Open File Envelope No. 3037

PEL 5 AND PEL 6; PEDIRKA BASIN FARMOUT BLOCK

EROMANGA BASIN, SIMPSON BASIN AND PEDIRKA BASIN

MACUMBA 1 TEST REPORTS

Submitted by

Delhi International Oil Corp. and SADME
1980

Enquiries: Customer Services
Ground Floor
101 Grenfell Street, Adelaide 5000

Telephone: (08) 8463 3000
Facsimile: (08) 8204 1880

PRIMARY INDUSTRIES
AND RESOURCES SA

ENVELOPE 3037

TENEMENT: PEL 5 and PEL 6, Pedirka Basin Farmout Block; Eromanga, Simpson and Pedirka Basins

TENEMENT HOLDER: Delhi International Oil Corp. (operator), Santos Ltd, Western Mining Corp. (Exploration) Pty Ltd, Total Exploration Australia Pty Ltd, Vamgas Ltd and South Australia Oil and Gas Corp. Pty Ltd

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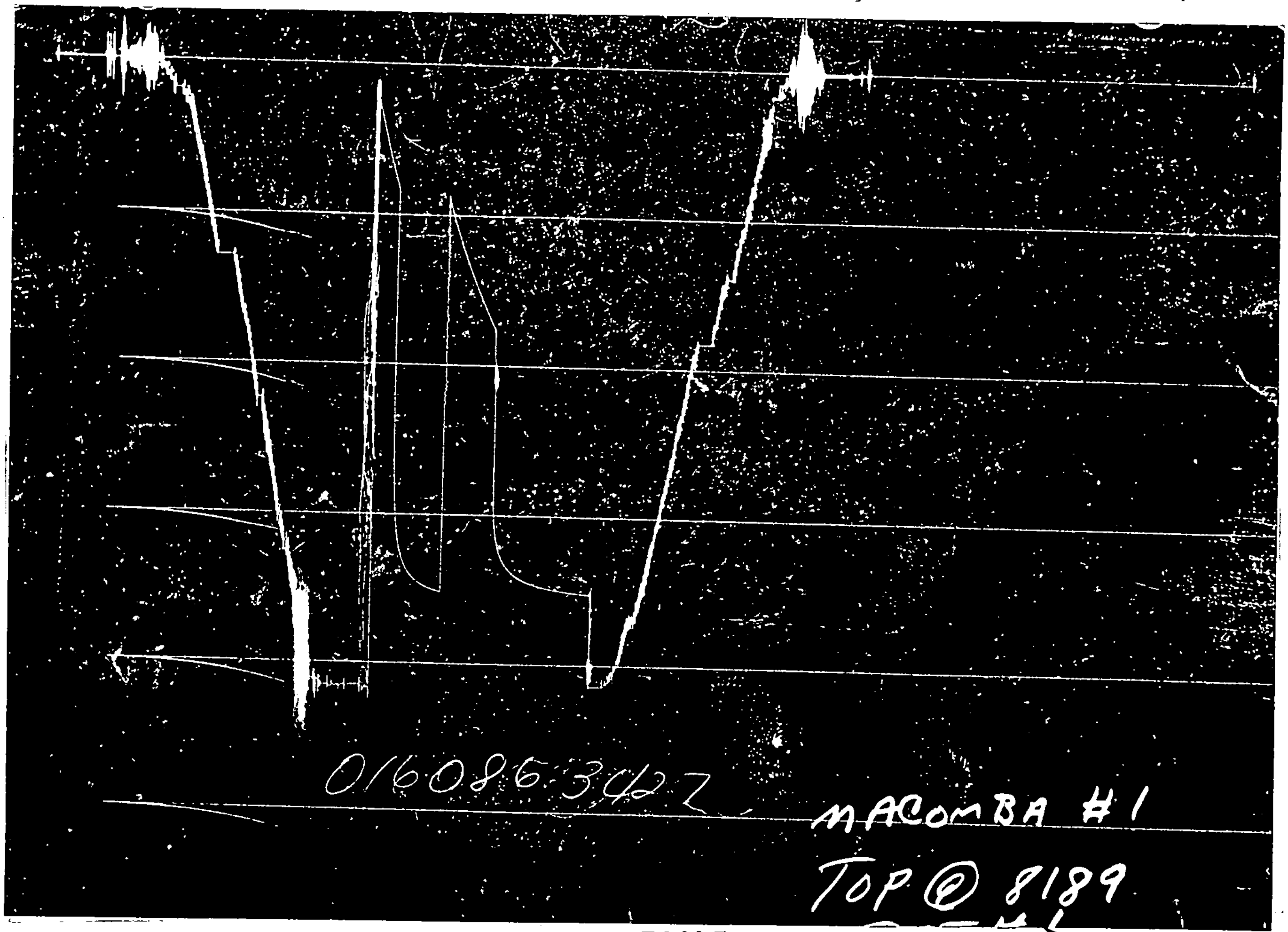
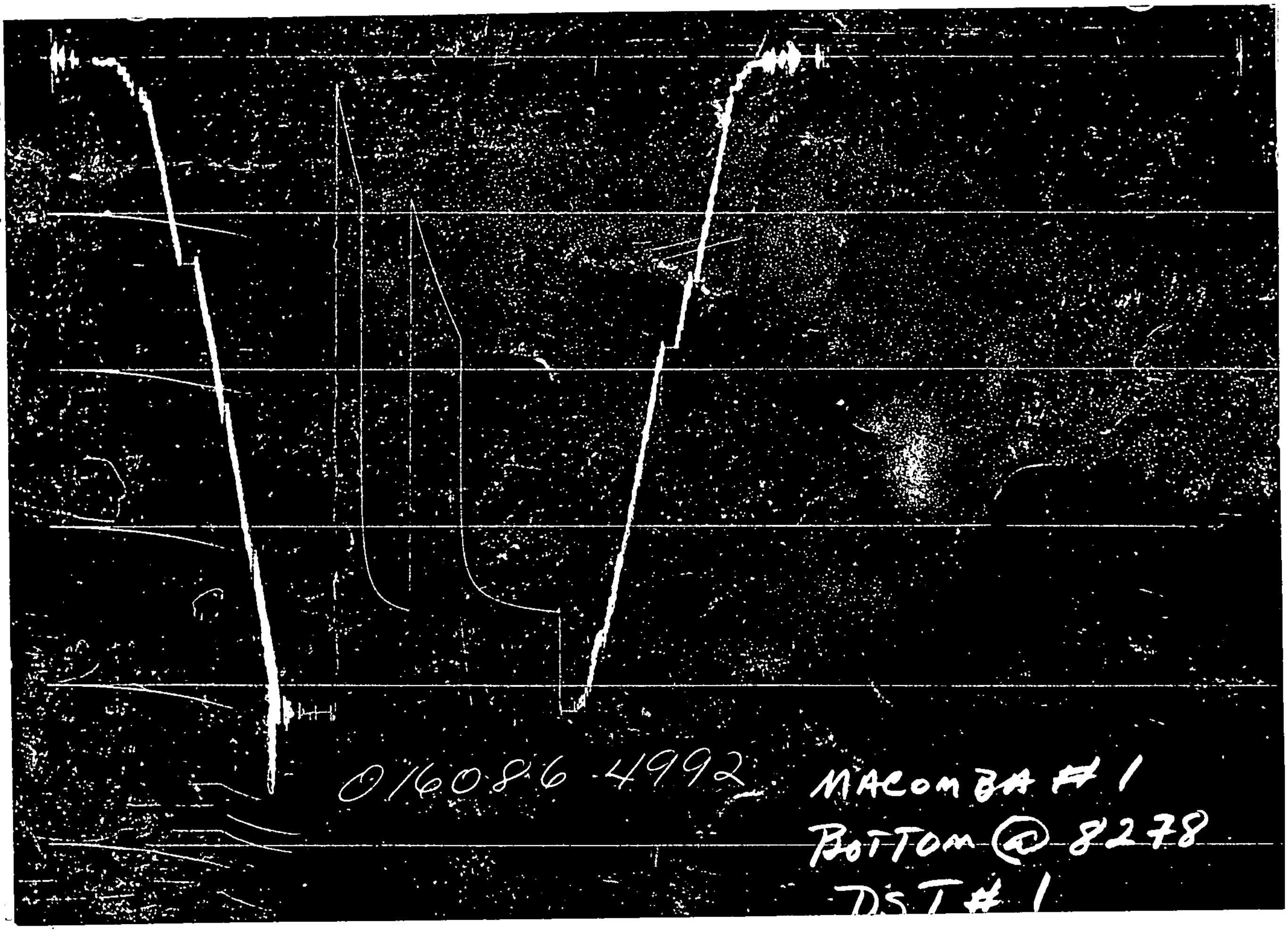


PRESSURE

TIME



Each Horizontal Line Equal to 1000 p.s.i.

FLUID SAMPLE DATA

Sampler Pressure ______ P.S.I.G. at Surface
Recovery: Cu. Ft. Gas ______
cc. Oil ______
cc. Water ______
cc. Mud ______
Tot. Liquid cc. ______
Gravity ______ ° API @ ______ °F.
Gas/Oil Ratio ______ cu. ft./bbl.

	RESISTIVITY		CHLORIDE CONTENT
Recovery Water	@	°F.	ppm
Recovery Mud	@	°F.	ppm
Recovery Mud Filtrate	@	°F.	ppm
Mud Pit Sample	@	°F.	ppm
Mud Pit Sample Filtrate	@	°F.	ppm

Mud Weight ______ vis ______ sec

Date	11-5-77	Ticket Number	016086
Kind of Job	OPEN HOLE	Halliburton District	AUSTRALIA
Tester	MR. HOOVER	Witness	MR. MC KAY
Drilling Contractor	OCEAN DRILLING & EXPLORATION RIG # 5		

EQUIPMENT & HOLE DATA

Formation Tested	- sm
Elevation	150' Ft.
Net Productive Interval	8211-8283' Ft.
All Depths Measured From	Rotary kelly bushing
Total Depth	8283' Ft.
Main Hole/Casing Size	8 1/2"
Drill Collar Length	420' I.D. 2 13/16"
Drill Pipe Length	7756' I.D. 3.826"
Packer Depth(s)	8202-8211' Ft.
Depth Tester Valve	8184' Ft.

Cushion TYPE ______ AMOUNT ______ Ft. Depth Back Pres. Valve ______ Surface Choke 1/2" Bottom Choke 3/4"

Recovered 4350 Feet of salt water (13,500 ppm) slightly gas cut
Recovered Feet of (Top 200-250' muddy)
Recovered Feet of
Recovered Feet of
Recovered Feet of

Mea. From Tester Valve

Remarks SEE PRODUCTION TEST DATA SHEET

TEMPERATURE	Gauge No. 3427 Depth: 8189 Ft.		Gauge No. 4992 Depth: 8279 Ft.		Gauge No. Depth: Ft.		TIME	
Est. °F.	24 Hour Clock, Blanked Off no		24 Hour Clock, Blanked Off yes		Hour Clock, Blanked Off		Tool Opened 0605 A.M./P.M.	
Actual 246 °F.	Pressures		Pressures		Pressures		Opened Bypass 0836 A.M./P.M.	
	Field	Office	Field	Office	Field	Office	Reported Minutes	Computed Minutes
Initial Hydrostatic	4156	4158	4183	4172				
First Period Flow Initial	100	143	160	176			—	—
First Period Flow Final	803	828	831	867			31	30
First Period Closed in	3523	3525	3525	3542			60	58
Second Period Flow Initial	870	882	927	924			—	—
Second Period Flow Final	1803	1782	1817	1813			60	63
Second Period Closed in	3523	3530	3525	3547			120	120
Third Period Flow Initial							—	—
Third Period Flow Final								
Third Period Closed in								
Final Hydrostatic	4156	4153	4183	4169			—	—

Legal Location Sec. - Twp. - Rng.: 26° 26' 40" S 136° 51' 27" E
Lease Name: MACUMBA
Well No.: 1
Test No.: 1
Field Area: WILDCAT
Tested Interval: 8211 - 8283'
County: SIMPSON DESERT
State: SOUTH AUSTRALIA
Lease Owner/Company Name: DELHI INTERNATIONAL OIL CORPORATION

Casing perfs. ______ Bottom choke 3/4" Surf. temp 100 °F Ticket No. 016086
Gas gravity ______ Oil gravity ______ GOR ______
Spec. gravity ______ Chlorides 13500 ppm Res. ______ @ ______ °F
INDICATE TYPE AND SIZE OF GAS MEASURING DEVICE USED ______

Date Time a.m. p.m.	Choke Size	Surface Pressure psi	Gas Rate MCF	Liquid Rate BPD	Remarks
0605	1/2"				Opened tool for first flow with
					a weak blow increasing to moderate
					blow.
0636	1/2"				Closed tool
0736	1/2"				Reopened for second flow with a
					weak to moderate blow.
0836	1/2"				Closed tool
1036	1/2"				Off bottom

Gauge No. 3427			Depth 8189'				Clock No. 7023			24 hour		Ticket No. 016086		
	First Flow Period		First Closed In Pressure			Second Flow Period		Second Closed In Pressure			Third Flow Period		Third Closed In Pressure		
	Time Defl. .000"	PSIG Temp. Corr.	Time Defl. .000"	$\log \frac{t+\theta}{\theta}$	PSIG Temp. Corr.	Time Defl. .000"	PSIG Temp. Corr.	Time Defl. .000"	$\log \frac{t+\theta}{\theta}$	PSIG Temp. Corr.	Time Defl. .000"	PSIG Temp. Corr.	Time Defl. .000"	$\log \frac{t+\theta}{\theta}$	PSIG Temp. Corr.
0	.0000	143	.0000		828	.0000	882	.0000		1782					
1	.0160	304	.0135*		3110	.0293	1028	.0267		3254					
2	.0320	419	.0338		3288	.0586	1185	.0535		3344					
3	.0480	535	10541		3370	.0879	1320	.0802		3393					
4	.0640	642	.0744		3420	.1172	1445	.1069		3425					
5	.0800	738	.0946		3451	.1465	1563	.1337		3448					
6	.0960	828	.1149		3475	.1757	1673	.1604		3465					
7			.1352		3493	.2050	1782	.1871		3478					
8			.1555		3507			.2138		3488					
9			.1758		3518			.2406		3497					
10			.1960		3525			.2673		3505					
11								.2940		3512					
12								.3208		3517					
13								.3475		3522					
14								.3742		3525					
15								.4010		3530					

Gauge No. 4992			Depth 8278'				Clock No. 7375			24 hour					
0	.0000	176	.0000		867	.0000	924	.0000		1813					
1	.0167	337	.0132*		3194	.0300	1028	.0264		3288					
2	.0333	457	.0329		3334	.0600	1191	.0528		3370					
3	.0500	565	.0527		3403	.0900	1340	.0792		3417					
4	.0667	672	.0725		3447	.1200	1472	.1056		3447					
5	.0834	777	.0922		3475	.1500	1593	.1320		3469					
6	.1000	867	.1120		3497	.1800	1707	.1584		3484					
7			.1317		3511	.2100	1813	.1848		3497					
8			.1515		3525			.2112		3508					
9			.1713		3534			.2376		3517					
10			.1910		3542			.2640		3523					
11								.2904		3530					
12								.3168		3534					
13								.3432		3539					
14								.3696		3544					
15								.3960		3547					
Reading Interval	5		6			9		8							Minutes

REMARKS: *First interval is equal to 4 minutes.

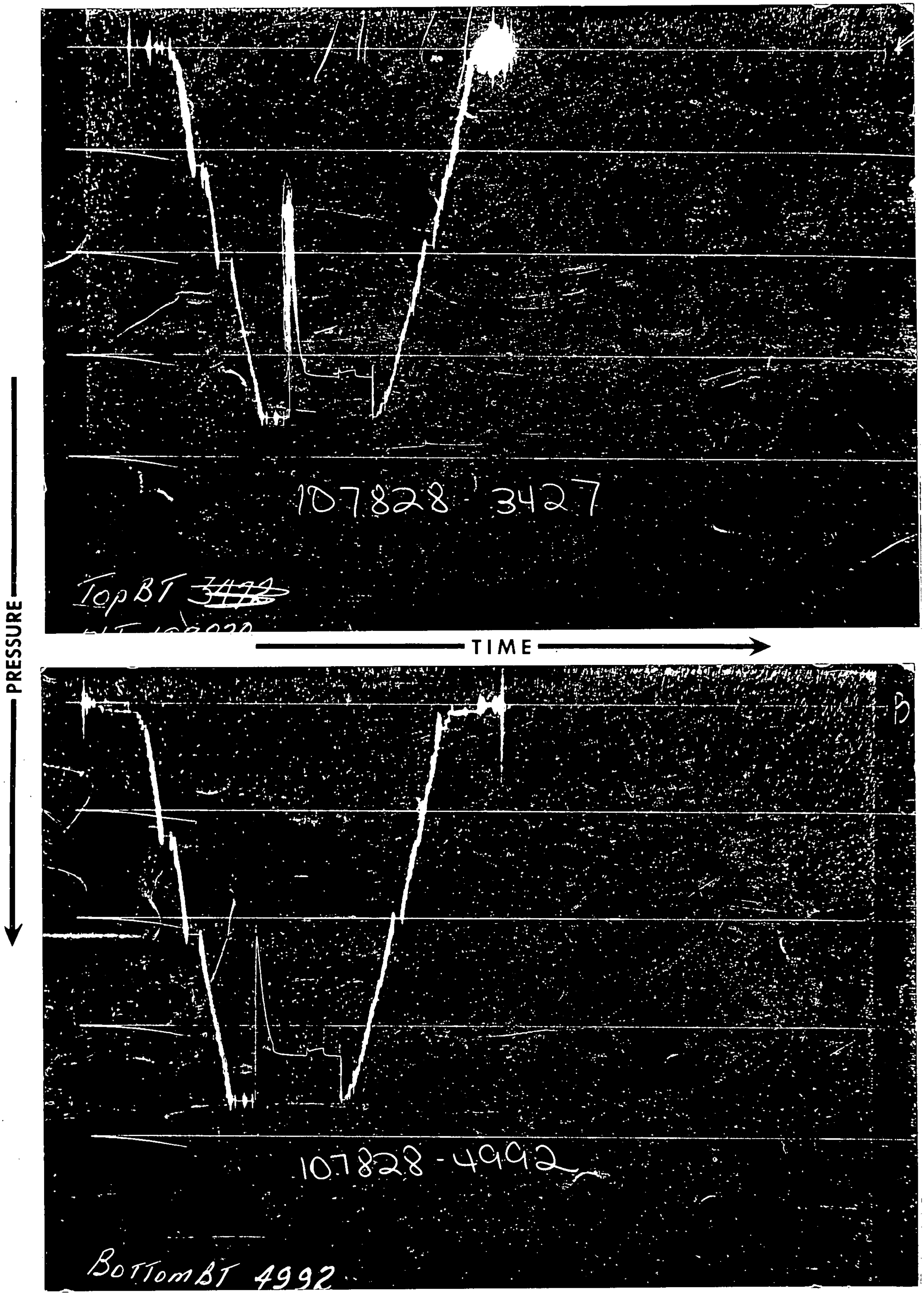
SPECIAL PRESSURE DATA

	O. D.	I. D.	LENGTH	DEPTH
Drill Pipe or Tubing				
Reversing Sub	6"		1'	
Water Cushion Valve				
Drill Pipe	4½"	3.826"	7756'	
Drill Collars	-	2 13/16"	420'	
Handling Sub & Choke Assembly	5"		2.70'	
Dual CIP Valve	5"		4'	
Dual CIP Sampler				
Hydro-Spring Tester	5"	7/8"	5'	8184'
Multiple CIP Sampler				
Extension Joint				
AP Running Case	5"		4.20'	8180'
Hydraulic Jar	5"	3/4"	3.30'	
VR Safety Joint	5"	7/8"	2.30'	
Pressure Equalizing Crossover				
Packer Assembly	7 3/4"		6.50'	8202'
Distributor	5"		2'	
Packer Assembly	7 3/4"		6.50'	8211'
Flush Joint Anchor				
Pressure Equalizing Tube				
Blanked-Off B.T. Running Case				
Drill Collars				
Anchor Pipe Safety Joint	5"		4'	
Packer Assembly				
Distributor				
Packer Assembly				
Anchor Pipe Safety Joint				
Side Wall Anchor				
Drill Collars	6 1/4"	2 13/16"	29.80'	
Flush Joint Anchor	5"		30'	
Blanked-Off B.T. Running Case	5"		4.10'	8279'
Total Depth				8283'

FORM 187-R1—PRINTED IN U.S.A.

EQUIPMENT DATA

LITTLE'S 96676 75C-h/74



Each Horizontal Line Equal to 1000 p.s.i.

FLUID SAMPLE DATA

Sampler Pressure ______ P.S.I.G. at Surface
Recovery: Cu. Ft. Gas ______
cc. Oil ______
cc. Water ______
cc. Mud ______
Tot. Liquid cc. ______
Gravity ______ ° API @ ______ °F.
Gas/Oil Ratio ______ cu. ft./bbl.

	RESISTIVITY			CHLORIDE CONTENT
Recovery Water		@	°F.	ppm
Recovery Mud		@	°F.	ppm
Recovery Mud Filtrate		@	°F.	ppm
Mud Pit Sample		@	°F.	ppm
Mud Pit Sample Filtrate		@	°F.	ppm

Mud Weight ______ vis ______ sec

Date 11-15-77 Ticket Number 107828
Kind of Job OPEN HOLE TEST Halliburton District AUSTRALIA
Tester WALLACE - JONES Witness
Drilling Contractor ODE RIG #5 PW

EQUIPMENT & HOLE DATA

Formation Tested ______
Elevation ______ Ft.
Net Productive Interval 7311' - 7456' (145') Ft.
All Depths Measured From Rotary Table
Total Depth 7456' Cement Plug Ft.
Main Hole/Casing Size 8 1/2"
Drill Collar Length 269.67' I.D. 2 3/8"
Drill Pipe Length 7018.31' I.D. 3.826"
Packer Depth(s) 7304' - 7312' Ft.
Depth Tester Valve 7288' Ft.

Legal Location Sec. - Twp. - Rng.
Lease Name: MACUMBA
Well No.: 1
Test No.: 3
Tested Interval: 7312' - 7456'
Lease Owner/Company Name: DELHI INTERNATIONAL-WMC-ETAL
Field Area: WILDCAT
County: SO. AUSTRALIA
State: AUSTRALIA

Cushion TYPE ______ AMOUNT ______ Ft. Depth Back Pres. Valve ______ Surface Choke 1/2" Bottom Choke ______

Mea. From Tester Valve

Recovered ______ Feet of ______
Recovered ______ Feet of ______
Recovered ______ Feet of ______
Recovered ______ Feet of ______
Recovered ______ Feet of ______

Remarks Opened tool at 06:04 with a fair blow, increasing rapidly for 30 minutes. Closed tool. Reopened tool - water surfaced within 4 minutes. Flowed to pit. Closed tool. Pulled loose at 08:34.
(Flowed water to the surface in 34 minutes).

TEMPERATURE	Gauge No. 3427 Depth: 7292 Ft.		Gauge No. 4992 Depth: 7456 Ft.		Gauge No. Depth: Ft.		TIME	
Est. 247 °F.	24 Hour Clock, Blanked Off no		24 Hour Clock, Blanked Off yes		Hour Clock, Blanked Off		Tool Opened 0604 A.M./P.M.	
Actual °F.	Pressures		Pressures		Pressures		Opened Bypass 0834 A.M./P.M.	
	Field	Office	Field	Office	Field	Office	Reported Minutes	Computed Minutes
Initial Hydrostatic	3693	3613	3697	3680				
First Period Flow Initial	1370	1558-Q	2166	2172			——	——
First Period Flow Final	3055	3112	3131	3166				31
First Period Closed in	3206	3211	3257	3270				59
Second Period Flow Initial	3156	3135	3226	3201			——	——
Second Period Flow Final	3139	3139	3209	3201				30
Second Period Closed in	3206	3209	3257	3271				30
Third Period Flow Initial							——	——
Third Period Flow Final								
Third Period Closed in								
Final Hydrostatic	3590	3600	3682	3666			——	——
	Q = Questionable.							

FORMATION TEST DATA

Gauge No. 3427			Depth 7292'				Clock No. 7032			24hour		Ticket No. 107828			
	First Flow Period		First Closed In Pressure			Second Flow Period		Second Closed In Pressure			Third Flow Period		Third Closed In Pressure		
	Time Defl. .000"	PSIG Temp. Corr.	Time Defl. .000"	$\text{Log}\frac{t+\theta}{\theta}$	PSIG Temp. Corr.	Time Defl. .000"	PSIG Temp. Corr.	Time Defl. .000"	$\text{Log}\frac{t+\theta}{\theta}$	PSIG Temp. Corr.	Time Defl. .000"	PSIG Temp. Corr.	Time Defl. .000"	$\text{Log}\frac{t+\theta}{\theta}$	PSIG Temp. Corr.
0	.000	1558-Q	.000		3112	.000	3135	.000		3139					
1	.0192*	1241-Q	.0101**		3176	.0162	3166	.0069		3196					
2	.0351	2435-Q	.0236		3186	.0323	3159	.0137		3201					
3	.0511	2722	.0371		3191	.0485	3152	.0206		3202					
4	.0671	2933	.0506		3194	.0647	3147	.0275		3204					
5	.0803	3047	.0641		3197	.0809	3142	.0344		3206					
6	.0990	3112	.0776		3199	.0970	3139	.0412		3206					
7			.0911		3201			.0481		3207					
8			.1046		3202			.0550		3207					
9			.1180		3204			.0618		3207					
10			.1315		3206			.0687		3207					
11			.1450		3206			.0756		3209					
12			.1585		3207			.0824		3209					
13			.1720		3209			.0893		3209					
14			.1855		3211			.0961		3209					
15			.1990		3211			.1030		3209					

Gauge No. 4992			Depth 7456'				Clock No. 7375			24 hour					
0	.000	2172	.000		3166	.000	3201	.000		3201					
1	.0199*	2390	.0101**		3237	.0165	3227	.0068		3257					
2	.0366	2654	.0235		3246	.0330	3218	.0136		3262					
3	.0532	2851	.0369		3251	.0495	3212	.0204		3263					
4	.0698	2995	.0503		3255	.0660	3205	.0272		3266					
5	.0864	3100	.0638		3257	.0825	3202	.0340		3266					
6	.1030	3166	.0772		3260	.0990	3201	.0408		3268					
7			.0906		3262			.0476		3268					
8			.1040		3263			.0544		3270					
9			.1174		3263			.0612		3270					
10			.1309		3265			.0680		3270					
11			.1443		3266			.0748		3271					
12			.1577		3266			.0816		3271					
13			.1711		3268			.0884		3271					
14			.1845		3270			.0952		3271					
15			.1980		3270			.1020		3271					
Reading Interval	5		4			5		2							Minutes

REMARKS: * = 6 minute interval. ** = 3 minute interval.
Q = Questionable.

SPECIAL PRESSURE DATA

	O. D.	I. D.	LENGTH	DEPTH
Drill Pipe or Tubing				
Reversing Sub	5"		1'	
Water Cushion Valve				
Drill Pipe	4 1/2"		7018'	
Drill Collars	6 1/2"	2 3/8"	269.67'	
Handling Sub & Choke Assembly				
Dual CIP Valve	5"		6.65'	
Dual CIP Sampler				
Hydro-Spring Tester	5"		5.00'	7288'
Multiple CIP Sampler				
Extension Joint				
AP Running Case	5"		4.12'	7292'
Hydraulic Jar	5"		3.28'	
VR Safety Joint	5"		2.35'	
Pressure Equalizing Crossover				
Packer Assembly	7 3/4"		6.16'	7304'
Distributor	5"		2.00'	
Packer Assembly	7 3/4"		6.16'	7312'
Flush Joint Anchor				
Pressure Equalizing Tube				
Blanked-Off B.T. Running Case				
Drill Collars	6 1/2"	2 3/8"	119.51'	
Anchor Pipe Safety Joint	5"		3.99'	
Packer Assembly				
Distributor				
Packer Assembly				
Anchor Pipe Safety Joint				
Side Wall Anchor				
Drill Collars				
Flush Joint Anchor	5"		15'	
Blanked-Off B.T. Running Case	5"		4.05'	7452'
Total Depth				7456'

EQUIPMENT DATA

000012

RESTRICTED INVESTIGATION REPORT 1040R

RESTRICTED CIRCULATION

CSIRO

INSTITUTE OF EARTH RESOURCES

FUEL GEOSCIENCE UNIT

THE PETROLOGY OF SOME COALS AND DISPERSED ORGANIC MATTER FROM THE LOWER TO MIDDLE JURASSIC SEQUENCE IN MACUMBA NO.1 WELL PEDIRKA BASIN

MICHELLE SMYTH

P.O. Box 136
NORTH RYDE, NSW
AUSTRALIA 2113

AUGUST 1979

INTRODUCTION

Cuttings of sediments from Macumba No. 1 well, Pedirka Basin (Fig. 1), of Cretaceous to Permian ages, have been supplied to CSIRO Fuel Geoscience Unit by Delhi International Oil Corporation. (Strictly, the Jurassic and Cretaceous sediments are in the Eromanga Basin).

The Lower to Middle Jurassic sediments, the Poolowanna Formation, extend from 7180 feet (2188.5 metres) to 7516 feet (2290.9 metres) depth in this well. Cuttings were taken at ten foot (3.1 metre) intervals in the Poolowanna Formation. These have been examined microscopically to determine the composition of the coals and dispersed organic matter (DOM) in them.

A similar study has been reported for the coals and DOM of Lower to Middle Jurassic age from Poolowanna No. 1 well, in Restricted Investigation Report 981R (November, 1978)[1].

ANALYSES

Most of the cutting samples have been hand-picked to concentrate the organic-rich fragments sufficiently for meaningful petrographic analyses to be carried out. Although the samples may then not be representative of the interval, a large enough number of analyses will indicate trends. Some of the cuttings were analysed as whole samples for comparison with the hand-picked ones. The complete sequence, from 7180 feet (2188.5 metres) to 2520 feet (2292.1 metres), has been analysed in 10 foot (3.1 metres) intervals for the maceral contents of its coal and DOM. The coal and DOM have been counted separately, and where there were enough coal fragments, microlithotype analyses have also been carried out.

Reflected light microscopy has been used, both plane polarised light plus blue light excitation to aid in the identification of the liptinite (exinite) macerals, especially those dispersed through the shales.

RESULTS

Results of the petrographic analyses of the 34 samples are in Table 1, which gives the percentages of total organic matter, coal and DOM in each one. The percentage of organic matter in the hand-picked samples is as high as 98 (all coal) and as low as 13, which is 7% coal, 6% DOM. In the whole samples, organic matter is 2 to 6% of the sediments. The amount of DOM in the hand-picked samples is 0 to 9%; in the whole samples DOM is a trace to 4%.

The maceral compositions of the coals and DOM are given in Table 2, and plotted in Figs. 2 and 3, respectively. The results found for Poolowanna 1 have also been plotted on these diagrams. Generally, the coals have moderate to high vitrinite value. The DOM has low to moderate vitrinite contents (Fig. 3), and in most cases exinite < inertinite for any vitrinite value.

The components of the exinite group have been plotted for the coals and DOM in Figs. 4 and 5, respectively. (Alginite is fairly rare and has been included with the resinite). Resinite is the dominant exinite in the coals (Fig. 4) and sporinite is most abundant in the DOM (Fig. 5).

The components of the inertinite group are plotted in Figs. 6 and 7 for the coals and DOM, respectively. Overall, the coals have slightly more semifusinite than inertodetrinite (Fig. 6), whilst inertodetrinite is distinctly dominant in the DOM (Fig. 7).

The results of the microlithotype analyses are given in Table 3, and are plotted in Fig. 8. Most of the coals have high vitrite plus clarite contents; some have high intermediates (duroclarite, clarodurite, vitrinertite). Fig. 8 has been divided into areas representing several depositional environments (Smyth, 1979)[2].

Using this classification, the majority of coals have formed in a fluvial environment, some in a lagoonal environment, and a few in a deltaic environment. The coals from both Macumba 1 and Poolowanna 1 lie in these three areas, and the proposed succession of environments is given in Fig. 9.

The two sequences differ in the lower part of the Poolowanna Formation, only deltaic coals having been found in Macumba and fluvial coals in Poolowanna. The middle portion of the formation includes fluvial and lagoonal coal in both wells, with fluvial and deltaic coals in the upper part of the two sequences.

Reflectance values for the vitrinite in Triassic sediments in Macumba 1 have been reported in Restricted Investigation Report 927R (March, 1978)[3]. The value at 2353.4 metres is 0.79% ($\bar{R}o$ max). The vitrinite in the Jurassic sediments would be expected to have a slightly lower, but similar reflectivity, indicating that the sediments are sufficiently mature for the generation of hydrocarbons.

DISCUSSION

In almost all cases, the DOM has lower vitrinite and higher exinite contents than the associated coals. The DOM is rich in exinite compared with that from the Cooper Basin Permian, for example. Previous work in the Cooper Basin has suggested that exinite-rich DOM is associated with high vitrite plus clarite coals, which is in agreement with the present results.

The dominance of resinite and semifusinite in the coals, sporinite and inertodetrinite in the DOM is as might be expected. Resinite is intimately associated with the cellular structure of woody tissue, and not likely to be easily removed from the coal forming environment, whilst semifusinite is oxidised woody tissue in which the cellular structure is well preserved. Spores, on the other hand, are easily removed from the coal swamp to adjacent sediments by wind and water, and inertodetrinite very often represents broken and transported fragments of semifusinite and fusinite.

The amount of DOM in whole samples, up to 4%, and its exinite - rich nature suggest that it should be a good source material for both liquid and gaseous hydrocarbons.

The sedimentary environments proposed for the Lower to Middle Jurassic sequences indicate a slightly lower energy regime in Macumba 1 initially, with deltaic as opposed to fluvial coals in Poolowanna 1. More prevalent lagoonal coals following the deltaic ones may mean that the coals in Macumba 1 were forming closer to a marine coastline than those in Poolowanna 1. The predominantly fluvial and deltaic coals at the top of the succession could represent a time of marine regression. Comment on these proposed environments of deposition by Delhi Petroleum geologists would be most welcome.

CONCLUSIONS

The coals from the Lower to Middle Jurassic sequence in Macumba 1 have moderate to high vitrite plus clarite contents.
Resinite is the dominant exinite component, semifusinite the inertinite one.

The DOM has higher exinite and lower vitrinite contents than the associated coal, and sporinite is the dominant exinite component, inertodetrinite the inertinite one.

The sediments contain up to 4% DOM, and its degree of maturity and exinite-rich nature, suggest that it should be good source material for the generation of liquid and gaseous hydrocarbons.

It is proposed that the coals from both Macumba 1 and Poolowanna 1 have formed in fluvial, deltaic and lagoonal environments, with Macumba possibly the closer to a marine shoreline.

The association of exinite-rich DOM with high vitrite plus clarite coals is in agreement with results found for the Permian sediments in the Cooper Basin.

REFERENCES

1. The petrology of some coals and dispersed organic matter from the Middle to Lower Jurassic sequence in Poolowanna No. 1 well, Pedirka Basin: Michelle Smyth, CSIRO Minerals Research Laboratories, Restricted Investigation Report 981R, November, 1978.

2. Smyth, Michelle, 1979: Hydrocarbon generation in the Fly Lake - Brolga Area of the Cooper Basin, APEA J vol 19 (1) p108-114.

3. Source rock and oil analyses on samples from Poolowanna No. 1 and Macumba No. 1, Pedirka Basin, South Australia: J.D. Saxby, N.J. Russell, L. Bruen and J. Friedrich CSIRO Minerals Research Laboratories Restricted Investigation Report 927R.

TABLE 1 PEDIRKA BASIN MACUMBA NO. 1 WELL

Maceral Analyses of cuttings from the lower to middle Jurassic sediments
(Results are given as percentages by volume unless otherwise stated)

Lab. No. Depth (ft)	Depth (metres)	Organic matter	Coal	DOM	Minerals
61713 7180-7190	2188.5 -2191.5	80	76	4	20
61714 7190-7200	2191.5 -2194.6	98	98	-	2
61715 7200-7210	2194.6 -2197.6	76	73	3	24
61716 7210-7220	2197.6 -2200.7	63	59	4	37
61717 7220-7230	2200.7 -2203.7	47	43	4	53
61718 7230-7240	2203.7 -2206.8	33	28	5	67
61719 7240-7250	2206.8 -2209.8	27	19	8	73
61720 7250-7260	2209.8 -2212.9	85	84	1	15
61721 7260-7270	2212.9 -2215.9	78	75	3	22
61722 7270-7280	2215.9 -2218.9	73	69	4	27
61723 7280-7290	2218.9 -2222.0	69	65	4	31
61724 7290-7300	2222.0 -2225.0	41	33	8	59
61725 7300-7310	2225.0 -2228.1	44	36	8	56
61726 7310-7320	2228.1 -2231.1	70	66	4	30
61727 7320-7330	2231.1 -2234.2	61	52	9	39
61728 7330-7340	2234.2 2237.2	45	39	6	55

TABLE 1 Con't

Lab. No. Depth (ft)	Depth (metres)	Organic matter	Coal	DOM	Minerals	
61729 7340-7350	2237.2 -2240.3	26	18	8	74	
61730 7350-7360	2240.3 -2243.3	33	27	6	67	
61731 7360-7370	2243.3 -2246.4	22	15	7	78	
61732 7370-7380	2246.4 -2249.4	2	1	1	98	ws
61733 7380-7390	2249.4 -2252.5	24	18	6	76	
61734 7390-7400	2252.5 -2255.5	6	4	2	94	ws
61735 7400-7410	2255.5 -2258.6	13	7	6	87	
61736 7410-7420	2258.6 -2261.6	21	12	9	79	
61737 7420-7430	2261.6 -2264.7	3	2	1	97	ws
61738 7430-7440	2264.7 -2267.7	4	3	1	96	ws
61739 7440-7450	2267.7 -2270.8	3	2	1	97	ws
61740 7450-7460	2270.8 -2273.8	6	5	1	94	ws
61741 7460-7470	2273.8 -2276.9	4	4	tr	96	ws
61742 7470-7480	2276.9 -2279.9	2	1	1	98	ws
61743 7480-7490	2279.9 -2283.0	20	16	4	80	

ws = whole sample

tr = trace

TABLE 1 Con't

Lab. No. Depth (ft)	Depth (metres)	Organic matter	Coal	DOM	Minerals	
61744 7490-7500	2283.0 -2286.0	15	10	5	85	
61745 7500-7510	2286.0 -2289.1	4	3	1	96	ws
61746 7510-7520	2289.1 -2292.1	6	2	4	94	ws

ws = whole sample

All samples have been hand-picked, except those marked whole sample (w.s.)

TABLE 2 PEDIRKA BASIN

MACUMBA NO 1 WELL

MACERAL ANALYSES OF THE COAL AND DISPERSED ORGANIC MATTER
FROM THE LOWER TO MIDDLE JURASSIC SEDIMENTS

(Results are given as percentages by volume unless otherwise stated)

Lab.No. Depth (Feet)	Depth (metres)	Vitrinite	Resinous Vitrinite	Sporinite	Cutinite	Resinite	Micrinite	Macrinite	Semifusite	Fusinite	Inertodetrinite		% organic matter
61713 7180-7190	2188.5 to 2191.5	56	6	1	tr	4	2	-	17	tr	14	coal	95
		24	-	12	-	-	-	-	24	-	40	dom	5
61714 7190-7200	2191.5 to 2194.6	45	10	4	1	3	-	1	15	1	20	coal	100
							NO DOM						
61715 7200-7210	2194.6 to 2197.6	73	3	2	tr	2	-	tr	10	-	10	coal	96
		8	-	4	-	-	-	-	16	-	72	dom	4
61716 7210-7220	2197.6 to 2200.7	42	1	6	-	3	tr	-	28	2	18	coal	94
		29	-	13	4	-	-	-	21	-	33	dom	6
61717 7220-7230	2200.7 to 2203.7	59	4	2	3	3	-	tr	18	-	12	coal	90
		53	-	22	-	6	-	-	3	-	16	dom	10
61718 7230-7240	2203.7 to 2206.8	68	10	8	1	tr	-	-	3	2	8	coal	86
		31	6	29	-	-	-	-	26	-	8	dom	14
61719 7240-7250	2206.8 to 2209.8	39	4	6	1	6	2	2	29	-	11	coal	72
		20	3	27	11	3	-	-	7	-	29	dom	28
61720 7250-7260	2209.8 to 2212.9	60	7	3	2	2	2	3	10	1	10	coal	99
		-	-	50	16	16	-	-	18	-	-	dom	1

All samples have been handpicked, except those marked Whole Sample (WS)

TABLE 2 PEDIRKA BASIN (continued)

MACUMBA NO 1 WELL

MACERAL ANALYSES OF THE COAL AND DISPERSED ORGANIC MATTER
FROM THE LOWER TO MIDDLE JURASSIC SEDIMENTS

(Results are given as percentages by volume unless otherwise stated)

Lab.No. Depth (Feet)	Depth (metres)	Vitrinite	Resinous Vitrinite	Sporinite	Cutinite	Resinite	Micrinite	Macrinite	Semifusite	Fusinite	Inertodetrinite		% organic matter
61721 7260-7270	2212.9 to 2215.9	57	10	2	1	3	1	-	11	2	13	coal	96
		47	-	12	-	-	-	-	-	6	35	dom	4
61722 7270-7280	2215.9 to 2218.9	64	8	3	tr	3	1	-	12	tr	9	coal	95
		26	-	9	4	4	-	-	18	-	39	dom	5
61723 7280-7290	2218.9 to 2222.0	55	10	3	2	3	2	1	12	2	10	coal	95
		23	-	23	11	-	-	-	8	-	35	dom	5
61724 7290-7300	2222.0 to 2225.0	60	7	3	1	1	1	1	14	1	11	coal	81
		50	-	10	5	-	-	-	7	3	25	dom	19
61725 7300-7310	2225.0 to 2228.1	48	13	5	1	4	4	1	9	2	13	coal	81
		29	-	11	4	10	-	-	4	8	34	dom	19
61726 7310-7320	2228.1 to 2231.2	66	12	3	2	5	2	2	4	tr	4	coal	94
		42	10	3	-	8*	-	-	5	3	29	dom	6
61727 7320-7330	2231.2 to 2234.2	68	19	2	2	1	tr	2	2	1	3	coal	86
		34	3	8	2	9	-	-	3	5	36	dom	14
61728 7330-7340	2234.2 to 2237.2	47	19	2	4	10	2	1	7	-	8	coal	86
		31	2	14	2	10	-	-	4	2	35	dom	14

* includes alginite

TABLE 2 PEDIRKA BASIN (continued)

MACUMBA NO 1 WELL

MACERAL ANALYSES OF THE COAL AND DISPERSED ORGANIC MATTER
FROM THE LOWER TO MIDDLE JURASSIC SEDIMENTS

(Results are given as percentages by volume unless otherwise stated)

Lab.No. Depth (Feet)	Depth (metres)	Vitrinite	Resinous Vitrinite	Sporinite	Cutinite	Resinite	Micrinite	Macrinite	Semifusite	Fusinite	Inertodetrinite		% organic matter	
61729 7340-7350	2237.2 to	42	21	4	3	6	1	1	10	1	10	coal	71	
	2240.3	33	-	14	6	9	-	-	9	-	29	dom	29	
61730 7350-7360	2240.3 to	34	11	8	4	15	4	-	5	2	17	coal	82	
	2243.3	22	2	23	14	2	-	-	2	2	33	dom	18	
61731 7360-7370	2243.3 to	51	14	1	7	7	2	-	10	-	8	coal	70	
	2246.4	29	4	15	9	4	-	-	6	-	33	dom	30	
61732 7370-7380	2246.4 to	25	8	8	-	25	-	-	25	-	9	coal	60	WS
	2249.4	25	-	38	-	-	-	-	-	-	37	dom	40	
61733 7380-7390	2249.4 to	34	4	1	2	6	1	5	24	1	22	coal	77	
	2252.5	26	5	7	5	-	-	-	24	-	33	dom	23	
61734 7390-7400	2252.5 to	36	7	7	4	18	3	-	11	4	11	coal	65	WS
	2255.5	33	-	-	-	-	-	-	13	-	54	dom	35	
61735 7400-7410	2255.5 to	39	16	2	2	2	-	-	15	-	24	coal	54	
	2258.6	31	2	3	3	-	-	-	18	-	43	dom	46	
61736 7410-7420	2258.6 to	31	14	1	6	3	3	2	17	-	23	coal	58	
	2261.6	30	5	1	8	1	-	-	17	2	36	dom	42	

WS = whole sample

TABLE 2 PEDIRKA BASIN (continued)

MACUMBA NO 1 WELL

MACERAL ANALYSES OF THE COAL AND DISPERSED ORGANIC MATTER FROM THE LOWER TO MIDDLE JURASSIC SEDIMENTS

(Results are given as percentages by volume unless otherwise stated)

Lab.No. Depth (Feet)	Depth (metres)	Vitrinite	Resinous Vitrinite	Sporinite	Cutinite	Resinite	Micrinite	Macrinite	Semifusite	Fusinite	Inertodetrinite		% organic matter	
61737 7420-7430	2261.6 to 2264.7	50	-	13	-	-	-	-	25	-	12	coal	80	WS
		-	-	-	-	-	-	-	50	-	50	dom	20	
61738 7430-7440	2264.7 to 2267.7	60	-	-	-	-	-	-	30	-	10	coal	71	WS
		25	-	-	25	-	-	-	25	-	25	dom	29	
61739 7440-7450	2267.7 to 2270.8	45	11	-	-	-	-	-	33	-	11	coal	75	WS
		-	-	33	-	-	-	-	-	-	67	dom	25	
61740 7450-7460	2270.8 to 2273.8	65	-	-	-	-	-	6	23	-	6	coal	89	WS
		-	-	-	-	-	-	-	-	-	100	dom	11	
61741 7460-7470	2273.8 to 2276.9	50	-	8	-	17	-	-	17	-	8	coal	92	WS
		-	-	-	-	-	-	-	-	-	100	dom	8	
61742 7470-7480	2276.9 to 2279.9	60	20	-	-	-	-	-	-	-	20	coal	71	WS
		50	-	-	-	-	-	-	50	-	-	dom	29	
61743 7480-7490	2279.9 to 2283.0	44	7	-	-	1	-	1	34	-	13	coal	81	
		33	-	-	-	-	-	-	22	-	45	dom	19	
61744 7490-7500	2283.0 to 2286.0	52	2	-	2	-	-	2	25	-	17	coal	67	
		25	-	-	-	4	-	-	29	4	38	dom	33	

WS = whole sample

TABLE 2 PEDIRKA BASIN (continued)

MACUMBA NO 1 WELL

MACERAL ANALYSES OF THE COAL AND DISPERSED ORGANIC MATTER
FROM THE LOWER TO MIDDLE JURASSIC SEDIMENTS

(Results are given as percentages by volume unless otherwise stated)

Lab.No. Depth (Feet)	Depth (metres)	Vitrinite	Resinous Vitrinite	Sporinite	Cutinite	Resinite	Micrinite	Macrinite	Semifusite	Fusinite	Inertodetrinite		% organic matter	
617445 7500-7510	2286.0 to 2289.1	33	-	11	-	-	-	-	45	-	11	coal	69	WS
		75	-	-	-	-	-	-	25	-	-	dom	31	
61746 7510-7520	2289.1 to 2292.1	-	15	-	14	-	14	-	29	14	14	coal	37	WS
		-	-	-	8	8	-	-	59	-	25	dom	63	

WS = whole sample

TABLE 3 PEDIRKA BASIN MACUMBA NO.1 WELL

MICROLITHOTYPE ANALYSES OF THE LOWER TO MIDDLE JURASSIC CUTTINGS

(Results are given as percentages by volume unless otherwise stated)

Lab. No. Depth (feet)	Depth (metres)	Vitrite	Clarite	Intermediates	Ø Durite	Semi fusite *	Shaly coal		% of sample
61713 7180-7190	2188.5 -2191.5	59	1	14	10	16	mmf	447 counts	87
61714 7190-7200	2191.5 -2194.6	42	2	5	28	13	mmf	563 counts	97
61715 7200-7210	2194.6 -2197.6	75	1	4	12	8	mmf	394 counts	83
61716 7210-7220	2197.6 -2200.7	38	2	6	29	25	mmf	347 counts	65
61717 7220-7230	2200.7 -2203.7	52	13	1	16	18	mmf	256 counts	46
61718 7230-7240	2203.7 -2206.8	70	13	5	5	7	mmf	163 counts	33
61719 7240-7250	2206.8 -2209.8	29	17	10	14	30	mmf	161 counts	22
61720 7250-7260	2209.8 -2212.9	45	10	28	2	15	mmf	443 counts	87
61721 7260-7270	2212.9 -2215.9	52	9	29	2	8	mmf	480 counts	81
61722 7170-7280	2215.9 -2218.9	57	10	18	6	9	mmf	604 counts	77
61723 7280-7290	2218.9 -2222.0	54	8	23	4	11	mmf	455 counts	67
61724 7290-7300	2222.0 -2225.0	54	7	19	5	15	mmf	270 counts	39
61725 7300-7310	2225.0 -2228.1	33	12	40	2	13	mmf	224 counts	38
61726 7310-7320	2228.1 -2231.1	63	19	12	1	5	mmf	272 counts	65
61727 7320-7330	2231.1 -2234.2	72	12	12	1	3	mmf	423 counts	59
61728 7330-7340	2234.2 -2237.2	38	27	30	2	3	mmf	331 counts	42
61729 7340-7350	2237.2 -2240.3	42	17	23	5	13	mmf	194 counts	21
61730 7350-7360	2240.3 -2243.3	41	22	27	2	8		199 counts	25
61731 7360-7370	2243.3 -2246.4	45	10	34	4	7		143 counts	17
61733 7380-7390	2249.4 -2252.5	25	8	17	26	24		147 counts	20
61736 7410-7420	2258.6 -2261.6	33	9	20	17	21		79 counts	10
61743 7480-7490	2279.9 -2283.0	44	1	8	13	34		77 counts	16

Ø includes microite and inertodetrite   mmf = mineral matter free

* includes fusite

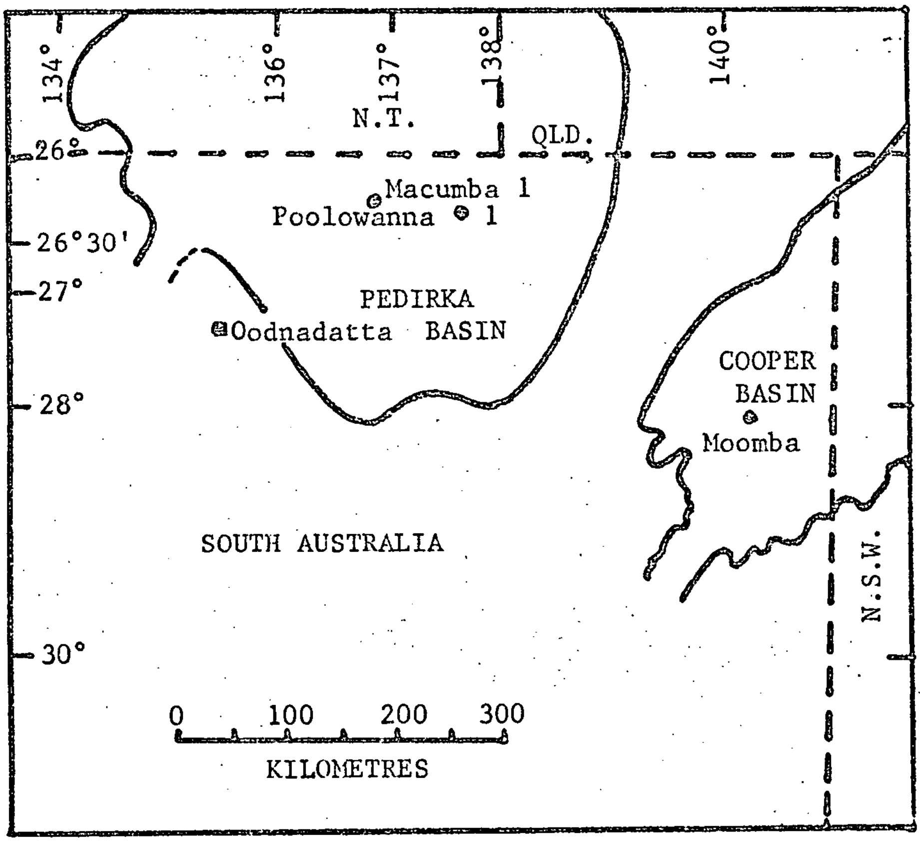
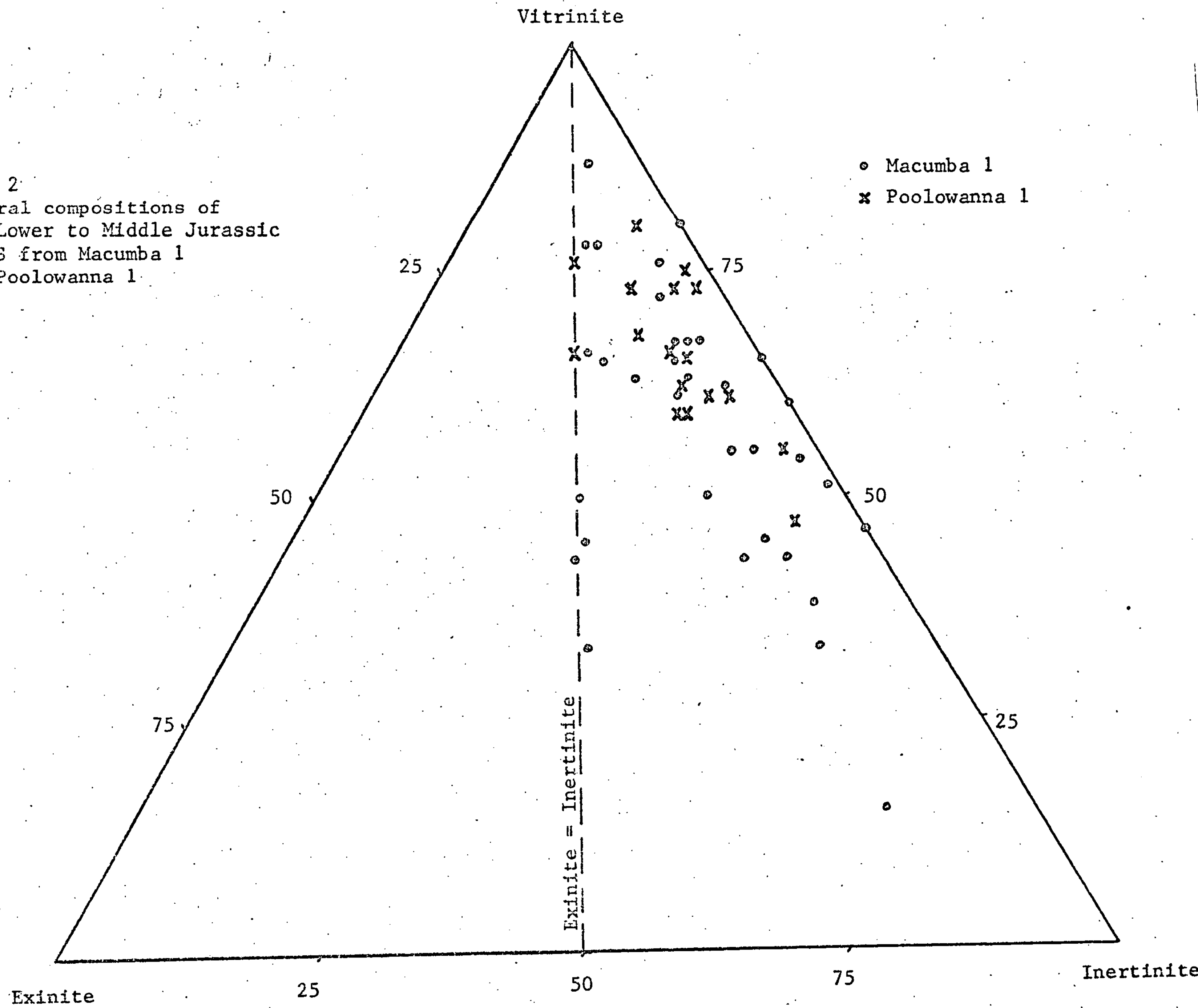


Fig. 1. Location of Macumba No 1 and Poolowanna No 1 wells in the Pedirka Basin.

Fig. 2
Maceral compositions of
the Lower to Middle Jurassic
COALS from Macumba 1
and Poolowanna 1



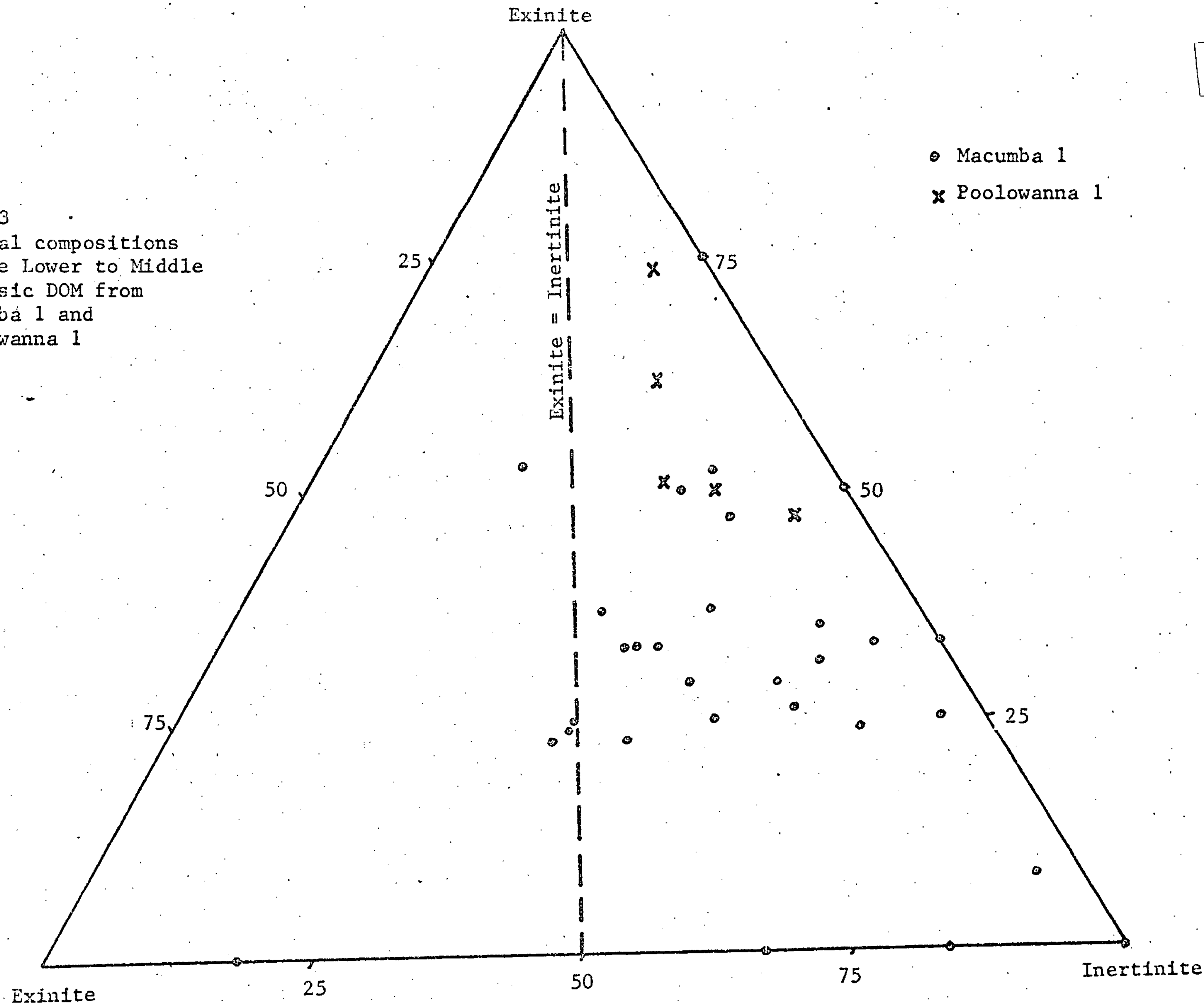


Fig. 3
Maceral compositions
of the Lower to Middle
Jurassic DOM from
Macumba 1 and
Poolowanna 1

Fig. 4
Components of the exinite group in the Lower to Middle Jurassic COALS from Macumba 1 and Poolowanna 1

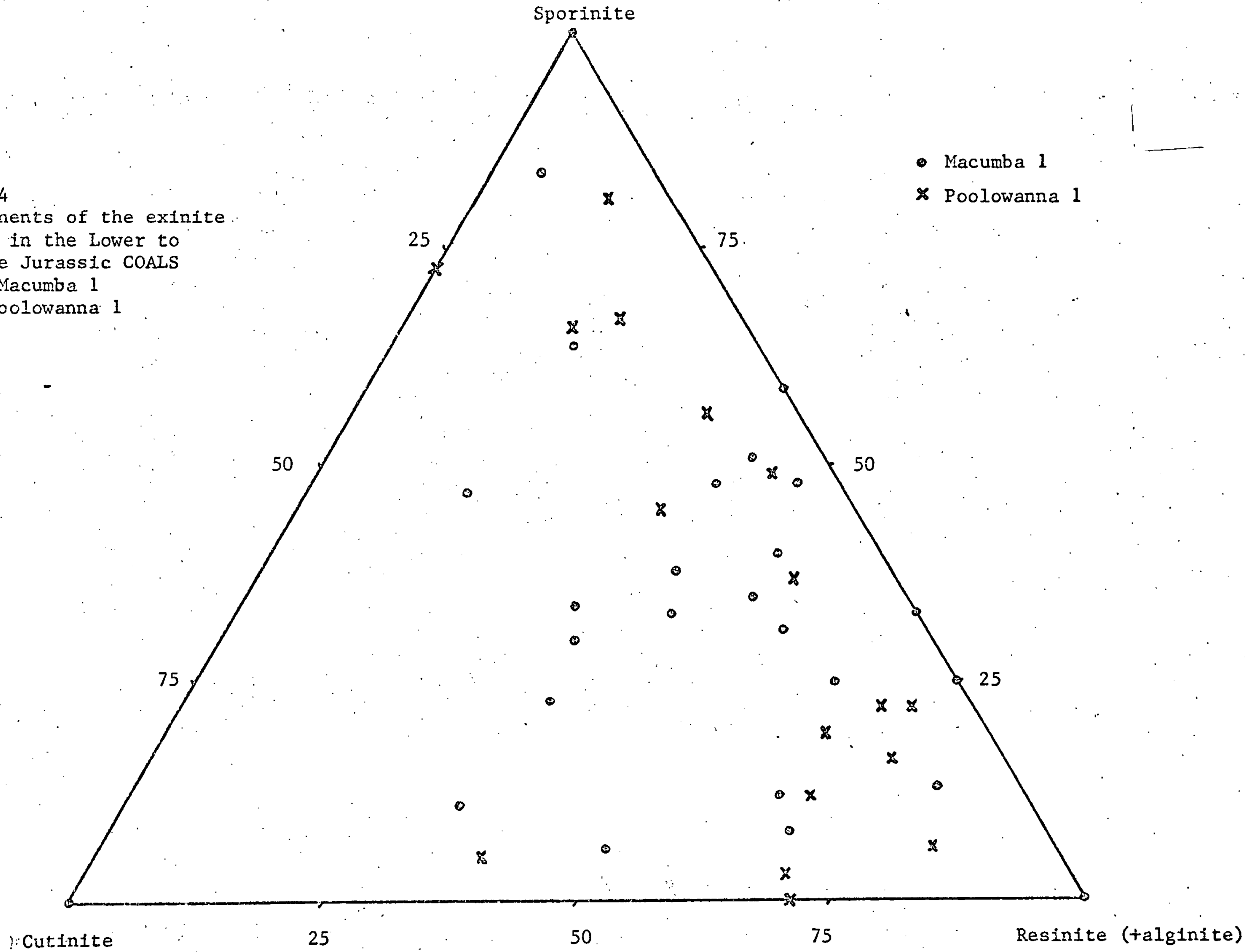
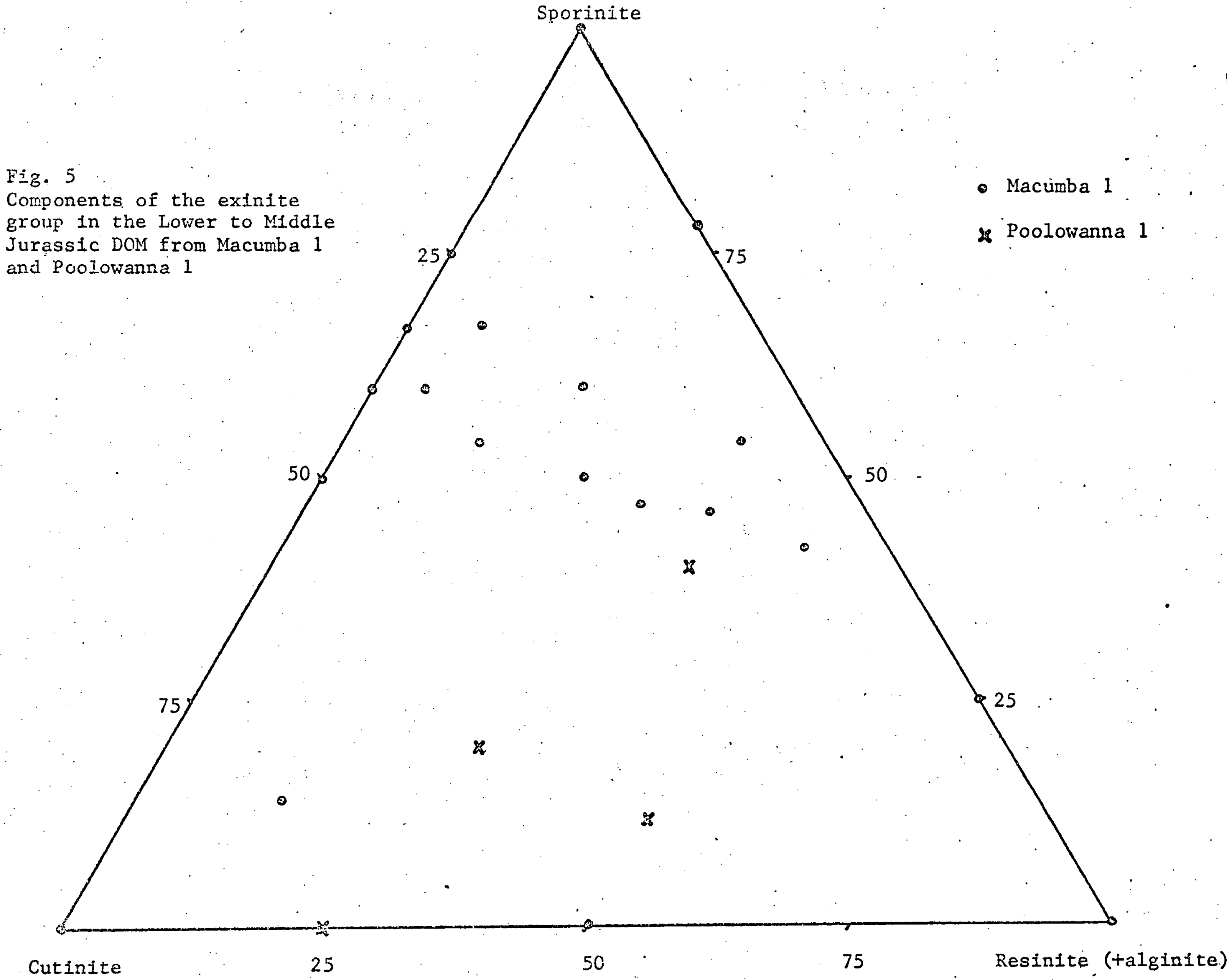


Fig. 5
Components of the exinite group in the Lower to Middle Jurassic DOM from Macumba 1 and Poolowanna 1



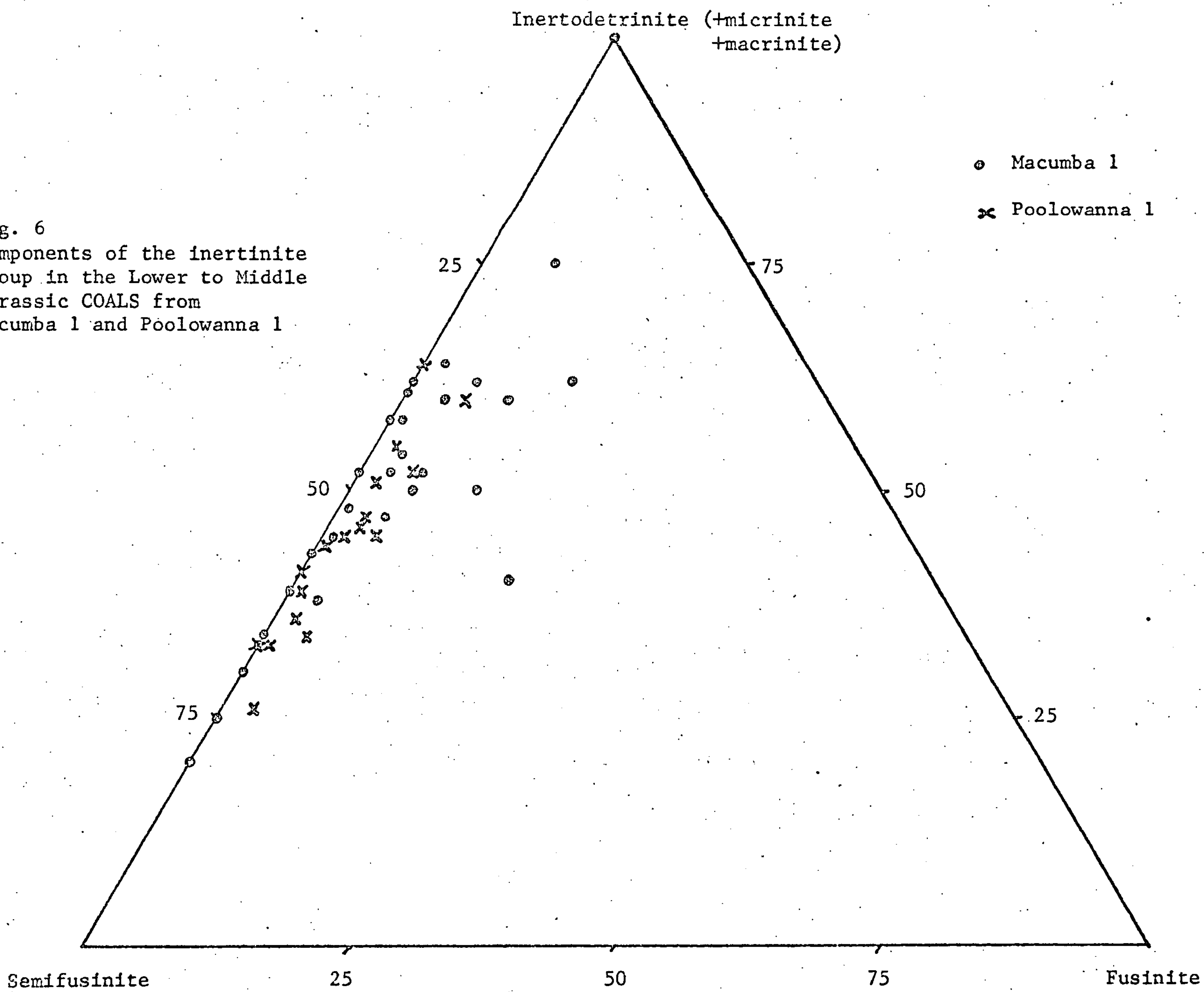
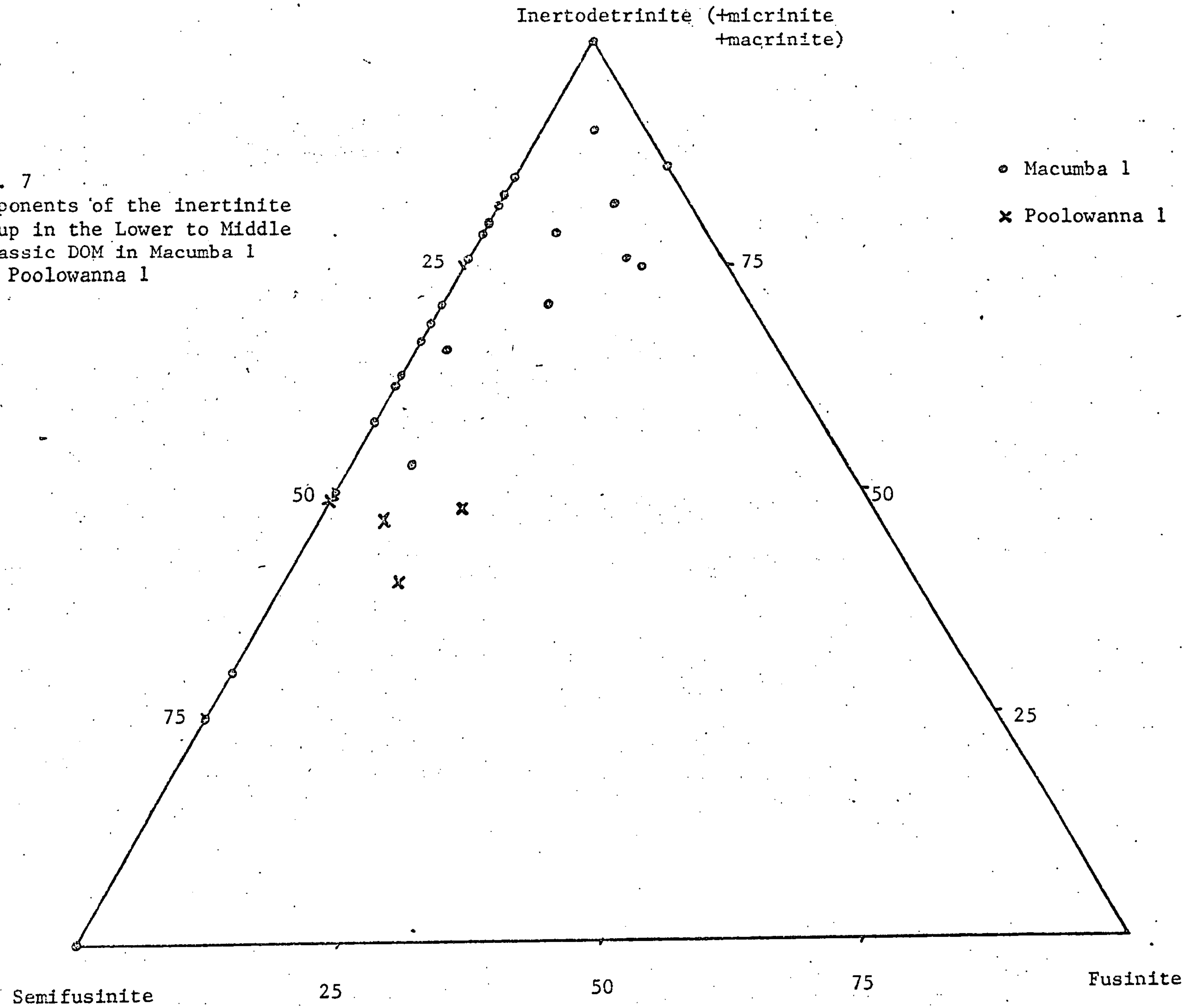


Fig. 6
Components of the inertinite group in the Lower to Middle Jurassic COALS from Macumba 1 and Poolowanna 1

Fig. 7
Components of the inertinite group in the Lower to Middle Jurassic DOM in Macumba 1 and Poolowanna 1



C00033

Fig. 8
Microlithotype compositions
of the Lower to Middle Jurassic
COALS from Macumba 1
to Poolowanna 1

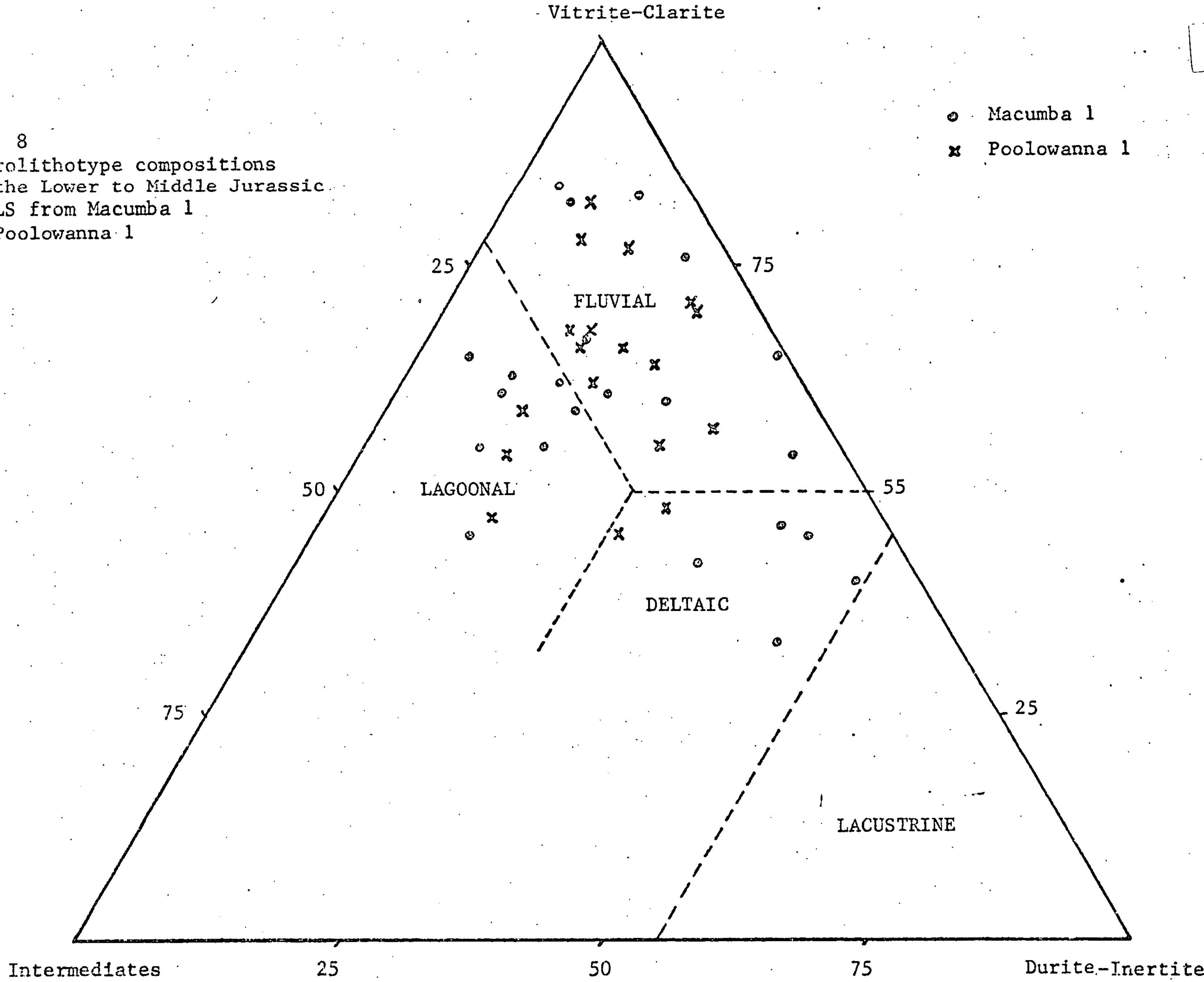


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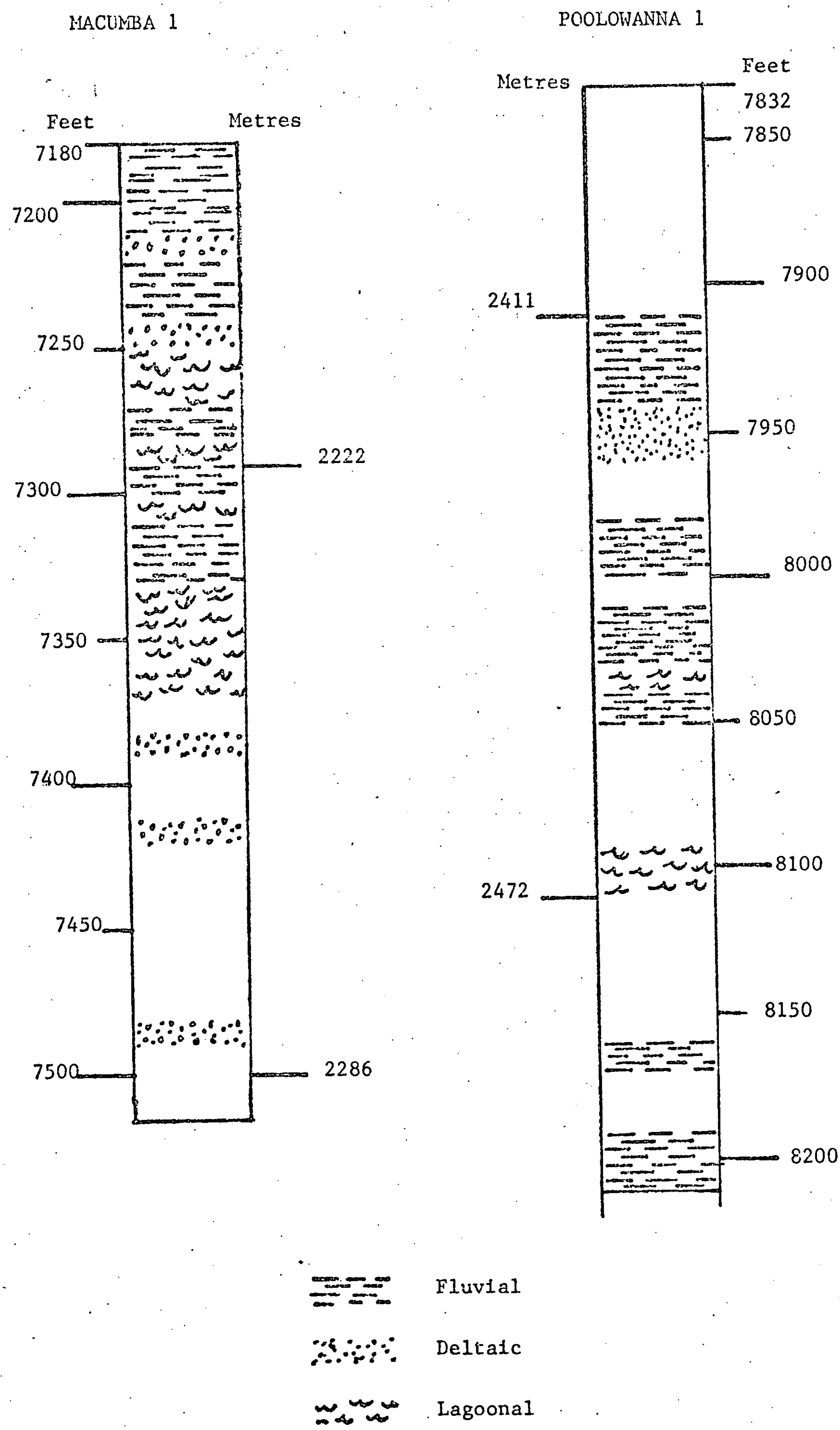
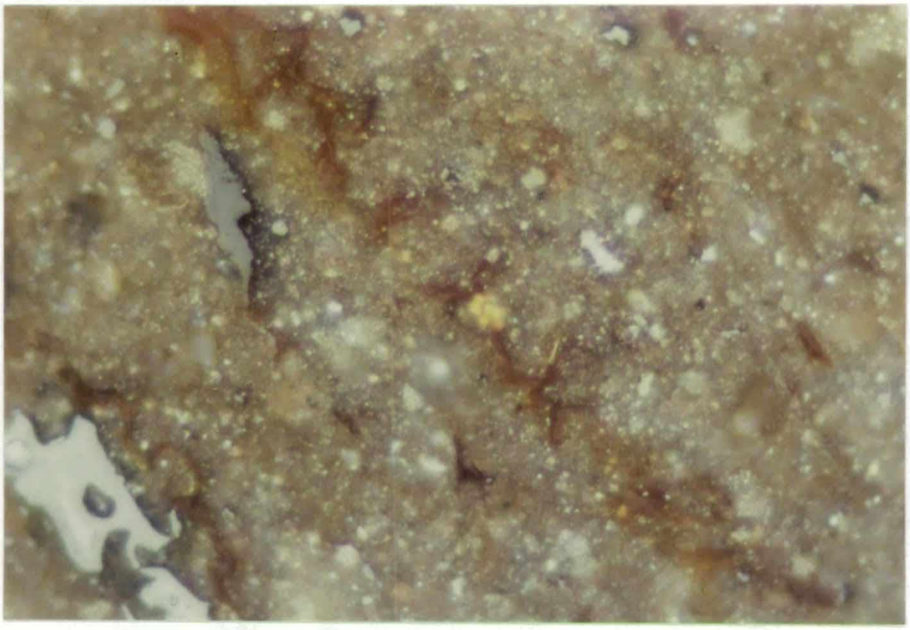
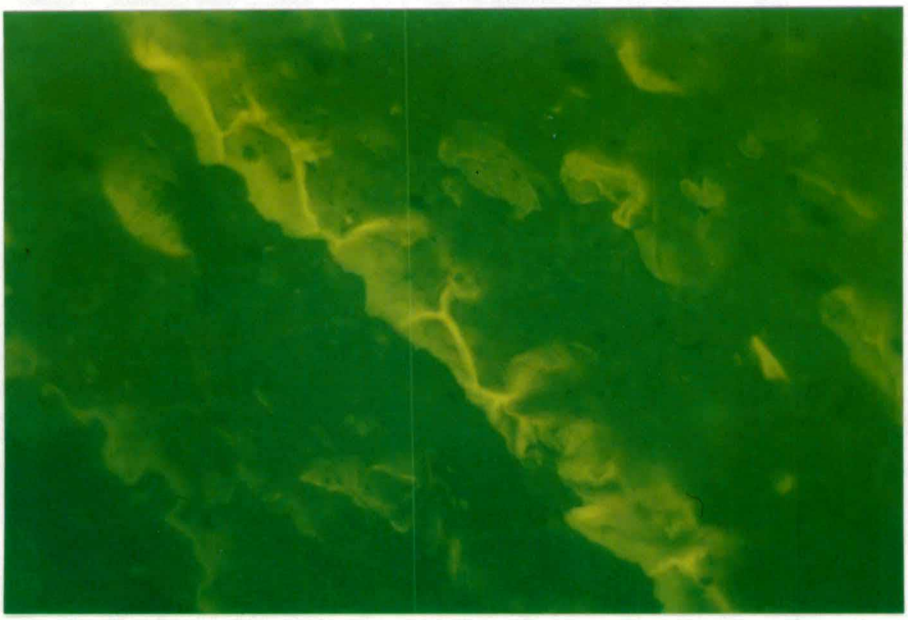
FIG 9 LOWER TO MIDDLE JURASSIC SEQUENCES



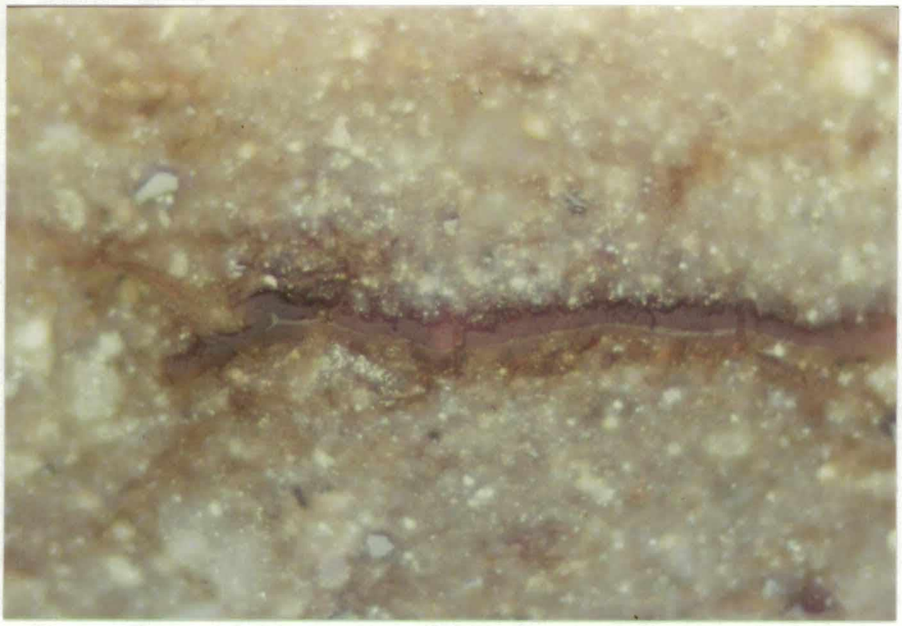


2222.0-2225.0 metres

Cutinite (orange-brown, diagonally across field) in organic sediment. There is also a fragment of vitrinite DOM (grey) and semifusinite DOM (white, in corner). Reflected plane polarized light, oil immersion. X400



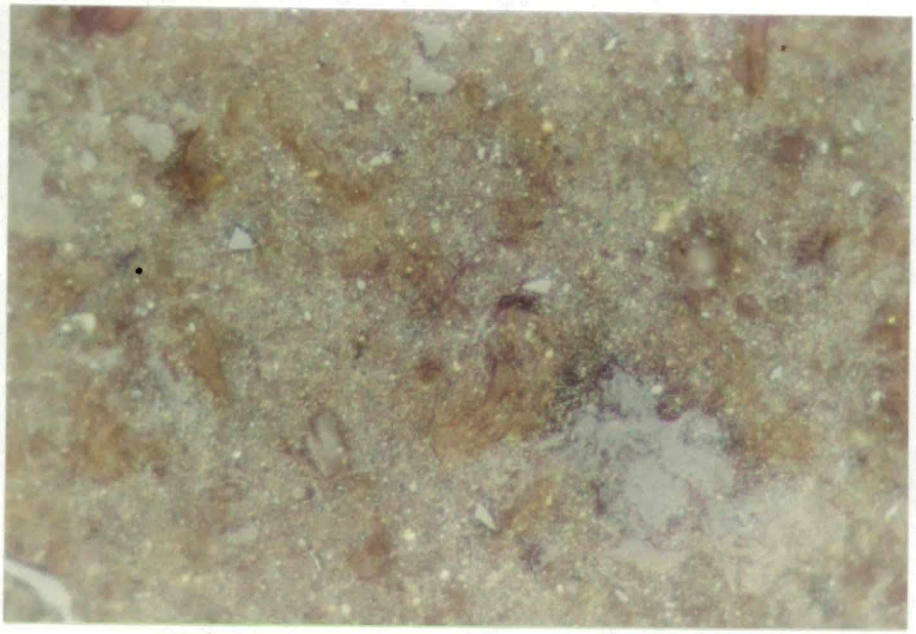
Same field as above using blue light excitation, which causes the cutinite and other exinite bodies present to fluoresce yellow



2222.0-2225.0 metres

Megaspore (dark grey, centre of field) in inorganic sediment under reflected plane polarised light, oil immersion X400

Same field as above, using blue light excitation which causes the megaspore, and other exinite fragments to fluoresce yellow.



2218.9-2222.0 metres

Spores (orange brown stains) in a carbonaceous shale. Reflected plane polarized light. Oil immersion X400

Same field as above, using blue light excitation which causes the spores to fluoresce yellow

RESTRICTED INVESTIGATION REPORT 1080R

CSIRO

INSTITUTE OF EARTH RESOURCES

FUEL GEOSCIENCE UNIT

THE PETROLOGY OF COALS AND DISPSERSED ORGANIC MATTER FROM LOWER PERMIAN SEDIMENTS IN MACUMBA NO.1 WELL, PEDIRKA BASIN

MICHELLE SMYTH

P.O. Box 136
North Ryde; NSW
Australia, 2113

DECEMBER 1979

1. INTRODUCTION

This is the second report on the organic sediments from Macumba No 1 well (Fig. 1). Those sediments from the Lower to Middle Jurassic sequence have been described in IR 1040R (1979). The Lower Permian sediments extend from 8029 feet (2447.2 metres) to 8410 feet (2563.4 metres).

Cuttings taken at ten feet intervals have been analysed petrographically to determine the type and quantity of organic matter in them.

2. ANALYSES

Maceral analyses have been carried out on 18 of the cuttings which contained organic particles. Only one sample contained sufficient coal for a microlithotype analysis to be done. The macerals occurring in coal and as dispersed organic matter (DOM) have been counted separately.

3. RESULTS

The quantities of coal and DOM in the cuttings are listed in Table 1. The proportion of coal varies from a trace to 24%, that of the DOM from nil to 4%. None of these samples has been handpicked, so that the organic matter has not been artificially concentrated.

Table 2 provides a breakdown of the maceral compositions of the coal and DOM, and these are plotted in Fig. 2. (Only points representing 10 or more counts have been plotted). The coals have low to moderate vitrinite contents (27 to 61%), whilst the DOM has a low vitrinite component (7 to 38%). The exinite content in the coals and DOM is similar, mostly in the range 5-20%. Thus, the difference in vitrinite contents is balanced by a lower inertinite content in the coals (28 to 63%) than in the DOM (42 to 80%).

The components of the exinite group - sporinite, cutinite and resinite - in both coals and DOM are given in Table 3, and plotted in Fig. 3. (Only points representing 5 or more exinite counts are shown). Sporinite and cutinite are the dominant constituents, with cutinite more abundant in the coals than sporinite. Unfortunately, the small number of exinite counts in the DOM means that most of them are not plotted, but sporinite and cutinite are approximately equally represented.

The components of the inertinite group - macrinite, micrinite, inertodetrinite, semifusinite and fusinite - in the coals and DOM are listed in Table 4, and plotted in Fig. 4. (Only points representing 10 or more inertinite counts are shown). In most samples inertodetrinite is more plentiful than semifusinite. Some of the coals have unusually high proportions of fusinite.

The one microlithotype analysis (Table 5) shows the coal to be low in vitrite plus clarite and high in intermediates (Fig. 5). Previous microlithotype analyses on the Lower Permian coals from Mokari No 1 well, gave similar results for coals at depths of 6220 feet (1895.9 metres) and 6320 feet (1926.3 metres), being more similar to the latter. (See IR 704R, 1975).

4. DISCUSSION

The maceral compositions of the coals and DOM show a pattern similar to that found elsewhere of the coal higher in vitrinite, lower in inertinite than the DOM. A distinctive feature of the DOM in these Lower Permian sediments is the relatively high proportion of exinite, compared with that of the Cooper Basin Permian sediments. Very often the absolute quantity of exinite is less than 1% by volume, but it is present in almost all of the samples viewed.

Another aspect of these organic fractions which is unusual is the relatively high proportion of cutinite in them. In virtually all Permian coals sporinite is the most abundant exinite maceral, and cutinite is dominant typically in Triassic coals.

Cutinite and sporinite DOM were readily identified during petrographic analyses. Algae have been detected in samples from Mokari 1 and Purni 1 wells using fluorescent light, and may have been missed in the counting of Macumba 1 samples. However, algae were not apparent in any of them when they were later scanned using fluorescent light. The spores and cutinite showed yellow fluorescence throughout the Permian samples.

The environment of deposition of the coal and associated sediments may have been deltaic, based on the microlithotype composition and extrapolated from the vitrinite content of the coals.

5. CONCLUSIONS

The coals from the Lower Permian have low to moderate vitrinite contents, the DOM low vitrinite contents.

The DOM has a relatively high proportion of exinite compared with DOM from the Cooper Basin Permian.

The high proportion of cutinite in the coals and DOM is unusual in Permian organic matter, being more typical of the Triassic.

The coals and sediments may have formed in a deltaic environment.

The DOM from this sequence appears to be more suitable for the generation of hydrocarbons than that in the Cooper Basin Permian.

TABLE 1

Pedirka Basin: Macumba No.1 Well

Lower Permian

Maceral Anslyses of the Cuttings

(Results are given as percentages by volume unless otherwise stated)

	Lab. No. Depth (feet)	Depth (metres)	Total organic	Total DOM	Total Coal	Total Minerals
1	61796 8030-40	2447.5-2450.6	1	1	tr	99
2	61799 8060-70	2456.7-2459.7	15	3	12	85
3	61800 8070-80	2459.7-2462.8	5	2	3	95
4	61801 8080-90	2462.8-2465.8	6	2	4	94
5	61802 8090-8100	2465.8-2468.9	2	-	2	98
6	61803 8100-10	2468.9-2471.9	28	4	24	72
7	61804 8110-20	2471.9-2475.0	7	3	4	93
8	61805 8120-30	2475.0-2478.0	10	2	8	90
9	61806 8130-40	2478.0-2481.1	6	1	5	94
10	61807 8140-50	2481.1-2484.1	3	1	2	97
11	61808 8150-60	2484.1-2487.2	5	1	4	95
12	61809 8160-70	2487.2-2490.2	6	1	5	94
13	61810 8170-80	2490.2-2493.3	7	2	5	93
14	61811 8180-90	2493.3-2496.3	9	3	6	91
15	61812 8190-8200	2496.3-2499.4	7	2	5	93
16	61813 8200-10	2499.4-2502.4	3	2	1	97
17	61821 8280-90	2523.7-2526.8	1	1	tr	99
18	61822 8290-8300	2526.8-2529.8	3	1	2	97
19-20 21	61824-26 8310-40	2532.9-2542.0	-	-	-	100
22	61827 8340-50	2542.0-2545.1	1	tr	1	99

TABLE 2

Pedirka Basin: Macumba No.1 well

Lower Permian

Maceral analyses of the organic matter

Depth (feet)	Depth (metres)	Lab. No.	Type of sample	Vitrinite	Sporinite	Cutinite	Resinite/ Liptodetrinite	Macrinite	Micrinite	Inertodetrinite	Semifusinite	Fusinite	No. of counts	Coal/ DOM
1. 8030-40	2447.5-	61796	Coal	40	-	20	-	-	-	20	20	-	5*	36/
	50.6		DOM	11	-	-	-	-	-	67	11	-	9*	64
2. 8060-70	2456.7-	61799	Coal	52	6	6	2	-	3	19	7	5	103	80/
	59.7		DOM	30	4	8	-	-	-	50	8	-	26	20
3. 8070-80	2459.7-	61800	Coal	36	9	9	-	5	-	14	18	9	22	51/
	62.8		DOM	38	-	-	-	-	-	38	19	5	21	49
4. 8080-90	2462.8-	61801	Coal	49	3	-	3	-	-	24	9	12	33	70/
	65.8		DOM	28	8	8	-	-	-	28	28	-	14	30
5. 8090-8100	2465.8-	61802	Coal	83	-	-	-	-	-	-	-	17	6*	100/
	68.9		DOM	No DOM counted										
6. 8100-10	2468.9-	61803	Coal	38	4	5	1	4	1	28	16	3	193	84/
	71.9		DOM	28	17	3	-	-	-	36	11	5	36	16
7. 8110-20	2471.9-	61804	Coal	34	3	3	-	3	3	36	15	3	33	58/
	75.0		DOM	21	-	-	-	-	-	54	25	-	24	42
8. 8120-30	2475.0-	61805	Coal	27	5	14	-	2	2	22	26	2	58	79/
	78.0		DOM	27	13	-	-	-	-	40	20	-	15	21
9. 8130-40	2478.0-	61806	Coal	61	3	8	-	3	3	5	17	-	36	78/
	81.1		DOM	20	-	10	-	-	-	40	30	-	10	22
10.8140-50	2481.1-	61807	Coal	27	5	5	-	-	-	47	16	-	19	61/
	84.1		DOM	25	8	25	-	-	-	34	8	-	12	39
11.8150-60	2484.1-	61808	Coal	59	4	7	-	-	4	15	11	-	27	79/
	87.2		DOM	14	-	43	-	-	-	14	29	-	7*	21
12.8160-70	2487.2-	61809	Coal	53	9	3	-	3	3	14	9	6	34	77/
	90.2		DOM	20	-	-	-	-	50	30	-	-	10	23
13.8170-80	2490.2-	61810	Coal	33	3	8	2	5	-	36	10	3	39	75/
	93.3		DOM	15	8	8	-	-	-	31	38	-	13	25
14.8180-90	2493.3-	61811	Coal	29	12	5	-	-	2	28	19	5	42	67/
	96.3		DOM	24	9	-	-	-	-	43	19	5	21	33
15.8190-8200	2496.3-	61812	Coal	43	11	7	2	-	-	21	16	-	44	72/
	99.4		DOM	12	12	12	-	-	-	47	17	-	17	28
16.8200-10	2499.4-	61813	Coal	45	-	11	11	-	-	11	22	-	9*	39/
	2502.4		DOM	7	14	8	-	-	-	43	29	-	14	61
17.8280-90	2523.7-	61821	Coal	25	-	25	-	-	-	50	-	-	4*	31/
	26.8		DOM	33	-	11	-	-	-	33	23	-	9*	69
18.8290-8300	2526.8-	61822	Coal	44	6	-	-	6	-	6	27	11	18	67/
	29.8		DOM	33	11	-	-	-	-	56	-	-	9*	33
19.20.21 8310-40	2532.9-42.0	61824-26		No organic matter apparent in these samples										
22.8340-50	2542.0-	61827	Coal	67	-	-	-	-	-	33	-	-	3*	75/
	45.1		DOM	-	-	-	-	-	-	100	-	-	1*	25

*Too few counts for meaningful results

TABLE 3

Pedirka Basin: Macumba No. 1 Well

Lower Permian

Maceral Analyses of the Exinite Group

(Results are given as percentages by volume unless otherwise stated)

	Lab No. Depth (feet)	Depth (metres)	Sporinite	Cutinite	Resinite	No. of Counts
1	61796	2447.5-	-	100	-	1 COAL
	8030-40	2450.6	100	-	-	1 DOM
2	61799	2456.7-	43	43	14	14 COAL
	8060-70	2459.7	33	67	-	3 *DOM
3	61800	2459.7-	50	50	-	4 *COAL
	8070-80	2462.8	-	-	-	- DOM
4	61801	2462.8-	50	-	50	2 *COAL
	8080-90	2465.8	50	50	-	2 *DOM
6	61803	2468.9-	40	45	15	20 COAL
	8100-10	2471.9	86	14	-	7 *DOM
7	61804	2471.9-	50	50	-	2 *COAL
	8110-20	2475.0	-	-	-	- DOM
8	61805	2475.0-	27	73	-	11 COAL
	8120-30	2478.0	100	-	-	2 *DOM
9		2478.0-	25	75	-	4 *COAL
	8130-40	2481.1	-	100	-	1 *DOM
10	61807	2481.1-	50	50	-	2 *COAL
	8140-50	2484.1	25	75	-	4 *DOM
11	61808	2484.1-	33	67	-	3 *COAL
	8150-60	2487.2	-	100	-	3 *DOM
12	61809	2487.2-	75	25	-	4 *COAL
	8160-70	2490.2	-	-	-	- *DOM
13	61810	2490.2-	20	60	20	5 *COAL
	8170-80	2493.3	50	50	-	2 *DOM
14	61811	2493.3-	71	29	-	7 *COAL
	8180-90	2496.3	100	-	-	2 *DOM
15	61812	2496.3-	56	33	11	9 *COAL
	8190-8200	2499.4	50	50	-	4 *DOM
16	61813	2499.4-	-	50	50	2 *COAL
	8200-10	2502.4	67	33	-	3 *DOM
17	61821	2523.7-	-	100	-	1 *COAL
	8280-90	2526.8	-	100	-	1 *DOM
18	61822	2526.8-	100	-	-	1 *COAL
	8290-8300	2529.8	75	25	-	4 *DOM

* Too few counts for meaningful results. Trends only

TABLE 4

Pedirka Basin: Macumba No.1 Well

Lower Permian

Maceral analyses of the inertinite group

(Results are given as percentages by volume unless otherwise stated)

	Lab. No. Depth (feet)	Depth (metres)	Macr-inite	Micr-inite	Inerto-detrin-ite	Semi-fus-inite	Fus-inite	No. of counts
1.	61796	2447.5-	-	-	50	50	-	2* coal
	8030-40	2450.6	-	-	86	14	-	7* DOM
2.	61799	2456.7-	-	9	57	20	14	35 coal
	8060-70	2459.7	-	-	87	13	-	15 DOM
3.	61800	2459.7-	10	-	30	40	20	10 coal
	8070-80	2462.8	-	-	61	31	8	13 DOM
4.	61801	2462.8-	-	-	53	20	27	15 coal
	8080-90	2465.8	-	-	50	50	-	8* DOM
5.	61802	2465.8	-	-	-	-	100	1* coal
	8090-8100	2468.9	-	-	-	-	-	DOM
6.	61803	2468.9	7	2	54	32	5	100 coal
	8100-10	2471.9	-	-	68	21	11	19 DOM
7.	61804	2471.9	5	5	60	25	5	20 coal
	8110-20	2475.0	-	-	68	32	-	19 DOM
8.	61805	2475.0-	3	3	42	49	3	31 coal
	8120-30	2478.0	-	-	33	67	-	9* DOM
9.	61806	2478.0-	10	10	20	60	-	10 coal
	8130-40	2481.1	-	-	57	43	-	7* DOM
10.	61807	2481.1-	-	-	75	25	-	12 coal
	8140-50	2484.1	-	-	80	20	-	5* DOM
11.	61808	2484.1-	-	12	50	38	-	8* coal
	8150-60	2487.2	-	-	33	67	-	3* DOM
12.	61809	2487.2-	8	8	42	25	17	12 coal
	8160-70	2490.2	-	-	63	37	-	8* DOM
13.	61810	2490.2-	9	-	67	19	5	21 coal
	8170-80	2493.3	-	-	44	56	-	9* DOM
14.	61811	2493.3-	-	4	52	35	9	23 coal
	8180-90	2496.3	-	-	64	29	7	14 DOM
15.	61812	2496.3-	-	-	56	44	-	16 coal
	8190-8200	2499.4	-	-	73	27	-	11 DOM
16.	61813	2499.4-	-	-	33	67	-	3* coal
	8200-10	2502.4	-	-	60	40	-	10 DOM
17.	61821	2523.7-	-	-	100	-	-	2* coal
	8280-90	2526.8	-	-	60	40	-	5* DOM
18.	61822	2526.8-	11	-	11	56	22	9* coal
	8290-8300	2529.8	-	-	100	-	-	5* DOM
22.	61827	2542.0-	-	-	100	-	-	1* coal
	8340-50	2545.1	-	-	100	-	-	1* coal

* Too few counts for meaningful results

TABLE 5

Pedirka Basin: Macumba No.1 well

Lower Permian

Microlithotype analyses of the cuttings

(Results are given as percentages by volume unless otherwise stated)

Lab. No. Depth (feet)	Depth (metres)	Vitrite	Clarite	Intermediates	Microite + Durite	Semifusite + Fusite	No. of counts
61803 8100-10		20	1	46	19	14	187

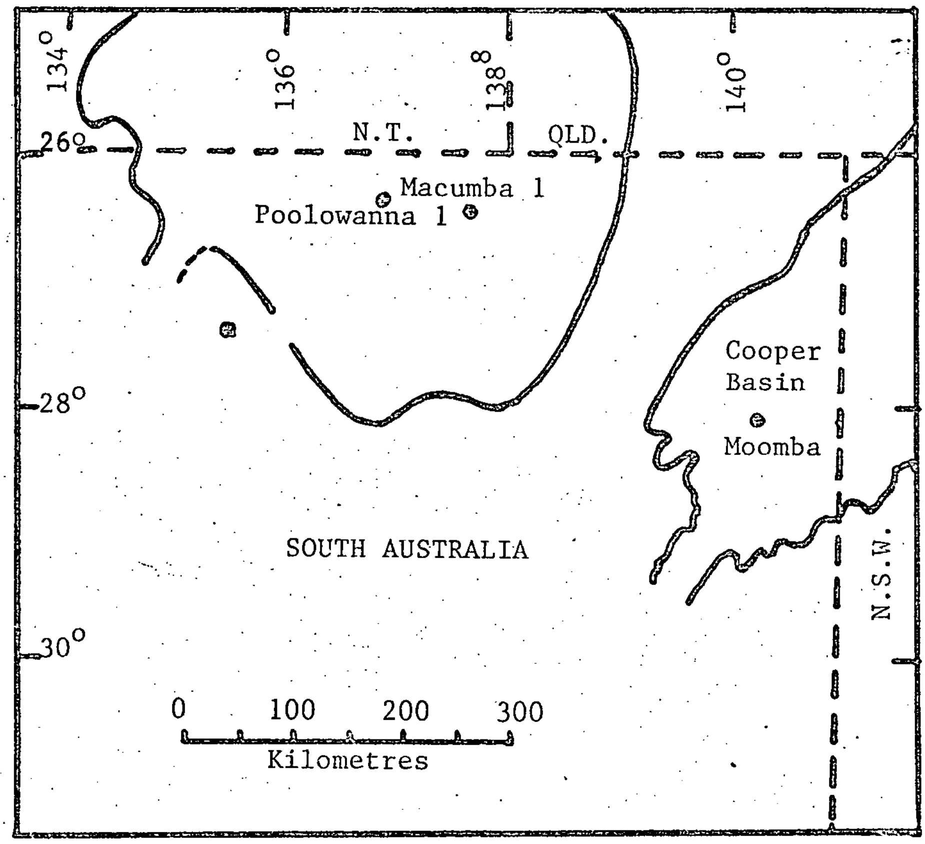


FIG. 1. LOCATION OF MACUMBA NO.1 AND POOLOWANNA NO.1 WELLS IN THE PEDIRKA BASIN

PEDIRKA BASIN

MACUMBA NO.1 WELL

Lower Permian

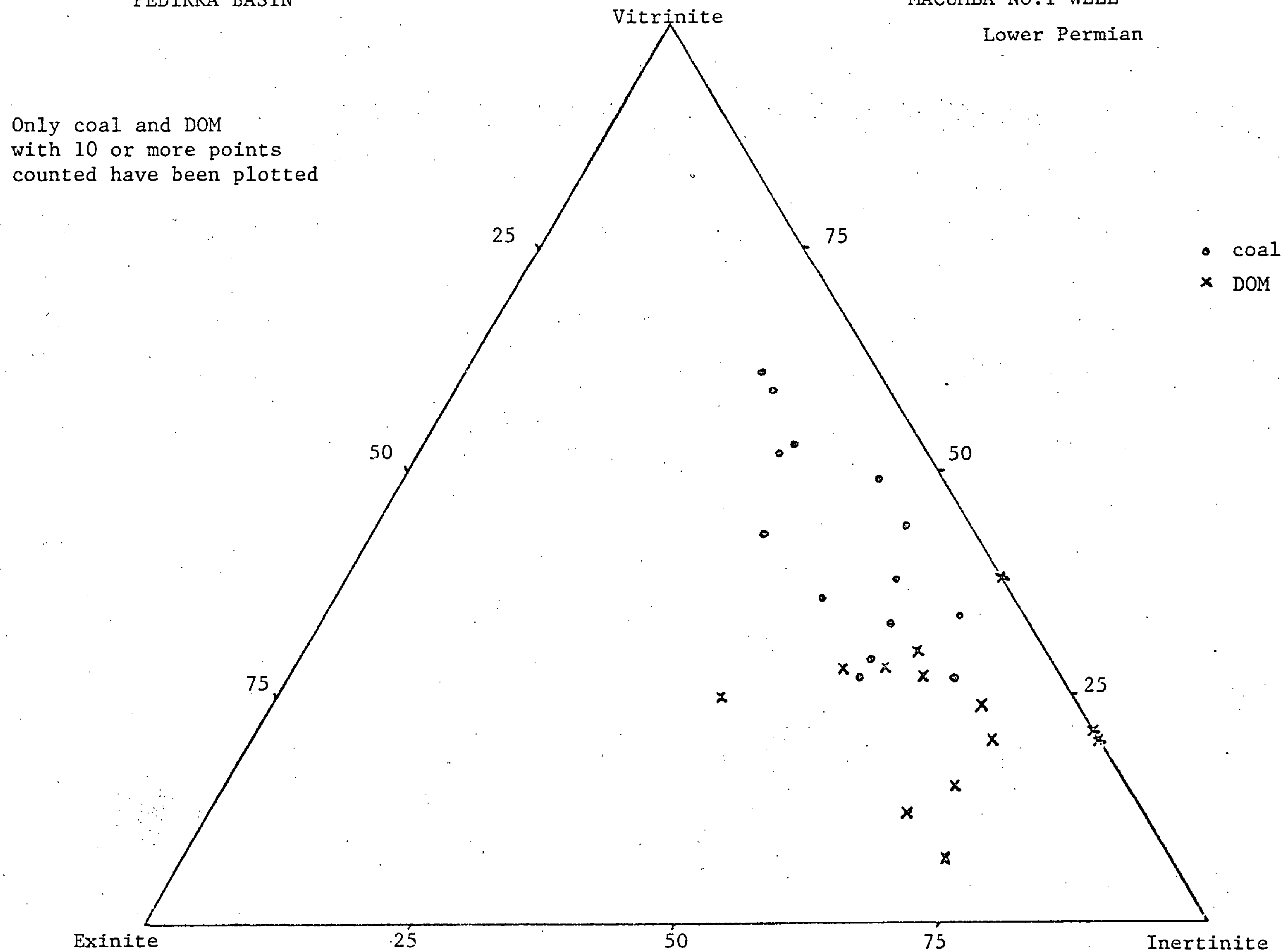


FIG.2 MACERAL COMPOSITION OF THE ORGANIC MATTER

PEDIRKA BASIN

MACUMBA NO.1 WELL

Lower Permian

Only coals and DOM with 5 or more points counted as exinite have been plotted

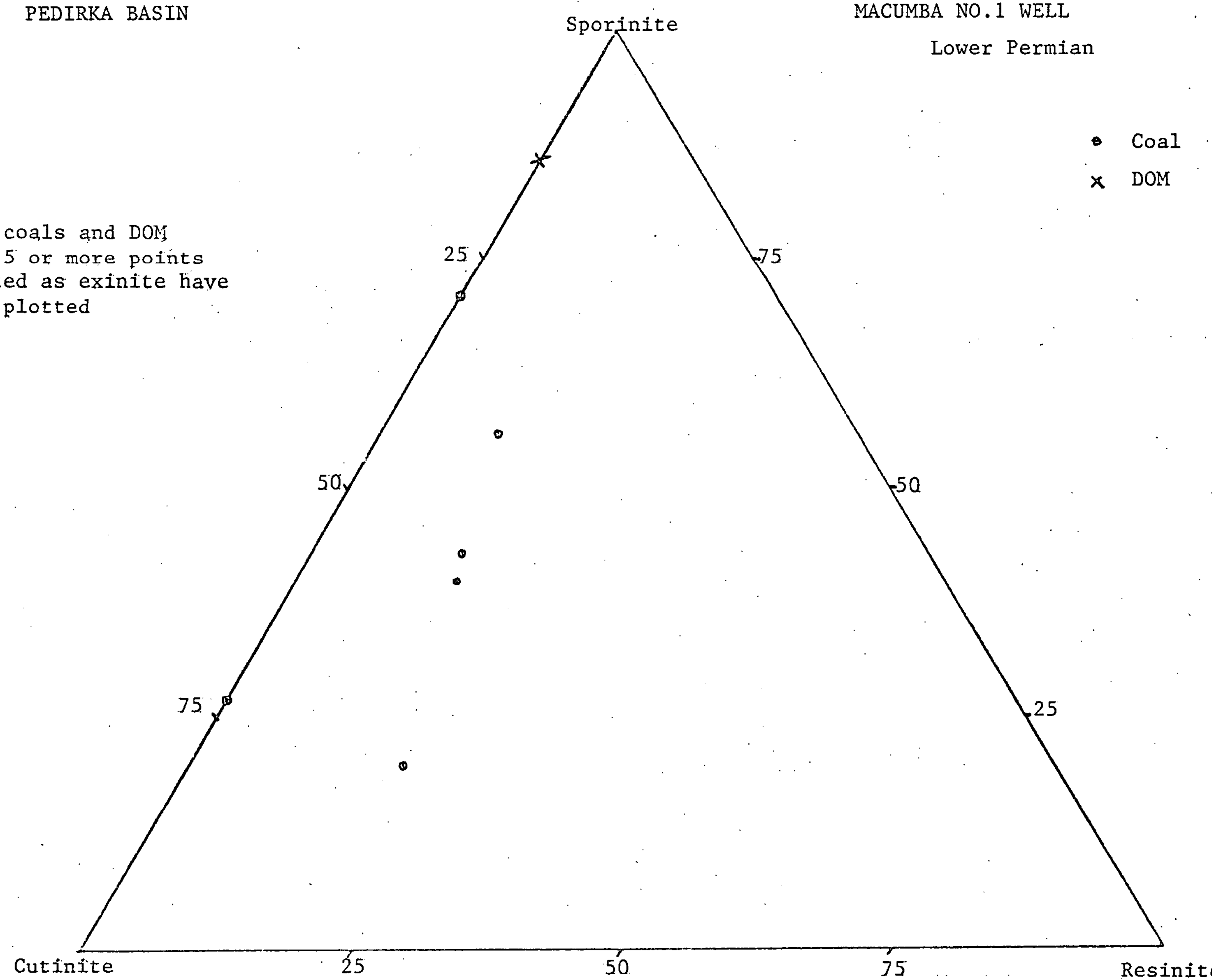


FIG.3 COMPONENTS OF THE EXINITE GROUP

PEDIRKA BASIN

MACUMBA NO.1 WELL

Lower Permian

Only coals and DOM which have 10 or more points counted as inertinite have been plotted

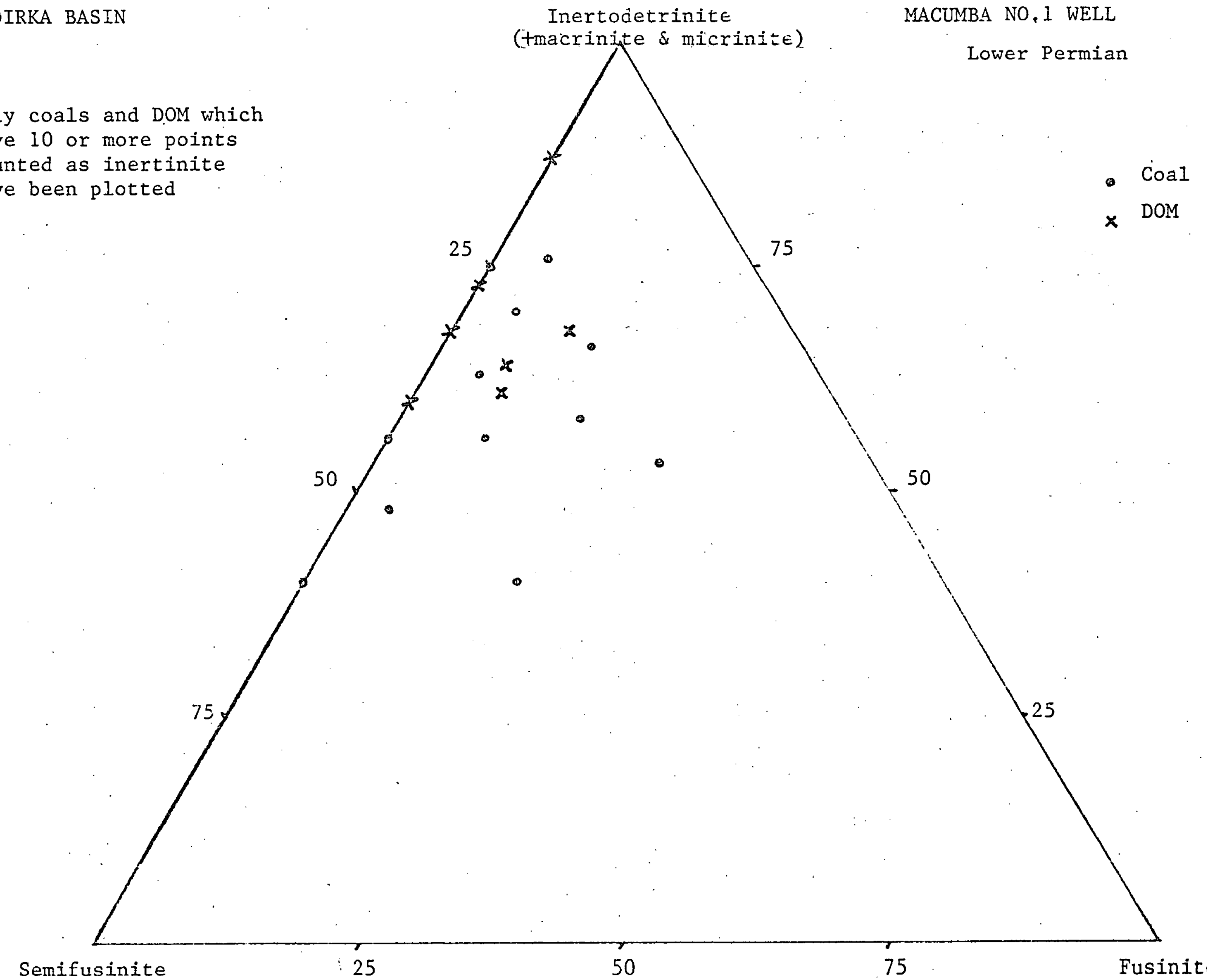


FIG.4 COMPONENTS OF THE INERTINITE GROUP

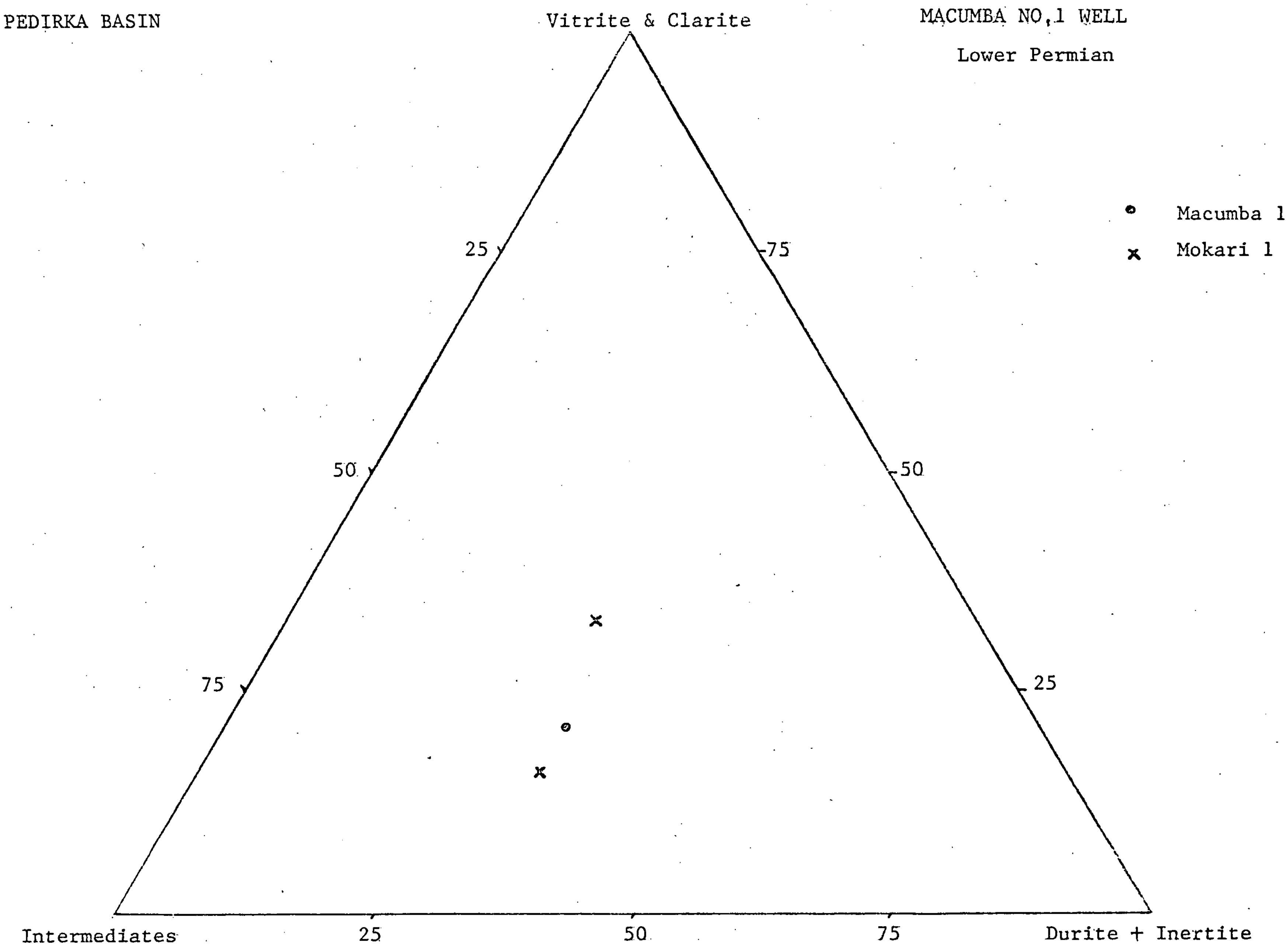


FIG.5 MICROLITHOTYPE COMPOSITIONS OF COALS FROM MACUMBA 1 AND MOKARI 1 WELLS

RESTRICTED INVESTIGATION REPORT 1091R

CSIRO

INSTITUTE OF EARTH RESOURCES

Fuel Geoscience Unit

PETROLOGY OF SOME COALS AND DISPERSED ORGANIC MATTER OF TRIASSIC AGE FROM MACUMBA NO. 1 WELL, PEDIRKA BASIN

MICHELLE SMYTH

p. o. Box 136
North Ryde, NSW
Australia, 2113

JANUARY 1980

1. INTRODUCTION

This is the third report on the organic matter in the sediments from Macumba No 1 well Pedirka Basin (Fig. 1) drilled by Delhi Petroleum Pty. Ltd. The report deals with the organic petrology of the Triassic sediments which extend from 7516 feet (2290.9 metres) to 8029 feet (2447.2 metres). They have been named the Peera Peera Formation. The organic petrology of Triassic sediments from Poolowanna No 1 well has been reported in Restricted Investigation Report 976R, 1978.

2. ANALYSES

All cutting samples which contained coaly particles or dark grey shales were made into grain mounts for petrographic analyses. The organic matter in coal particles has been counted separately from that which occurs as dispersed organic matter (DOM). Maceral analyses have been carried out on 33 samples. There were not enough coal particles in any of the samples for microlithotype analyses.

3. RESULTS

The proportions of total organic matter, DOM and coal are listed in Table 1. The total organic matter ranges between 1 and 8% (by volume), and the DOM between trace and 8%. The maceral compositions of the coal and DOM are given in Table 2, and plotted in Fig. 2. Both coals and DOM are inertinite-rich, and the coals contain more vitrinite than the DOM. They have relatively high proportions of exinite, up to 60%, and generally 10 to 30%.

The exinite is predominantly cutinite, as shown in Table 3 and Fig. 3. The inertinite is predominantly inertodetrinite; see Table 4, Fig. 4.

4. DISCUSSION

The organic matter from Macumba No 1 contains more exinite and less vitrinite than that from Poolowanna No 1. Cutinite is the dominant exinite in both, with more occurrences of resinite and sporinite in Poolowanna. Inertodetrinite is dominant in both wells with more semifusinite present in Poolowanna. There appears to be a larger volume of organic matter in the Triassic sediments from Poolowanna than Macumba, but the Poolowanna samples were froth floated. The nature of the organic matter is very similar.

The quantities and types of DOM through the Triassic section in Macumba are illustrated in Fig. 5. The exinite DOM is concentrated in the top part of the Triassic section, forming up to 1% (by volume) of the sediments. This concentration is found also in Poolowanna (RIR 976R). It is unlikely that this exinite is from the overlying Jurassic, because the exinite in the Jurassic sediments is predominantly resinite and sporinite, rather than cutinite (see RIR 981R, 1978 and RIR 1040R, 1979).

5. CONCLUSIONS

The DOM of Triassic age from Macumba No 1 is inertinite-rich, but also contains 10 to 30% exinite, which occurs as cutinite. The exinite DOM is found in greatest concentrations at the top of the Triassic sequence. This is also the case in the Triassic sediments from Poolowanna No 1.

Assuming that exinite can generate liquid hydrocarbons, the upper Triassic sediments from the Pedirka Basin should be fair to good source rocks for liquid hydrocarbons.

Most of the samples contain more than 50% inertinite DOM, but there is sufficient vitrinite plus exinite DOM to classify the upper Triassic sediments as good source rocks for gaseous hydrocarbons, when sufficiently mature.

(The Triassic sediments belong, strictly, to the Simpson Desert Basin, but the name Pedirka Basin has been used for uniformity with preceding reports).

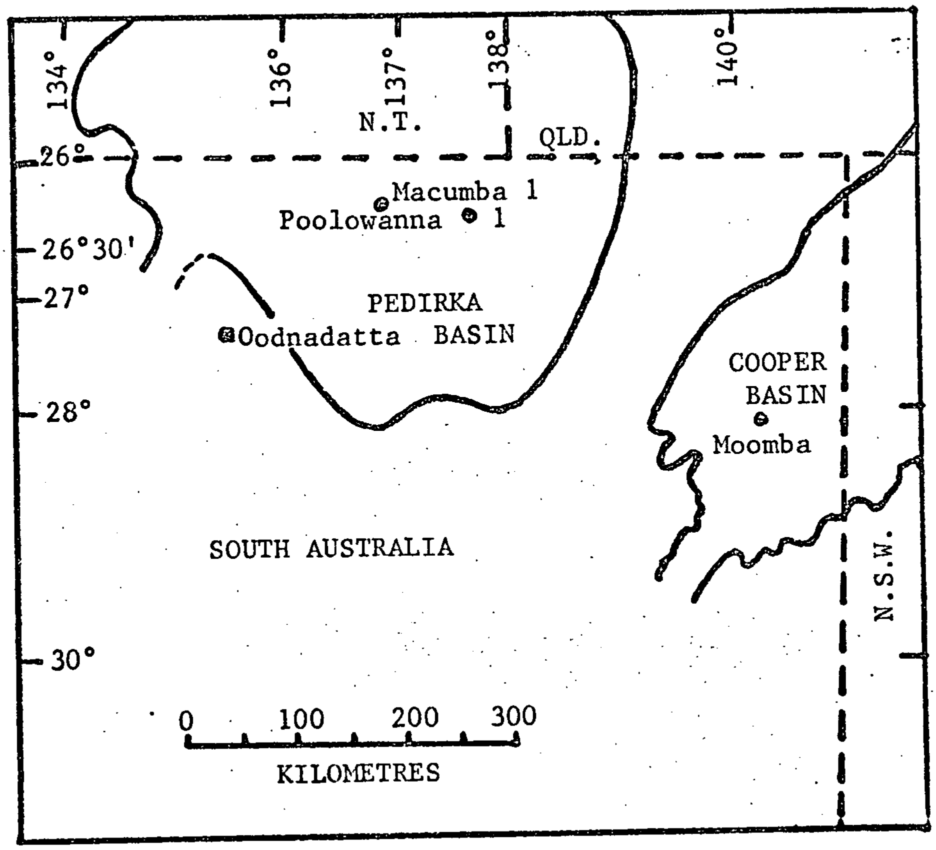


Fig. 1. Location of Macumba No 1 and Poolowanna No 1 wells in the Pedirka Basin.

PEDIRKA BASIN Macumba No.1 well

Triassic Macerals

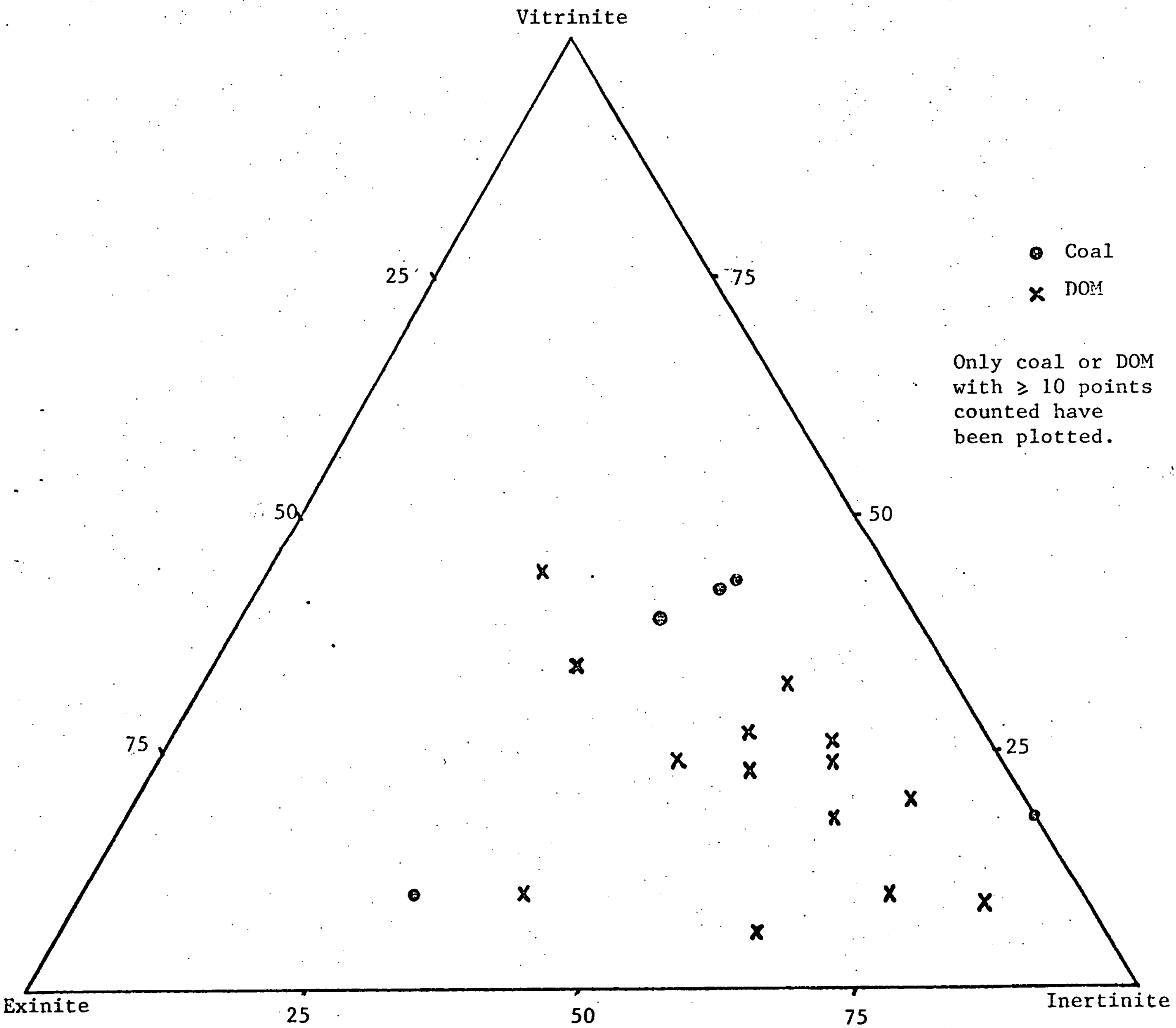


FIG.2 MACERAL COMPOSITIONS OF THE COALS AND DOM

PEDIRKA BASIN

Macumba No.1 well

Traissic

Exinites

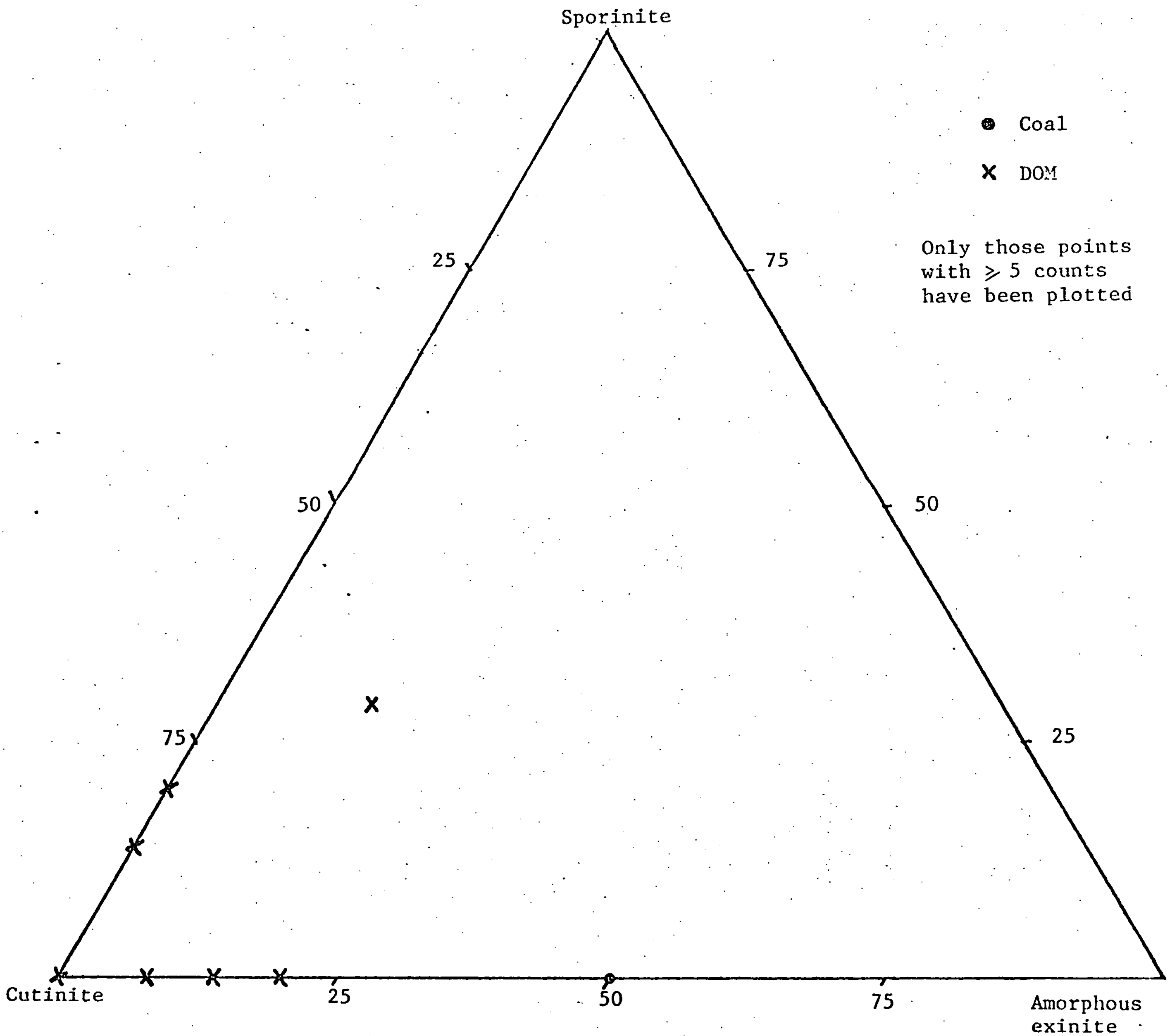


FIG.3. COMPONENTS OF THE EXINITE GROUP

PEDIRKA BASIN Macumba No.1 well

Triassic Inertinites

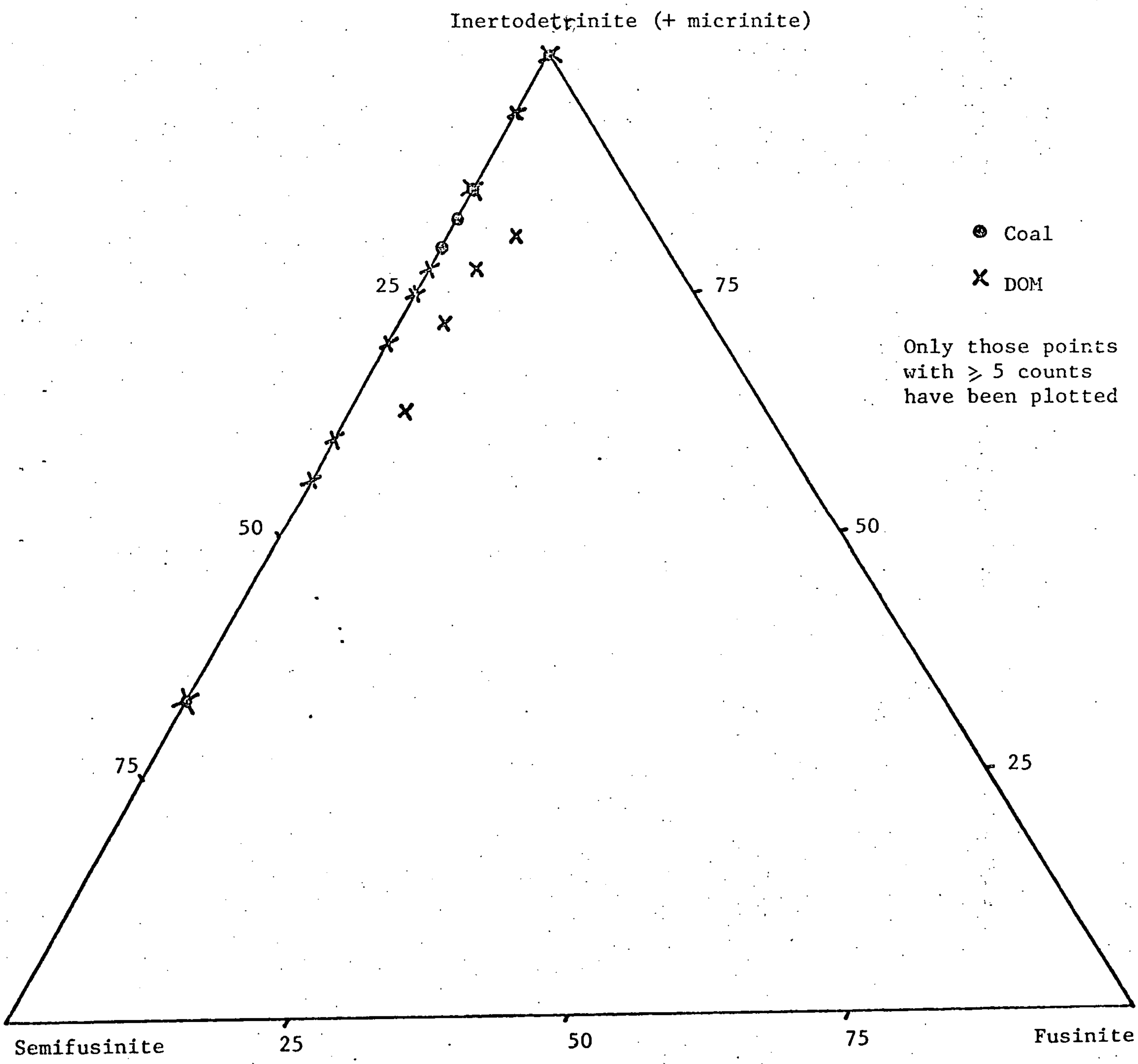
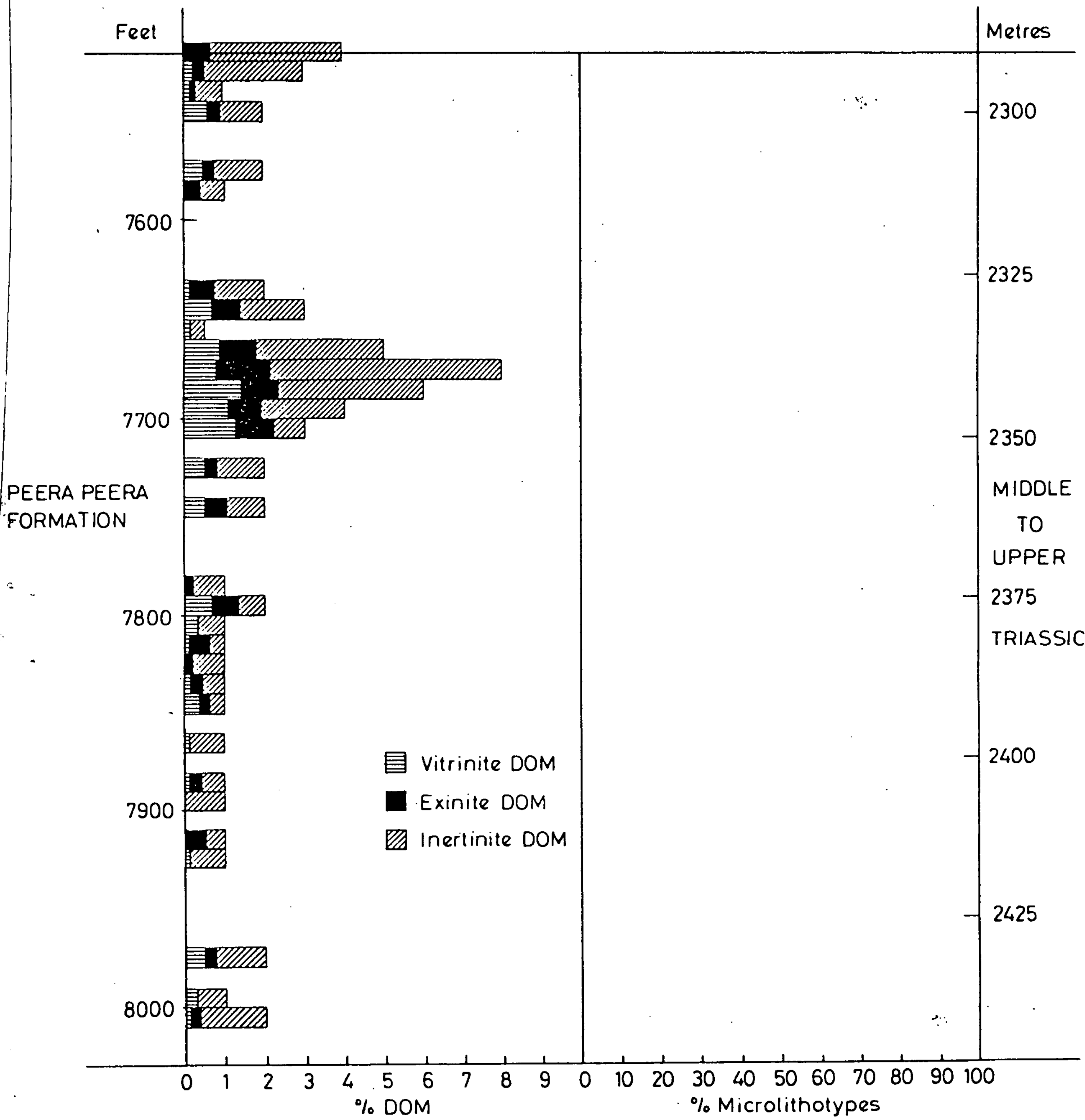


FIG.4 COMPONENTS OF THE INERTINITE GROUP



MACUMBA N°1 WELL

FIG. 5

V/Fo. M. Smyth

TABLE 1

Pedirka Basin: Macumba No 1

Middle to Upper Triassic

Maceral Analyses of the Cuttings

	Depth (feet)	Depth (metres)	Total organic	Total DOM	Total coal	Total minerals
1.	61747 7520-30	2292.1 -95.1	4	3	1	96
2.	61748 7530-40	2295.1 -98.2	2	1	1	98
3.	61749 7540-50	2298.2 -2301.2	3	2	1	97
4.	61752 7570-80	2307.3 -10.4	2	2	tr	98
5.	61753 7580-90	2310.4 -13.4	1	1	tr	99
6.	61758 7630-40	2325.6 -28.7	3	2	1	97
7.	61759 7640-50	2328.7 -31.7	4	3	1	96
8.	61760 7650-60	2331.7 -34.8	1	0.5	0.5	99
9.	61761 7660-70	2334.8 -37.8	6	5	1	94
10.	61762 7670-80	2337.8 -40.9	8	8	-	92
11.	61763 7680-90	2340.9 -43.9	6	6	-	94
12.	61764 7690-7700	2343.9 -41.0	4	4	-	96
13.	61765 7700-10	2347.0 -50.0	3	3	-	97
14.	61767 7720-30	2353.1 -56.1	3	2	1	97
15.	61769 7740-50	2359.2 -62.2	3	2	1	97
16.	61771 7780-90	2371.3 -74.4	1	1	tr	99
17.	61772 7290-7800	2374.4 -77.4	3	2	1	97
18.	61773 7800-10	2377.4 -80.5	2	1	1	98
19.	61774 7810-20	2380.5 -83.5	3	1	2	97

TABLE 1 (con't)

Pedirka Basin: Macumba No 1

Middle to Upper Triassic

Maceral Analyses of the Cuttings

	Depth (feet)	Depth (metres)	Total organic	Total DOM	Total coal	Total minerals
20.	61775 7820-30	2383.5 -86.6	2	1	1	98
21.	61776 7830-40	2386.6 -89.6	1	1	tr	99
22.	61777 7840-50	2389.6 -92.7	1	1	tr	99
23.	61778 7850-60	2392.7 -95.7	3	tr	3	97
24.	61779 7860-70	2395.7 -98.8	2	1	1	98
25.	61780 7870-80	2398.8 -2401.8	1	tr	1	99
26.	61781 7880-90	2401.8 -04.9	3	1	2	97
27.	61782 7890-7900	2404.9 -07.9	5	1	4	95
28.	61783 7900-10	2407.9 -11.0	1	tr	1	99
29.	61784 7910-20	2411.0 -14.0	2	1	1	98
30.	61785 7920-30	2414.0 -17.1	3	1	2	97
31.	61790 7970-80	2429.3 -32.3	2	2	tr	98
32.	61792 7990-8000	2435.4 -38.4	2	1	1	98
33.	61793 8000-10	2438.4 -41.4	3	2	1	97

tr = trace

TABLE 2

Pedirka Basin; Macumba No 1

Middle to Upper Triassic

Maceral analyses of the organic matter

Depth (feet)	Depth (metres)	Lab. No	Part of sample	Vitrinite	Sporinite	Cutinite	Resinite+ Liptodetrinite	Macrinite	Vegemite	Inertodetrinite	Semifusinite	Fusinite	COAL/ DOM	No of counts
1. 7520-30	2292.1	61747	Coal	43	-	-	14	-	7	29	7	-	38/	14
	-95.1		DOM	9	9	-	-	-	-	52	26	4	62	23
2. 7530-40	2295.1	61748	Coal	42	-	8	8	-	-	34	8	-	55/	12
	-98.2		DOM	20	10	-	-	-	-	70	-	-	45	10
3. 7540-50	2298.2	61749	Coal	10	-	30	30	-	-	10	20	-	34/	10
	-2301.2		DOM	32	10	5	-	-	-	32	21	-	66	19
4. 7570-80	2307.3	61752	Coal	33	-	33	-	-	-	34	-	-	17/	3*
	-10.4		DOM	26	-	7	7	-	-	34	26	-	83	15
5. 7580-90	2310.4	61753	Coal	33	-	33	-	-	-	-	-	34	37/	3*
	-13.4		DOM	-	-	40	-	-	-	40	20	-	63	5*
6. 7630-40	2325.6	61758	Coal	56	-	11	-	-	-	33	-	-	36/	9*
	-28.7		DOM	6	-	31	-	-	-	44	19	-	64	16*
7. 7640-50	2328.7	61759	Coal	20	-	-	-	-	-	-	40	40	14/	5*
	-31.7		DOM	23	-	20	3	-	-	44	7	3	86	30
8. 7650-60	2331.7	61760	Coal	33	-	-	-	-	-	67	-	-	43/	3*
	-34.8		DOM	25	-	-	-	-	-	-	75	-	57	4*
9. 7660-70	2334.8	61761	Coal	40	20	20	-	-	-	-	20	-	11/	5*
	-37.8		DOM	18	3	15	-	-	-	46	15	3	89	39
10. 7670-80	2337.8	61762	Coal					No Coal					-/	-
	-40.9		DOM	10	-	16	1	-	-	57	13	3	100	69
11. 7680-90	2340.9	61763	Coal					No Coal					-/	-
	-43.9		DOM	24	4	9	2	-	-	52	9	-	100	46
12. 7690-7700	2343.9	61764	Coal					No Coal					0/	-
	-41.0		DOM	27	3	18	-	-	-	49	3	-	100	33
13. 7700-10	2347.0	61765	Coal					No Coal					0/	
	-50.0		DOM	44	-	31	-	-	-	19	6	-	100	16
14. 7720-30	2353.1	61767	Coal	-	-	14	-	-	-	29	57	-	32/	7*
	-56.1		DOM	26	7	7	-	-	7	40	13	-	68	15
15. 7740-50	2359.2	61769	Coal	66	-	-	-	17	-	-	17	-	26/	6*
	-62.2		DOM	24	-	23	6	-	-	35	12	-	74	17
16. 7780-90	2371.3	61771	Coal	50	-	-	-	-	-	50	-	-	29/	2*
	-74.4		DOM	-	-	20	-	-	-	60	20	-	71	5*
17. 7790-7800	2374.4	61772	Coal	40	-	40	-	-	-	20	-	-	29/	5*
	-77.4		DOM	34	-	25	8	-	-	25	8	-	71	12
18. 7800-10	2377.4	61773	Coal	100	-	-	-	-	-	-	-	-	36/	5*
	-80.5		DOM	33	-	-	-	-	-	22	45	-	64	9*
19. 7810-20	2380.5	61774	Coal	18	-	-	-	-	-	70	12	-	63/	17
	-83.5		DOM	10	10	40	-	-	-	40	-	-	37	10
20. 7820-30	2383.5	61775	Coal	39	-	15	8	15	-	23	-	-	68/	13
	-86.6		DOM	-	-	17	-	-	-	83	-	-	32	6*
21. 7830-40	2386.6	61776	Coal	-	-	-	-	-	-	-	100	-	12/	1*
	-89.6		DOM	13	-	29	-	-	-	29	29	-	88	7*
22. 7840-50	2389.6	61777	Coal	100	-	-	-	-	-	-	-	-	29/	2*
	-92.7		DOM	40	-	20	-	-	-	40	-	-	71	5*
23. 7850-60	2392.7	61778	Coal	19	-	-	-	-	-	52	29	-	88/	21
	-95.7		DOM	-	-	-	-	-	-	100	-	-	12	3*
24. 7860-70	2395.7	61779	Coal	54	-	8	8	-	-	23	7	-	59/	13
	-98.8		DOM	11	-	-	-	-	-	56	33	-	41	9*
25. 7870-80	2398.8	61780	Coal	-	-	-	-	-	-	33	17	50	67/	6*
	-2401.8		DOM	-	-	-	-	-	-	36	67	-	33	3*
26. 7880-90	2401.8	61781	Coal	77	-	-	-	6	6	11	-	-	72/	18
	-04.9		DOM	13	-	29	-	-	-	29	29	-	28	7*
27. 7890-7900	2404.9	61782	Coal	12	3	6	6	3	-	55	15	-	85/	33
	-07.9		DOM	-	-	-	-	-	-	67	33	-	15	6*
28. 7900-10	2407.9	61783	Coal	30	-	10	-	-	-	40	20	-	83/	10
	-11.0		DOM	-	50	50	-	-	-	-	-	-	17	2*
29. 7910-20	2411.0	61784	Coal	27	-	-	-	-	-	18	37	18	65/	11
	-14.0		DOM	-	50	-	-	-	-	17	33	-	35	6*
30. 7920-30	2414.0	61785	Coal	35	10	-	-	-	-	10	45	-	69/	20
	-17.1		DOM	10	-	-	-	-	-	45	45	-	31	9*
31. 7970-80	2429.3	61790	Coal	75	-	-	-	-	25	-	-	-	20/	4*
	-32.3		DOM	25	6	6	-	-	-	44	19	-	80	16
32. 7990-8000	2535.4	61792	Coal	34	-	22	11	-	-	22	11	-	60/	9*
	-38.4		DOM	33	-	-	-	-	-	50	17	-	40	6*
33. 8000-10	2438.4	61793	Coal	66	-	17	-	-	-	-	17	-	36/	6*
	-41.4		DOM	6	-	6	6	-	-	63	19	-	64	16

+ amorphous exinite rather than resinite

* too few counts for meaningful results

TABLE 3

Pedirka Basin: Macumba No 1
Middle to Upper Triassic

MACERAL ANALYSES OF THE EXINITE GROUP

	Lab. No. Depth(feet)	Depth (metres)	Sporinite	Cutinite	Amorphous exinite	No. of counts	
1.	61747	2292.1	–	–	100	2*	COAL
	7520-30	-95.1	100	–	–	2*	DOM
2.	61748	2295.1	–	50	50	2*	COAL
	7530-40	-98.2	100	–	–	1*	DOM
3.	61749	2298.2	–	50	50	6	COAL
	7540-50	-2301.2	67	53	–	3*	DOM
4.	61752	2307.3	–	100	–	1*	COAL
	7570-80	-10.4	–	50	50	2*	DOM
5.	61753	2310.4	–	100	–	1*	COAL
	7580-90	-13.4	–	100	–	2*	DOM
6.	61758	2325.6	–	100	–	1*	COAL
	7630-40	-28.7	–	100	–	5	DOM
7.	61759	2328.7	–	–	–	–	–
	7640-50	-31.7	–	86	14	7	DOM
9.	61761	2334.8	50	50	–	2*	COAL
	7660-70	-37.8	14	86	–	7	DOM
10.	61762	2337.8	–	–	–	–	COAL
	7670-80	-40.9	–	92	8	12	DOM
11.	61763	2340.9	–	–	–	–	COAL
	7680-90	-43.9	29	57	14	7	DOM
12.	61764	2343.9	–	–	–	–	COAL
	7690-7700	-41.0	14	86	–	7	DOM
13.	61765	2347.0	–	–	–	–	COAL
	7700-10	-50.0	–	100	–	5	DOM
14.	61767	2353.1	–	100	–	1*	COAL
	7720-30	-56.1	50	50	–	2*	DOM
15.	61769	2359.2	–	–	–	–	COAL
	7740-50	-62.2	–	80	20	5	DOM
16.	61771	2371.3	–	–	–	–	COAL
	7780-90	-74.4	–	100	–	1*	DOM
17.	61772	2374.4	–	100	–	2*	COAL
	7790-7800	-77.4	–	75	25	4*	DOM
19.	61774	2380.5	–	–	–	–	COAL
	7810-20	-83.5	20	80	–	5	DOM
20.	61775	2383.5	–	67	33	3*	COAL
	7820-30	-86.6	–	100	–	1*	DOM
21.	61776	2386.6	–	–	–	–	COAL
	7830-40	-89.6	–	100	–	2*	DOM
22.	61777	2389.6	–	–	–	–	COAL
	7840-50	-92.7	–	100	–	1*	DOM
24.	61779	2395.7	–	50	50	2*	COAL
	7860-70	-98.8	–	–	–	–	DOM
26.	61781	2401.8	–	–	–	–	COAL
	7880-90	-04.9	–	100	–	2*	DOM
27.	61782	2404.9	20	40	40	5	COAL
	7890-7900	-07.9	–	–	–	–	DOM
28.	61783	2407.9	–	100	–	1*	COAL
	7900-10	-11.0	50	50	–	2*	DOM
29.	61784	2411.0	–	–	–	–	COAL
	7910-20	-14.0	100	–	–	3*	DOM
30.	61785	2414.0	100	–	–	2*	COAL
	7920-30	-17.1	–	–	–	–	DOM
31.	61790	2429.3	–	–	–	–	COAL
	7970-80	-32.3	50	50	–	2*	DOM
32.	61792	2435.4	–	67	33	3*	COAL
	7990-8000	-38.4	–	–	–	–	DOM
33.	61793	2438.4	–	100	–	1*	COAL
	8000-10	-41.4	–	50	50	2*	DOM

* too few counts for meaningful results

TABLE 4

Pedirka Basin: Macumba No 1

Middle to Upper Triassic

MACERAL ANALYSES OF THE INERTINITE GROUP

(Results are given as percentages by volume unless otherwise stated)

	Lab. No. Depth(feet)	Depth (metres)	Macrinite	Micrinite	Inerto-detrinite	Semi-fus-inite	Fus-inite	No of counts	
1.	61747	2292.1	-	17	66	17	-	6	COAL
	7520-30	-95.1	-	-	63	32	5	19	DOM
2.	61748	2295.1	-	-	80	20	-	5	COAL
	7530-40	-98.2	-	-	100	-	-	7	DOM
3.	61749	2298.2	-	-	33	67	-	3*	COAL
	7450-50	-2301.2	-	-	60	40	-	10	DOM
4.	61752	2307.3	-	-	100	-	-	1*	COAL
	7570-80	-10.4	-	-	56	44	-	9	DOM
5.	61753	2310.4	-	-	-	-	100	1*	COAL
	7580-90	-13.4	-	-	67	33	-	3*	DOM
6.	61758	2325.6	-	-	100	-	-	3*	COAL
	7630-40	-28.7	-	-	70	30	-	10	DOM
7.	61759	2328.7	-	-	-	50	50	4*	COAL
	7640-50	-31.7	-	-	81	13	6	16	DOM
8.	61760	2331.7	-	-	100	-	-	2*	COAL
	7650-60	-34.8	-	-	-	100	-	3*	DOM
9.	61761	2334.8	-	-	-	100	-	1*	COAL
	7660-70	-37.8	-	-	72	24	4	25	DOM
10.	61762	2337.8	-	-	-	-	-	-	COAL
	7670-80	-40.9	-	-	78	18	4	50	DOM
11.	61763	2340.9	-	-	-	-	-	-	COAL
	7680-90	-43.9	-	-	86	14	-	28	DOM
12.	61764	2343.9	-	-	-	-	-	-	COAL
	7690-7700	-41.0	-	-	94	6	-	17	DOM
13.	61765	2347.0	-	-	-	-	-	-	COAL
	7700-10	-50.0	-	-	75	25	-	4*	DOM
14.	61767	2353.1	-	-	33	67	-	6	COAL
	7720-30	-56.1	-	11	67	22	-	9	DOM
15.	61769	2359.2	50	-	-	50	-	2*	COAL
	7740-50	-62.2	-	-	75	25	-	8	DOM
16.	61771	2371.3	-	-	100	-	-	1*	COAL
	7780-90	-74.4	-	-	75	25	-	4*	DOM
17.	61772	2374.4	-	-	100	-	-	1*	COAL
	7790-7800	-77.4	-	-	75	25	-	4*	DOM
18.	61773	2377.4	-	-	-	-	-	-	COAL
	7800-10	-80.5	-	-	33	67	-	6	DOM
19.	61774	2380.5	-	-	86	14	-	14	COAL
	7810-20	-83.5	-	-	100	-	-	4*	DOM
20.	61775	2383.5	40	-	60	-	-	5	COAL
	7820-30	-86.6	-	-	100	-	-	5	DOM
21.	61776	2386.6	-	-	100	-	-	1*	COAL
	7830-40	-89.6	-	-	50	50	-	4*	DOM
22.	61777	2389.6	-	-	-	-	-	-	COAL
	7840-50	-92.7	-	-	100	-	-	2*	DOM
23.	61778	2392.7	-	-	65	35	-	17	COAL
	7850-60	-95.7	-	-	100	-	-	3*	DOM

TABLE 4 (cont)

Pedirka Basin: Macumba No 1

Middle to Upper Triassic

MACERAL ANALYSES OF THE INERTINITE GROUP

(Results are given as percentages by volume unless otherwise stated)

	Lab. No. Depth(feet)	Depth (metres)	Macrinite	Micrinite	Inerto-detrinite	Semi-fus-inite	Fus-inite	No of counts	
24.	61779	2395.7	-	-	75	25	-	4*	COAL
	7860-70	-98.8	-	-	63	37	-	8	DOM
25.	61780	2398.8	-	-	33	17	50	6	COAL
	7870-80	-2401.8	-	-	33	67	-	3*	DOM
26.	61781	2401.8	25	25	50	-	-	4*	COAL
	7880-90	-04.9	-	-	50	50	-	4*	DOM
27.	61782	2404.9	4	-	75	21	-	24	COAL
	7890-7900	-07.9	-	-	67	33	-	6	DOM
28.	61783	2407.9	-	-	67	33	-	6	COAL
	7900-10	-11.0	-	-	-	-	-	-	DOM
29.	61784	2411.0	-	-	25	50	25	8	COAL
	7910-20	-14.0	-	-	33	67	-	3*	DOM
30.	61785	2414.0	-	-	18	82	-	11	COAL
	7920-30	-17.1	-	-	50	50	-	8	DOM
31.	61790	2429.3	-	100	-	-	-	1*	COAL
	7970-80	-32.3	-	-	70	30	-	10	DOM
32.	61792	2535.4	-	-	67	33	-	3*	COAL
	7990-8000	-38.4	-	-	75	25	-	4*	DOM
33.	61793	2438.4	-	-	100	-	-	1*	COAL
	8000-10	-41.4	-	-	77	23	-	13	DOM

* too few counts for meaningful results

RESTRICTED INVESTIGATION REPORT 1134R

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CSIRO

INSTITUTE OF EARTH RESOURCES

Fuel Geoscience Unit

MACUMBA - 1, PEDIRKA BASIN: ORGANIC PETROLOGY.

CRETACEOUS AND UPPER JURASSIC SEDIMENTS (EROMANGA BASIN)

MICHELLE SMYTH

P.O. BOX 136

North Ryde, NSW

AUSTRALIA 2113

MAY 1980

Introduction

This is the final report in a series on the petrology of coals and dispersed organic matter (DOM), covering the Permian to Upper Cretaceous sequence in Macumba No 1 well, South Australia (Fig. 1). Cuttings from the well were supplied to CSIRO Fuel Geoscience Unit by Delhi Petroleum Pty Ltd.

Previous reports on the Macumba sediments are 1040R (Lower to Middle Jurassic), 1080R (Lower Permian) and 1091R (Triassic). This report covers the organic petrology of carbonaceous sediments from the Upper and Lower Cretaceous and Upper Jurassic sections in Macumba - 1. These rocks belong to the Eromanga Basin, but the name "Pedirka" has been included in the title for continuity of the series.

Analyses

Maceral and microlithotype analyses have been carried out on 17 samples from the Upper Cretaceous, 3 from the Lower Cretaceous, and 15 samples from the Upper Jurassic. Reflectivity measurements on vitrinite from Macumba - 1 have been reported in Restricted Investigation Report 727R (Saxby et al., 1978). The extrapolated reflectivity for the Upper Jurassic and younger sediments is 0.70% and less.

Results

Results of the maceral analyses on coals and DOM are given in Tables 1 to 4 (Upper Cretaceous); 6 to 9 (Lower Cretaceous) and 11 to 14 (Upper Jurassic). These tables include breakdowns of the exinite and inertinite groups. Microlithotype analyses results are in Tables 5, 10 and 15.

The maceral compositions of coals and DOM are plotted in Figs 2 and 3. The majority of the coals from the Cretaceous and Upper Jurassic have high vitrinite contents, with exinite and inertinite each about 10% and less. A few of the coals have higher inertinite and lower vitrinite contents. Two Lower Cretaceous and one Upper Jurassic coal have high exinite contents.

The DOM is markedly different, petrographically, from the coals, with a low vitrinite content and a high inertinite content in the Cretaceous samples, and a high exinite and inertinite content in the Upper Jurassic (Figs 2 and 3).

The Cretaceous coals contain six different types of exinite, and these have been paired in Fig. 4, based on similarity in their potentials as hydrocarbon generators. Liptodetrinite and suberinite are the least suitable exinite source material, resinite and alginite, the most suitable. Quite a few of the samples have mixed exinites with a tendency for resinite and alginite to be dominant in many. The only sample of DOM represented has dominant sporinite (Fig. 4).

In the Upper Jurassic samples (Fig. 5), most of the coals are grouped into the resinite/liptodetrinite/alginite corner of the triangle, whilst the DOM consists predominantly of sporinite. The coal between 5710 and 5800 feet (1740.4 to 1767.8 m) has sporinite as its major exinite component.

The inertinites in the Upper Cretaceous coals have a high semifusinite component and an unusually high fusinite component (Fig. 6). The DOM and a Lower Cretaceous coal have more inertodetrinite and micrinite, and less fusinite.

The Upper Jurassic coals range from those high in semifusinite to those high in inertodetrinite (+ micrinite + macrinite), with generally low fusinite (Fig. 7). The DOM contains predominantly inertodetrinite.

Because of the extremely high vitrite plus clarite content of the coals, their microlithotype compositions have been plotted differently from those of older coals, previously reported. Vitrite, which represents almost pure vitrinite, is plotted on its own, and the inertinite-rich microlithotypes, durite plus inertite are plotted together, as usual (Fig. 8). All of the intermediate types - clarite (+ liptite), duroclarite, clarodurite, vitrinertite - are grouped together. Despite this different grouping most coals still plot near the top of the triangle, having high vitrite contents.

Discussion

The most obvious features of the organic petrology, are that most of the coals have high vitrinite and low exinite and inertinite contents, whilst the reverse is true of the DOM, which has low vitrinite and high exinite plus inertinite contents. In the Permian, Triassic and Lower to Middle Jurassic sediments from Macumba - 1, there has been a trend for higher exinite and inertinite and lower vitrinite in the DOM compared with the coals, but not nearly so markedly as in these youngest sediments.

Sporinite is the dominant exinite in the Permian and Lower to Middle Jurassic DOM, as well as in the Upper Jurassic and Cretaceous. Only the Triassic DOM is different, with dominant cutinite. Cutinite and/or sporinite is the major exinite component of the Permian and Triassic coals with resinite plus alginite the major one in the Lower to Middle and Upper Jurassic and Cretaceous coals.

Inertodetrinite is the most abundant inertinite in the DOM of all ages. The inertinite in coal changes from inertodetrinite in the Permian and Triassic coals to semifusinite/inertodetrinite in the Lower to Middle Jurassic and Upper Jurassic to semifusinite in the Cretaceous.

The average amount of DOM present in the samples examined is (by volume) 1.7% in the Permian, 1.9% in the Triassic, 2.1% in the Upper Jurassic, 0.3% in the Lower Cretaceous and 0.9% in the Upper Cretaceous (Table 16). Unfortunately most of the Lower to Middle Jurassic samples were hand-picked, so their true DOM content cannot be calculated from the results available. From the few whole samples of the Lower to Middle Jurassic, there is an average DOM content of 1.3%.

The Permian DOM is, overall, inertinite-rich (Fig. 9, Table 16), as is the Triassic. The Lower to Middle Jurassic DOM is a mixture of the 3 macerals, inertinite still being the largest component, and the Upper Jurassic DOM varies from inertinite-rich to exinite-rich, with lower vitrinite than most of the other DOM. The Upper Cretaceous DOM is inertinite-rich.

Given the compositions of the DOM, and the average quantities for each age, the volume of vitrinite is fairly constant throughout (Table 16), but the volume of exinite is very much greater in the Upper Jurassic sediments.

If the Upper Jurassic rocks were sufficiently mature, they should have the best potential for generating liquid hydrocarbons. In Macumba - 1, these Upper Jurassic rocks may not be sufficiently mature. In this case, the Triassic sediments may have the greater potential, with a relatively high volume of exinite and greater maturity.

Conclusions

DOM: The Cretaceous samples contain relatively little DOM, and this is inertinite-rich. The Upper Jurassic DOM has a high proportion of exinite, and should be a good source for liquid hydrocarbons if sufficiently mature.

Coal: Most of the Cretaceous and Upper Jurassic coals are vitrinite-rich.

On the basis of the quantity and type of DOM present in the Permian to Upper Cretaceous sediments, those in the Upper Jurassic appear to be most suitable as potential source rocks for liquid hydrocarbons. However in Macumba - 1, they may not be sufficiently mature, in which case the more mature Triassic section would be the most suitable.

MACUMBA No 1 WELL

PEDIRKA BASIN

Upper Cretaceous

MACERAL ANALYSES OF THE CUTTINGS

(Results are given as percentages by volume unless otherwise stated)

Lab. No. Depth (feet)	Depth (metres)	Total Organic	Total DOM	Total Coal	Total minerals
61467 540-570	164.6 -73.7	51	-	51	49
61468 570-600	173.7 -82.9	83	-	83	17
61469 600-30	182.9 -92.0	76	-	76	24
61470 630-60	192.0 -201.2	91	-	91	9
61471 660-90	201.2 -10.3	97	-	97	3
61472 690-720	210.3 -19.5	95	-	95	5
61473 720-50	219.5 -28.6	94	-	94	6
61478 870-90	265.2 -71.3	94	-	94	6
61479 890-920	271.3 -80.4	81	tr	81	19
61480 920-50	280.4 -89.6	96	-	96	4
61483 1020-50	310.9 -20.0	55	1	54	45
61484 1050-80	320.0 -29.2	81	-	81	19
61485 1080-1110	329.2 -38.3	69	tr	69	31
61517 2030-60	618.8 -27.9	94	-	94	6
61519 2090-2120	637.0 -46.2	57	6	51	43
6150 2120-50	646.2 -55.3	58	7	51	42
61523 2210-40	673.6 -82.8	84	1	83	16

Average DOM = 0.9   tr = trace

TABLE 2

MACUMBA NO 1 WELL

PEDIRKA BASIN

Upper Cretaceous

Maceral analyses of the organic matter

Depth (feet)	Depth (metres)	Lab. No.	Vitrinite	Resinous Vitrinite	Sporinite	Cutinite	Suberinite/ Resinite/ Liptodetrinite	Macrinite	Micrinite	Inertodetrinite	Semifusinite	Fusinite	No of counts	
540-70	164.6-73.7	61467	85	9	-	-	4	-	-	-	1	1	173	COAL
570-600	173.7-82.9	61468	88	6	-	-	2	-	-	1	3	-	337	COAL
600-30	182.9-92.0	61469	87	10	-	tr	-	-	tr	-	3	-	480	COAL
630-60	192.0-201.2	61470	74	17	-	1	1	-	tr	2	4	1	309	COAL
660-90	201.2-10.3	61471	86	7	-	1	2	-	tr	3	1	tr	341	COAL
690-720	210.3-19.5	61472	76	12	-	-	2	1	2	1	5	1	311	COAL
720-50	219.5-28.6	61473	82	12	-	-	3	-	1	tr	1	1	351	COAL
870-90	265.2-71.3	61478	81	9	-	-	7	tr	tr	1	2	tr	307	COAL
890-920	271.3-80.4	61479	75	17	-	-	7	-	-	1	-	-	125	COAL
			-	-	-	-	-	-	-	100	-	-	1*	DOM
920-50	280.4-89.6	61480	92	3	tr	-	2	-	-	tr	2	1	357	COAL
1020-50	310.9-20.0	61483	77	9	-	2	3	-	-	1	4	4	201	COAL
			33	-	-	67	-	-	-	-	-	-	3*	DOM
1050-80	320.0-29.2	61484	82	8	tr	-	2	-	tr	tr	5	3	264	COAL
1080-1110	329.2-38.3	61485	89	1	-	1	2	-	-	1	5	1	223	COAL
			50	-	-	-	-	-	-	-	50	-	2*	DOM
2030-60	618.8-27.9	61517	80	7	-	1	1	1	tr	-	9	1	354	COAL
2090-2120	637.0-46.2	61519	61	5	3	tr	2	-	1	12	15	1	393	COAL
			32	-	11	-	-	-	-	23	27	7	44	DOM
2120-50	646.2-55.3	61520	72	3	3	-	3	-	1	7	10	1	188	COAL
			11	-	4	4	-	-	-	42	31	8	26	DOM
2210-40	673.6-82.8	61523	81	4	2	1	4	-	1	3	2	2	226	COAL
			50	-	-	-	-	-	-	50	-	-	4*	DOM

* too few counts for meaningful results

tr = trace

TABLE 3

MACUMBA No 1 WELL

PEDIRKA BASIN

Upper Cretaceous

MACERAL ANALYSES OF THE EXINITE GROUP

(Results are given as percentages by volume unless otherwise stated)

Lab. No. Depth (feet)	Depth (metres)	Sporin- ite	Cutin- ite	Resin- ite	Suber- inite	No of counts	
61467	164.6	-	-	100	-	7	COAL
540-70	-73.7						
61468	173.7	-	-	100	-	7	COAL
570-600	-82.9						
61469	182.9	-	100	-	-	1*	COAL
600-30	-92.0						
61470	192.0	-	60	40	-	5	COAL
630-60	-201.2						
61471	201.2	-	29	71	-	7	COAL
660-90	-10.3						
61472	210.3	-	-	100	-	8	COAL
690-720	-19.5						
61473	219.5	-	-	42	58	12	COAL
720-50	-28.6						
61478	265.2	-	-	56	44	18	COAL
870-90	-71.3						
61479	271.3	-	-	45	55	9	COAL
890-920	-80.4						
61480	280.4	12	-	88	-	8	COAL
920-950	-89.6						
61483	310.9	-	33	67	-	9	COAL
1020-50	-20.0	-	100	-	-	2*	DOM
61484	320.0	17	-	50	33	6	COAL
1050-80	-29.2						
61485	329.2	-	17	83	-	6	COAL
1080-1110	-38.3						
61517	618.8	-	29	71	-	7	COAL
2030-60	-27.9						
61519	637.0	50	5	20	25	20	COAL
2090-2120	-46.2	100	-	-	-	5	DOM
61520	646.2	50	-	8	42	12	COAL
2120-50	-55.3	-	50	50	-	2*	DOM
61523	673.6	29	12	17	12	17	COAL +
2210-40	-82.8						6% Alginite
							24% Lipto- detrinite

* too few counts for meaningful results

TABLE 4

MACUMBA No 1 WELL

PEDIRKA BASIN

Upper Cretaceous

MACERAL ANALYSES OF THE INERTINITE GROUP

(Results are given as percentages by volume unless otherwise state)

Lab. No. Depth(feet)	Depth (metres)	Micrin- ite	Macrin- ite	Inerto- detrinite	Semi- fusin- ite	Fusin- ite	No of counts	
61467	164.6	-	-	-	50	50	4*	COAL
540-70	-73.7							
61468	173.7	-	-	8	92	-	12	COAL
570-600	-82.9							
61469	182.9	-	-	7	93	-	14	COAL
600-30	-92.0							
61470	192.0	9	-	26	52	13	23	COAL
630-60	-201.2							
61471	201.2	7	-	66	20	7	15	COAL
660-90	-10.3							
61472	210.3	17	7	14	52	10	29	COAL
690-720	-19.5							
61473	219.5	18	-	9	27	46	11	COAL
720-50	-28.6							
61478	265.2	8	8	26	50	8	12	COAL
870-90	-71.3							
61479	271.3	-	-	100	-	-	1*	COAL
890-920	-80.4	-	-	100	-	-	1*	DOM
61480	280.4	-	-	9	64	27	11	COAL
920-50	-89.6							
61483	310.9	-	-	10	45	45	20	COAL
1020-50	-20.0							
61484	320.0	5	-	5	59	31	22	COAL
1050-80	-29.2							
61485	329.2	-	-	19	62	19	16	COAL
1080-1110	-38.3	-	-	-	100	-	1*	DOM
61517	618.8	2	8	-	77	13	39	COAL
2030-60	-27.9							
61519	637.0	3	-	42	51	4	116	COAL
2090-2120	-46.2	-	-	40	48	12	25	DOM
61520	646.2	5	-	35	52	8	37	COAL
2120-50	-55.3	-	-	52	38	10	21	DOM
61523	673.6	11	-	37	26	26	19	COAL
2210-40	-82.8	-	-	100	-	-	2*	DOM

* too few counts for meaningful results

TABLE 5

MACUMBA NO 1 WELL

PEDIRKA BASIN

Upper Cretaceous

MICROLITHOTYPE ANALYSES OF THE CUTTINGS

(Results are given as percentages by volume unless otherwise stated)

	Lab. No. Depth(feet)	Depth (metres)	Vitr-ite	Liptite+ Clarite	Inter-med-ates	Microite+ Durite+ Macroite	Semifus-ite+ fusite	No of counts	% of sample
	61467 540-70	164.6 -73.7	90	5	1	1	3	210	51
	61468 570-600	173.7 -82.9	94	3	-	-	3	337	83
	61469 600-30	182.9 -92.0	94	3	2	-	1	261	76
	61470 630-60	192.0 -201.2	84	4	6	-	6	340	91
1.	61471 660-90	201.2 10.3	89	4	6	-	1	381	97
	61472 690-720	210.3 -19.5	84	4	7	-	5	357	95
	61473 720-50	219.5 -28.6	87	10	1	-	2	341	96
	Seam average		88	5	4	tr	3	Seam 1UC	
	61478 870-90	265.2 -71.3	85	8	2	-	5	295	93
2.	61479 890-920	271.3 -80.4	80	15	4	-	1	154	86
	61480 920-50	280.4 -89.6	96	tr	1	-	3	400	96
	Seam Average		87	8	2	-	3	Seam 2UC	

TABLE 5 (continued)

MACUMBA NO 1 WELL

PEDIRKA BASIN

Upper Cretaceous

MICROLITHOTYPE ANALYSES OF THE CUTTINGS

(Results are given as percentages by volume unless otherwise stated)

	Lab. No. Depth(feet)	Depth (metres)	Vitrite	Liptite+ Clarite	Intermediates	Microite+ Durite+ Macroite	Semifusite+ fusite	No of counts	% of sample
	61483 1020-50	310.9 -20.0	78	8	2	-	12	256	59
3.	61484 1050-80	320.0 -29.2	87	3	3	tr	7	302	89
	61485 1080-1110	329.2 -38.3	85	6	4	-	5	259	73
	Seam average		84	5	3	tr	8	Seam 3UC	
4.	61517 2030-60	618.8 -27.9	84	4	-	1	11	368 Seam 4UC	95
	61519 2090-2120	637.0 -46.2	57	7	15	6	15	344	55
5.	61520 2120-50	646.2 -55.3	70	4	11	2	13	290	52
	Seam Average		63	6	13	4	14	Seam 5UC	
6.	61523 2210-40	673.6 -82.8	76	10	7	2	5	380 Seam 6UC	90

TABLE 6

MACUMBA NO 1 WELL

PEDIRKA BASIN

Lower Cretaceous

MACERAL ANALYSES OF THE CUTTINGS

Lab. No. Depth(feet)	Depth (metres)	Total Organic	Total DOM	Total Coal	Total minerals
61527 2330-60	710.2 -19.3	86	1	85	14
61535 2570-2600	783.3 -92.5	96	-	96	4
61574 3800-30	1158.2 -67.4	90	-	90	10
Average DOM	0.3				

TABLE 7

MACUMBA NO 1 WELL

PEDIRKA BASIN

Lower Cretaceous

Maceral analyses of the organic matter

Depth (feet)	Depth (metres)	Lab. No	Vitr-inite	Resinous Vitrinite	Spor-inite	Cut-inite	Suberinite/ Resinite/ Liptodet-rinite	Macr-inite	Micr-inite	Inerto-detr-inite	Semi-fus-inite	Fusin-ite	No of counts	
2330-60	710.2 -19.3	61527	91 -	5 34	1 -	- -	3 -	- -	- -	tr 33	tr 33	- -	288 3*	COAL DOM
2570-2600	783.3 -92.5	61535	64	15	1	1	19	-	-	-	-	-	303	COAL
3800-30	1158.2 -67.4	61574	52	5	8	4	22	1	-	5	3	-	142	COAL

* too few meaningful results

TABLE 8

MACUMBA NO 1 WELL

PEDIRKA BASIN

Lower Cretaceous

MACERAL ANALYSES OF THE EXINITE GROUP

(Results are given as percentages by volume unless otherwise stated)

Lab. No. Depth(feet)	Depth (metres)	Sporinite	Cutinite	Resinite	Suberinite	Alginite	Liptodetrinite	No of counts
61527 2330-60	710.2 -19.3	17	-	58	17	8	-	12 COAL
61535 2570-2600	783.3 -92.5	5	3	30	46	-	16	63 COAL
61574 3800-30	1158.2 -67.4	25	10	37	6	-	22	49 COAL

TABLE 9

MACUMBA NO 1 WELL

Lower Cretaceous

MACERAL ANALYSES OF THE INERTINITE GROUP

(Results are given as percentages by volume unless otherwise stated)

Lab. No. Depth (feet)	Depth (metres)	Micrinite	Macrinite	Inertodetrinite	Semifusinite	Fusinite	No of counts	
61527 2330-60	710.2 -19.3	- -	- -	50 50	50 50	- -	2* 2*	COAL DOM
61574 3800-30	1158.2 -67.4	-	8	58	34	-	12	COAL

TABLE 10

MACUMBA NO 1 WELL

PEDIRKA BASIN

Lower Cretaceous

MICROLITHOTYPE ANALYSES OF THE CUTTINGS

(Results are given as percentages by volume unless otherwise stated)

Lab. No. Depth (feet)	Depth (metres)	Vitrite	Liptite+ Clarite	Intermediates	Microite+ Durite+ Macroite	Semifusite+ fusite	No of counts	% of sample
61527 2330-60	710.2 -19.3	90	10	-	-	tr	295	89
61535 2570-2600	783.3 -92.5	65	35	-	-	-	313	97
61574 3800-30	1158.2 -67.4	43	31	21	5	-	159	92

tr = trace

TABLE 11

MACUMBA NO 1 WELL

PEDIRKA BASIN

Upper Jurassic

MACERAL ANALYSES OF THE CUTTINGS

(Results are given as percentages by volume unless otherwise stated)

Lab. No. Depth (feet)	Depth (metres)	Total Organic	Total DOM	Total Coal	Total Minerals
61609 4840-70	1475.2 -84.4	63	1	62	37
61633 5560-90	1694.7 -1703.8	62	tr	62	38
61634 5590-5620	1703.8 -13.0	56	2	54	44
61638 5710-40	1740.4 -49.6	97	-	97	3
61639 5740-70	1749.6 -58.7	98	-	98	2
61640 5770-5800	1758.7 -67.8	49	2	47	51
61658 6310-40	1923.3 -32.4	41	13	28	59
61661 6400-30	1950.7 -59.9	51	3	48	49
61662 6430-60	1959.9 -69.0	94	tr	94	6
61674 6790-6800	2069.6 -72.6	78	1	77	22
61689 6940-50	2115.3 -18.4	65	2	63	35
61693 6980-90	2127.5 -30.6	49	3	46	51
61694 6990-7000	2130.6 -33.6	91	1	90	9
61697 7020-30	2139.7 -42.7	67	3	64	33
61712 7170-80	2185.4 -88.5	87	1	86	13

Average DOM 2.1

tr = trace

TABLE 12

MACUMBA No 1 WELL

PEDIRKA BASIN

Upper Jurassic

Maceral analyses of the organic matter

Depth (feet)	Depth (metres)	Lab. No.	Vitrinite	Resinous Vitrinite	Sporinite	Cutinite	Resinite/ Liptodetrinite	Macrinite	Micrinite	Inertodetrinite	Semi-fusinite	Fusinite	No of counts	
4840-70	1475.2	61609	73	11	-	8	4	-	tr	1	3	-	367	COAL
	-84.4		-	-	-	-	-	-	-	75	25	-	4*	DOM
5560-90	1694.7	61633	46	13	tr	3	5	3	tr	1	26	3	449	COAL
	-1703.8		67	-	-	-	33	-	-	-	-	-	3*	DOM
5590-5620	1703.8	61634	52	10	3	1	4	3	-	2	24	1	373	COAL
	-13.0		15	-	8	-	-	-	-	77	-	-	13	DOM
5710-40	1740.4	61638	69	12	7	1	2	-	1	5	3	-	272	COAL
	-49.6					NO DOM								
5740-70	1749.6	61639	76	7	6	1	tr	tr	2	6	2	tr	584	COAL
						NO DOM								
5770-5800	1758.7	61640	65	12	7	1	1	tr	2	9	3	tr	324	COAL
	-67.8		13	-	47	20	7	-	-	13	-	-	15	DOM
6310-40	1923.3	61658	72	22	-	2	3	-	-	-	1	-	124	COAL
	-32.4		31	20	22	7	5+2+	-	2	9	2	-	55	DOM
6400-30	1950.7	61661	62	22	2	2	3	-	-	2	7	-	184	COAL
	-59.9		17	-	50	-	8+8+	-	-	-	17	-	12	DOM
6430-60	1959.9	61662	97	-	tr	-	3	-	-	tr	-	-	683	COAL
	-69.0		50	-	-	50	50	-	-	-	-	-	4*	DOM
6790-6800	2069.6	61674	78	2	4	3	5	-	2	4	1	1	398	COAL
	-72.6		38	-	25	-	12	-	-	25	-	-	8*	DOM
6940-50	2115.3	61689	91	-	1	-	3	3	-	-	-	2	138	COAL
	-18.4		75	-	-	-	-	-	-	25	-	-	4*	DOM
6980-90	2127.5	61693	81	8	1	1	1	1	-	2	5	-	272	COAL
	-30.6		16	-	32	16	-	-	-	32	4	-	19	DOM
6990-7000	2130.6	61694	98	-	-	tr	1+	-	-	1	-	-	305	COAL
	-33.6		-	-	50	-	-	-	-	50	-	-	2*	DOM
7020-30	2139.7	61697	55	7	8	3	8	tr	2	11	5	1	502	COAL
	-42.7		4	-	29	4	-	-	-	38	25	-	24	DOM
7170-80	2185.4	61712	65	1	2	1	3	tr	1	12	15	tr	678	COAL
	-88.5		23	-	11	-	-	-	-	33	33	-	9*	DOM

+ includes algae

* too few counts for meaningful results

TABLE 13

MACUMBA NO 1 WELL

PEDIRKA BASIN

Upper Jurassic

MACERAL ANALYSES OF THE EXINITE GROUP

(Results are given as percentages by volume unless otherwise stated)

Lab. No. Depth (feet)	Depth (metres)	Spor-inite	Cutin-ite	Resin-ite	Lipto-detrinite	Algin-ite	No of counts	
61609	1475.2	-	65	35	-	-	43	COAL
4840-70	-84.4	-	-	-	-	-	-	DOM
61633	1694.7	5	34	61	-	-	38	COAL
5560-90	-1703.8	-	-	100	-	-	1*	DOM
61634	1703.8	33	11	56	-	-	27	COAL
5590-5620	-13.0	100	-	-	-	-	1*	DOM
61638	1740.4	67	15	18	-	-	27	COAL
5710-40	-49.6			NO DOM				
61639	1749.6	79	14	7	-	-	42	COAL
5740-70	-58.7			NO DOM				
61640	1758.7	78	15	7	-	-	27	COAL
5770-5800	-67.8	64	27	9	-	-	11	DOM
61658	1923.3	-	57	43	-	-	7	COAL
6310-40	-32.4	60	20	15	-	5	20	DOM
61661	1950.7	31	23	46	-	-	13	COAL
6400-30	-59.9	76	-	12	-	12	8	DOM
61662	1959.9	10	-	14	76	-	21	COAL
6430-60	-69.0	-	50	50	-	-	2*	DOM
61674	2069.6	30	28	4	36	2	47	COAL
6790-6800	-72.6	67	-	33	-	-	3*	DOM
61689	2115.3	20	-	-	80	-	5	COAL
6940-50	-18.4	-	-	-	-	-	-	DOM
61693	2127.5	22	33	45	-	-	9	COAL
6980-90	-30.6	67	33	-	-	-	9	DOM
61694	2130.6	-	25	50	-	25	4*	COAL
6990-7000	-33.6	100	-	-	-	-	1*	DOM
61697	2139.7	44	14	24	18	-	94	COAL
7020-30	-42.7	88	12	-	-	-	8	DOM
61712	2185.4	41	18	8	33	-	39	COAL
7170-80	-88.5	100	-	-	-	-	1*	DOM

TABLE 14

MACUMBA NO 1 WELL

PEDIRKA BASIN

Upper Jurassic

MACERAL ANALYSES OF THE INERTINITE GROUP

(Results are given as percentages by volume unless otherwise stated)

Lab. No. Depth (feet)	Depth (metres)	Micrinite	Macrinite	Iertodetrinite	Semifusinite	Fusinite	No of counts	
61609	1475.2	6	-	19	75	-	16	COAL
4840-70	-84.4	-	-	75	25	-	4*	DOM
61633	1694.7	1	8	3	79	9	150	COAL
5560-90	-1703.8	-	-	-	-	-	-	DOM
61634	1703.8	-	11	6	80	3	113	COAL
5590-5620	-13.0	-	-	100	-	-	10	DOM
61638	1740.4	15	-	54	31	-	26	COAL
5710-40	-49.6			NO DOM				
61639	1749.6	17	3	60	17	3	59	COAL
5740-70	-58.7			NO DOM				
61640	1758.7	13	2	62	21	2	47	COAL
5770-5800	-67.8	-	-	100	-	-	2*	DOM
61658	1923.3	-	-	-	100	-	1*	COAL
6310-40	-32.4	14	-	72	14	-	7	DOM
61661	1950.7	-	-	19	81	-	16	COAL
6400-30	-59.9	-	-	-	100	-	2*	DOM
61662	1959.9	-	-	100	-	-	1*	COAL
6430-60	-69.0	-	-	-	-	-	-	DOM
61674	2069.6	29	-	45	13	13	31	COAL
6790-6800	-72.6	-	-	100	-	-	2*	DOM
61689	2115.3	-	63	-	-	37	8	COAL
6940-50	-18.4	-	-	100	-	-	1*	DOM
61693	2127.5	-	18	27	55	-	22	COAL
6980-90	-30.6	-	-	86	14	-	7	DOM
61694	2130.6	-	-	100	-	-	4*	COAL
6990-7000	-33.6	-	-	100	-	-	1*	DOM
61697	2139.7	10	2	57	28	3	93	COAL
7020-30	-42.7	-	-	60	40	-	15	DOM
61712	2185.4	1	2	43	53	1	192	COAL
7170-80	-88.5	-	-	50	50	-	6	DOM

* too few counts to be meaningful

TABLE 15

MACUMBA NO 1 WELL

PEDIRKA BASIN

Upper Jurassic

MICROLITHOTYPE ANALYSES OF THE CUTTINGS

(Results are given as percentages by volume unless otherwise stated)

	Lab. No. Depth (feet)	Depth (metres)	Vitr- ite	Liptite+ Clarite	Inter- mediates	Microite+ Durite+ Macroite	Semifus- ite+ Fusite	No of counts	% of sample	
1.	61609 4840-70	1475.2 -84.4	80	17	tr	-	3	259	63	SEAM 1UJ
	61633 5560-90	1694.7 -1703.8	46	17	2	7	28	367	66	
	61634 5590-5620	1703.8 -13.0	45	17	3	7	28	329	58	
2.	Seam Average		46	17	2	7	28			SEAM 2UJ
	61638 5710-40	1740.4 -49.6	51	27	20	-	2	300	100	
	61639 5740-50	1749.6 -58.7	69	10	19	1	1	504	98	
	61640 5770-5800	1758.7 -67.8	68	8	19	2	3	322	49	
3.	Seam Average		62	16	19	1	2			SEAM 3UJ
4.	61658 6310-40	1923.3 -32.4	90	8	2	-	-	205	26	SEAM 4UJ
	61661 6400-30	1950.7 -59.9	87	9	2	-	2	193	45	
	61662 6430-60	1959.9 -69.9	94	6	-	-	-	341	94	
5.	Seam Average		91	7	1	-	1			SEAM 5UJ
6.	61674 6790-6800	2069.6 -72.6	63	20	12	1	4	415	81	SEAM 6UJ
7.	61689 6940-50	2115.3 -18.4	80	11	-	9	-	70	62	SEAM 7UJ
	61693 6980-90	2127.5 -30.6	80	11	2	3	4	264	45	
	61694 6990-7000	2130.6 -33.6	96	-	3	-	1	142	90	
8.	Seam Average		90	4	3	1	2			SEAM 8UJ
9.	61697 7020-30	2139.7 -42.7	40	36	14	7	4	548	63	SEAM 9UJ
10.	61712 7170-80	2185.4 -88.5	66	2	6	15	11	523	86	SEAM 10UJ

TABLE 16

MACUMBA - 1 WELL

PEDIRKA BASIN

AVERAGE MACERAL ANALYSES OF THE DOM

(Results are given as percentages by volume unless otherwise stated)

AGE	Average percent of DOM in sediments	Vitrinite	Exinite	Inertinite	No of samples
Upper Cretaceous	0.9	22	9	69	2
Lower Cretaceous	0.3	-	-	-	-
Upper Jurassic	2.1	19	44	37	6
Lower to Middle Jurassic	1.3	31	18	51	24
Triassic	1.9	21	21	58	17
Permian	1.7	23	13	64	13
		Weighted percentages			
Upper Cretaceous	0.9	20	8	62	
Upper Jurassic	2.1	40	92	78	
Lower to Middle Jurassic	1.3	40	23	66	
Triassic	1.9	40	40	110	
Permian	1.7	39	22	109	

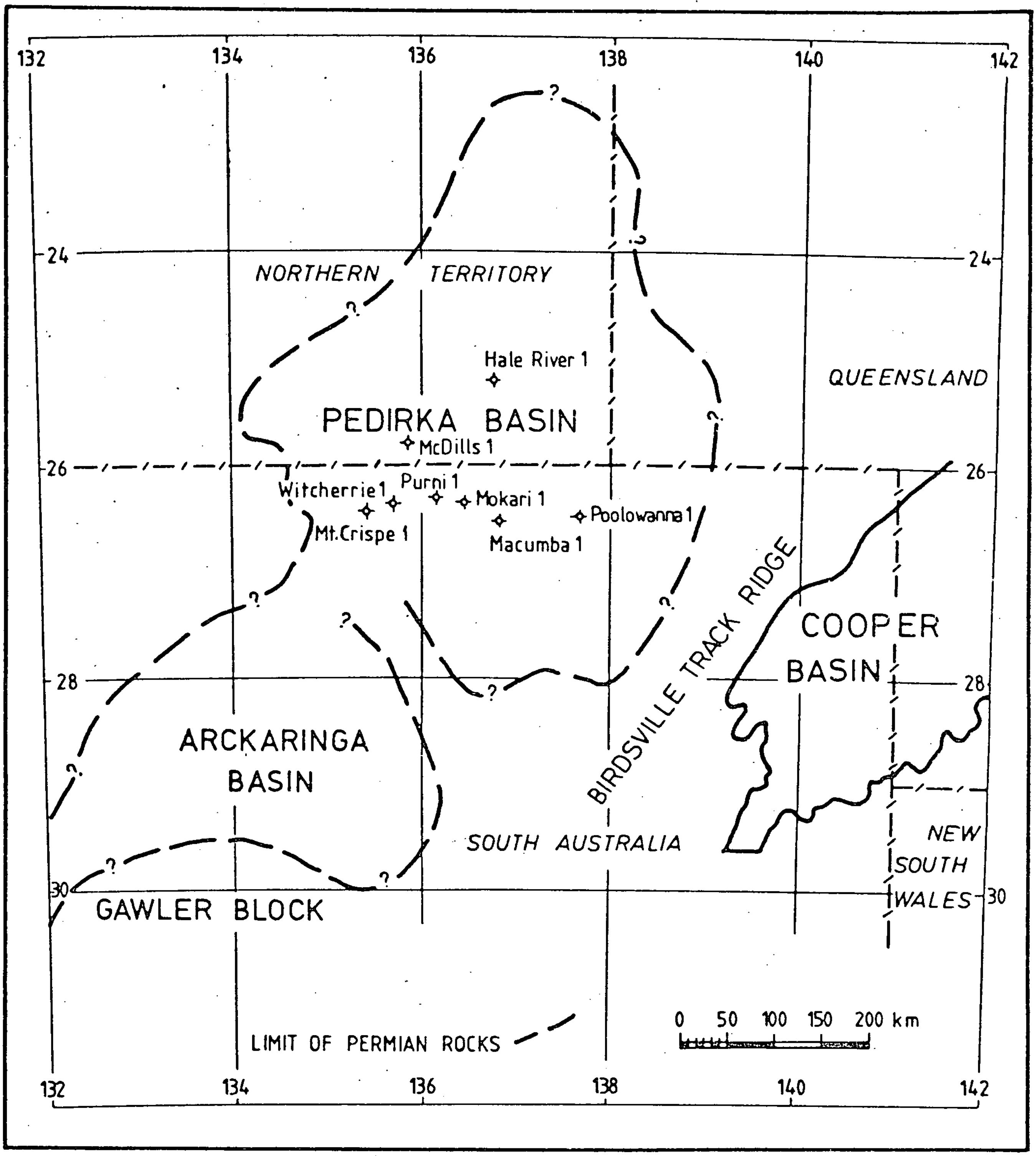

FIG. 1 LOCATION OF WELLS IN THE PEDIRKA BASIN

MACUMBA - 1

UPPER and LOWER CRETACEOUS

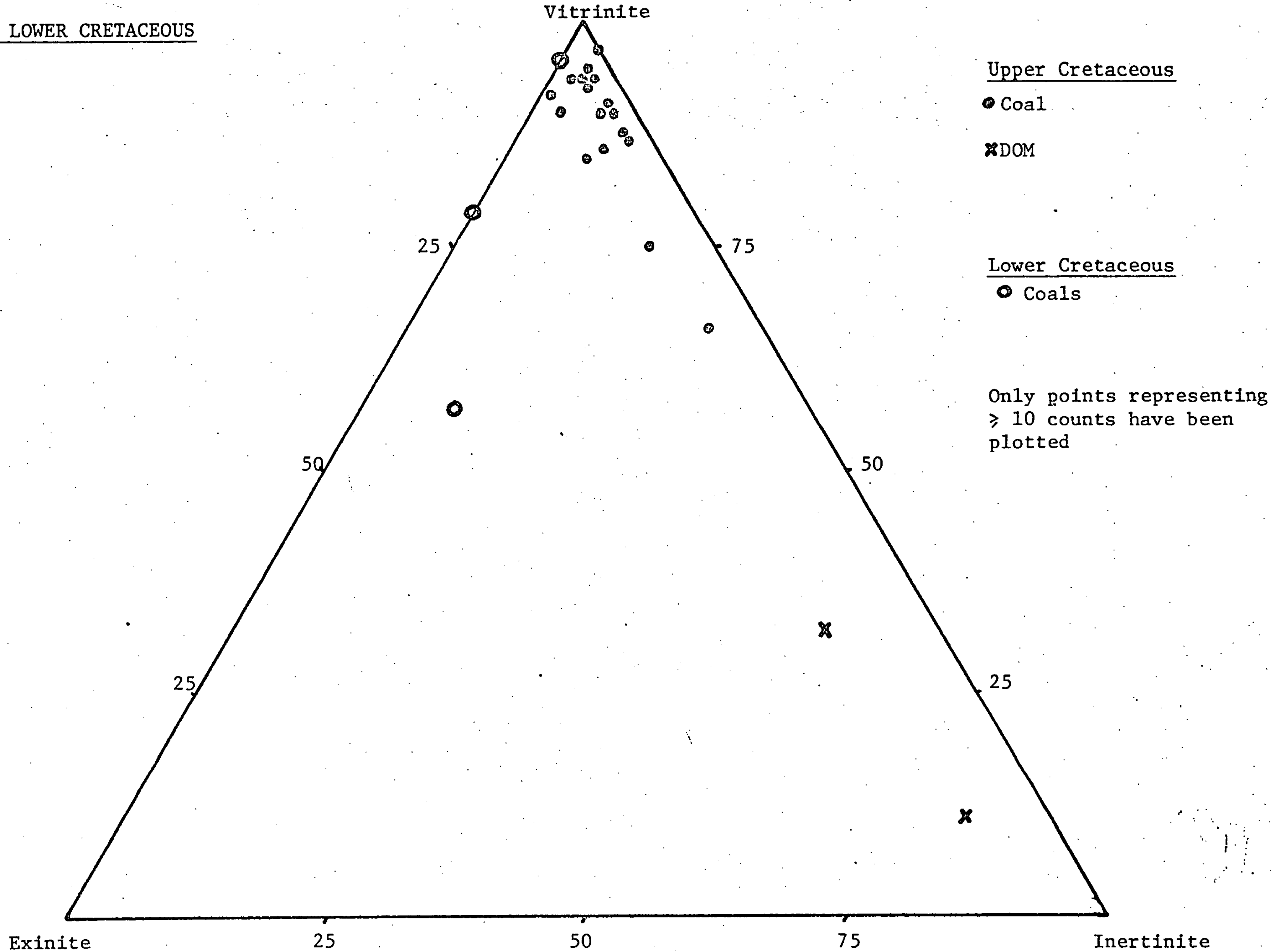

FIG. 2 Maceral compositions of the coals and DOM

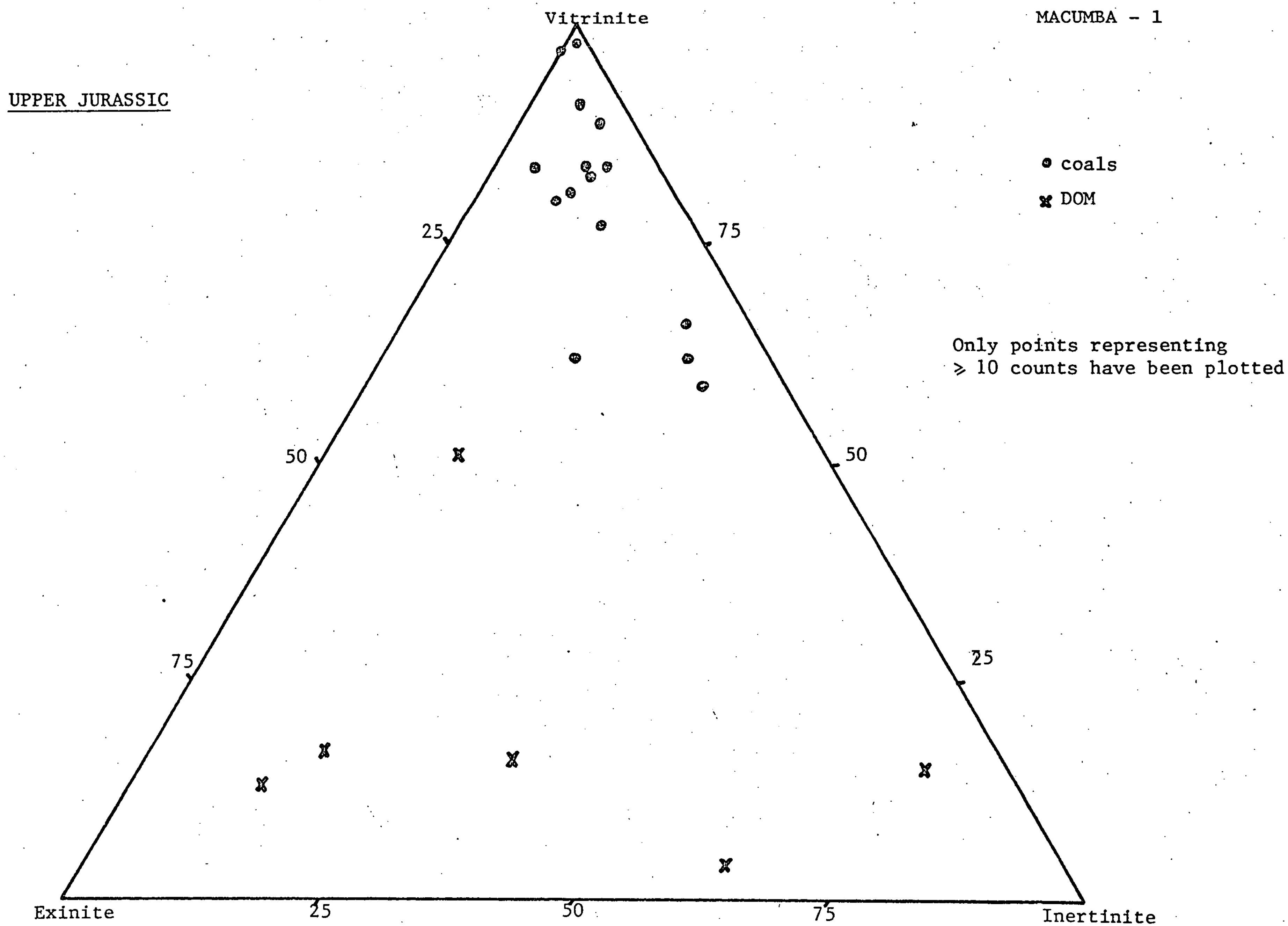

FIG. 3 Maceral compositions of the coals and DOM

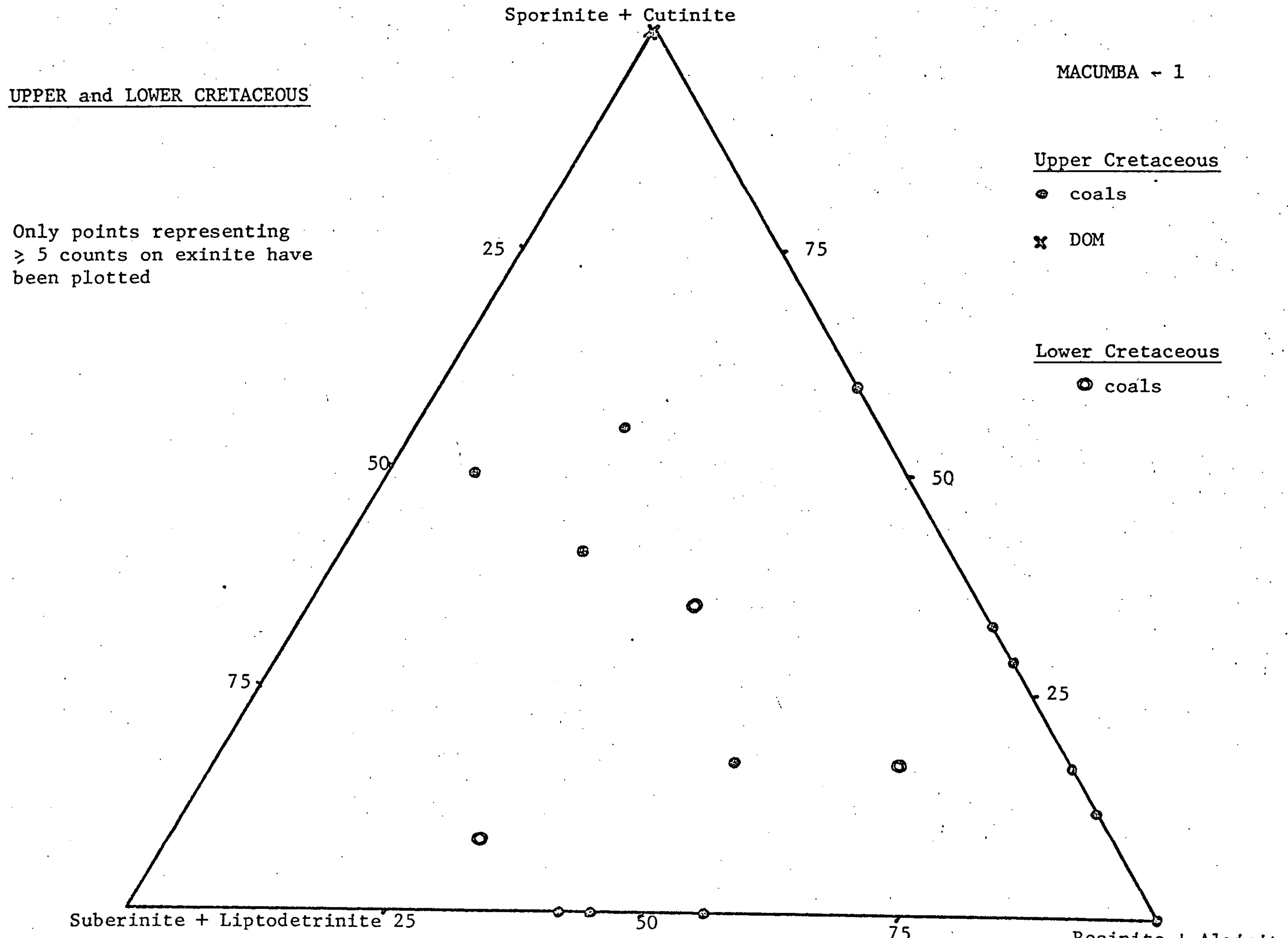

FIG. 4 Components of the EXINITE group

MACUMBA - 1

UPPER JURASSIC

Only points representing $\geq$ 5 counts on exinite have been plotted

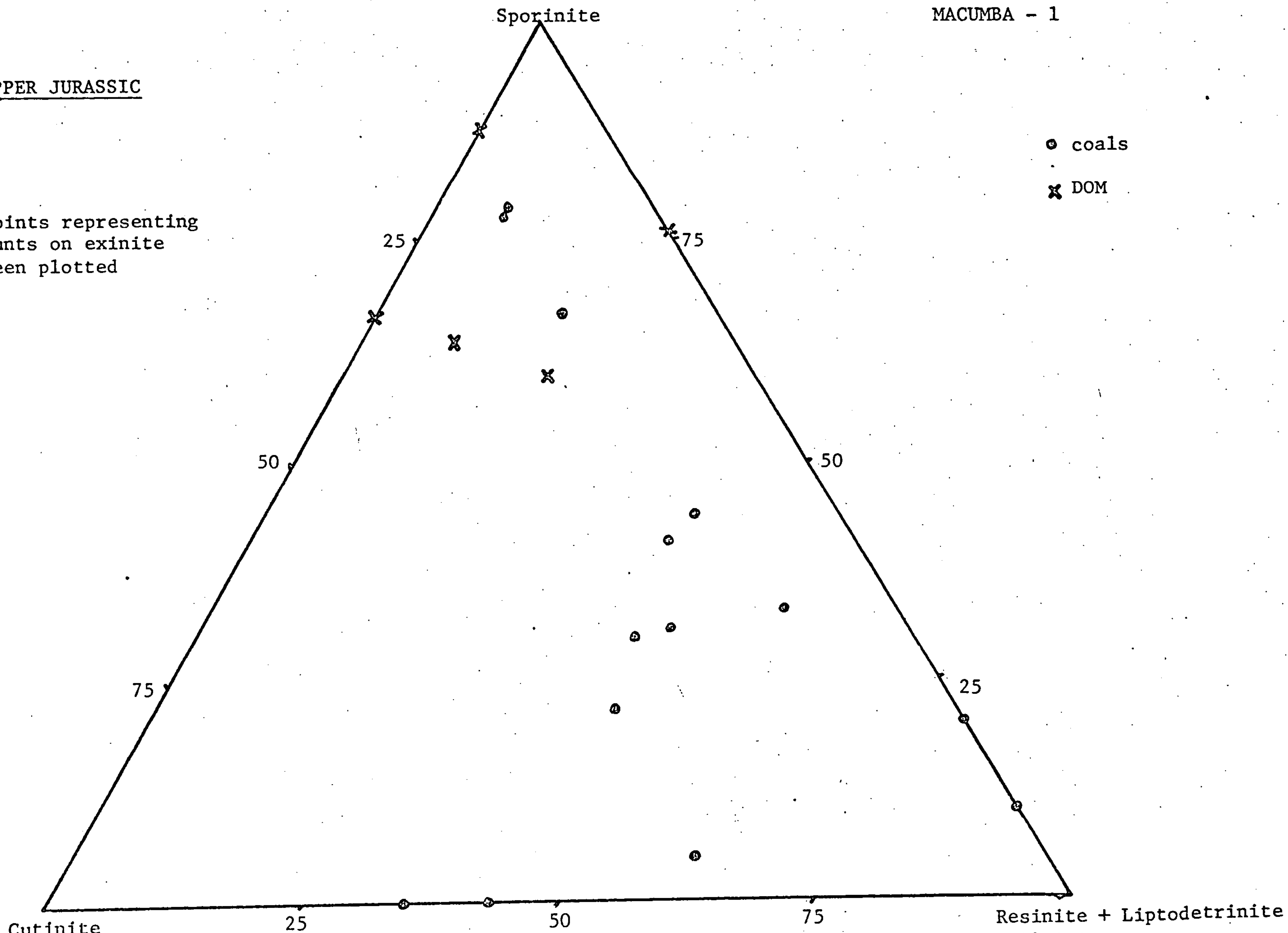

FIG. 5 Components of the EXINITE GROUP

MACUMBA - 1

UPPER and LOWER CRETACEOUS

Only points representing ≥ 5 counts on inertinite have been plotted

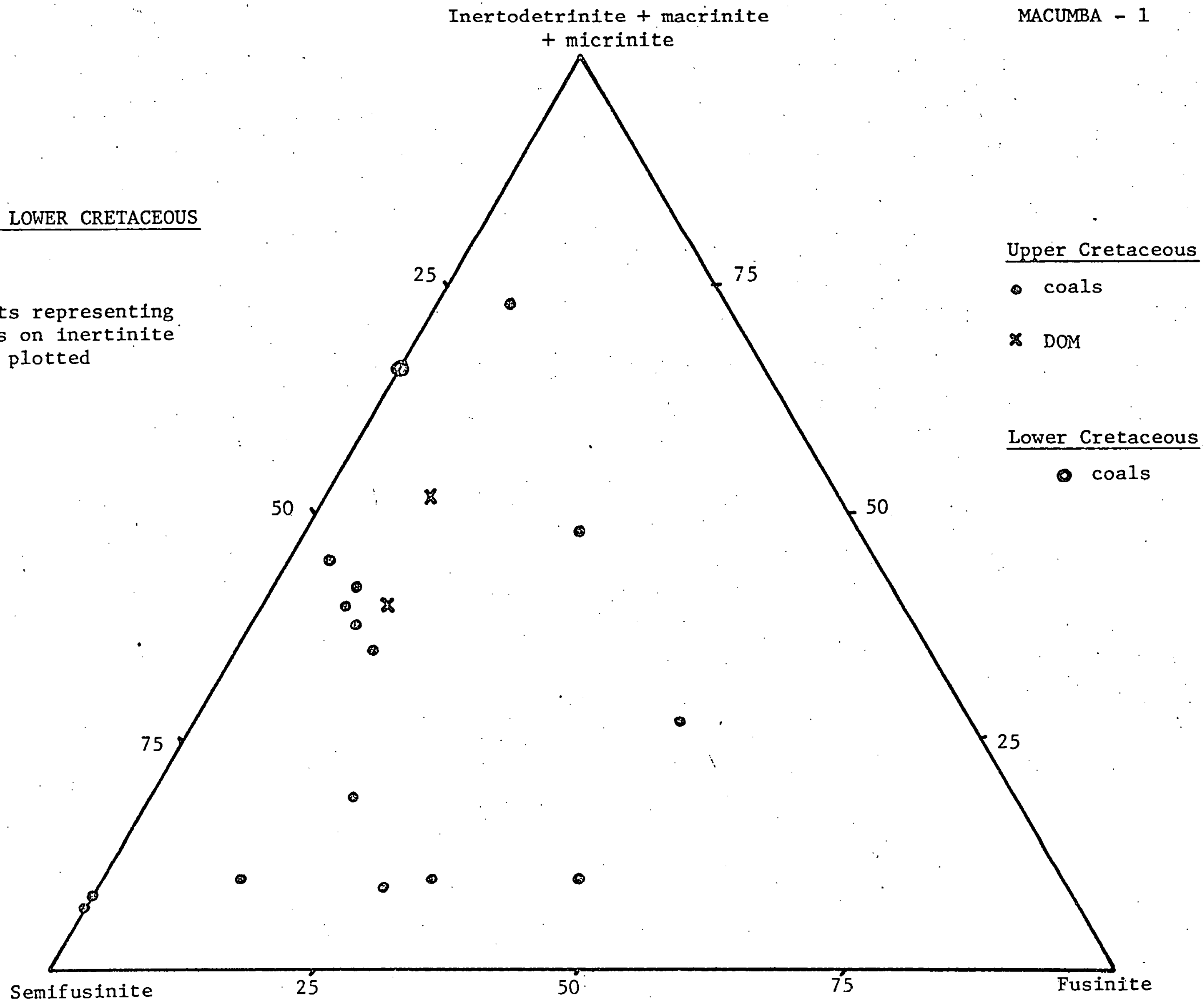

FIG. 6 Components of the INERTINITE group

UPPER JURASSIC

Only points which represent
≥ 5 points counted on
inertinite have been plotted

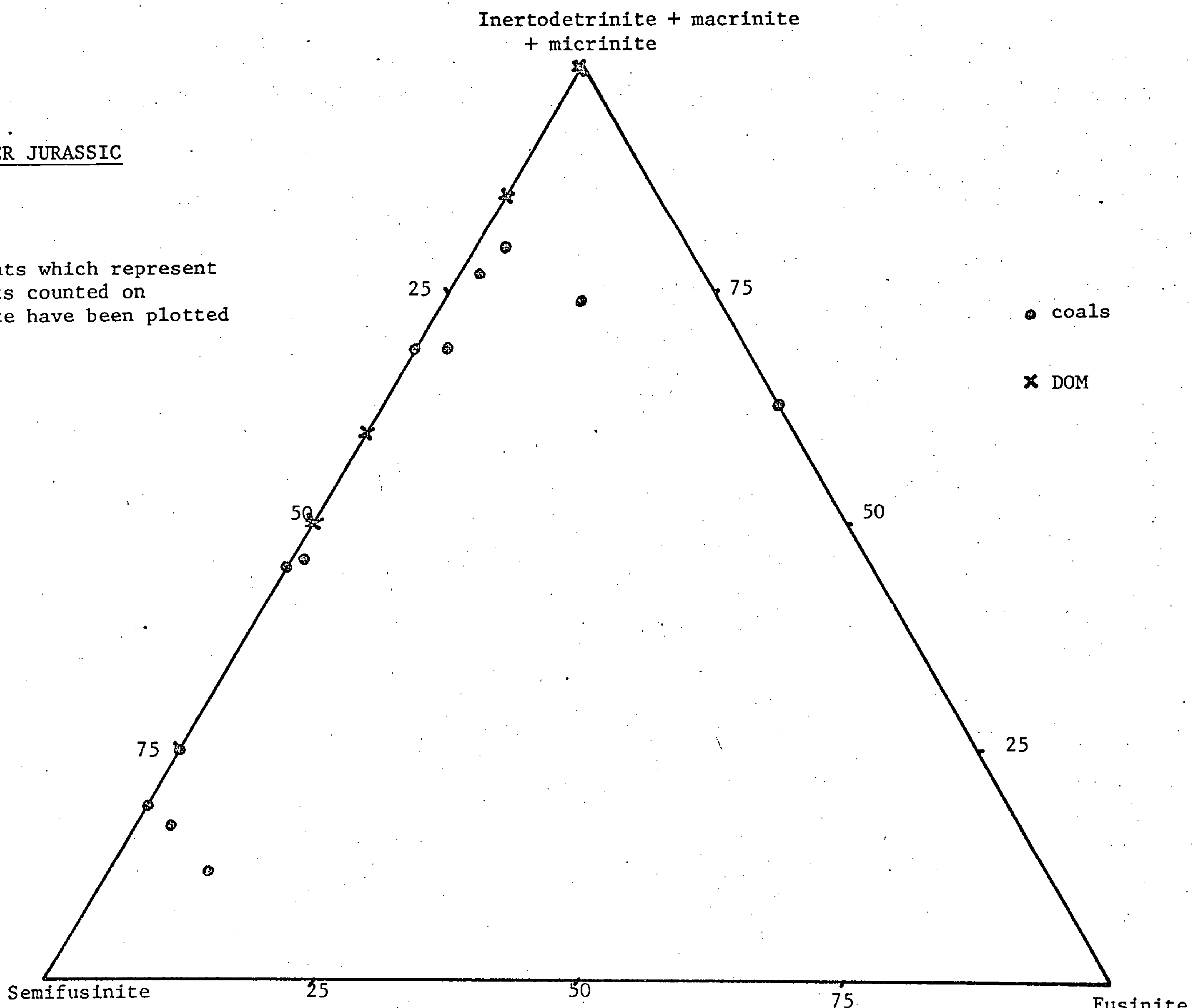

FIG. 7 Components of the INERTINITE group

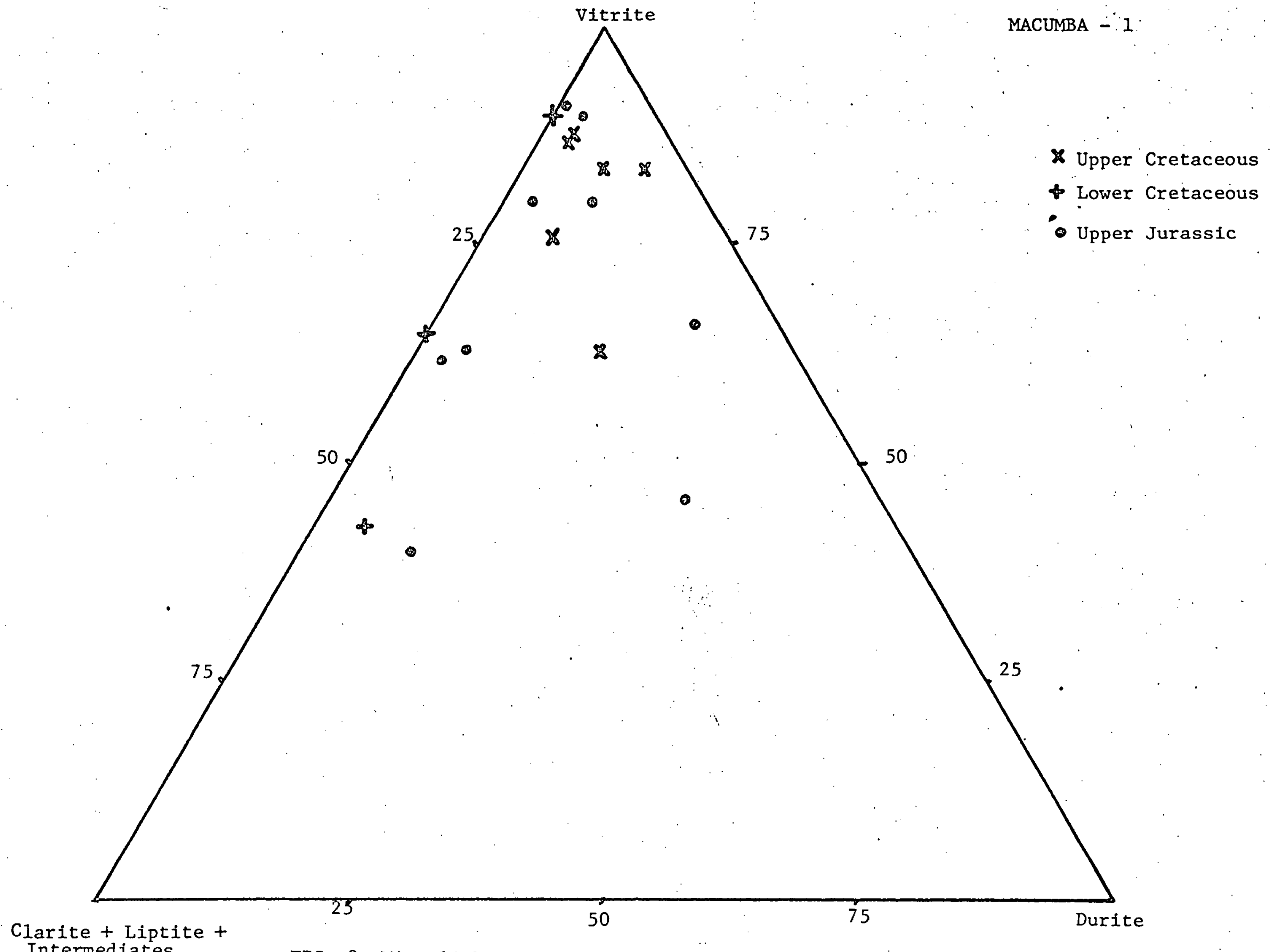

FIG. 8 Microlithotype compositions of the coal seams
(mineral - matter - free)

MACUMBA #1 CORE 1 CHEM

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10 May 1979

Director-General,
Department of Mines & Energy,
EASTWOOD, SA

Attention: Dr D. McKirdy

SOURCE ROCK STUDIES -

S.A. SEDIMENTARY BASINS

PROGRESS REPORT NO. 8

Investigation and Report by: H. Sears

Manager, Geological Services Division: Dr Keith J. Henley

Keith Henley

for Norton Jackson,
Managing Director.

meo/2

SOURCE ROCK

SAMPLE NO.	Sheet 6245 RS 5
WELL:	Macumba 1
SAMPLE IDENTIFICATION:	Core 1
DEPTH:	7714' 7½" - 7714' 9½"
TYPE OF SAMPLE:	Drill core

Total organic carbon (TOC)	3.2	%
Weight of sample extracted	52.0	gm
Extracted organic matter (EOM)	1158	ppm
EOM as fraction of TOC	36	mg/g

Analysis of extracted organic matter:-

Asphaltenes	45.1	% (wt)
Saturates	7.0	%
Aromatics	15.6	%
Resins	19.0	%
Loss on column	13.3	%

n-Alkane distribution of saturates:-

n-Alkane	C_{13}	C_{14}	C_{15}	C_{16}	C_{17}	C_{18}	C_{19}	C_{20}	C_{21}	C_{22}	C_{23}
Rel abund.	--	2.2	5.0	7.0	7.9	7.0	7.8	7.5	7.5	7.1	6.9

n-Alkane	C_{24}	C_{25}	C_{26}	C_{27}	C_{28}	C_{29}	C_{30}	C_{31}	C_{32}	C_{33}	C_{34}
Rel abund.	6.7	6.6	5.7	5.4	3.7	2.9	1.7	1.1	--	--	--

Pristane/phytane ratio 3

Pristane/C_{17} ratio 0.27

SOURCE ROCK

SAMPLE NO. Sheet 6245 RS 6

WELL: Macumba 1

SAMPLE IDENTIFICATION: Core 1

DEPTH: 7721' 4½" - 7721' 6"

TYPE OF SAMPLE: Drill core

Total organic carbon (TOC)	3.15	%
Weight of sample extracted	53.0	gm
Extracted organic matter (EOM)	1340	ppm
EOM as fraction of TOC	43	mg/g

Analysis of extracted organic matter:-

Asphaltenes	40.6	% (wt)
Saturates	9.4	%
Aromatics	17.4	%
Resins	17.2	%
Loss on column	15.0	%

n-Alkane distribution of saturates:-

n-Alkane	C_{13}	C_{14}	C_{15}	C_{16}	C_{17}	C_{18}	C_{19}	C_{20}	C_{21}	C_{22}	C_{23}
Rel abund.	--	3.2	5.5	6.9	7.5	7.5	7.4	6.8	6.9	6.5	6.5

n-Alkane	C_{24}	C_{25}	C_{26}	C_{27}	C_{28}	C_{29}	C_{30}	C_{31}	C_{32}	C_{33}	C_{34}
Rel abund.	6.5	7.1	6.5	6.0	4.1	2.8	1.6	0.9	0.1	--	--

Pristane/phytane ratio 3.2

Pristane/C_{17} ratio 0.33