DUCK BAY 1
COCKATOO DATA FOLDER.
Includes CSIRO report(pt)
on EOM data for
Duck Bay 1

BUREAU OF MINERAL RESOURCES, GEOLOGY & GEOPHYSICS

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77/196

8 August 1979

The Director,
Geological Survey of Victoria,
Department of Minerals and Energy,
107 Russell Street,
MELBOURNE VIC 3000

Dear Sir,

I am enclosing the results of source rock analysis carried out by CSIRO for BMR on core samples from Duck Bay-1, as part of BMR's ongoing source rock study program.

We request that the analysis be held on a confidential basis until it has been reported on, either by BMR or in publications in which BMR has joint authorship.

Yours sincerely,

(E.R. SMITH)
Acting Assistant Director (Petroleum Exploration)

VIC.

RESTRICTED INVESTIGATION REPORT 1030R

Batch 3

CSIRO

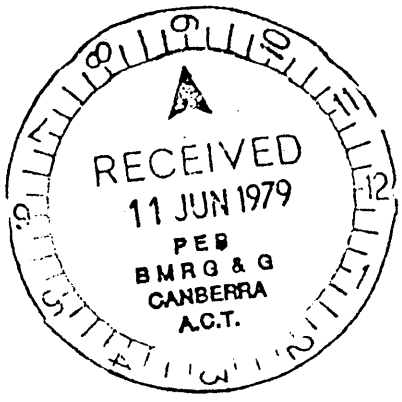
SS289I

INSTITUTE OF EARTH RESOURCES

SOURCE ROCK ANALYSES ON SAMPLES FROM THE OTWAY, SYDNEY, BOWEN, SURAT, BASS, GIPPSLAND, GEORGINA AND NGALIA BASINS

A REPORT TO THE BUREAU OF MINERAL RESOURCES, CANBERRA

N.M. RAPHAEL AND J.D. SAXBY



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AUSTRALIA 2113

JUNE 1979

1. INTRODUCTION

This report contains the results of organic geochemical analyses carried out by G.S.I.R.O. on forty five core samples, four samples of cuttings and one surface sample supplied by the B.M.R. (December, 1978) from wells (location - BMR map reference) in the following sedimentary basins:

Otway basin: - Kalangadoo-1 (37°34'40''S, 140°41'40''E-310) Clam-1 (40°51'52''S, 144°12'55''E-478), Alliance Caroline-1 (37°56'30''S, 140°54'30'' E-386)

Sydney basin: - Dural South-1 (33°42'37''S, 151°01'02'' E-361)

Bowen basin: - Warrinilla-1 (25°06'49''S, 148°33'14''E-128), Warrinilla-2 (25°03'33''S, 148°33'10''E-272), Glentulloch-1 (25°47'17''S, 148°42'27''E-42), Cometside-1 (24°39'30''S, 148°48'06''E-206), Purbrook-1 (24°37'10''S, 148°48'20''E-139),Rolleston-1 (24°33'47''S, 148°37'52''E-173), Warrinilla North-1 (24°52'49''S, 148°31'50''E-140),Purbrook South-1 (24°49'30''S, 148°46'40''E-219), Bandanna-1 (25°06'40''S, 148°17'20''E-120).

Surat basin: - Westgrove-3 (25°34'00''S, 148°26'00''E-46)

Bass basin: - Bass-3 (39°59'51''S, 145°16'57''E-390), Aroo-1 (39°47'30''S, 145°26'48''E-657), Poonboon-1 (40°08'00''S, 145°55'00''E) Cormorant-1 (39°34'23''S, 145°31'36''E).

Gippsland basin: - Duck Bay-1 (37°56'45''S, 147°39'36''E-201).

Georgina basin: - Netting Fence-1 (22°56'05''S, 138°02'06''E-229).

Ngalia basin: - Mt Doreen Afmeco-1 (22°17'45''S, 131°14'45''E).

A surface sample from Joadja, 29 km S.W. of Mittagong in the Sydney basin, was also supplied.

The approximate location of each well is shown in Figs. 1 & 2.

2. METHODS AND RESULTS

2.1 Extractable Organic Matter

A portion of each sample was ground to produce approximately 75% less than 70 μm which was then extracted in a soxhlet with purified chloroform for a minimum of six hours. Evaporation of the solvent under nitrogen gave the total extract. That part of the total extract soluble in petroleum ether was transferred to a 5 cm x 1 cm column of florisil and eluted with petroleum ether. This eluate, after evaporation of the ether, is the aliphatic fraction which was analysed by gas chromatography for hydrocarbons in the n-C_{15} to n-C_{35} boiling range (Fig. 3).

Further dissolution of the total extract with benzene and its subsequent elution from the same florisil column produces the aromatic fraction. Methanol is then similarly used to obtain the polar fraction. Thus:

Total extract(ppm)	= aliphatic fraction(ppm)	+ aromatic fraction(ppm)	+ polar fraction(ppm)	+ residue, losses and materials remaining on the column.

The probable error in the values (expressed as ppm of the original sample) depends on the weight of core extracted and the nature of the extract. However, the following ranges probably represent the maximum errors:

Total extract	±	60 ppm
Aliphatic fraction	±	10 ppm
Aromatic fraction	±	20 ppm
Polar fraction	±	100 ppm

The separation achieved on the short florisil columns is not perfect, and it should not be assumed that these fractions contain solely aliphatic, aromatic or polar compounds respectively. In Table 1, most samples demonstrated that, within experimental error, the sum of the three fractions was equal to the total extract. However, the following samples did not show this pattern:

Group 1 - Lab. No.: 78454, 78468, 78474, 78475, 78476, 78477, 78490, 78493, 78496.

Group 2 - Lab. No.: 78469, 78470, 78471, 78489, 78494, 78495, 78498.

The extracts from Group 1 samples contained a considerable residue that did not redissolve in petroleum ether, benzene or methanol. Most of these contained an appreciable amount of sulphur in all fractions and especially in the residue. The remaining samples which gave an appreciable insoluble residue were coaly in nature. In the case of Group 2 samples evaporative losses of more volatile material in the extracts were appreciable and difficult to control. As with data in previous reports, all results are single determinations on the samples as received. Samples and extracts vary greatly and in some cases further CSIRO-BMR collaborative work is desirable so that the most meaningful conclusions can be drawn.

2.2 Total Organic Carbon

This was determined using a Leco analyser on a sample of ground core which had previously been treated with 5N HCl to remove carbonates. Results are shown in Table 1 and in most cases the error is ± 0.05%.

2.3 Reflectance

Part of each core was crushed to -0.7 mm and the carbonaceous material was concentrated by froth flotation. The floated material was mounted in cold setting resin, ground and polished. Measurements of reflectance were difficult on some samples because of a lack of readily identifiable vitrinite. However, where possible mean average values at 546 n.m. with an oil of refractive index 1.515 are listed in Table 1. Distributions of these measurements are seen in Tables 2 and 3. Some of the samples showed a considerable range of reflectance values but for most samples a probable error of ± 0.05%, corresponding to twice the standard error of the mean, would be reasonable.

3. ACKNOWLEDGEMENTS

Essential contributions to this work were made by the following North Ryde staff: A. Bennett (reflectance); K. Riley and N. Watson (carbon analysis); and G. Hansen, V. Hutchings and Eric Murray (sample preparation).

TABLE 1. ANALYTICAL RESULTS

Lab. No.	Well	Core	Depth (m)	Formation	Age	Remarks	Total Extract (ppm)	Ali-phatic Fraction (ppm)	Arom-matic Fraction (ppm)	Polar Frac-tion (ppm)	Organic Carbon (%)	Reflectance (%)
78479	Duck Bay-1	3	862.9	Strzelecki Group	L. Cretaceous	Shale-mudstone (grey slightly carb.)	170	32	51	48	1.05	0.86
78480	"	6	1127.5	Unnamed	L. Permian	Sandstone (v. fine, grey, argillaceous matrix, slightly carb.)	242	41	51	69	0.65	0.65

† Cuttings
Values in parentheses are more uncertain
– insufficient vitrinite present for measurement

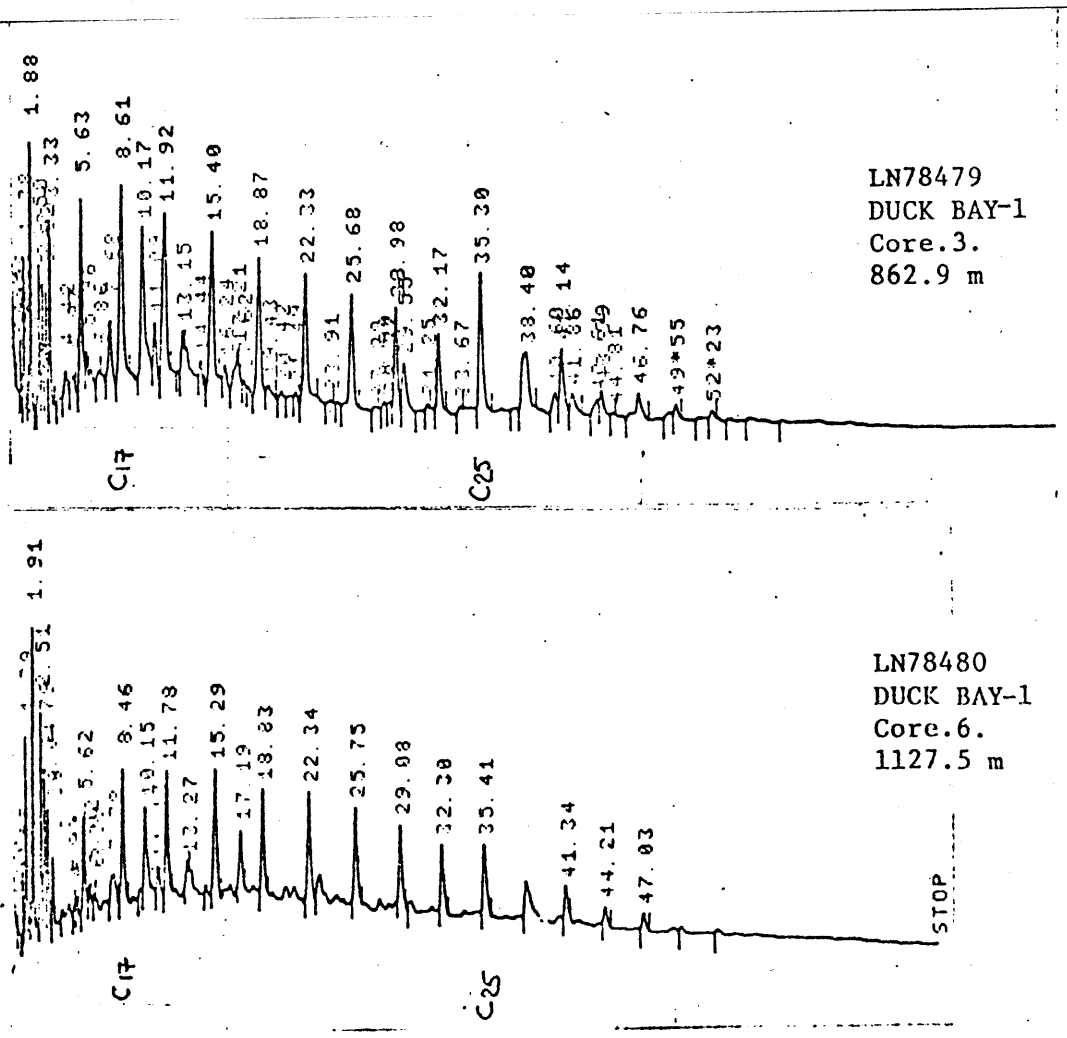

TABLE 2. DISTRIBUTIONS OF REFLECTANCE MEASUREMENTS (R_o 0.20–1.55)

Lab. No.	No. of readings in reflectance group .20	.25	.30	.35	.40	.45	.50	.55	.60	.65	.70	.75	.80	.85	.90	.95	1.00	1.05	1.10	1.15	1.20	1.25	1.30	1.35	1.40	1.45	1.50	1.55	R_o (%) average	No. of readings
78479																	3	3	1										0.86	7
78480						1	1	7	12	19	4	6																	0.65	50

Reading numbers in parentheses not used to obtain mean

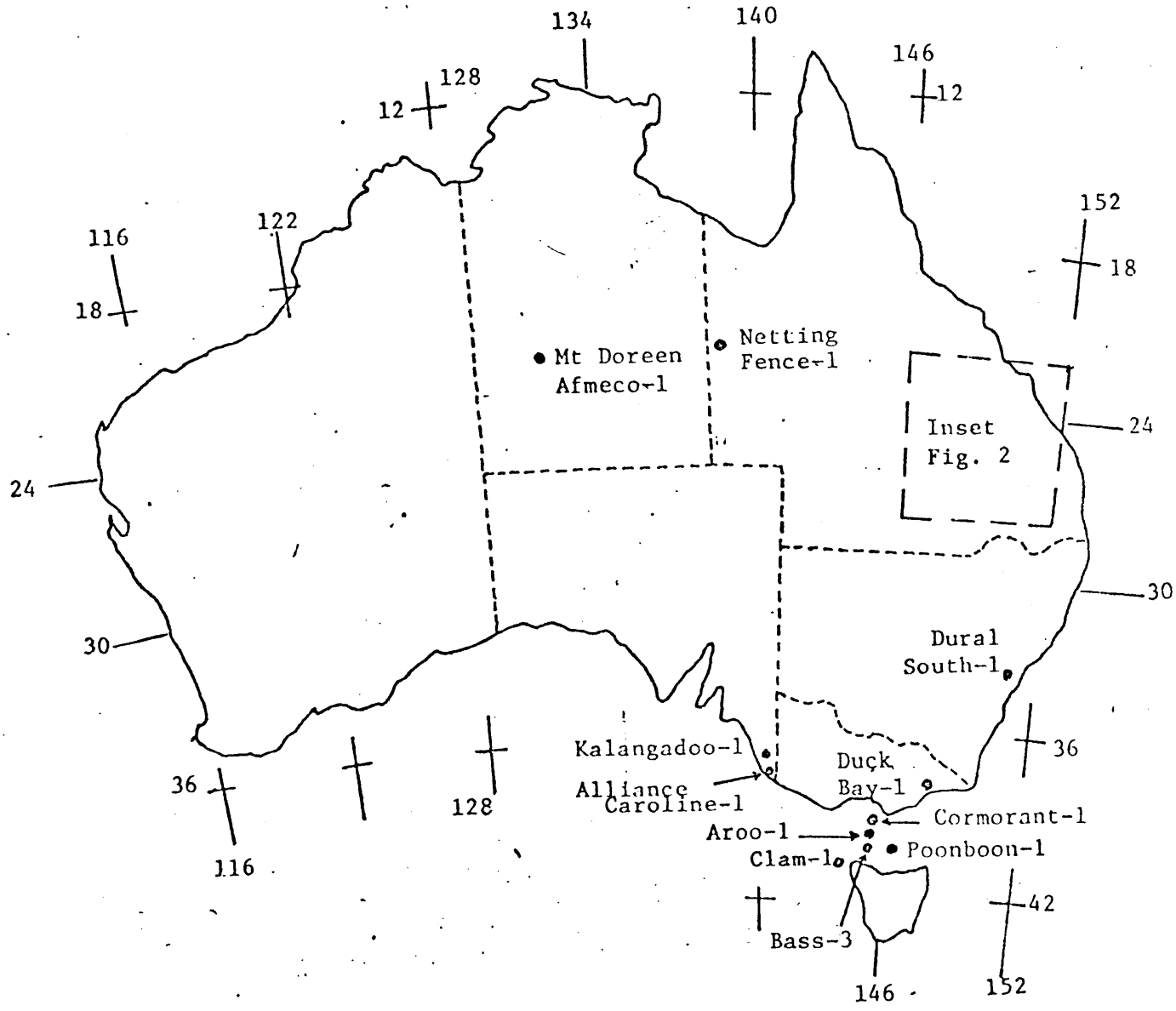

FIG. 1 Approximate locations of Exploration Wells