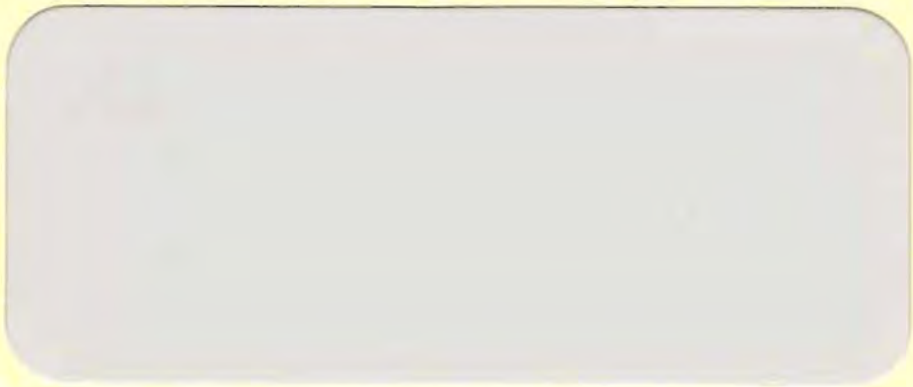

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KONINKLIJKE / SHELL EXPLORATIE EN PRODUKTIE LABORATORIUM

RIJSWIJK, THE NETHERLANDS

December 1981

RKER 81.186

SOURCE ROCK PROPERTIES OF CUTTING SAMPLES FROM WELL EAST MEREENIE-1, NORTHERN TERRITORY, AUSTRALIA.

by

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code:774.103

Investigation

9.12.480

KONINKLIJKE/SHELL EXPLORATIE EN PRODUKTIE LABORATORIUM

RIJSWIJK, THE NETHERLANDS

(Shell Research B.V.)

CONTENTS

I INTRODUCTION

A source rock investigation has been carried out on cutting samples from well EAST MEREENIE-1, Northern Territory, Australia. The location of the well is shown on Figure 1.

The samples derive from the interval 1100-4655ft and are of Ordovician to Cambrian age.

Source rock evaluation commonly comprises determination of:

1. the presence (or absence) of hydrocarbons source material in the rock samples;
2. the quality of the organic matter as well as the distribution of its specific constituents;
3. the degree of organic metamorphism (= level of maturity).

A source rock is identified by measuring the amount of temperature reactive ("live") organic matter present, i.e. the amount of organic matter that yields hydrocarbons upon pyrolysis. The method excludes any ("dead") organic matter such as inertinites.

In addition, the total organic carbon content can be determined which gives the sum of "live" and "dead" organic carbon. Rocks containing less than 0.5 % organic carbon are not considered to have a potential for commercial oil accumulations.

The source rock indications (SRI), which are a measure of the amount of pyrolysable organic matter, are determined on the original samples and in certain cases also after extraction with organic solvents. A systematically lower value after extraction is due to the presence of extractable hydrocarbons. These may consist of trapped oil, oil generated in situ by a source rock, or e.g. gasoil used in the drilling fluid.

In general, samples with source rock indications of 30 or less do not represent (immature or mature) source rocks. Values between 30 and 100 generally indicate marginal source rocks, while values above 100 commonly indicate good source rocks.

Intervals or samples with high source rock indications are investigated under a microscope to ensure that the high values indicate genuine source rock properties and are not due to contaminants of an organic nature such as lost circulation material.

The quality of a source rock for oil/gas generation depends on the type of organic matter present. Five categories of organic matter can be distinguished, viz.: humic, mainly humic, mixed, mainly kerogenous, kerogenous. This classification

is based on the hydrogen content of the organic matter.

Source rocks with organic matter of kerogenous, mainly kerogenous and/or mixed type generate predominantly oil. Organic matter of humic type generates gas only. Strata with organic matter of mainly humic quality generate either gas, or gas and oil.

In addition to the type and the concentration of the organic matter, the source rock quality is also characterised by the distribution of the typical organic constituents, or macerals[1], in the sediments. The maceral distribution can be used to further qualify the source rock, especially when mainly humic quality is found. For this purpose a microscopic investigation on polished rock fragments is carried out.

The maturity of source rocks is expressed in terms of degree of organic metamorphism. With increasing degree of organic metamorphism the organic matter is gradually carbonised while generating hydrocarbons. With increased carbonification the light reflectance of vitrinite, one of the coal macerals, increases. The degree of organic metamorphism can be assessed by measuring this reflectance.

1) maceral: an organic constituent which can be recognised with the microscope (with objectives 25x to 50 x).

II RESULTS

The analytical results are plotted on the geochemical log (Enclosure 1) and are listed in Table I.
The results can be summarised as follows:

a) Source rock indications (SRI)

In three samples marginal source rock indications have been detected:

depth, ft	SRI-value
3250	55
4120	30
4180	35

b) Organic carbon content, C_t

The following samples have been measured:

depth, ft	C_t, wt%
1600	0.1
2400	0.1
3250	0.3
4180	0.3

III DISCUSSION AND CONCLUSION

Samples 3250 ft and 4180 ft show SRI values of 55 and 35 units respectively. However the organic carbon contents of these samples are very low (0.3 wt %) Therefore none of the investigated samples can be regarded as source rock.

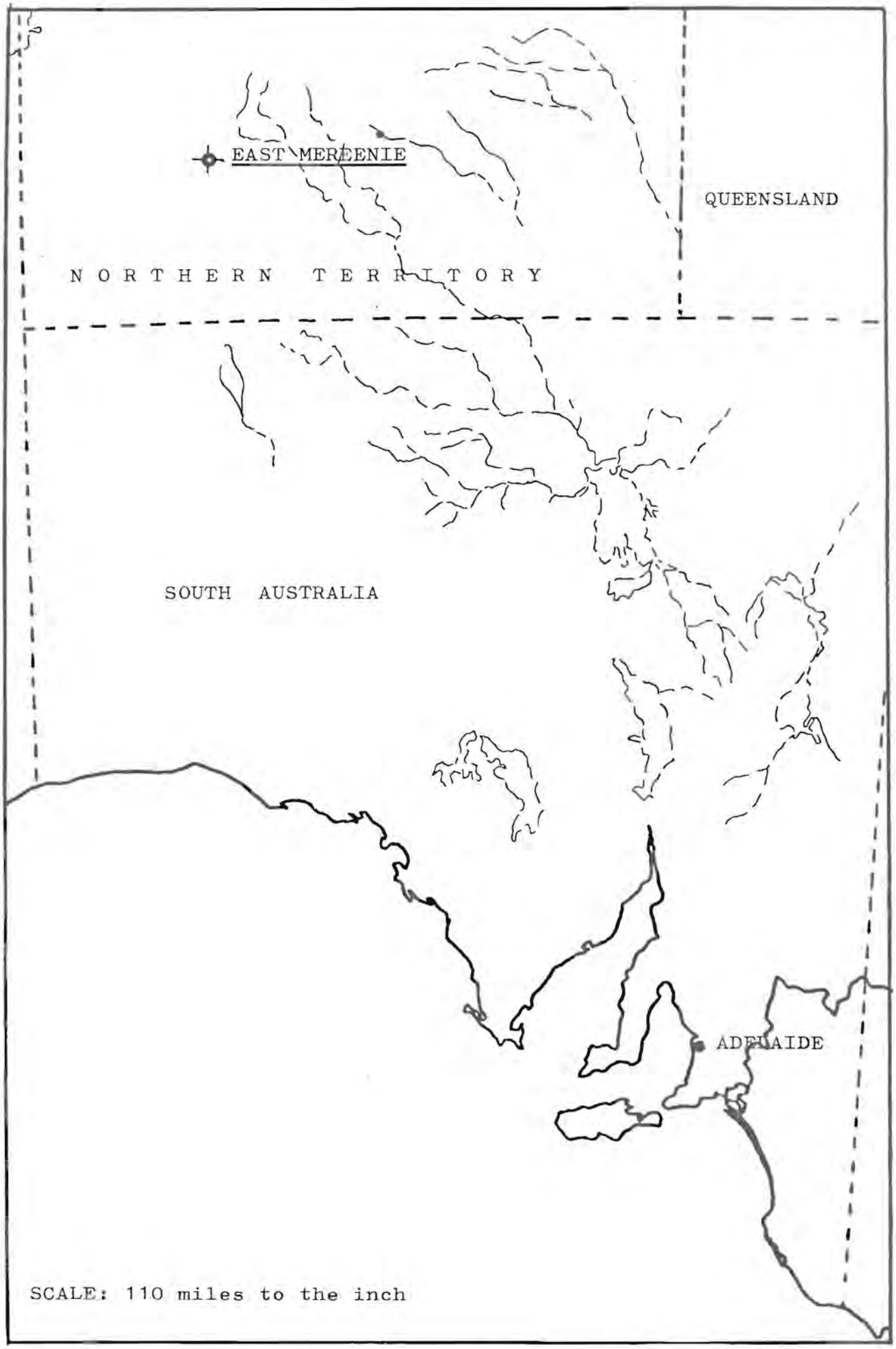

Figure 1: Location map

TABLE I (PART 1) WELL: EAST MERCENIE-1

DEPTH F	TYPE OF SAMPLE	SOURCE ROCK INDICATION BEFORE EXTR.	SOURCE ROCK INDICATION AFTER EXTR.	TYPE OF ORGANIC MATTER	ORGANIC CARBON CONTENT %W
1100	C	5	-		-
1150	C	5	-		-
1200	C	5	-		-
1250	C	5	-		-
1350	C	5	-		-
1400	C	5	-		-
1450	C	5	-		-
1500	C	5	-		-
1550	C	5	-		-
1600	C	5	-		.1
1650	C	5	-		-
1700	C	5	-		-
1750	C	5	-		-
1800	C	5	-		-
1850	C	5	-		-
1900	C	5	-		-
1950	C	5	-		-
2000	C	5	-		-
2050	C	5	-		-
2100	C	5	-		-
2150	C	5	-		-
2200	C	5	-		-
2250	C	5	-		-
2300	C	5	-		-
2350	C	5	-		-
2400	C	5	-		.1
2450	C	5	-		-
2700	C	5	-		-
2750	C	5	-		-
2800	C	5	-		-

TABLE I (PART 2) WELL: EAST MEREENIE-1

DEPTH F	TYPE OF SAMPLE	SOURCE ROCK INDICATION BEFORE EXTR.	SOURCE ROCK INDICATION AFTER EXTR.	TYPE OF ORGANIC MATTER	ORGANIC CARBON CONTENT %
2850	C	5	-		-
2900	C	5	-		-
2950	C	10	-		-
3000	C	5	-		-
3050	C	5	-		-
3100	C	20	-		-
3250	C	155	55		.3
3300	C	30	20		-
3350	C	15	-		-
3400	C	40	15		-
3450	C	35	10		-
3500	C	35	10		-
3550	C	25	-		-
3600	C	25	-		-
3650	C	20	-		-
3750	C	20	-		-
3800	C	25	-		-
3850	C	20	-		-
3945	C	35	20		-
4120	C	55	30		-
4180	C	105	35		.3
4200	C	40	5		-
4273	C	305	15		-
4350	C	35	5		-
4490	C	40	15		-
4655	C	40	5		-

TYPE OF SAMPLE C = CUTTINGS, R = CORE, S = SIDEWALL SAMPLE

CONTAMINATION : W = WALNUT FRAGMENTS OR SOME SIMILAR PRODUCT, E = CELLOPHANE SHREDS, F = FIBRES, P = PLASTIC OR PAINT AND C = CONTAMINATED BUT KIND NOT SPECIFIED

A DASH (-) INDICATES TEST NOT MADE, ASTERISKS INDICATE THE ORGANIC CARBON CONTENT IS THE AVERAGE FOR THE SAMPLES CONCERNED

INITIAL DISTRIBUTION

4 copies area

GEOCHEMICAL LOG

WELL EAST MEREENIE-1

SCALE 1:5000

LOCATION

REGEO IDENTIFIER

AGE	FORMATION	DEPTH IN F	LITHOLOGY	DOM(VR)	SOURCE ROCK INDICATION OF ORIGINAL SAMPLE 100 200 300 400 500 600	TYPE OF SAMPLE	SOURCE ROCK INDICATION OF SAMPLE AFTER EXTRACTION WITH CHLOROFORM 100 200 300 400 500 600	CONTAMINATION	DEPTH IN F	ORG.CARBON (PCT. WT)	TYPE OF ORGANIC MATTER
ORDOVICIAN	MEREENIE SANDSTONE UPPER / LOWER	1000					VALUES SMALLER THAN 30 ARE CONSIDERED NOT TO BE OF SIGNIFICANCE		1000		
	STOKES UPPER / LOWER	1500							1500	0.1	
	STAIRWAY UPPER / MIDDLE / LOWER	2000							2000	0.1	
	HORN VALLEY	2500							2500		
	PACOOTA UPPER / LOWER	3000							3000	0.3	
		3500							3500		
		4000					NONE OF THE INVESTIGATED SAMPLES CAN BE REGARDED AS SOURCE ROCK.		4000	0.3	
		4500							4500		
EE	GOYDER		TD 4710								
		5000							5000		

NUMBER OF SAMPLES ANALYSED 56

NUMBER OF SAMPLES ANALYSED 13

LEGEND

TYPE OF SAMPLE ⊖ = CORE
▶ = SIDEWALL SAMPLE

CONTAMINATION C = UNSPECIFIED
W = WALNUTS
E = CELLOPHANE
F = FIBRES
P = PLASTIC OR PAINT

KONINKLYKE/SHELL
EXPLORATIE EN PRODUKTIE LABORATORIUM

GEOCHEMICAL LOG OF
EAST MEREENIE-1
AUSTRALIA

AUTHOR: STE | DATE: DECEMBER 1981
REP: 81.305.188 | ENCL: 1 | DRAW.NO: 1

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