GIPPSLAND BASIN

BURNS B.J. MAY 1979
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ESSO EXPLORATION AND PRODUCTION AUSTRALIA INC.

Rec'd 8-6-79

Geochemical Comparison of Crude Oils from Halibut, Fortescue and Cobia Fields, Gippsland Basin.

CONFIDENTIAL

B.J. BURNS.

May 1979.

8/6/79

FIGURES AND TABLES

OIL - OIL CORRELATION STUDIES OF THE FORTESCUE - HALIBUT - COBIA FIELDS, GIPPSLAND BASIN

B. J. BURNS

MAY 1979

INTRODUCTION:

The use of geochemistry for oil-oil and oil-source correlation in petroleum exploration has been well established over the past 20 years. It was felt that very detailed chemical comparisons might be useful in establishing the relationship between the three oil accumulations of the Fortescue, Cobia and Halibut fields. The objectives were three-fold:-

1. Establish the chemical variations that exist within each field. This is especially important where reservoir sands are separated by continuous shale barriers. Several analyses are therefore required from each field.
2. Comparison of these chemical properties to establish whether the oils from the three fields are the same - in which case the fields, could be all part of a common system, or if they are different - in which case the oils would belong to separate systems.
3. To check whether the M-1.0.1 oil in Halibut has any relationship to the Fortescue oil, i.e. could the M-1.0.1 oil extend across to Fortescue and have the same oil-water contact as the Fortescue field.

PROCEDURE:

Table 1 shows the oils that were selected for analysis. The four Halibut oils were recently collected from the production platform while the Fortescue and Cobia samples are from tests run when the wells were being drilled.

The C_{15+} (or "heavy") fraction of oils has been found to be the most reliable fraction for conducting oil correlation analyses. It is divided into Saturate, Aromatic, and NSO (Asphaltene) fractions and then the Saturate and Aromatic fractions are analysed in detail using mass spectrometry to measure the carbon isotope ratios and the relative concentrations of specific components within these fractions such as the steranes and heavy aromatics.

Continued 2/.....

The composition of the gasoline range (C_{4-7}) hydrocarbons is also useful in correlation work but it is not always as reliable as the C_{15+} analyses. About 25-30 components are identified in the C_{4-7} fraction and it has been established that certain combinations and ratios of these components can be used to separate oils which belong to different families or groups. These combinations are simply called the "Significant Compound Ratios".

For ease of comparison, all of the analytical data is plotted onto diagrams which allow the various differences and similarities to be more easily seen. These are presented as Figures 1-7 and the following comments relate to each specific plot.

CARBON ISOTOPES FIGURE 1.

The Halibut and Fortescue oils can be grouped into two separate families and what is most significant is that there is very little difference within the Halibut oils from the M-1.0.1 to M-1.4.1 reservoirs. This means that these latter oils are in chemical equilibrium. The Fortescue oils group quite differently and so are not in chemical equilibrium with the Halibut oils, indicating a separate oil accumulation. The Cobia oils, which are geologically believed to be part of the Halibut field, show a spread in isotope values that overlap both the Halibut and Fortescue values. The oils from the M-1.3 and M-1.4 in Halibut plot close to the respective M-1.3 and M-1.4 oils in Cobia. However, the M-1.1 oil of Cobia does not correlate with Halibut but rather with the FM-1.2 of Fortescue.

HEAVY AROMATICS PLOT FIGURE 2.

This plot shows the range of values of each of the twelve aromatic groups for the Fortescue oils (blue) and Halibut oils (red). The overall shape of the plot indicates that the two fields have a similar origin, i.e. the same overall source interval, but each field clearly plots within a discrete band. The narrow width of these bands indicates that the oils from each field are in chemical equilibrium within that field and therefore the separation of the two bands indicates that the two fields are not connected.

Continued 3/.....

The range of the Cobia oils is shown by the green bar and it is apparent that the Cobia oils correlate with the Halibut oils.

The small black "crosses" are the actual values of the M-1.0.1 oil from Halibut and these do not correlate with the values from Fortescue.

4 - RING NAPHTHENE CORRELATION PLOT FIGURE 3.

The Halibut and Fortescue oils again plot into fairly narrow bands but in this case there is more overlap between the two. The grouping into separate fields is real but with less confidence than the two previous plots. The Cobia oils correlate very clearly with Halibut while the Halibut M-1.0.1 oil is quite distinct from the Fortescue oils.

NAPHTHENE RING CORRELATION PLOT FIGURE 4.

This plot does not separate the Fortescue and Halibut oils into separate groups. The two groups show considerable overlap and even the Cobia oils correlate with both groups. However, the M-1.0.1 Halibut oil (black "crosses") still shows a definite separation from the Fortescue oils.

STERANE ANALYSIS FITURE 5.

The Fortescue and Halibut groups show some overlap but generally the separation seems real. The Cobia oils again correlate better with Halibut.

GASOLINE FRACTION, SIGNIFICANT COMPOUND RATIOS FIGURE 6.

The Halibut and Cobia oils plot into a close group while three of the four Fortescue oils form a different group. The exception is Fortescue-3, 2454.5m which correlates nicely with the Halibut/Cobia group. No reason can be given for this latter correlation.

NOTE: The C_{4-7} analyses for Fortescue-2, 2450m seems to be in error (analytical or technical??) as the results indicate that there is no methylycyclohexane (MCH) present. This is anomalous as all of the other oil analyses contain about 20% MCH and it is a constituent of virtually all normal oils. For this reason, the Fortescue-2, 2450m sample does not appear in the Significant Compound Ratios Plot (Figure 6).

Continued 4/.....

C_{15+} SATURATE - AROMATIC - NSO PLOT FIGURE 7.

This plot, while sensitive to maturation effects, can also be used for correlation as it reflects the major compositional fractions of the oils. It very clearly demonstrates that the Halibut and Cobia oils are the same but very different to the Fortescue oils. The Fortescue field oils contain about 63% saturates while the Halibut/Cobia oils contain only 43%. This is a very significant difference which would not exist if the oils were in communication as mixing or diffusion would occur.

CONCLUSIONS:

1. Detailed comparison of these fields indicates that Halibut and Fortescue fields are not connected and therefore belong to two separate systems.

2. The Cobia field correlates closely with Halibut and should be considered a part of the Halibut field.

3. The M-1.0.1 oil in Halibut is the oil which is most unlike any of the Fortescue oils and therefore is not connected to the Fortescue field.

4. The differences observed between the Halibut and Fortescue oils are probably due to local variations in source rock quality.

For the sake of regional comparison with other Gippsland oils some of the relevant plots are included as Figures 8-10.

TABLE 1. C_{15+} liquid chromatography and C_{4-7} component ratios.

					C_{15+} FRACTION (%)			Carbon Isotopes (‰ PDB)		C_{4-7} Significant Compound Ratios.		
FIELD	WELL	SAMPLE TYPE	DEPTH (M)	RESERVOIR UNIT	SATS	AROM	NSO	SATS	AROM	C_1/C_2	A/D_2	C_1/D_2
HALIBUT	A-10	PRODUCING WELL (FLOWLINE)	2267.5 - 2271.0	M-1.0.1	41.5	12.3	46.2	-27.2	-25.5	3.34	5.55	10.59
	A-1	PRODUCING WELL (FLOWLINE)	2263 - 2267	M-1.1.1	41.5	11.7	46.8	-27.1	-25.9	2.83	6.01	11.06
	A-7	PRODUCING WELL (FLOWLINE)	2289.5 - 2295.5	M-1.3.1	41.4	11.5	47.1	-27.0	-25.5	3.34	6.38	10.95
	A-11	PRODUCING WELL (FLOWLINE)	2311.5 - 2318.0	M-1.4.1	41.5	11.8	46.7	-26.9	-25.4	3.29	5.54	10.40
COBIA	-1	FIT - 2	2406.5	M-1.1.1	43.3	11.8	44.9	-26.5	-25.4	3.12	6.68	10.57
	-2	FIT - 1	2420	M-1.4.1	40.2	11.2	48.6	-26.8	-25.3	3.35	5.80	11.03
	-2	FIT - 4	2401	M-1.3.1	42.4	11.6	46.0	-27.0	-25.7	3.13	6.60	10.55
FORTESCUE	-2	RFT - 1	2446.5	FM-1.2	64.2	22.7	13.1	-26.8	-25.4	3.17	3.97	6.17
	-2	RFT - 3	2450	FM-1.2	64.1	22.3	13.6	-26.5	-25.5	*	*	*
	-3	RFT - 1	2440	FM-1.2	63.1	25.0	12.0	-26.7	-25.5	2.92	3.22	6.29
	-3	RFT - 5	2454.5	FM-1.2	63.6	22.0	14.4	-26.5	-25.3	3.08	5.65	10.29
WEST HALIBUT (≡ FORTESCUE)	-1	FIT - 6	2405	FM-1.3	64.8	22.0	13.2	-26.4	-25.4	3.13	3.69	6.86

* C_{4-7} analysis appears to be incomplete as no value is given for MCH (see Appendix A). Ratios are therefore unreliable.

C_{15+} OIL PLOT

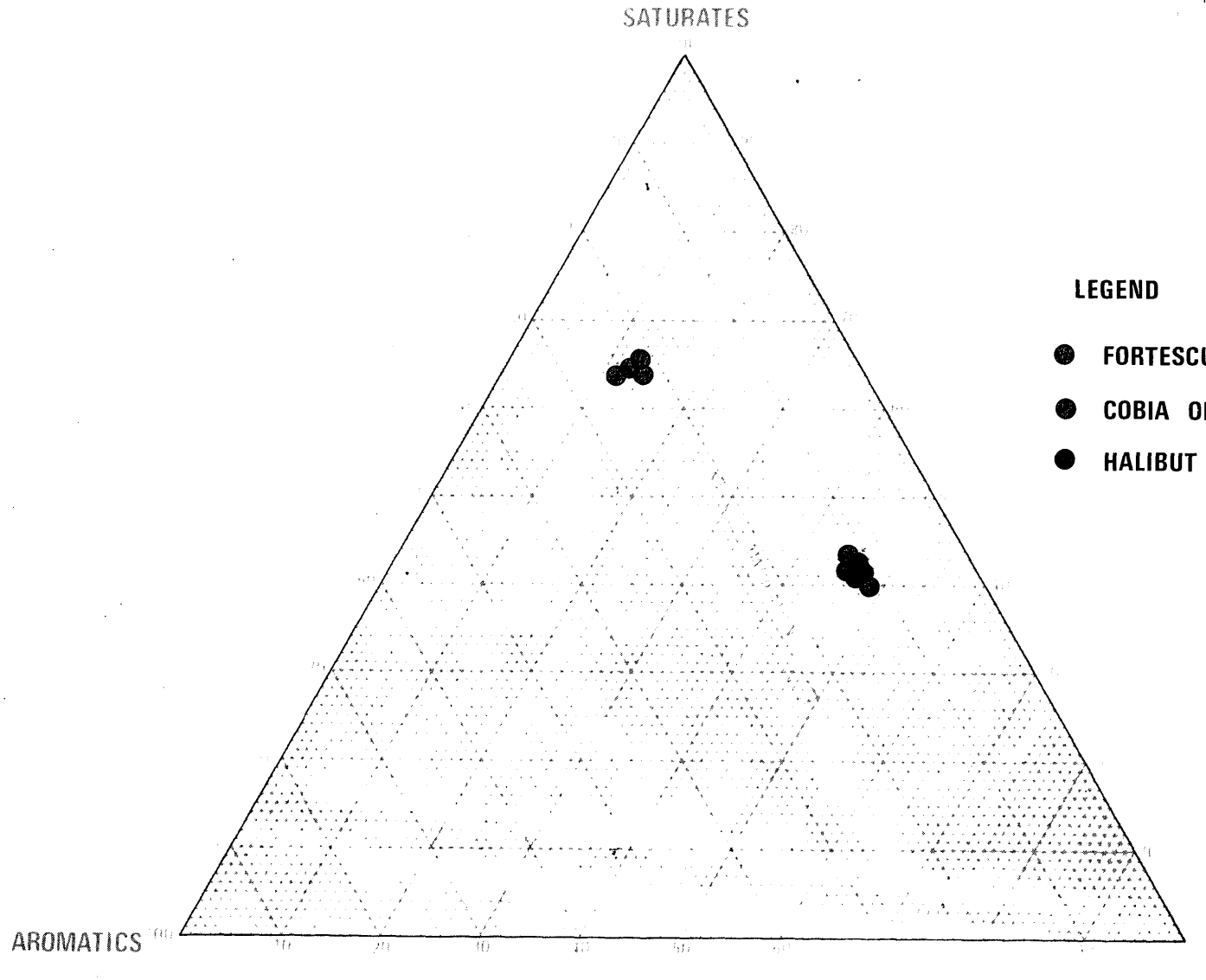

FIG. 7

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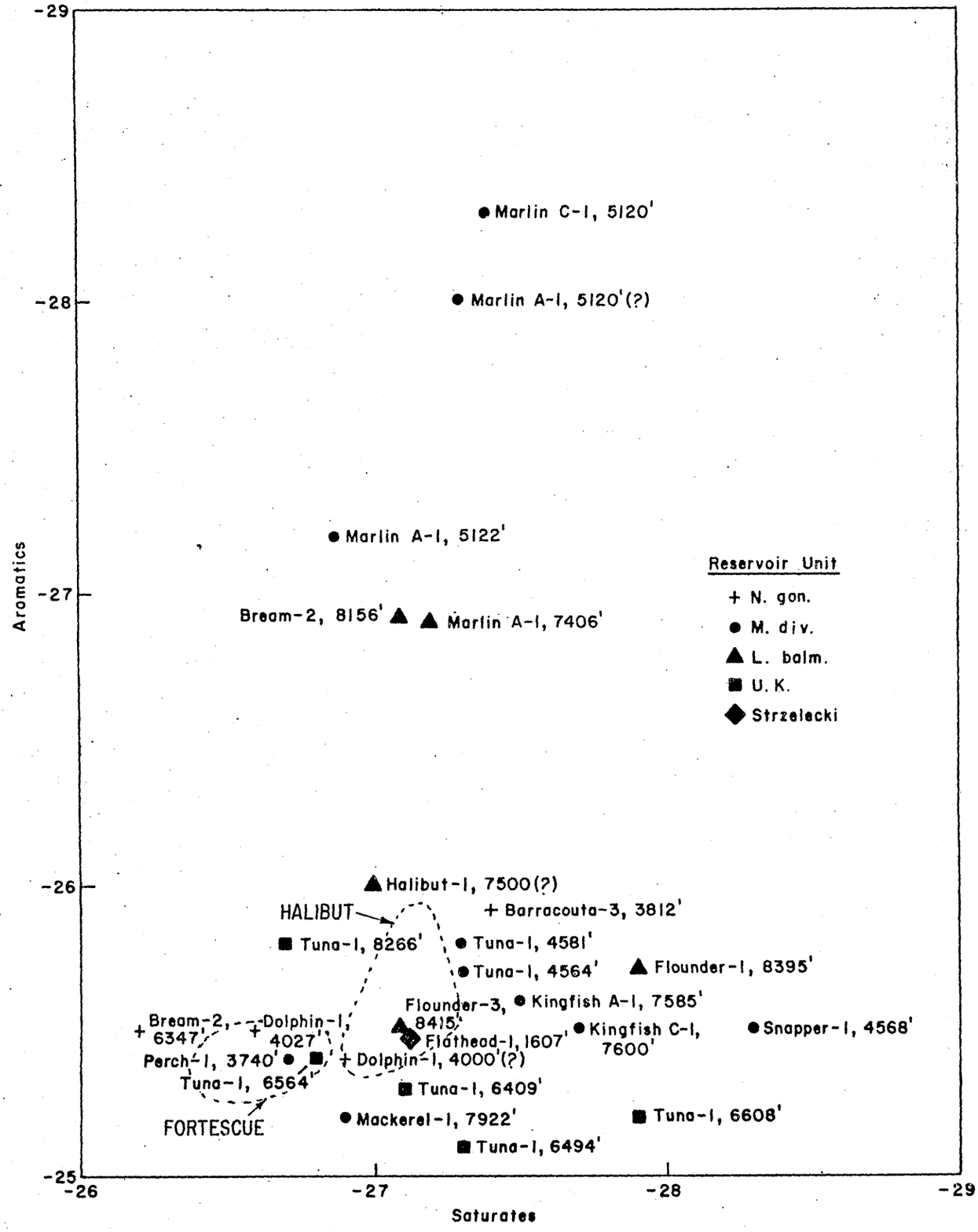
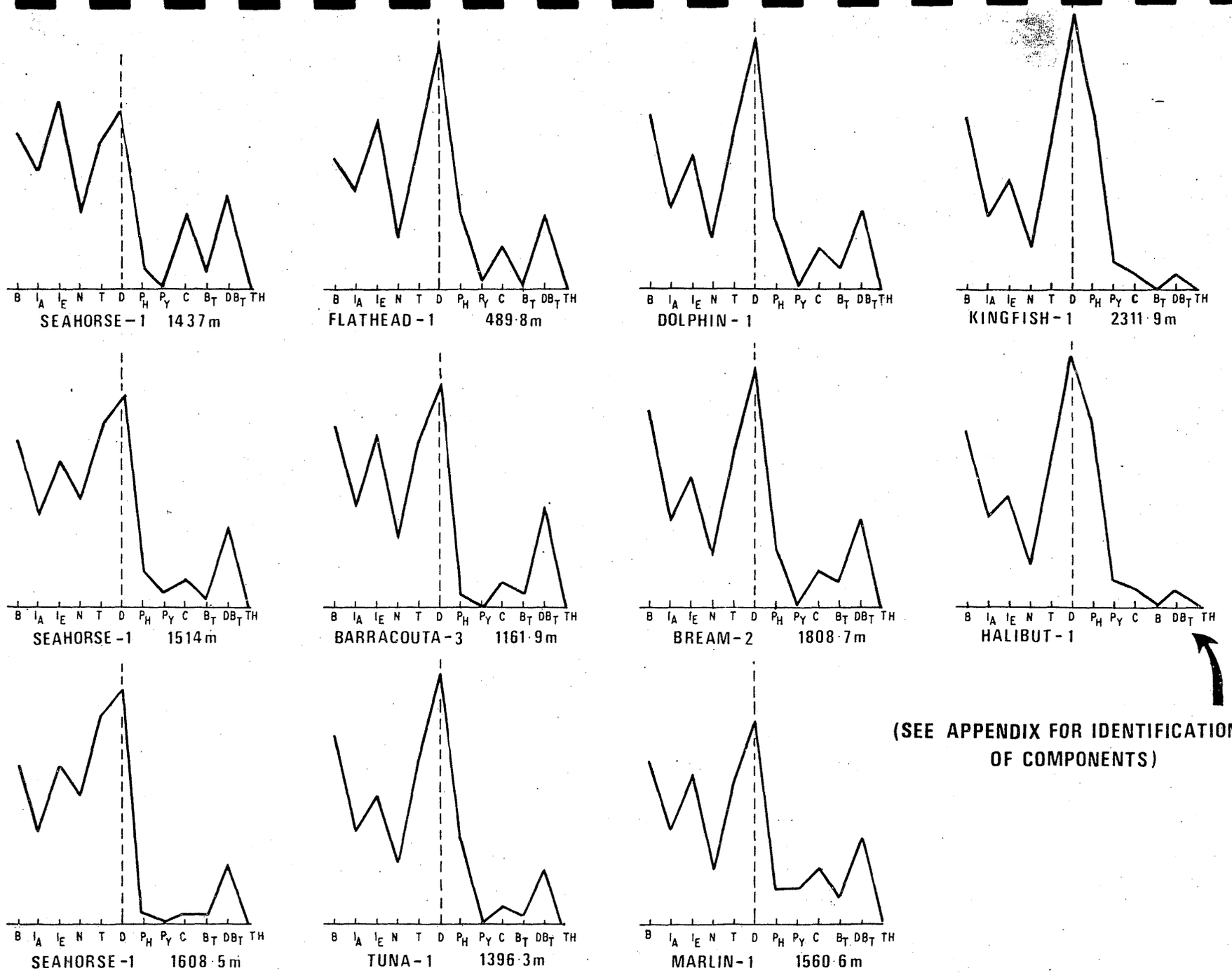


FIG. 8 - CARBON ISOTOPE VALUES — C_{15+} FRACTION OF OILS (Values given in ‰ deviation from Peedee belemnite).



HIGH MOLECULAR WEIGHT AROMATIC COMPOSITION OF SEAHORSE AND SELECTED GIPPSLAND CRUDE OILS.

FIGURE 9

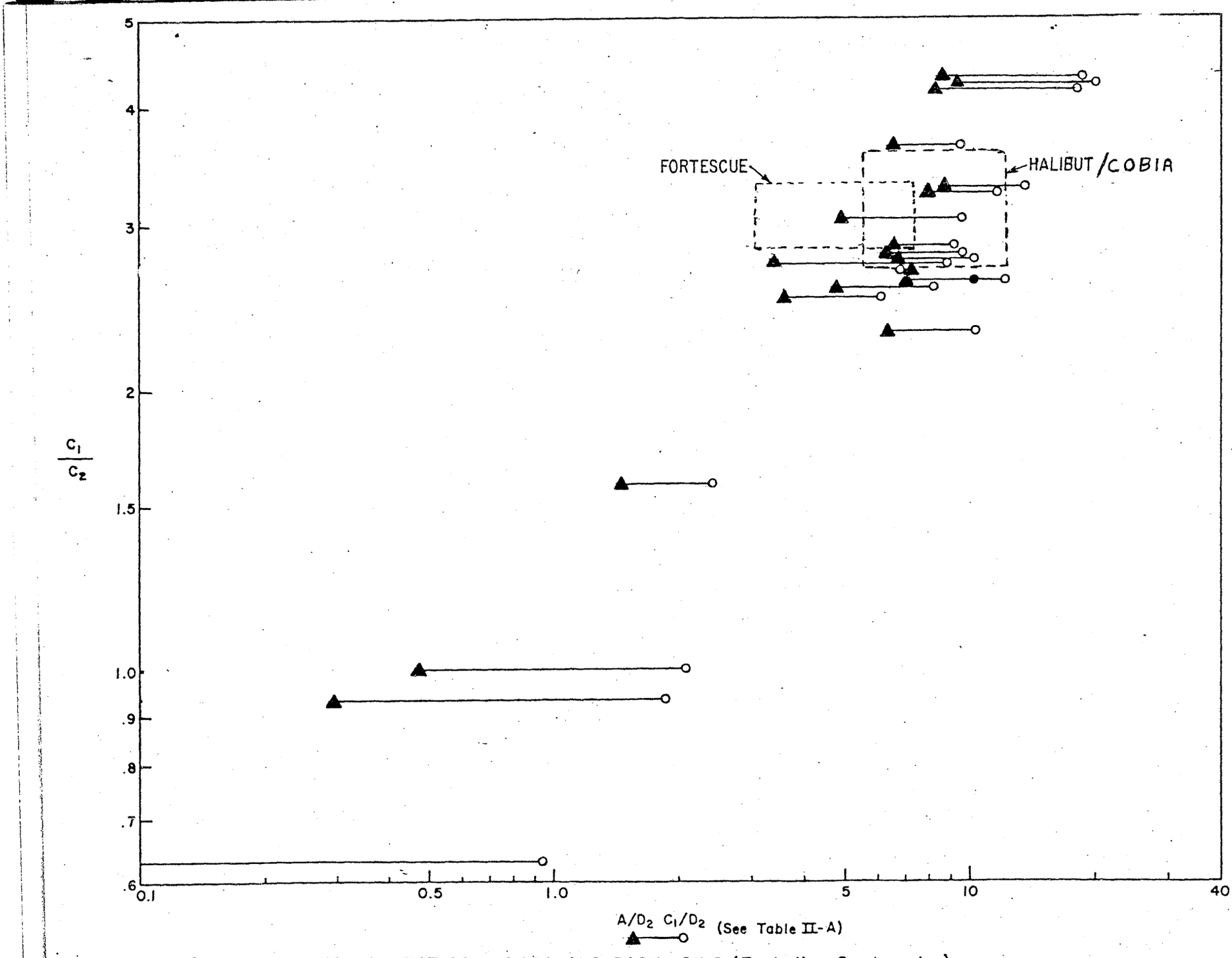


FIG. 10 - C_4-C_7 MOLECULAR RATIOS – GIPPSLAND BASIN OILS (Excluding Condensates).

APPENDIX A:

HALIBUT A-10

C4-C7 OIL 2267.5 - 2271.0 m 09 APR 79

69791 AUSTRALIA GIPPSLAND BASIN WELL A-10 HALIBUT FIELD

	TOTAL PERCENT	NORM PERCENT
METHANE	0.000	
ETHANE	0.000	
PROPANE	3.851	
IBUTANE	8.662	0.81
NBUTANE	21.972	2.06
IPENTANE	40.431	3.80
NPENTANE	50.346	4.73
22-DMB	2.269	0.21
CPENTANE	4.135	0.39
23-DMB	9.230	0.87
2-MP	49.788	4.68
3-MP	29.308	2.75
NHEXANE	93.804	8.81
MCP	50.117	4.71
22-DMP	0.000	0.00
24-DMP	6.613	0.62
223-TMB	0.000	0.00

	TOTAL PERCENT	NORM PERCENT
CHEX	74.998	7.04
33-DMP	0.000	0.00
11-DMCP	44.547	4.18
2-MHEX	0.000	0.00
23-DMP	21.752	2.04
3-MHEX	38.418	3.61
1C3-DMCP	23.545	2.21
1T3-DMCP	18.413	1.73
1T2-DMCP	29.792	2.80
3-EPENT	0.000	0.00
224-TMP	0.000	0.00
NHEPTANE	119.298	11.20
1C2-DMCP	0.000	0.00
MCH	287.404	26.99
ECP	0.000	0.00
BENZENE	0.000	0.00
TOLUENE	39.863	3.74

TOTALS

ALL COMP	1068.554
GASOLINE	1064.704

SIG COMP RATIOS

C1/C2	3.34
A /D2	5.55
D1/D2	1.04
C1/D2	10.59
PENT/IPENT	1.25
CH/MCP	1.50

Normalised %

CH	7.04	18.2
MCP	4.71	12.2
MCH	26.99	69.6

INTERPRETER -
ANALYST -

HALIBUT A-1

C4-C7 OIL 2263 - 2267 m 09 APR 79

69789 AUSTRALIA GIPPSLAND BASIN WELL A-1 HALIBUT FIELD

	TOTAL PERCENT	NORM PERCENT		TOTAL PERCENT	NORM PERCENT
METHANE	0.000		CHEX	73.788	6.47
ETHANE	0.000		33-DMP	0.000	0.00
PROPANE	6.850		11-DMCP	40.481	3.55
IBUTANE	10.264	0.90	2-MHEX	0.000	0.00
NBUTANE	26.399	2.31	23-DMP	25.052	2.20
IPENTANE	69.565	6.10	3-MHEX	36.434	3.19
NPENTANE	59.993	5.26	1C3-DMCP	23.684	2.08
22-DMB	2.884	0.25	1T3-DMCP	17.283	1.52
CPENTANE	4.378	0.38	1T2-DMCP	28.687	2.51
23-DMB	10.293	0.90	3-EPENT	0.000	0.00
2-MP	56.888	4.99	224-TMP	0.000	0.00
3-MP	30.953	2.71	NHEPTANE	116.300	10.19
NHEXANE	102.696	9.00	1C2-DMCP	0.000	0.00
MCP	73.016	6.40	MCH	288.819	25.32
22-DMP	0.000	0.00	ECP	0.000	0.00
24-DMP	7.895	0.69	BENZENE	0.000	0.00
223-TMB	0.000	0.00	TOLUENE	35.017	3.07

TOTALS

ALL COMP	1147.619
GASOLINE	1140.769

SIG COMP RATIOS

C1/C2	2.83
A /D2	6.01
D1/D2	0.96
C1/D2	11.06
PENT/IPENT	0.86
CH/MCP	1.01

Normalized %

CH	6.47	16.9
MCP	6.40	16.8
MCH	25.32	66.3

INTERPRETER -
ANALYST -

HALIBUT A-7

C4-C7 OIL 2289.5 - 2295.5 m 09 APR 79

69790 AUSTRALIA GIPPSLAND BASIN WELL A-7 HALIBUT FIELD

	TOTAL PERCENT	NORM PERCENT
METHANE	0.000	
ETHANE	0.200	
PROPANE	5.771	
IBUTANE	11.334	0.99
NBUTANE	27.740	2.43
IPENTANE	71.258	6.25
NPENTANE	59.125	5.19
22-DMB	2.846	0.25
CPENTANE	4.173	0.37
23-DMB	10.114	0.89
2-MP	56.486	4.95
3-MP	31.763	2.79
NHEXANE	99.426	8.72
MCP	51.065	4.48
22-DMP	0.000	0.00
24-DMP	6.933	0.61
223-TMB	0.000	0.00

	TOTAL PERCENT	NORM PERCENT
CHEX	73.455	6.44
33-DMP	0.000	0.00
11-DMCP	64.403	5.65
2-MHEX	0.000	0.00
23-DMP	22.433	1.97
3-MHEX	37.077	3.25
1C3-DMCP	23.860	2.09
1T3-DMCP	17.469	1.53
1T2-DMCP	29.060	2.55
3-EPENT	0.000	0.00
224-TMP	0.000	0.00
NHEPTANE	137.109	12.03
1C2-DMCP	0.000	0.00
MCH	268.119	23.52
ECP	0.000	0.00
BENZENE	0.000	0.00
TOLUENE	34.908	3.06

TOTALS

ALL COMP	1146.123
GASOLINE	1140.153

SIG COMP RATIOS

C1/C2	3.34
A /D2	6.38
D1/D2	0.94
C1/D2	10.95
PENT/IPENT	0.83
CH/MCP	1.44

Normalised %

CH	6·44	18·7
MCP	4·48	13·0
MCH	23·52	68·3

INTERPRETER -
ANALYST -

HALIBUT A-11

2311.5 - 2318.0 m

C4-C7 OIL 09 APR 79

69792 AUSTRALIA GIPPSLAND BASIN WELL A-11 HALIBUT FIELD

	TOTAL PERCENT	NORM PERCENT		TOTAL PERCENT	NORM PERCENT
METHANE	0.000		CHEX	73.717	6.91
ETHANE	0.000		33-DMP	0.000	0.00
PROPANE	3.724		11-DMCP	40.341	3.78
IBUTANE	8.576	0.80	2-MHEX	0.000	0.00
NBUTANE	21.759	2.04	23-DMP	26.402	2.48
IPENTANE	40.214	3.77	3-MHEX	38.138	3.58
NPENTANE	49.973	4.69	1C3-DMCP	23.617	2.21
22-DMB	2.349	0.22	1T3-DMCP	18.245	1.71
CPENTANE	4.042	0.38	1T2-DMCP	29.261	2.74
23-DMB	9.286	0.87	3-EPENT	0.000	0.00
2-MP	53.715	5.04	224-TMP	0.000	0.00
3-MP	28.952	2.71	NHEPTANE	117.518	11.02
NHEXANE	93.729	8.79	1C2-DMCP	0.000	0.00
MCP	49.509	4.64	MCH	282.443	26.48
22-DMP	0.000	0.00	ECP	8.376	0.79
24-DMP	7.256	0.68	BENZENE	0.000	0.00
223-TMB	0.000	0.00	TOLUENE	39.212	3.68

TOTALS

ALL COMP	1070.355
GASOLINE	1066.632

SIG COMP RATIOS

C1/C2	3.29
A /D2	5.54
D1/D2	1.03
C1/D2	10.40
PENT/IPENT	1.24
CH/MCP	1.49

Normalised %

CH	6.91	18.2
MCP	4.64	12.2
MCH	26.48	69.6

INTERPRETER -
ANALYST -

COBIA - 1

C4-C7 OIL FIT - 2 2406.5 m 09 APR 79

69787 AUSTRALIA GIPPSLAND BASIN COBIA-1 FIT-2 7896FT.

	TOTAL PERCENT	NORM PERCENT		TOTAL PERCENT	NORM PERCENT
METHANE	0.000		CHEX	52.838	6.11
ETHANE	0.744		33-DMP	0.000	0.00
PROPANE	16.624		11-DMCP	43.145	4.99
IBUTANE	23.374	2.70	2-MHEX	0.000	0.00
NBUTANE	39.784	4.60	23-DMP	18.273	2.11
IPENTANE	44.500	5.15	3-MHEX	26.260	3.04
NPENTANE	54.014	6.25	1C3-DMCP	16.633	1.92
22-DMB	2.394	0.28	1T3-DMCP	13.789	1.59
CPENTANE	3.565	0.41	1T2-DMCP	20.302	2.35
23-DMB	8.646	1.00	3-EPENT	0.000	0.00
2-MP	47.529	5.50	224-TMP	0.000	0.00
3-MP	26.293	3.04	NHEPTANE	81.042	9.37
NHEXANE	94.428	10.92	1C2-DMCP	0.000	0.00
MCP	38.371	4.44	MCH	181.642	21.01
22-DMP	0.000	0.00	ECP	0.000	0.00
24-DMP	6.058	0.70	BENZENE	0.000	0.00
223-TMB	0.000	0.00	TOLUENE	21.701	2.51

TOTALS

ALL COMP	881.948
GASOLINE	864.580

SIG COMP RATIOS

C1/C2	3.12
A /D2	6.68
D1/D2	0.83
C1/D2	10.57
PENT/IPENT	1.21
CH/MCP	1.38

Normalised %

CH	6.11	19.4
MCP	4.44	14.1
MCH	21.01	66.5

INTERPRETER -
ANALYST -

COBIA - 2

C4-C7 OIL FIT - 1 2420 m 09 APR 79

69788A AUSTRALIA GIPPSLAND BASIN COBIA-2 FIT-1 7940FT.

	TOTAL PERCENT	NORM PERCENT		TOTAL PERCENT	NORM PERCENT
METHANE	0.000		CHEX	77.742	6.01
ETHANE	0.628		33-DMP	0.000	0.00
PROPANE	17.188		11-DMCP	70.301	5.43
IBUTANE	26.678	2.06	2-MHEX	0.000	0.00
NBUTANE	73.976	5.72	23-DMP	24.538	1.90
IPENTANE	64.842	5.01	3-MHEX	40.327	3.12
NPENTANE	75.874	5.86	1C3-DMCP	25.566	1.98
22-DMB	3.471	0.27	1T3-DMCP	18.942	1.46
CPENTANE	7.516	0.58	1T2-DMCP	31.147	2.41
23-DMB	15.070	1.16	3-EPENT	0.000	0.00
2-MP	69.129	5.34	224-TMP	0.000	0.00
3-MP	38.497	2.98	NHEPTANE	119.550	9.24
NHEXANE	114.340	8.84	1C2-DMCP	0.000	0.00
MCP	56.940	4.40	MCH	296.804	22.94
22-DMP	0.000	0.00	ECP	0.000	0.00
24-DMP	8.197	0.63	BENZENE	0.000	0.00
223-TMB	0.000	0.00	TOLUENE	34.337	2.65

TOTALS

ALL COMP	1311.598
GASOLINE	1293.782

SIG COMP RATIOS

C1/C2	3.35
A /D2	5.80
D1/D2	0.85
C1/D2	11.03
PENT/IPENT	1.17
CH/MCP	1.37

Normalised %

CH	6.01	18.0
MCP	4.40	13.2
MCH	22.94	68.8

INTERPRETER -
ANALYST -

COBIA - 2

C4-C7 OIL FIT - 4 2401 m 09 APR 79

69788B AUSTRALIA GIPPSLAND BASIN COBIA-2 FIT-4 7877FT.

	TOTAL PERCENT	NORM PERCENT		TOTAL PERCENT	NORM PERCENT
METHANE	0.000		CHEX	82.241	6.17
ETHANE	1.038		33-DMP	0.000	0.00
PROPANE	23.744		11-DMCP	43.092	3.23
IBUTANE	31.942	2.40	2-MHEX	0.000	0.00
NBUTANE	58.934	4.42	23-DMP	30.232	2.27
IPENTANE	65.922	4.94	3-MHEX	40.796	3.06
NPENTANE	79.758	5.98	1C3-DMCP	25.352	1.90
22-DMB	3.834	0.29	1T3-DMCP	19.200	1.44
CPENTANE	5.598	0.42	1T2-DMCP	31.232	2.34
23-DMB	15.600	1.17	3-EPENT	0.000	0.00
2-MP	71.794	5.38	224-TMP	0.000	0.00
3-MP	39.196	2.94	NHEPTANE	148.471	11.13
NHEXANE	121.007	9.07	1C2-DMCP	0.000	0.00
MCP	61.737	4.63	MCH	305.064	22.88
22-DMP	0.000	0.00	ECP	7.714	0.58
24-DMP	9.471	0.71	BENZENE	0.000	0.00
223-TMB	0.000	0.00	TOLUENE	35.377	2.65

TOTALS

ALL COMP	1358.296
GASOLINE	1333.514

SIG COMP RATIOS

C1/C2	3.13
A /D2	6.60
D1/D2	0.87
C1/D2	10.55
PENT/IPENT	1.21
CH/MCP	1.33

Normalised %

CH	6.17	18.3
MCP	4.63	13.7
MCH	22.88	68.0

INTERPRETER -
ANALYST -

INTERPRETER -
ANALYST -

FORTESCUE - 2

RFT - 1 2446.5 m

C4-C7 OIL 09 MAR 78

69734

	TOTAL PERCENT	NORM PERCENT
METHANE	0. 000	
ETHANE	0. 455	
PROPANE	13. 549	
IBUTANE	18. 530	2. 19
NBUTANE	33. 637	3. 98
IPENTANE	32. 943	3. 90
NPENTANE	38. 360	4. 54
22-DMB	2. 063	0. 24
CPENTANE	3. 648	0. 43
23-DMB	8. 413	1. 00
2-MP	43. 148	5. 11
3-MP	25. 302	3. 00
NHEXANE	88. 188	10. 44
MCP	38. 135	4. 52
22-DMP	0. 000	0. 00
24-DMP	5. 628	0. 67
223-TMB	0. 000	0. 00

	TOTAL PERCENT	NORM PERCENT
CHEX	56. 384	6. 68
33-DMP	0. 000	0. 00
11-DMCP	34. 413	4. 08
2-MHEX	0. 000	0. 00
23-DMP	16. 072	1. 90
3-MHEX	42. 780	5. 07
1C3-DMCP	17. 083	2. 02
1T3-DMCP	13. 710	1. 62
1T2-DMCP	21. 723	2. 57
3-EPENT	0. 000	0. 00
224-TMP	0. 000	0. 00
NHEPTANE	81. 733	9. 68
1C2-DMCP	0. 000	0. 00
MCH	196. 220	23. 24
ECP	0. 000	0. 00
BENZENE	2. 333	0. 28
TOLUENE	23. 995	2. 84

TOTALS

ALL COMP	858. 444
GASOLINE	844. 440

SIG COMP RATIOS

C1/C2	3. 17
A /D2	3. 97
D1/D2	0. 62
C1/D2	6. 71
PENT/IPENT	1. 16
CH/MCP	1. 48

Normalised %

CH	6.68	19.4
MCP	4.52	13.1
MCH	23.24	67.5

INTERPRETER -
ANALYST -

FORTESCUE - 2

C4-C7 OIL RFT - 3 2450 m 09 MAR 78

69735

	TOTAL PERCENT	NORM PERCENT
METHANE	0.000	
ETHANE	0.000	
PROPANE	0.608	
IBUTANE	3.769	0.87
NBUTANE	9.033	2.09
IPENTANE	23.245	5.37
NPENTANE	39.363	9.09
22-DMB	1.720	0.40
CPENTANE	1.841	0.43
23-DMB	5.614	1.30
2-MP	43.024	9.93
3-MP	16.445	3.80
NHEXANE	47.642	11.00
MCP	24.591	5.68
22-DMP	0.000	0.00
24-DMP	4.096	0.95
223-TMB	0.000	0.00

	TOTAL PERCENT	NORM PERCENT
CHEX	37.914	8.75
33-DMP	0.000	0.00
11-DMCP	25.181	5.81
2-MHEX	0.000	0.00
23-DMP	12.668	2.92
3-MHEX	21.771	5.03
1C3-DMCP	12.893	2.98
1T3-DMCP	10.051	2.32
1T2-DMCP	16.359	3.78
3-EPENT	0.000	0.00
224-TMP	0.000	0.00
NHEPTANE	60.120	13.88
1C2-DMCP	0.000	0.00
MCH	0.000	0.00
ECP	0.000	0.00
BENZENE	0.000	0.00
TOLUENE	15.864	3.66

TOTALS

ALL COMP	433.814
GASOLINE	433.206

SIG COMP RATIOS

C1/C2	0.99
A /D2	4.95
D1/D2	0.73
C1/D2	2.90
PENT/IPENT	1.69
CH/MCP	1.54

Something wrong — MCH peak has been missed.

	Norm.
CH 8.75	60.6
MCP 5.68	39.4
MCH 0	0.

INTERPRETER -
ANALYST -

FORTESCUE - 3

C4-C7 OIL

RFT - 1 2440 m

09 MAR 78

69736

	TOTAL PERCENT	NORM PERCENT
METHANE	0. 000	
ETHANE	1. 107	
PROPANE	18. 468	
IBUTANE	21. 780	2. 70
NBUTANE	32. 628	4. 04
IPENTANE	42. 275	5. 24
NPENTANE	32. 699	4. 05
22-DMB	2. 178	0. 27
CPENTANE	3. 549	0. 44
23-DMB	8. 946	1. 11
2-MP	43. 319	5. 37
3-MP	26. 494	3. 28
NHEXANE	67. 845	8. 41
MCP	36. 922	4. 58
22-DMP	0. 000	0. 00
24-DMP	6. 000	0. 74
223-TMB	0. 000	0. 00

	TOTAL PERCENT	NORM PERCENT
CHEX	52. 426	6. 50
33-DMP	0. 000	0. 00
11-DMCP	33. 128	4. 10
2-MHEX	0. 000	0. 00
23-DMP	17. 138	2. 12
3-MHEX	42. 003	5. 20
1C3-DMCP	17. 865	2. 21
1T3-DMCP	14. 321	1. 77
1T2-DMCP	21. 437	2. 66
3-EPENT	0. 000	0. 00
224-TMP	0. 000	0. 00
NHEPTANE	67. 470	8. 36
1C2-DMCP	0. 000	0. 00
MCH	178. 474	22. 11
ECP	0. 000	0. 00
BENZENE	0. 000	0. 00
TOLUENE	38. 145	4. 73

TOTALS

ALL COMP	826. 618
GASOLINE	807. 043

SIG COMP RATIOS

C1/C2	2. 92
A /D2	3. 22
D1/D2	0. 91
C1/D2	6. 29
PENT/IPENT	0. 77
CH/MCP	1. 42

Normalised %

CH	6·50	19·6
MCP	4·58	13·8
MCH	22·11	66·6

INTERPRETER -
ANALYST -

FORTESCUE - 3

C4-C7 OIL RFT - 5 2454.5 m 09 MAR 78

69737

	TOTAL PERCENT	NORM PERCENT
METHANE	0. 000	
ETHANE	0. 516	
PROPANE	13. 162	
IBUTANE	17. 567	2. 06
NBUTANE	44. 610	5. 23
IPENTANE	25. 287	2. 96
NPENTANE	47. 291	5. 54
22-DMB	1. 890	0. 22
CPENTANE	3. 590	0. 42
23-DMB	9. 136	1. 07
2-MP	42. 313	4. 96
3-MP	24. 117	2. 83
NHEXANE	75. 310	8. 82
MCP	39. 263	4. 60
22-DMP	0. 000	0. 00
24-DMP	5. 323	0. 62
223-TMB	0. 000	0. 00

	TOTAL PERCENT	NORM PERCENT
CHEX	56. 820	6. 66
33-DMP	0. 000	0. 00
11-DMCP	33. 660	3. 94
2-MHEX	0. 000	0. 00
23-DMP	15. 601	1. 83
3-MHEX	28. 341	3. 32
1C3-DMCP	18. 609	2. 18
1T3-DMCP	13. 702	1. 61
1T2-DMCP	23. 212	2. 72
3-EPENT	0. 000	0. 00
224-TMP	0. 000	0. 00
NHEPTANE	84. 745	9. 93
1C2-DMCP	0. 000	0. 00
MCH	201. 028	23. 55
ECP	0. 000	0. 00
BENZENE	0. 000	0. 00
TOLUENE	42. 151	4. 94

TOTALS

ALL COMP	867. 244
GASOLINE	853. 566

SIG COMP RATIOS

C1/C2	3. 08
A /D2	5. 65
D1/D2	1. 49
C1/D2	10. 29
PENT/IPENT	1. 87
CH/MCP	1. 45

		Normalised %
CH	6.66	19.1
MCP	4.60	13.2
MCH	23.55	67.7

C6-7

WEST HALIBUT - 1

FIT - 6 2405 m

C4-C7 CIL

09 MAR 78

69727 AUSTRALIA W. HALIBUT R. METTER

	TOTAL PERCENT	NORM PERCENT
METHANE	0.000	
ETHANE	0.453	
PROPANE	9.194	
IBUTANE	12.973	1.66
NBUTANE	26.123	3.33
IPENTANE	42.026	5.36
NPENTANE	34.345	4.38
22-DMB	1.650	0.21
CPENTANE	3.251	0.41
23-DMB	6.924	0.88
2-MP	36.738	4.69
3-MP	21.512	2.75
NHEXANE	67.053	8.56
MCP	35.766	4.56
22-DMP	0.000	0.00
24-DMP	4.993	0.64
223-TMB	0.000	0.00

	TOTAL PERCENT	NORM PERCENT
CHEX	52.883	6.75
33-DMP	0.000	0.00
11-DMCP	31.802	4.06
2-MHEX	0.000	0.00
23-DMP	14.302	1.83
3-MHEX	40.029	5.11
1C3-DMCP	17.298	2.21
1T3-DMCP	12.943	1.65
1T2-DMCP	21.790	2.78
3-EPENT	0.000	0.00
224-TMP	0.000	0.00
NHEPTANE	80.586	10.28
1C2-DMCP	0.000	0.00
MCH	190.079	24.26
ECP	0.000	0.00
BENZENE	0.000	0.00
TOLUENE	28.580	3.65

TOTALS

ALL COMP	793.293
GASOLINE	783.646

SIG COMP RATIOS

C1/C2	3.13
A /D2	3.69
D1/D2	0.71
C1/D2	6.86
PENT/IPENT	0.82
CH/MCP	1.48

		Normalised %
CH	6.75	19.0
MCP	4.56	12.8
MCH	24.26	68.2

APPENDIX B:

HALIBUT A-10

2267.5 - 2271.0 m

DATE OF RUN 7904 SAMPLE NO. 69791 REGION NO. 7
CPR JC[illegible]0 PRS0.1730 SAMPLE TYPE OIL

SATURATES

CALCULATION DATA

	UNIC PK SUMMATIONS	UNNORM VALUES	HYDROCARBON TYPE COMPOSITION
PARAFFINS	1[illegible]223.0	229.93	69.3
1-RING NAPH	5701.0	20.95	6.3
2-RING NAPH	1103.0	19.61	5.9
3-RING NAPH	549.0	19.21	5.8
4-RING NAPH	300.0	17.65	5.3
5-RING NAPH	127.0	8.41	2.5
6-RING NAPH	150.0	16.08	4.8
TOTAL		331.84	

STERANE ANALYSIS

	RELATIVE STERANE VALUES TOTAL	C27	C28	C29	C30	SLOPE	Y-INCEPT	TRAPEZOID LEGS LOW	HIGH	CALCULATE STERN	TR
C20-C30	19.3	2.4	3.0	9.0	4.9	-0.700	27.800	13.80	6.80	24.60	103.
C20-C32	13.1	1.2	1.7	6.8	3.4	-0.796	31.694	15.78	6.23	19.94	132.

CARBON NUMBER	20	21	22	23	24	25	26	27	28	29	30	31	32
UNIC PEAK HTS	21.0	15.0	13.0	11.0	11.0	10.0	10.0	12.0	12.0	19.0	13.0	9.0	7.0
STERANE EXCESS C20-C30								3.1	3.8	11.5	6.2		
STERANE EXCESS C20-C32								1.8	2.6	10.4	5.2		
UNIC PKS - NORMALIZED	12.9	9.2	8.0	6.7	6.7	6.1	6.1	7.4	7.4	11.7	8.0	5.5	4.3

11282

HALIBUT A-10

2267.5 - 2271.0 m

DATE OF RUN 7904 SAMPLE NO. 69791 REGION NO. 7
EPR JOB NO: PRMC173C SAMPLE TYPE OIL

AROMATICS

CALCULATION DATA

	ORIG PK SUMMATIONS	UNNORM VALUES	HYDROCARBON TYPE COMPOSITION
BENZENES	9846.0	239.95	11.1
INDANES	5065.0	123.22	5.7
INDENES	4542.0	204.89	9.5
NAPHTHALENES	6170.0	95.51	4.4
TETRHYDRPHEN	6844.0	328.48	15.3
DIHYDROPHEN	8166.0	595.18	27.7
PHENANTHRENE	3819.0	416.24	19.3
PYRENES	2790.0	113.21	5.3
CHRYSENES	1140.0	4.12	0.2
BTHIOPHENES	1651.0	-6.86	0.0
DBTHIOPHENES	2332.0	31.48	1.5
THIOPHNOPHEN	1205.0	-42.05	0.0
TOTAL		2152.28	

1282

HALIBUT A-1

2263 - 2267 m

DATE OF RUN 7904 SAMPLE NO. 69789 REGION NO. 7
EPR JOB NO. PRMC1730 SAMPLE TYPE OIL

SATURATES

CALCULATION DATA

	ORIG PK SUMMATIONS	UNNORM VALUES	HYDROCARBON TYPE COMPOSITION
PARAFFINS	1845.0	400.28	65.3
1-RING NAPH	1240.0	69.96	11.4
2-RING NAPH	2286.0	41.96	6.8
3-RING NAPH	1000.0	37.73	6.2
4-RING NAPH	478.0	29.04	4.7
5-RING NAPH	166.0	9.98	1.6
6-RING NAPH	230.0	23.93	3.9
TOTAL		612.88	

STERANE ANALYSIS

	RELATIVE STERANE VALUES TOTAL	C27	C28	C29	C30	SLOPE	Y-INCEPT	TRAPEZOID LEGS LOW	HIGH	CALC STERN
C20-C30	23.0	2.9	4.2	9.2	6.9	-2.100	65.000	23.00	2.00	37.40
C20-C32	10.1	0.1	1.2	5.3	3.4	-2.218	72.659	28.29	1.67	28.27

CARBON NUMBER	20	21	22	23	24	25	26	27	28	29	30	31	32
ORIG PEAK HTS	46.0	24.0	19.0	17.0	14.0	12.0	11.0	13.0	13.0	19.0	13.0	8.0	6.0
STERANE EXCESS C20-C30								4.7	6.8	14.9	11.0		
STERANE EXCESS C20-C32								3.2	2.5	10.7	6.9		
ORIG PKS - NORMALIZED	21.4	11.2	8.8	7.9	6.5	5.6	5.1	6.0	6.0	8.8	6.0	3.7	2.8

11282

HALIBUT A-1

2263 - 2267 m

DATE OF RUN 7904 SAMPLE NO. 69789 REGION NO.
EPR JOB NO. PRM01730 SAMPLE TYPE OIL

AROMATICS

CALCULATION DATA

	LRIC PK SUMMATIONS	UNNORM VALUES	HYDROCARBON TYPE COMPOSITION
BENZENES	6637.0	165.13	10.3
INDANES	3594.0	86.92	5.4
INDENES	3076.0	135.91	8.5
NAPHTHALENES	3855.0	54.99	3.4
TETRHYDRPHEN	4991.0	240.52	15.0
DIHYDROPHEN	5966.0	433.34	27.0
PHENANTHRENE	2952.0	343.30	21.4
PYRENES	2194.0	97.19	6.1
CHRYSENES	948.0	20.81	1.3
BTHIOPHENES	1195.0	-2.27	0.0
DBTHIOPHENES	1755.0	27.46	1.7
THIOPHNOPHEN	963.0	-21.99	0.0
TOTAL		1605.57	

Halibut A-7

"11282,

HALIBUT A-7

2289.5 - 2295.5 m

DATE OF RUN 7904 SAMPLE NO. 69790 REGION NO. 7
EPR JOB NO. PR801730 SAMPLE TYPE OIL

SATURATES

CALCULATION DATA

	ORIG PK SUMMATIONS	UNNORM VALUES	HYDROCARBON TYPE COMPOSITION
PARAFFINS	11613.0	259.95	68.9
1-RING NAPH	6649.0	25.96	6.9
2-RING NAPH	1336.0	24.86	6.6
3-RING NAPH	630.0	22.83	6.1
4-RING NAPH	327.0	19.63	5.2
5-RING NAPH	129.0	8.78	2.3
6-RING NAPH	147.0	15.24	4.0
TOTAL		377.25	

STERANE ANALYSIS

	RELATIVE STERANE VALUES TOTAL	C27	C28	C29	C30	SLOPE	Y-INCEPT	TRAPEZOID LEGS LOW	HIGH	CALCULAT STERN
C27-C30	20.9	2.0	3.8	8.7	6.4	-1.100	37.200	15.20	4.20	25.60 97
C20-C32	10.3	0.0	1.3	5.4	3.5	-1.166	41.697	18.37	4.37	15.39 136

CARBON NUMBER	20	21	22	23	24	25	26	27	28	29	30	31	32
ORIG PEAK HTS	29.0	16.0	13.0	12.0	11.0	9.0	9.0	10.0	11.0	16.0	12.0	8.0	7.0
STERANE EXCESS C27-C30								2.5	4.6	10.7	7.8		
STERANE EXCESS C20-C32								0.0	2.0	8.1	5.3		
ORIG PKS - NORMALIZED	17.8	9.8	8.0	7.4	6.7	5.5	5.5	6.1	6.7	9.8	7.4	4.9	4.3

11282

HALIBUT A-7

2289.5 - 2295.5 m

DATE OF RUN 7904 SAMPLE NO. 69790 REGION NO. 7

EPR JOB NO. PRM01730 SAMPLE TYPE OIL

AROMATICS

CALCULATION DATA

	ORIG PK SUMMATIONS	UNNORM VALUES	HYDROCARBON TYPE COMPOSITION
BENZENES	9515.0	231.95	10.7
INDANES	4815.0	116.29	5.4
INDENES	4220.0	188.03	8.7
NAPHTHALENES	5592.0	83.30	3.9
TETRHYDRPHEN	6724.0	322.98	15.0
DIHYDROPHEN	8150.0	593.10	27.5
PHENANTHRENE	4129.0	472.47	21.9
PYRENES	2847.0	109.51	5.1
CHRYSENES	1157.0	5.13	0.2
BITHIOPHENES	1599.0	-5.67	0.0
DRTHIOPHENES	2345.0	31.84	1.5
THIOPHNOPHEN	1253.0	-59.50	0.0
TOTAL		2154.20	

11282

HALIBUT A-11

2311.5 - 2318.0 m

DATE OF RUN 7904 SAMPLE NO. 69702 REGION NO. 7
EPA JOB NO. PRM01730 SAMPLE TYPE OIL

SATURATES

CALCULATION DATA

	ORIG PK SUMMATIONS	UNNORM VALUES	HYDROCARBON TYPE COMPOSITION
PARAFFINS	25530.0	545.04	63.3
1-RING NAPH	18477.0	119.65	13.9
2-RING NAPH	2994.0	50.12	5.8
3-RING NAPH	1334.0	47.33	5.5
4-RING NAPH	713.0	43.04	5.0
5-RING NAPH	253.0	13.71	1.6
6-RING NAPH	388.0	42.30	4.9
TOTAL		861.19	

STERANE ANALYSIS

	RELATIVE STERANE VALUES TOTAL	C27	C28	C29	C30	SLOPE	Y-INCEPT	TRAPEZOID LEGS LOW	HIGH	CALCULAT STERN	T
C20-C30	16.5	2.3	3.1	7.3	3.8	-2.900	94.200	36.20	7.20	42.80	217
C20-C32	11.1	1.0	1.8	5.6	2.8	-3.468	112.658	43.29	1.67	33.77	26

CARBON NUMBER	20	21	22	23	24	25	26	27	28	29	30	31	32
ORIG PEAK HTS	63.0	36.0	30.0	28.0	25.0	21.0	19.0	22.0	21.0	29.0	17.0	9.0	6.0
STERANE EXCESS C20-C30								6.1	8.0	18.9	9.8		
STERANE EXCESS C20-C32								3.0	5.5	16.9	8.4		
ORIG PKS - NORMALIZED	19.3	11.0	9.2	8.6	7.7	6.4	5.8	6.7	6.4	8.9	5.2	2.8	1.8

Halibut A-11

11282

HALIBUT A-11

2311.5 - 2318.0 m

DATE OF RUN 7904 SAMPLE NO. 69792 REGION NO.
EPR JOB NO. PRM01730 SAMPLE TYPE OIL

AROMATICS

CALCULATION DATA

	ORIG PK SUMMATIONS	UNNORM VALUES	HYDROCARBON TYPE COMPOSITION
BENZENES	9174.0	224.61	11.2
INDANES	4551.0	109.96	5.5
INDENES	3978.0	177.25	8.8
NAPHTHALENES	5102.0	74.33	3.7
TETRAHYDROPHEN	6396.0	308.51	15.3
DIHYDROPHEN	7628.0	556.32	27.7
PHENANTHRENE	3624.0	404.43	20.1
PYRENES	2630.0	101.49	5.0
CHRYSENES	1128.0	15.45	0.8
BITHIOPHENES	1493.0	-7.15	0.0
DIBTHIOPHENES	2243.0	38.97	1.9
THIOPHNOPHEN	1162.0	-34.39	0.0
TOTAL		2011.32	

COBIA - 1

14282

FIT - 2 2406.5 m

DATE OF RUN 7904 SAMPLE NO. 69787 REGION NO. 7
EPR JOB NO. PRM01730 SAMPLE TYPE OIL

SATURATES

CALCULATION DATA

	ORIG PK SUMMATIONS	UNNORM VALUES	HYDROCARBON TYPE COMPOSITION
PARAFFINS	15632.0	346.52	68.5
1-RING NAPH	942.0	42.41	8.4
2-RING NAPH	1857.0	35.37	7.0
3-RING NAPH	828.0	31.42	6.2
4-RING NAPH	397.0	24.46	4.8
5-RING NAPH	136.0	9.03	1.8
6-RING NAPH	166.0	16.43	3.2
TOTAL		505.64	

STERANE ANALYSIS

	RELATIVE STERANE VALUES TOTAL	C27	C28	C29	C30	SLOPE	Y-INCEPT	TRAPEZOID LEGS LOW	HIGH	CALCULATE STERN	TR
C20-C30	17.8	1.0	3.4	7.3	5.2	-1.200	41.000	17.00	5.00	23.80	110.
C20-C32	9.1	0.0	1.4	4.6	3.1	-1.481	51.195	21.57	3.80	15.27	152.

CARBON NUMBER	20	21	22	23	24	25	26	27	28	29	30	31	32
ORIG PEAK HTS	35.0	18.0	15.0	13.0	12.0	11.0	10.0	11.0	12.0	16.0	12.0	8.0	7.0
STERANE EXCESS C20-C30								2.4	4.6	9.8	7.0		
STERANE EXCESS C20-C32								0.0	2.3	7.8	5.2		
ORIG PKS - NORMALIZED	19.4	10.0	8.3	7.2	6.7	6.1	5.6	6.1	6.7	8.9	6.7	4.4	3.9

11282

COBIA - 1

FIT - 2 2406.5 m

DATE OF RUN 7904 SAMPLE NO. 69797 REGION NO. 7
EPR JOB NO. PRM01730 SAMPLE TYPE OIL

AROMATICS

CALCULATION DATA

	ORIG PK SUMMATIONS	UNNORM VALUES	HYDROCARBON TYPE COMPOSITION
BENZENES	6553.0	159.70	10.7
INDANES	3345.0	81.40	5.4
INDENES	3106.0	141.76	9.5
NAPHTHALENES	3993.0	59.79	4.0
TETRAHYDROPHEN	5085.0	248.67	16.6
DIHYDROPHEN	5967.0	440.24	29.4
PHENANTHRENE	2666.0	276.97	18.5
PYRENES	1755.0	27.33	1.8
CHRYSENES	837.0	19.26	1.3
BITHIOPHENES	1106.0	-6.12	0.0
DITHIOPHENES	1788.0	42.53	2.8
THIOPHNOPHEN	750.0	-54.89	0.0
TOTAL		1497.65	

Cobia 1 FIT 1

1.1282-

COBIA - 2

FIT - 1 2420 m

DATE OF RUN 7904 SAMPLE NO. 69788A REGION NO. 7
EPR JOB NO. PRM01730 SAMPLE TYPE OIL

SATURATES

CALCULATION DATA

	ORIG PK SUMMATIONS	UNNORM VALUES	HYDROCARBON TYPE COMPOSITION
PARAFFINS	14333.0	316.01	65.6
1-RING NAPH	8938.0	41.20	8.6
2-RING NAPH	1889.0	35.92	7.5
3-RING NAPH	856.0	31.38	6.5
4-RING NAPH	427.0	26.54	5.5
5-RING NAPH	163.0	10.95	2.3
6-RING NAPH	107.0	19.58	4.1
TOTAL		481.58	

STERANE ANALYSIS

	RELATIVE STERANE VALUES TOTAL	C27	C28	C29	C30	SLOPE	Y-INCEPT	TRAPEZOID LEGS LOW	HIGH	CALCULATE STERN	TR
C20-C30	22.2	2.2	3.5	10.3	6.2	-1.200	42.800	18.80	6.80	36.60	128.
C20-C32	12.4	0.3	1.4	7.0	3.7	-1.346	49.839	22.91	6.75	25.11	178.

CARBON NUMBER	20	21	22	23	24	25	26	27	28	29	30	31	32
ORIG PEAK HTS	35.0	21.0	17.0	15.0	13.0	13.0	12.0	14.0	15.0	25.0	17.0	12.0	9.0
STERANE EXCESS C21-C30								3.6	5.8	17.0	10.2		
STERANE EXCESS C20-C32								0.5	2.9	14.2	7.5		
ORIG PKS - NORMALIZED	16.1	9.6	7.8	6.9	6.0	6.0	5.5	6.4	6.9	11.5	7.8	5.5	4.1

COBIA - 2

I1282

FIT - 1 2420 m

DATE OF RUN 7904 SAMPLE NO. 69788A REGION NO. 7
EPR JOB NO. PRMC1730 SAMPLE TYPE OIL

AROMATICS

CALCULATION DATA

	ORIG PK SUMMATIONS	UNNORM VALUES	HYDROCARBON TYPE COMPOSITION
BENZENES	9008.0	220.33	11.4
INDANES	4493.0	108.24	5.6
INDENES	3390.0	171.74	8.9
NAPHTHALENES	5108.0	75.63	3.9
TETRHYDRPHEN	6185.0	299.28	15.5
DIHYDROPHEN	7043.0	510.87	26.5
PHENANTHRENE	3191.0	323.54	16.8
PYRENES	2613.0	130.02	6.7
CHRYSENES	1238.0	46.87	2.4
BTHIOPHENES	1489.0	-4.19	0.0
DBTHIOPHENES	2140.0	42.31	2.2
THIOPHNOPHEN	1132.0	-19.47	0.0
TOTAL		1928.83	

11282

COBIA - 2

FIT - 4 2401 m

DATE OF RUN 7904 SAMPLE NO. 69788B REGION NO. 7
EPR JOB NO. PRM01730 SAMPLE TYPE OIL

2 FIT 4

SATURATES

CALCULATION DATA

	ORIG PK SUMMATIONS	UNNORM VALUES	HYDROCARBON TYPE COMPOSITION
PARAFFINS	21925.0	477.00	65.9
1-RING NAPH	14177.0	75.78	10.5
2-RING NAPH	2570.0	46.03	6.4
3-RING NAPH	1156.0	41.49	5.7
4-RING NAPH	607.0	36.56	5.1
5-RING NAPH	223.0	13.19	1.8
6-RING NAPH	311.0	33.34	4.6
TOTAL		723.39	

STERANE ANALYSIS

	RELATIVE STERANE VALUES TOTAL	C27	C28	C29	C30	SLOPE	Y-INCEPT	TRAPEZOID LEGS LOW	HIGH	CALCUL STERN
C20-C30	19.0	2.5	3.6	8.6	4.4	-1.400	53.200	25.20	11.20	42.80
C20-C32	14.9	1.4	2.6	7.1	3.9	-2.320	79.857	33.45	5.61	41.07

CARBON NUMBER	20	21	22	23	24	25	26	27	28	29	30	31	32
ORIG PEAK HTS	52.0	28.0	23.0	21.0	19.0	17.0	18.0	21.0	22.0	32.0	21.0	12.0	9.0
STERANE EXCESS C20-C30								5.6	8.0	19.4	9.8		
STERANE EXCESS C20-C32								3.8	7.1	19.4	10.7		
ORIG PKS - NORMALIZED	17.6	9.5	7.8	7.1	6.4	5.8	6.1	7.1	7.5	10.8	7.1	4.1	3.1

11282

COBIA - 2

FIT - 4 2401 m

DATE OF RUN 7904 SAMPLE NO. 69788B REGION N
EPR JOB NO. PRMC1730 SAMPLE TYPE D

AROMATICS

CALCULATION DATA

	ORIG PK SUMMATIONS	UNNORM VALUES	HYDROCARBON TYPE COMPOSITION
BENZENES	8958.0	219.18	11.2
INDANES	4472.0	108.17	5.5
INDENES	3996.0	179.49	9.1
NAPHTHALENES	4974.0	71.98	3.7
TETRHYDRPHEN	6460.0	314.34	16.0
DIHYDROPHEN	7444.0	542.49	27.6
PHENANTHRENE	3510.0	383.72	19.5
PYRENES	2507.0	81.39	4.1
CHRYSENES	1157.0	28.25	1.4
BTHIOPHENES	1472.0	-6.92	0.0
DETHIOPHENES	2181.0	36.05	1.8
THIOPHNOPHEN	1114.0	-37.53	0.0
TOTAL		1965.06	

11282

FORTESCUE - 2

RFT - 1 2446.5 m

DATE OF RUN 7903 SAMPLE NO. 69734 REGION NO. 1
EPR JOB NO. PRM01710 SAMPLE TYPE OIL

Fortescue 2
RFT 1
2446.5 m.

SATURATES

CALCULATION DATA

	ORIG PK SUMMATIONS	UNNORM VALUES	HYDROCARBON TYPE COMPOSITION
PARAFFINS	25899.0	546.64	59.5
1-RING NAPH	19644.0	126.98	13.8
2-RING NAPH	3971.0	73.33	8.0
3-RING NAPH	1757.0	66.75	7.3
4-RING NAPH	847.0	53.11	5.8
5-RING NAPH	258.0	15.49	1.7
6-RING NAPH	344.0	36.47	4.0
TOTAL		918.77	

TERANE ANALYSIS

	RELATIVE STERANE VALUES TOTAL	C27	C28	C29	C30	SLOPE	Y-INCEPT	TRAPEZOID LEGS LOW	HIGH	CALCULATED STERN	TRAP
C20-C30	21.9	2.7	4.0	9.3	5.9	-3.300	102.200	36.20	3.20	55.40	197.00
C20-C32	10.3	0.1	1.3	5.7	3.1	-3.737	120.462	45.72	0.87	32.21	279.50

CARBON NUMBER	20	21	22	23	24	25	26	27	28	29	30	31	32
ORIG PEAK HTS	76.0	37.0	30.0	26.0	23.0	19.0	17.0	20.0	20.0	30.0	18.0	11.0	8.0
STERANE EXCESS C20-C30								6.9	10.2	23.5	14.8		
STERANE EXCESS C20-C32								0.4	4.2	17.9	9.7		
ORIG PKS - NORMALIZED	22.7	11.0	9.0	7.8	6.9	5.7	5.1	6.0	6.0	9.0	5.4	3.3	2.4

FORTESCUE - 2

11282

RFT - 1 2446.5 m

DATE OF RUN 7903 SAMPLE NO. 69734 REGION NO. 1
EPR JOB NO. PRM01710 SAMPLE TYPE OIL

AROMATICS

CALCULATION DATA

	ORIG PK SUMMATIONS	UNNORM VALUES	HYDROCARBON TYPE COMPOSITION
BENZENES	7446.0	162.77	13.0
INDANES	4154.0	105.28	7.5
INDENES	3978.0	188.65	13.4
NAPHTHALENES	6229.0	110.53	7.9
TETRHYDRPHEN	5039.0	244.16	17.4
DIHYDROPHEN	5223.0	374.35	26.6
PHENANTHRENE	2146.0	167.79	11.9
PYRENES	1377.0	-13.22	0.0
CHRYSENES	726.0	8.06	0.6
BTHIOPHENES	1278.0	-4.36	0.0
DBTHIOPHENES	1576.0	25.56	1.8
THIOPHNOPHEN	592.0	-54.55	0.0
TOTAL		1407.15	

FORTESCUE - 2

11282 RFT - 3 2450 m

DATE OF RUN 7903 SAMPLE NO. 69735 REGION NO. 1
EPR JOB NO. PRM01710 SAMPLE TYPE OIL

Fortescue-2
RFT 3
2450.0 m.

SATURATES

CALCULATION DATA

	ORIG PK SUMMATIONS	UNNORM VALUES	HYDROCARBON TYPE COMPOSITION
PARAFFINS	19273.0	420.25	65.6
1-RING NAPH	12647.0	67.33	10.5
2-RING NAPH	2450.0	45.43	7.1
3-RING NAPH	1107.0	42.39	6.6
4-RING NAPH	522.0	32.35	5.1
5-RING NAPH	171.0	10.99	1.7
6-RING NAPH	216.0	21.80	3.4
TOTAL		640.54	

STERANE ANALYSIS

	RELATIVE STERANE VALUES TOTAL	C27	C28	C29	C30	SLOPE	Y-INCEPT	TRAPEZOID LEGS LOW	HIGH	CALCULATED STERN	TRAP
C20-C30	22.1	2.9	3.6	8.7	6.9	-2.100	65.000	23.00	2.00	35.40	125.00
C20-C32	8.6	0.0	0.6	4.7	3.3	-2.133	70.539	27.87	2.27	17.04	180.89

CARBON NUMBER	20	21	22	23	24	25	26	27	28	29	30	31	32
ORIG PEAK HTS	45.0	24.0	19.0	17.0	14.0	12.0	11.0	13.0	12.0	18.0	13.0	8.0	7.0
STERANE EXCESS C20-C30								4.7	5.8	13.9	11.0		
STERANE EXCESS C20-C32								0.1	1.2	9.3	6.5		
ORIG PKS - NORMALIZED	21.1	11.3	8.9	8.0	6.6	5.6	5.2	6.1	5.6	8.5	6.1	3.8	3.3

FORTESCUE - 2

11282

RFT - 3 2450 m

DATE OF RUN 7903 SAMPLE NO. 69735 REGION NO. 1
EPR JOB NO. PRM01710 SAMPLE TYPE OIL

AROMATICS

CALCULATION DATA

	ORIG PK SUMMATIONS	UNNORM VALUES	HYDROCARBON TYPE COMPOSITION
BENZENES	11591.0	287.49	14.3
INDANES	6132.0	154.65	7.7
INDENES	5464.0	253.90	12.6
NAPHTHALENES	8135.0	139.61	6.9
TETRHYDRPHEN	6600.0	311.99	15.5
DIHYDROPHEN	7063.0	495.35	24.6
PHENANTHRENE	3179.0	287.72	14.3
PYRENES	2271.0	39.72	2.0
CHRYSENES	1071.0	-0.08	0.0
BTHIOPHENES	1990.0	5.73	0.3
DBTHIOPHENES	2238.0	35.72	1.8
THIOPHNOPHEN	1061.0	-27.46	0.0
TOTAL		2011.88	

FORTESCUE - 3

11282

RFT - 1 2440 m

DATE OF RUN 7903 SAMPLE NO: 69736 REGION NO: 1 -3
EPR JOB NO: PRM01710 SAMPLE TYPE OIL

Fortes.
RFT 1
2440.0.

SATURATES

CALCULATION DATA

	ORIG PK SUMMATIONS	UNNORM VALUES	HYDROCARBON TYPE COMPOSITION
PARAFFINS	23482.0	501.73	61.0
1-RING NAPH	16922.0	101.47	12.3
2-RING NAPH	3511.0	65.62	8.0
3-RING NAPH	1565.0	59.01	7.2
4-RING NAPH	767.0	47.91	5.8
5-RING NAPH	247.0	15.99	1.9
6-RING NAPH	297.0	31.03	3.8
TOTAL		822.76	

STERANE ANALYSIS

RELATIVE STERANE VALUES

	TOTAL	C27	C28	C29	C30
C20-C30	21.4	2.4	4.0	9.3	5.7
C20-C32	11.4	0.1	1.7	6.2	3.4

	SLOPE	Y-INCEPT
	-3.000	94.200
	-3.576	115.125

	TRAPEZOID LEGS LOW	HIGH	CALCULA STERN
	34.20	4.20	52.20 19
	43.60	0.68	34.22 26

CARBON NUMBER	20	21	22	23	24	25	26	27	28	29	30	31	32
ORIG PEAK HTS	70.0	37.0	29.0	25.0	21.0	19.0	17.0	19.0	20.0	30.0	18.0	10.0	7.0
STERANE EXCESS C20-C30								5.8	9.8	22.8	13.8		
STERANE EXCESS C20-C32								0.4	5.0	18.6	10.2		
ORIG PKS - NORMALIZED	21.7	11.5	9.0	7.8	6.5	5.9	5.3	5.9	6.2	9.3	5.6	3.1	2.2

FORTESCUE - 3

11282 RFT - 1 2440 m DATE OF RUN 7903 SAMPLE NO. 69736 REGION NO. 1
EPR JOB NO. PRM01710 SAMPLE TYPE OIL

AROMATICS

CALCULATION DATA

	ORIG PK SUMMATIONS	UNNORM VALUES	HYDROCARBON TYPE COMPOSITION
BENZENES	8192.0	200.88	13.3
INDANES	4673.0	118.95	7.9
INDENES	4355.0	205.68	13.6
NAPHTHALENES	6816.0	120.99	8.0
TETRHYDRPHEN	5334.0	256.56	17.0
DIHYDROPHEN	5539.0	395.29	26.2
PHENANTHRENE	2242.0	166.83	11.1
PYRENES	1570.0	11.46	0.8
CHRYSENES	794.0	8.19	0.5
BTHIOPHENES	1424.0	-2.87	0.0
DBTHIOPHENES	1669.0	24.76	1.6
THIOPHNOPHEN	665.0	-49.42	0.0
TOTAL		1509.59	

FORTESCUE - 3

11282 RFT - 5 2454.5 m DATE OF RUN 7903 SAMPLE NO. 69737 REGION NO. 1
EPR JOB NO. PRM0171C SAMPLE TYPE OIL

Fortescue - 3
RFT 5
2454.5 m

SATURATES

CALCULATION DATA

	ORIG PK SUMMATIONS	UNNORM VALUES	HYDROCARBON TYPE COMPOSITION
PARAFFINS	19077.0	422.39	68.2
1-RING NAPH	11571.0	51.88	8.4
2-RING NAPH	2370.0	46.06	7.4
3-RING NAPH	1046.0	40.62	6.6
4-RING NAPH	479.0	29.81	4.8
5-RING NAPH	153.0	9.98	1.6
6-RING NAPH	193.0	18.82	3.0
TOTAL		619.56	

TERANE ANALYSIS

	RELATIVE STERANE VALUES TOTAL	C27	C28	C29	C30	SLOPE	Y-INCEPT	TRAPEZOID LEGS LOW	HIGH	CALCULATED AREA STERN	TRAP
C20-C30	23.7	3.0	3.8	9.5	7.4	-2.100	63.400	21.40	0.40	33.80	109.00
C20-C32	8.2	0.0	0.3	4.8	3.1	-2.052	66.961	25.92	1.30	14.64	163.31

CARBON NUMBER	20	21	22	23	24	25	26	27	28	29	30	31	32
ORIG PEAK HTS	43.0	22.0	18.0	15.0	12.0	10.0	10.0	11.0	10.0	16.0	11.0	7.0	6.0
STERANE EXCESS C20-C30								4.3	5.4	13.5	10.6		
STERANE EXCESS C20-C32								0.0	0.5	8.5	5.6		
ORIG PKS - NORMALIZED	22.5	11.5	9.4	7.9	6.3	5.2	5.2	5.8	5.2	8.4	5.8	3.7	3.1

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DATE OF RUN 7903 SAMPLE NO. 69737 REGION NO. 1
EPR JOB NO. PRM01710 SAMPLE TYPE OIL

FORTESCUE - 3

RFT - 5 2454.5 m

CALCULATION DATA

ORIG PK SUMMATIONS	UNNORM VALUES	HYDROCARBON TYPE COMPOSITION
4082.0	99.94	12.7
2225.0	55.80	7.1
2178.0	102.90	13.1
3552.0	63.54	8.1
2853.0	138.64	17.6
2990.0	215.77	27.4
1223.0	97.23	12.3
794.0	-2.08	0.0
395.0	2.23	0.3
695.0	-3.39	0.0
872.0	11.98	1.5
335.0	-31.77	0.0
	788.03	

WEST HALIBUT - 1

11282 FIT - 6 2405 m

DATE OF RUN 7903 SAMPLE NO. 69727 REGION NO. 1
EPR JOB NO. PRMC1710 SAMPLE TYPE OIL

West Halibut
I.I.T. 6
2405.0m.

SATURATES

CALCULATION DATA

	ORIG PK SUMMATIONS	UNNORM VALUES	HYDROCARBON TYPE COMPOSITION
PARAFFINS	27847.0	577.49	56.9
1-RING NAPH	22611.0	157.26	15.5
2-RING NAPH	4648.0	86.38	8.5
3-RING NAPH	2030.0	79.39	7.8
4-RING NAPH	915.0	57.34	5.7
5-RING NAPH	200.0	13.87	1.4
6-RING NAPH	394.0	42.52	4.2
TOTAL		1014.16	

STERANE ANALYSIS

RELATIVE STERANE VALUES

	TOTAL	C27	C28	C29	C30		SLOPE	Y-INCEPT	TRAPEZOID LEGS LOW	TRAPEZOID LEGS HIGH	CALCULATED STERN	CALCULATED TRA
C20-C30	26.2	3.5	4.9	10.4	7.5	*NEG*	-3.800	113.800	37.80	-0.20	66.80	188.0
C20-C32	11.6	0.2	1.5	6.0	3.8	*NEG*	-4.110	130.191	47.98	-1.34	36.82	280.0

CARBON NUMBER	20	21	22	23	24	25	26	27	28	29	30	31	32		
ORIG PEAK HTS	81.0	40.0	30.0	27.0	22.0	19.0	15.0	20.0	20.0	30.0	19.0	10.0	7.0		
STERANE EXCESS C20-C30								8.8	12.6	26.4	19.0				*NEG*
STERANE EXCESS C20-C32								0.8	4.9	19.0	12.1				*NEG*
ORIG PKS - NORMALIZED	23.8	11.8	8.8	7.9	6.5	5.6	4.4	5.9	5.9	8.8	5.6	2.9	2.1		

WEST HALIBUT - 1

11282 FIT - 6 2405 m

DATE OF RUN 7903 SAMPLE NO. 69727 REGION NO. 1
EPR JOB NO: PRM01710 SAMPLE TYPE OIL

AROMATICS

CALCULATION DATA

	ORIG PK SUMMATIONS	UNNORM VALUES	HYDROCARBON TYPE COMPOSITION
BENZENES	10864.0	265.46	12.6
INDANES	5873.0	146.15	6.9
INDENES	5521.0	256.38	12.2
NAPHTHALENES	8916.0	157.13	7.4
TETRHYDRPHEN	7191.0	345.80	16.4
DIHYDROPHEN	7658.0	547.03	25.9
PHENANTHRENE	3321.0	291.80	13.8
PYRENES	2411.0	53.62	2.5
CHRYSENES	1166.0	19.61	0.9
BTHIOPHENES	1881.0	-3.54	0.0
DBTHIOPHENES	2265.0	27.13	1.3
THIOPHNOPHEN	1028.0	-55.79	0.0
TOTAL		2110.11	