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PEL 5 AND PEL 6, PEDIRKA BLOCK

EROMANGA BASIN AND SIMPSON BASIN

POOLOWANNA 1 TEST REPORTS

Submitted by

SADME and Delhi International Oil Corp.
1979

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

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

PRIMARY INDUSTRIES AND RESOURCES SA

ENVELOPE 2977

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

TENEMENT HOLDER: Delhi International Oil Corp. (operator), Western Mining Corp. Pty Ltd, Santos Ltd, Vamgas Ltd, Total Exploration Australia Pty Ltd and Commonwealth of Australia (Petroleum and Minerals Authority)

CONTENTS

REPORTS:		MESA NO.
	Smyth, M., 1978. Lower Jurassic coals and dispersed organic matter in Poolowanna 1 well, Eromanga Basin (CSIRO Minerals Research Laboratories, Fuel Geoscience Unit, Restricted Investigation Report no. 975R for SADM, October 1978).	**2977 R 10** [13 pages]
	Smyth, M., 1978. Dispersed organic matter in the Triassic sediments from Poolowanna 1 well, Simpson Basin (CSIRO Minerals Research Laboratories, Fuel Geoscience Unit, Restricted Investigation Report no. 976R for SADM, October 1978).	**2977 R 11** [16 pages]
	Smyth, M., 1978. The petrology of some coals and dispersed organic matter from the Middle to Lower Jurassic sequence in Poolowanna 1 well, Eromanga Basin (CSIRO Minerals Research Laboratories, Fuel Geoscience Unit, Restricted Investigation Report no. 981R for SADM, November 1978).	**2977 R 12** [13 pages]
	Rahdon, A.E., 1978. Petrography and diagenesis of Jurassic sandstones from Poolowanna 1 (sample depth interval 8426 feet 2 inches to 8439 feet 3 inches below drilling floor), Simpson Desert, Central Australia (consultant's report for Delhi International Oil Corp., December 1978).	**2977 R 13** [9 pages]
	Smyth, M., 1979. The petrology of some coals and dispersed organic matter of Triassic to Cretaceous ages in Poolowanna 1 well (CSIRO Minerals Research Laboratories, Fuel Geoscience Unit, Restricted Investigation Report no. 989R for SADM, January 1979).	**2977 R 14** [29 pages]
	Sears, H.W., 1979. Results of the organic analysis of an oil sample taken during DST 2 over the depth interval 8216-8328 feet KB, to determine its petroleum geochemical composition, plus comparative results of analyses of some potential source rocks for this crude oil, as obtained from 11 selected sidewall core, drill cuttings and drill core samples taken over the depth interval 7755-8530 feet KB, to determine the petroleum geochemical composition of their organic extracts (Amdel Ltd contractor's report for SADM, 10/5/79).	**2977 R 15** [13 pages]
	Alexander, R. and Steveson, B.G., 1979. Results of carbon isotope ratio determinations for 6 selected samples of kerogen from the depth interval 2414-2601.5 metres KB (Amdel Ltd contractor's report for SADM, 28/5/79).	**2977 R 16** [2 pages]

END OF CONTENTS

amdel
The Australian Mineral Development Laboratories

Flemington Street, Frewville, South Australia 5063
Phone Adelaide 79 1662, telex AA 82520

Pilot Plant: Osmond Place, Thebarton, Sth. Aust.
Phone Adelaide 43 8053
Branch Offices: Perth and Sydney
Associated with: Professional Consultants Australia Pty. Ltd.

Please address all correspondence to Frewville.
In reply quote: MP 1/13/7/0

2nd May, 1977

The Director,
Department of Mines,
PO Box 151,
EASTWOOD, SA 5063.

Attention: Mr R.A. Callen
Regional Mapping

REPORT MP 3186/77

YOUR REFERENCE:	Application dated 4/4/77
MATERIAL:	Four clay samples (bore cores)
LOCALITY:	POOLOWANNA Pillan 6445/3. Poolowanna 1 water bore, 12 m. north of Lake Peera Peera Poolanna
IDENTIFICATION:	P98 - P101/77
DATE RECEIVED:	6/4/77
WORK REQUIRED:	Bulk and -2µm (clay) mineralogy

Investigation and Report by: Dr R.N. Brown

Officer in Charge, Mineralogy/Petrology Section: Dr K.J. Henley

K.J. Henley

for F.R. Hartley
Director

jd

2977 R1

EXAMINATION OF FOUR CLAYS (POOLOWANNA 1 BORE)

1. INTRODUCTION

Four clays from Poolowanna 1 water bore were submitted by Mr R.A. Callen of the SA Department of Mines (Regional Mapping Section). The clay and non-clay mineralogy of the bulk samples and of the -2µm fractions were required (Amdel Code MC2).

2. PROCEDURE

X-ray diffractometer traces were recorded of powdered bulk material from each of the four samples. Weighed amounts of each were dispersed in water and sedimented to give -2µm e.s.d. material by the pipette method. Oriented clay samples were prepared on ceramic plates from this, saturated with Mg^{++} ions and treated with glycerol. Duplicate glycerol-free plates were prepared also in case required. The plates were examined in an X-ray diffractometer and in the case of P100/77 the glycerol-free plate was re-examined hot (approx. 130°C).

3. RESULTS

The results are given in Table 1, which lists the mineralogy of the bulk material and -2µm fractions, giving the minerals in approximate order of decreasing abundance. It also gives the proportion of the bulk sample found to disperse into the -2µm fraction.

4. SEMIQUANTITATIVE ABBREVIATIONS

The abbreviations in the table are defined as follows:-

D	=	Dominant. Used for the component apparently most abundant, regardless of its probable percentage level.
CD	=	Co-dominant. Used for two (or more) predominating components, both or all of which are judged to be present in roughly equal amounts.
SD	=	Sub-dominant. The next most abundant component(s) providing its percentage level is judged above about 20.
A	=	Accessory. Components judged to be present between the levels of roughly 5 and 20%.
Tr	=	Trace. Components judged to be below about 5%.

TABLE 1

POOLOWANNA 1 WATER BORE

BULK AND -2μm MINERALOGY OF FOUR CLAYS

SAMPLE	92-94 P98/77		120-130 P99/77		100-102 P100/77		84-86 P101/77	
Bulk Mineralogy	Dol P K Q	D A A Tr	Q K NA Dol	D SD A Tr	UC Dol K P? M? Q	D SD A A A A	Q K M F Dol? Cal?	D A A Tr Tr Tr
-2μm Mineralogy	P Dol K RI Mo M Q	D SD SD A A A Tr	K NA P? Mo M? Q Dol	D A A Tr Tr Tr Tr	K RI P M Dol Q	D SD A A A Tr	M K RI Mo Q	D SD A-SD A Tr
Proportion of -2μm material	36%		32%		62%		63%	

Mineral Key:

- Cal - Calcite
- Dol - Dolomite
- F - Feldspar
- K - Kaolinite
- M - Mica/illite
- Mo - Montmorillonite
- NA - Natroalunite (possibly alunite)
- P - Palygorskite
- Q - Quartz
- RI - Randomly-interstratified clays of indeterminate type
- UC - Undefined clays - see -2μm fraction for details

PALYNOLOGICAL EXAMINATION OF MATERIAL FROM DELHI-SANTOS POOLOWANNA NO. 1 WATER BORE

Request submitted: R. Callen (Regional Geology) (March 1977)

Type of Sample: Cuttings

Sample No.: S4333

Prepared by: A.G.K. (27/6/77)

Location of Sample: Delhi-Santos Poolowanna No. 1 Water Bore

Latitude: 26°26'00"S

Longitude: 137°41'30"E

Province: EROMANGA BASIN

POOLOWANNA 1:250 000 sheet (SG 53-12)

Pillan 1:100 000 sheet (6445)

Stratigraphic Information: Sample depth 140.00 - 148.00 m (logged as EYRE FMN, EOCENE) Light brown calcareous clayey sand. (logged as grey and white carbonaceous silt with black carbonaceous fragments and wood).

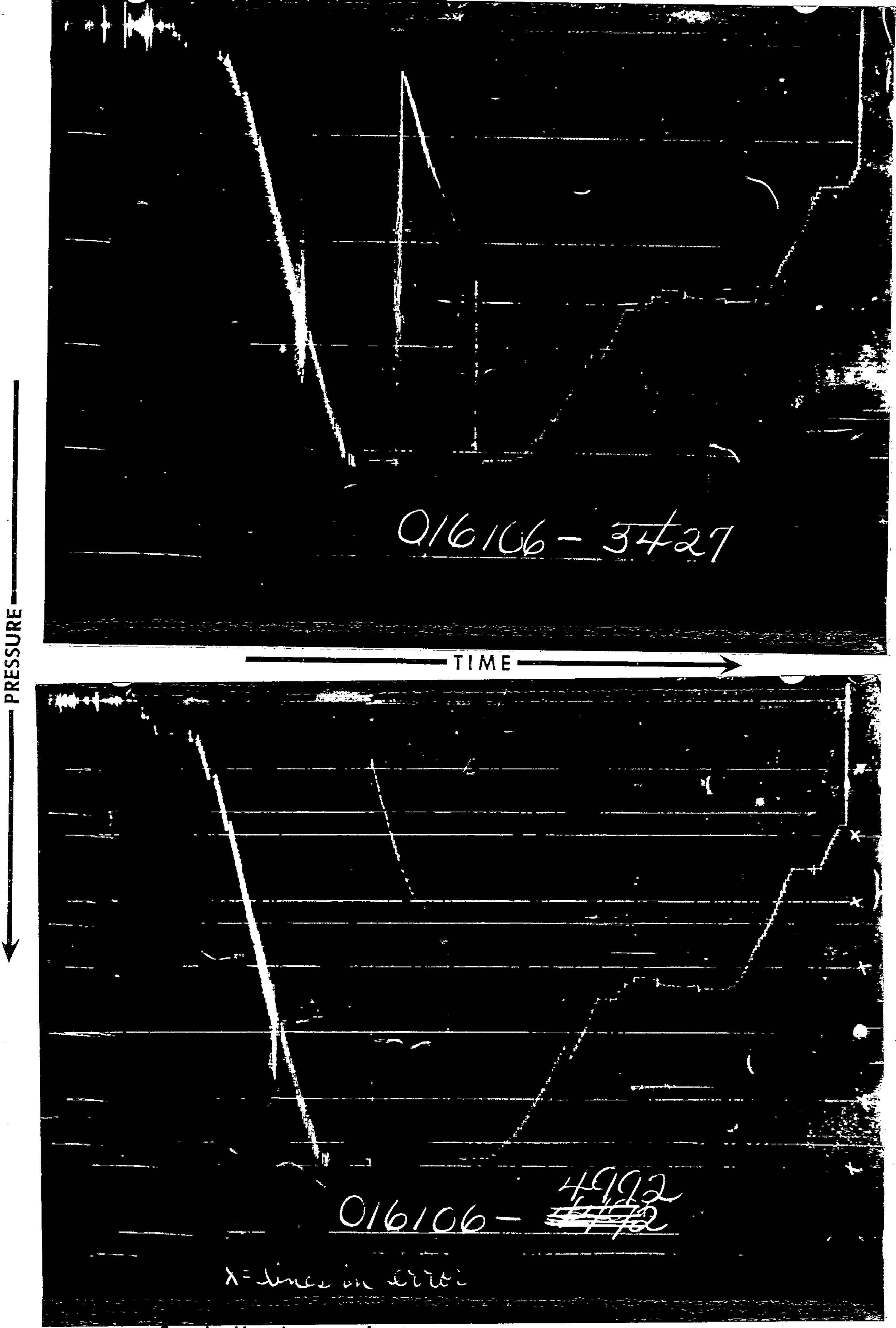
Results: Palynological preparation of material failed to produce any identifiable organic residue. Therefore, there is no palynological evidence as to age.

28/06/77

A.G. KRESS
PALAEOBOTONY SECTION

Formation Testing Service Report

HALLIBURTON SERVICES
DUNCAN, OKLAHOMA



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: 8-28-77 | Ticket Number: 016106

Kind of Job: OPEN HOLE FORMATION TEST | Halliburton District: MOOMBA

Tester: MR. LARKIN | Witness: ?

Drilling Contractor: ODE DRILLING COMPANY BJ

EQUIPMENT & HOLE DATA

Formation Tested: ? Punni

Elevation: 100' Ft.

Net Productive Interval: 8213' to 8328' Ft.

All Depths Measured From: Kelly Bushing

Total Depth: 8328' Ft.

Main Hole/Casing Size: 8 1/2"

Drill Collar Length: 540' I.D. 3.00"

Drill Pipe Length: 7726' I.D. 3.826"

Packer Depth(s): 8213' 8205' Ft.

Depth Tester Valve: 8190' Ft.

Cushion — TYPE ______ AMOUNT ______ Ft. | Depth Back Pres. Valve ______ | Surface Choke 1/4" | Bottom Choke 5/8"

Recovered 360' Feet of mud-oil cut.

Recovered 2000' Feet of oil.

Recovered 2500' Feet of salt water (mud cut)

Recovered 640' Feet of oil and water (mud cut oil)

Recovered ______ Feet of ______

(Mea. From Tester Valve)

Remarks SEE PRODUCTION TEST DATA SHEET....

Charts indicate partial plugging of anchor perforations during flow period.

TEMPERATURE	Gauge No. 3427 Depth: 8195 Ft.		Gauge No. 4992 Depth: 8324 Ft.		Gauge No. Depth: Ft.		TIME	
	12 Hour Clock		12 Hour Clock		Hour Clock		Tool Opened	6:49 P.M.
Est. °F.	Blanked Off NO		Blanked Off YES		Blanked Off		Opened Bypass	8:00 P.M.
Actual 260 °F.	Pressures		Pressures		Pressures			
	Field	Office	Field	Office	Field	Office	Reported Minutes	Computed Minutes
Initial Hydrostatic	4096	4098	4159	4165				
First Period Flow Initial	370	372-Q	451	522			—	—
First Period Flow Final	2154	2162	2184	2241			71	
First Period Closed in								
Second Period Flow Initial							—	—
Second Period Flow Final								
Second Period Closed in								
Third Period Flow Initial							—	—
Third Period Flow Final								
Third Period Closed in								
Final Hydrostatic	4096	4088	4159	4154			—	—
	Q = QUESTIONABLE							

Legal Location Sec. - Twp. - Rng.

Lease Name: POOLAWANNA

Well No. 1

Test No. 2

Field Area: WILDCAT

Tested Interval: 8213' to 8328'

County

Lease Owner/Company Name: DELHI INTERNATIONAL OIL COMPANY

State: SOUTH AUSTRALIA

FORM 181-R2—PRINTED IN U.S.A.

FORMATION TEST DATA

LITTLE'S 102548 5M 9/76

Casing perfs. Bottom choke 5/8" Surf. temp °F Ticket No. 016106
Gas gravity Oil gravity GOR
Spec. gravity Chlorides ppm Res. @ 26° °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
8-28-77					
6:49 AM	1/4				Opened test tool.
6:54	"				Weak blow at surface.
7:49					Attempted to close dual CIP.
					Drill collars above tool wall, sticking
					Drill pipe torquing up.
8:00					Pulled tool loose and came out of the
					hole.

FORM 182-R1—PRINTED IN U.S.A.

PRODUCTION TEST DATA

LITTLE'S 96672 5M 8/74

TICKET NO. 016106

	O. D.	I. D.	LENGTH	DEPTH
Drill Pipe or Tubing				
Reversing Sub	6"	3"	12"	
Water Cushion Valve				
Drill Pipe	4.50"	3.826"	7726'	
Drill Collars	6.25"	3.00"	540'	
Handling Sub & Choke Assembly	5"	5/8"	23.50'	
Dual CIP Valve	5"	.87"	58.98"	
Dual CIP Sampler				
Hydro-Spring Tester	5"	.75"	60.21"	8190'
Multiple CIP Sampler				
Extension Joint				
AP Running Case	5"	3.06"	49.63"	8195'
Hydraulic Jar	5"	.87"	39.66"	
VR Safety Joint	5"	1."	33.40"	
Pressure Equalizing Crossover				
Packer Assembly	7.75"	1.75"	72.33"	8205'
Distributor	5"	1.68"	24"	
Packer Assembly	7.75"	1.75"	72.33"	8213'
Flush Joint Anchor				
Pressure Equalizing Tube				
Blanked-Off B.T. Running Case	5"	2.44"	48.71"	8324'
Drill Collars				
Anchor Pipe Safety Joint				
Packer Assembly				
Distributor				
Packer Assembly				
Anchor Pipe Safety Joint				
Side Wall Anchor				
Drill Collars				
Flush Joint Anchor				
Blanked-Off B.T. Running Case				
Total Depth				8328'

FORM 187-R1—PRINTED IN U.S.A.

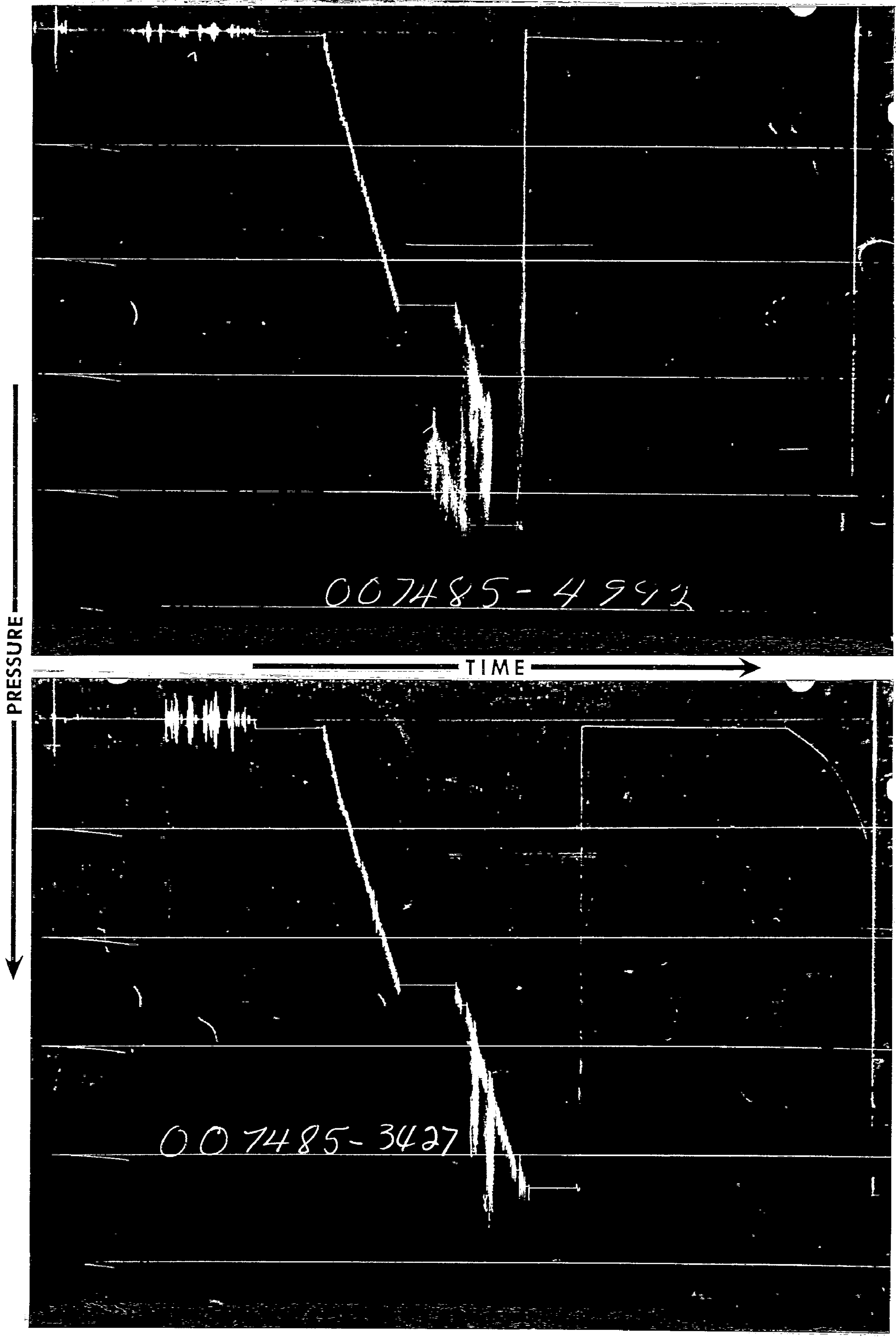
EQUIPMENT DATA

LITTLE'S 96676 73C 6/7

Formation Testing Service Report

HALLIBURTON SERVICES
DUNCAN, OKLAHOMA

2977 R4



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 9.6 vis 42 sec

Date 9-2-77
Ticket Number 007485
Kind of Job OPEN HOLE
Halliburton District SINGAPORE
Tester C. KENNEY
Witness M. WILTSHIRE
Drilling Contractor DR

EQUIPMENT & HOLE DATA

Formation Tested Wildcat Sand
Elevation 100' Ft.
Net Productive Interval 8' Ft.
All Depths Measured From Kelly Bushing
Total Depth 8642' Ft.
Main Hole/Casing Size 8 1/2"
Drill Collar Length 418.75' I.D. 2 13/16"
Drill Pipe Length 8186.34' I.D. 3.826"
Packer Depth(s) 8577-8585' Ft.
Depth Tester Valve 8559' Ft.

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

Recovered 110 Feet of trace distillant, mud and trace of oil at the bottom
Recovered Feet of
Recovered Feet of
Recovered Feet of
Recovered Feet of
(Mea. From Tester Valve)

Remarks SEE PRODUCTION TEST DATA SHEET

TEMPERATURE	Gauge No. 4992 Depth: 8564 Ft.		Gauge No. 3427 Depth: 8638 Ft.		Gauge No. Depth: Ft.		TIME	
	12 Hour Clock		12 Hour Clock		Hour Clock		Tool Opened	0524 A.M./P.M.
Est. °F.	Blanked Off No		Blanked Off Yes		Blanked Off		Opened Bypass	1003 A.M./P.M.
Actual 260 °F.	Pressures		Pressures		Pressures		Reported	Computed
	Field	Office	Field	Office	Field	Office	Minutes	Minutes
Initial Hydrostatic	4278	4279	4307	4302				
First Period Flow Initial	64	54	67	64			—	—
First Period Flow Final	97	59	101	82			181	
First Period Closed in	2008	2022		1245			98	
Second Period Flow Initial	—		CHART TIME				—	—
Second Period Flow Final			EXPIRED					
Second Period Closed in								
Third Period Flow Initial							—	—
Third Period Flow Final								
Third Period Closed in								
Final Hydrostatic	4278	4259					—	—

Legal Location Sec. - Twp. - Rng.: Lat 26°-25'-34" S LONG 137°-40'31" E
Lease Name: POOLOWANNA
Well No.: 1
Test No.: 3
Field Area: WILDCAT
Tested Interval: 8585-8642'
County: AUSTRALIA
Lease Owner/Company Name: DELHI WMC ETAL
State: SOUTH AUSTRALIA

FORMATION TEST DATA

~~XXXXXXXX~~ 8594-8602 Bottom choke 3/4" Surf. temp 65 °F Ticket No. 007485

Gas gravity ______ Oil gravity ______ GOR ______

Spec. gravity ______ Chlorides ______ 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
2200					Wound clocks and loaded bt.
2330					Started making up tools and went in hole.
0500					Made up control head
0522					Set packer
0524					Opened tool with no blow
0610					First bubble in bucket
0645					Bubble off bottom of bucket
0725					Gas to surface
0825					Closed tool
1003					Unseated packer, broke off surface
					equipment and started out of hole.
1540					Out of hole with tools

TICKET NO. 0 07485 0016

	O.D.	I.D.	LENGTH	DEPTH
Drill Pipe or Tubing				
Reversing Sub	6"	3"	1.00'	
Water Cushion Valve				
Drill Pipe	4½"	3.826"	8186.34'	
Drill Collars	6 1/2"	2 13/16"	388.87'	
Handling Sub & Choke Assembly	6"	2 5/8"	2.18'	
Dual CIP Valve	5"	7.8"	4.50'	
Dual CIP Sampler	5 13/16"	3"	.62' Change over	
Hydro-Spring Tester	5"	3/4"	5.00'	8559'
Multiple CIP Sampler				
Extension Joint				
AP Running Case	5"	2 1/4"	4.10'	8564'
Hydraulic Jar	5"	1"	3.28'	
VR Safety Joint	5"	1'	2.36'	
Pressure Equalizing Crossover				
Packer Assembly	7 3/4"	1 1/2"	6.17'	8577'
Distributor	5"	1 11/16"	2.00'	
Packer Assembly	7 3/4"	1 1/2"	6.17'	8585'
Flush Joint Anchor				
Pressure Equalizing Tube				
Blanked-Off B.T. Running Case				
Drill Collars				
Anchor Pipe Safety Joint				
Packer Assembly				
Distributor				
Packer Assembly				
Anchor Pipe Safety Joint	5"	1 1/2"	4.00'	
	5 13/16"	2 3/8"	.70' X over	
Side Wall Anchor				
Drill Collars	6 1/2"	2 13/16"	29.88'	
	6"	2 1/2"	.63' X over	
Flush Joint Anchor	5"		18.00'	
Blanked-Off B.T. Running Case	5"		4.08'	8638'
Total Depth				

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EQUIPMENT DATA

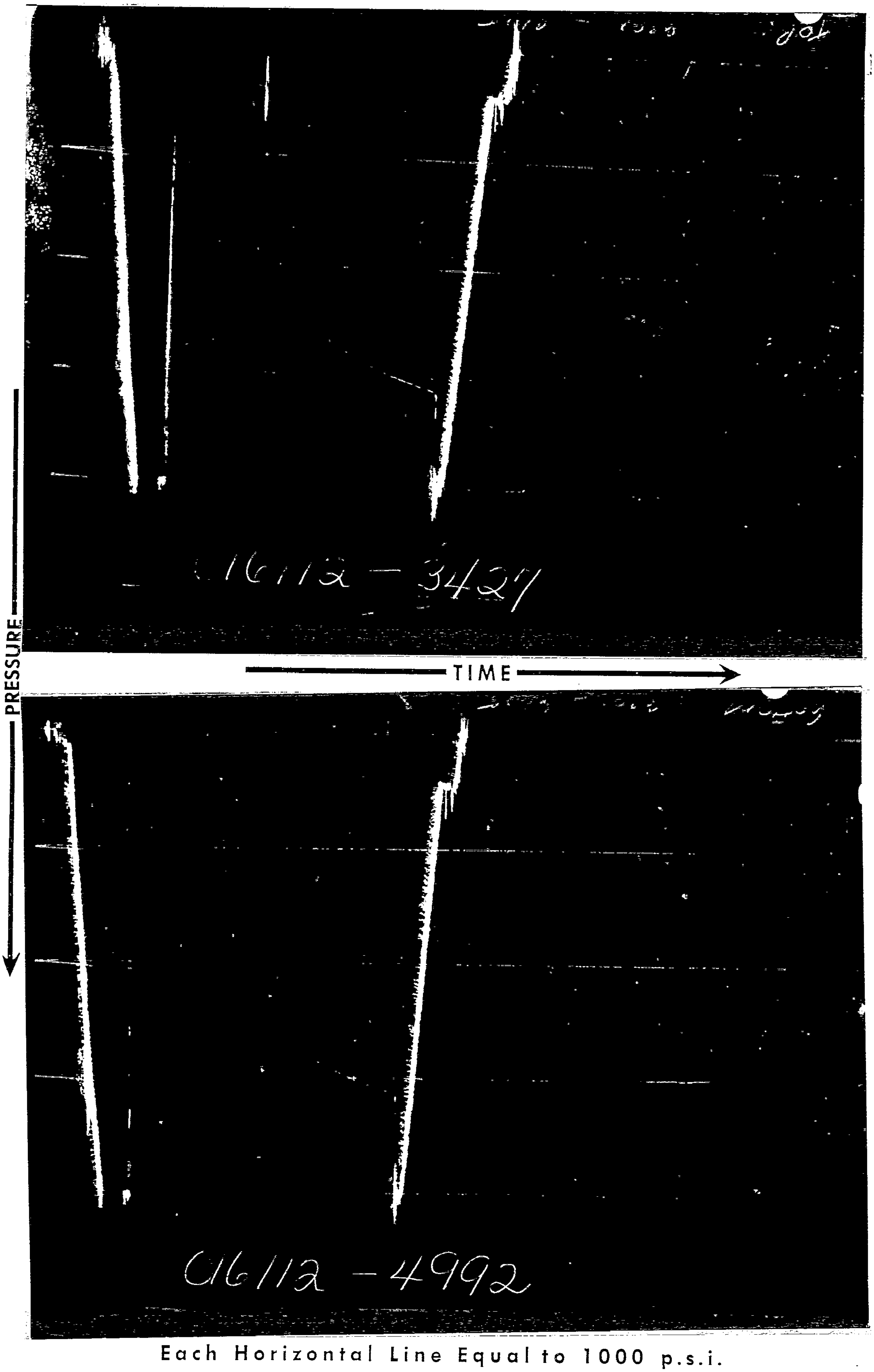
LITTLE'S 96676 75C 8/74

Formation Testing Service Report

HALLIBURTON SERVICES

DUNCAN, OKLAHOMA

2977 R 5



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	9-29-77	Ticket Number	016112
Kind of Job	HOOKWALL	Halliburton District	AUSTRALIA
Tester	MR. LARKINS	Witness	MR. GESTE
Drilling Contractor	ODE DRILLING COMPANY RIG # 5 bjs		

EQUIPMENT & HOLE DATA

Formation Tested	-		
Elevation	- Ft.		
Net Productive Interval	8392'-98' - 8413'-25' Perfs. Ft.		
All Depths Measured From	Kelly Bushing		
Total Depth	9053' Ft.		
Main Hole/Casing Size	7"		
Drill Collar Length	-	I.D.	-
Drill Pipe Length	8327'	I.D.	2.992"
Packer Depth(s)	8360' Ft.		
Depth Tester Valve	8346' Ft.		

Cushion TYPE	AMOUNT	Depth Back Pres. Valve	Surface Choke	Bottom Choke
	Ft.			5/8"

Recovered Feet of RECOVERED 3.65 barrels of condensate and 4.25 barrels

Recovered Feet of of water.

Recovered Feet of

Recovered Feet of

Recovered Feet of

Meas. From Tester Valve

Remarks SEE PRODUCTION TEST DATA SHEET....

Q = QUESTIONABLE

Legal Location Sec. - Twp. - Rng.

Lease Name: POOLAWANNA

Well No.: 1

Test No.: 6

Field Area: WILDCAT

Tested Interval: 8360' to 9053'

County

State: SOUTH AUSTRALIA

Lease Owner/Company Name: DELHI INTERNATIONAL OIL CORPORATION

TEMPERATURE	Gauge No. 3427 Depth: 8352' Ft.		Gauge No. 4992 Depth: 8370' Ft.		Gauge No. Depth: Ft.		TIME	
Est. °F.	72 Hour Clock, Blanked Off NO		72 Hour Clock, Blanked Off YES		Hour Clock, Blanked Off		Tool Opened 9-28- 0600 A.M. P.M.	
Actual 242 °F.	Pressures		Pressures		Pressures		Opened Bypass 9-29- 0600 A.M. P.M.	
	Field	Office	Field	Office	Field	Office	Reported Minutes	Computed Minutes
Initial Hydrostatic	4029	4025	4030	4034				
First Period Flow Initial	50	72-Q	64	95			—	—
First Period Flow Final	387	388	603	402			475	482
First Period Closed in	3109	3124	3134	3133			965	959
Second Period Flow Initial							—	—
Second Period Flow Final								
Second Period Closed in								
Third Period Flow Initial							—	—
Third Period Flow Final								
Third Period Closed in								
Final Hydrostatic	4029	4025	4030	4034			—	—

FORM 181-R2—PRINTED IN U.S.A.

FORMATION TEST DATA

LITTLE'S 102548 5M 9/76

Casing perfs. 8392'-98' 8413' - 25' Bottom choke 5/8" Surf. temp. °F Ticket No. 016112

Gas gravity Oil gravity GOR

Spec. gravity Chlorides ppm Res. @ °F

INDICATE TYPE AND SIZE OF GAS MEASURING DEVICE USED

Date 9-29-77 Time a.m. p.m.	Choke Size	Surface Pressure psi	Gas Rate MCF	Liquid Rate BPD	Remarks
0600	1/2				Opened tool with a good blow to mod-
					erate in 40 minutes.
0940	1/2				Gas to surface with 1 to 2' flame at
					flare line.
1355	1/2				Closed tool.
0600					Pulled tool loose. Pulled out of hole.
1050					Oil and condensate in tubing. Reverse
					circulated and put fluid through sep-
					erator.
1130					Tools out of the hole.
					Recovered 3.65 barrels of oil and
					condensate. 4.25 barrels of water.

FORM 182-R1—PRINTED IN U.S.A.

PRODUCTION TEST DATA

LITTLE'S 96672 5M 6/70

Gauge No. 3427 | Depth 8352 | Clock No. 6248 | 72 hour | Ticket No. 016112

	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	72-Q	.0000		388										
1	.0898*	153	.0698**		1655										
2	.1775	215	.1408		2089										
3	.2651	258	.2117		2326										
4	.3527	305	.2827		2477										
5	.4403	347	.3536		2594										
6	.5280	388	.4245		2682										
7			.4955		2761										
8			.5664		2826										
9			.6374		2883										
10			.7083		2935										
11			.7792		2982										
12			.8502		3023										
13			.9211		3059										
14			.9921		3095										
15			1.0630		3124										

Gauge No. 4992 | Depth 8370 | Clock No. 11660 | 72 hour

	First Flow Period		First Closed In Pressure			Second Flow Period		Second Closed In Pressure			Third Flow Period		Third Closed In Pressure		
0	.0000	95	.0000		402										
1	.0891*	167	.0686**		1659										
2	.1761	231	.1383		2105										
3	.2631	276	.2079		2340										
4	.3501	322	.2776		2492										
5	.4370	364	.3473		2607										
6	.5240	402	.4169		2697										
7			.4866		2773										
8			.5563		2837										
9			.6259		2895										
10			.6956		2945										
11			.7653		2991										
12			.8350		3033										
13			.9046		3070										
14			.9743		3103										
15			1.0440		3133										
Reading Interval	80		64												Minutes

REMARKS: * INTERVAL = 82 MINUTES ** INTERVAL = 63 MINUTES Q = QUESTIONABLE

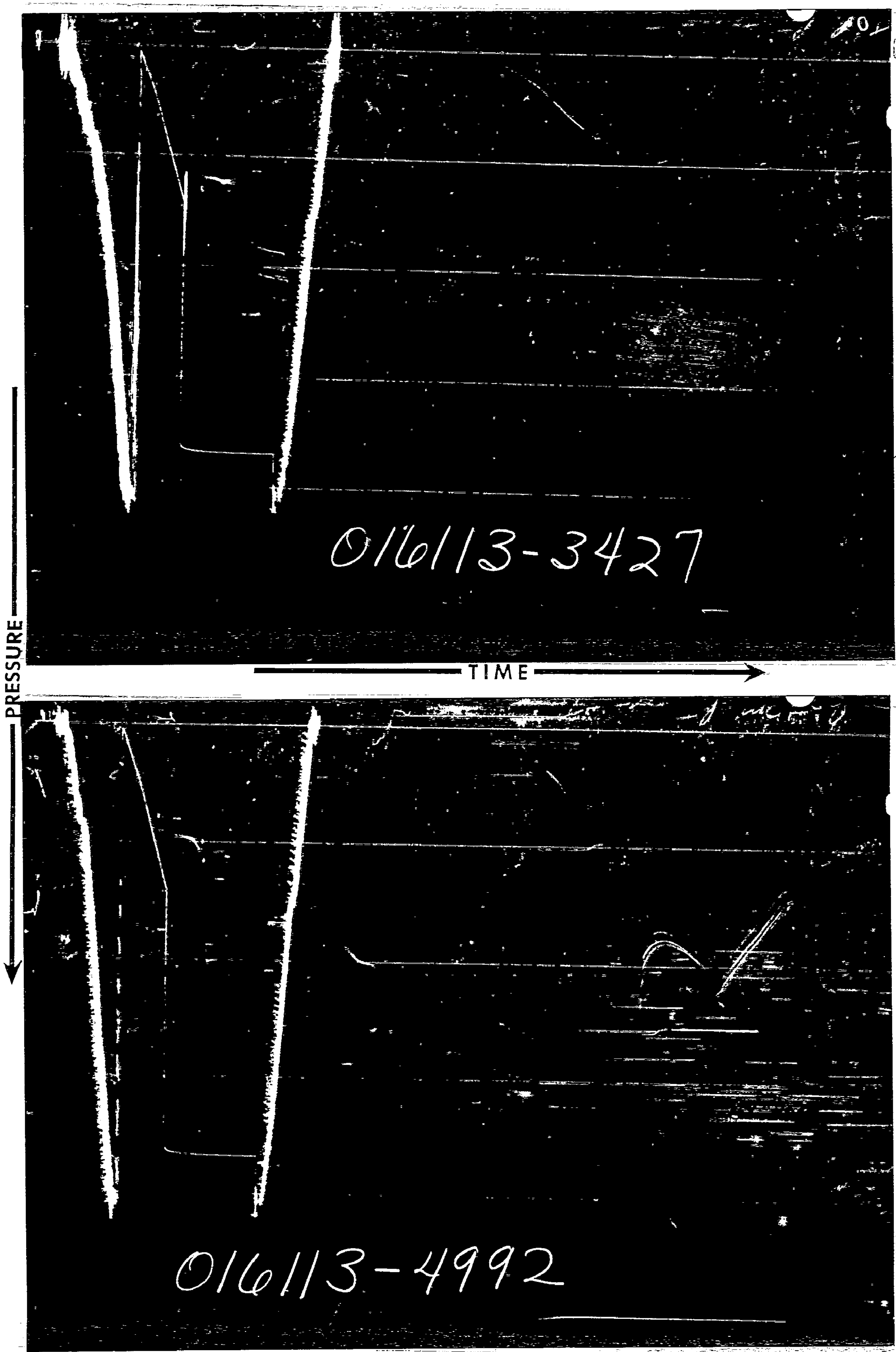
SPECIAL PRESSURE DATA

	O.D.	I.D.	LENGTH	DEPTH
Drill Pipe or Tubing				
Reversing Sub				
Water Cushion Valve				
Drill Pipe	3.50"	2.992"	8327'	
Drill Collars				
Handling Sub & Choke Assembly				
Dual CIP Valve	3 7/8"		5'	
Dual CIP Sampler				
Hydro-Spring Tester	3 7/8"		5'	8346'
Multiple CIP Sampler				
Extension Joint				
AP Running Case				8352'
Hydraulic Jar				
VR Safety Joint	3 7/8"			
Pressure Equalizing Crossover				
Packer Assembly				
Distributor				
Packer Assembly				
Flush Joint Anchor				
Pressure Equalizing Tube				
Blanked-Off B.T. Running Case				
Drill Collars				
Anchor Pipe Safety Joint				
Packer Assembly				
Distributor				
Packer Assembly				
Anchor Pipe Safety Joint				
Side Wall Anchor HOOK WALL	7"			8360'
Drill Collars				
Flush Joint Anchor				
Blanked-Off B.T. Running Case	3 3/4"			8370'
Total Depth				9053'

EQUIPMENT DATA

Formation Testing Service Report

HALLIBURTON SERVICES
DUNCAN, OKLAHOMA



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	9-29-77	Ticket Number	016113
Kind of Job	HOOK WALL	Halliburton District	AUSTRALIA
Tester	MR. LARKINS	Witness	MR. GESIE
Drilling Contractor	O D E DRILLING COMPANY RIG #5 BC S		

EQUIPMENT & HOLE DATA

Formation Tested	
Elevation	Ft.
Net Productive Interval	Ft.
All Depths Measured From	Kelly Bushing
Total Depth	9053' Ft.
Main Hole/Casing Size	7"
Drill Collar Length	- I.D.
Drill Pipe Length	8415' I.D. 2.922"
Packer Depth(s)	8438' Ft.
Depth Tester Valve	8424' Ft.

Legal Location Sec. - Twp. - Rng.

Lease Name: POOLAWANNA

Well No.: 1

Test No.: 7

Field Area: WILDCAT

Tested Interval: 8438' - 9053'

County

Lease Owner/Company Name: DELHI INTERNATIONAL OIL CORPORATION

State: SOUTH AUSTRALIA

Cushion	TYPE	AMOUNT	Ft.	Depth Back Pres. Valve	Surface Choke	Bottom Choke

Mea. From Tester Valve

Recovered 3869 Feet of Brine filtrate gas cut water

Recovered Feet of

Recovered Feet of

Recovered Feet of

Recovered Feet of

Remarks SEE PRODUCTION TEST DATA SHEET.

TEMPERATURE	Gauge No. 3427 Depth: 8430' Ft.		Gauge No. 4992 Depth: 8452' Ft.		Gauge No. Depth: Ft.		TIME	
Est. 255 °F.	72 Hour Clock, Blanked Off No		72 Hour Clock, Blanked Off Yes		Hour Clock, Blanked Off		Tool Opened 10:20 A.M.	
Actual °F.	Pressures		Pressures		Pressures		Opened Bypass 10:24 A.M.	
	Field	Office	Field	Office	Field	Office	Reported Minutes	Computed Minutes
Initial Hydrostatic	4074	4091	4077	4073				
First Period Flow Initial	44	44	32	45			—	—
First Period Flow Final	1422	1435	1309	1408			240	240
First Period Closed in	3694	3700	3684	3684			484	484
Second Period Flow Initial							—	—
Second Period Flow Final								
Second Period Closed in								
Third Period Flow Initial							—	—
Third Period Flow Final								
Third Period Closed in								
Final Hydrostatic	4074	4091	4077	4073			—	—

Casing perfs. 8452' - 8466' Bottom choke 5/8" Surf. temp ____ °F Ticket No. 016113
Gas gravity ____ Oil gravity ____ GOR ____
Spec. gravity ____ Chlorides ____ 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
10:20 PM					Opened tool with a strong blow for
					20 minutes, then a moderate to weak
					blow at surface
2:20 AM					Closed tool
10:24					Pulled tool loose, pulled out of hole

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PRODUCTION TEST DATA

LITTLE'S 96672 5M 8/74

Gauge No. 3427 | Depth 8430' | Clock No. 6428 | 72 hour | Ticket No. 016113

	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	44	.0000		1435										
1	.0440	243	.0089		3648										
2	.0880	461	.0177		3658										
3	.1320	707	.0266		3665										
4	.1760	962	.0354		3670										
5	.2200	1212	.0443		3673										
6	.2640	1435	.0532		3675										
7			.0620		3677										
8			.0709		3678										
9			.0797		3682										
10			.0886		3683										
11			.1772		3690										
12			.2658		3695										
13			.3544		3697										
14			.4430		3698										
15			.5360		3700										

Gauge No. 4992 | Depth 8452' | Clock No. 11660 | 72 hour

0	.0000	45	.0000		1408										
1	.0437	231	.0087		3627										
2	.0873	439	.0174		3641										
3	.1310	672	.0261		3648										
4	.1747	927	.0348		3653										
5	.2183	1187	.0436		3656										
6	.2620	1408	.0523		3659										
7			.0610		3661										
8			.0697		3663										
9			.0784		3664										
10			.0871		3666										
11			.1742		3673										
12			.2613		3678										
13			.3484		3681										
14			.4355		3683										
15			.5270		3684										
Reading Interval	40		*												Minutes

REMARKS: *First 10 intervals = 8 minutes each; next 4 intervals = 80 minutes each; last interval = 84 minutes

0027

10

SPECIAL PRESSURE DATA

TICKET NO. 016113

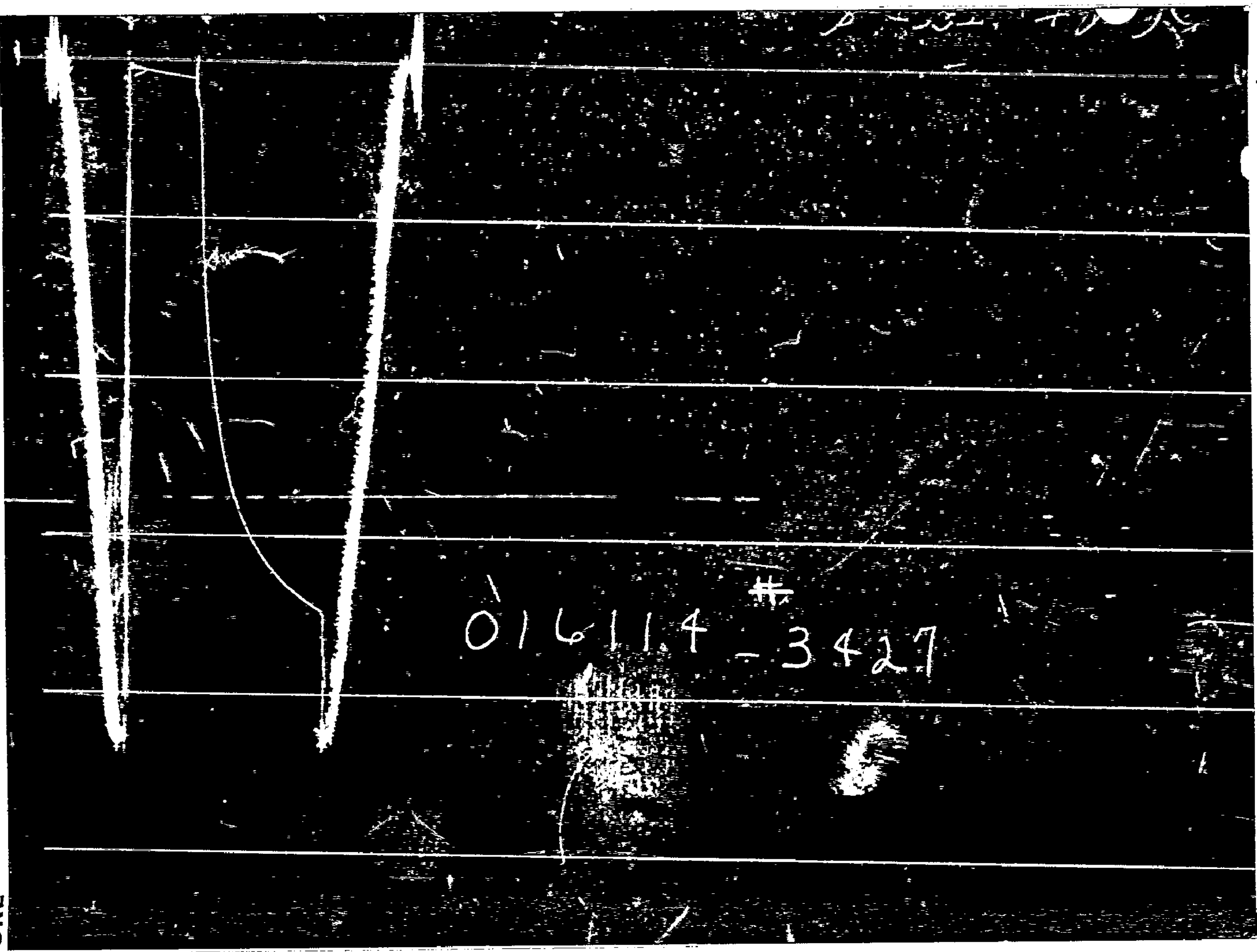
	O.D.	I.D.	LENGTH	DEPTH
Drill Pipe or Tubing				
Reversing Sub				
Water Cushion Valve				
Drill Pipe	3.5"	2.922"	8415'	
Drill Collars				
Handling Sub & Choke Assembly				
Dual CIP Valve				
Dual CIP Sampler				
Hydro-Spring Tester	3 7/8"	-	5'	8424'
Multiple CIP Sampler				
Extension Joint				
AP Running Case				8430'
Hydraulic Jar				
VR Safety Joint	3 7/8"			
Pressure Equalizing Crossover				
Packer Assembly				
Distributor				
Packer Assembly				
Flush Joint Anchor				
Pressure Equalizing Tube				
Blanked-Off B.T. Running Case				
Drill Collars				
Anchor Pipe Safety Joint				
Packer Assembly				
Distributor				
Packer Assembly Hook wall	7"	-	-	8438'
Anchor Pipe Safety Joint				
Side Wall Anchor				
Drill Collars				
Flush Joint Anchor				
Blanked-Off B.T. Running Case	3 3/4"	-	-	8452'
Total Depth				9053'

EQUIPMENT DATA

Formation Testing Service Report

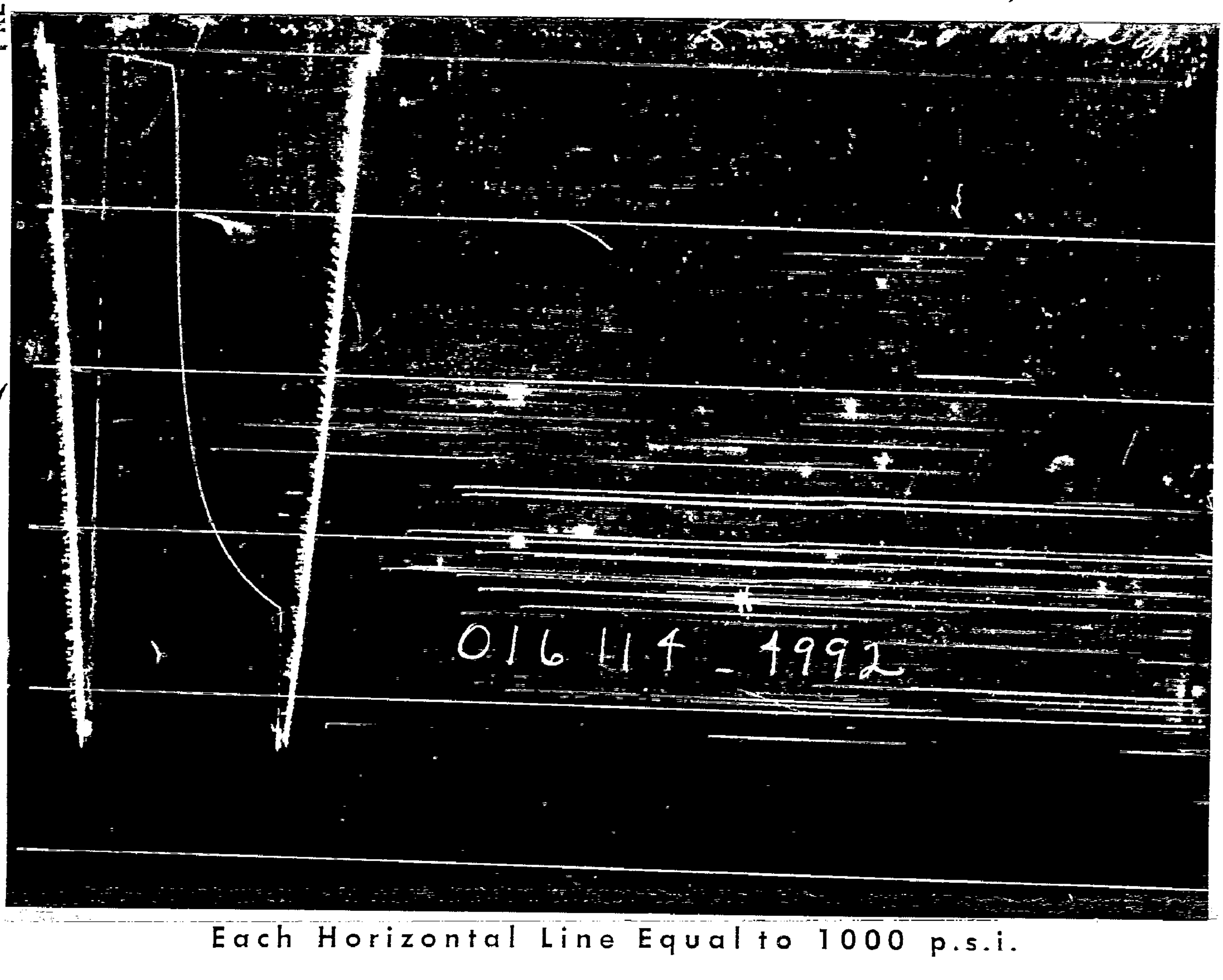
HALLIBURTON SERVICES

DUNCAN, OKLAHOMA



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: 1-10-77
Ticket Number: 016114
Kind of Job: HOOK WALL
Halliburton District: AUSTRALIA
Tester: LARKINS
Witness: GESTE
Drilling Contractor: O D E RIG # 5 NM S

EQUIPMENT & HOLE DATA

Formation Tested: -
Elevation: - Ft.
Net Productive Interval: - Ft.
All Depths Measured From: Kelly Bushing
Total Depth: 9053' Ft.
Main Hole/Casing Size: -
Drill Collar Length: - I.D. -
Drill Pipe Length: 8810' I.D. 2.992"
Packer Depth(s): 8835' Ft.
Depth Tester Valve: 8821' Ft.

Cushion TYPE AMOUNT: NONE Ft.
Depth Back Pres. Valve: NONE
Surface Choke: NONE
Bottom Choke: 5/8"

Recovered 200' Feet of salt water
Recovered ____ Feet of ____
Recovered ____ Feet of ____
Recovered ____ Feet of ____
Recovered ____ Feet of ____
(Meas. From Tester Valve)

Remarks: Tool opened at 10:35 PM with a strong blow - moderate to a weak blow at 10:40 PM.. Closed tool for a 469 minute closed in pressure. SEE PRODUCTION TEST DATA SHEET...

Q-Questionable

TEMPERATURE	Gauge No. 3427, Depth: 8827' Ft.		Gauge No. 4992, Depth: 8845' Ft.		Gauge No. ____, Depth: ____ Ft.		TIME	
	72 Hour Clock		72 Hour Clock		Hour Clock		Tool Opened 10:35 P.M.	
Est. °F.	Blanked Off NO		Blanked Off YES		Blanked Off			
Actual 260 °F.	Pressures		Pressures		Pressures		Opened Bypass 2:35 P.M.	
	Field	Office	Field	Office	Field	Office	Reported Minutes	Computed Minutes
Initial Hydrostatic	4246.6	4270 Q	4249.8	4245				
First Period Flow Initial	16.8	57	32.2	74			—	—
First Period Flow Final	100.7	101	112.6	104			240	244
First Period Closed in	3460.6	3468	3465.9	3458			473	469
Second Period Flow Initial							—	—
Second Period Flow Final								
Second Period Closed in								
Third Period Flow Initial							—	—
Third Period Flow Final								
Third Period Closed in								
Final Hydrostatic	4246.6	4270 Q	4269.8	4245			—	—

Legal Location Sec. - Twp. - Rng.: -
Lease Name: POOLAWANNA
Well No.: 1
Test No.: 8
Tested Interval: 8835' - 9053'
Field Area: WILDCAT
County: -
State: SOUTH AUSTRALIA
Lease Owner/Company Name: DELHI-INTERNATIONAL OIL CORPORATION

Casing perfs. 8870' - 8878' - 8880 - 8890' 8934' - 8944' Bottom choke 3/8" Surf. temp ____ °F Ticket No. 016114

Gas gravity ____ Oil gravity ____ GOR ____

Spec. gravity ____ Chlorides ____ ppm Res. ____ @ ____ °F

INDICATE TYPE AND SIZE OF GAS MEASURING DEVICE USED ____

Date 9-29-77 Time a.m. p.m.	Choke Size	Surface Pressure psi	Gas Rate MCF	Liquid Rate BPD	Remarks
6:45					Started in the hole.
10:35					Opened tool with a strong blow.
10:40					Moderate blow to a weak blow.
2:35 AM					Closed DCIP Valve for a 469 minute closed in pressure.
10:28 AM					Pulled tool loose - pulled out of the hole.
3:00 PM					Out of the hole..

FORM 182-R1—PRINTED IN U.S.A.

PRODUCTION TEST DATA

LITTLE'S 96672 5M 8/74

Gauge No. 3427 | Depth 8827' | Clock No. 6248 | 72 hour | Ticket No. 016114

	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	.000	57	.000		101										
1	.0531	45*	.0387		1377**										
2	.1073	59	.0729		2007										
3	.1616	74	.1071		2358										
4	.2158	87	.1414		2619										
5	.2700	101	.1756		2799										
6			.2099		2938										
7			.2441		3047										
8			.2783		3135										
9			.3126		3207										
10			.3468		3269										
11			.3810		3319										
12			.4153		3366										
13			.4495		3406										
14			.4838		3445										
15			.5180		3468										

Gauge No. 4992 | Depth 8845' | Clock No. 11660 | hour 72

	First Flow Period		First Closed In Pressure			Second Flow Period		Second Closed In Pressure			Third Flow Period		Third Closed In Pressure		
0	.000	74	.000		104										
1	.0519	50*	.0378		956**										
2	.1050	66	.0712		1879										
3	.1580	80	.1047		2295										
4	.2110	91	.1381		2577										
5	.2640	104	.1715		2769										
6			.2050		2912										
7			.2384		3024										
8			.2719		3113										
9			.3053		3194										
10			.3388		3246										
11			.3722		3301										
12			.4057		3348										
13			.4391		3390										
14			.4725		3429										
15			.5060		3458										
Reading Interval	49		31												Minutes

REMARKS: * INTERVAL = 48 MINUTES. ** INTERVAL = 35 MINUTES.

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FORM 193-R1—PRINTED IN U.S.A.

SPECIAL PRESSURE DATA

LITTLE'S 96673 75C 8/74

0033

TICKET NO. 016114

	O.D.	I.D.	LENGTH	DEPTH
Drill Pipe or Tubing				
Reversing Sub				
Water Cushion Valve				
Drill Pipe	3.5"	2.992"	8810'	
Drill Collars				
Handling Sub & Choke Assembly				
Dual CIP Valve	3 7/8"		5.00'	
Dual CIP Sampler				
Hydro-Spring Tester	3 7/8"		5.00'	8821'
Multiple CIP Sampler				
Extension Joint				
AP Running Case	3 7/8"			8827'
Hydraulic Jar				
VR Safety Joint				
Pressure Equalizing Crossover				
Packer Assembly				
Distributor				
Packer Assembly				
Flush Joint Anchor				
Pressure Equalizing Tube				
Blanked-Off B.T. Running Case				
Drill Collars				
Anchor Pipe Safety Joint				
Packer Assembly				
Distributor				
Packer Assembly				
Anchor Pipe Safety Joint				
Side Wall Anchor Hook Wall	7"			8835'
Drill Collars				
Flush Joint Anchor				
Blanked-Off B.T. Running Case				8845'
Total Depth				9053'

FORM 187-R1—PRINTED IN U.S.A.

EQUIPMENT DATA

LITTLE'S 96676 75C 8/74

RESTRICTED INVESTIGATION REPORT 927R

CSIRO

MINERALS RESEARCH LABORATORIES

FUEL GEOSCIENCE UNIT

SOURCE ROCK AND OIL ANALYSES ON SAMPLES FROM POOLOWANNA No. 1 AND MACUMBA No. 1 EROMANGA & SIMPSON ~~PEDIRKA~~ BASIN, SOUTH AUSTRALIA

J.D. SAXBY, N.J. RUSSELL, L. BRUEN AND J. FRIEDRICH

P.O. Box 136
NORTH RYDE NSW
AUSTRALIA 2113

MARCH 1978

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1. INTRODUCTION

This report contains the results of analyses carried out by CSIRO on ten core samples, two sidewall core samples and some selected ditch cuttings provided by Delhi Petroleum from Poolowanna No. 1 and Macumba No. 1 in the Pedirka Basin, South Australia. The report also contains results on two oils from Poolowanna No. 1. In addition, one core sample from Poolowanna No. 1 contained obvious coaly material, so some of this coal was scraped off and analysed as a separate sample. Locations of the two wells are shown in Fig. 1.

2. METHODS AND RESULTS

2.1. Extractable Organic Matter

Part of each sample was crushed and ground to approximately 75% below 70 μm and extracted in a Soxhlet with purified chloroform for 8 hours or until extraction was complete. Evaporation of the solvent under a stream of nitrogen gave the total extract. That part of the total extract soluble in petroleum ether was then transferred to a 5 x 1 cm column of florisil and eluted with petroleum ether to give the aliphatic fraction. Benzene was added to the residue of the total extract and the resulting solution poured onto the florisil column. Elution with benzene gave the aromatic fraction. Similarly, methanol was added to the residue of the total extract and the resulting solution added to the florisil column. Elution with methanol gave the polar fraction. The total extract and each of these fractions are expressed as parts per million of the original core in Table 1. Any of the total extract not redissolving in petroleum ether, benzene or methanol is shown in Table 1 as "residue". Thus:

$$\begin{aligned}\text{total extract} = {} & \underset{(\text{ppm})}{\text{aliphatic fraction}} + \underset{(\text{ppm})}{\text{aromatic fraction}} + \underset{(\text{ppm})}{\text{polar fraction}} \\ & + \underset{(\text{ppm})}{\text{residue}} + \text{losses and material remaining on the column}\end{aligned}$$

The probable error in each of these values is difficult to estimate and depends on the weight of core extracted and the nature of the extract. However, the following ranges should cover virtually all samples:

total extract	± 30 ppm
aliphatic fraction	± 5 ppm
aromatic fraction	± 10 ppm
polar fraction	± 10 ppm
residue	± 5 ppm

The aliphatic fraction was analysed by gas chromatography for hydrocarbons in the n-C_{15} to n-C_{35} boiling range. The resulting chromatograms are shown in Figs. 2-4.

2.2. Carbon and Sulphur Analyses

Total carbon and sulphur were determined on a sample of ground core using a Leco analyzer. Organic carbon was determined on a sample which had previously been treated with dilute HCl to remove carbonates. The probable error in all these values is ± 0.05%.

2.3. Reflectance Measurements

In the case of cores, part of each sample was crushed to -0.7 mm and the carbonaceous material was concentrated by froth flotation. The Black shale and/or coal was handpicked from ditch cuttings. In each case the carbonaceous material was mounted in cold setting resin, ground and polished. Reflectance measurements were made on vitrinite and sporinite particles having diameters 5 µm or larger. Mean values for vitrinite in the cores at 546 nm with oil (refractive index 1.515) are listed in Table 1. A probable error of ± 0.05% corresponding to twice the standard error of the mean is applicable in most cases. More detailed reflectance data and values for sporinite are given in Table 2.

2.4. Oil Analyses

The two oils were separated into fractions in the same manner as the extracts (Table 3) and gas chromatograms were run on the aliphatic fractions (Figs. 5 and 6).

3. DISCUSSION

1. In most cases the total extracts are approximately proportional to the organic carbon content. Furthermore the aliphatic fractions form only a small proportion of the total extract which is predominantly aromatic. This would be consistent with most of the soluble matter coming from coaly material with a minimal contribution from migration. The complexity of the situation is illustrated by the variations in results and chromatograms even from the same core.

2. The alkane distributions most resembling crude oils come from Core 3 in Poolowanna and Core 1 in Macumba.

3. The most reliable reflectance values are those for the coal partings in sandstone in the Poolowanna No. 1 well (L.N. 59760 and L.N. 59761). Although the samples rich in black shale should yield reliable results, there is evidence to suggest that dark (resinous) vitrinite may dominate the in situ vitrinite population in some samples, e.g. L.N. 59763.

4. Poolowanna No. 1 and Macumba No. 1 appear to exhibit similar depth/reflectance relationships between 2350 and 2530 metres (Figs. 7-9). Towards the base of Poolowanna No. 1 the reflectance data are less certain. Sidewall core samples (L.N. 59990 and L.N. 59991) and the lowest ditch cuttings samples (L.N. 60088) suggest a possible discontinuity in the depth/reflectance curve. This remains to be confirmed.

5. Data from the gas chromatograms of the oils are plotted in Fig. 10 and 11. This method of crude oil comparison has been described in Geochim. Cosmochim. Acta, 1978, 42, 215-217. Both oils are similar and have undergone very little, if any, bacterial alteration. It is possible that the original oil formed from the source rock has undergone disproportionation to give the present waxy crude and a lighter fraction that may have been lost.

6. A moderately high geothermal gradient (3.5°C/100 m in Poolowanna and 3.2°C/100 m in Macumba) usually assists generation provided much higher temperatures have not been reached in the past.

4. CONCLUSION

1. Reflectance and other data suggest that all the core samples examined from Poolowanna and Macumba are relatively immature and are unlikely to have acted as the source of the discovered (or any yet to be found) crude oils.

2. The presence of sporinite and resinous vitrinite in a number of the samples examined suggest that these are good potential source rocks. In other parts of the basin the geothermal temperatures may already have been somewhat higher resulting in the breakdown of such material into hydrocarbons.

3. The two oils analyzed from Poolowanna are similar and likely to have been generated at least in part from waxy, land plant material. It is likely that the initial oil formed has lost an appreciable amount of lower molecular weight hydrocarbons by some type of disproportionation either during migration or since being trapped in the reservoir.

TABLE 1. ANALYTICAL DATA ON CORE AND SIDEWALL CORE SAMPLES FROM THE PEDIRKA BASIN

CSIRO Lab. No.	Well	Core	Depth (m)	Total Extract (ppm)	Aliphatic Fraction (ppm)	Aromatic Fraction (ppm)	Polar Fraction (ppm)	Residue (ppm)	Reflect-ance (%)	Total Sulphur (%)	Carbonate Carbon (%)	Organic Carbon (%)
59760	Poolowanna No. 1	1	2355.8	1040	70	280	400	81	0.76	0.03	0.05	0.75
59761	Poolowanna No. 1	1	2363.1	1150	50	410	160	99	0.74	0.02	0.05	0.85
59762	Poolowanna No. 1	3	2572.8	3200	71	1400	380	760	0.76	0.05	0.05	3.00
59763	Poolowanna No. 1	3	2569.5	6300	220	3900	280	61	-	0.09	0.75	5.60
59764	Poolowanna No. 1	4	2799.9	23	0	5	38	0	0.92	<0.01	0.00	<0.05
59861	Macumba No. 1	1	2344.8-2344.9	2800	120	1200	300	420	0.74	0.04	0.15	4.60
59862	Macumba No. 1	1	2353.5-2353.6	1600	50	910	180	13	0.79	0.03	0.25	2.55
59863	Macumba No. 1	2	2535.1-2535.2	40	6	5	55	0	0.83	0.01	0.05	0.05
59864	Macumba No. 1	2	2542.3	190	6	13	74	2	-	0.26	0.95	0.15
59865	Macumba No. 1	3	2601.2	180	2	0	73	0	-	<0.01	0.25	<0.05
59990	Poolowanna No. 1	S.W.C.	2601.5	3900	280	2300	740	35	0.85	0.07	0.05	6.20
59991	Poolowanna No. 1	S.W.C.	2596.9	4000	810	1800	530	78	0.74	0.07	0.00	5.70
59831	Coal from L.N. 59760 Poolowanna No. 1	-	2355.8	300000	1500	16000	10300	180000	n.d.	n.d.	n.d.	n.d.

- = insufficient material

n.d. = not determined

TABLE 2. DETAILED REFLECTANCE DATA FOR POOLOWANNA NO. 1 AND MACUMBA NO. 1

Depth (metres)	Laboratory Number	Sample Type** (Lithology)	Vitrinite $\bar{R}_o$ Max. %*	Sporinite $\bar{R}_o$ Max. %*
	POOLOWANNA NO. 1			
2011.7-2023.9	59767-59770 COMPOSITE	DC	0.66(100)	0.19(18)
2112.3-2127.5	59800-59804 COMPOSITE	DC	0.69(110)	0.25(11)
2234.2-2237.2	59878	DC	0.49(8)†, 0.73(72)	0.27(11)
2313.4 2316.5	59904	DC	0.68(110)	0.28(25)
2355.8	59760	CC (Ss + C)	0.60(28)‡, 0.76(114)	0.23(2)
2363.1	59761	CC (Ss + C)	0.51(11)‡, 0.74(127)	0.35(3)
2417.1	59938	DC	0.81(66)	0.31(30)
2502.4-2505.5	59967	DC	0.66(74), 0.86(45)	0.29(11), 0.49(5)
2569.5	59763	CC (BkSh)	0.66(101)	0.23(22), 0.44(10)
2572.8	59762	CC (Ss + Bsh)	0.60(37), 0.76(58)	0.29(40)
2596.9	59991	SWC	0.74(3), 1.01(14), 1.35(63)	0.31(2), 0.61(4)
2596.9-2599.9	60016	DC	0.62(19), 0.83(23)	0.22(9), 0.41(28)
2601.5	59990	SWC	0.85(3), 1.04(11), 1.49(48)	0.25(7), 0.40(10)
2761.5-2764.5	60076	DC	0.83(113)	0.37(13), 0.53(10)
2799.9	59764	CC (Sst)	0.60(1), 0.92(17)	0.27(7)

TABLE 2 (Cont)

Depth (metres)	Laboratory Number	Sample Type** (Lithology)	Vitrinite $\bar{R}_o$ Max. %*	Sporinite $\bar{R}_o$ Max. %*
		POOLOWANNA NO. 1 (Cont)		
2800.5-2804.2	60088	DC	0.46(27)†, 0.80(40), 1.09(59)	0.36(5)
		MACUMBA NO. 1		
2344.8	59861	CC (BkSh)	0.74(11)	0.16(13)
2353.4	59862	CC (Ss + BSh)	0.79(127)	0.12(6)
2531.4-2535.3	59863	CC (Lmst)	0.83(1), 1.13(1)	0.31(2)
2542.3	59864	CC (Ss/BSh)	0.74(3)	
2601.2	59865	CC (Lmst)	0.74(1)	0.29(2)

* Numbers in parenthesis refer to the number of readings leading to the given mean. The underlined values probably represent in situ vitrinite populations.

** DC = Ditch cuttings
CC = Conventional core
SWC = Sidewall core
Ss + C = Sandstone + coal
Ss + BSh == Sandstone + black shale
Sst = Sandstone
BkSh = Black shale
Ss/BSh = Finely laminated sandstone/black shale
Lmst = Limestone
† = Contamination (drilling mud additive)
‡ = Dark (resinous) vitrinite

TABLE 3. DATA ON POOLOWANNA NO. 1 OIL

CSIRO Lab. No.	Test	Depth (m)	Aliphatic Fraction (%)	Aromatic Fraction (%)	Polar Fraction (%)	Low-boiling Material* (%)
59832	DST 5	2506.3-2517.6	62.3	6.1	1.2	30.4
59833	DST 6	2557.9-2567.9	81.2	7.3	1.9	9.6

*Represents material lost during evaporation of aliphatic, aromatic and polar fractions (together with a small amount of material not eluted from the florisil column).

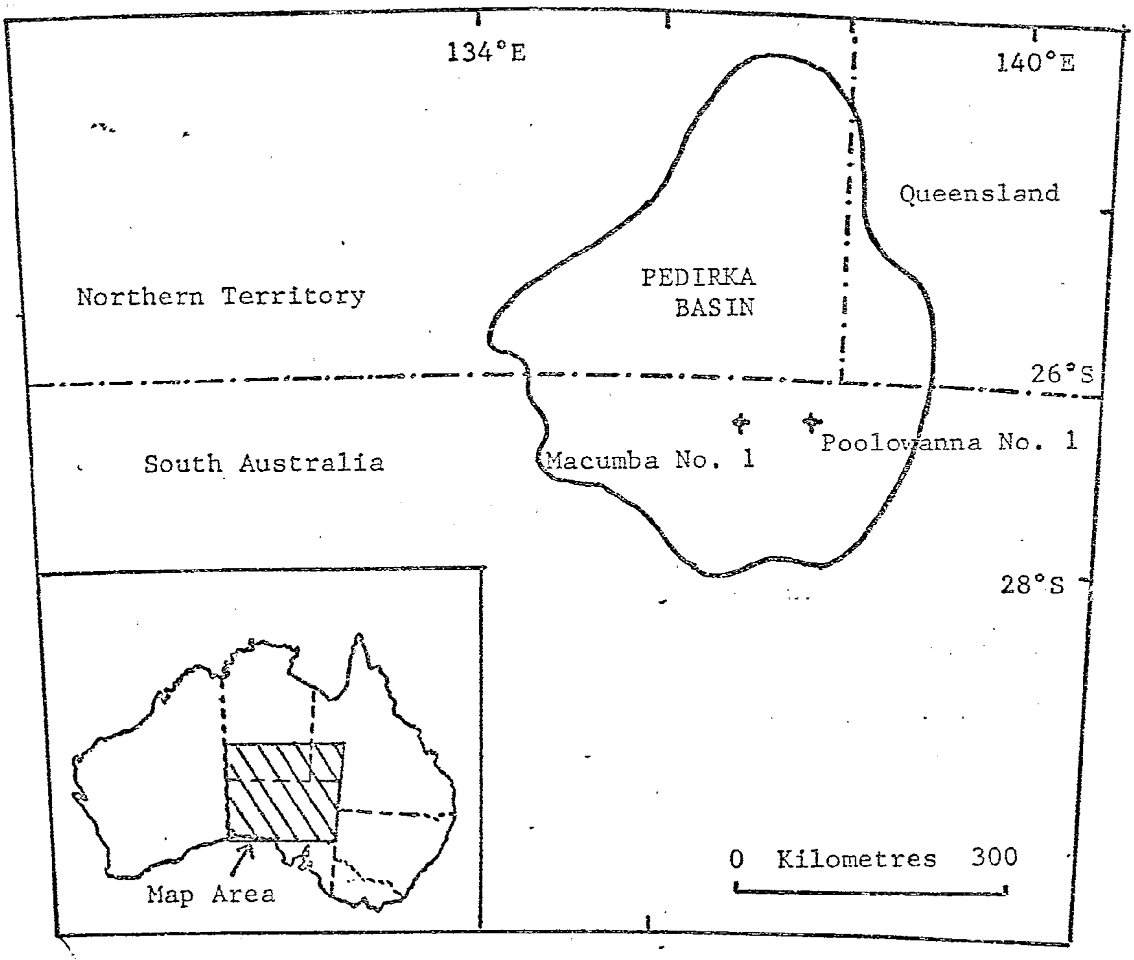
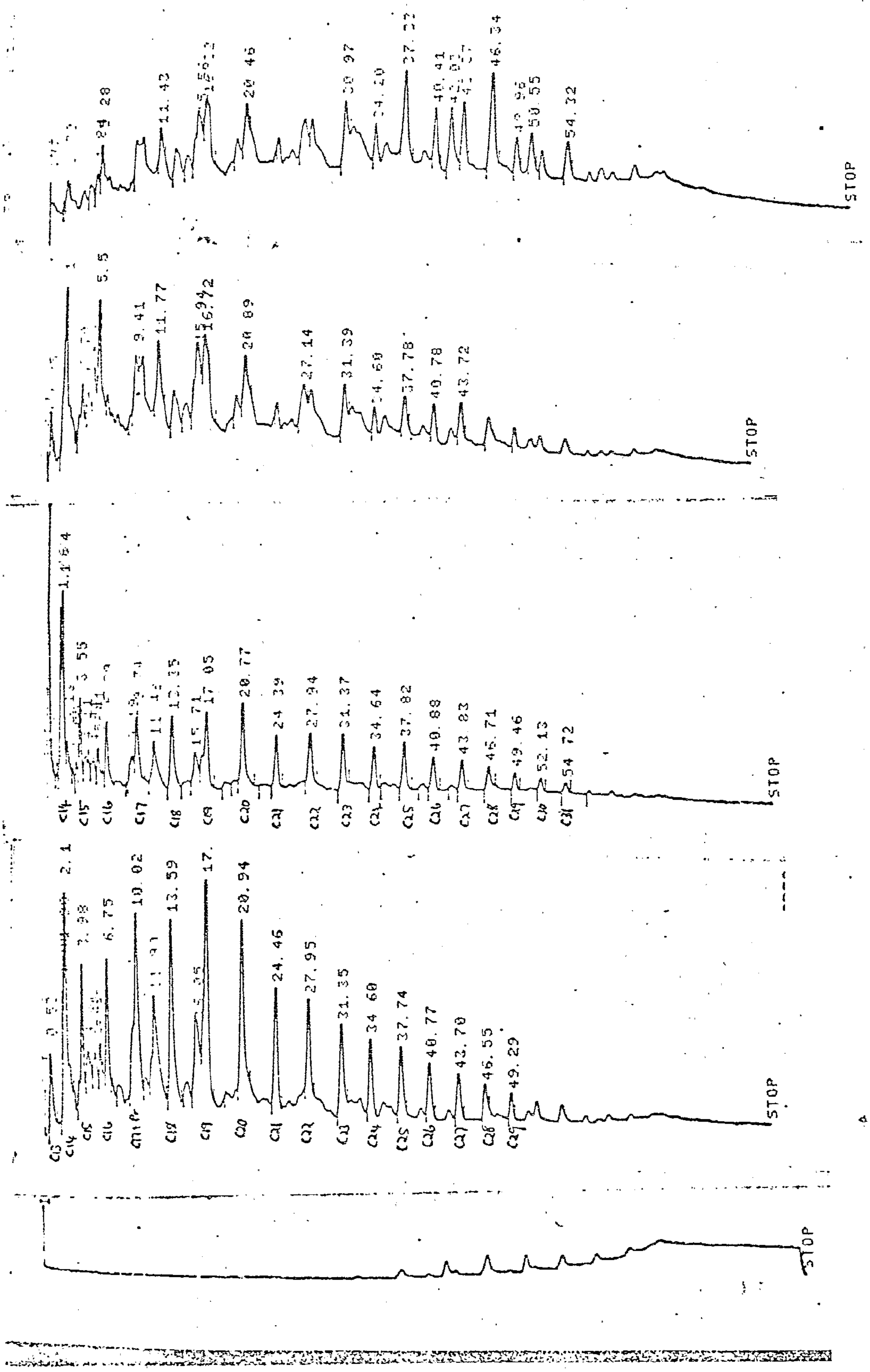


FIG. 1. LOCATION OF POOLOWANNA AND MACUMBA WELLS IN THE PEDIRKA BASIN

FIG. 2. GAS CHROMATOGRAMS OF ALIPHATIC FRACTIONS EXTRACTED FROM POOLOWANNA NO. 1 CORE SAMPLES



L.N. 59760
Poolowanna No. 1
Core 1
2355.8-2360.0 m

L.N. 59761
Poolowanna No. 1
Core 1
2363.1-2363.2 m

L.N. 59763
Poolowanna No. 1
Core 3
2569.5 m

L.N. 59762
Poolowanna No. 1
Core 3
2572.8 m

L.N. 59764
Poolowanna No. 1
Core 4
2799.9-2800.0 m

FIG. 3. GAS CHROMATOGRAMS OF ALIPHATIC FRACTIONS EXTRACTED FROM POOLOWANNA NO. 1 SIDEWALL CORES AND COAL FROM CONVENTIONAL CORE 1

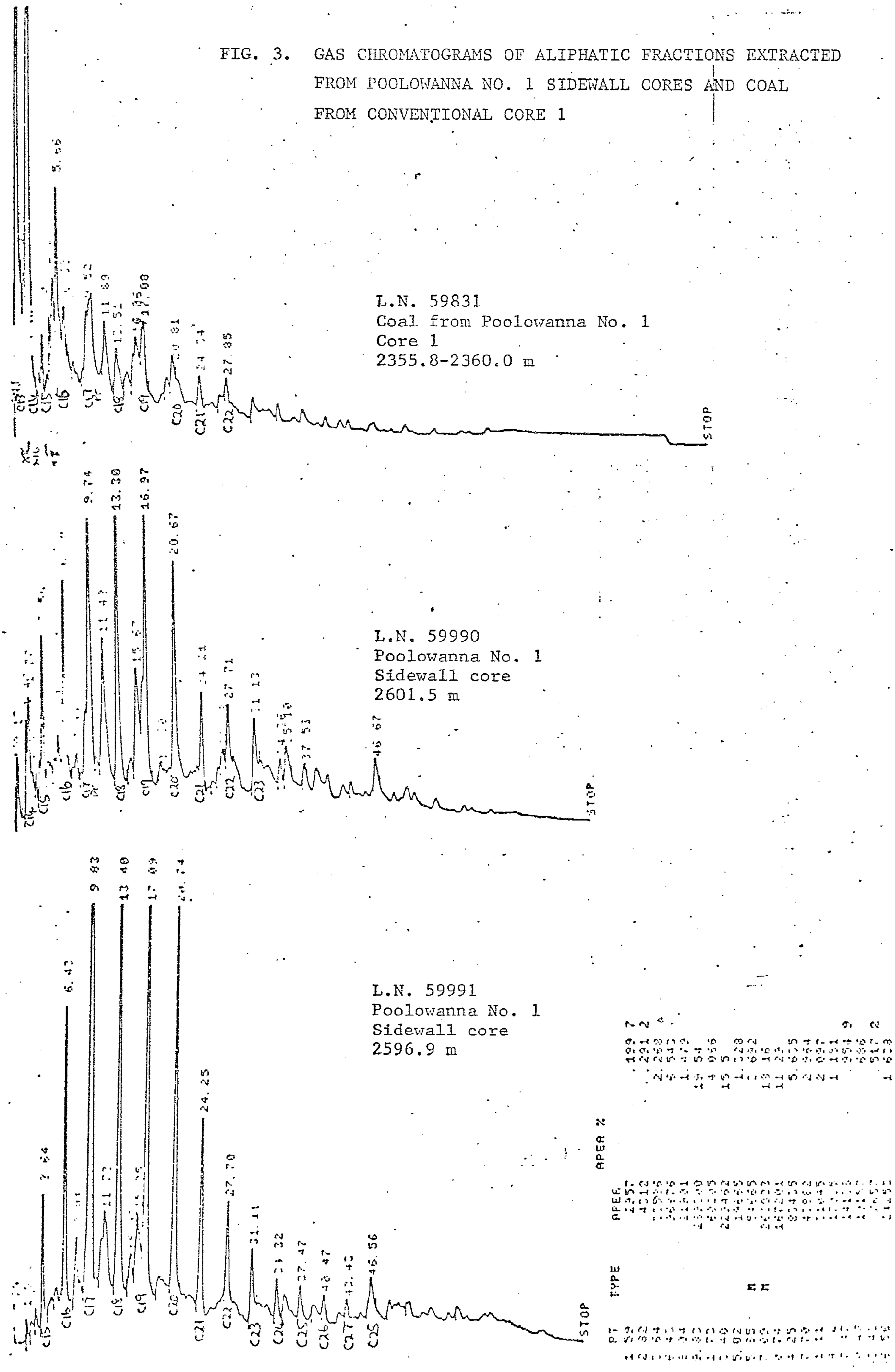


FIG. 4. GAS CHROMATOGRAMS OF ALIPHATIC FRACTIONS EXTRACTED FROM MACUMBA NO. 1 CORE SAMPLES

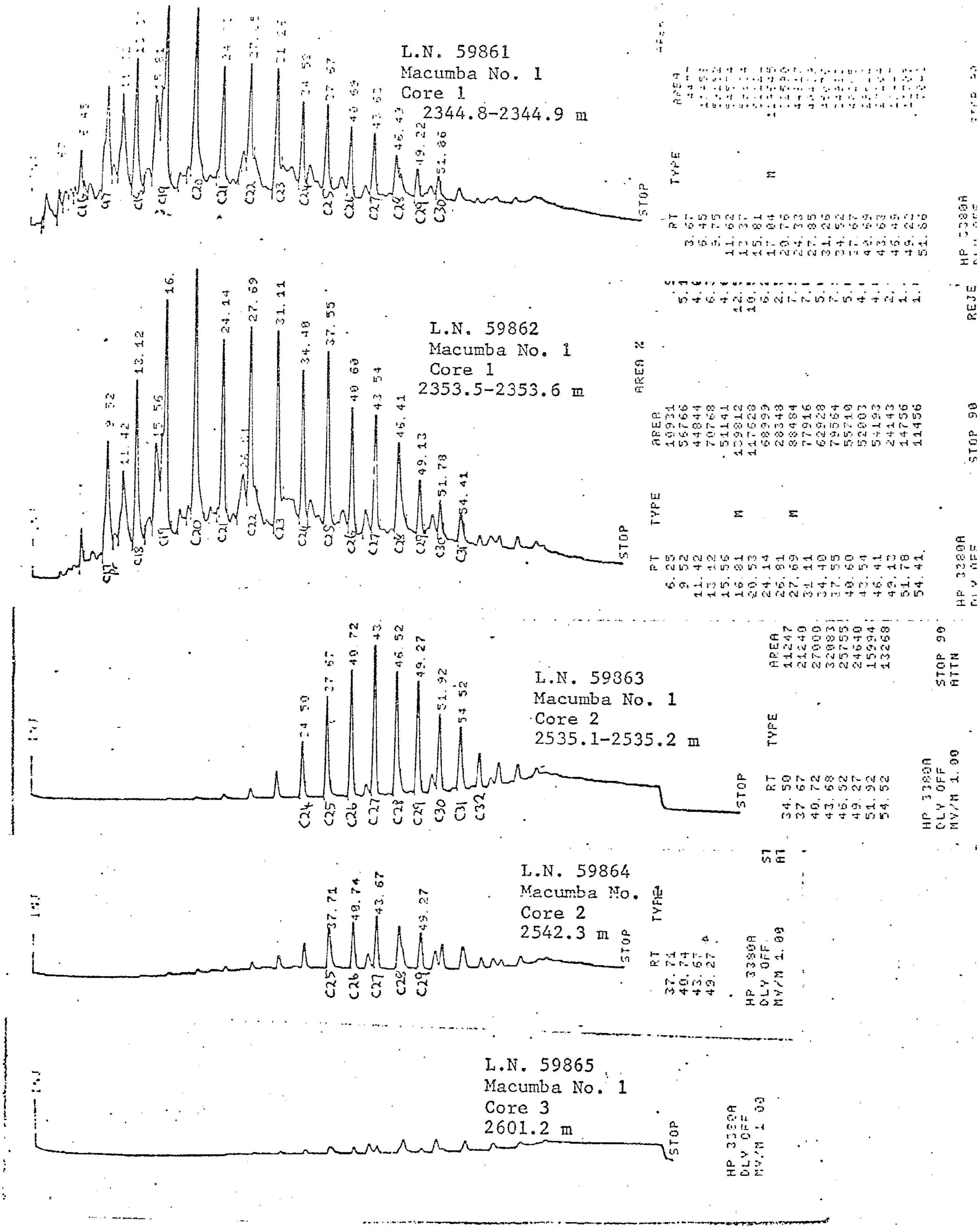
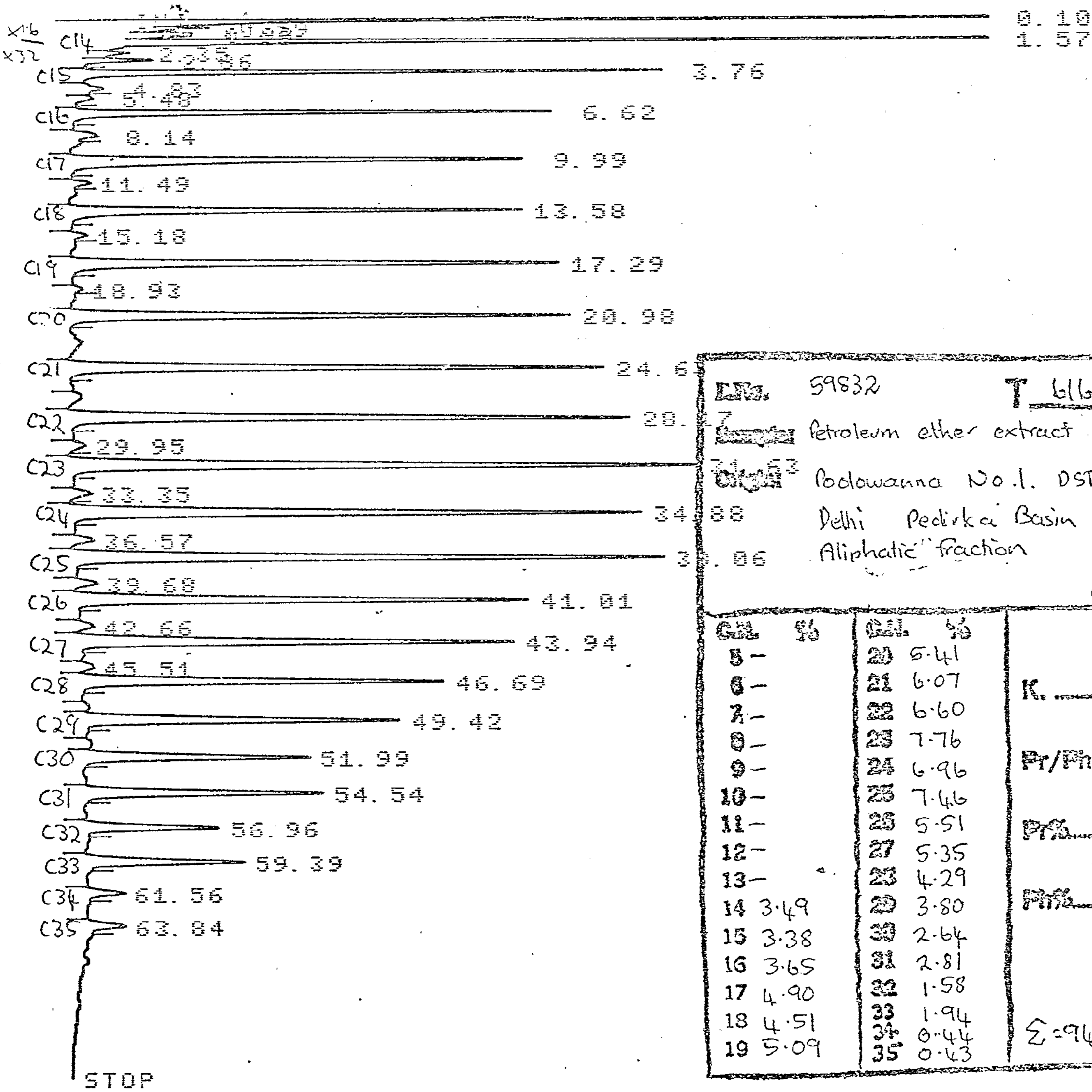


FIG. 5. GAS CHROMATOGRAM OF ALIPHATIC FRACTION SEPARATED FROM DST 5 IN POOLOWANNA NO. 1



L.No. 59832 T 6165

Sample Petroleum ether extract

Origin Poolowanna No.1. DST 5 Delhi Pedirka Basin Aliphatic fraction

C662

C.N.	%	C.N.	%
5	–	20	5·41
6	–	21	6·07
7	–	22	6·60
8	–	23	7·76
9	–	24	6·96
10	–	25	7·46
11	–	26	5·51
12	–	27	5·35
13	–	28	4·29
14	3·49	29	3·80
15	3·38	30	2·64
16	3·65	31	2·81
17	4·90	32	1·58
18	4·51	33	1·94
19	5·09	34	0·44
		35	0·43

K. ....

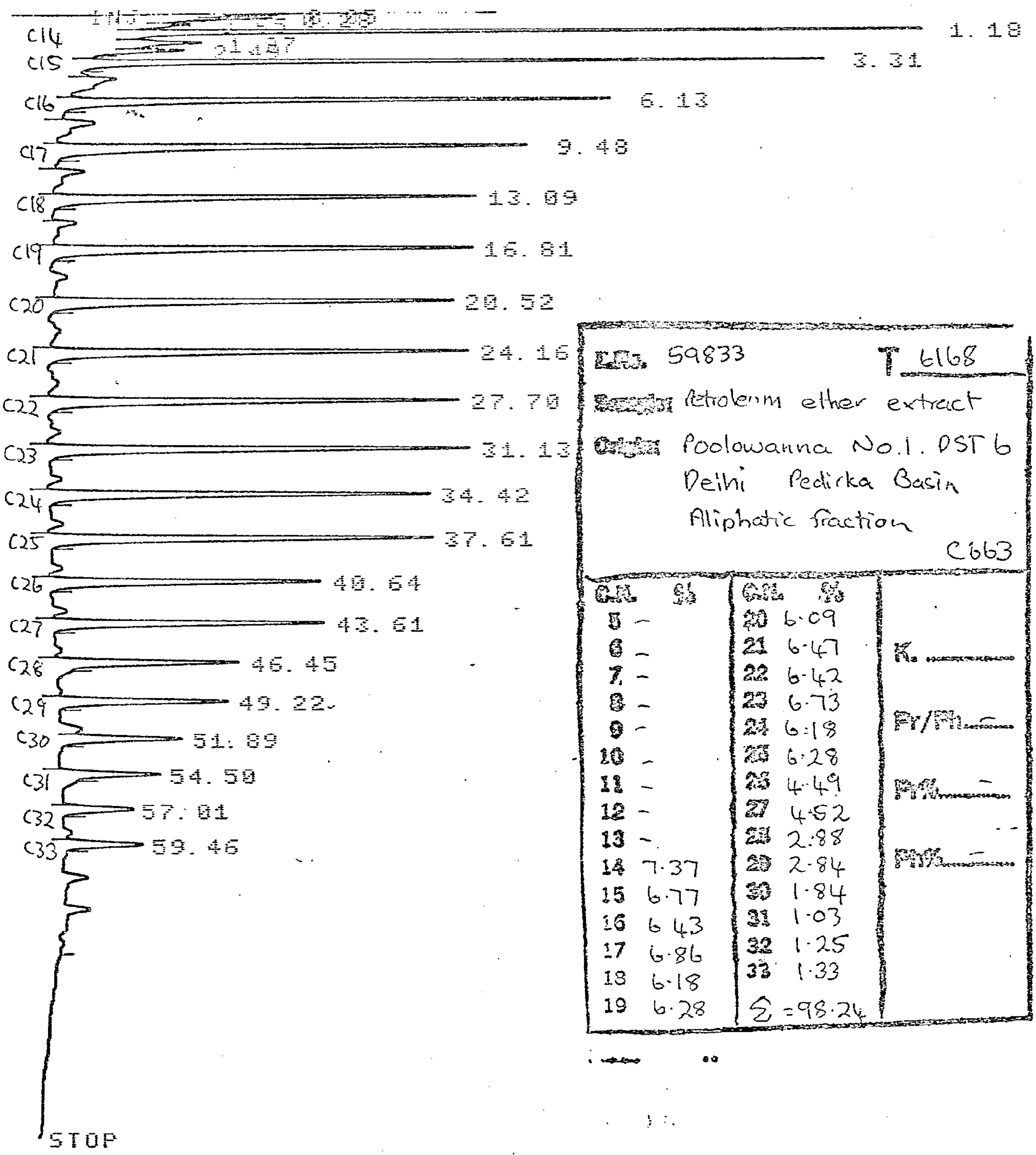
Pr/Ph ....

Pr% ....

Ph% ....

$\Sigma = 94{\cdot}07$

FIG. 6. GAS CHROMATOGRAM OF ALIPHATIC FRACTION SEPARATED FROM DST 6 IN POOLOWANNA NO. 1



L.R. 59833 T 6168

Sample: Petroleum ether extract

Origin: Poolowanna No.1. DST 6
Delhi Pedirka Basin
Aliphatic fraction

C663

C.N.	%	C.N.	%	
5	–	20	6·09	
6	–	21	6·47	K.
7	–	22	6·42	
8	–	23	6·73	Pr/Ph. –
9	–	24	6·18	
10	–	25	6·28	Pr% –
11	–	26	4·49	
12	–	27	4·52	Ph% –
13	–	28	2·88	
14	7·37	29	2·84	
15	6·77	30	1·84	
16	6 43	31	1·03	
17	6·86	32	1·25	
18	6·18	33	1·33	
19	6·28	Σ = 98·24		

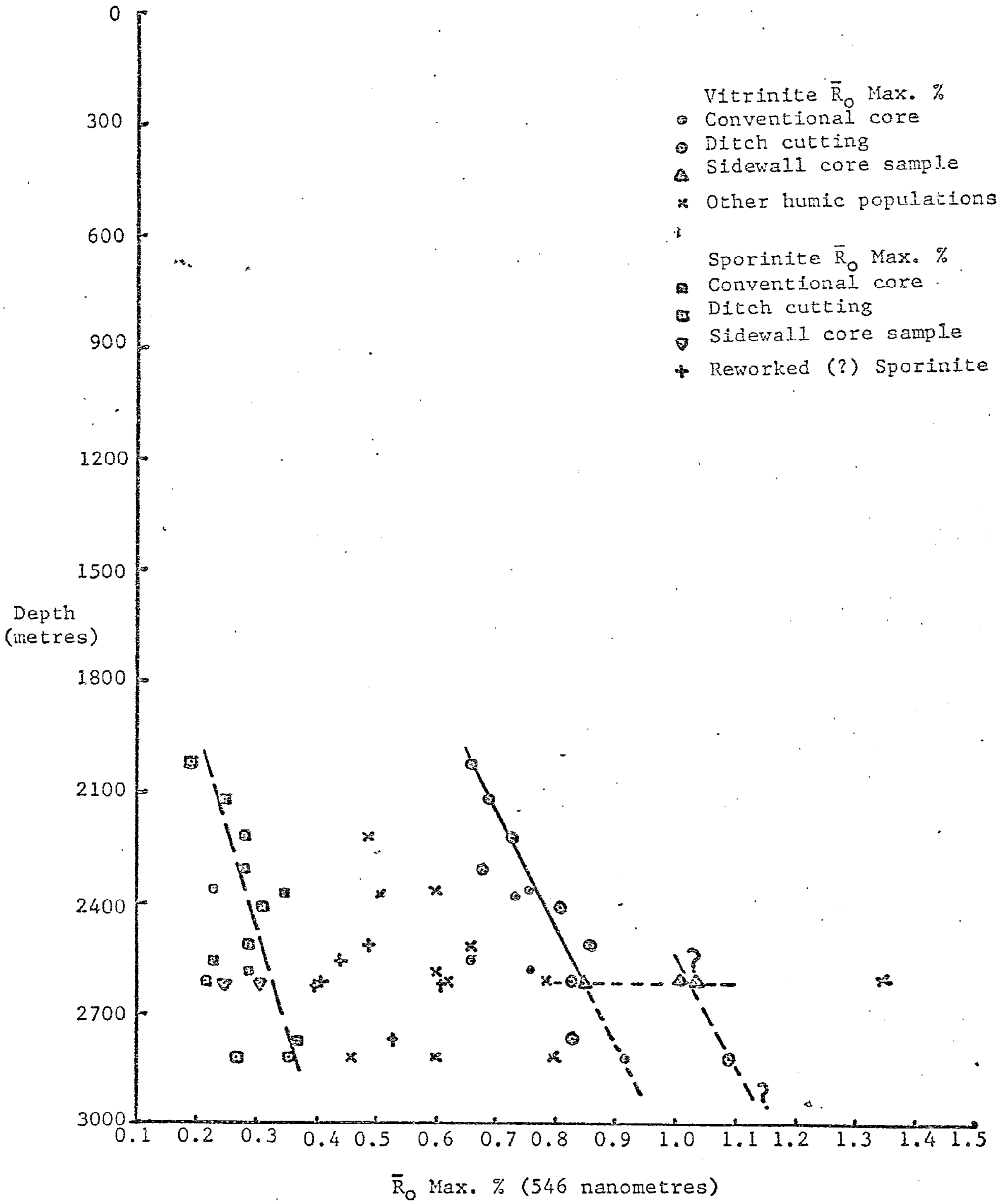


FIG. 7. REFLECTANCE CURVE FOR POOLOWANNA NO. 1

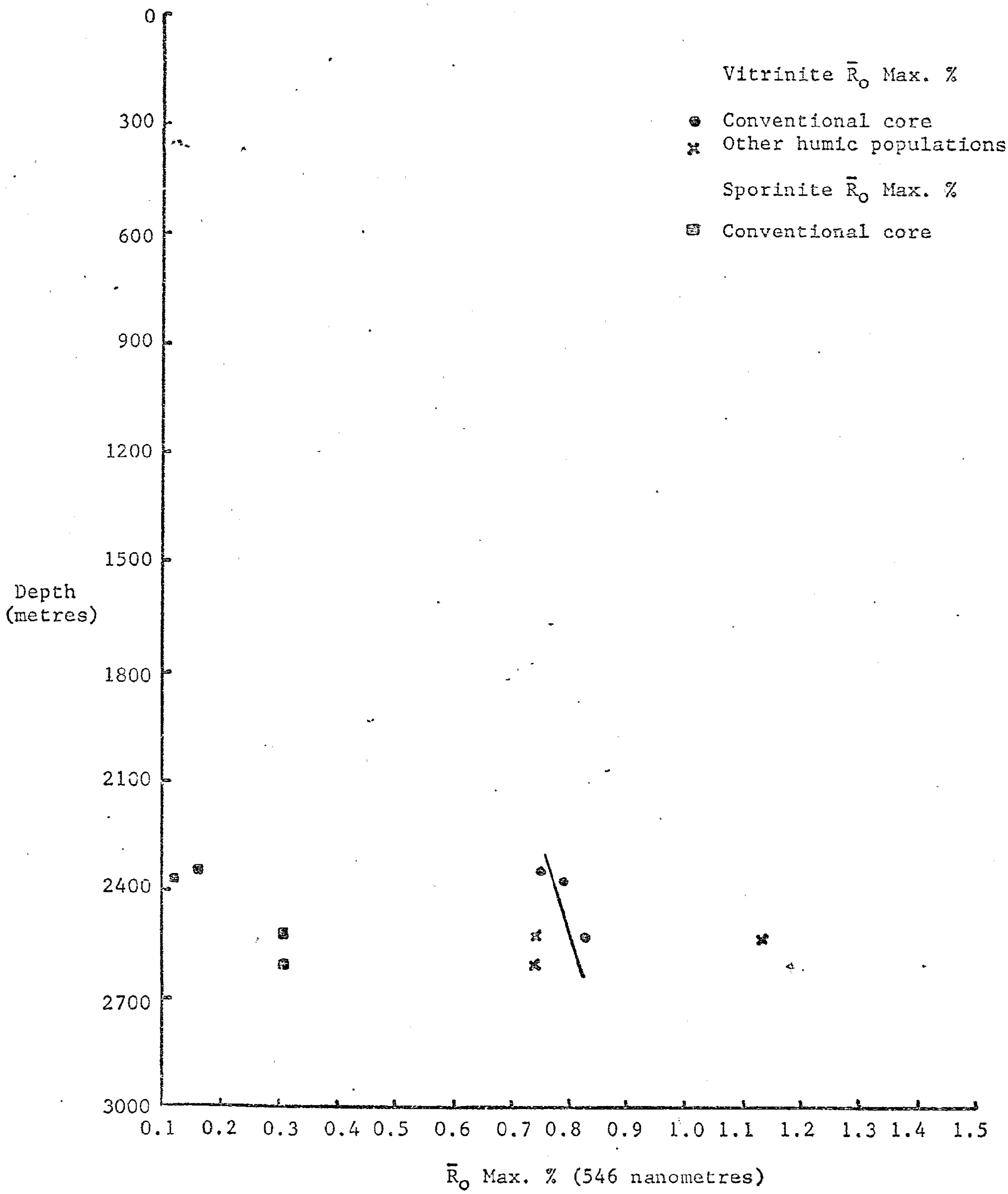


FIG. 8. REFLECTANCE CURVE FOR MACUMBA NO. 1

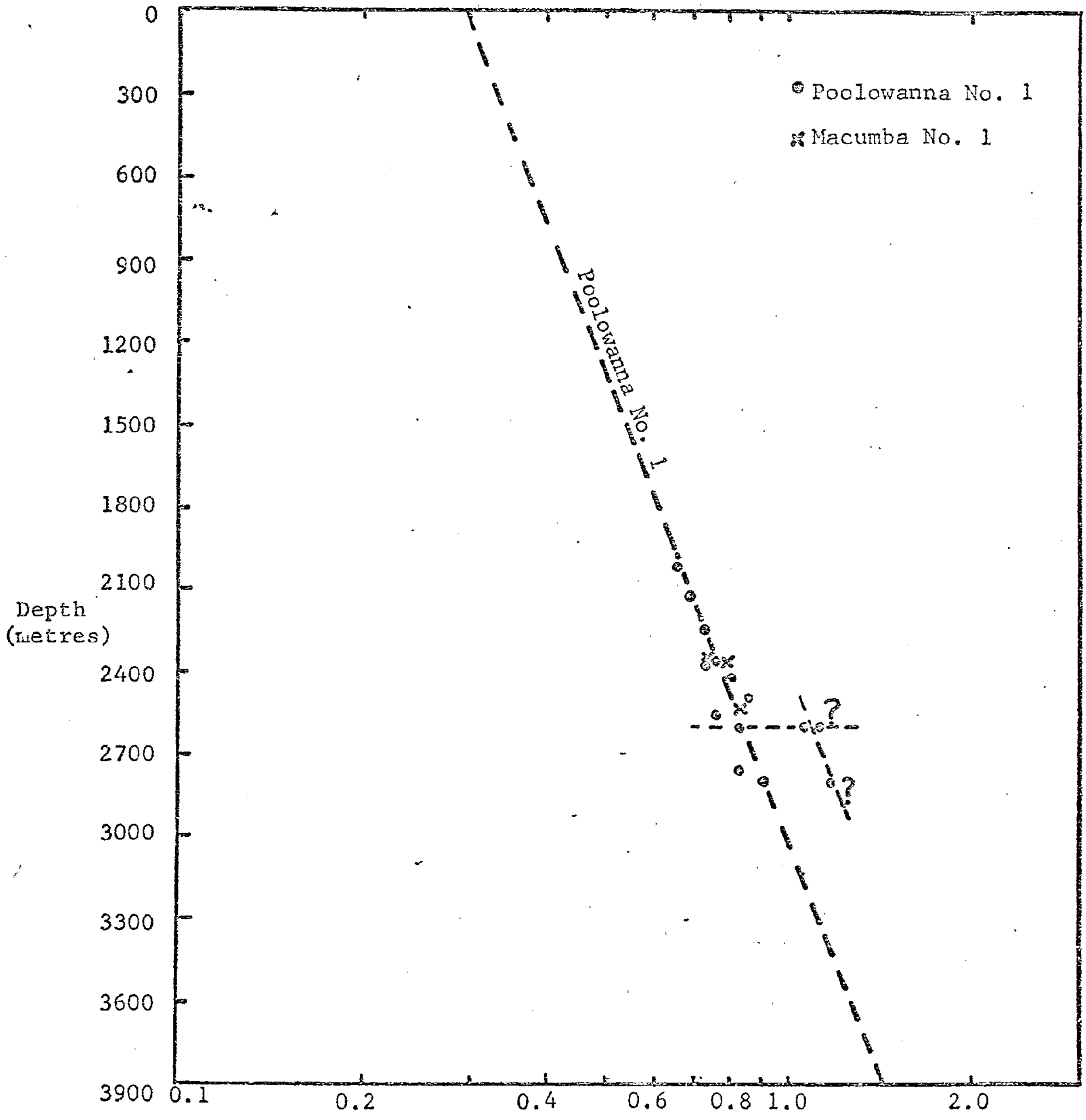


FIG. 9. LOG REFLECTANCE VERSUS DEPTH FOR POOLOWANNA NO. 1 AND MACUMBA NO. 1

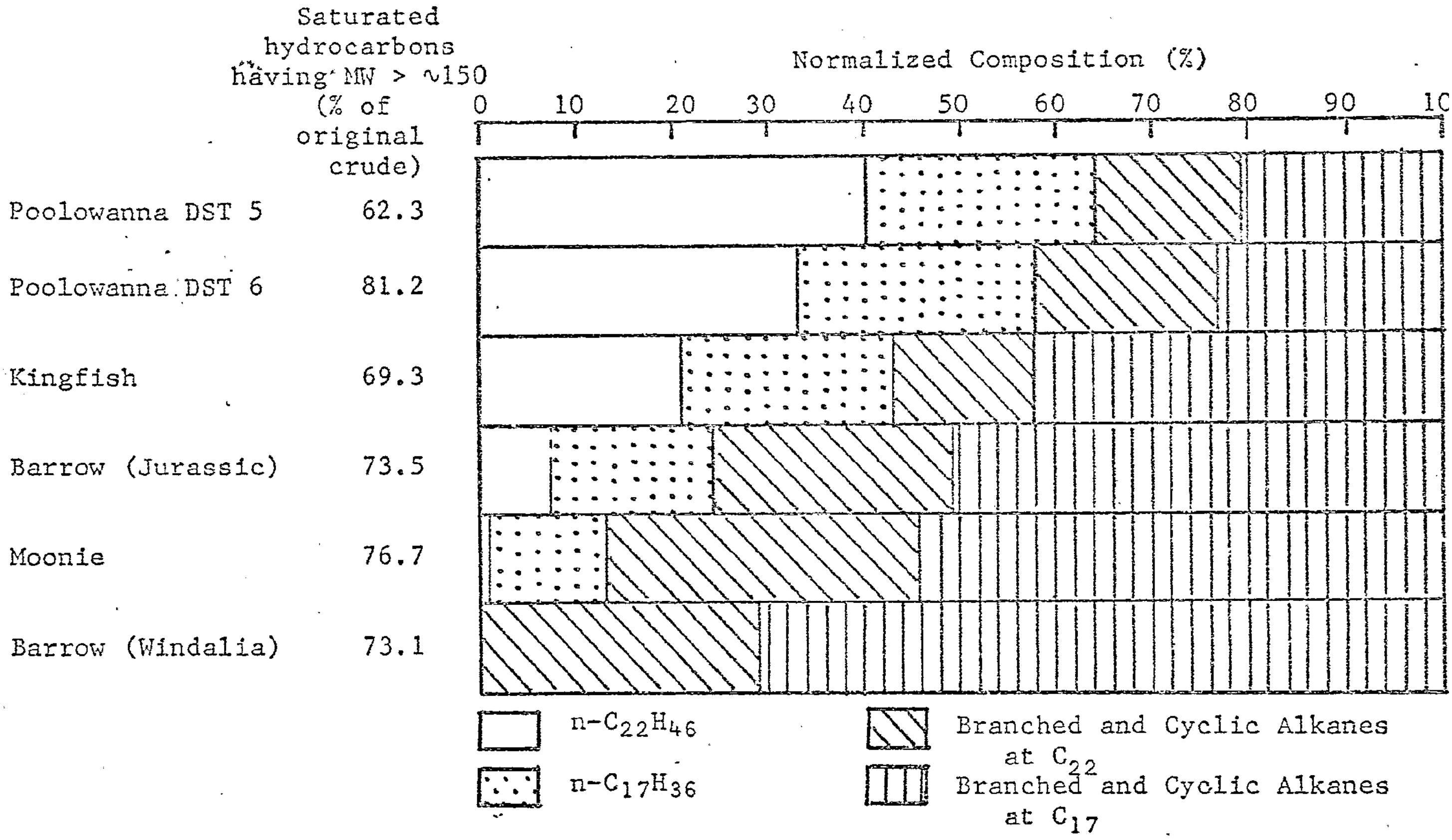


FIG. 10. DISTRIBUTION OF HYDROCARBONS IN POOLOWANNA OILS AND IN SELECTED AUSTRALIAN CRUDES (ARRANGED IN APPROXIMATE ORDER OF DECREASING WAX CONTENT)

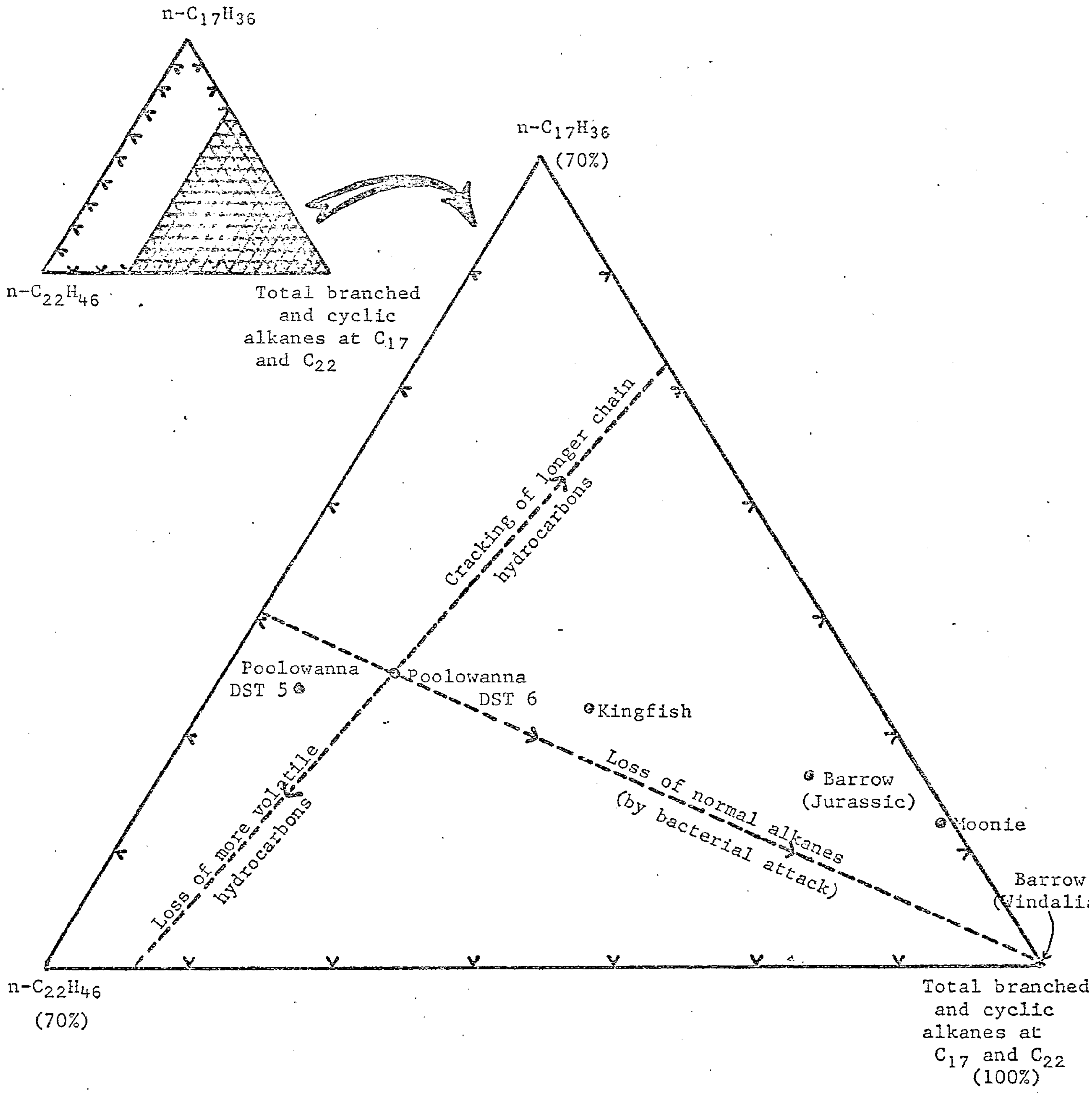


FIG. 11. COMPOSITIONS AND ALTERATION PATHWAYS OF VARIOUS CRUDE OILS

NJH

1978 MAY 16 AM 9:51

CSIRO

MINERALS RESEARCH LABORATORIES

P.O. BOX 136, NORTH RYDE, N.S.W., AUSTRALIA 2113 • *DELHI ROAD, NORTH RYDE.*

TELEPHONE *888 1666*
TELEGRAMS *MINRES NORTH RYDE*
TELEX *MINRE AA25817*

NJR.jcm

5th May, 1978

Mr N.J. Hamilton
Delhi International Oil Corporation
GPO Box 2364
ADELAIDE S.A. 5001

Dear Norrie,

I enclose the preliminary vitrinite reflectivity data for hand-picked coal samples from the interval 1200-8360 feet (365-2548 metres) in the Poolowanna No.1 well.

Teichmüller (1971) states that oil deposits occur in sediments containing vitrinite with reflectivity values of 0.3% to 1.0% and that economic gas deposits occur in sediments containing vitrinite with reflectivity values of 0.7% to 2.0%. Hood *et al.* (1975) suggest the following correlation between the thermal maturity of organic matter and vitrinite reflectivity values:-

Level of Thermal Maturity	Vitrinite Reflectivity (R_o)
Immature, i.e. early (diagenetic) methane	< 0.50
Onset of maturity with respect to oil generation	0.50-0.7
Mature (principal zone of oil generation)	0.7-1.3
Condensate and wet gas (Transition to post maturity)	1.3-2.0
Post mature; generation of high-temperature (katagenetic) methane	> 2.0

If this correlation between vitrinite reflectivity values and the level of thermal maturity are correct, the onset of oil generation from suitable organic matter should occur at a depth of about 1320 metres in the Poolowanna No.1 well. The principal zone of oil generation should be encountered at a depth of 2000 metres. Below 2720 metres, high °API gravity oils, condensate and wet gas should be generated from suitable organic matter.

Tissot *et al.* (1974) have discussed the importance of the nature of the organic matter on the type of hydrocarbon generated at a given level of thermal maturity. Kerogens with the highest atomic H/C and lowest atomic O/C values, e.g. algal kerogen, marine sapropel, are likely to yield the greatest quantity of liquid hydrocarbons in the zone of thermal maturity. Kerogens with low atomic H/C and high atomic O/C values, e.g. humic matter, are unlikely to constitute a major source of liquid hydrocarbons, but they should be capable of generating gas at a level of thermal maturity above that of the "oil generation window". Kerogens with intermediate atomic H/C and O/C values, corresponding to exinite, i.e. plant lipids, are capable of sourcing liquid hydrocarbons, possibly with a high wax content (high pour point) (Hedberg, 1963; Reed, 1969).

I would like to obtain a suite of coal samples from the Macumba No.1 well, if this is at all possible, in order to compare their reflectivity values with the reflectivity data for the Poolowanna No.1 well.

Yours sincerely,

N.J. Russell
Fuel Geoscience Unit

1) Hedberg, H.D. (1963). Bull. Amer. Assoc. Pet. Geol., 52(5), 736-750.

2) Hood, A., Gutjahr, C.C.M., and Heacock, R.L. (1975), Bull. Amer. Assoc. Pet. Geol., 59(6), 986-996.

3) Reed, K.J. (1969), Bull. Amer. Assoc. Pet. Geol., 53(7), 1502-1506.

4) Teichmüller (1971), Erdöl u. Kohle, 24(2) 69-76.

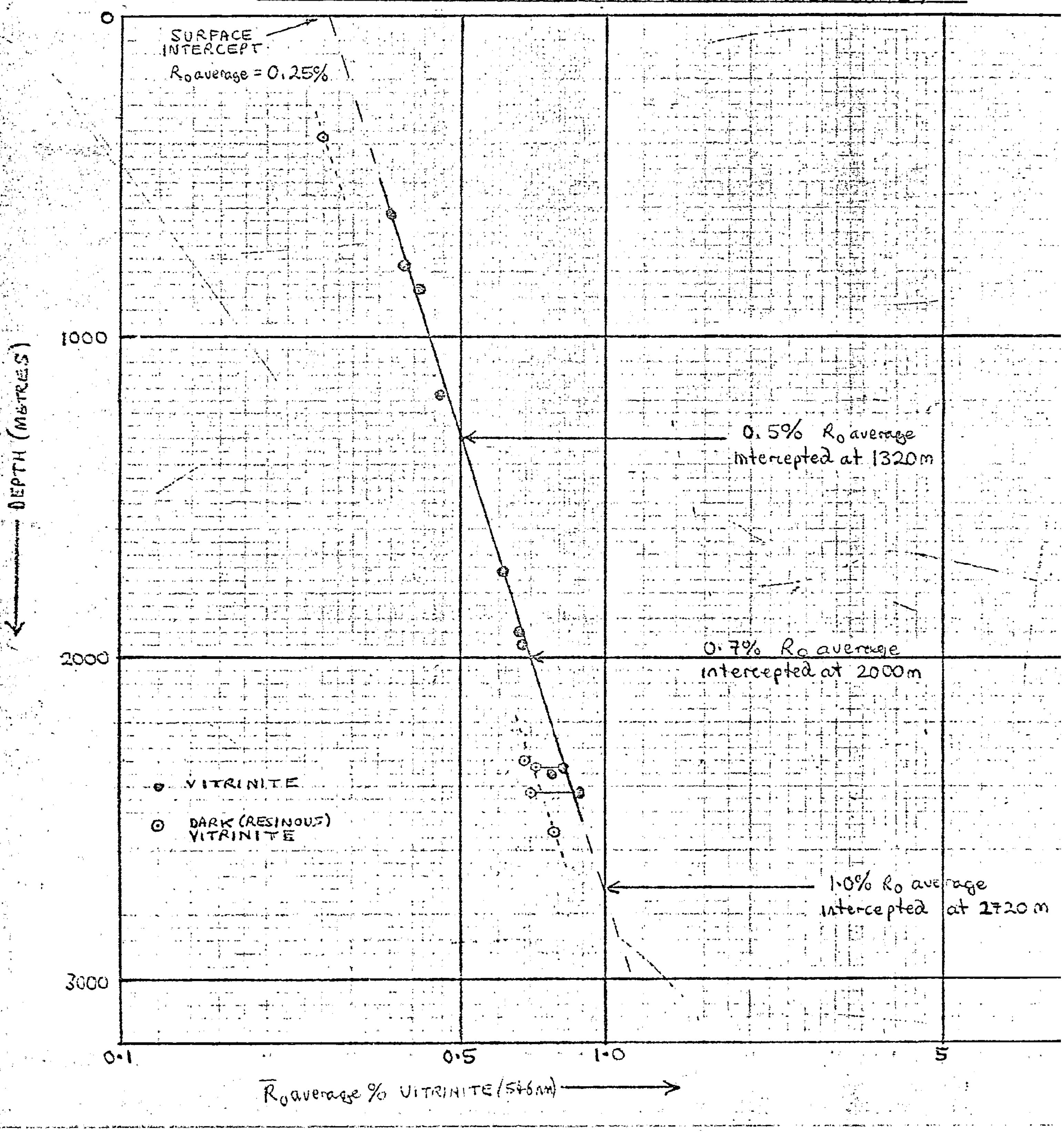
5) Tissot, B., Durand, B., Espitalié, J., and Combaz, A. (1974), Bull. Amer. Assoc. Pet. Geol., 58(3), 499-506.

REFLECTIVITY DATA FOR HAND-PICKED COAL SAMPLES FROM POOLOWANNA #1 WELL:

Laboratory Number	Petrographic Number	Depth (feet)	Depth (metres)	$\overline{R}_o$ average Vitrinite (546 nm)
60441	29968	1200-1300	366-396	* 0.26 (50)
60442	29969	2000-2100	610-640	0.36 (80)
60443	29970	2500-2600	762-793	0.38 (78)
60444	29971	2800	854	0.41 (78)
60445	29972	3950	1204	0.45 (80)
60446	29973	5650	1722	0.61 (60)
60447	29974	6300	1920	0.66 (80)
60448	29975	6400	1951	0.67 (80)
60449	29976	7595	2315	* 0.68 (80)
60595	29879	7729	2356	* 0.72 (69) ; 0.82 (51)
60596	29880	7753	2363	0.77 (99)
60450	29977	7920	2414	* 0.70 (32) ; 0.86 (88)
60451	29978	8350-8360	2545-2548	* 0.78 (100)

* Possible dark (resinous) vitrinite

DEPTH / REFLECTANCE CURVE FOR POOLOWANNA #1 WELL
(BASED ON READINGS TAKEN FROM HAND-PICKED COAL)



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RESTRICTED INVESTIGATION REPORT 975R

LOWER JURASSIC COALS AND DISPERSED ORGANIC MATTER IN POOLOWANNA NO 1 WELL, ~~PEDIRKA~~ EROMANGA BASIN

MICHELLE SMYTH

Fuel Geoscience Unit

P.O. Box 136

North Ryde, N.S.W.

Australia 2113

OCTOBER 1978

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CAPTIONS TO FIGURES

Introduction

Oil has been discovered in the Poolowanna No 1 well, in Lower Jurassic reservoirs, opening up a potential new hydrocarbon province in the Pedirka Basin (Fig. 1). Samples of ditch cuttings, sidewall cores and conventional cores from this well, of Triassic to Cretaceous age, were supplied to CSIRO Fuel Geoscience Unit by Delhi International Oil Corporation, who were the drillers. All samples which appeared to contain organic matter, either coal or carbonaceous shale, have been microscopically examined to determine the nature and quantities of this material.

Reports on coals and dispersed organic matter of Triassic, Middle to Lower Jurassic, Upper Middle Jurassic and Cretaceous ages, are being prepared.

Analyses

The Lower Jurassic in Poolowanna No 1 extends from 8211 feet (2502.7 metres) to 8506 feet (2592.6 metres) and overlies Triassic sediments. Intervals from which oil was recovered are 8233-8260 feet (2509.4-2517.6 metres), 8214-8328 feet (2503.6-2538.4 metres) and 8392-8425 feet (2557.9-2567.9 metres).

Fourteen samples of ditch cuttings and two conventional cores were selected on the basis of their organic matter content. These were hand picked or froth floated where necessary, and the organic-rich fractions made into grain mounts for petrographic analyses.

The reflectivity of the vitrinite over this interval (Lower Jurassic) lies between 0.85% at 8200 feet (2499.4 metres) and 0.88% at 8500 feet (2590.8 metres). (Russell, pers. comm.).

Results

Maceral analyses are listed in Table 1 and microlithotypes in Table 2. Many samples contain sufficient coaly fragments for both types of analyses to be carried out, except near the bottom of the Lower Jurassic, into the Triassic, where the sediments contain dispersed organic matter (d.o.m.) rather than solid coal.

The maceral compositions are plotted in Fig. 2. The coals have generally moderate to high vitrinite contents and exinite in the usual range for Australian Permian and Triassic coals, of 0-10%. The d.o.m. has a lower vitrinite component, higher exinite (10-15%) and inertinite than the coals. Most of the d.o.m. analysed occurs near the base of the Lower Jurassic, into the Triassic, where the d.o.m. is inertinite-rich. (IR ?). The decrease in vitrinite content in the d.o.m. may be due to either its occurrence in sediments, rather than coal, or to the continuation of Triassic depositional conditions into the Lower Jurassic.

Fig. 3 shows the constituents of the exinite present in the coals and d.o.m. Resinite is most often the dominant exinite maceral, but some samples contain abundant cutinite or sporinite.

The inertinite macerals (Fig. 4) form two groups - one where inertodetrinite : semifusinite is about 60:40, and the other where inertodetrinite : semifusinite is 40:60. Coals near the base of the Lower Jurassic tend to be in the first group, and coals near the top in the second group.

The coals nearly all have high vitrite-plus-clarite contents (≥ 50%), with low intermediates (≤ 25%). (Fig. 5).

Discussion

The d.o.m. is similar in maceral composition to that found in the underlying Triassic sediments. However the maceral composition of the coals is different, the vitrinite content being higher in the Lower Jurassic coals, than in the one coal sampled from the Triassic. There is a difference in the exinite group constituents also, with resinite being dominant in the Lower Jurassic coals and in some of the d.o.m., whilst cutinite is markedly dominant in the d.o.m. from the Triassic. Inertodetrinite is dominant near the Triassic, but upwards through the Lower Jurassic more of the samples have semifusinite in excess of inertodetrinite.

The coal seam from the Triassic may have formed in a lacustrine environment. The Lower Jurassic coals, on the basis of their microlithotype composition, plot in an area (Fig. 5) which is considered to be indicative of fluvial conditions (Britten et. al., 1973). In the case of the two coals lowest in vitrite-plus-clarite, the environment could be upper deltaic. A generalised plan of these environments is drawn in Fig. 6.

If these interpretations of environment, which are based largely on Permian coal measure sequences from the Sydney Basin, can be applied to the Pedirka Basin, then depositional conditions changed there after the Triassic. The Triassic sediments were deposited in relatively low energy lacustrine environments. Conditions altered in the Lower Jurassic so that coals and sediments accumulated in a relatively high energy fluvial environment.

Conclusions

The Lower Jurassic coals have moderate to high vitrinite contents and low exinite contents, similar in range to other Australian Permian and Triassic coals. The type of exinite in the coals is predominantly resinite, which is not so in Permian and Triassic coals. In the lower part of the Lower Jurassic the inertinite macerals tend to consist more of inertodetrinite than semifusinite, but this tendency is reversed in the upper part of the sequence.

The d.o.m. (dispersed organic matter) has lower vitrinite and higher exinite and inertinite contents than the coals. This may be due to Triassic depositional conditions continuing into the Lower Jurassic, where the d.o.m. has been sampled.

The coals appear to have accumulated in a fluvial environment, or rarely, upper deltaic. This is in contrast to a lacustrine environment postulated for the Triassic coal.

References

Britten, R.A., Smyth, M., Bennett, A.J.R. and Shibaoka, M., 1973: Environmental Interpretations of Gondwana Coal Measure Sequences in the Sydney Basin of New South Wales. Third Gondwana Symposium, Canberra, Australia.

TABLE 1. PEDIRKA BASIN: Poolowanna No 1 Maceral Analyses of Lower Jurassic Coals and Dispersed Organic Matter
(Results are given as percentages by volume unless otherwise stated)

Lab. No. Depth (ft)	Depth (m)	Vitrinite	Resinous Vitrinite	Sporinite	Cutinite	Resinite	Micrinite	Inertodet-rinite	Semifus-inite	Fusinite	Minerals	No. of coal counts
59967	2502.4-2505.5	33	41	2	1	1	-	3	4	-	15	204
8210-8220	mmf	39	48	3	1	1	-	3	5	-	-	
59975	2526.8-2529.8	49	7	2	2	12	3	13	11	1	n.c.	263
8290-8300												d.o.m.
59980	2538.5-2542.0	56	14	1	3	1	tr	4	20	1	n.c.	172
8328.5-8340												
59981	2542.0-2545.1	48	12	1	2	4	2	6	10	tr	15	449
8340-8350	mmf	57	14	1	3	4	2	7	12	tr	-	
59982	2545.1-2548.1	53	3	2	tr	2	-	13	19	1	7	479
a 8350-8360	mmf	56	4	2	tr	2	-	14	21	1	-	
b 60451	2545.1-2548.1	47	4	2	tr	4	1	13	21	1	7	585
8350-8360	mmf	50	5	2	tr	4	1	13	23	2	-	
59983	2548.1-2551.2	58	3	2	tr	2	2	9	15	2	7	314
8360-8370	mmf	63	3	2	tr	2	2	10	16	2	-	
59984	2551.2-2554.2	63	3	2	tr	2	3	9	9	1	8	583
8370-8380	mmf	69	4	2	tr	2	3	10	9	1	-	
59985	2554.2-2557.3	46	9	2	1	4	5	14	10	1	8	418
8380-8390	mmf	50	10	2	1	4	5	15	12	1	-	
59986	2557.3-2560.3	60	5	1	-	1	2	12	10	-	9	447
8390-8400	mmf	65	6	2	-	2	2	12	11	-	-	
60002	2560.3-2563.4	56	6	1	tr	2	1	16	8	tr	10	242
8400-8410	mmf	63	7	tr	tr	2	1	18	9	tr	-	
60003	2563.4-2566.4	38	2	2	3	2	2	15	19	2	15	292
8410-8420	mmf	44	3	2	4	3	3	17	22	2	-	
60004	2566.4-2569.5	18	13	1	3	4	3	32	25	1	n.c.	146
8420-8430												d.o.m.
(a) 59763	2569.5	25	-	7	8	13	-	37	7	3	n.c.	84
8430(core)												d.o.m.
(b) 60597	2569.5	Not enough coaly particles for counting										d.o.m.
8430(core)												
(a) 59762	2572.8	34	-	7	3	10	1	28	17	-	n.c.	151
8441(core)												d.o.m.
(b) 60598	2572.8	40	2	-	14	12	1	13	17	1	n.c.	164
8441(core)												d.o.m.
60008	2573.4-2575.6	45	2	1	9	1	1	9	16	1	15	370
8443-8450	mmf	53	2	2	10	1	2	10	19	1	-	
8500-8510 (+ Triassic)	2590.8-2593.8	30	5	1	10	2	1	30	19	2	n.c.	167 d.o.m.

d.o.m. = dispersed organic matter n.c. = not counted
mmf = mineral matter free tr = trace

TABLE 2. Pedirka Basin: Poolowanna No 1 Microlithotype Analyses of Lower Jurassic Coals and Dispersed Organic Matter
(Results are given as percentages by volume unless otherwise stated)

	Lab. No. Depth(ft)	Depth (m)	Vitrite	Clarite	Intermed-iates	Durite	Fusite	Shaly coal	Mineral Matter	No. of coal counts
	59967	2502.4-2505.5	77	3	6	1	6	2	5	278
	8210-8220	mmf	83	3	7	1	6	-	-	
	59975	2526.8-2529.8	NOT ENOUGH MATERIAL FOR MICROLITHOTYPES							
	8290-8300									
	59980	2538.5-2542.0	54	9	7	4	20	6	n.c.	146
	8328.5-8340	mmf	57	10	7	5	21	-		
	59981	2542.0-2545.1	51	8	20	4	5	12	n.c.	426
	8340-8350	mmf	58	9	22	5	6	-		
	59982	2545.1-2548.1	49	3	23	3	17	5	n.c.	601
a	8350-8360	mmf	51	3	24	4	18	-		
	60451	2545.1-2548.1	44	4	23	4	25	n.c.	n.c.	508
b	8350-8360									
	59983	2548.1-2551.2	51	10	18	2	13	6	n.c.	305
	8360-8370	mmf	54	10	19	3	14	-		
	59984	2551.2-2554.2	57	5	21	6	6	5	n.c.	532
	8370-8380	mmf	60	6	22	6	6	-		
	59985	2554.2-2557.3	46	5	23	11	7	8	n.c.	357
	8380-8390	mmf	50	5	25	12	8	-		
	59986	2557.3-2560.3	61	5	14	5	10	5	n.c.	402
	8390-8400	mmf	64	5	15	5	11	-		
	60002	2560.3-2563.4	48	4	16	16	7	9	n.c.	204
	8400-8410	mmf	53	4	17	17	9	-		
	60003	2563.4-2566.4	36	5	21	10	19	9	n.c.	279
	8410-8420	mmf	39	6	23	12	20	-		
	60004	2566.4-2569.5	NOT ENOUGH MATERIAL FOR MICROLITHOTYPES							
	8420-8430									
a	59763	2569.5	NOT ENOUGH MATERIAL FOR MICROLITHOTYPES							
	8430(core)									
b	60597	2569.5	NOT ENOUGH MATERIAL FOR MICROLITHOTYPES							
	8430(core)									
a	59762	2572.8	NOT ENOUGH MATERIAL FOR MICROLITHOTYPES							
	8441(core)									
b	60598	2572.8	NOT ENOUGH MATERIAL FOR MICROLITHOTYPES							
	8441(core)									
	8443-8450	2573.4-2575.6	31	20	21	4	16	8	n.c.	367
		mmf	34	21	23	4	18	-		
	8500-8510 (+ Triass.)	2590.8-2593.8	NOT ENOUGH MATERIAL FOR MICROLITHOTYPES							

mmf = mineral matter free n.c. = not counted

LEGEND FOR DIAGRAMS; FIGS 2 to 5

Feet	Metres	No. of counts on: all macerals	exinite	inertinite	micro-lithotypes	Point on diagram
8210-8220	2502.4-2505.5	204	9*	18*	278	1.
8290-8300	2526.8-2529.8	263	42	73	-	2.
8328.5-8340	2538.5-2542.0	172	8*	44	146	3.
8340-8350	2542.0-2545.1	449	37	93	426	4.
8350-8360(a)	2545.1-2548.1	479	19*	170	601	5.
8350-8360(b)	2545.1-2548.1	585	39	225	508	6.
8360-8370	2548.1-2551.2	314	14*	92	305	7.
8370-8380	2551.2-2554.2	583	27	135	532	8.
8380-8390	2554.2-2557.3	418	31	135	357	9.
8390-8400	2557.3-2560.3	447	14*	114	402	10.
8400-8410	2560.3-2563.4	242	6*	69	204	11.
8410-8420	2563.4-2566.4	292	26	129	279	12.
8420-8430	2566.4-2569.5	146	13*	87	-	13.
8430(a)	2569.5(a)	84	24	39	-	14.
8430(b)	2569.5(b)	-	-	-	-	15.
8441(a)	2572.8(a)	151	30	69	-	16.
8441(b)	2572.8(b)	164	42	52	-	17.
8443-8450	2573.4-2575.6	370	48	118	367	18.
8500-8510	2590.8-2593.8	167	21	86	-	19.

* not sufficient points counted for reliable results

FIG. 2 Maceral compositions of coals and dispersed organic matter of Lower Jurassic age in Poolowanna No 1 well.

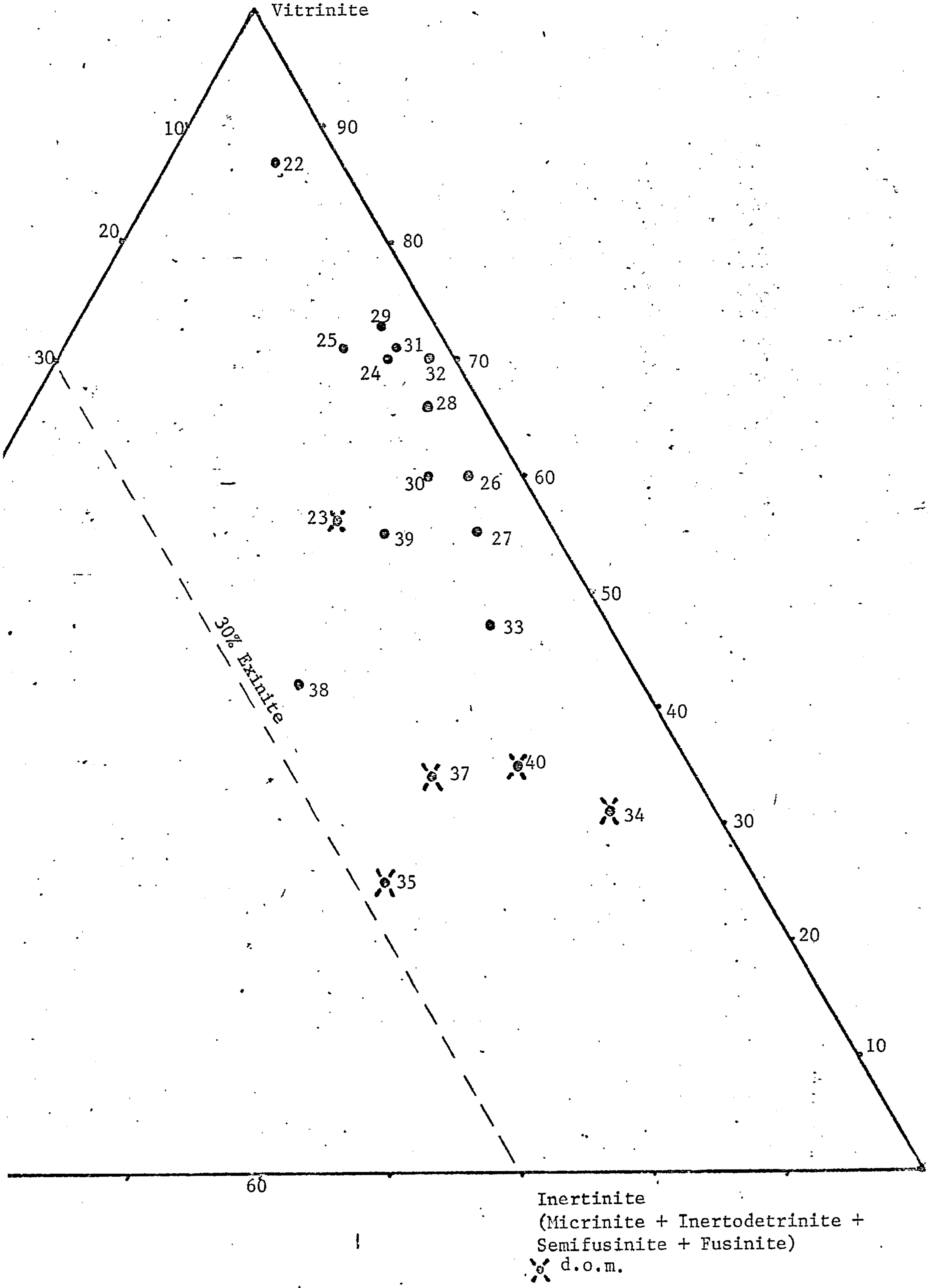


FIG. 3. Constituents of the exinite maceral group in coals and dispersed organic matter of Lower Jurassic age in Poolowanna No 1 well.

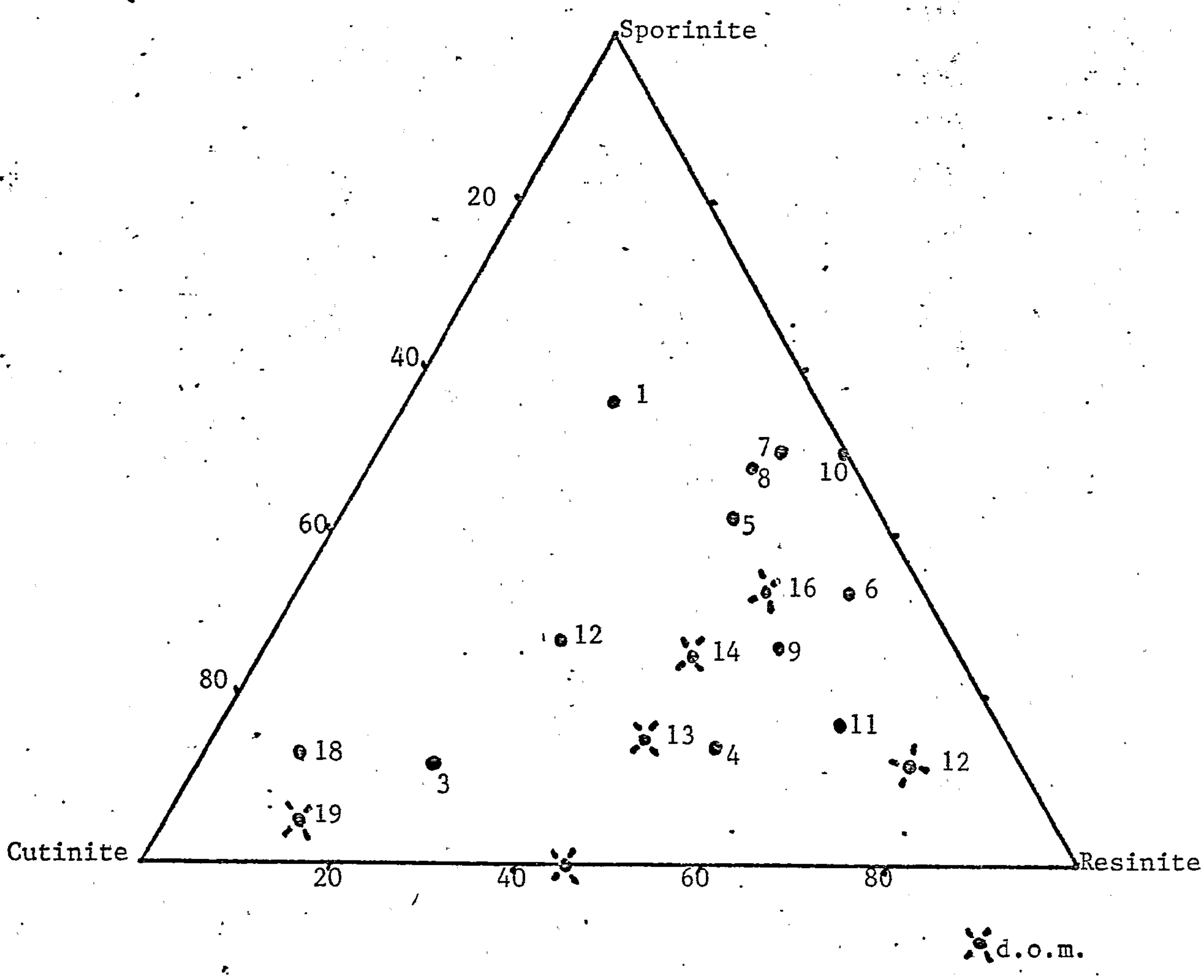


FIG. 4. Constituents of the inertinite maceral group in coals and dispersed organic matter of Lower Jurassic age in Poolowanna No 1 well.

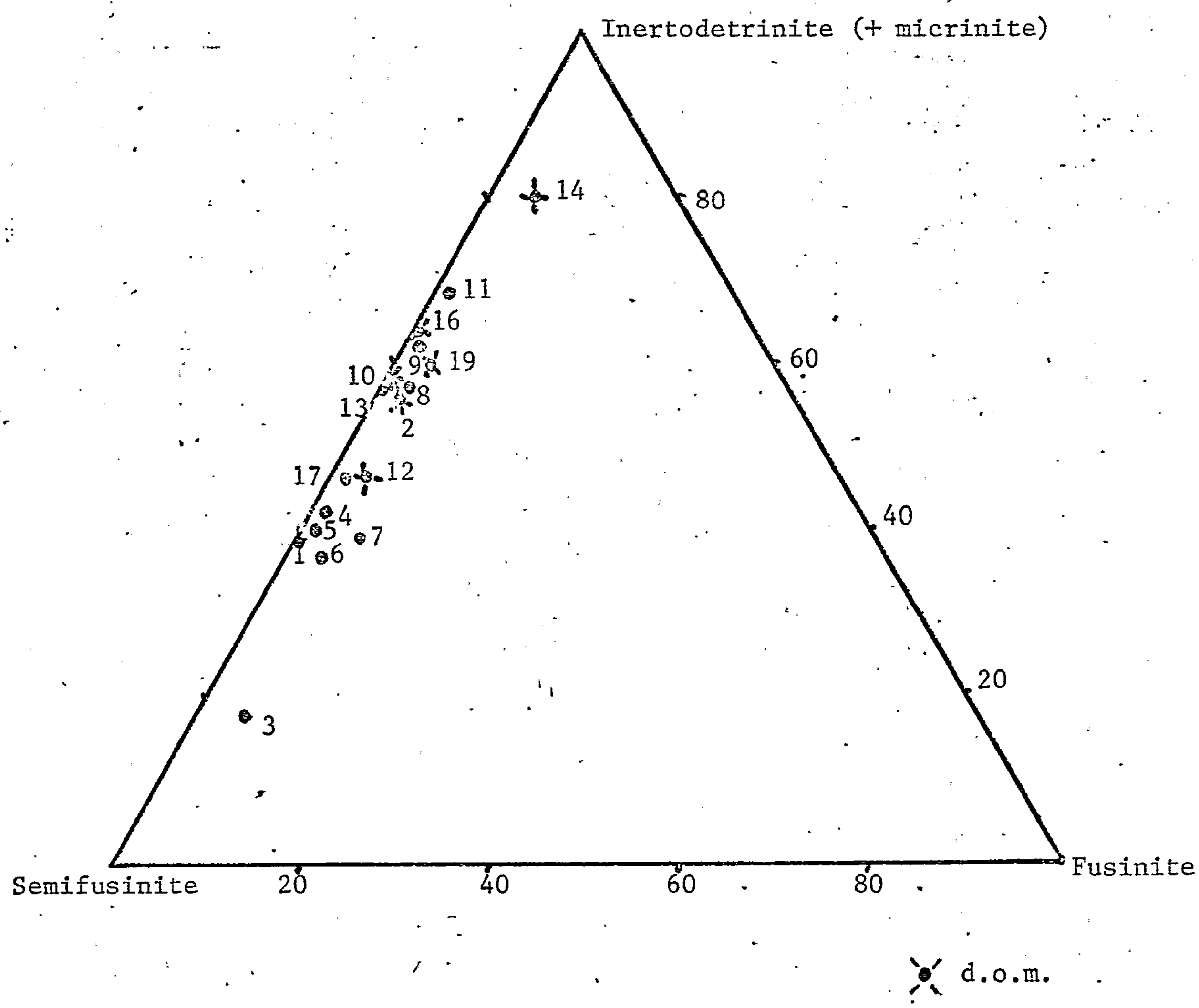


FIG. 5. Microlithotype compositions of coals of Lower Jurassic age in Poolowanna No 1 well.

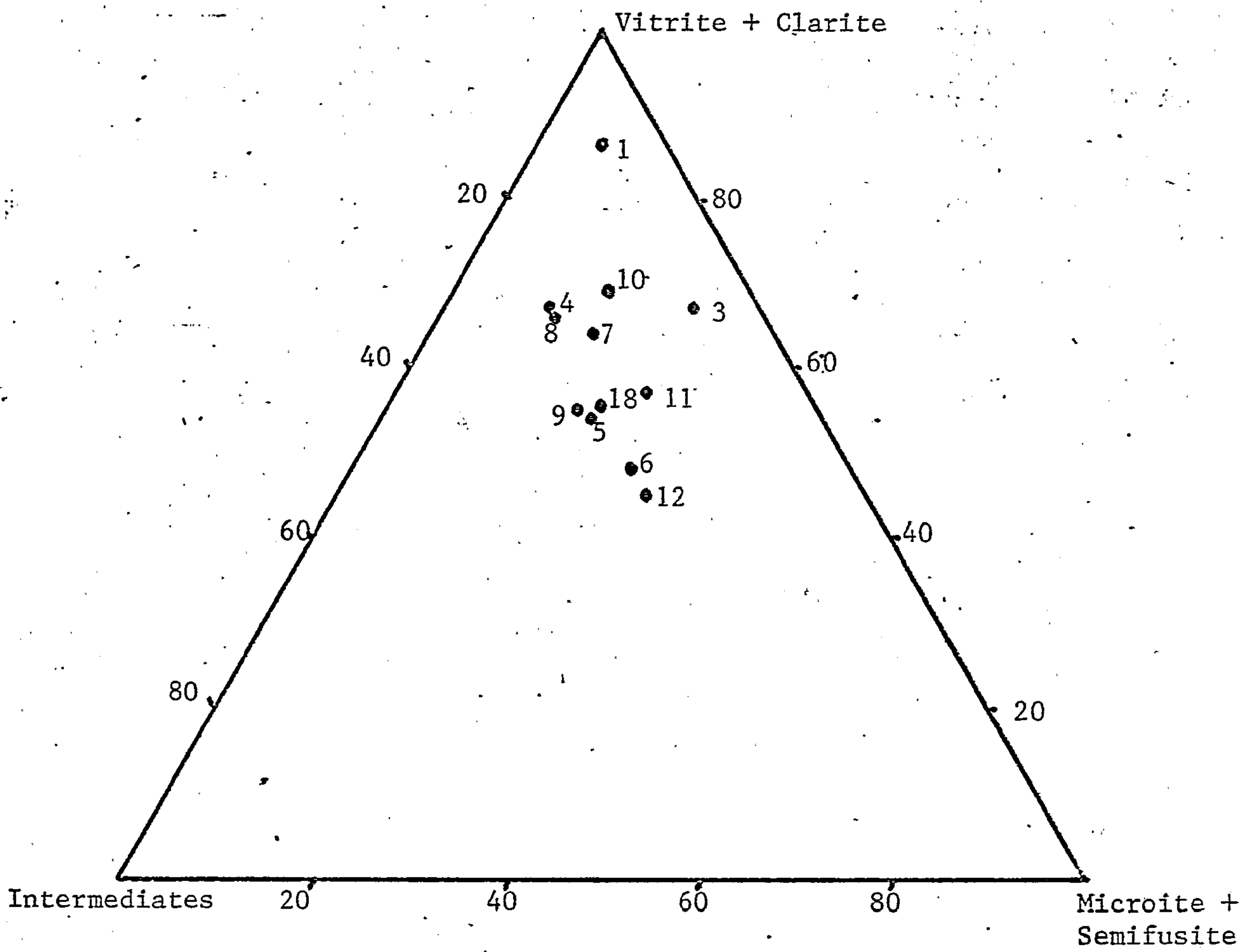
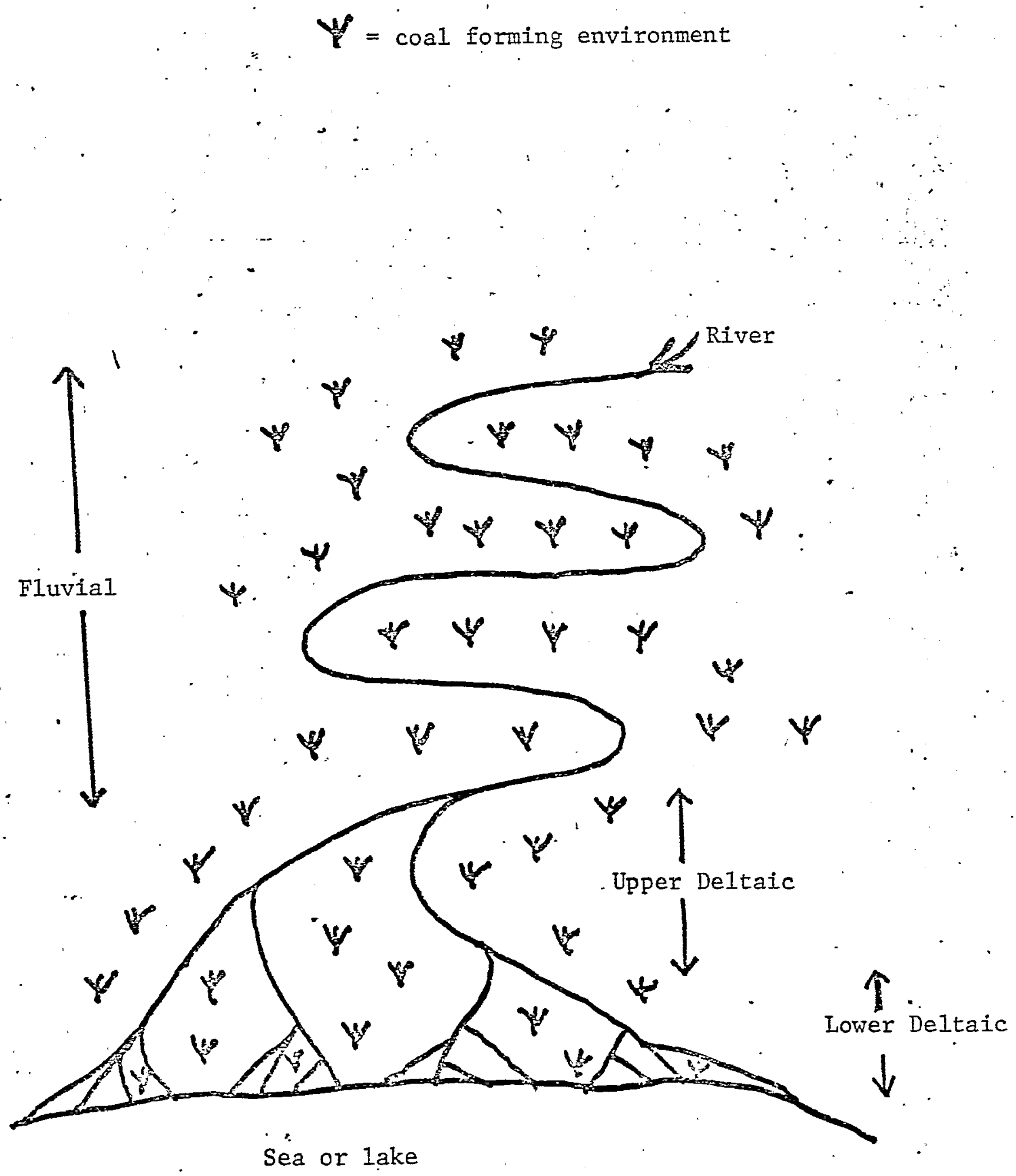


FIG. 6. Generalised plan of various coal-forming environments, related to a river system.



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RESTRICTED INVESTIGATION REPORT 976R

DISPERSED ORGANIC MATTER IN THE TRIASSIC SEDIMENTS FROM POOLOWANNA NO.1 WELL, ~~PEDIRKA~~ SIMPSON BASIN

MICHELLE SMYTH

CSIRO Fuel Geoscience Unit,
P.O. Box 136
North Ryde, NSW
Australia, 2113

OCTOBER, 1978

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Introduction

Ditch cuttings and cores of the rocks from 570 feet (173.7 metres) through to 10,074 feet (3070.6 metres) in Poolowanna No.1 well, Pedirka Basin (Fig.1), have been supplied to the Fuel Geoscience Unit, CSIRO, by Delhi International Oil Corporation. These sediments are Cretaceous to Triassic in age. Many intervals contain abundant coaly material, representing coal seams and carbonaceous shales.

Triassic sediments occur below 8506 feet (2592.6 metres) to the base of the well. There are few occurrences of substantial coal seams, but many sediments contain dispersed organic matter. The nature and abundance of this carbonaceous material have been investigated.

Further reports, covering the coals and dispersed organic matter of Lower Jurassic, Middle to Lower Jurassic, Upper Middle Jurassic and Cretaceous ages, are being prepared.

Analyses

Twenty-one samples of ditch cuttings with visible coaly fragments and/or dark shaly particles were selected from the interval 8500 feet (2590.8 metres) to 10,060 feet (3066.3 metres). Each sample is of a ten foot thickness (3 metres) and all were froth floated to concentrate the organic material. Two sidewall cores were also froth floated. Coal was hand picked from a conventional core at 9181 to 9188 feet (2798.4 to 2800.5 metres), and material from the core at 9186'3" to 5" (2800.0 metres) was also used.

These twenty-five samples were made into grain mounts and microscopically analysed in reflected light using the point-counting technique. Maceral analyses were carried out on all samples and microlithotype analyses were done when there were sufficient coaly fragments greater than 50 micrometres.

The reflectivity of the vitrinite in the above sediments range from 0.88% ($\bar{R}_{o\ max}$) at 8500 feet (2590.8 metres) to an extrapolated 1.06% at 10,000 feet (3048 metres). (Russell, pers. comm.).

Results

Results of the maceral analyses are given in Table 1, and microlithotypes in Table 2. Most of the counts have been made on dispersed organic matter (d.o.m.) rather than whole coal fragments, except where indicated in Table 1. The maceral compositions of the d.o.m. and coals are shown in Fig.2. The approximate proportions of d.o.m. in the samples have been plotted in Fig.3, including subdivisions into the three maceral groups. As these samples have been concentrated by froth flotation the values of d.o.m. content are higher than in the original samples. The d.o.m. may be spread over the 3 metre interval of each of the ditch cuttings, or concentrated into thinner layers within the 3 metres. Table 3 gives the approximate absolute percentage of each maceral group in the ditch cuttings and cores.

Fig. 4 shows the distribution of the constituents of the exinite group - sporinite, cutinite and resinite. Cutinite is the dominant (>50%) exinite maceral in most of the ditch cuttings, but not in the two sidewall cores, the hand-picked coal from the conventional core or the coal seam from the ditch cuttings.

The constituents of the inertinite group - micrinite, inertodetrinite, semifusinite and fusinite are plotted in Fig. 5. The dominant inertinite maceral is inertodetrinite, except in some samples where the total inertinite content is relatively low.

The microlithotype analyses are plotted in Fig.6, showing a scatter from dull (high microite plus semifusite) to bright (high vitrite plus clarite) coal.

Discussion

The d.o.m. in the ditch cuttings is predominantly inertinite-rich (Fig.2), with exinite about 10-20%, which is high compared with most Australian coals where the exinite content is generally 0-10%. Coal from the conventional core has the highest vitrinite content and high resinite. This represents only a few centimetres of hand-picked coal, and may not be typical of thicker seams from the Triassic. In fact, the coal from 8980 to 8990 feet (2737.1 to 2740.2 metres) has a composition similar to that of the d.o.m.

Cook (1975) has found that cutinite is the dominant exinite maceral in Australian Triassic coals. In Poolowanna No.1, this trend is very marked in the d.o.m. rather than the actual coals. In many samples cutinite appears to be the only exinite maceral present in the shaly layers. Inertodetrinite is the dominant inertinite maceral in both d.o.m. and coals.

The d.o.m. in sediments is considered to be a source material for the generation of hydrocarbons, and in particular exinitic and vitrinitic d.o.m. Exinitic d.o.m. is more suited to the generation of liquid hydrocarbons than is vitrinitic (Tissot et al., 1974), which is likely to generate more gaseous than liquid hydrocarbons at the same degree of diagenesis. The absolute amount of exinitic d.o.m. in sediments is thus of particular interest in the search for oil source rocks.

In these Triassic sediments, the quantity of exinitic d.o.m. in the ditch cuttings (froth floated) varies between a trace and 4%, averaging about 2%. This amount would be considerably reduced in the original sample, but may still be sufficiently high for these rocks to be potential source rocks for liquid hydrocarbons. If the vitrinitic d.o.m. is included, the total d.o.m. suitable for generating liquid and gaseous hydrocarbons is increased to about 7% in the ditch cuttings.

Conclusions

The dispersed organic matter (d.o.m.) in the Triassic sediments is inertinite-rich. One coal seam has been analysed, and has a maceral composition similar to that of the d.o.m.

There is an average exinitic d.o.m. content of about 2% in the (froth floated) ditch cuttings, and an average of 5% vitrinitic d.o.m. These quantities would be considerably less in the original samples, but may still be sufficiently high to provide source material suitable for the generation of hydrocarbons.

The dominant exinite maceral in the d.o.m. is cutinite, and the dominant inertinite maceral is inertodetrinite.

References

Cook, A.C., 1975: The spatial and temporal variation of the type and rank of Australian coals. Australian Black Coal Symposium, Wollongong, Australia.

Tissot, B., Durand, B., Espitalié, J. and Combaz, A., 1974: Influence of Nature and Diagenesis of Organic Matter in Formation of Petroleum. The American Association of Petroleum Geologists Bulletin V58, No.3 p 499-506.

TABLE 1: PEDIRKA BASIN - Poolowanna No.1 well maceral analyses of the dispersed organic matter of Triassic age (Results are given as percentages by volume unless otherwise stated)

Lab. No. Depth (ft)	Depth (m)	Vitrinite	Resinous Vitrinite	Sporinite	Cutinite	Resinite	Micrinite	Inertodet-rinite	Semifus-inite	Fusinite	Minerals	No. of coal counts
60014 8500-8510	2590.8 -2593.8	30	5	1	10	2	1	30	19	2	n.c.	167
60015 8510-8520	2593.8 -2596.9	15	-	1	8	-	-	54	22	-	n.c.	97
59991 8520	2596.9	9	-	3	3	5	-	66	13	1	n.c.	98
60016 8520-8530	2596.9 -2599.9	18	-	-	18	3	-	48	11	2	n.c.	73
60017 8530-8540	2599.9 -2693.0	9	-	-	11	1	-	52	24	3	n.c.	104
59990 8535	2601.5	15	-	6	5	4	-	54	14	2	n.c.	124
60018 8540-8550	2603.0 -2606.0	28	-	-	18	-	-	28	24	2	n.c.	76
60019 8550-8560	2606.0 -2609.1	12	-	-	13	-	-	43	31	1	n.c.	107
60020 8560-8570	2609.1 -2612.1	26	2	-	9	2	-	41	20	-	n.c.	130
60021 8570-8580	2612.1 -2615.2	14	-	2	13	2	3	43	21	2	n.c.	106
60022 8580-8590	2615.2 -2618.2	36	2	2	14	-	-	12	30	4	n.c.	66
60030 8660-8670	2639.6 -2642.6	59	-	-	3	2	-	11	23	2	n.c.	64
60034 8700-8710	2651.8 -2654.8	51	-	-	10	-	-	17	17	5	n.c.	63
60035 8710-8720	2654.8 -2657.9	11	-	-	15	-	-	63	11	-	n.c.	85
60042 8780-8790	2676.1 -2679.2	44	3	1	2	2	3	24	19	2	n.c.	Partly Coa 270
60068 8980-8990	2737.1 -2740.2	25 30	1 1	1 1	5 6	2 2	5 6	38 45	7 9	tr tr	16 mmf	454 Coal
60069 8990-9000	2740.2 -2743.2	23	-	1	5	3	2	47	19	-	n.c.	89
60076 9060-9070	2761.5 -2764.5	33	3	-	8	2	tr	26	26	2	n.c.	172
60088 9181-9188	2798.4 -2800.5	67	-	1	1	4	-	17	8	2	n.c.	Coal 160
60121 9450-9460	2880.4 -2883.4	38	7	2	4	4	2	36	7	-	n.c.	45
60130 9540-9550	2907.8 -2910.8	55 Not enough d.o.m. for meaningful count	-	-	-	-	-	45	-	-	n.c.	11
60154 9780-9790	2980.9 -2984.0	50 Not enough d.o.m. for meaningful count	-	-	-	-	-	16	34	-	n.c.	32
60175 9990-10000	3045.0 -3048.0	30 Not enough d.o.m. for meaningful count	-	-	-	-	-	40	25	5	n.c.	20
60181 10050-10060	3063.2 -3066.3	26	-	-	10	6	-	24	30	4	n.c.	50

d.o.m. = dispersed organic matter   n.c. = not counted

mmf = mineral matter free   tr = trace

TABLE 2: PEDIRKA BASIN Poolowanna No.1 well Microlithotype analyses of the Triassic coals
(Results are given as percentages by volume unless otherwise stated)

Lab. No. Depth (ft)	Depth (m)	Vitrite	Clarite	Intermediates	Microite + Durite	Semifusite + Fusite	Shaly coal	Mineral Matter	No. of coal counts
60042	2676.1	33	6	17	14	18	12	n.c.	217
8780-8790	-2679.2	37	7	19	16	21	-	mmf	
60068	2737.1	15	4	16	49	7	9	n.c.	429
8980-8990	-2740.2	17	5	17	53	8	-	mmf	
60088	2798.4								
9181-9188	-2800.5	70	2	16	6	6	n.c.	n.c.	128

n.c. = not counted

mmf = mineral matter free

TABLE 3: PEDIRKA Basin Poolowanna No.1 well
Approximate Maceral composition of Triassic dispersed organic matter
(Results are given as percentages by volume unless otherwise stated)

Lab. No. Depth(ft)	Depth (m)	Vitrinite	Exinite	Inertinite	Total
60014 8500-8510	2590.8 -2593.8	7	3	10	20
60015 8510-8520	2593.8 -2596.9	1	1	8	10
59991 8520	2596.9	1	2	12	15
60016 8520-8530	2596.9 -2599.9	4	4	12	20
60017 8530-8540	2599.9 -2603.0	1	2	12	15
59990 8535	2601.5	3	3	14	20
60018 8540-8550	2603.0 -2606.0	3	2	5	10
60019 8550-8560	2606.0 -2609.1	2	2	11	15
60020 8560-8570	2609.1 -2612.1	6	2	12	20
60021 8450-8580	2612.1 -2615.2	1	2	7	10
60022 8580-8590	2615.2 -2618.2	4	2	4	10
60030 8660-8670	2639.6 -2642.6	6	tr	4	10
60034 8700-8710	2651.8 -2654.8	5	1	4	10
60035 8710-8720	2654.8 -2657.9	2	3	15	10
60042 8780-8790	2676.1 -2679.2	19	2	19	40
60068 8080-8990	2737.1 -2740.2	COAL			
60069 8990-9000	2640.2 -2743.2	2	1	7	10
60076 9060-9070	2761.5 -2764.5	7	2	11	20
60088 9181-9188	2798.4 -2800.5	20	2	8	30
60121 9450-9460	2880.4 -2883.4	2	tr	3	5
60130 9540-9550	2907.8 -2910.8	1.5 Not enough d.o.m. for meaningful results	-	1.5	3
60143 9780-9790	2980.9 -2984.0	1.5 Not enough d.o.m. for meaningful results	-	1.5	3
60175 9990-10000	3045.0 -3048.0	1 Not enough d.o.m. for meaningful results	-	1.5	2.5
60181 10050-10060	3063.2 -3066.3	1	1	3	5

d.o.m. = dispersed organic matter

LEGEND FOR FIGURES 2 TO 6

Depth of samples				No. of maceral counts on:			
Feet	Metres	Type of Sample	Form of organic matter	All organic matter	exinite	inertinite	Point on figure
8500-8510	2590.8-2593.8	ditch cuttings	d.o.m.	167	21	86	1
8510-8520	2593.8-2596.9	"	"	97	9	73	2
8520-8530	2596.9-2599.9	"	"	98	15	45	3
8520	2596.9	sidewall core	"	73	11	78	4
8530-8540	2599.9-2603.0	ditch cuttings	"	104	13	82	5
8535	2601.5	sidewall core	"	124	19	86	6
8540-8550	2603.0-2606.0	ditch cuttings	"	76	14	41	7
8550-8560	2606.0-2609.1	"	"	107	14	80	8
8560-8570	2609.1-2612.1	"	"	130	15	78	9
8570-8580	2612.1-2615.2	"	"	106	18	73	10
8580-8590	2615.2-2618.2	"	"	66	10	31	11
8660-8670	2639.6-2642.6	"	"	64	3	23	12
8700-8710	2651.8-2654.8	"	"	63	6	25	13
8710-8720	2654.8-2657.9	"	"	85	13	63	14
8780-8790	2676.1-2679.2	"	partly coal	270	15	129	15
8980-8990	2737.1-2740.2	"	coal	454	40	276	16
8990-9000	2740.2-2743.2	"	d.o.m.	89	8	61	17
9060-9070	2761.5-2764.5	"	"	172	16	93	18
9186'3"to5"	2800.0	core	none visible	0	0	0	19
9181-9188	2798.4-2800.5	core	coal	160	10	43	20
9450-9460	2880.4-2883.4	ditch cuttings	d.o.m.	45	5	20	21
9540-9550	2907.8-2910.8	"	"	11	0	5	22
9780-9790	2980.9-2984.0	"	"	32	0	16	23
9990-10,000	3045.0-3048.0	"	"	20	0	14	24
10050-10060	3063.2-3066.3	"	"	50	8	29	25

FIG. 1. Location of Poolowanna No 1 well in the Pedirka Basin, central Australia

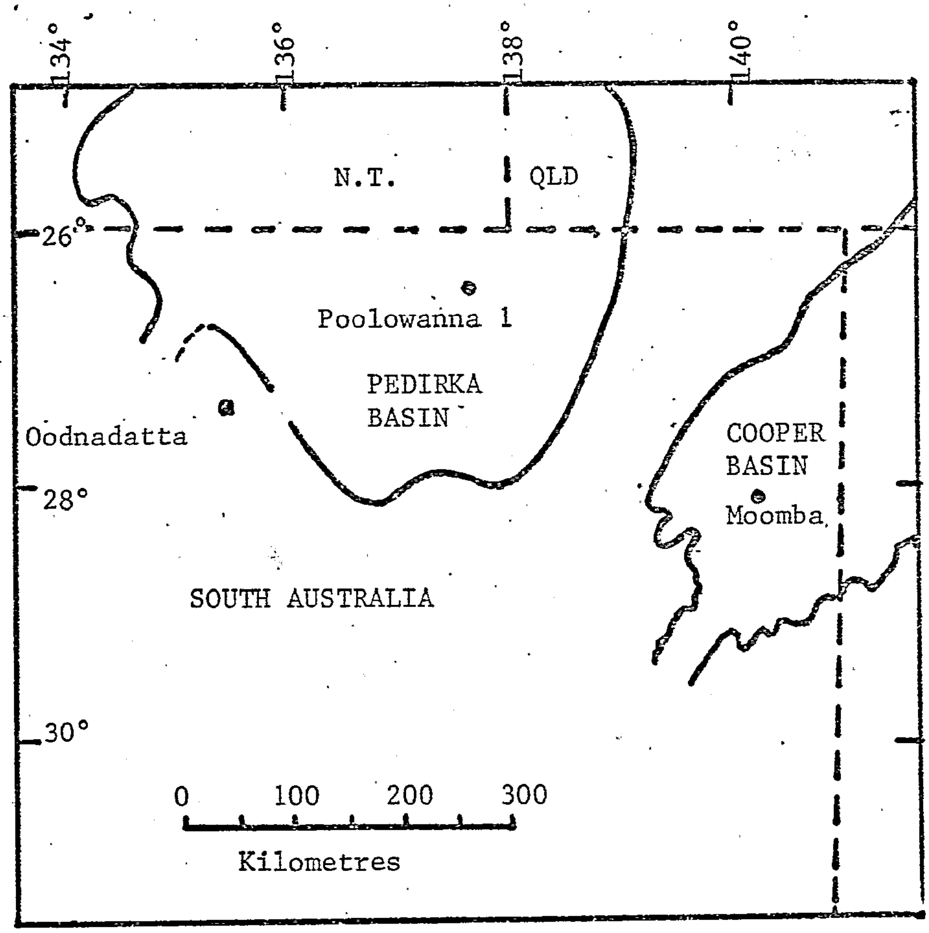


FIGURE 2: Maceral compositions of the dispersed organic matter and coals from the Triassic in the Poolowanna No.1 well, Pedirka Basin

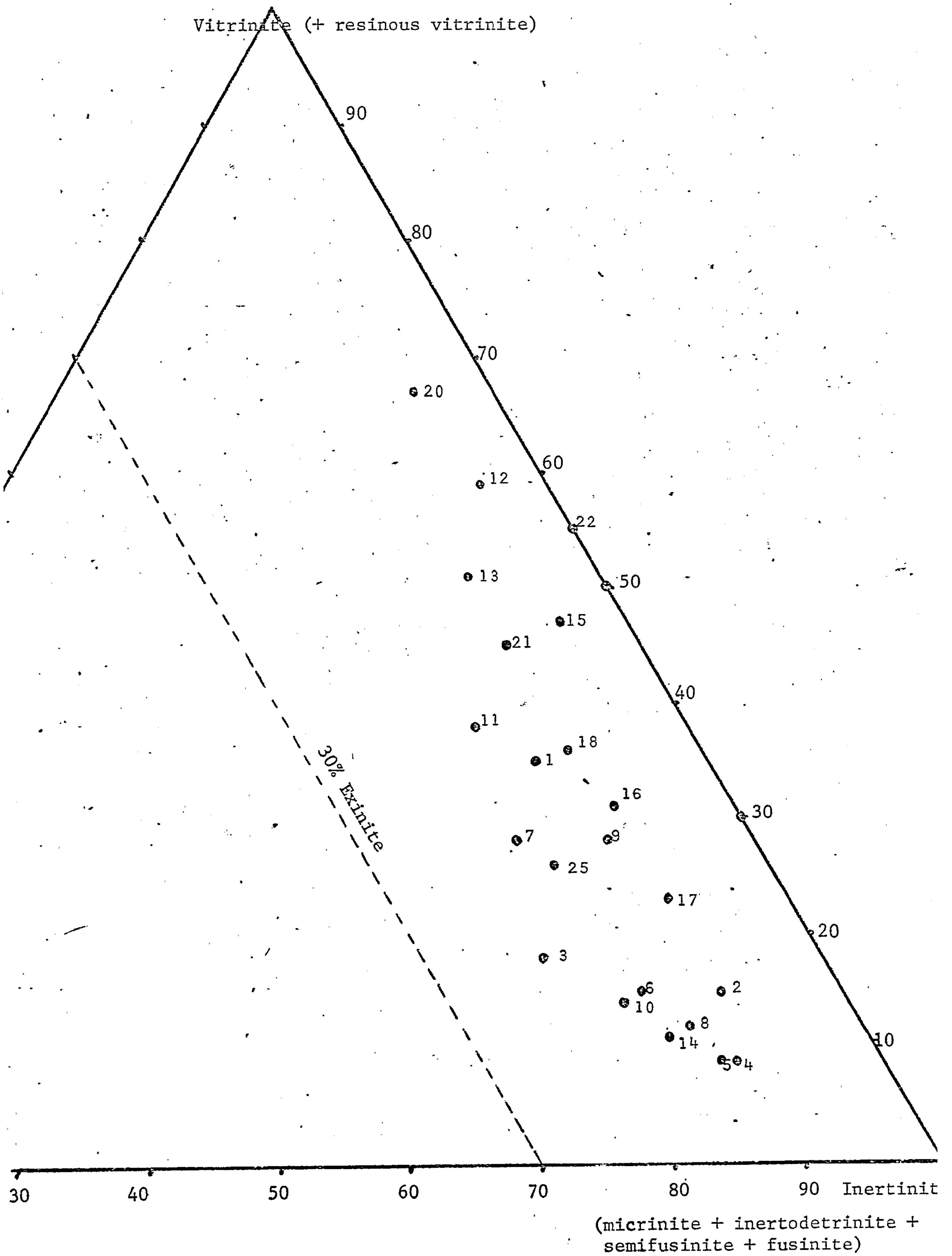


FIGURE 3. Approximate proportions of dispersed organic matter in the Triassic sediments, with subdivisions into the three maceral groups

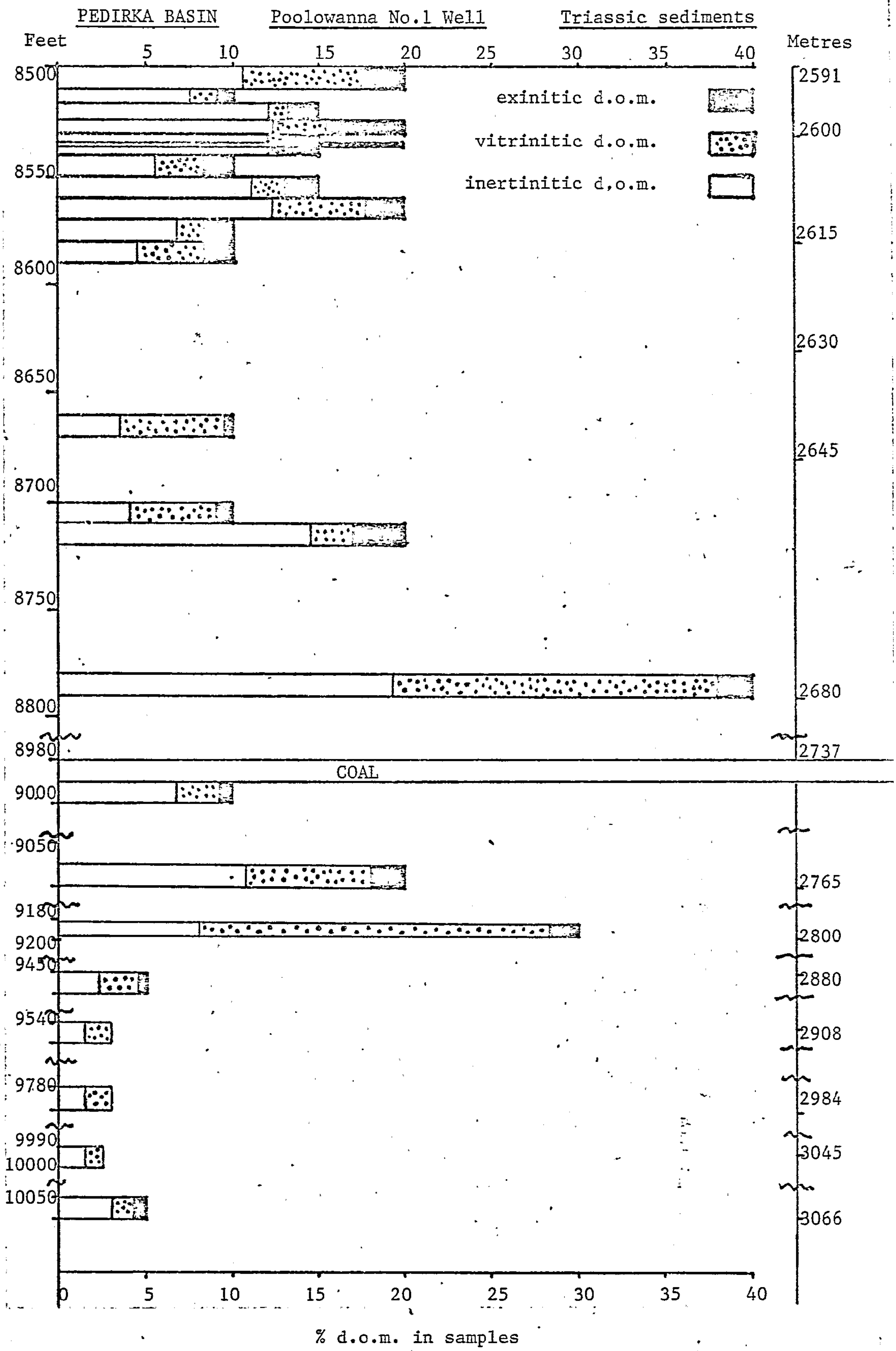


FIGURE 4: Distribution of exinite types in Triassic sediments

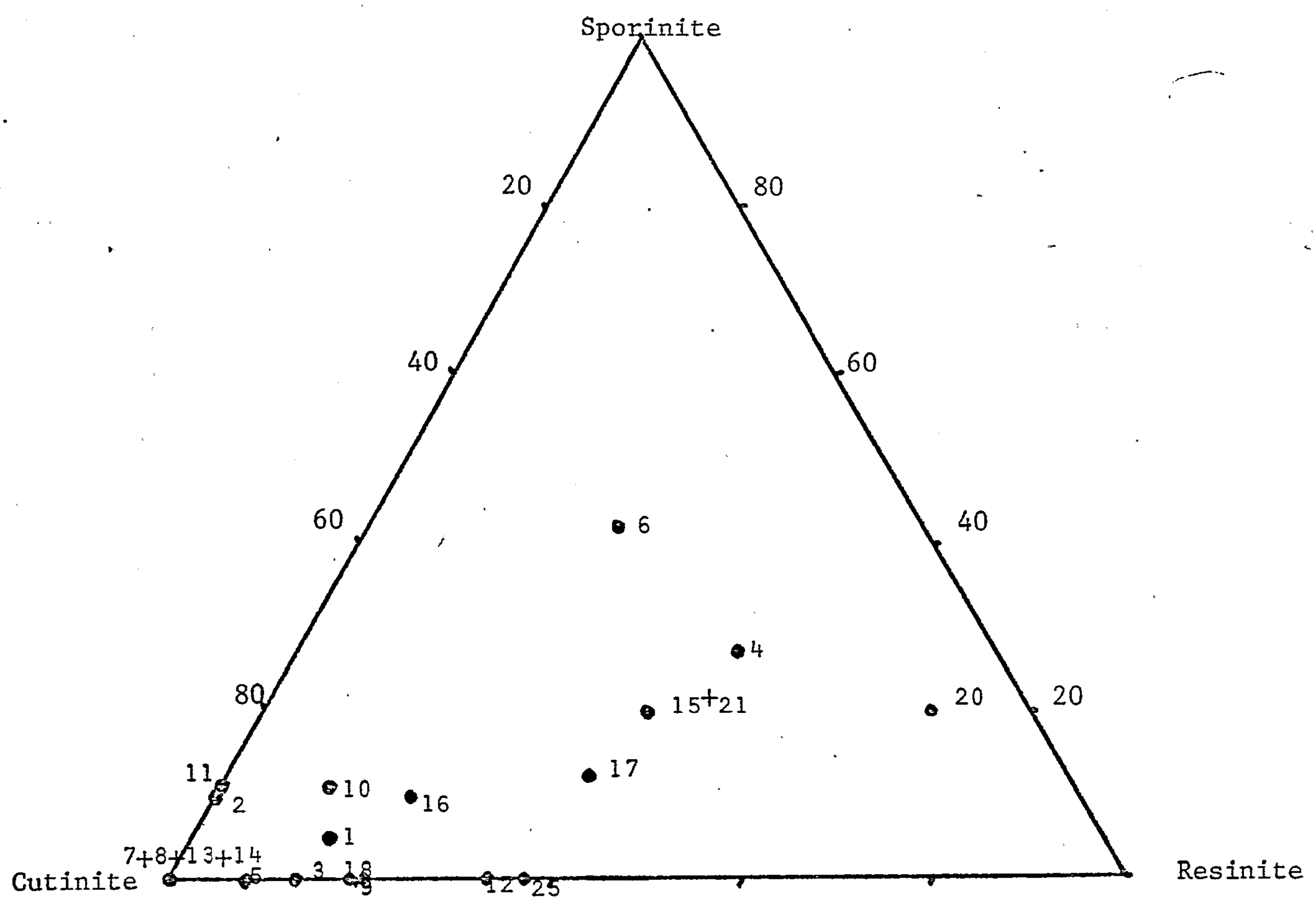


FIGURE 5: Distribution of inertinite types in Triassic sediments.

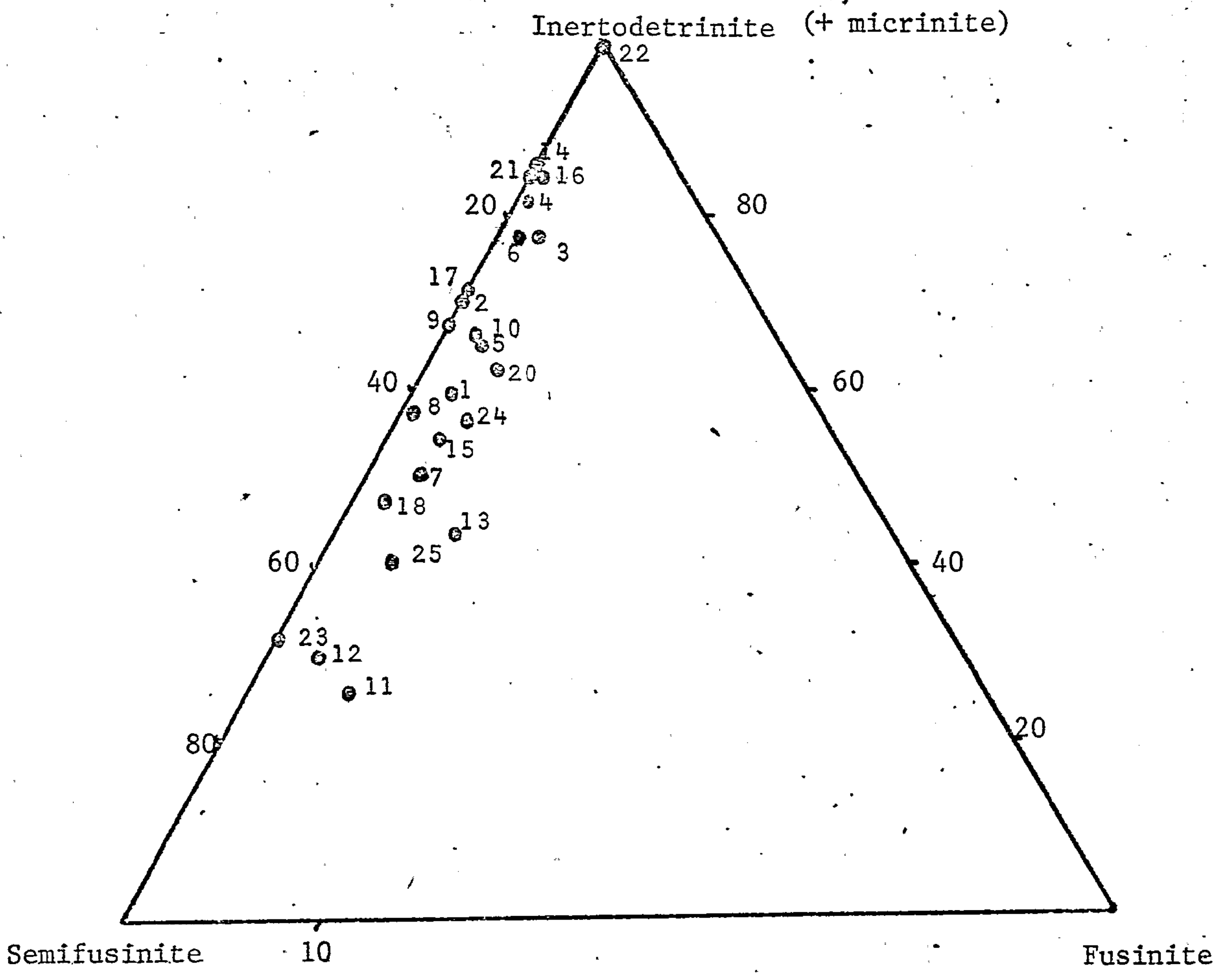
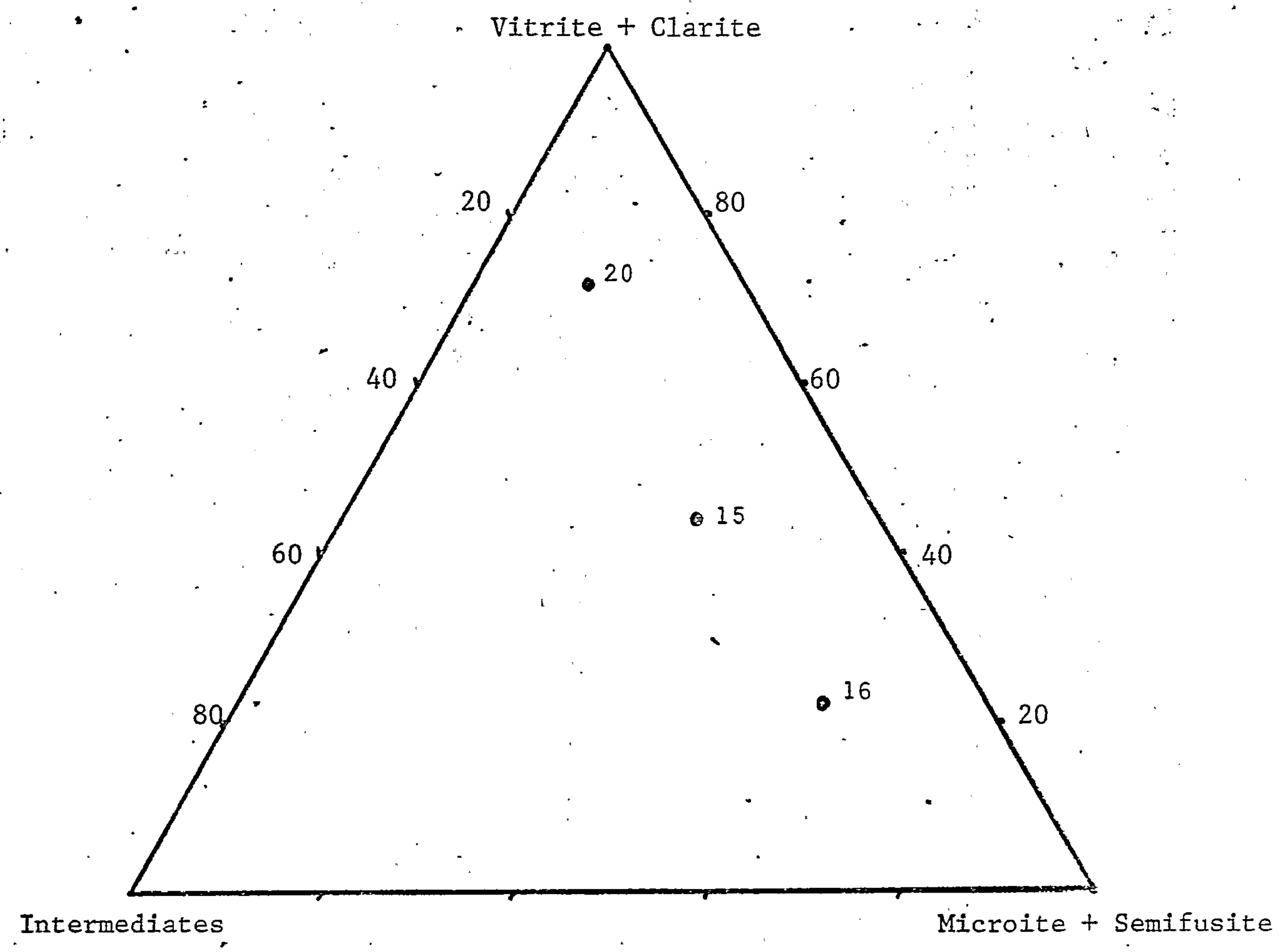


FIGURE 6: Microlithotype compositions of the Triassic coals from Poolowanna No.1 well, Perdika Basin.



0030

RESTRICTED INVESTIGATION REPORT 981R

CSIRO

MINERALS RESEARCH LABORATORIES

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

FUEL GEOSCIENCE UNIT
P.O. BOX 136
NORTH RYDE, NSW
AUSTRALIA, 2113

NOVEMBER 1978

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Introduction

Samples of the sediments from Poolowanna No 1 well, Pedirka Basin, (Fig. 1), of Cretaceous to Triassic ages, have been supplied to CSIRO Fuel Geoscience Unit by Delhi International Oil Corporation. The petrology of the coals and dispersed organic matter, of Triassic and Lower Jurassic ages, has already been reported. (Reports RIR 976R and RIR 975R respectively).

The Middle to Lower Jurassic sediments extend from 7832 feet (2387.2 metres) to 8211 feet (2502.7 metres). Selected samples from this sequence have been analysed petrographically.

Analyses

Twenty ditch cuttings, each covering 10 feet (3 metres) intervals, and containing fragments of coal and/or carbonaceous shale, plus one coal sample, were hand-picked or froth floated to concentrate the organic matter. These organic-rich fractions were made into grain mounts and analysed for their maceral and microlithotype contents. Most of the samples had a high proportion of coal fragments in them, probably representing coal seams within the 3 metre interval.

The reflectance of vitrinite in these Middle to Lower Jurassic samples ranges from 0.80% ($\overline{Ro}_{max}$) at 7900 feet (2407.9 metres) to 0.85% at 8200 feet (2499.4 metres). (Russell, pers. comm.).

Results

Maceral analyses are listed in Table 1, and microlithotypes in Table 2. The maceral compositions of the coals are plotted in Fig. 2. They have moderate to high vitrinite contents, and exinite contents generally 5 to 10%, which is similar to the Lower Jurassic coals from Poolowanna No 1 (RIR 975R). Three samples containing mostly dispersed organic matter (d.o.m.) have lower vitrinite contents than the coals; two samples of d.o.m. have compositions similar to the coals.

The predominant constituent of the exinite maceral group is most often resinite (Fig. 3), but with several samples having dominant sporinite or cutinite. Again this is similar to the occurrences in the

Lower Jurassic coals. Inertodetrinite and semifusinite of the inertinite group are dominant in approximately the same number of samples, (Fig. 4), with a trend for inertodetrinite to be associated with those coals having the lower vitrinite values.

The coals have moderate to high vitrite-plus-clarite contents (Fig. 5) and generally low intermediates except for three coals which are similar in petrographic composition to Greta Coal Measures coals from the Sydney Basin (Area C of Fig. 5).

Discussion

These coals are very similar in their maceral and microlithotype compositions to the underlying Lower Jurassic coals. The only coals which are different are the three with the high intermediates content. Such coals have been interpreted as accumulating in brackish conditions in the Sydney Basin, perhaps in large lagoons. The other coals have petrographic compositions which have been ascribed to a fluvial environment, or upper deltaic for the coals between 7940 and 7960 feet (2420.1 to 2426.2 metres). (Britten et al, 1973). It is not yet certain whether the same petrographic compositions in coals of different ages represent the same geological conditions or not. The alternative explanation is that flora from different geological ages can produce the same petrographic compositions in different geological environments. The latter explanation is almost certainly true for Tertiary coals, but for Jurassic coals there are insufficient data to be sure of either.

Conclusions

The Middle to Lower Jurassic coals have moderate to high vitrinite contents and low exinite contents. The dominant exinite constituent is most often resinite.

The coals may have accumulated in a fluvial environment, or rarely upper deltaic and brackish lagoonal.

They are very similar petrographically to the underlying Lower Jurassic coals and should be grouped with them.

References

Britten, R.A., Smyth, M., Bennett, A.J.R. and Shibaoka, M., 1973: Environmental Interpretations of Gondwana Coal Measure Sequences in the Sydney Basin of New South Wales. Third Gondwana Symposium, Canberra, Australia.

TABLE 1 - PEDIRKA BASIN : Poolowanna No.1 well Maceral analyses of Middle to Lower Jurassic coals and dispersed organic matter
(Results are given as percentages by volume unless otherwise stated)

Depth (ft.)	Depth (M)	Vitrinite	Resinous vitrinite	Sporinite	Cutinite	Resinite	Micrinite	Inertod-etrinite	Semi-fusinite	Fusinite	Minerals	No. of coal counts	
59936 7910-20	2411.0- 2414.0	68 71	1 2	2 2	tr tr	tr tr	1 1	9 9	14 15	tr tr	5 mmf	479	
60450 7920	2414.0	69 72	1 1	2 2	1 1	5 5	1 1	8 8	10 10	tr tr	4 mmf	418	
59937 7920-30	2414.0- 2417.1	70 73	2 2	2 2	tr tr	tr tr	1 1	9 9	11 12	1 1	4 mmf	641	
59938 7930-40	2417.1- 2420.1	62 65	- -	4 4	1 1	1 2	- -	9 9	18 19	tr tr	5 mmf	366	
7940-50	2420.1- 2423.2	52 55	tr tr	2 2	1 1	- -	tr tr	22 23	18 18	1 1	4 mmf	463	
7950-60	2423.2- 2426.2	40 42	4 5	1 1	3 3	2 2	- -	21 23	23 24	- -	6 mmf	161	Coal d.o.
7960-70	2426.2- 2429.3	50	-	5	2	5	-	18	18	2	n.c.	40	d.o.
7980-90	2432.3- 2435.4	71	3	-	4	1	-	10	8	3	n.c.	151	d.o.
7990-8000	2435.4- 2438.4	68	5	-	1	3	tr	6	16	1	n.c.	309	Coal d.o.
59945 8000-07	2438.4- 2440.5	48	3	1	2	13	-	15	17	1	n.c.	110	d.o.
59946 8007-10	2440.5- 2441.4	41 60	2 2	1 1	1 2	4 6	tr 1	9 12	11 16	tr tr	31 mmf	361	
59947 8010-20	2441.4- 2444.5	59 78	2 2	1 1	tr tr	2 3	tr tr	8 10	4 6	- -	24 mmf	398	
59948 8020-30	2444.5 2447.5	38 57	2 2	tr tr	2 3	5 7	- -	10 15	10 15	1 1	32 mmf	341	
59949 8030-40	2447.5- 2450.6	53	6	5	1	5	-	15	14	1	n.c.	291	
59950 8040-50	2450.6- 2453.6	63	3	2	1	5	-	9	17	-	n.c.	369	
59955 8090-8100	2465.8- 2468.9	52 60	1 1	2 2	1 1	2 2	1 2	14 16	13 14	1 2	13 mmf	550	
59956 8100-8110	2468.9 2471.9	35 61	- -	3 4	tr tr	1 3	1 1	11 18	6 11	1 2	42 mmf	303	
59962 8160-8170	2487.2- 2490.2	23 65	1 3	tr tr	2 6	1 4	- -	3 9	5 13	- -	63 mmf	202	
59963 8170-8180	2490.2- 2493.3	54 61	1 1	1 1	4 4	5 6	- -	10 11	11 13	2 3	12 mmf	139	d.o.m
59965 8190-8200	2496.3 2499.4	53 60	6 6	6 6	2 2	8 9	- -	5 6	9 10	1 1	10 mmf	412	
59966 8200-8210	2499.4 2502.4	65 71	4 5	2 2	1 1	8 9	tr tr	4 4	8 8	tr tr	8 mmf	385	

mmf = mineral matter free   n.c. = not counted   d.o.m. = dispersed organic matter

TABLE 2 - PEDIRKA BASIN : Poolowanna No.1 well Microlithotype analyses of the Middle to Lower Jurassic coals
(Results are given as percentages by volume unless otherwise stated)

Depth (ft.)	Depth (M)	Vitrinite	Clarite	Intermediates	Microite + Durite	Semifusite + Fusite	Shaly Coal	Mineral Matter	No. of coal counts
59936 7910-7920	2411.0- 2414.0	65 67	1 1	16 17	2 2	13 13	3 mmf	n.c.	485
60450 7920	2414.0	63	5	19	2	11	n.c.	n.c.	416
59937 7920-30	2414.0- 2417.1	62 63	3 3	19 19	2 2	13 13	1 mmf	n.c.	685
59938 7930-40	2417.1- 2420.1	51 53	9 9	19 20	3 3	14 15	2 mmf	2	541
7940-50	2420.1- 2423.2	39 41	4 4	25 26	11 11	18 18	3 mmf	n.c.	449
7950-60	2423.2- 2426.2	33 39	7 9	17 20	10 11	17 21	16 mmf	n.c.	124
7960-70	2426.2- 2429.3	Not enough material for microlithotypes							-
7980-90	2432.3- 2435.4	61 66	4 4	6 6	3 3	19 21	7 mmf	n.c.	121
7990-8000	2435.4- 2438.4	59 66	5 5	6 6	2 2	18 21	10 mmf	n.c.	277
59945 8000-07	2438.4- 2440.5	Not enough material for microlithotypes							-
59946 8007-10	2440.5- 2441.4	34 52	2 3	12 17	8 12	10 16	7 mmf	27	332
59947 8010-20	2441.4- 2444.5	56 73	4 5	10 13	3 4	4 5	6 mmf	17	412
59948 8020-30	2444.5- 2447.5	27 51	3 6	6 11	5 10	12 22	5 mmf	42	269
59949 8030-40	2447.5- 2450.6	24 36	7 11	24 37	3 5	7 11	6 mmf	29	254
59950 8040-50	2450.6- 2453.6	39 56	6 8	9 13	5 7	11 16	6 mmf	24	393
59955 8090-8100	2465.8- 2468.9	49 50	4 4	32 32	3 3	11 11	1 mmf	n.c.	517
59956 8100-8110	2468.9- 2471.9	55 56	3 3	28 28	6 6	7 7	1 mmf	n.c.	243
59962 8160-8170	2487.2- 2490.2	49 59	5 7	13 15	5 6	11 13	17 mmf	n.c.	154
59963 8170-8180	2490.2- 2493.3	Not enough material for microlithotypes							-
59965 8190-8200	2496.3- 2499.4	38 46	26 31	8 9	2 2	10 12	9 mmf	7	364
59966 8200-8210	2499.4- 2502.4	49 55	24 27	10 10	tr tr	8 8	9 mmf	n.c.	350

mmf = mineral matter free n.c. = not counted

Middle to Lower Jurassic coals from Poolowanna No.1 well, Pedirka Basin

Legend for Figures 2 to 5

Depth: Feet	Depth: Metres	No. of counts on: All macerals	exinite	inertinite	micro-lithotypes	Point on diagrams
7910-7920	2411.0-2414.0	479	12*	118	485	1
7920	2414.0	418	32	82	416	2
7920-7930	2414.0-2417.1	641	16*	147	685	3
7930-7940	2417.1-2420.1	366	24	104	541	4
7940-7950	2420.1-2423.2	463	11*	199	449	5
7950-7960	2423.2-2426.2	161	10*	76	124	6
7960-7970	2426.2-2429.3	40*	5*	15*	-	7
7980-7990	2432.3-2435.4	151	8*	31	121	8
7990-8000	2435.4-2438.4	309	14*	71	277	9
8000-8007	2438.4-2440.5	110	17*	37	-	10
8007-8010	2440.5-2441.4	361	33	105	332	11
8010-8020	2441.4-2444.5	398	18*	63	412	12
8020-8030	2444.5-2447.5	341	36	104	269	13
8030-8040	2447.5-2450.6	291	33	85	254	14
8040-8050	2450.6-2453.6	369	31	95	393	15
8090-8100	2465.8-2468.9	550	31	185	517	16
8100-8110	2468.9-2471.9	303	23	96	243	17
8160-8170	2487.2-2490.2	202	21	44	154	18
8170-8180	2490.2-2493.3	139	16*	37	-	19
8190-8200	2496.3-2499.4	412	72	68	364	20
8200-8210	2499.4-2502.4	385	45	50	350	21

* Not enough points counted for reliable results

FIGURE 1 - Location of Poolowanna No.1 well in the Pedirka Basin.

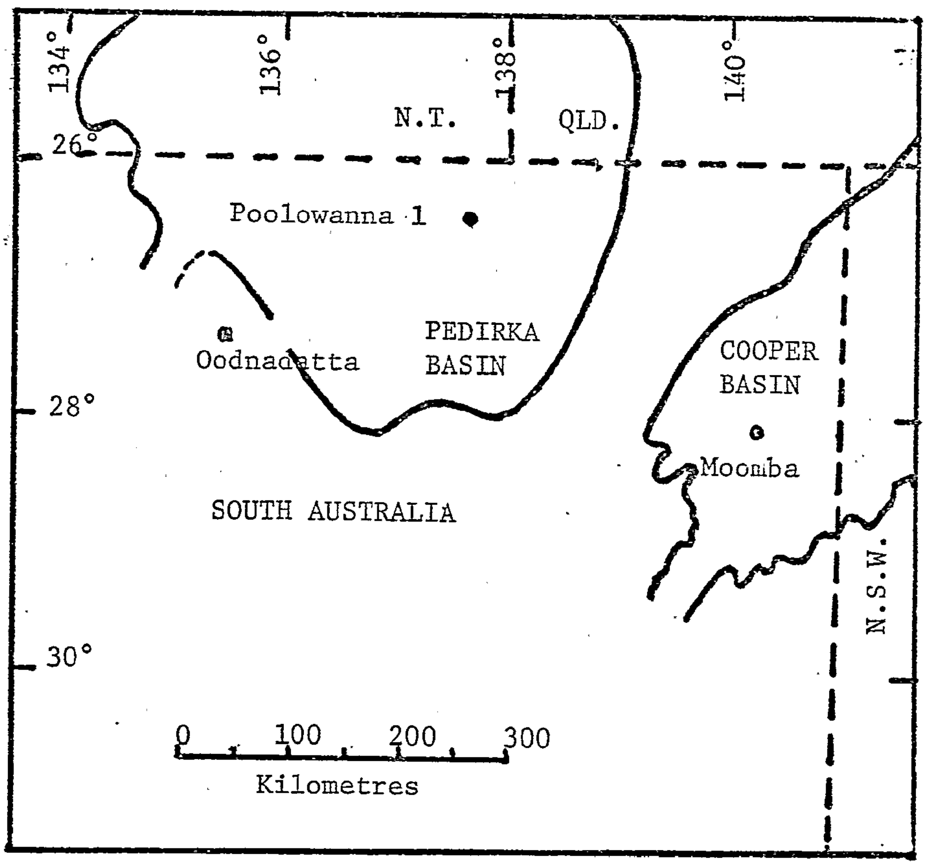


FIGURE 2 - Maceral compositions of coals and dispersed organic matter of Middle to Lower Jurassic age in Poolowanna No.1 well.

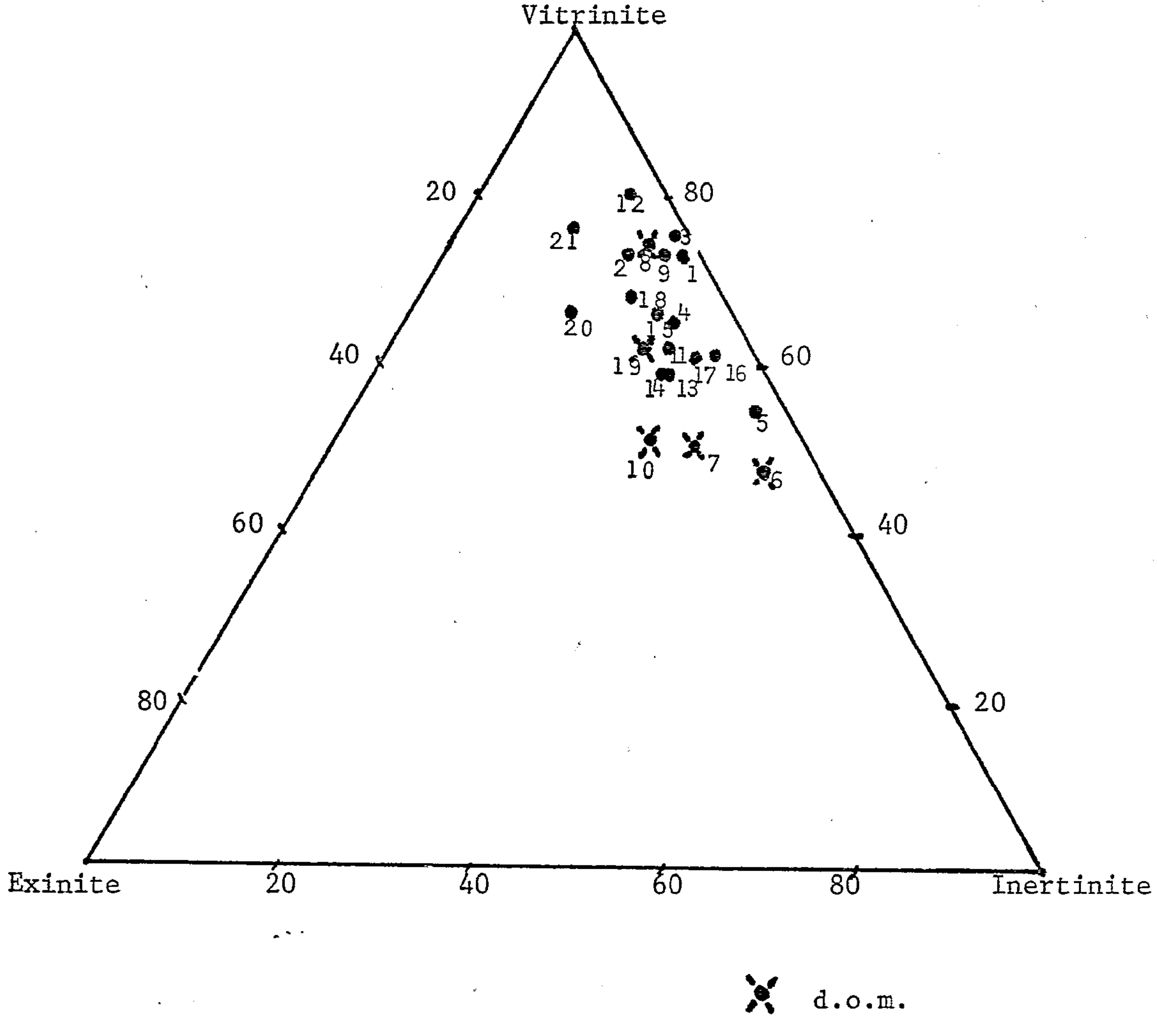


FIGURE 3 - Constituents of the exinite maceral group in coals and dispersed organic matter of Middle to Lower Jurassic age in Poolowanna No.1 well.

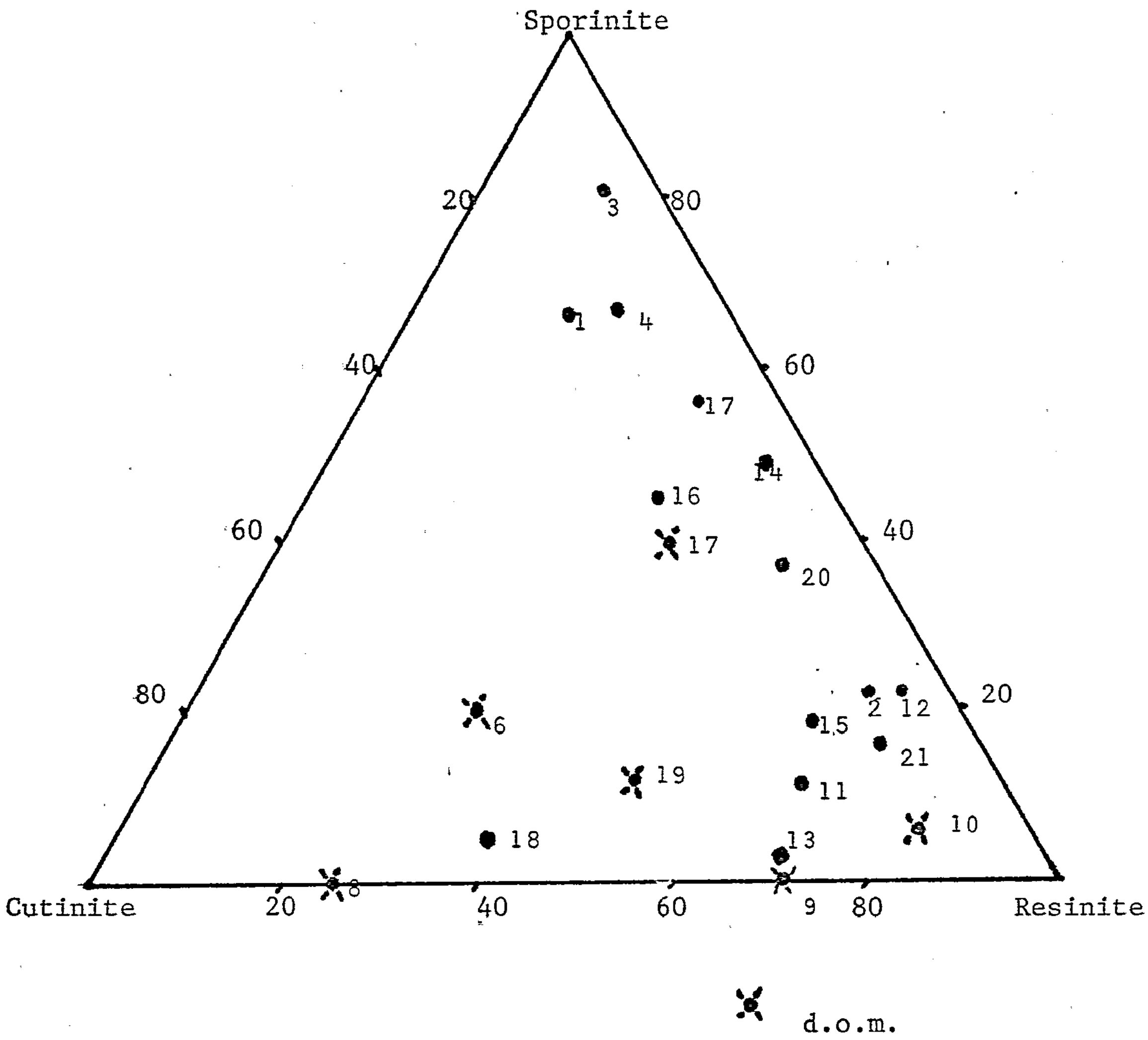


FIGURE 4 - Constituents of the inertinite maceral group in coals and dispersed organic matter of Middle to Lower Jurassic age in Poolowanna No.1 well.

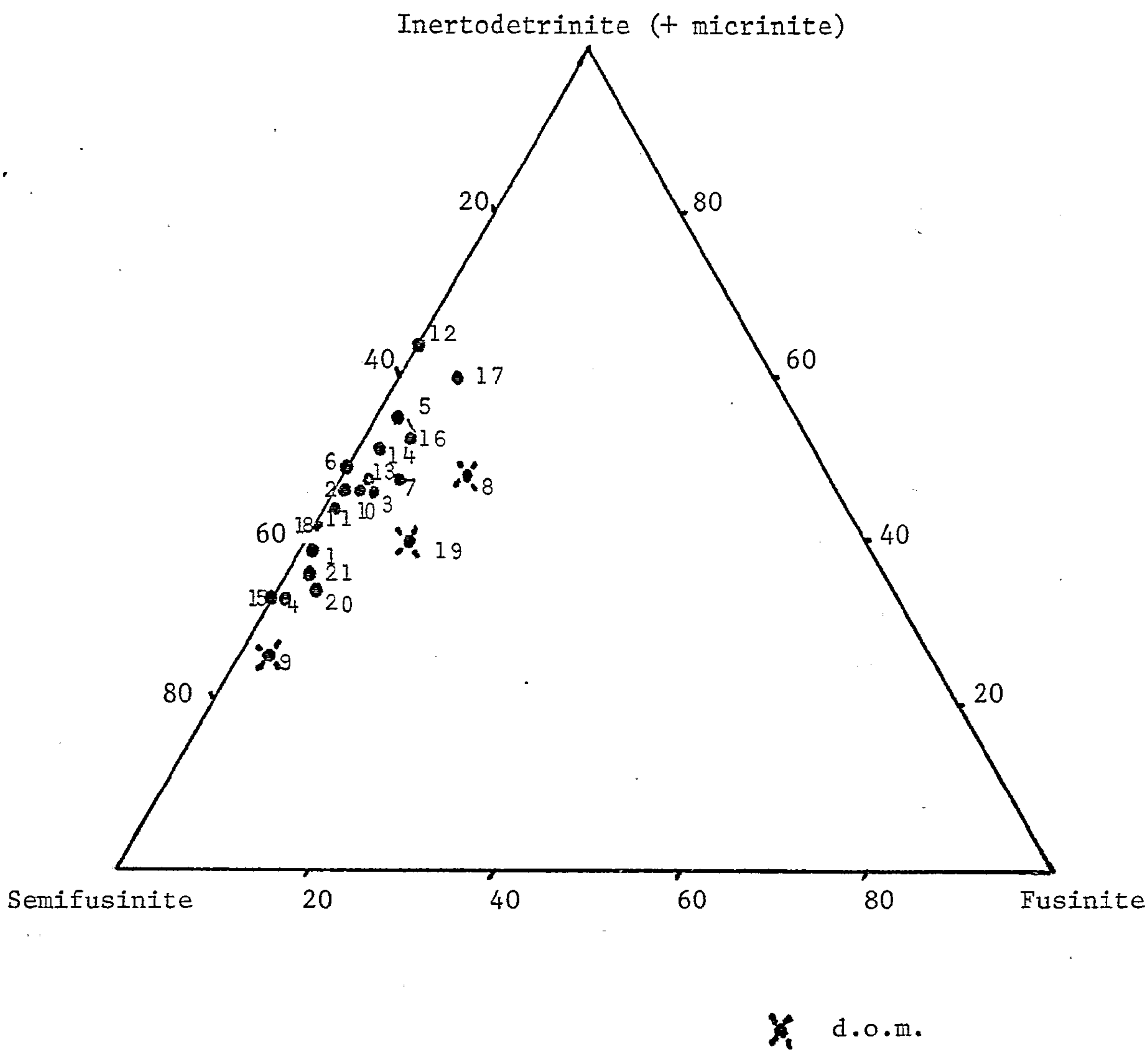
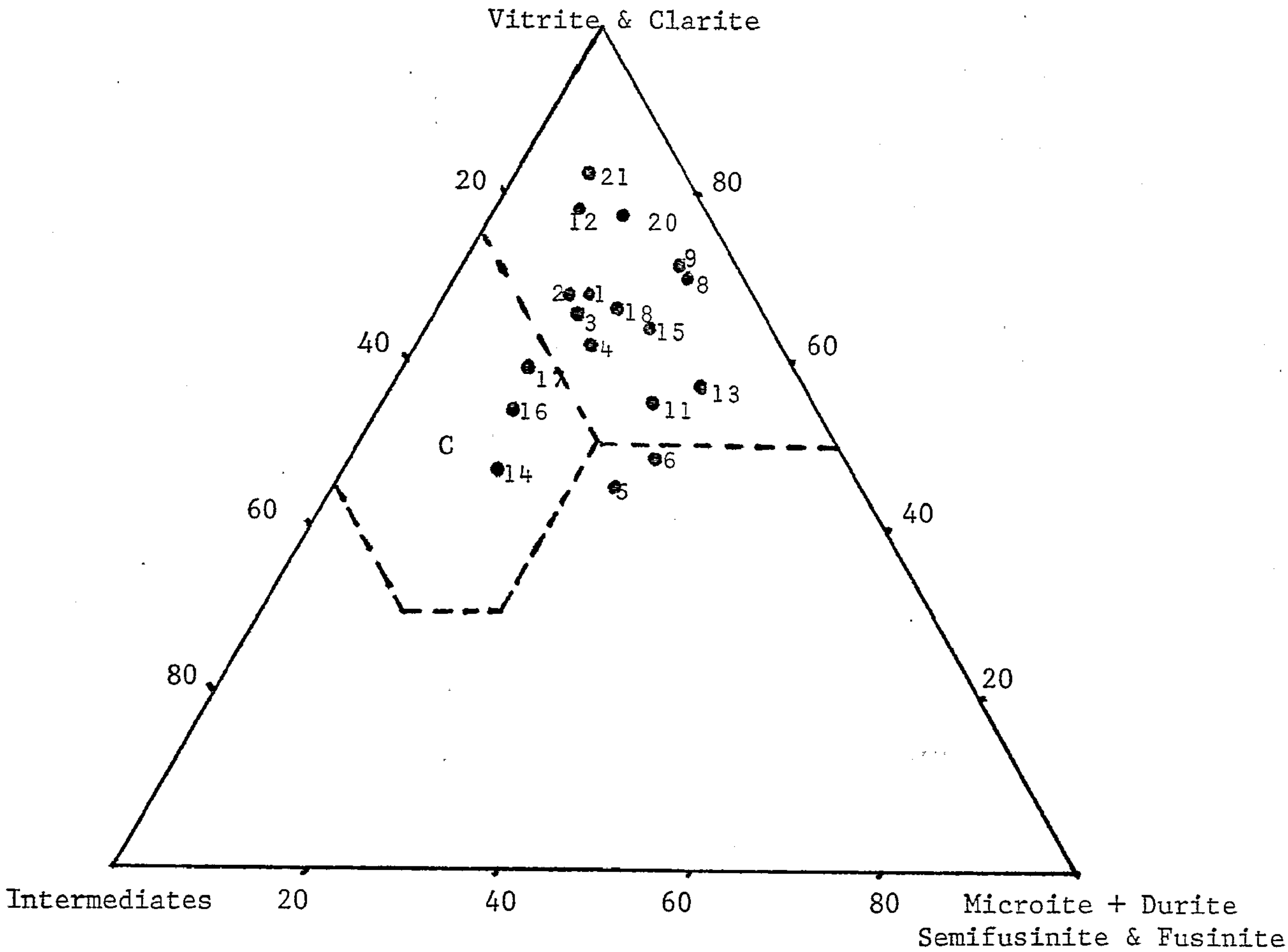


FIGURE 5 - Microlithotype compositions of coals of Middle to Lower Jurassic age in Poolowanna No.1 well.



0103

PETROGRAPHY AND DIAGENESIS OF
JURASSIC SANDSTONES FROM
POOLOWANNA-1(8426'2"-8439'3" bdf)
SIMPSON DESERT, CENTRAL AUSTRALIA

BY

A.E. RAHDON

CONTENTS

1. Introduction

At the request of I.D. Bruce several samples of Jurassic sandstones from Poolowanna-1, interval 8426'2" - 8439'3" were examined for preliminary identification of compositional, textural and diagenetic characteristics. The investigation was carried out using reflection and transmitted light microscopes.

The well Poolowanna-1 was drilled in the Simpson Desert, Central Australia (26°25'34"S and 137°40'31"E) by a consortium headed by Delhi International Oil Corp. in 1977. The DST at depth 8216'-8328' bdf recovered 15 bbls of oil and water from the Jurassic sandstones; the gravity of the oil was reported as 36.9°API (MPR Sept. 1978). According to geological literature the subcropping Permian and Triassic sediments in this part of Australia are considered to belong to the "Pedirka Basin" whereas the overlying Jurassic/Cretaceous sediments are assigned to the "Eromanga Basin". This was the first bona fide oil occurrence in the Simpson Desert.

2. Megascopic Features of Samples

The samples examined were small fragments ca. 200 grams (in weight) each, taken from one core. Their more important visual characteristics are as follows:

Sample 8426'2" (2570m)	Sandstone, brown, fine to medium (av. diameter 200 microns) well sorted. Contains patches of carbonaceous shale and a laminae of carbonaceous matter. A stylolite is present.
Sample 8427'1" (2570.2m)	Sandstone grey, fine (av. 150 microns), well sorted, hard and tough, some dark streaks and rare fractures parallel to bedding.
Sample 8430'10" (2571.2m)	Sandstone grey, fine to medium, well sorted, very hard; carbonaceous laminae and stylolites present. Some fractures parallel to bedding.

Sample 8438'6" (2573.7m) Sandstone, brownish grey, fine to coarse poorly sorted, laminated. Carbonaceous shale and carbonaceous matter forms thin beds, layers and stylolites. The sample seems to be hydrocarbon bearing.

Sample 8439'3" 2574m Sandstones in contact with coal. Sandstone grey, medium to coarse, moderately sorted, relatively friable. Numerous white patches of kaolinite. The sandstone is in contact with a coal layer, black shiny.

From the above it can be seen that the first three samples are fine grained and the lower two medium to coarse grained. The grey samples (8427'1" and 8430'10") are very hard, the others are hard to semifriable.

3. Composition of Sandstones

As seen under the microscope the framework of the sandstones is composed of quartz, polycrystalline quartz, kaolinite grains, occasional grains of coal, heavy minerals and flakes of mica. Only in the coarse grained sandstone (8439'3") could feldspar be identified. Quartz is by far the most common constituent.

Intergranular matter, composed of phyllosilicates (clay and micas) is common in samples 8426'2" and 8438'6" but is rare in the grey, hard sandstones. On the whole the grains are well sorted in the upper three samples and vary in angularity from semi-rounded to semi-angular.

3.1 Framework minerals

Quartz which forms 90-95% of the framework minerals in the fine and medium sandstones occurs with straight or with undulating extinction. The quartz grains in the grey sandstone invariably have advanced authigenic overgrowths.

Polycrystalline quartz, occurs as chert, as vein quartz, and as detrital grains derived from gneiss, quartzites and pre-existent quartzose sandstones. Some varieties have the appearance of quartz derived from silcretes (detrital grains with healed fractures).

Feldspars occur mainly in the coarse grained sandstone (sample 8439'3"). They are of an untwinned variety and only the presence of cleavage permits their identification.

Micas are predominantly of muscovite composition and occur as flakes up to 1 cm long, mostly deformed and contorted to a varying degree. Some micas seem to form part of matrix and are stained by hydrocarbons (in 8426'2" and 8438'6").

Heavy Minerals are not common constituents. Of those present, zircon and blue tourmaline are the most representative. In the sample 8438'6" a minute amount of pyrite is present.

Lithoclasts are composed of shale, carbonaceous shale, coal and some composite grains (kaolinite/quartz, mica/quartz).

Alteration Minerals form grain-size patches composed of kaolinite. They are common in the coarse sandstone (8439'3") and most likely are alteration products of some unstable mineral (?microcline?).

3.2 Matrix

The intergranular matrix is abundant in the samples 8926'2" and 8438'6". In these two samples several substances such as strongly deformed contorted micas, squeezed soft lithoclasts, weakly birefringent fibrous brown clay, kaolinite and structureless brown semi-translucent matter (probably a heavy hydrocarbon) are present.

In the grey sandstones (8427'1" and 8430'10") the matrix is not abundant and is composed of kaolinite, whereas in the coarse sandstone (8439'3") it is composed almost exclusively of a diagenetic kaolinite.

3.3 Carbonaceous layers

Part of the sample 3438'6" consists of black shale. Under the microscrope this shale appears to be composed of a dark carbonaceous mass with mica flakes well aligned within. Very thin laminae of carbonaceous matter branch off from the main shale body and laterally pass into stylolites.

In other samples carbonaceous matter forms lenses, fills stylolites or forms very narrow laminae. The nature of the carbonaceous matter could not be established but it is thought to be rich in heavy hydrocarbon.

Part of the sample 8439'3" is composed of a coal.

4. Diagenesis

The grey sandstones (8427'1" and 8430'10") are tight, hard and strongly consolidated. The main post-depositional changes that affected these sandstones are compaction and the growth of authigenic quartz. The authigenic quartz overgrowth are particularly well advanced imparting to the sandstones a mozaic texture.

The other sandstones are more friable than the above and contain depositional and diagenetic phyllosilicates (micas and clay minerals). In these sandstones the authigenic quartz overgrowth are less developed and portions of the intergranular space are occupied by clay and micaceous minerals. The main diagenetic pore reducing processes in these sandstones are compaction and pore-filling by phyllosilicate minerals. In the coarse sandstone (8439'3") the quartz diagenesis has been strongly advanced but the authigenic kaolinite is also abundant and occupies the intergranular space.

Petrographic Description of Samples

Sample 8426'2"

Sandstone, medium grained, well sorted, composed of quartz and subordinate amounts of polycrystalline quartz, lithoclasts, tourmaline, mica and other phyllosilicates.

Alignment of grains is parallel to bedding. Sutured contacts are present. Argillaceous and plastically deformed components occupy much of the intergranular space.

Sample 8427'1"

Sandstone, fine grained, very well sorted, composed of quartz (ca. 93%), polycrystalline quartz, micas, zircon and kaolinized grains.

The diagenetic minerals are authigenic quartz overgrowths and some phyllosilicates (? illite) that form a coating around the detrital grains.

Dissolution of quartz grains is very pronounced in the vicinity of stylolites.

Sample 8430'10"

Sandstone, fine to medium grained, very well sorted; composed of quartz (ca. 90%), muscovite, volcanic lithoclasts, sericitized and kaolinized grains.

The diagenetic minerals are authigenic quartz overgrowths.

Sample 8438'6"

Sandstone, medium grained, poorly sorted, carbonaceous, argillaceous; the framework composed of quartz (dominant), lithoclasts, micas and opaque constituents (coal and other carbonized matter, mainly plant remains).

The diagenetic minerals are authigenic quartz overgrowths (minor amount) and phyllosilicates. The presence of sutured contacts indicates some dissolution of framework minerals.

Sample 8439'3"

Sandstone, fine to very coarse grained, poorly sorted; composed of quartz, (?) orthoclase, polycrystalline grains and patches of kaolinite.

The diagenetic minerals are authigenic quartz and kaolinite.

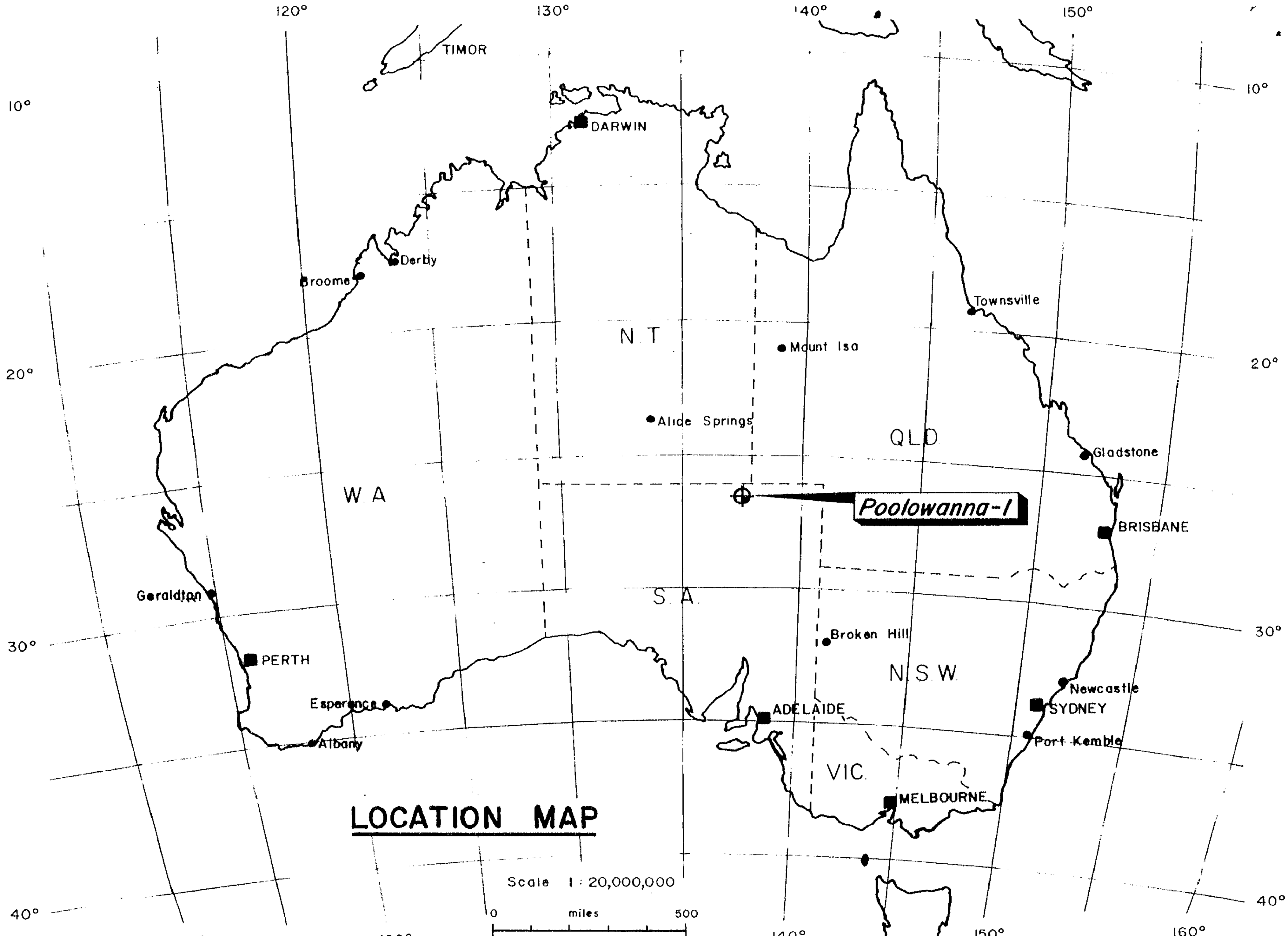


Fig. I.

Drg. No. 10165

Base Drg No. 7665

0111

RESTRICTED INVESTIGATION REPORT 989R

CSIRO

MINERALS RESEARCH LABORATORIES

FUEL GEOSCIENCE UNIT

THE PETROLOGY OF SOME COALS AND DISPERSED ORGANIC MATTER OF TRIASSIC TO CRETACEOUS AGES IN POOLOWANNA NO 1 WELL PEDIRKA BASIN

MICHELLE SMYTH

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

JANUARY 1979

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INTRODUCTION

This is the fourth report on the organic sediments from Poolowanna No 1 well. It deals specifically with those sediments from the Upper Middle Jurassic and Cretaceous successions. Also, as this is the last report, a comparison has been made of the petrography of all of the coals and dispersed organic matter from the Triassic to the Cretaceous. The three reports covering the Triassic, Lower Jurassic and Middle to Lower Jurassic sediments are Restricted Reports 976R, 975R and 981R, respectively.

All of the samples used have been supplied by Delhi International Oil Corporation to CSIRO Fuel Geoscience Unit. The microscope study of these samples has been undertaken in an attempt to define the nature of the source rocks for hydrocarbons in this basin.

ANALYSES

Samples of coals and carbonaceous shales were selected from ditch cuttings of the Upper Middle Jurassic and Cretaceous sediments. These were froth floated if necessary to concentrate the organic fraction.

Fourteen ditch cuttings and two cores from the Upper Middle Jurassic and thirteen ditch cuttings from the Cretaceous have been analysed for their maceral contents, and also microlithotypes where possible.

RESULTS

Results of the maceral analyses are in Tables 1 and 3, and Figs 1 and 2. Many of the Upper Middle Jurassic samples contained d.o.m. rather than coal (Table 1) and the proportions of the three maceral groups comprising this d.o.m. are given in Table 2.

The coals are generally vitrinite-rich, as in the d.o.n; except for the coal between 7590 and 7600 feet (2313.4 to 2316.5 metres), which has a moderate vitrinite content and high exinite content.

The Cretaceous coals and d.o.m. also have high vitrinite contents, (Table 3) but less than the Upper Middle Jurassic ones. The exinite content of the Cretaceous d.o.m. is higher, particularly in one sample where the exinite content is 50% (Fig. 2).

Few of the samples contained sufficient exinite for meaningful subdivisions of this group into the constituents sporinite, cutinite and resinite. In both the Upper Middle Jurassic (Fig. 3) and the Cretaceous (Fig. 4), there is a trend for resinite, then cutinite to be the dominant exinite maceral, particularly in the Cretaceous samples.

Semifusinite is the dominant inertinite group constituent (Figs 5 and 6), with fusinite more than usually plentiful in the Cretaceous coals.

Microlithotype analyses of the coals are given in Tables 4 and 5 and Figs 7 and 8. Most of the coals have high vitrite plus clarite contents and low intermediates, except for the two samples of coal from the 7590 - 7600 feet (2313.4 to 2316.5 metres) interval, which have relatively high intermediates (Table 4).

The reflectance of the vitrinite ($R_o$max) in the Upper Middle Jurassic varies from 0.60% at 5560 feet (1694.7 metres to 0.80% at 7900 feet (2407.9 metres). The reflectance of the vitrinite in the Cretaceous is 0.35% at 910 feet (277.4 metres) to 0.59% at 5450 feet (1661.2 metres). (Russell, pers. comm.).

DISCUSSION

Dispersed organic matter (d.o.m.)

The vitrinite content of the d.o.m. tends to increase from the Triassic, where it is generally low at <50%, to the Upper Middle Jurassic where it is high, at 75% (Fig. 9). The vitrinite content of the Cretaceous d.o.m. is lower than that of the Upper Middle Jurassic, <70%.

The exinite content of the d.o.m. does not vary greatly in amount, ranging between 0 and 30% generally, and being lowest in the Upper Middle Jurassic (Fig. 10). Cutinite is the dominant exinite constituent in the Triassic sediments, and both cutinite and resinite are well represented in the younger sediments.

The inertinite content of the d.o.m. varies inversely with the vitrinite (Fig. 11). It is highest in the Triassic sediments, generally >50%, and lowest in Upper Middle Jurassic, <20%. The dominant inertinite constituent in the Triassic d.o.m. is inertodetrinite, and then the proportion of semifusinite increases in the younger sediments to the Upper Middle Jurassic and Cretaceous, where semifusinite is dominant.

Coals

In the coals there is the same tendency for the vitrinite content to increase from the Triassic to the Upper Middle Jurassic, but the vitrinite in coals is higher than in the d.o.m. of the same age (Fig. 12).

Most of the coals have exinite contents between 0 and 15% (Fig. 13). Coals with exinite >15% are Upper Middle Jurassic and Cretaceous. The exinite constituents of the coals differs from that in the d.o.m. Both cutinite and resinite are well represented in the Triassic and the Lower Jurassic; from the Lower Jurassic onwards sporinite increases and to the Upper Middle Jurassic sporinite and resinite occur in the coals; resinite is dominant in the Cretaceous.

The inertinite content of the coals follows similar trends to that in the d.o.m. (Fig. 14). Inertodetrinite is the dominant constituent in Triassic coals, with the proportion of semifusinite increasing from the Lower Jurassic onwards, semifusinite being dominant in Middle to Lower Jurassic and younger coals. The proportion of fusinite is highest in the Cretaceous coals.

Fig. 15 shows the stratigraphy in Poolowanna No 1 well. If it is accepted that exinitic d.o.m. is the most suitable source material for oil (Tissot et al, 1974), most of the sediments could be likely sources. The most promising sediments would be those from the Middle to Lower Jurassic, which combine a high exinite content with a sufficiently high degree of maturity.

If vitrinitic d.o.m. is suitable for generating gaseous hydrocarbons, more than liquid ones, all of the Jurassic sediments could be likely source rocks, limited only by their maturity.

Based on the microlithotype compositions of the coals, depositional environments have been proposed for them. (Fig. 15). The inertinite-rich coals of the Triassic may have accumulated in deltaic and lacustrine environments; the Middle to Lower Jurassic coals in deltaic and fluvial invironments, with occasionally lagoonal; and most of the Upper Middle Jurassic, plus the Cretaceous, in a fluvial environment.

CONCLUSIONS

The Upper Middle Jurassic and Cretaceous coals and dispersed organic matter have high vitrinite contents, being highest in the Upper Middle Jurassic. The dominant exinite constituent is resinite, then cutinite; and semifusinite is the dominant inertinite constituent.

Most of the coals have high vitrite plus clarite and low intermediates contents.

The vitrinite content of both coals and d.o.m. increases from the Triassic to the Upper Middle Jurassic. The vitrinite content of the coals tends to be higher than that in the d.o.m. of the same age.

Exinite in the d.o.m. is mostly cutinite and resinite, with resinite increasing from the Triassic to the younger sediments. Coals generally contain more sporinite than the d.o.m. of the same age.

Inertinite is dominantly inertodetrinite in the Triassic, with the proportion of semifusinite increasing in the younger sediments.

The interval most suitable for potential source rocks of liquid hydrocarbons is the Middle to Lower Jurassic, which combines a relatively high exinite content with a sufficiently high degree of maturity.

Sediments all through the Jurassic could be suitable source rocks for gaseous hydrocarbons, provided they are sufficiently mature.

REFERENCES

Tissot, B., Durand, B., Espitalie, J., and Combaz, A; 1974: Influence of Nature and Diagenesis of Organic Matter in Formation of Petroleum, AAPG Bull 58, No 3 pp 499 - 506.

TABLE 1 POOLOWANNA NO 1 WELL, PEDIRKA BASIN

Upper Middle Jurassic Coals and Dispersed Organic Matter

Maceral Analyses

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

	Lab. No. Depth (feet)	Depth (metres)	Vitrinite	Resinous vitrinite	Sporinite	Cutinite	Resinite	Micrinite	Inerto-detrinite	Semi-fusinite	Fusinite	Minerals	No of coal counts
1.	60487 5560-70	1694.7 to 1697.7	87 90	7 7	- -	3 3	tr tr	- -	- -	- -	- -	3 mmf	212
2.	60446 5650	1722.1	85 86	12 12	- -	- -	- -	- -	- -	2 2	- -	1 mmf	67 d.o.m.
3.	60514- 5830-40	1777.0 to 1780.0	80	3	-	-	3	-	3	11	-	n.c.	35 d.o.m.
4.	60541 6100-10	1859.3 to 1862.3	79	-	-	5	3	-	-	13	-	n.c.	60 d.o.m.
5.	60447 6300	1920.2	92 93	7 7	- -	- -	- -	- -	- -	- -	- -	1 mmf	95 d.o.m.
6.	6390- 6400	1947.7 to 1950.7	90 98	tr tr	- -	- -	- -	- -	1 1	tr 1	- -	9 mmf	206
7.	60448 6400	1950.7	98	2	-	-	-	-	-	-	-	-	66 d.o.m.
8.	59767-70 6600-40	2011.7 to 2023.9	40 81	3 7	2 4	1 2	2 3	- -	tr 1	1 2	- -	51 mmf	249
9.	59800-04 6930-80	2112.3 to 2127.5	19 89	- -	- -	1 7	1 2	- -	- -	1 2	- -	78 mmf	92 d.o.m.
10.	59878 7330-40	2234.2 to 2237.2	65 90	2 4	- -	- -	1 1	- -	3 4	1 1	- -	28 mmf	113 d.o.m.
11.	59904 7590- 7600	2313.4 to 2316.5	49 54	- -	6 6	1 1	17 19	- -	8 8	11 12	- -	8 mmf	376

continued ....

TABLE 1 POOLOWANNA NO 1 WELL, PEDIRKA BASIN

Upper Middle Jurassic Coals and Dispersed Organic Matter

Maceral Analyses

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

	Lab. No. Depth (feet)	Depth (metres)	Vitrinite	Resinous vitrinite	Sporinite	Cutinite	Resinite	Micrinite	Inerto-detrinite	Semi-fusinite	Fusinite	Minerals	No of coal counts
12.	60449	2315.0	49	10	3	tr	14	2	11	6	-	5	453
	7595		51	10	3	tr	15	2	12	7	-	mmf	
13.	60595	2355.8	64	34	-	-	2	-	-	-	-	n.c.	271
	7729												
14.	59760												
	7729.25	2355.9	60	6	-	-	3	-	2	2	-	27	127 d.o.m.
	to	to	81	9	-	-	4	-	3	3	-	mmf	
	7729.50	2356.0											
15.	59761												
	7753.17	2363.2	49	-	-	-	4	-	1	9	-	37	139 d.o.m.
	to	to	78	-	-	-	7	-	1	14	-	mmf	
	7753.42	2363.3											
16.	60596	2364.6	96	1	-	-	1	-	-	-	-	2	227
	7758		98	1	-	-	1	-	-	-	-	mmf	

tr - trace

mmf - mineral-matter-free

n.c. - not counted

d.o.m. - dispersed organic matter

TABLE 2 APPROXIMATE MACERAL COMPOSITIONS OF THE DISPERSED ORGANIC MATTER IN THE UPPER MIDDLE JURASSIC SEDIMENTS

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

Sample No.	Lab. No. Depth (feet)	Depth (metres)	Vitrinite	Exinite	Inertinite	Total d.o.m.
2.	60446 5650	1722.1	5	-	tr	5
3.	60514 5830-40	1777.0-1780.0	4	tr	1	5
4.	60541 6100-10	1859.3 to 1862.3	4	0.5	0.5	5
5.	60447 6300	1920.2	10	-	-	10
7.	60448 6400	1950.7	5	-	-	5
9.	59800-04 6930-80	2112.3 to 2127.5	19	1	tr	20
10.	59878 7330-40	2234.2 to 2237.2	24	tr	1	25
14.	7729.25 to .50	2355.9 to 2356.0	9	tr	1	10
15.	7753.17 to .42	2363.2 to 2363.3	8.5	0.5	1	10

tr - trace

d.o.m. - dispersed organic matter

TABLE 3 POOLOWANNA NO 1 WELL - CRETACEOUS, PEDIRKA BASIN

Maceral Analysis of the Subsections

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

	Lab. No. Depth (feet)	Depth (metres)	Vitrinite	Resinous vitrinite	Sporinite	Cutinite	Resinite	Micrinite	Inerto-detrinite	Semi-fusinite	Fusinite	Minerals	No of coal counts
1.	60312 910-940	277.4 -286.5	82 86	1 1	- -	1 1	4 4	- -	1 2	5 5	1 1	5 mmf	292
2.	60441 1200-1300	365.8 -396.2	100	-	-	-	-	-	-	-	-	-	132
3.	60442 2000-2100	609.6 -640.1	93 96	1 1	- -	- -	tr 1	- -	- -	2 2	- -	4 mmf	325
4.	60349 2020-2050	615.7 -624.8	75 82	2 2	- -	3 3	2 2	tr tr	2 2	6 7	1 2	9 mmf	237
5.	60359 2320-2350	707.1 -716.3	76 81	2 2	tr tr	4 4	2 3	tr tr	2 3	5 5	2 2	7 mmf	330
6.	60443 2500-2600	762.0 -792.5	75 82	5 6	1 1	2 2	5 5	- -	1 1	3 3	- -	8 mmf	234
7.	60368 2770-2800	844.3 -853.4	66 70	3 3	5 6	1 1	8 8	- -	6 6	5 6	tr tr	6 mmf	524
8.	60444 2800	853.4	56 60	3 3	5 6	1 1	14 15	tr tr	8 8	5 6	1 1	7 mmf	576
9.	60389 3400-3430	1036.3 -1045.6	66	3	-	2	12	-	3	12	2	mmf	65 d.o.m.
10.	60445 3950	1204.0	93 95	3 3	- -	- -	1 1	- -	- -	1 1	- -	2 mmf	372
11.	60411 4060-4090	1237.5 -1246.6	50 61	5 6	- -	6 8	3 4	- -	4 5	12 15	1 1	18 mmf	82 d.o.m.
12.	60429 4600-4630	1402.1 -1411.2	29 29	5 5	2 2	10 11	35 37	- -	5 5	9 9	2 2	3 mmf	85 d.o.m.
13.	60458 5140-5170	1566.7 -1575.8	55	1	11	11	4	-	7	8	3	mmf	73 d.o.m.

mmf = mineral matter free

d.o.m. = dispersed organic matter

tr = trace

TABLE 4 UPPER MIDDLE JURASSIC COALS FROM POOLOWANNA NO 1 WELL, PEDIRKA BASIN

Microlithotype analyses

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

Lab No. Depth (feet)	Depth (metres)	Vitrite	Clarite	Intermediates	Microite & Durite	Semi-fusite & Fusite	Shaly Coal	Mineral Matter	No. of Counts
8. 59767-70 6600-40	2011.7 -2023.9	36 77	10 22	tr 1	- -	- -	6	48 mmf	150
11. 59904 7590-7600	2313.4 -2316.5	32 40	11 13	24 30	9 11	5 6	11	8 mmf	466
12. 60449 7595	2315.0	37 39	9 10	29 32	13 14	5 5	7	n.c. mmf	402
14. 59760 7729.25.50	2355.9 -2356.0	74 96	1 1	- -	- -	2 3	2	21 mmf	117
15. 59761 7753.17.42	2363.2 -2363.3	82	2	2	-	14	n.c.		134

mmf = mineral-matter free

n.c. = not counted

tr = trace

TABLE 5 PEDIRKA BASIN, POOLOWANNA NO.1 WELL

Microlithotype analyses of coals and d.o.m. of Cretaceous age

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

	Lab No. Depth (feet)	Depth (metres)	Vitrite	Clarite	Intermediates	Microite & Durite	Semifusite & Fusite	Shaly Coal	Mineral Matter	No. of Counts
1.	60312 910-940	277.4 -286.5	83 85	6 6	tr tr	tr tr	9 9	2 -	tr mmf	288
2.	60441 1200-1300	365.8 -396.2	100	-	-	-	-	-	mmf	132
3.	60442 2000-2100	609.6 -640.1	97	-	-	-	3	-	mmf	355
4.	60349 2020-2050	615.7 -624.8	65 69	13 14	6 7	2 2	8 8	1 -	n.c. mmf	243
5.	60359 2320-2350	707.1 -716.3	74 79	11 12	1 1	1 1	7 7	6 -	n.c. mmf	314
6.	60443 2500-2600	762.0 -792.5	87	8	-	3	2	n.c.	n.c.	111
7.	60368 2770-2800	844.3 -853.4	61 63	15 16	13 14	4 4	3 3	3 -	1 mmf	482
8.	60444 2800	853.4	48	22	20	4	6	n.c.	n.c.	485
10.	60445 3950	1204.0	94 99	1 1	- -	- -	tr tr	1 -	4 mmf	402

mmf = mineral matter free
n.c. = not counted
tr = trace

Legend for Figs 1, 3, 5, 7

Depth of samples Feet	Metres	No. of counts on: all macerals	exinite	iner-tinite	micro-lithotypes	Point on diagrams
5560-70	1694.7-1697.7	212	7*	-	-	1.
5650	1722.1	67	-	1*	-	2.
5830-40	1777.0-1780.0	35*	1*	5*	-	3.
6100-10	1859.3-1862.3	60	5*	8*	-	4.
6300	1920.2	95	-	-	-	5.
6390-6400	1947.7-1950.7	206	-	3*	-	6.
6400	1950.7	66	-	-	-	7.
6600-40	2011.7-2023.9	249	24	7*	150	8.
6930-80	2112.3-2127.5	92	8*	2*	-	9.
7330-40	2234.2-2237.2	113	1*	6*	-	10.
7590-7600	2313.4-2316.5	376	97	78	466	11.
7595	2315.0	453	83	92	402	12.
7729	2355.8	271	4*	-	-	13.
7729.25 to .50 (core)	2355.9-2356.0	127	5*	8*	117	14.
7753.17 to .42 (core)	2363.2-2363.3	139	9*	21	134	15.
7758	2364.6	227	3*	-	-	16.

*not sufficient points for meaningful results
Upper Middle Jurassic coals and d.o.m. from Poolowanna No 1 well, Pedirka Basin

Legend for Figs 2, 4, 6, 8

Depth of samples Feet	Metres	all macerals	exinite	iner-tinite	mico-lithotypes	Point on diagrams
910-940	277.4-286.5	292	15*	23	288	1.
1200-1300	365.8-396.2	132	-	-	-	2.
2000-2100	609.6-640.1	325	1*	7*	355	3.
2020-2050	615.7-624.8	237	13*	27	243	4.
2320-2350	707.1-716.3	330	23	31	314	5.
2500-2600	762.0-792.5	234	18*	9*	111	6.
2770-2800	844.3-853.4	524	77	63	482	7.
2800	853.4	576	125	85	485	8.
3400-3430	1036.3-1045.6	65	9*	11*	-	9.
3950	1204.0	372	3*	5*	402	10.
4060-4090	1237.5-1246.6	82	9*	17*	-	11.
4600-4630	1402.1-1411.2	85	42	14*	-	12.
5140-5170	1566.7-1575.8	73	19*	13*	-	13.

* not sufficient points for meaningful results
Cretaceous coals and d.o.m. from Poolowanna No 1 well, Pedirka Basin

FIG. 1 MACERAL COMPOSITIONS OF THE UPPER MIDDLE JURASSIC COALS AND DISPERSED ORGANIC MATTER

Poolowanna No 1 Well Pedirka Basin

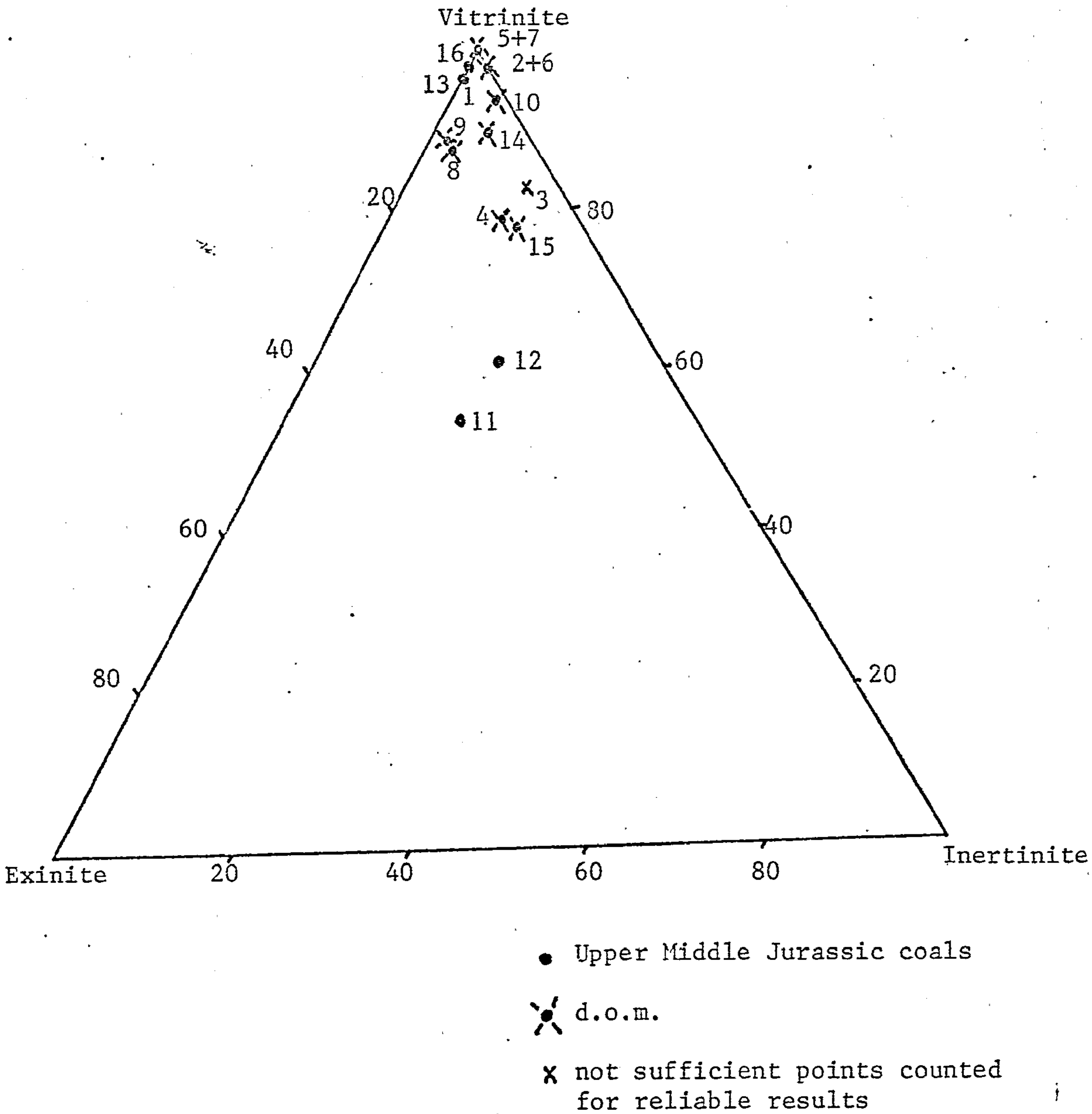


FIG. 2 MACERAL COMPOSITIONS OF THE CRETACEOUS COALS AND DISPERSED ORGANIC MATTER

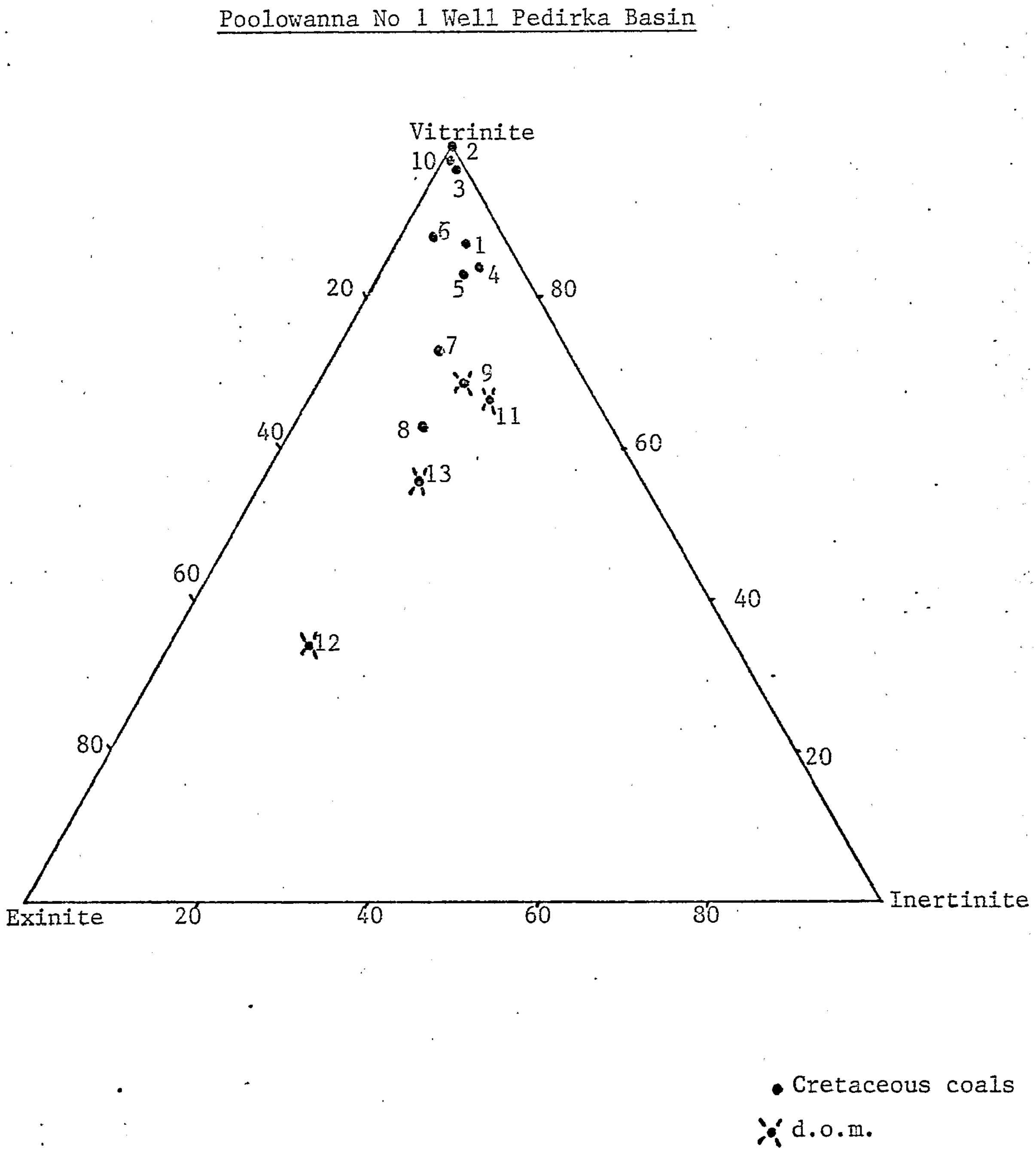


FIG. 3 CONSTITUENTS OF THE EXINITE MACERAL GROUP IN UPPER MIDDLE JURASSIC COALS AND DISPERSED ORGANIC MATTER

Poolowanna No 1 Well Pedirka Basin

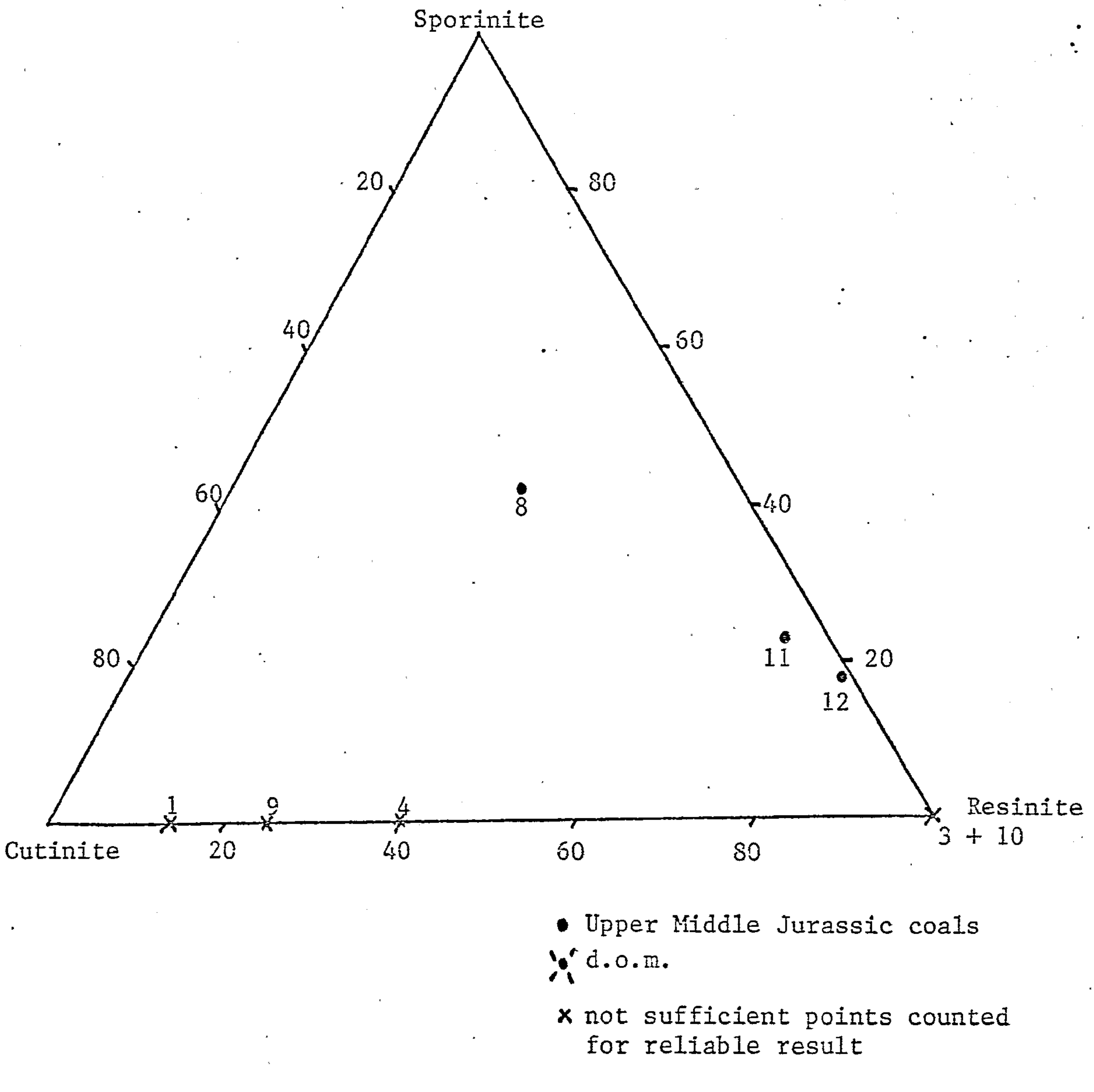


FIG. 4 CONSTITUTENTS OF THE EXINITE MACERAL GROUP IN CRETACEOUS COALS AND DISPERSED ORGANIC MATTER

Poolowanna No 1 Well Pedirka Basin

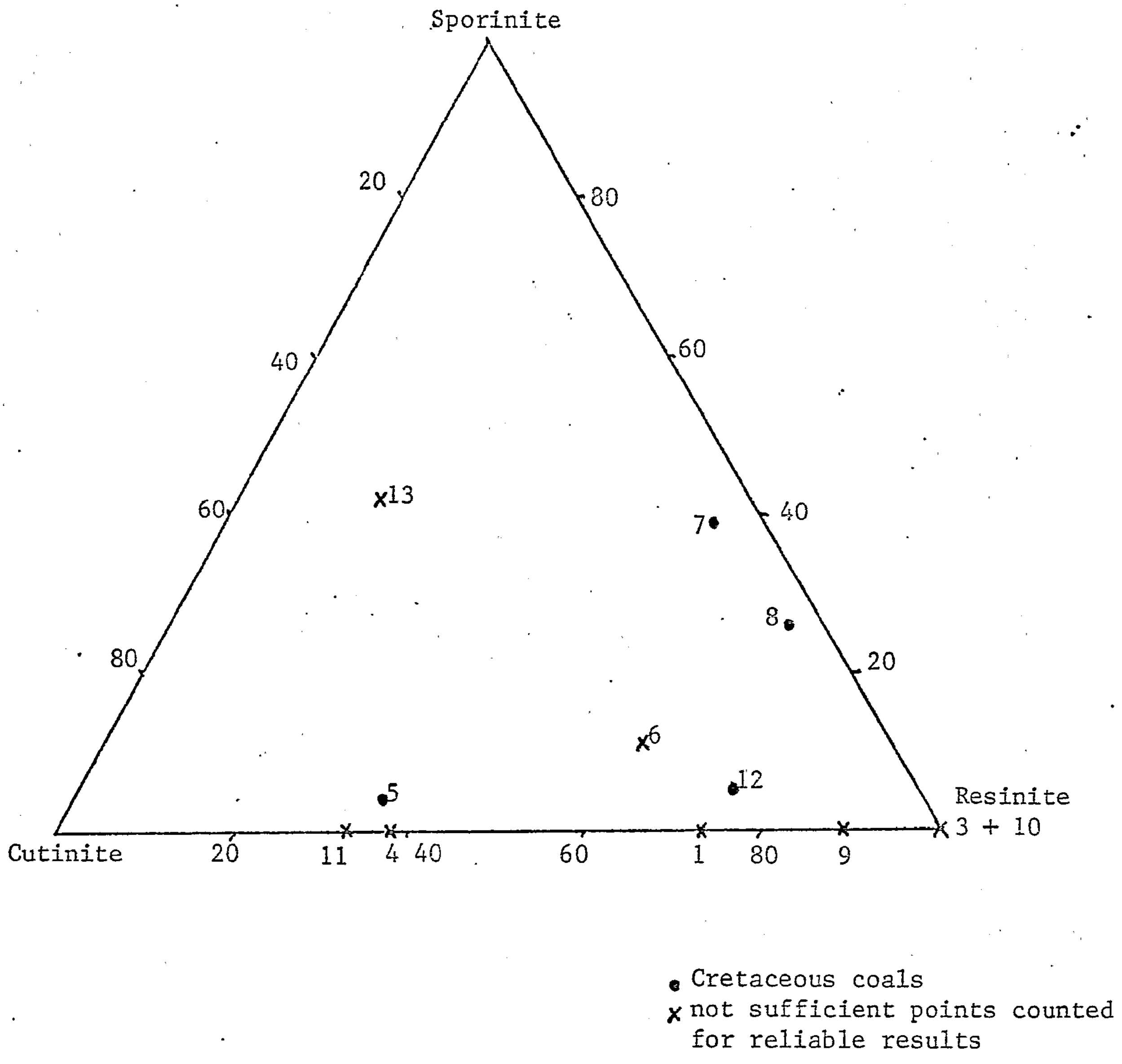
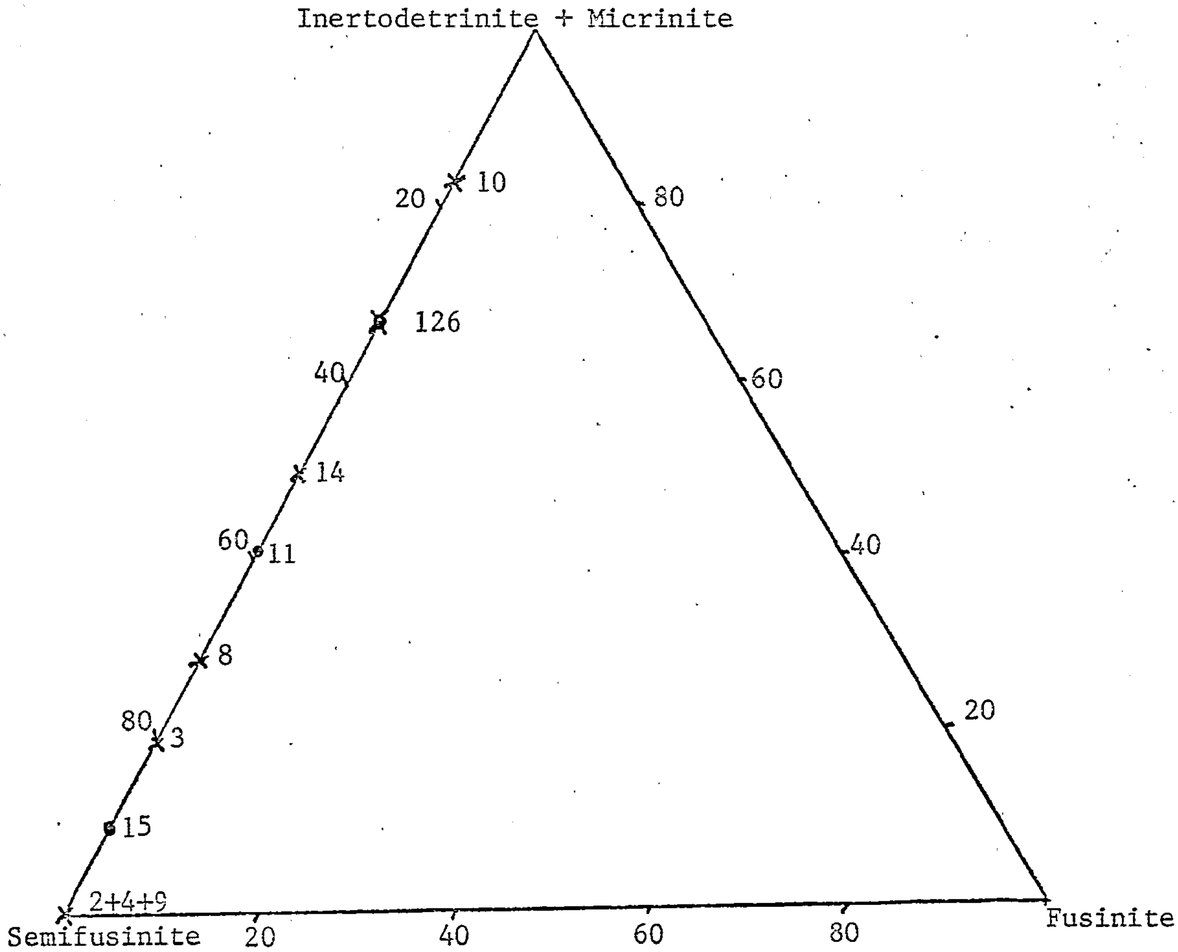


FIG. 5 CONSTITUENTS OF THE INERTINITE MACERAL GROUP IN UPPER MIDDLE JURASSIC COALS AND DISPERSED ORGANIC MATTER

<u>Poolowanna No 1 well Pedirka Basin</u>



• Upper Middle Jurassic coals

x not sufficient points counted for reliable results

FIG. 6 CONSTITUENTS OF THE INERTINITE MACERAL GROUP IN CRETACEOUS COALS AND DISPERSED ORGANIC MATTER

Poolowanna No 1 Well Pedirka Basin

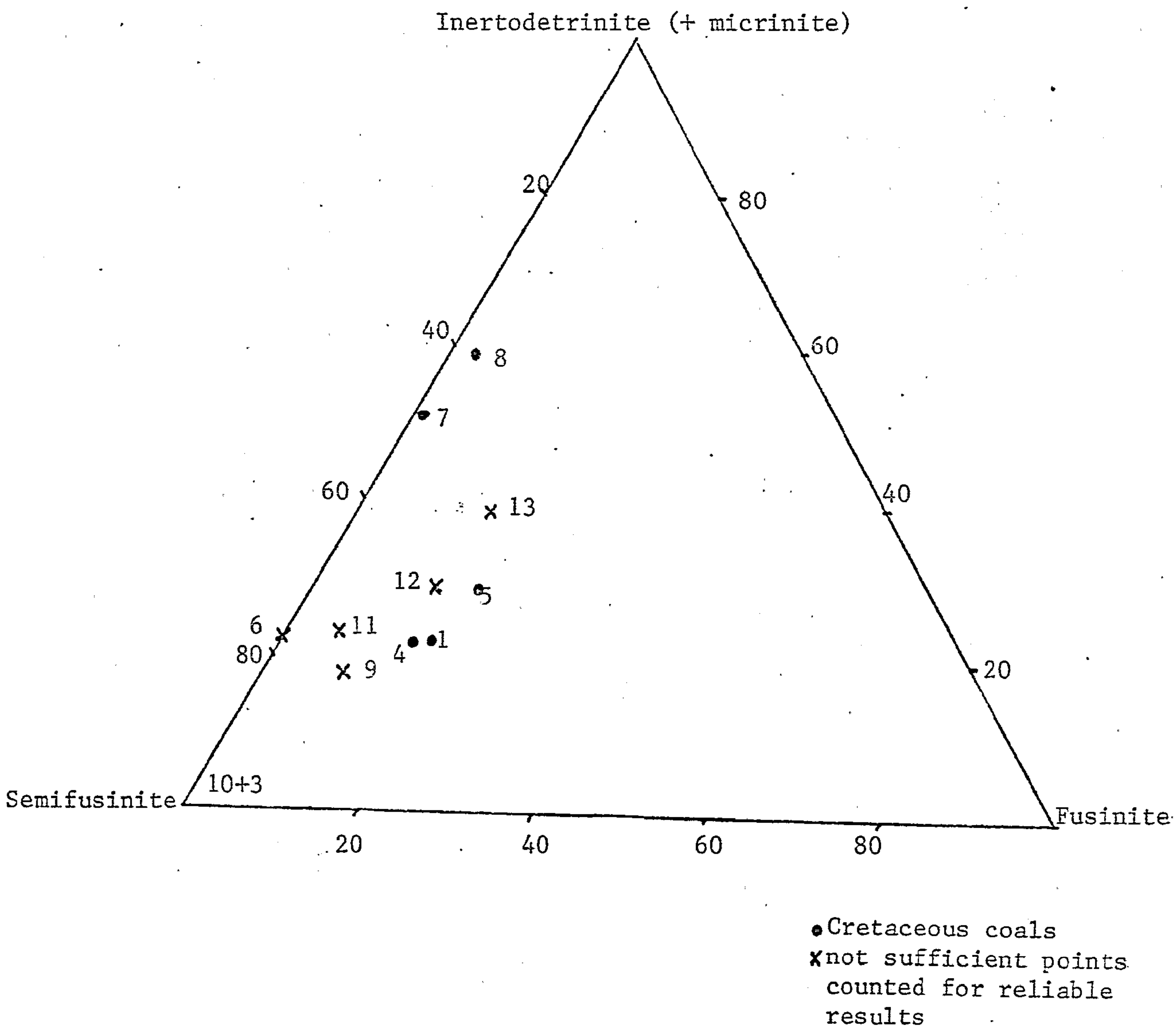


FIG. 7 MICROLITHOTYPE COMPOSITIONS OF THE UPPER MIDDLE JURASSIC COALS

Poolowanna No 1 Well Pedirka Basin

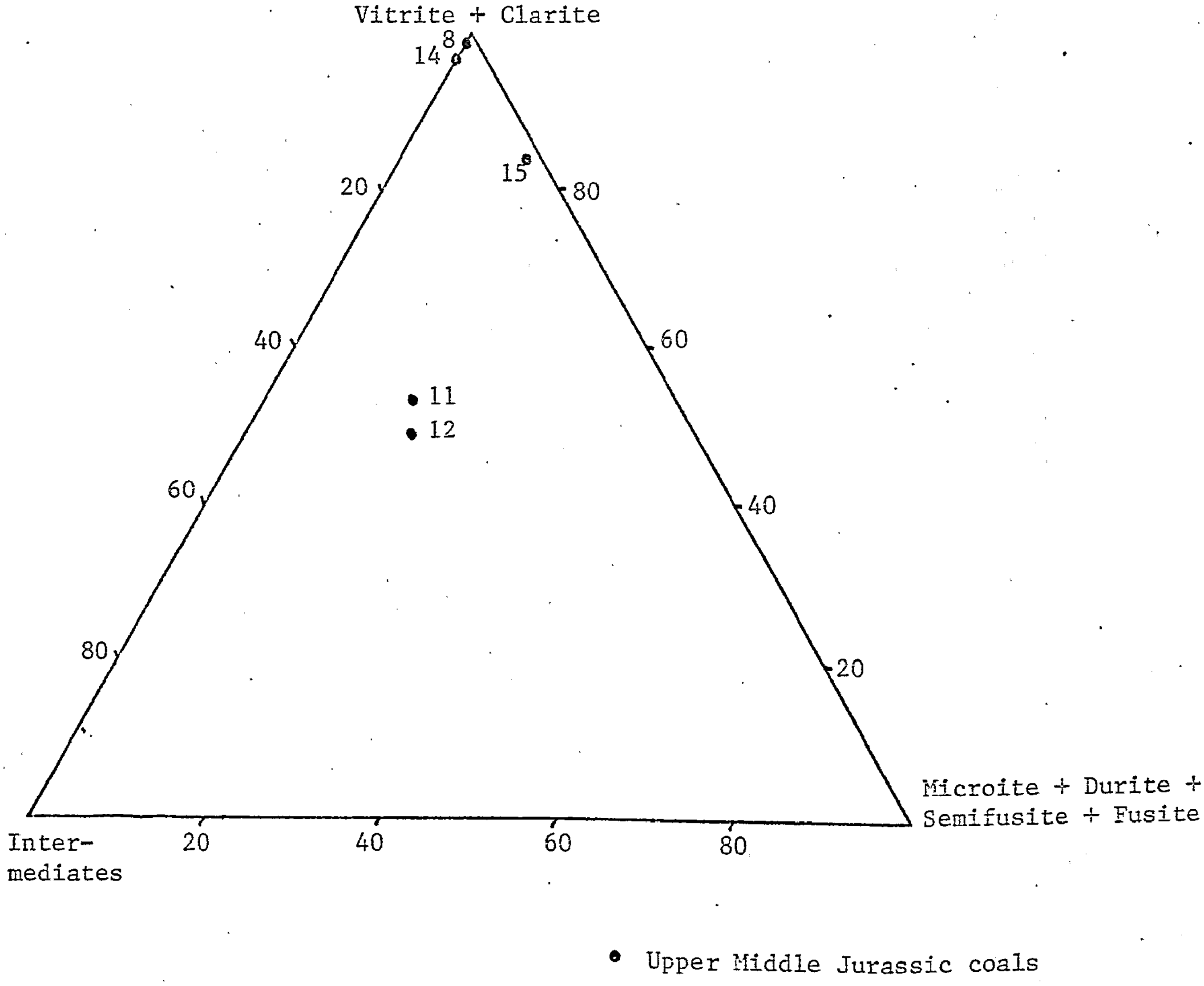


FIG. 8 MICROLITHOTYPE COMPOSITIONS OF THE CRETACEOUS COALS

Poolowanna No 1 Well Pedirka Basin

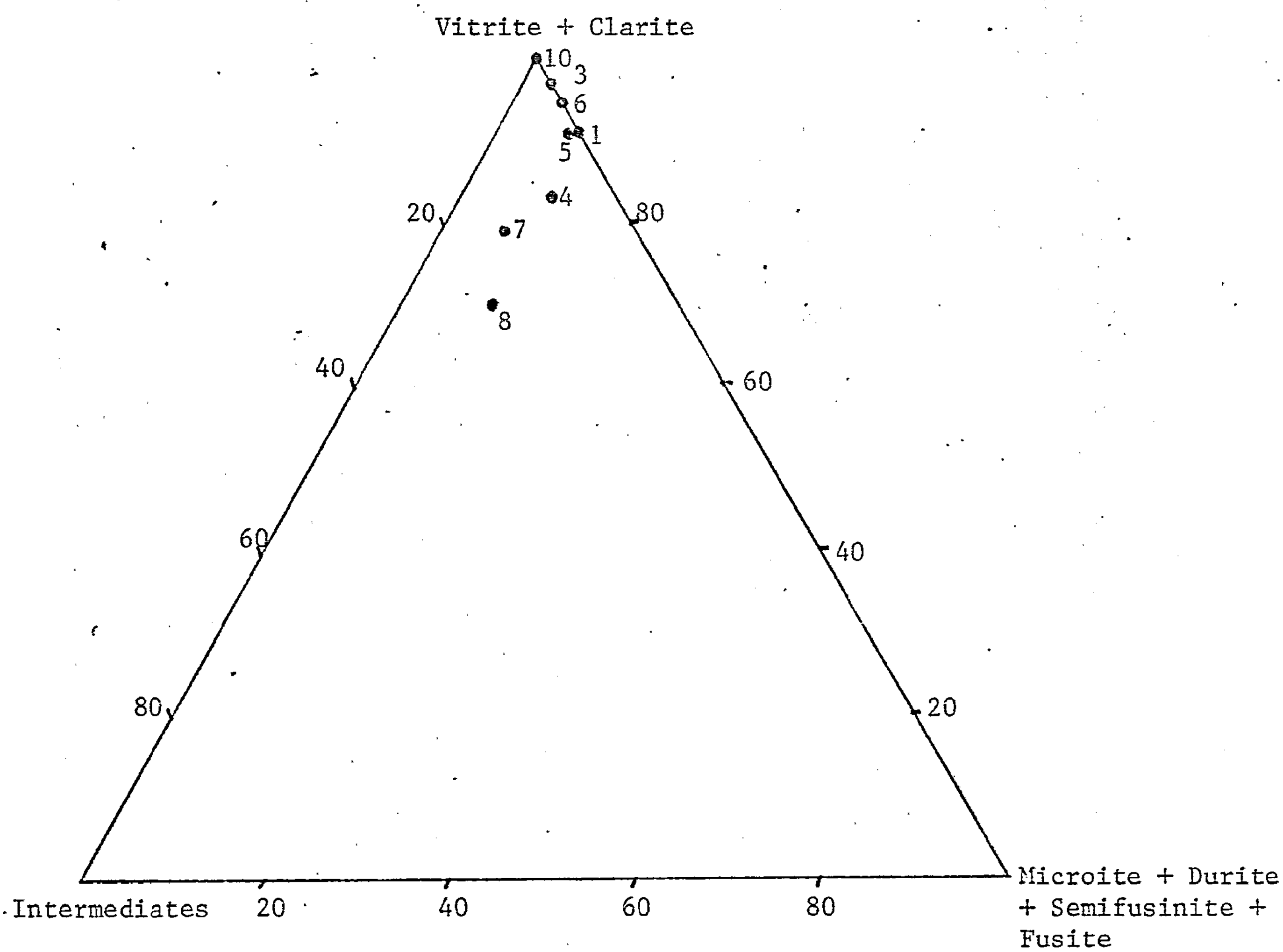


FIG. 9 MACERAL COMPOSITIONS OF DISPERSED ORGANIC MATTER OF TRIASSIC TO CRETACEOUS AGES

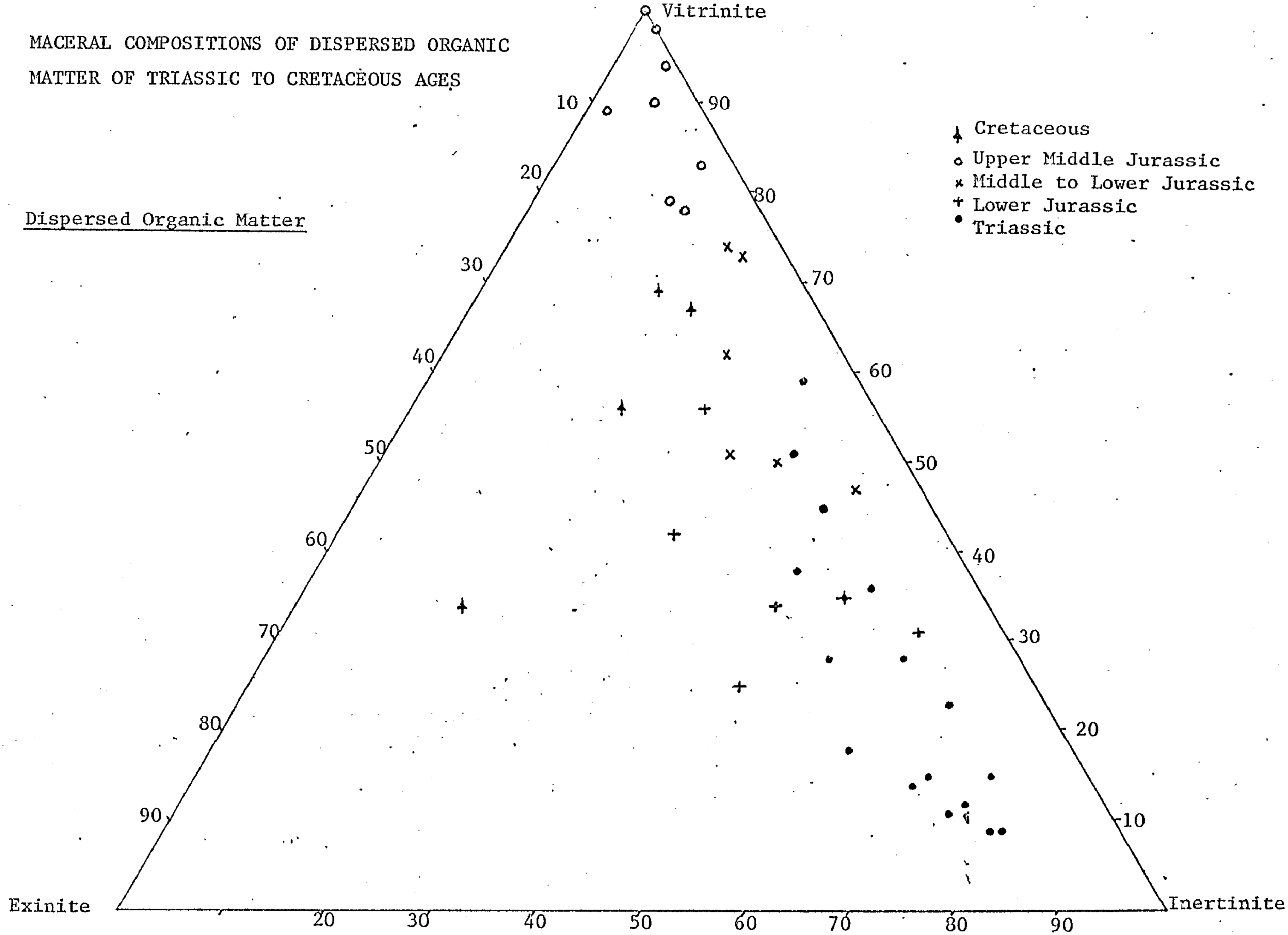


FIG. 10 CONSTITUENTS OF THE EXINITE MACERAL GROUP IN DISPERSED ORGANIC MATTER OF TRIASSIC TO CRETACEOUS AGES

Dispersed Organic Matter

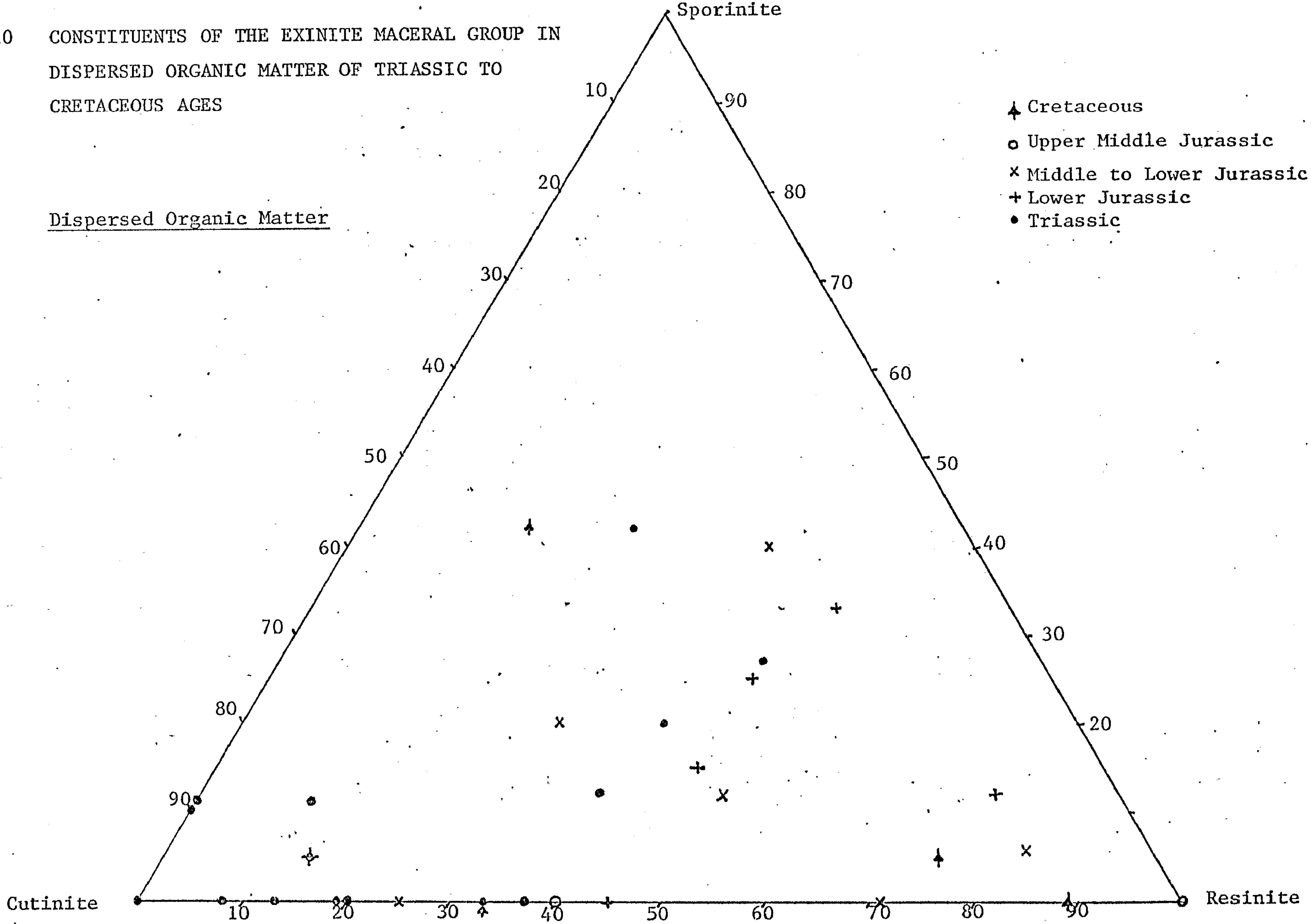


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FIG. 11 CONSTITUENTS OF THE INERTINITE MACERAL GROUP IN DISPERSED ORGANIC MATTER OF TRIASSIC TO CRETACEOUS AGES

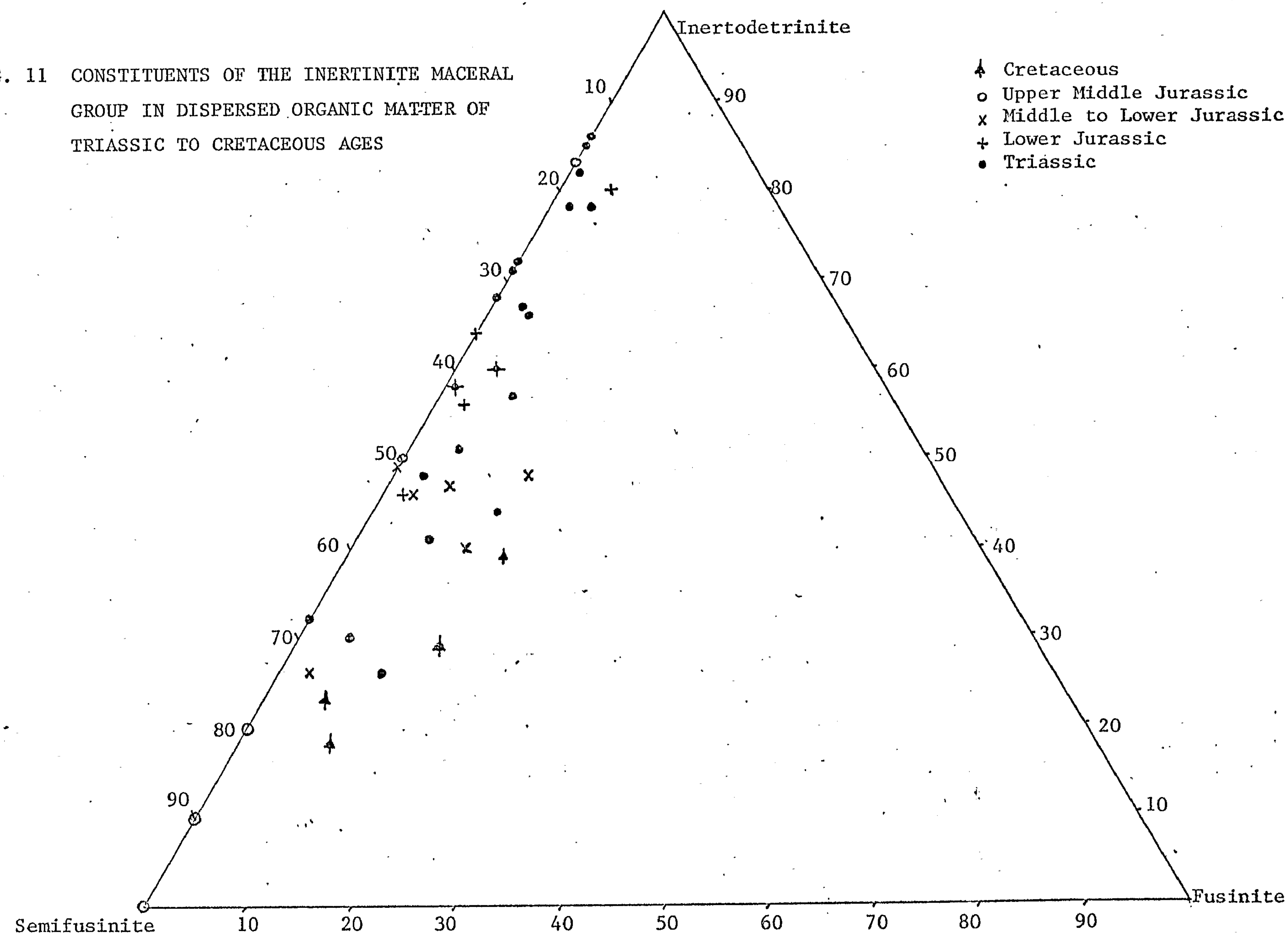

FIG. 12 MACERAL COMPOSITIONS OF COALS OF TRIASSIC TO CRETACEOUS AGES

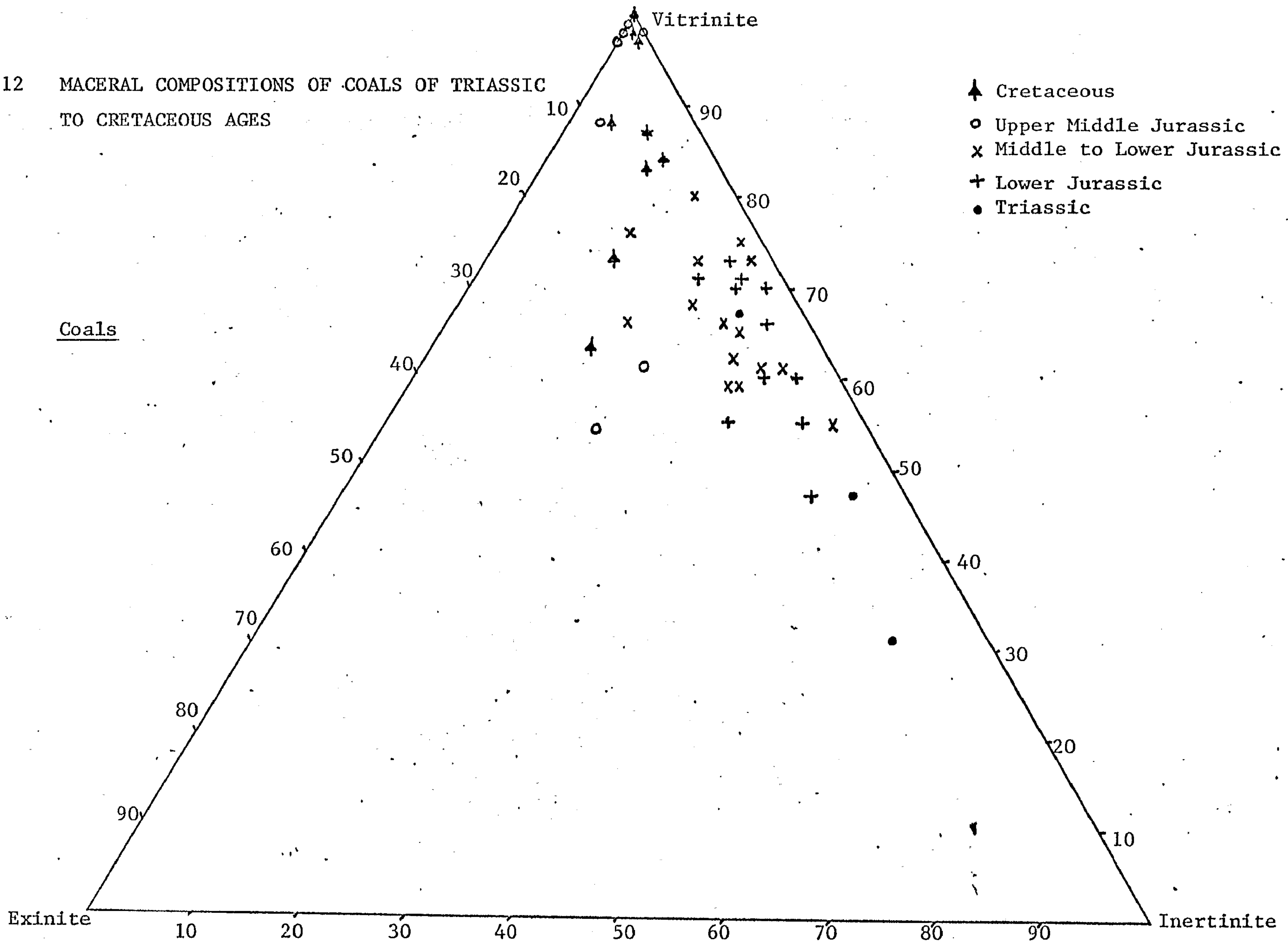

FIG. 13 CONSTITUENTS OF THE INERTINITE MACERAL GROUP IN COALS OF TRIASSIC TO CRETACEOUS AGES

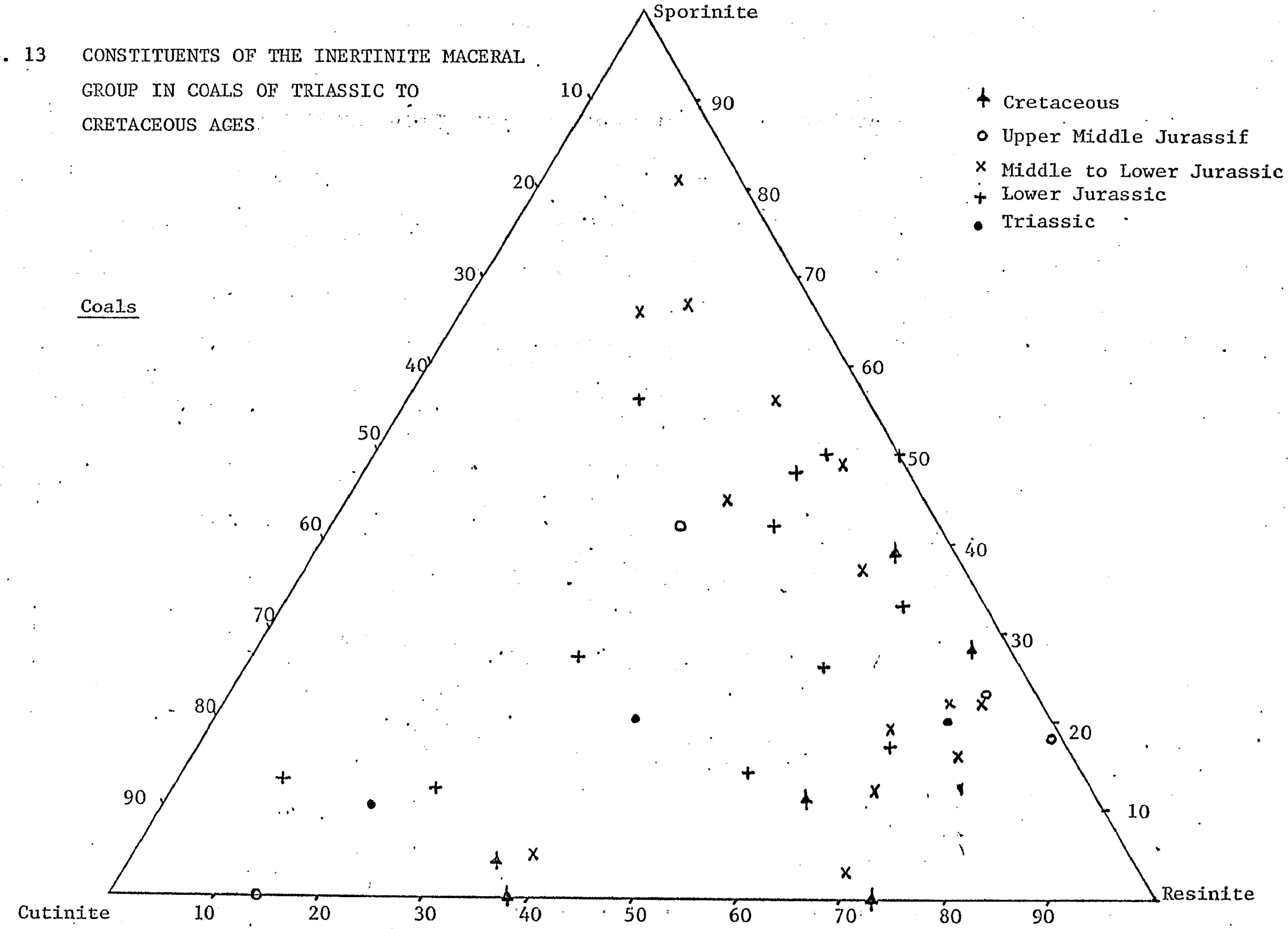

FIG. 14 CONSTITUENTS OF THE INERTINITE MACERAL GROUP IN COALS OF TRIASSIC TO CRETACEOUS AGES

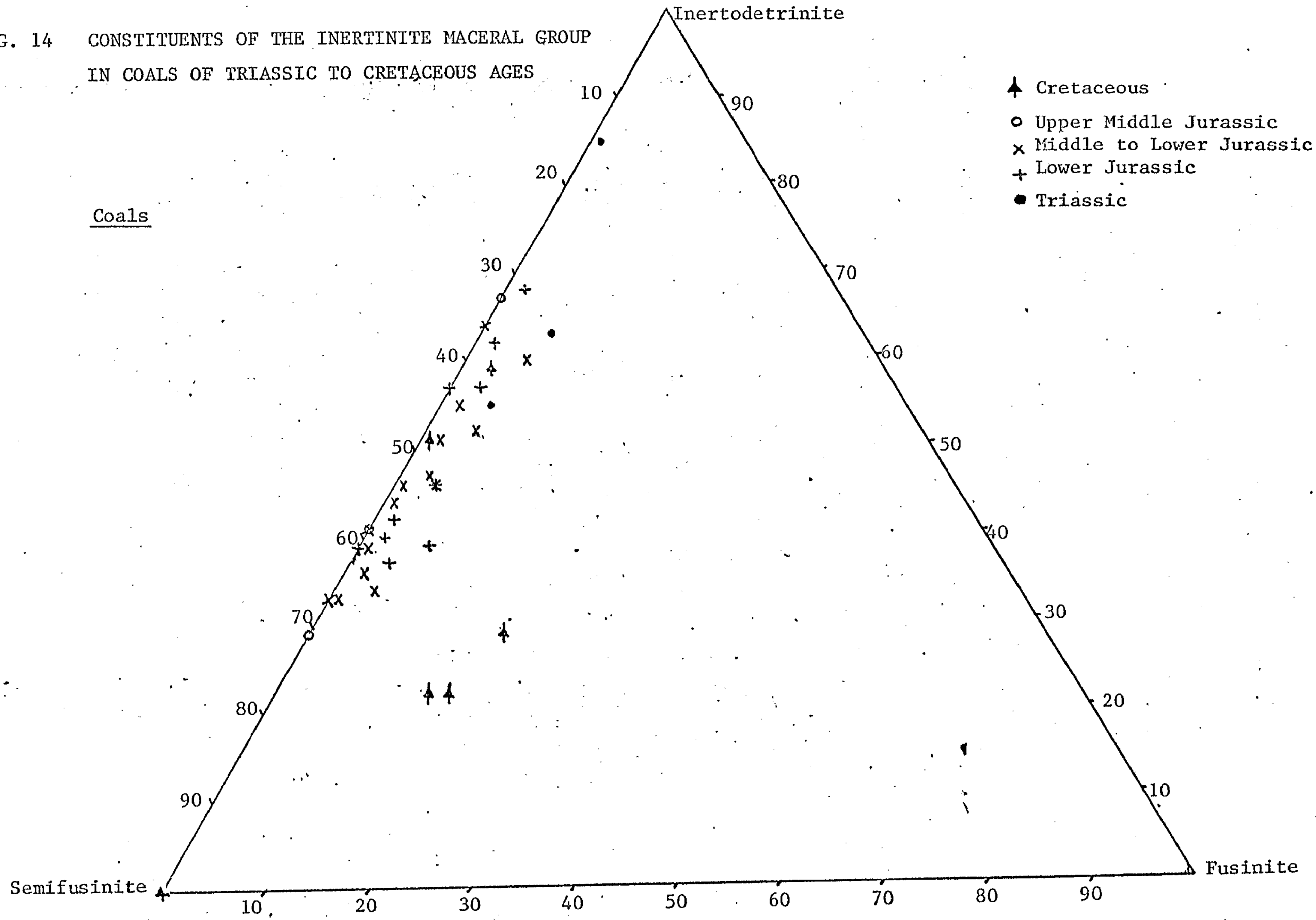

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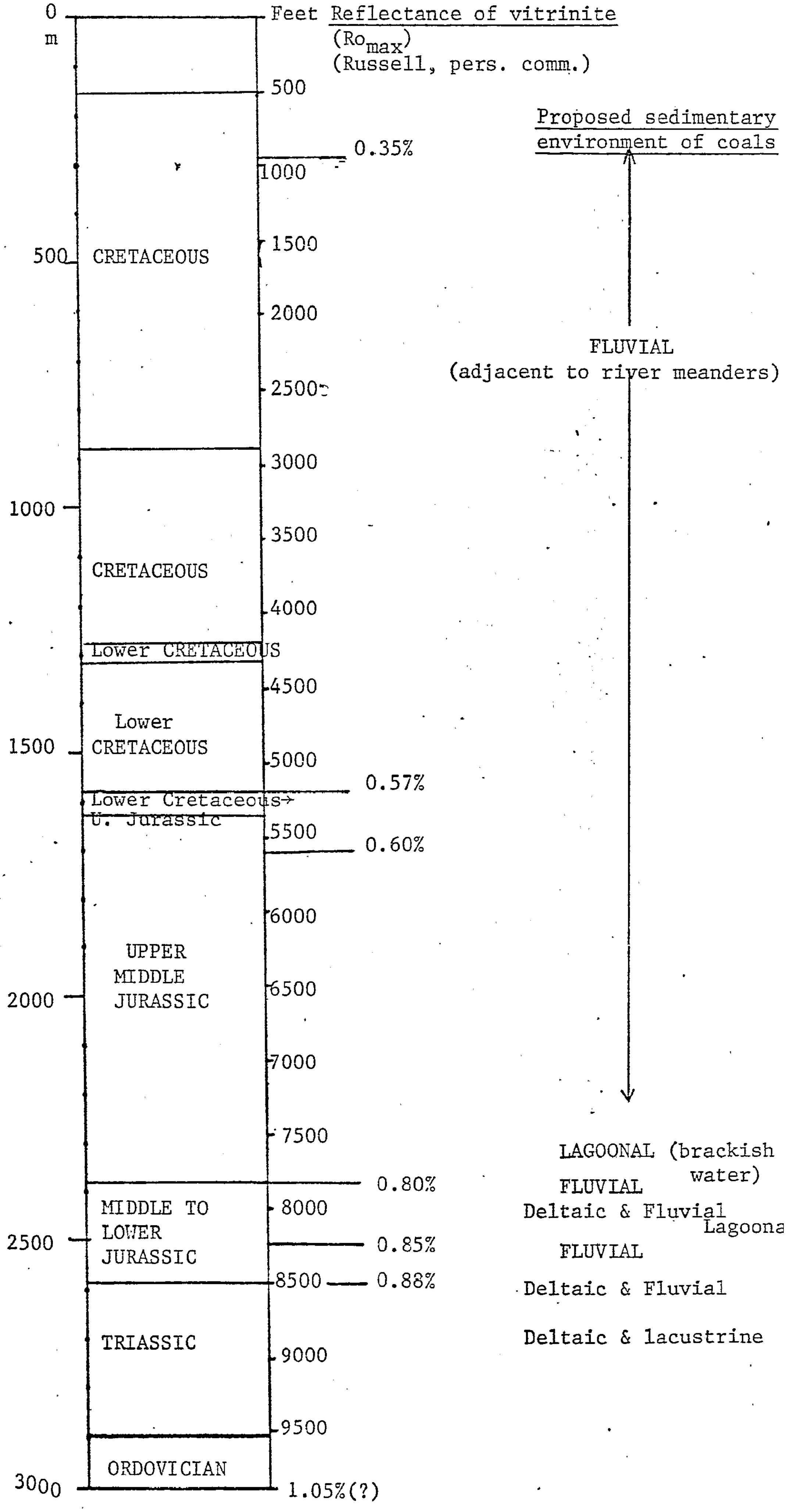
FIG. 15 STRATIGRAPHY IN POOLOWANNA NO 1 WELL AND PROPOSED SEDIMENTARY ENVIRONMENTS OF THE COALS



POOLOWANNA #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. 7

Investigation and Report by: H. Sears

Manager, Geological Services Division: Dr Keith J. Henley

Keith Henley

for Norton Jackson,
Managing Director.

meo/12

OILS

SAMPLE NO: A832/79 - A835/79

WELL: Poolowanna 1.

SAMPLE IDENTIFICATION: Drill Stem Test No. 2

DEPTH: 8216' - 8328'.

TYPE OF SAMPLE: Oil

Analysis of fraction boiling above 250° C

Asphaltenes	0.3	% (wt)
Saturates	77.2	%
Aromatics	18.3	%
Resins	4.2	%
Loss on column	--	%

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 abundance	1.6	2.7	3.1	3.6	4.1	4.6	5.1	5.4	5.9	6.4	7.3

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 abundance	6.7	7.3	5.8	5.8	4.6	4.8	3.7	3.6	2.6	2.6	6.6

Pristane/phytane ratio 4.6

Pristane/C_{17} ratio 0.22

Carbon isotope ratio ($\delta^{13}C_{PDB}$) for asphaltenes: -26.60

SOURCE ROCK

SAMPLE NO.	A 837/79
WELL:	Poolowanna 1.
SAMPLE IDENTIFICATION:	SWC 15, Gun 3
DEPTH:	7837'
TYPE OF SAMPLE:	Side Wall Core

Total organic carbon (TOC)	1.22	%
Weight of sample extracted	7.6	gm
Extracted organic matter (EOM)	7460	ppm
EOM as fraction of TOC	612	mg/g

Analysis of extracted organic matter:-

Asphaltenes	46.0	% (wt)
Saturates	20.6	%
Aromatics	5.1	%
Resins	9.7	%
Loss on column	18.6	%

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.	--	2.4	8.3	13.2	15.8	15.1	14.3	11.1	6.1	3.6	2.4

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.	1.7	1.6	1.3	1.3	0.9	0.6	0.2	-	-	-	-

Pristane/phytane ratio 6.4

Pristane/C_{17} ratio 0.70

SOURCE ROCK

SAMPLE NO.	A 838/79
WELL:	Poolowanna 1
SAMPLE IDENTIFICATION:	SWC 10, Gun 3
DEPTH:	7936'
TYPE OF SAMPLE:	Side Wall Core

Total organic carbon (TOC)	1.89	%
Weight of sample extracted	25.7	gm
Extracted organic matter (EOM)	2537	ppm
EOM as fraction of TOC	134	mg/g

Analysis of extracted organic matter:-

Asphaltenes	22.5	% (wt)
Saturates	28.7	%
Aromatics	15.2	%
Resins	28.1	%
Loss on column	5.5	%

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.	0.7	4.8	10.7	14.6	16.0	15.5	13.9	10.3	5.3	2.7	1.7

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.	1.1	0.9	0.7	0.6	0.4	0.2	--	--	--	--	--

Pristane/phytane ratio 6.2

Pristane/C_{17} ratio 0.71

SOURCE ROCK

SAMPLE NO.	A 839/79
WELL:	Poolowanna 1
SAMPLE IDENTIFICATION:	SWC 23, Gun 2
DEPTH:	8215'
TYPE OF SAMPLE:	Side Wall Core

Total organic carbon (TOC)	2.30	%
Weight of sample extracted	12.7	gm
Extracted organic matter (EOM)	5291	ppm
EOM as fraction of TOC	230	mg/g

Analysis of extracted organic matter:-

Asphaltenes	34.8	% (wt)
Saturates	13.8	%
Aromatics	11.5	%
Resins	10.0	%
Loss on column	29.9	%

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.	2.0	4.2	8.8	11.3	13.8	14.4	13.7	10.5	5.7	3.7	2.5
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.	2.1	2.0	1.7	1.6	1.1	0.5	0.3	0.1	--	--	--

Pristane/phytane ratio 5.5

Pristane/C_{17} ratio 0.71

SOURCE ROCK

SAMPLE NO.	A 840/79
WELL:	Poolowanna 1
SAMPLE IDENTIFICATION:	--
DEPTH:	7920' - 7930'
TYPE OF SAMPLE:	Cuttings

Total organic carbon (TOC)	3.55	%
Weight of sample extracted	32.65	gm
Extracted organic matter (EOM)	4509	ppm
EOM as fraction of TOC	130	mg/g

Analysis of extracted organic matter:-

Asphaltenes	42.6	% (wt)
Saturates	9.8	%
Aromatics	19.8	%
Resins	18.9	%
Loss on column	8.9	%

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.	1.2	3.4	5.2	6.3	7.1	7.6	7.9	8.0	7.7	7.9	7.9
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.	7.7	7.3	5.7	4.8	2.1	0.6	0.5	0.4	0.3	--	--

Pristane/phytane ratio 4.2

Pristane/C_{17} ratio 0.32

SOURCE ROCK

SAMPLE NO.	A 841/79
WELL:	Poolowanna 1
SAMPLE IDENTIFICATION:	--
DEPTH:	8130' - 8140'
TYPE OF SAMPLE:	Cuttings

Total organic carbon (TOC)	1.36	%
Weight of sample extracted	33.5	gm
Extracted organic matter (EOM)	1761	ppm
EOM as fraction of TOC	129	mg/g

Analysis of extracted organic matter:-

Asphaltenes	36.6	% (wt)
Saturates	17.8	%
Aromatics	14.9	%
Resins	26.4	%
Loss on column	4.3	%

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.	0.7	4.8	10.7	12.7	12.2	11.5	10.7	817	5.9	4.6	3.7

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.	3.7	2.9	2.7	2.0	1.3	0.8	0.4	--	--	--	--

Pristane/phytane ratio 6

Pristane/C_{17} ratio 0.77

SOURCE ROCK

SAMPLE NO. A 842/79

WELL: Poolowanna 1

SAMPLE IDENTIFICATION: --

DEPTH: 8520'-8530'

TYPE OF SAMPLE: Cuttings

Total organic carbon (TOC)	6.40	%
Weight of sample extracted	30.7	gm
Extracted organic matter (EOM)	3394	ppm
EOM as fraction of TOC	53	mg/g

Analysis of extracted organic matter:-

Asphaltenes	35.4	% (wt)
Saturates	13.0	%
Aromatics	19.9	%
Resins	19.2	%
Loss on column	2.5	%

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.	2.9	6.6	12.5	13.1	13.2	12.7	11.6	9.1	5.3	3.8	2.2
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.	2.7	1.4	1.6	0.7	0.3	0.1	--	--	--	--	--

Pristane/phytane ratio 5.1

Pristane/C_{17} ratio 0.53

SOURCE ROCK

SAMPLE NO.	A 843/79
WELL:	Poolowanna 1
SAMPLE IDENTIFICATION:	--
DEPTH:	8530' - 8540'
TYPE OF SAMPLE:	Cuttings

Total organic carbon (TOC)	5.25	%
Weight of sample extracted	31.25	gm
Extracted organic matter (EOM)	2147	ppm
EOM as fraction of TOC	41	mg/g

Analysis of extracted organic matter:-

Asphaltenes	22.2	% (wt)
Saturates	14.6	%
Aromatics	24.4	%
Resins	22.1	%
Loss on column	16.7	%

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.	1.3	6.1	11.7	14.3	14.7	13.9	12.2	9.1	5.0	3.5	2.0

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.	2.4	1.1	1.2	0.5	0.4	0.4	--	--	--	--	--

Pristane/phytane ratio 5.0

Pristane/C_{17} ratio 0.51

SOURCE ROCK

SAMPLE NO.	A 844/79
WELL:	Poolowanna 1
SAMPLE IDENTIFICATION:	Core 1
DEPTH:	7755' 10"
TYPE OF SAMPLE:	Drill Core

Total organic carbon (TOC)	13.5	%
Weight of sample extracted	104.0	gm
Extracted organic matter (EOM)	24310	ppm
EOM as fraction of TOC	180	mg/g

Analysis of extracted organic matter:-

Asphaltenes	45.3	% (wt)
Saturates	6.3	%
Aromatics	12.1	%
Resins	12.9	%
Loss on column	23.4	%

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.	1.6	4.8	5.4	5.2	6.1	6.1	6.8	7.2	7.6	7.9	8.0
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.	7.8	7.3	6.3	5.2	3.0	1.5	0.7	0.8	0.7	--	--

Pristane/phytane ratio 5.3

Pristane/C_{17} ratio 1.4

Note: sample extracted 96 hrs.

SOURCE ROCK

SAMPLE NO.	A 845/79
WELL:	Poolowanna 1
SAMPLE IDENTIFICATION:	Core 1
DEPTH:	7757' 7"
TYPE OF SAMPLE:	Drill Core

Total organic carbon (TOC)	6.2	%
Weight of sample extracted	95.9	gm
Extracted organic matter (EOM)	11545	ppm
EOM as fraction of TOC	186	mg/g

Analysis of extracted organic matter:-

Asphaltenes	59.8	% (wt)
Saturates	5.0	%
Aromatics	11.7	%
Resins	12.1	%
Loss on column	11.4	%

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.	--	1.9	4.4	6.0	6.0	6.2	6.9	6.9	7.6	8.5	9.3

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.	10.9	10.6	8.7	4.7	1.1	0.3	--	--	--	--	--

Pristane/phytane ratio 3.8

Pristane/C_{17} ratio 0.89

Note: sample extracted 96 hrs

SOURCE ROCK

SAMPLE NO.	A 846/79
WELL:	Poolowanna 1
SAMPLE IDENTIFICATION:	Core 3
DEPTH:	8435' 3"
TYPE OF SAMPLE:	Drill Core

Total organic carbon (TOC)	5.15	%
Weight of sample extracted	71.5	gm
Extracted organic matter (EOM)	3186	ppm
EOM as fraction of TOC	62	mg/g

Analysis of extracted organic matter:-

Asphaltenes	44.7	% (wt)
Saturates	17.6	%
Aromatics	19.9	%
Resins	12.8	%
Loss on column	5.0	%

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.	3.0	4.9	5.7	6.7	7.7	8.5	8.6	7.9	6.7	6.0	5.9
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.	5.7	5.7	5.2	4.8	3.5	2.0	0.8	0.4	--	--	--

Pristane/phytane ratio 3.9

Pristane/C_{17} ratio 0.36

Note: sample extracted 48 hrs

SOURCE ROCK

SAMPLE NO.	A 847/79
WELL:	Poolowanna 1
SAMPLE IDENTIFICATION:	Core 3
DEPTH:	8438'
TYPE OF SAMPLE:	Drill Core

Total organic carbon (TOC)	7.95	%
Weight of sample extracted	54.3	gm
Extracted organic matter (EOM)	3960	ppm
EOM as fraction of TOC	50	mg/g

Analysis of extracted organic matter:-

Asphaltenes	22.9	% (wt)
Saturates	14.0	%
Aromatics	26.1	%
Resins	21.2	%
Loss on column	15.8	%

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.	5.1	8.3	8.8	9.7	9.5	9.2	8.7	7.6	6.2	5.3	4.7

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.	4.1	3.6	3.0	3.1	1.3	0.2	--	--	--	--	--

Pristane/phytane ratio	3.0
Pristane/C_{17} ratio	0.23

PEOLOWANNA #1 CARBON ISOTOPES

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28 May 1979

Director-General,
Department of Mines & Energy,
EASTWOOD, 5063.

Attention: Dr D.M. McKirdy

SOURCE ROCK STUDIES -

S.A. SEDIMENTARY BASINS

PROGRESS REPORT NO.13

Investigation and Report by: R. Alexander (WAIT) and
Dr B.G. Steveson

Manager, Geological Services Division: Dr Keith J. Henley

Keith Henley

for Norton Jackson,
Managing Director.

meo/1

CARBON ISOTOPE RATIOS - POOLOWANNA NO. 1

Stable carbon isotope ratios were measured on kerogens from Poolowanna No. 1 with the following results:

Sample	$\delta^{13}C_{PDB}$
A6051/78 2414 m	-24.7
A6052/78 2445.1 m	-24.4
A6053/78 2478 m	-25.0
A6054/78 2569.5 m	-25.9
A6055/78 2596.9 m	-26.8
A6056/78 2601.5 m	-27.2