28.14	-27.92	-27.00	
1399-139A	2268m	-29.08	-30.10	-28.68	-28.27	-27.75	-28.16	
1399-141A	2265-2280m	-29.97	-30.17	-28.74	-28.40	-28.69	-28.78	
1399-143A	2280.5m	-28.52	-29.02	-27.96	-27.76	-27.55	-26.94	
1399-147A	2289m	-27.98	-29.04	-27.65	-27.98	-27.65	-27.16	
1399-152A	2312.5m	-26.75	-27.02	-26.28	-27.63	-27.51	-25.51	
1399-156A	2321m	-27.21	-26.61	-25.83	-27.45	-28.86	-26.51	
1399-158A	2324.00-05m	-28.30	-28.46	-26.74	-29.05	-30.06	-28.34	
1399-161A	2335.15-20m	-28.05	-29.06	-26.92	-28.10	-28.68	SAND	
1399-166A	2350.63-68m	-29.16	-29.33	-27.24	-28.13	-29.37	SAND	
1399-170	2353-2368m	-28.36	-28.79	-28.08	-27.84	-27.71	SAND	
1399-173A	2377.55-60m	-29.01	-29.33	-27.81	-28.72	-29.41	SAND	
1399-177A	2393.65-70m	-28.64	-29.28	-27.64	-28.04	-28.39	SAND	
1399-181A	2414m	*	-29.77	-27.64	-28.08	-28.02	SAND	
1399-183A	2426m	*	-29.90	-28.02	-28.06	-29.12	SAND	
1399-186A	2449m	-27.75	-28.42	-26.02	-27.84	-27.41	-24.89	



NBS 22 STANDARD -29.84 -29.87

TABLE 11
CARBON ISOTOPE COMPOSITIONS (‰, PDB)

GEOCHEM SAMPLE NUMBER	DEPTH	TOTAL EXTRACT WHOLE OIL	SATURATES	AROMATICS	NSO	ASPHALTENES	KEROGEN	PYROLYSATE S2
1399-190	2472-2487m	-26.88	-28.71	-26.32	-27.43	-26.71	-25.42	
1399-195A	2518m	-27.64	-28.05	-26.56	-27.66	-27.13	-25.61	
1399-198	2532-2539m	-27.56	-28.37	-27.30	-28.53	-28.06	-25.47	
1399-199	2328m (# 5 Oil)	-30.49	-28.42	-27.46	-29.08	-29.31		
1399-200	2355m (# 4 Oil)	-30.81	-31.66	-30.16	-27.23	-28.65		



TABLE 11

NBS 22 STANDARD -29.81; -29.76; 29.84 CARBON ISOTOPE COMPOSITIONS (‰, PDB)

GEOCHEM SAMPLE NUMBER	DEPTH	TOTAL EXTRACT WHOLE OIL	SATURATES	AROMATICS	NSO	ASPHALTENES	KEROGEN	PYROLYSATE S2
1399-213A	2341.80m	-29.06	-29.71	-27.24	-28.07	-27.20		
1399-167	2354.58m	-28.99	-29.26	-27.37	-28.03	-28.87		
1399-224A	2360.00m	-28.57	-29.13	-27.54	-28.19	-28.18		
1399-227A	2362.80m	-29.00	-29.04	-27.36	-27.91	-27.71		
1399-233A	2372.00m	-28.92	-29.25	-27.54	-28.39	-28.01		
1399-235A	2373.80m	-28.75	-29.19	-27.84	-28.10	-28.07		
1399-243A	2382.52m	-28.59	-29.24	-27.55	-28.23	-27.59		
1399-247A	2386.60m	-29.01	-29.17	-27.37	-27.91	-28.30		
1399-249A	2389.60m	-28.88	-29.33	-27.32	-27.86	-27.89		
1399-254A	2396.70m	-30.07	-30.46	-27.95	-28.26	-28.77		



**TABLE 12
BIOMARKER MOLECULAR RATIOS**

GEOCHEM SAMPLE NUMBER	SAMPLE DEPTH/ IDENTITY	SAMPLE TYPE	STERANES (m/z 217, 218)				TERPANES (m/z 191, 177)					
			$C_{29} \frac{\alpha\alpha\alpha\alpha\ 20S\ [O]}{\alpha\alpha\alpha\alpha\ 20R\ [T]}$	$C_{29} \frac{\alpha\beta\beta\ 20R\ [R]}{\alpha\alpha\alpha\alpha\ 20R\ [T]}$	$C_{27} \frac{20SDIAST\ [A]}{20RDIAST\ [B]}$	$\frac{C_{27}\ \beta\beta}{C_{29}\ \beta\beta}^{(218)}$	$\frac{Tm\ [B]}{Ts\ [A]}$	$\frac{C_{29}\ 17\alpha-NH\ [C]}{[C] + C_{30}\ 17\alpha-H\ [E]}$	$C_{29} \frac{NM\ [D]}{[D] + NH\ [C]}$	$\frac{28, 30-BNH\ [Z]}{[Z] + C_{29}\ 17-NH\ [C]}$	$\frac{28, 30-BNH\ [Z]}{[Z] + 25, 28, 30-TNH\ [177]}$	$C_{31} \frac{20S\ [G]}{[G] + 20R\ [H]} \%$
1399-045	1110-1125	----	0.65	-----	1.65	1.70	1.00	0.42	0.26	0.12	-----	43.1
1399-052	1215-1230											
1399-058	1305-1320	----	2.77	-----	1.39	-----	1.09	0.28	-----	-----	-----	44.9
1399-065	1418-1425	----	0.90	-----	1.36	0.47	2.13	0.51	0.21	-----	-----	55.2
1399-071	1500-1515		0.63	-----	1.00	0.95	0.73	0.46	0.17	-----	-----	55.9
1399-077	1590-1605		0.84	0.47	1.00	0.91	1.33	0.51	0.12	-----	-----	55.5
1399-083	1680-1695	----	0.52	0.30	1.21	0.77	1.89	0.46	0.24	-----	-----	48.9
1399-089	1770-1785	----	0.43	0.48	1.09	0.64	7.08	0.50	0.29	-----	-----	54.4
1399-093	1830-1845	----	0.74	0.64	1.26	0.77	2.43	0.44	0.21	-----	-----	49.5
1399-096	1875-1890	----	0.67	-----	1.29	0.53	-----	0.50	0.27	-----	-----	57.1
1399-108	2025-2040		0.61	-----	1.76	-----	3.69	0.50	0.11	0.07	-----	60.5
1399-117	2121	----	0.96	0.26	1.20	1.46	7.02	0.48	0.17	-----	-----	62.1
1399-126	2184	----	0.82	-----	1.64	1.16	-----	0.47	0.14	-----	-----	62.4
1399-136	2250-2265		-----	-----	1.67	0.47	-----	0.42	0.31	-----	-----	65.0
1399-139	2268		-----	-----	1.46	1.06	0.97	0.33	-----	0.10	-----	62.6
1399-141	2265-2280	----	1.79	0.80	1.61	1.47	0.86	0.35	-----	-----	-----	
1399-143	2280.5	----	1.63	-----	1.30	0.97	0.71	0.37	-----	-----	-----	59.4
1399-147	2289	----	2.42	-----	1.82	0.95	0.76	0.11	-----	-----	-----	64.7
1399-152	2312.5		0.94	-----	1.49	0.74	2.57	0.38	-----	-----	-----	60.0
1399-156	2321	----	-----	-----	1.53	0.83	3.18	0.39	-----	0.18	-----	61.2

[A] etc. REFERS TO IDENTIFICATION ON APPROPRIATE MASS FRAGMENTOGRAM DIAST – DIASTERANES H – HOPANE NH – NORHOPANE BNH – BSNORHOPANE

CT – ditch cuttings CO – core SWC – sidewall core

TNH – TRISNORHOPANE NM – NORMORETANE



TABLE 12
BIOMARKER MOLECULAR RATIOS

GEOCHEM SAMPLE NUMBER	SAMPLE DEPTH/ IDENTITY	SAMPLE TYPE	STERANES (m/z 217, 218)				TERPANES (m/z 191, 177)					
			$C_{29} \frac{\alpha\alpha\alpha 20S [Q]}{\alpha\alpha\alpha 20R [T]}$	$C_{29} \frac{\alpha\beta\beta 20R [R]}{\alpha\alpha\alpha 20R [T]}$	$C_{27} \frac{20SDIAST [A]}{20RDIAS [B]}$	$\frac{C_{27} \beta\beta}{C_{29} \beta\beta} [218]$	$\frac{Tm [B]}{Ts [A]}$	$\frac{C_{29} 17\alpha-NH [C]}{[C] + C_{30} 17\alpha-H [E]}$	$C_{29} \frac{NM [D]}{[D] + NH [C]}$	$\frac{28, 30-BNH [Z]}{[Z] + C_{29} 17-NH [C]}$	$\frac{28, 30-BNH [Z]}{[Z] + 25, 28, 30-TNH [177]}$	$C_{31} \frac{20S [G]}{[G] + 20R [H]} \%$
1399-158	2324.00-05	----	1.60	0.65	1.57	1.73	2.09	0.43	0.14	-----	-----	59.07
1399-199	2328	Cond.	0.59	0.51	1.00	1.04	0.94	0.48	0.12	-----	-----	56.7
1399-166	2350.63-68	----	1.62	-----	1.29	----	0.75	0.44	----	-----	-----	61.1
1399-170	2352-2368	----	0.64	-----	1.31	0.67	2.15	0.39	0.18	-----	-----	62.7
1399-200	2355	Oil	0.89	-----	1.58	0.61	1.20	0.46	----	0.10	-----	61.1
1399-173	2377.55-60	----	----	-----	1.72	1.59	0.78	0.35	----	-----	-----	62.4
1399-177	2393.65-70	----	0.85	0.70	1.29	----	1.62	0.36	----	-----	-----	62.6
1399-186	2449	----	1.02	-----	1.59	0.82	1.51	0.47	0.10	-----	-----	57.8
1399-198	2532-2539	----	0.60	-----	1.25	0.68	3.17	0.43	0.16	-----	-----	52.5

[A] etc. REFERS TO IDENTIFICATION ON APPROPRIATE MASS FRAGMENTOGRAM

DIAS - DIASTERANES H - HOPANE NH - NORHOPANE BNH - BISNORHOPANE

CT - ditch cuttings CO - core SWC - sidewall core

TNH - TRISNORHOPANE NM - NORMORETANE



**TABLE 12
BIOMARKER MOLECULAR RATIOS**

GEOCHEM SAMPLE NUMBER	SAMPLE DEPTH/ IDENTITY	SAMPLE TYPE	STERANES (m/z 217, 218)				TERPANES (m/z 191, 177)					
			$C_{29} \frac{\alpha\alpha\alpha\alpha\ 20S\ [G]}{\alpha\alpha\alpha\alpha\ 20R\ [T]}$	$C_{29} \frac{\alpha\beta\beta\ 20R\ [R]}{\alpha\alpha\alpha\alpha\ 20R\ [T]}$	$C_{27} \frac{20SDIAST\ [A]}{20RDIAST\ [B]}$	$\frac{C_{27}\ \beta\beta}{C_{29}\ \beta\beta}$ (218)	$\frac{Tm\ [B]}{Ts\ [A]}$	$\frac{C_{29}\ 17\alpha-NH\ [C]}{[C] + C_{30}\ 17\alpha-H\ [E]}$	$\frac{C_{29}\ NM\ [D]}{[D] + NH\ [C]}$	$\frac{28,30-BNH\ [Z]}{[Z] + C_{29}\ 17-NH\ [C]}$	$\frac{28,30\ BNH\ [Z]}{[Z] + 25,28,30\ TNH\ [177]}$	$C_{31} \frac{20S\ [G]}{[G] + 20R\ [H]} \%$
1399-167	2354.58-.62	---	1.28	1.37	1.34	---	---	---	---	---	---	---
1399-213	2341.80-.85	---	0.88	0.98	1.41	0.60	1.12	0.43	0	0.14	---	0.53
1399-224	2360.00-.03	---	0.94	0.98	1.67	0.40	0.87	0.44	0	0	0	0.60
1399-227	2362.80-.85	---	1.02	1.36	1.46	0.60	0.96	0.42	0	0	0	0.49
1399-233	2372.00-.04	---	1.00	0.97	1.53	1.48	0.70	0.44	0	0	0	0.54
1399-235	2373.80-.84	---	1.07	0.70	1.60	0.52	1.13	0.42	0	0	0	0.55
1399-243	2382.52-.58	---	1.22	1.85	1.50	0.57	0.78	0.40	0	0	0	0.44
1399-247	2386.60-.76	---	1.10	1.38	1.60	0.72	0.87	0.39	0	0	0	0.58
1399-249	2389.60-.65	---	0.87	1.12	1.60	1.43	1.12	0.42	0.08	0	0	0.59
1399-254	2396.70-.75	---	1.69	2.14	1.40	1.26	0.62	0.46	0	0.72	---	0.44

[A] etc. REFERS TO IDENTIFICATION ON APPROPRIATE MASS FRAGMENTOGRAM

DIAST – DIASTERANES H – HOPANE NH – NORHOPANE BNH – BISNORHOPANE

CT – ditch cuttings CO – core SWC – sidewall core

TNH – TRISNORHOPANE NM – NORMORETANE





TABLE 13

OIL COMPOSITIONAL DATA

Geochem Sample Number	Sample Identity	API Gravity (°API)
1399-199	FMT Run#5	49.4
1399-200	FMT Run#4	40.0



TABLE 14

DETAILED GASOLINE (C4-C7) ANALYSIS

GEOCHEM SAMPLE NUMBER	199	200
DEPTH	FMT #4	FMT #5
isobutane	0.01	1.46
n-butane	0.11	5.58
isopentane	0.17	4.86
n-pentane	0.56	6.79
2,2-dimethylB	0.10	0.25
cyclopentane(CP)	0.61	0.95
2,3-dimethylB	0.00	0.00
2-methylP	2.28	3.84
3-methylP	1.89	2.39
n-hexane	6.29	7.21
methylCP(MCP)	4.72	5.04
2,2-dimethylP	0.54	0.38
2,4-dimethylP	0.09	0.06
2,2,3-trimethylB	0.12	0.08
benzene	3.07	5.76
cyclohexane(CH)	8.87	7.44
3,3-dimethylP	0.00	0.00
1,1-dimethylCP	0.00	0.00
2-methylH	6.07	3.49
2,3-dimethylP	0.63	0.36
3-methylH	5.11	2.87
1,c,3-dimethylCP	1.62	1.04
1,t,3-dimethylCP	1.06	0.66
1,t,2-dimethylCP	3.30	2.09
3-ethylP	0.00	0.00
n-heptane	15.45	8.44
methylCH(MCH)	24.04	15.30
1,c,2-dimethylCP	0.00	0.00
toluene	13.28	13.66
ABUNDANCE		
nC7/C7nap x100	51.46	44.21
MCP/Bz	1.54	0.87
MH/DMCP	1.87	1.68
nC6/MCP	1.33	1.43
%n-PARAFFINS	22.41	28.02
%iso-PARAFFINS	17.01	20.04
% NAPHTHENES	44.23	32.52
% AROMATICS	16.35	19.42



BRIEF DESCRIPTION OF THE ANALYSES PERFORMED BY GEOCHEM

"Screen Analyses" are described in sections A, C and D, "Sample Preparation" in section B, "Follow-up Analyses" in sections E through K and "Correlation Studies" in section L. The analyses can be run on either core or cuttings material with the proviso that samples must be canned for the C₁-C₇ analysis and should be canned (or at least wet) for the C₄-C₇ analysis. The other analyses can be run on both canned and bagged samples.

A) C₁-C₇ LIGHT HYDROCARBON ANALYSIS

The abundance and composition of the C₁-C₇ hydrocarbons in sediments reflects their source richness, maturity and the character of the hydrocarbons they can yield. Most importantly, it is extremely sensitive to the presence of migrated hydrocarbons and is an excellent method for their detection. As it provides the information on most of the critical parameters and is also economical, this analysis is excellent for screening samples to decide which of them merit further analysis.

During the time which elapses between the collection of the sample at the wellsite and its analysis in the laboratory, a fraction of the total gas passes from the rock to the air space at the top of the can. For this reason, both the air space and the cuttings are analysed.

The analysis involves the gas chromatographic separation of the individual C₁-C₄ gaseous hydrocarbons (methane, ethane, propane, isobutane and normal butane) and a partial resolution of the C₅-C₇ gasoline-range hydrocarbons (for their complete resolution see Section E). The ppm abundance of the five gases and of the total C₅-C₇ hydrocarbons are calculated from their electronically integrated peak areas (not from peak height) by comparison with a standard.

In the report, the following data are tabulated: the abundance and composition of the air space gas, of the cuttings gas and of the combined air space and cuttings gases. The combined results are also presented graphically.

B) SAMPLE WASHING AND HAND PICKING

All of the analyses described in subsequent sections are run on washed and hand picked samples.

Cuttings are washed to remove the drilling mud, care being taken not to remove soft clays and fine sand during the washing procedure. Using the C₁-C₇ hydrocarbon data profile of the well, or the organic carbon profile¹ (if this analysis is used for screening), electric logs (if supplied) and the appearance of the cuttings under the binocular microscope, samples are selected to represent the lithological and geochemical zones penetrated by the well. These samples are then carefully hand picked and the lithology of the uncaved material is described. It is these samples which are submitted for further analysis.

Sample material remaining after analysis is retained for six months. Unless instructions are received to the contrary, Geochem Laboratories may then destroy the samples.

Our reports incorporate a gross lithological description of all the samples which have been analysed and litho percentage logs. As screen analyses are recommended at narrow intervals, a complete lithological profile is obtained.



C) ORGANIC CARBON ANALYSIS

The organic carbon content of a rock is a measure of its total organic richness. Combined with the visual kerogen, C_1-C_7 , C_4-C_7 , pyrolysis and C_{15+} analyses, the organic carbon content is used to evaluate the potential (not necessarily actual) hydrocarbon source richness of the sediment. This analysis is an integral part of a total evaluation and it can also be used as an economical screen analysis for dry samples (when the C_1-C_7 analysis cannot be used).

Hand picked samples are dried, crushed and then acidised to remove the inorganic calcium and magnesium carbonates. The actual analysis involves combustion in a Leco carbon analyser. Blanks, standards and duplicates are run routinely for purposes of quality control at no extra cost to the client.

The data are tabulated and presented diagrammatically in our reports in a manner which facilitates comparison with the gross lithology (see Section B) of the samples.

D) MINI-PYROLYSIS

An ideal screen analysis which provides a definitive measure of potential source richness upon those samples whose organic carbon contents suggest fair or good source potential. This is described in detail in section K.

E) DETAILED C_4-C_7 HYDROCARBON ANALYSIS

The abundance and composition of the C_4-C_7 gasoline-range hydrocarbons in sediments reflects their source quality, level of thermal maturation and organic facies. In addition, the data also reveal the presence of migrated hydrocarbons and can be used for crude oil-parent source rock correlation studies.

This powerful analysis, performed upon hand picked lithologies, is employed as a follow-up to confirm the potential of samples which have been selected using the initial screen analysis. It is used in conjunction with the organic carbon, visual kerogen and C_{15+} analyses.

The individual normal paraffins, isoparaffins, naphthenes and aromatics with between four and seven carbon atoms in the molecule (but also including toluene) are resolved by capillary gas chromatography and their peak areas electronically integrated.

Normalised compositions, selected ratios and the ppm abundance of the total gasoline-range fraction are tabulated in the report and also presented graphically.

F) KEROGEN TYPE AND MATURATION

Kerogen is the insoluble organic matter in rocks. Visual examination of the kerogen gives a direct measure of thermal maturity and of the composition of the organic matter (organic facies) and indicates the source quality of the sediment - which is confirmed using the organic carbon, light hydrocarbon, pyrolysis and C_{15+} analyses.

The type of hydrocarbon (oil or gas) generated by a source rock is a function of the types and level of thermal maturation of the organic matter which are present. Both of these parameters are measured directly by this method.



Kerogen is separated from the inorganic rock matrix by acid digestion and flotation methods which avoid oxidation of the organic matter. It is then mounted on a glass slide and examined at high and low magnifications with a Leitz microscope. Chemical methods measure the total kerogen population but, with this technique, individual particles can be selected for examination and spurious material identified. This is particularly valuable in reworked, contaminated and turbodrilled sediments.

The following data are generated: the types of the organic matter present and their relative abundances, an estimate of the proportion of reworked material, preservation state, the thermal maturity of the non-reworked organic matter using the spore colouration technique.

Our maturation scale has been developed to digitise small but recognisable changes in organic matter colouration resulting from increasing maturity and to place particular emphasis upon the immature to mature transition. In the absence of a universal colouration scale, the most significant points on our scale have been calibrated against equivalent vitrinite reflectance values. The following maturation stages are recognised at the low end of the scale:-

- a) immature; thermal index less than 2- (0.45% Ro)
- b) marginally mature; indices between 2- and 2.
Minor hydrocarbon generation from amorphous and herbaceous (\pm algal) organic matter
- c) mature; indices between 2 (0.53% Ro) and 2 to 2+ (0.72% Ro),
significant generation from amorphous, algal and herbaceous organic matter but wood only marginally mature
- d) oil window; indices of 2 to 2+ (0.72% Ro) through to 3 (1.2% Ro). Peak hydrocarbon generation.

The condensate zone starts at a thermal index of 3 whilst indices of 3+ (2.0% Ro) and higher indicate the eometamorphic dry gas stage.

A total of fourteen types of organic matter are sought based upon the major categories of algal, amorphous, herbaceous (spore, pollen, cuticle), wood, inertinite and resin. This detail is essential for a proper understanding of hydrocarbon source potential as the different sub-groups within each category have different properties.

Upon completion of the study, the kerogen slides are sent to the client.

G) VITRINITE REFLECTANCE

Vitrinite reflectance is an alternative/confirmatory method for evaluating thermal maturation which is used in conjunction with the visual kerogen analysis. The reflectivity of vitrinite macerals increases in response to thermal alteration and is used to define maturation levels and, by projection, to predict maturity at depth or the thicknesses of section removed by erosion.

Measurements are made upon kerogen separations in conjunction with polished whole rock samples. In general, this analysis is performed upon the same samples as the visual kerogen analysis, thus facilitating a direct comparison of the two sets of results.

If possible, forty to fifty measurements are taken per sample - unless the sediments are organically lean, vitrinite is sparse or only a single uniform population is present. The data are plotted in a histogram which



distinguishes the indigenous vitrinite from possible reworked or caved material. Averages are calculated for each population. Comments upon exinite fluorescence and upon the character of the phytoclasts are noted on the histograms. The reports contain the tabulated data, histograms and the reflectivities plotted against depth.

The vitrinite and visual kerogen techniques provide mutually complementary information upon maturity, organic matter type and diagenesis.

H) C₁₅₊ EXTRACTION, DEASPHALTENING AND CHROMATOGRAPHIC SEPARATION

Sections "A" and "E" dealt with analyses covering the light end of the hydrocarbon spectrum. This section is concerned with the solvent extractable organic material in the rock with more than fourteen carbon atoms in the molecule (i.e. the heavy end). The amount and composition of this extract indicates source richness and type, the level of thermal maturation and the possible presence of migrated hydrocarbons.

These results are integrated with those derived from the pyrolysis, visual kerogen, organic carbon and light hydrocarbon analyses.

The techniques involved in this analysis employ pure solvents and have been designed to give reproducible results. Hand picked samples are ground and then solvent extracted in a soxhlet apparatus, or by blending, with dichloromethane (the solvent system can be adapted to client's specifications). After asphaltene precipitation, the total extract is separated by column chromatography or high pressure liquid chromatography into the following fractions: paraffin-naphthene hydrocarbons, aromatic hydrocarbons, eluted NSO's (nitrogen-, sulphur-, and oxygen- containing non-hydrocarbons) and non-eluted NSO's. Note that the non-hydrocarbons are split into three fractions and not reported as a gross value. These fractions can be submitted for further analyses (carbon isotopes, gas chromatography, mass spectroscopy) including correlation studies.

For convenience and thoroughness, the data are reported in three formats: the weights of the fractions, ppm abundances and normalised percentage compositions. The data are also presented diagrammatically.

J) GC ANALYSIS OF C₁₅₊ PARAFFIN-NAPHTHENE HYDROCARBONS

The gas chromatographic configurations of the heavy C₁₅₊ paraffin-naphthene hydrocarbons reflect source type, the degree of thermal maturation and the presence and character of migrated hydrocarbons or contamination.

Not only is this analysis an integral part of any source rocks study but it also provides a fingerprint for correlation purposes and helps to define the geochemical/palynological environmental character of the source rocks from which crude oils were derived.

The paraffin-naphthene hydrocarbons obtained by column chromatography are separated by high resolution capillary chromatography. Excellent resolution of the individual normal paraffins, isoprenoids and significant individual isoparaffins and naphthenes is achieved. Runs are normally terminated at nC₃₅. A powerful in-house microprocessor system is being introduced to correct for the change in response factor with chain length.

The normal paraffin carbon preference indices (C.P.I.) indicate if odd (values in excess of 1) or even (values less than 1) normal paraffins are dominant.

Strong odd preferences (\pm strong pristane peaks) are characteristic of immature land plant organic matter whilst even preferences (\pm strong phytane peaks) suggest a reducing environment of deposition. With increasing maturity, values approach 1.0 and oils are typically close to 1.0. The indices are calculated using the following formulae:

$$\begin{aligned}
 \text{C.P.I.}_A &= \frac{C_{21} + C_{23} + C_{25} + C_{27}}{C_{20} + C_{22} + C_{24} + C_{26}} + \frac{C_{21} + C_{23} + C_{25} + C_{27}}{C_{22} + C_{24} + C_{26} + C_{28}} \\
 \text{C.P.I.}_B &= \frac{C_{25} + C_{27} + C_{29} + C_{31}}{C_{24} + C_{26} + C_{28} + C_{30}} + \frac{C_{25} + C_{27} + C_{29} + C_{31}}{C_{26} + C_{28} + C_{30} + C_{32}}
 \end{aligned}$$

Chromatograms are reproduced in the report for use as visual fingerprints and in addition, the following data are tabulated: normalised normal paraffin distributions; proportions of paraffins, isoprenoids and naphthenes in the total paraffin-naphthene fraction; C.P.I._A and C.P.I._B; pristane to phytane ratio; pristane to nC₁₇ ratio.

K) PYROLYSIS

The process of thermal maturation can be simulated in the laboratory by pyrolysis, which involves heating the sample under specified conditions and measuring the oil-like material which is freed/generated from the rock. With this analysis, the potential richness of immature sediments can be determined and, by coupling the pyrolysis unit to a gas chromatograph, the liberated material can be characterised. These results are correlated with those obtained from the organic carbon, kerogen and C₁₅₊ analyses.

Small amounts of powdered sample are heated in helium to release the thermal bitumen (up to 340°C) and pyrolysate (340-550°C). The thermal bitumen correlates with the solvent extractable material (see above) whilst the pyrolysate fraction does not exist in a "free" state but is generated from the kerogen, thus simulating maturation in the subsurface. Abundances (weight ppm of rock) are measured with a flame ionisation detector against a standard. Thermal bitumen includes source indigenous, contaminant and migrated hydrocarbons but the pyrolysate abundance is a measure of ultimate source richness. The capillary gas chromatogram of the pyrolysate is used to evaluate the character of the parent organic matter and whether it is oil or gas prone. Peak temperature(s) of pyrolysate evolution is recorded. Carbon dioxide can be measured if requested but is normally ignored as the separation of the organic and inorganic species has been found to be artificial and unreliable.

Pyrolysate yields provide a definitive measure of potential source richness which avoids the ambiguities of the organic carbon data and the problem of contamination. This analysis is also used to evaluate the quality and character of the organic matter and the degree to which it has realised its ultimate hydrocarbon potential. Geochem does not employ the pyrolysis technique to evaluate maturation, preferring the kerogen and vitrinite reflectance analyses which avoid the problem of reworking and hence, are more reliable.

Capillary chromatograms produced for the pyrolysate hydrocarbons range from C_1 (methane) out towards C_{35} but exhibit considerable variations. They are used to define whether a source rock will yield oil, condensate or gas. With this new technique, it is now possible to complete the evaluation of a source rock.

The data are tabulated and presented graphically. MINI-PYROLYSIS includes ppm thermal bitumen and ppm pyrolysate. PYROLYSIS also provides the above together with the temperature of peak pyrolysate evolution. The capillary chromatograms of the pyrolysate obtained by PYROLYSIS-GC are reproduced in the report. The Mini-Pyrolysis analysis is recommended as a screening technique.

L) CORRELATION STUDY ANALYSES

Oil to oil and oil to parent source rock correlation studies require high resolution analytical techniques. This requirement is satisfied by some of the analyses discussed above but others have been selected specifically for correlation work. Many of these analyses also provide information upon the character of the environment of deposition of the parent source rocks.

- detailed C_4 - C_7 hydrocarbon (gasoline range) analysis. See Section E. Although these hydrocarbons can be affected by migrational/alteration processes, they commonly provide a very useful correlation parameter.
- capillary gas chromatography of the C_{15+} paraffin-naphthenes. See section J. The branched-normal paraffin distributions are used to "fingerprint" the samples.
- capillary chromatograms of whole oils and of the C_{4+} fraction of source rocks.
- capillary gas chromatography of C_{15+} aromatic hydrocarbons. Separate chromatograms of the hydrocarbons and of the sulphur-bearing species are reproduced.
- high pressure liquid chromatograms.
- mass spectrometric carbon isotope analyses of crude oil and rock extract fractions and of kerogen separations. A powerful tool for comparing hydrocarbons and correlating hydrocarbons to organic matter. With this technique the problem of source rock contamination can be avoided. The data are recorded on x-y or Galimov plots.
- mass fragmentograms (mass chromatograms) of fragment ions characteristic of selected hydrocarbon groups such as the steranes and terpanes. The fragmentograms provide a convenient and simple means of presenting detailed mass spectrometric data and are used as a sophisticated fingerprinting technique. This provides the ultimate resolution for correlating hydrocarbons and facilitates the examination of hydrocarbon classes.
- vanadium and nickel contents.

Suites of (rather than single) analyses are employed in correlation studies, the actual selection depending upon the complexity of the problem. See also section N.



M) ANALYSES FOR SPECIAL CASES

M-1) ELEMENTAL KEROGEN ANALYSIS

This analysis evaluates source quality, whether the sediments are oil or gas prone, the character of the organic matter and its level of thermal maturation. It is the chemical equivalent of the visual kerogen analysis. The pyrolysis analysis is generally preferred to this technique, both methods providing similar information.

M-2) SULPHUR ANALYSIS

The abundance of sulphur in source rocks and crude oils.

M-3) CARBONATE CONTENT

The mineral carbonate content of sediments is determined by acid treatment. These data are particularly useful when used in conjunction with organic carbon contents as a screening technique.

M-4) NORMAL PARAFFIN ANALYSIS

Following the removal of the branched paraffins and naphthenes from the total paraffin-naphthene fraction, a chromatogram of the normal paraffins is obtained. The resulting less complicated chromatogram facilitates the examination of normal paraffin distributions.

M-5) SOLID BITUMEN EVALUATION

Residual solid bitumen after crude oil is generated by three prime processes; the action of waters, gas deasphalting, thermal alteration. Thus it provides a means of determining the reservoir history of a crude and of evaluating whether adjacent traps will or will not be prospective for oil. In carbonate sections, where organic matter is sometimes sparse, this technique is also used to evaluate thermal maturation levels.

The analysis involves the determination of the solubility (in CS₂) of the solid bitumen and of the atomic hydrogen to carbon ratio of the insoluble fraction.

N) CRUDE OIL ANALYSIS

N-1) API GRAVITY

This can be performed upon large (hydrometer) and small (SG bottle, pycnometer) samples and even upon stains extracted from sediments (refractive index).

N-2) SULPHUR CONTENTS (ASTM E30-47)

N-3) POUR POINT (ASTM D97-66, IP15/67)

N-4) VISCOSITY (ASTM D445-72, IP71/75)



N-5) FRACTIONAL DISTILLATION

Graph of cumulative distillation yield against temperature. Five percent cuts taken for further analysis. Mass spectrometric studies of these fractions provide a detailed picture of the distribution of paraffins and of the various naphthene and aromatic groups within a crude, which is useful both for correlation and for refinery evaluation purposes.