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PEL 5 AND PEL 6, TOOLACHEE BLOCK

EROMANGA BASIN AND COOPER BASIN

MUDLALEE 2 TEST REPORTS

Submitted by

Delhi Petroleum Pty Ltd
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 3322

TENEMENT: PEL 5 and PEL 6, Nappacoongee-Murteree Block; Eromanga and Cooper Basins

TENEMENT HOLDER: Delhi International Oil Corp. (operator), Santos Ltd, Pursuit Oil NL, Vamgas Ltd and South Australian Oil and Gas Corp. Pty Ltd

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END OF CONTENTS

The University of Wollongong
P.O.Box 1144 Wollongong N.S.W. 2500 Australia
Telephone (042) 297311 Telex 29022 Cable Uniofwol
Chairman of Department:
Professor A. C. Cook
DEPARTMENT OF GEOLOGY

13th December, 1978

Mr Ross Skerman,
Delhi International Oil Corporation,
G.P.O. Box 2364,
ADELAIDE, S.A. 5001

Dear Ross,

Below are the results of reflectance analysis of your 10 samples from the Mudlalee No. 2 well.

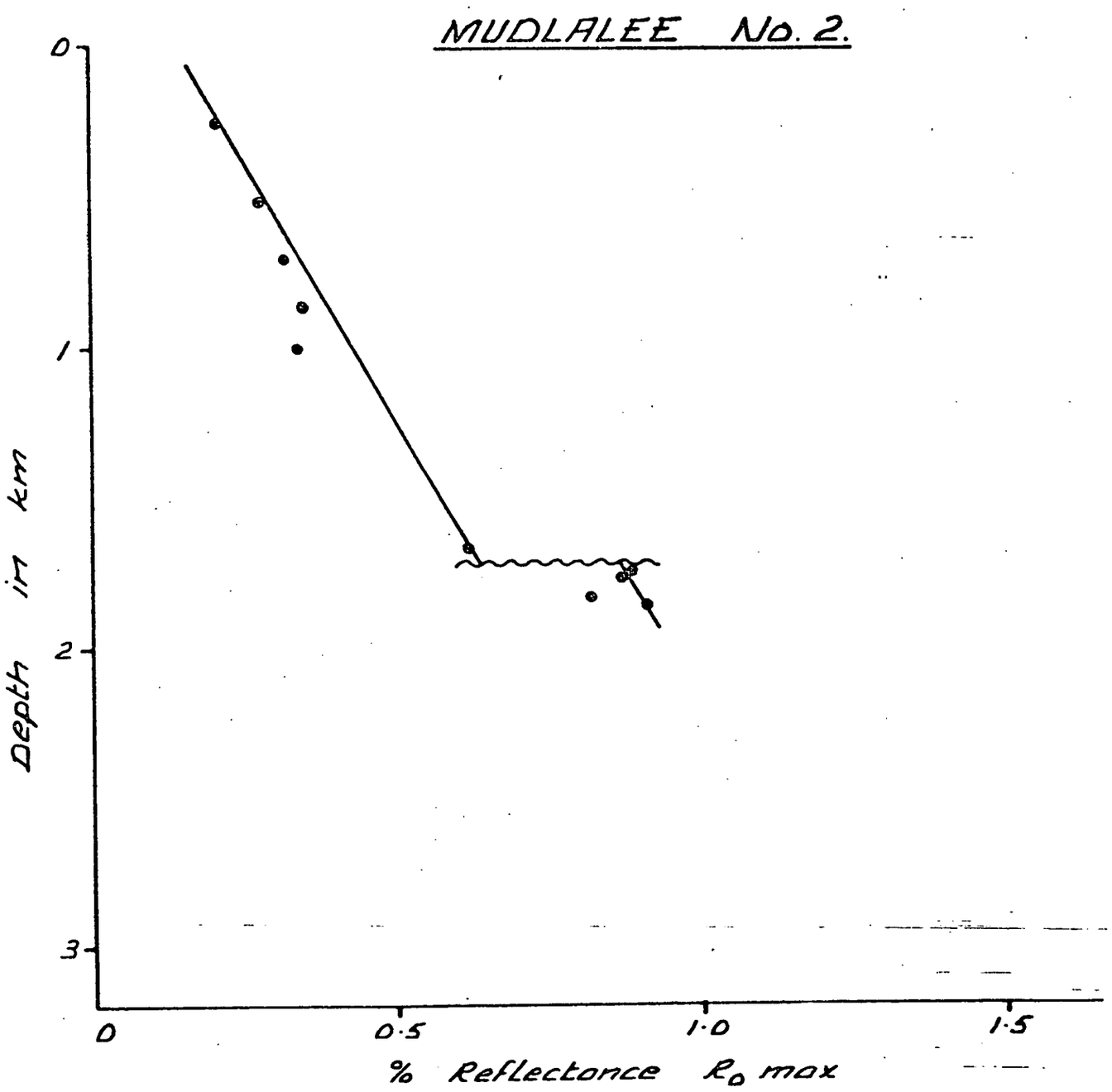
Sample No.	Depth ft.	$\bar{R}_o$max %	Range $\bar{R}_o$max %	Comments
6920	830-860	0.21	0.17-0.24	Huminite
6921	1790-1820	0.28	0.22-0.31	?lignite additive to drilling mud.
6922	2320-2350	0.32	0.24-0.38	Huminite/lignite additive.
6923	2860-2890	0.35	0.30-0.40	Huminite.
6924	3280-3310	0.34	0.30-0.40	Huminite/lignite additive.
6925	5510-5520	0.62	0.55-0.73	Clarite.
6926	5730-5740	0.89	0.81-0.96	Trimacerite
6927	5820-5830	0.87	0.76-0.97	Duroclarite/ clarodurite.
6928	6040-6050	0.82	0.76-0.88	Clarite/Duro-clarite.
6929	6150-6160	0.91	0.82-1.00	Trimacerite.

The Cretaceous coals are typically immature and are associated with a ?lignite additive to the drilling mud. The Jurassic coal is initially mature, perhydrous (high suberinite, exinite, desmocollinite content) and associated with large oval shaped bodies of fluorinite which could be considered as low temperature condensates. Permian coals are mostly trimacerites (duroclarite or clarodurite) containing 1% to 5% exinite. Sample 6929

contains abundant 'dead' (non-fluorescing) algae, while some samples e.g. 6927, appear to contain extensive replacement of algae by clay. The low exinite fluorescence intensity and appearance of algae in sample 6929 suggests an unusual burial history for this sample. The reflectance profile indicates a strong early thermal event and pronounced uplift and erosion in Triassic/Jurassic time.

Yours sincerely,

A.J. Kantsler.


MUDLALEE No. 2.
0
1
2
3
Depth in km
0
0·5
1·0
1·5
% Reflectance R_o max

amdel

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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. 9

Investigation and Report by: H. Sears

Manager, Geological Services Division: Dr Keith J. Henley

Keith Henley

for Norton Jackson,
Managing Director.

meo/6

SOURCE ROCK

SAMPLE NO.	Sheet 7041 RS 128
WELL:	Mudlalee 2
SAMPLE IDENTIFICATION:	SWC 30
DEPTH:	3994'
TYPE OF SAMPLE:	Side wall core

Total organic carbon (TOC)	1.15	%
Weight of sample extracted	15.3	gm
Extracted organic matter (EOM)	1242	ppm
EOM as fraction of TOC	108	mg/g

Analysis of extracted organic matter:-

Asphaltenes	40.5	% (wt)
Saturates	23.7	%
Aromatics	10.0	%
Resins	15.3	%
Loss on column	10.5	%

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.	--	2.2	7.7	12.8	14.1	12.2	9.9	7.7	6.2	4.6	4.0
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.	3.6	3.2	2.6	2.8	1.9	1.9	1.3	0.9	0.4	--	--

Pristane/phytane ratio 4.5

Pristane/C_{17} ratio 0.56

SOURCE ROCK

SAMPLE NO.	Sheet 7041 - RS 129
WELL:	Mudlalee 2
SAMPLE IDENTIFICATION:	SWC 29
DEPTH:	4222'
TYPE OF SAMPLE:	Side wall core

Total organic carbon (TOC)	1.26	%
Weight of sample extracted	17.1	gm
Extracted organic matter (EOM)	924	ppm
EOM as fraction of TOC	73	mg/g

Analysis of extracted organic matter:-

Asphaltenes	36.1	% (wt)
Saturates	23.4	%
Aromatics	12.7	%
Resins	12.7	%
Loss on column	15.1	%

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.	--	2.3	7.0	12.4	15.3	13.6	10.8	8.3	6.7	5.4	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.	3.3	2.6	1.7	1.9	1.2	1.1	0.8	0.7	0.3	--	--

Pristane/phytane ratio	3.9
Pristane/C_{17} ratio	0.26

SOURCE ROCK

SAMPLE NO.	Sheet 7041 RS 130
WELL:	Mudlalee 2
SAMPLE IDENTIFICATION:	SWC 27
DEPTH:	4516'
TYPE OF SAMPLE:	Sidewall core

Total organic carbon (TOC)	1,72	%
Weight of sample extracted	21.2	gm
Extracted organic matter (EOM)	2321	ppm
EOM as fraction of TOC	135	mg/g

Analysis of extracted organic matter:-

Asphaltenes	25.6	% (wt)
Saturates	36, 9	%
Aromatics	14.8	%
Resins	17.2	%
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,	3.4	8.4	11,7	12,5	11.6	9,7	8,0	6,9	6,3	5.8	5,5
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,	4,2	3,2	1,6	0,8	0,3	0,1	--	--	--	--	--

Pristane/phytane ratio	4,5
Pristane/C_{17} ratio	0.31

SOURCE ROCK

SAMPLE NO.	Sheet 7041 RS 131
WELL:	Mudlalee 2
SAMPLE IDENTIFICATION:	SWC 23
DEPTH:	5322'
TYPE OF SAMPLE:	Sidewall core

Total organic carbon (TOC)	1.42	%
Weight of sample extracted	13.5	gm
Extracted organic matter (EOM)	2740	ppm
EOM as fraction of TOC	193	mg/g

Analysis of extracted organic matter:-

Asphaltenes	25.9	% (wt)
Saturates	25.9	%
Aromatics	17.8	%
Resins	16.0	%
Loss on column	14.4	%

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.	--	1.3	4.5	7.8	9.8	10.4	10.0	8.6	6.8	5.3	4.9
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.	4.6	5.3	4.5	5.8	4.0	3.7	1.6	0.9	0.2	--	--

Pristane/phytane ratio	5.5
Pristane/C_{17} ratio	0.68

SOURCE ROCK

SAMPLE NO.	Sheet 704 RS 132
WELL:	Mudlalee 2
SAMPLE IDENTIFICATION:	SWC 22
DEPTH:	5456'
TYPE OF SAMPLE:	Sidewall core

Total organic carbon (TOC)	2.79	%
Weight of sample extracted	13.7	gm
Extracted organic matter (EOM)	2569	ppm
EOM as fraction of TOC	92	mg/g

Analysis of extracted organic matter:-

Asphaltenes	40.1	% (wt)
Saturates	14.1	%
Aromatics	15.9	%
Resins	19.6	%
Loss on column	10.3	%

n-Alkane distribution of saturates:-

n-Alkane	C_{13}	C_{14}	C_{15}	C_{16}	C_{17}	C_{18}	C_{19}	C_{20}	C_{21}	C_{22}	C_{23}
Rel abund.	--	2.6	6.2	7.5	9.1	10.0	10.1	9.1	7.9	6.5	6.3
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.	5.4	5.4	4.0	4.2	2.5	2.0	0.7	0.5	--	--	--

Pristane/phytane ratio	5.3
Pristane/C_{17} ratio	0.82

SOURCE ROCK

SAMPLE NO.	Sheet 7041 RS 133
WELL:	Mudlalee 2
SAMPLE IDENTIFICATION:	SWC 18
DEPTH:	5736'
TYPE OF SAMPLE:	Side wall core

Total organic carbon (TOC)	3.47	%
Weight of sample extracted	13.15	gm
Extracted organic matter (EOM)	2030	ppm
EOM as fraction of TOC	58.5	mg/g

Analysis of extracted organic matter:-

Asphaltenes	43.5	% (wt)
Saturates	4.2	%
Aromatics	11.7	%
Rosins	17.6	%
Loss on column	23.0	%

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.	--	1.1	6.2	8.9	12.0	12.0	11.6	10.0	8.3	6.7	5.8
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.	4.8	4.7	2.8	2.3	1.1	0.8	0.6	0.3	--	--	--

Pristane/phytane ratio	5.4
Pristane/C_{17} ratio	0.63

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The Australian Mineral Development Laboratories
Flemington Street, Frewville, South Australia 5063
Phone Adelaide 79 1662, telex AA 82520

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Your ref: 11.06.368

In reply quote: GS 1/1/231
(B3092/79,
B3887/79, part)

22 June 1979

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

Attention: Dr D.M. McKirdy

SOURCE-ROCK STUDIES -

S.A. SEDIMENTARY BASINS

PROGRESS REPORT NO.15

Investigation and Report by: Dr Brian Steveson

Manager, Geological Services Division: Dr Keith J. Henley

Keith Henley.

for Norton Jackson,
Managing Director.

meo/15

SOURCE-ROCK STUDIES - S.A. SEDIMENTARY BASINS
(MUDLALEE NO. 2)

1. INTRODUCTION AND SUMMARY

This progress report gives descriptions of organic material in sidewall cores from Mudlalee No. 2.

Apart from a few virtually barren samples, the rocks (siltstones, mainly) contain 2-5% of organic material. In SWC 29, 50% of the organic matter is exinite but in most other samples inertinites and vitrinite greatly preponderate over exinite. Furthermore, inertinites are commonly more abundant than vitrinite. The reflective macerals occur in small shreds and fragments conformable with bedding. Vitrinite is generally smooth and reflectivity appears to increase from 0.4% (SWC 26, 5005') to about 1.0-1.2% at depths greater than 5972'.

Exinites consist of cutinite and sporinite with less resinite and liptodetrinite. Alginite was tentatively identified in six of the samples (SWC's 29, 28, 23, 22, 12 and 7). This maceral shows moderate fluorescence but the other exinites have much weaker, duller brown colours.

SWC 18 (5736') is a little different from others in that it contains coal fragments and about one-third of the organic material is exinite (mainly resinite).

Hence, although the rocks have reached a maturity stage at which they could be active source beds, the organic material is of a type (humic, rich in inertinite) which has little potential for oil or gas production.

2. DESCRIPTION OF ORGANIC MATERIAL

Sample RS128; PS27306; Mudlalee No. 2, SWC 30 (3994')

This rock contains only small traces of vitrinite and inertinites and dispersed organic matter occurs mainly as exinite and translucent, brown ?bitumen.

Vitrinite and inertinite group macerals are fine-grained and only a few fragments were noted; these were difficult to polish and no reflectance could be obtained from the vitrinite.

Exinites are present as dark grey shreds of ?cutinite and liptodetrinite. These, in effect, grade towards translucent fragments similar in shape and fluorescence. In fact, such translucent material is probably the most abundant type of organic matter (<1% of the rock). Fluorescence is generally very dull orange but a few wisps of cutinite and broken relics of ?alginite have a brighter shade.

There is widespread fine-grained pyrite.

Sample RS129; PS27305; Mudlalee No. 2, SWC 29 (4222')

Organic material is widely dispersed in this sample as scraps and ragged elongate wisps up to 0.015 mm in width; the total amount of organic matter is about 3%.

Fully 50% of this is exinite material; commonly this is translucent and shows dull brown/orange fluorescence. Some fragments can be assigned to sporinite and a few to ?alginite, but most of the exinite is liptodetrinite. There are a few relatively large fragments of resinite.

Vitrinite (mean reflectance ∿0.7%) and semifusinite are also small, elongate and irregular fragments. There are traces of fusinite.

Sample RS161; PS27768; Mudlalee No. 2, SWC 28 (4380')

The most significant feature of the organic material in this sample is the relative abundance of exinite macerals. Alginite alone comprises about 1% of the rock and sporinite and other, less abundant, macerals, a further 2-3%. Vitrinite and inertinites only amount to ∿1-2%.

The last two macerals form equant fragments generally up to only 0.02 mm in size; the reflectance of vitrinite was tentatively measured at about 0.6-0.7%.

Moderate orange fluorescence is associated with both grey sporinite and deep red alginite and also with numerous very small scraps of bitumen aligned parallel to bedding. Apart from the sporinite and alginite mentioned above, there are small amounts of cutinite and liptodetrinite but no identifiable resinite.

The rock is, therefore, rich in exinite macerals, including alginite.

Sample RS130; PS27304; Mudlalee No. 2, SWC 26 (5005')

This single fragment of fine-grained sandstone contains about 2-3% of reflective organic material. In addition, there is a relatively large proportion (though probably little in absolute terms) of translucent brown staining on grains.

Vitrinite forms elongate wisps generally not more than 0.01 mm in width; the reflectance appears to be very low (∿0.35-0.4%(?)). Inertinites are distinctly more abundant than vitrinite and form larger and more massive aggregates. Some fusinite is present but most of the inertinite consists of semifusinite.

Under fluorescence illumination, the translucent material shows patchy and weak orange colours and in places there are some structures which could be interpreted as sporinite. Weakly reflective patches (reflectance ∿0.3%) of resinite (?resinous vitrinite) show very dull brown fluorescence.

Sample RS131; PS27303; Mudlalee No. 2, SWC 23 (5322')

Quartz grains are present in thin beds in this sample but most of the rock is a siltstone/shale. Organic components comprise about 2% of the rock and are largely vitrinite with minor exinite.

Vitrinite forms elongate wisps up to about 0.03 x 2 mm in size; the reflectance is ∿0.5%. There are smaller wisps of vitrinite and equally small, equant fragments of inertinites.

Exinite is not abundant (about 5-10% of the amount of vitrinite) but, even so, it can readily be identified as dark strips of cutinite and blobs of resinite associated with the larger wisps of vitrinite; these macerals show only dull brown fluorescence. There are small amounts of a maceral tentatively identified as alginite. As is commonly the case, this has more fluorescence than other exinites. In this case it shows moderate yellow/brown shades.

Sample RS132; PS27302; Mudlalee No. 2, SWC 22 (5456')

The reflectance of vitrinite in this sample is 0.55-0.60%. Most grains are very small but there are a few large fragments (more than 1 mm in length). Most of the vitrinite and inertinites, however, occur as tiny scraps (less than 0.02 mm in size) and in some cases semifusinite, inertodetrinite and vitrinite can hardly be distinguished. Overall, the ratio of inertinite to vitrinite is about 2 to 1 and organic components comprise up to 5% of the rock (this varies considerably from place to place).

Exinite is moderately abundant (about 20% of the organic material) and is represented by rare large fragments of cutinite and more common small scraps of cutinite and sporinite. The latter are not more than 0.02 mm in size and show dull orange/brown fluorescence. Traces of resinite and alginite (with equally dull fluorescence) are present.

Sample RS162; PS27767; Mudlalee No. 2, SWC 21 (5644')

There are two rock chips representing this sidewall core.

One is a sandstone in which organic material is confined to a few fragments of vitrinite and inertinites. The aggregates of these macerals are large (up to 0.5 mm) but comprise only about 1% of the sandstone. No exinites and no fluorescence were seen in this fragment.

The other fragment is a shale and this contains widely dispersed, fine-grained organic material amounting to 1-2% by volume. Pieces of vitrinite and inertodetrinite are less than 0.05 mm in size commonly. Much of the vitrinite is rather dark and has a pitted surface (reflectivity 0.5%). Scraps of cutinite and resinite are present in trace amounts and show dull brown fluorescence.

Sample RS PS27766; Mudlalee No. 2, SWC 19

This sample is completely barren - no organic material was seen.

Sample RS133; PS27301; Mudlalee No. 2, SWC 18 (5736')

In one part of this sample there is a large aggregate of coaly material and this predominates over all the finely dispersed material. Exinite macerals comprise about 30% of the identifiable organics and, in the remainder, there is distinctly more inertinite than vitrinite. The latter is, however, well-defined and has a reflectance of 0.6-0.7%. In part, the semifusinite forms large, equant aggregates, some of which show bogen structure; most often, the coaly material has a well-defined banding and vitrinite and exinite-rich bands are 0.05 to 0.1 mm in width.

In the bulk of the sample macerals are present as ragged fragments not more than 0.02 mm in length and commonly much smaller.

The exinite macerals form compact aggregates; these are mainly resinite with dispersed minor sporinite. The resinite has a dull brown/orange fluorescence whereas the sporinite is brighter.

Predominantly, organic material occurs in large patches; resinite, vitrinite and semifusinite are all significant organic components.

Sample RS163; PS27765; Mudlalee No. 2, SWC 17 (5763')

This sample is similar to other sidewall cores from this hole. Organic material comprises about 3% of the siltstone and occurs widely distributed as wisps and ragged grains generally <0.2 mm in size. The most abundant types are inertinites (generally inertodetrinite and semifusinite) with distinctly less vitrinite. Exinites can only rarely be positively identified and, apart from a few shreds of cutinite, are represented by liptodetrinite. Fluorescence of both exinite and translucent brown ?bitumen is only weak.

The reflectance of vitrinite is about 0.8%.

A photomicrograph (Plate 2b) of this sample shows a field-of-view which is typical of many of the sidewall cores in Mudlalee No. 2.

Sample RS164; PS27764; Mudlalee No. 2, SWC 16 (5788')

In this siltstone organic material comprises approximately 3-5% of the rock and is present very largely as inertinites and vitrinite.

Vitrinite generally forms elongate, ragged scraps not more than 0.1 mm in length; these are conformable to bedding - as defined by clay and ferruginous films. The reflectance of the vitrinite is about 0.7-0.9% and some fragments are a little pitted. Inertodetrinite and semifusinite are distinctly more abundant than vitrinite; they form similar kinds of fragments. There are a few fragments as much as 0.6 mm in length, but most are small and structureless and should be regarded as inertodetrinite.

Exinite is present in trace amounts only and shows only dull brown fluorescence. Most material appears to be fragments of cutinite and ?resinite.

Sample RS165; PS27763; Mudlalee No. 2, SWC 15 (5804')

Aggregates of vitrinite in this sample are commonly more than 0.3 mm in length and they are aligned parallel to the bedding in this siltstone. Semifusinite is equally coarse-grained and is distinctly more abundant than vitrinite. Together, inertinites (including some inertodetrinite) and vitrinite comprise 5% of the rock. The reflectance of vitrinite is approximately 0.9%.

In places there are large patches of red translucent material which shows dull brown fluorescence. Unfortunately, these objects do not have distinctive shapes which would permit identification. Rarely, there are also small patches of weakly fluorescing ?resinite.

In brief, therefore, the organic material is essentially humic with some translucent, weakly-fluorescing bitumen or exinite.

Sample RS166; PS27762; Mudlalee No. 2, SWC 14 (5856')

No exinite was identified in this sample but there is a small amount of translucent material which fluoresces with a dull brown colour.

Vitrinite and inertinites together comprise about 3% of the sandstone/siltstone. The two are not easy to distinguish in many places, particularly where they form only small fragments. Reflectances range from 0.9 to 1.5% and this range includes material which is clearly vitrinite (reflectivity <1.2%) and semifusinite showing cell texture. It is likely that vitrinite is somewhat more abundant than inertinites. Both macerals generally form shreds about 0.05-0.15 mm in length.

Sample RS167; PS27761; Mudlalee No. 2, SWC 13 (5913')

This rock (a siltstone) is very similar in the organic content to many other sidewall cores from this hole: inertinites comprise probably 60-70% of the organic material and there is only a little exinite. Organic material comprises about 3% of the sample.

Inertinites and vitrinite are present as irregular grains embedded randomly in the clays and quartz, and these are not more than 0.03 mm in size. No reflectance values could be obtained from vitrinite.

The sample shows only very dull fluorescence but there are traces of liptodetrinite and broken fragments of ?alginite. Brown, translucent material is widespread but very fine-grained and quantitatively not important.

Sample RS168 PS27760; Mudlalee No. 2, SWC 12 (5926')

The organic material in this shale is so fine-grained that no reflectance values could be obtained from vitrinite. Reflective macerals - mainly inertinites - form ragged fragments, many of which are elongated parallel to bedding. The majority of the fragments are less than 0.05 mm in length. Amongst such fine-grained material it is difficult to identify any vitrinite with certainty and it is likely that vitrinite comprises less than 10% of the organic material.

Under fluorescent illumination there is widespread dull brown fluorescence emanating from small translucent wisps, many of which are probably bituminous.

In brief, the sample contains about 3-5% of organic material, principally present as inertodetrinite and bituminous material.

Sample RS169 PS2770; Mudlalee No. 2, SWC 11 (5932')

As in SWC 12, the organic material is extremely fine-grained and comprises approximately 3% of this shale/siltstone. The most abundant organic phases are inertodetrinite and semifusinite which typically form equant, irregular pieces less than 0.05 mm in length. Vitrinite can be identified since it is somewhat darker, but no grains of vitrinite are larger than about 0.02 mm and no reflectance could be determined; vitrinite comprises less than 15% of the organic material.

The largest fragments in the rock are, in fact, algal colonies (see photomicrograph) but only two were identified in the polished section. There is abundant, translucent brown material (intergranular films, mainly) and minute shreds of ?sporinite and cutinite - none show any but the dullest brown fluorescence.

Sample RS170; PS27758; Mudlalee No. 2, SWC 10 (5941')

The three chips comprising this sample contain varying amounts of organic material, up to 5% in one. Fragments of vitrinite and semifusinite are commonly 0.1 mm in size and they are generally equant but ragged in shape. Vitrinite has a reflectance of $\sim$0.8%. There are less reflective, grey, structureless grains and these have been assumed to be resinite. In general, neither these, nor identifiable sporinite, fluoresce other than very dull brown and this suggests that the vitrinite reflectance is relatively high.

There are patches of brown translucent material, some of which show brown fluorescence. As indicated above, there are trace amounts of resinite and sporinite with only very dull fluorescence. Also present are fragments of fusinite and inertodetrinite.

Sample RS171; PS27757; Mudlalee No. 2, SWC 9 (5947')

Fragments of vitrinite and inertinites (in the ratio of about 1:5, respectively) are typically 0.015-0.03 mm in length and they are slightly elongate and distinctly irregular in shape. The reflectance of vitrinite is about 0.8%. As in many other samples from this hole, inertinites are most abundant and are so fine-grained as to be classified as inertodetrinite.

Reflective (as opposed to translucent) exinite material comprises only a very small proportion of the organic material. Distorted shreds and fragments of cutinite, sporinite and alginite can all be identified. There is, in addition, some translucent material and barely recognisable liptodetrinite. All of the liptinite/exinite-like material shows very dull (especially liptodetrinite) to moderate orange (alginite) colours under fluorescent illumination.

Sample RS172; PS27756; Mudlalee No. 2, SWC 8 (5972')

Organic material comprises about 3% of this siltstone/shale and is present predominantly as vitrinite and inertodetrinite. Most of the fragments of these macerals are elongate and are aligned parallel to the bedding; commonly the fragments are less than 0.02 mm in size. Some aggregates of semi-fusinite are up to 0.15 mm in size. Fragments of vitrinite are generally elongate and smooth and hence are autochthonous; the reflectance is ∿1.2% There are traces of fusinite.

The sample contains relatively abundant, translucent brown material in thin films, as well as identifiable cutinite and liptodetrinite. There is also considerable fluorescence, but it is dull and "fine-grained" and only rarely can it be equated with identifiable macerals at the surface of the section.

The sample therefore contains essentially humic kerogen and has reached a maturity stage equivalent to a vitrinite reflectance of ∿1.2%.

Sample RS173; PS27755; Mudlalee No. 2, SWC 7 (6000')

This siltstone contains organic matter similar to that in other rocks from this hole. Vitrinite and inertinites comprise about 3% of the rock and form elongate, ragged fragments up to 0.3 mm in length but commonly much smaller. Vitrinite has a reflectance of ∿1.2%.

Traces of ?alginite were noted and these show dull orange/brown fluorescence; otherwise traces of exinite consist of weakly fluorescing liptodetrinite, cutinite and also some translucent brown films (?bitumen).

Sample RS174; PS27754; Mudlalee No. 2, SWC 6 (6020')

Organic components comprise approximately 3% of this siltstone and consist mainly of semifusinite and inertodetrinite with smaller amounts of vitrinite and exinites.

Vitrinite and inertinites form widely dispersed grains commonly less than 0.04 mm in size. Vitrinite can readily be identified and has a reflectance of 1.15-1.30%. There are traces of fusinite.

Reflective exinite macerals are virtually absent and are so small that they can only be regarded as liptodetrinite. Translucent brown material forms coherent patches in a few places but most often is indeterminate material. Under fluorescent illumination there are only very dull brown shades, emanating from the translucent material.

Sample RS175; PS27753; Mudlalee No. 2, SWC 5 (6130')

This sandstone contains about 3% of organic material disposed as thin lenses parallel to bedding. Within these there are subequal amounts of structure-less phases having reflectivities around 1.0 and 1.5%; the former is vitrinite and the latter may be variously defined as inertodetrinite or, where a texture can be seen, semifusinite. Some aggregates of these macerals are as much as 0.3 mm in width.

Exinite is comparatively rare and only one fragment was specifically identified - this is an elongate fragment of cutinite. The rock contains shreds of translucent brown material but neither these nor the cutinite show any fluorescence.

Sample RS176; PS27752; Mudlalee No. 2, SWC 3 (6232')

One equant fragment of vitrinite 0.05 mm in size was observed; the reflectivity is 0.98%. Translucent brown material is non-fluorescing and spatially associated with fine-grained pyrite and hence is probably ferruginous.

The sample is, therefore, virtually barren.

Sample RS177; PS27751; Mudlalee No. 2, SWC 2 (6272')

Three of the four rock chips in the section contain no reflecting organic constituents; in the fourth, however, there are a few grains of vitrinite, one of which is 0.6 mm long (reflectivity, 0.95%). Small grains of inertinites are present in this chip also, but are by no means as abundant as vitrinite. The vitrinite is smooth and well-polished and hence appears not to be a re-worked particle.

Green fluorescence in the sample is believed to be derived from minerals and the sample is free from bitumen and exinite macerals.

Sample RS178; PS27750; Mudlalee No. 2, SWC 1 (6280')

No organic material was seen in this sample. Fluorescence is of a dull yellow colour but is thought most likely to be derived from mineral matter.

3. PHOTOMICROGRAPHS

In all the photomicrographs, the long dimension is 0.4 mm. Photographs in fluorescent light were taken using a 510 nm barrier filter.

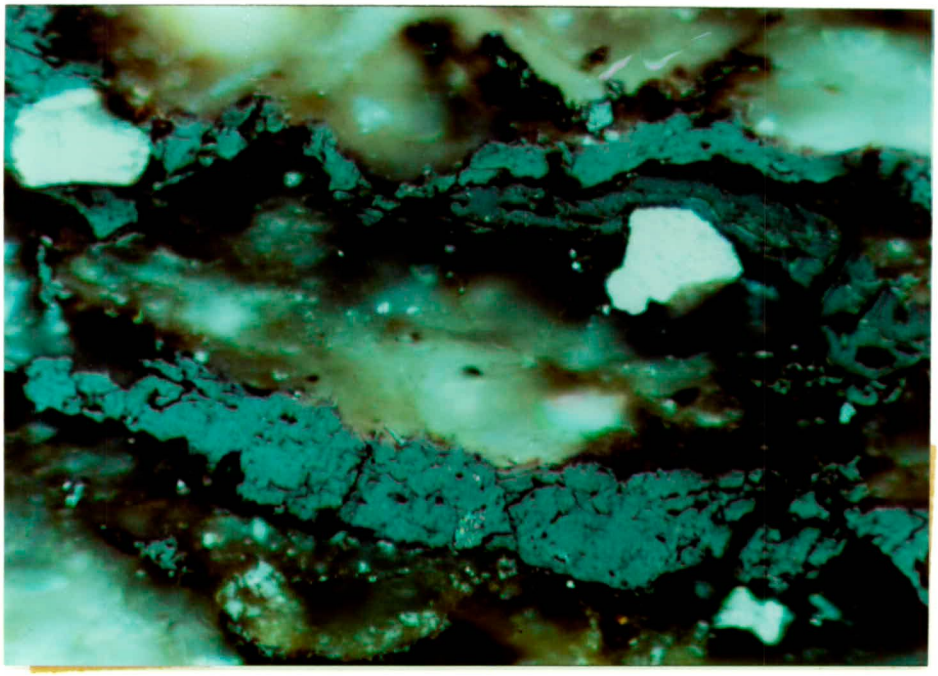
PLATE 1

a. Sample RS130; PS27304
Mudlalee No. 2, SWC 26 (5005')

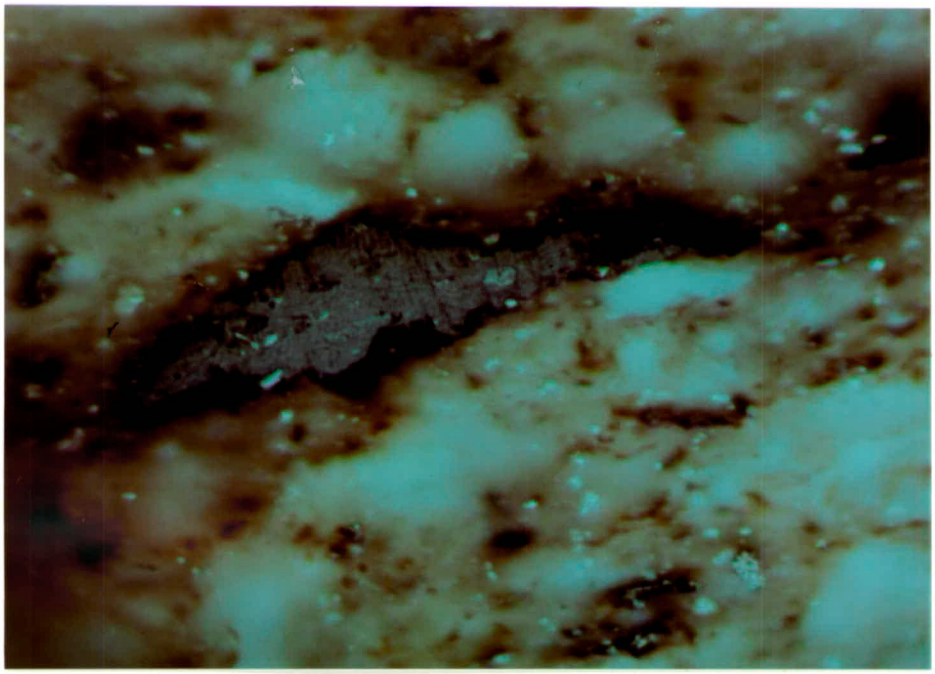
Large patches of porous vitrinite with pyrite crystals.

b. SampleRS162; PS27767
Mudlalee No. 2, SWC 21 (5644')

Elongate patch of autochthonous vitrinite with finely disseminated inertodetrinite.



a.



b.

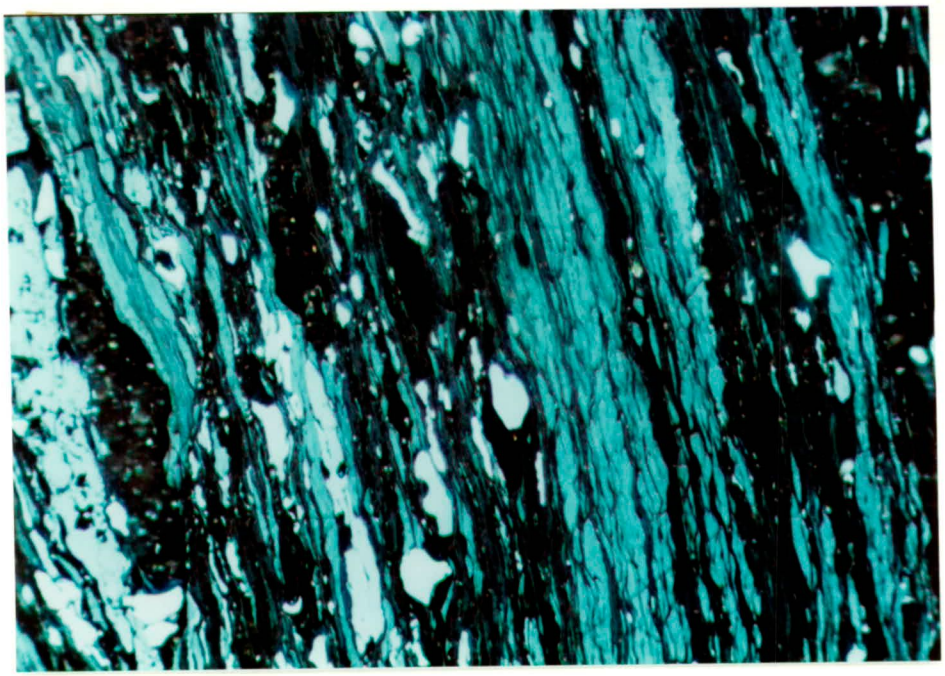
PLATE 2

a. Sample RS133; PS27301
Mudlalee No. 2, SWC 18 (5736')

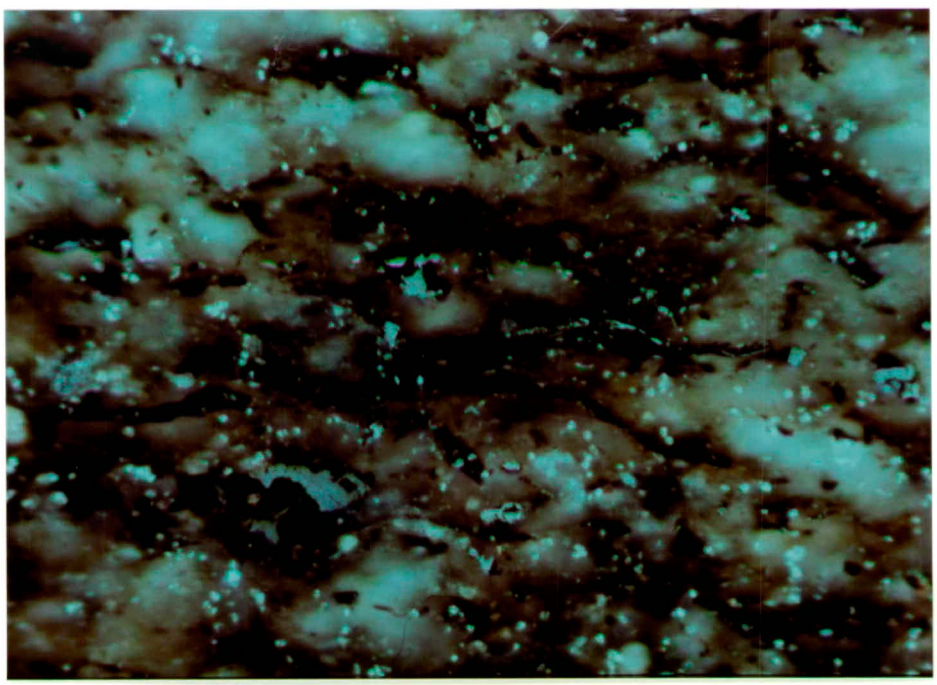
Typical coal fragment with dark grey sporinite and brighter vitrinite and inertinites.

b. Sample RS163; PS27765
Mudlalee No. 2, SWC 17 (5763')

Typical field of view. Relatively large patch of vitrinite, scraps of cutinite and dispersed inertodetrinite.



a.



b.

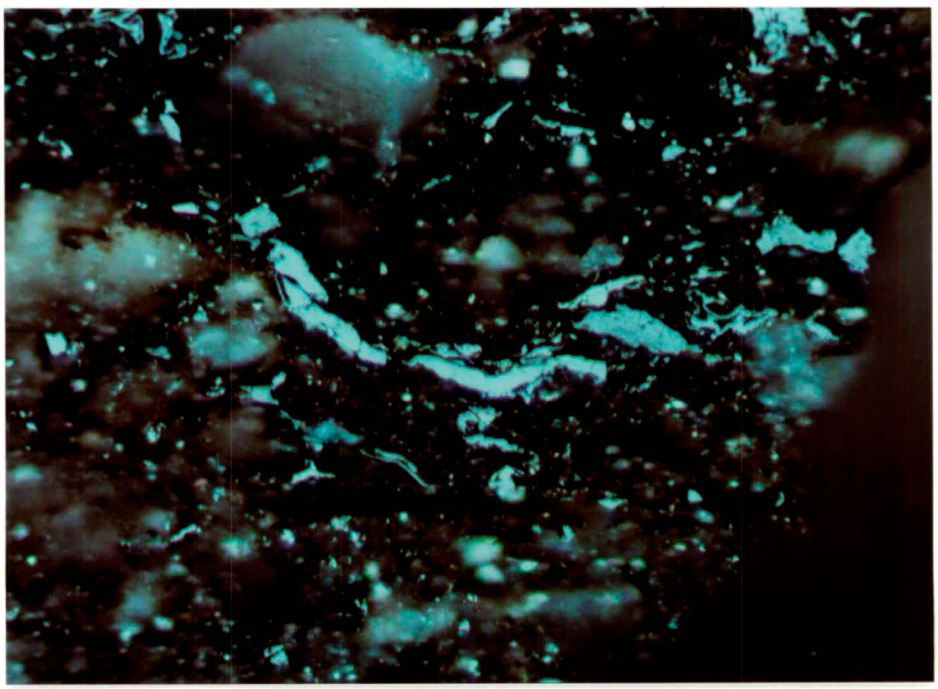
PLATE 3

a. Sample RS164; PS27764
Mudlalee No. 2, SWC 16 (5788')

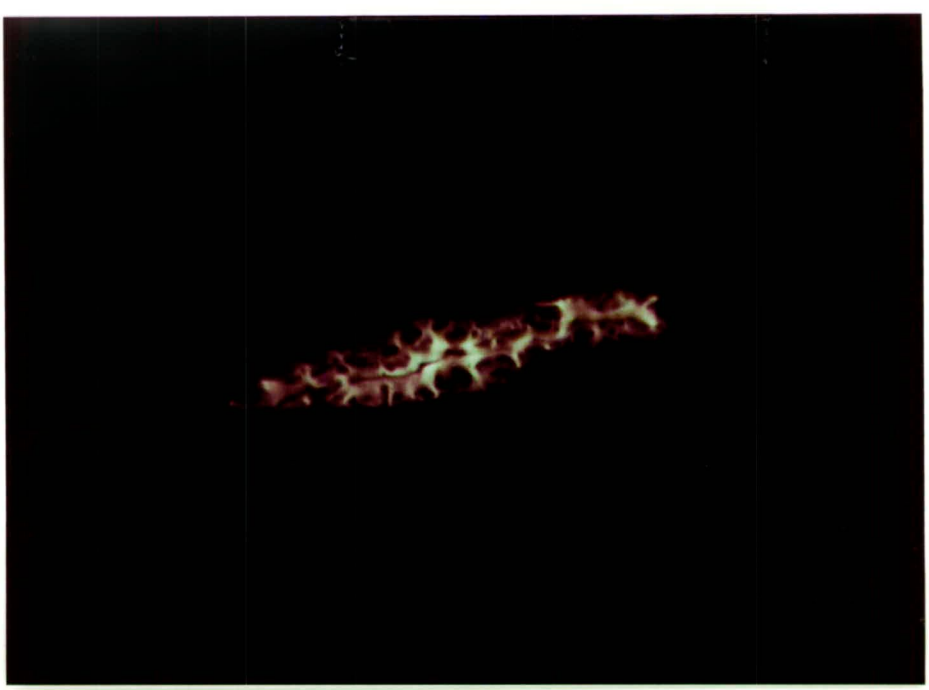
General view; organic matter consists wholely of inertinites.

b. Sample RS168; PS27760
Mudlalee No. 2, SWC 12 (5926')

View of alginite showing relatively dull fluorescence.



a.



b.

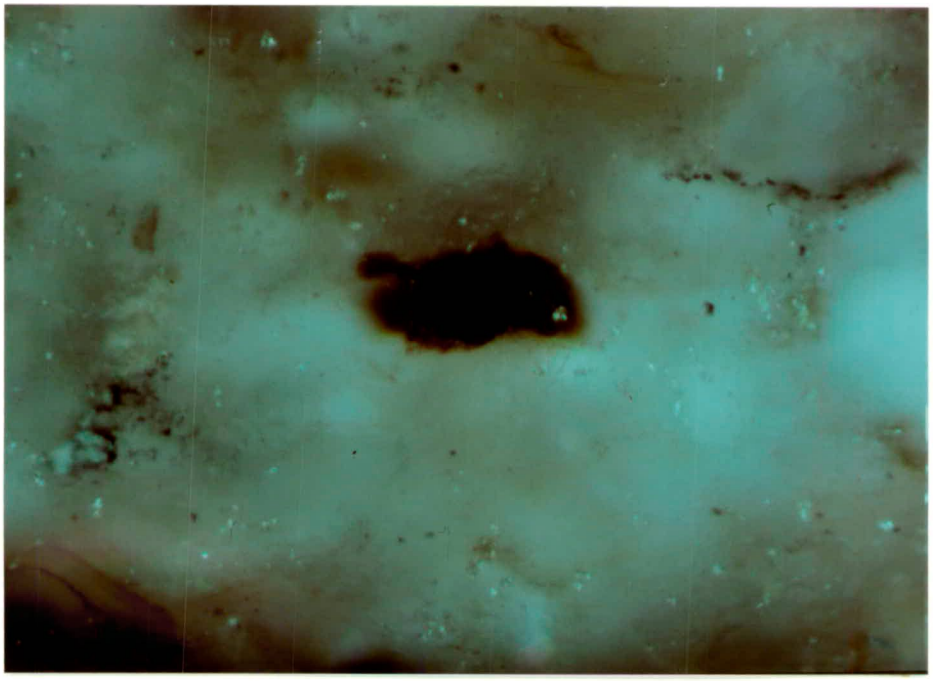
PLATE 4

a. Sample RS170; PS27758
Mudlalee No. 2, SWC 10 (5941')

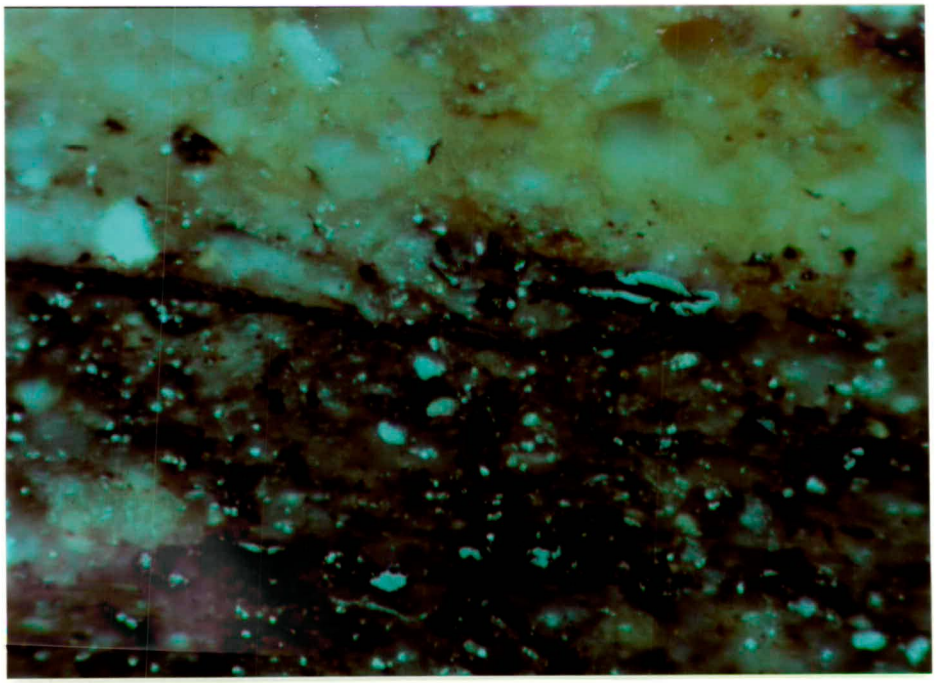
Patch of translucent brown material, referred to as bitumen. Fluorescence is very weak.

b. Sample RS172; PS27756
Mudlalee No. 2, SWC 8 (5972')

Cutinite (near centre) with numerous scraps of inertodetrinite.



a.

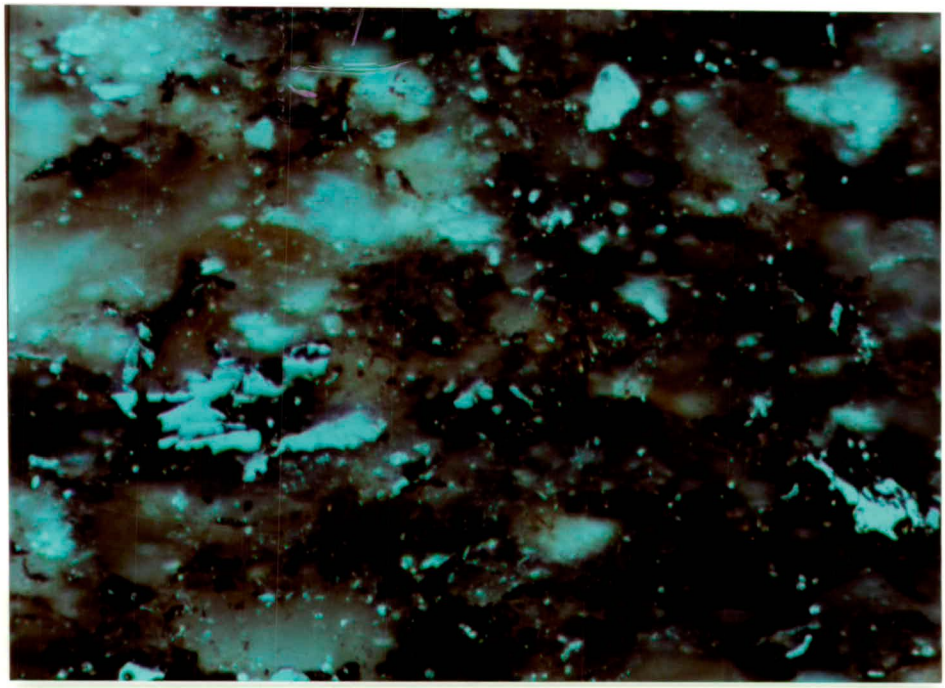


b.

PLATE 5

a. Sample RS173; PS27755
Mudlalee No. 2, SWC 7 (6000')

Mainly inertodetrinite and semifusinite. Dull red/brown diffuse area near centre is alginite.



a.

amdel
The Australian Mineral Development Laboratories
Flemington Street, Frewville, South Australia 5063
Phone Adelaide 79 1662, telex AA 82520

Pilot Plant: Osman 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: GS1.1.231

Your ref: 11.06.368

9 July, 1979

Director-General,
Department of Mines & Energy,
P.O. Box 151,
EASTWOOD, SA 5063.

Attention: Dr D.M. McKirdy

SOURCE ROCK STUDIES -

S.A. SEDIMENTARY BASINS

PROGRESS REPORT No. 18

Investigation and Report by: H. Sears

Manager, Geological Services Division: Dr Keith J. Henley

Keith Henley

for Norton Jackson,
Managing Director.

jdy

SOURCE ROCK

SAMPLE NO.	RS161
WELL:	Mudlalee 2.
SAMPLE IDENTIFICATION:	
DEPTH:	4380 ft
TYPE OF SAMPLE:	(SWC 28) Sidewall core.

Total organic carbon (TOC)	1.41	%	
Weight of sample extracted	10.05	gm	
Extracted organic matter (EOM)	1 295	ppm	(13.0 mg)
EOM as fraction of TOC	91.8	mg/g	

Analysis of extracted organic matter:-

Asphaltenes	41.9	% (wt)
Saturates	19.4	%
Aromatics	9.4	%
Resins	15.0	%
Loss on column	14.4	%

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.	0.7	3.2	6.1	8.7	11.0	12.5	13.0	11.4	9.4	6.8	4.6
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.	3.1	2.8	2.1	2.5	1.7	0.4					

Pristane/phytane ratio	3.80
Pristane/C_{17} ratio	0.49

SAMPLE DESCRIPTION:- Compact medium grey mudstone with some white patches.

SAMPLE NO.	RS162.
WELL:	Mudlalee 2.
SAMPLE IDENTIFICATION:	
DEPTH:	5644 ft
TYPE OF SAMPLE:	(SWC 21) Sidewall core.

Total organic carbon (TOC)	0.74	%
Weight of sample extracted	7.55	gm
Extracted organic matter (EOM)	1 298	ppm (9.8 mg)
EOM as fraction of TOC	175.4	mg/g

Analysis of extracted organic matter:-

Asphaltenes	60.2	% (wt)
Saturates	5.1	%
Aromatics	7.1	%
Resins	12.2	%
Loss on column	15.3	%

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.	-	1.0	3.8	7.1	9.1	9.5	9.5	8.6	8.2	7.9	7.6
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.	7.4	7.5	6.3	4.9	1.3	0.3					

Pristane/phytane ratio	4.50
Pristane/C_{17} ratio	0.75

SAMPLE DESCRIPTION:- Variously cream and pale grey friable silt stone with ferruginous spots.

SOURCE ROCK

SAMPLE NO.

WELL: Mudlalee 2.

SAMPLE IDENTIFICATION:

DEPTH: 5695 ft

TYPE OF SAMPLE: (SWC 19) Sidewall Core

Total organic carbon (TOC)	0.27	%
Weight of sample extracted	10.75	gm
Extracted organic matter (EOM)	326	ppm (3.5 mg)
EOM as fraction of TOC	120.7	mg/g

Analysis of extracted organic matter:-

Asphaltenes	25.7	% (wt)
Saturates	34.3	%
Aromatics	8.6	%
Resins	22.9	%
Loss on column	8.6	%

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.	-	1.0	5.3	10.6	14.3	15.6	15.7	14.3	10.0	5.7	3.3
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.	1.9	1.3	0.6	0.4							

Pristane/phytane ratio 5.70

Pristane/C_{17} ratio 1.01

SAMPLE DESCRIPTION:- Pale grey and red brown silt stone: Friable and notably ferrunginous in places.

SOURCE ROCK

SAMPLE NO.	RS163
WELL:	Mudlalee 2.
SAMPLE IDENTIFICATION:	
DEPTH:	5763 ft
TYPE OF SAMPLE:	(SWC 17) Sidewall core.

Total organic carbon (TOC)	2.04	%
Weight of sample extracted	6.20	gm
Extracted organic matter (EOM)	1 405	ppm (8.7 mg)
EOM as fraction of TOC	68.9	mg/g

Analysis of extracted organic matter:-

Asphaltenes	62.1	% (wt)
Saturates	5.8	%
Aromatics	9.2	%
Resins	16.1	%
Loss on column	6.9	%

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.	-	0.3	3.5	9.8	14.9	16.0	14.8	11.9	9.2	6.6	4.9
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.	3.7	2.5	1.4	0.5							

Pristane/phytane ratio	3.88
Pristane/C_{17} ratio	0.64

SAMPLE DESCRIPTION:- Grey and mottled mud stone/shale: some fine laminatior

SOURCE ROCK

SAMPLE NO.	RS 164
WELL:	Mudlalee 2.
SAMPLE IDENTIFICATION:	
DEPTH:	5788 ft
TYPE OF SAMPLE:	(SWC 16) Sidewall core

Total organic carbon (TOC)	3.26	%
Weight of sample extracted	4.90	gm
Extracted organic matter (EOM)	2 165	ppm (10.6 mg)
EOM as fraction of TOC	66.4	mg/g

Analysis of extracted organic matter:-

Asphaltenes	61.9	% (wt)
Saturates	6.6	%
Aromatics	13.2	%
Resins	24.5	%
Loss on column	13.2	%

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	5.1	9.5	13.1	14.3	13.9	12.9	9.1	6.5	5.1
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	2.9	1.4	0.6	0.2						

Pristane/phytane ratio	4.43
Pristane/C_{17} ratio	0.70

SAMPLE DESCRIPTION:- Grey rather patchy and mottled mud stone.

SAMPLE NO.	RS 165
WELL:	Mudlalee 2.
SAMPLE IDENTIFICATION:	
DEPTH:	5804 ft
TYPE OF SAMPLE:	(SWC 15) Sidewall Core

Total organic carbon (TOC)	3.56	%
Weight of sample extracted	6.95	gm
Extracted organic matter (EOM)	2 635	ppm (18.3 mg)
EOM as fraction of TOC	74.0	mg/g

Analysis of extracted organic matter:-

Asphaltenes	33.4	% (wt)
Saturates	14.8	%
Aromatics	15.3	%
Resins	26.2	%
Loss on column	10.4	%

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	6.9	11.8	13.9	14.2	12.6	10.6	8.1	7.4
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.	6.6	4.3	1.4	0.3							

Pristane/phytane ratio	4.22
Pristane/C_{17} ratio	0.56

SAMPLE DESCRIPTION:- Silt stone with fine well defined black and grey laminations.

SOURCE ROCK

SAMPLE NO.	RS166
WELL:	Mudlalee 2.
SAMPLE IDENTIFICATION:	
DEPTH:	5856 ft
TYPE OF SAMPLE:	(SWC 14) Sidewall Core

Total organic carbon (TOC)	1.50	%
Weight of sample extracted	3.45	gm
Extracted organic matter (EOM)	1 420	ppm (4.9 mg)
EOM as fraction of TOC	94.7	mg/g

Analysis of extracted organic matter:-

Asphaltenes	42.9	% (wt)
Saturates	4.1	%
Aromatics	12.2	%
Resins	12.2	%
Loss on column	28.6	%

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.	-	-	2.7	6.6	12.9	14.0	0.1	9.2	7.8	7.0	6.2
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.	5.8,	5.5	4.7	3.1	1.6	0.8					

Pristane/phytane ratio	3.00
Pristane/C_{17} ratio	0.68

SAMPLE DESCRIPTION:- Medium grey/brown friable shale/mud stone: micaceous in places.

SOURCE ROCK

SAMPLE NO.	RS167
WELL:	Mudlalee 2.
SAMPLE IDENTIFICATION:	
DEPTH:	5913 ft
TYPE OF SAMPLE:	(SWC 13) Sidewall Core

Total organic carbon (TOC)	2.65	%
Weight of sample extracted	3.35	gm
Extracted organic matter (EOM)	1 550	ppm (5.2 mg)
EOM as fraction of TOC	58.5	mg/g

Analysis of extracted organic matter:-

Asphaltenes	59.6	% (wt)
Saturates	5.8	%
Aromatics	19.2	%
Resins	15.4	%
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 abund.	0.5	3.4	7.1	10.7	12.6	13.7	12.3	10.1	8.9	6.8	5.5
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.	4.0	2.8	1.1	0.5							

Pristane/phytane ratio	4.2
Pristane/C_{17} ratio	0.63

SAMPLE DESCRIPTION:- Dark grey massive mud stone: some ferruginous concretions

SOURCE ROCK

SAMPLE NO.	RS168
WELL:	Mudlalee 2.
SAMPLE IDENTIFICATION:	
DEPTH:	5926 ft
TYPE OF SAMPLE:	(SWC 12) Sidewall Core

Total organic carbon (TOC)	2.60	%
Weight of sample extracted	14.45	gm
Extracted organic matter (EOM)	1 205	ppm (17.4 mg)
EOM as fraction of TOC	46.3	mg/g

Analysis of extracted organic matter:-

Asphaltenes	31.6	% (wt)
Saturates	7.5	%
Aromatics	20.7	%
Resins	32.8	%
Loss on column	7.4	%

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.	1.0	3.7	7.7	10.7	12.5	12.8	11.9	10.4	8.4	6.3	5.6
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.	4.3	3.1	1.0	0.6							

Pristane/phytane ratio	4.10
Pristane/C_{17} ratio	0.53

SAMPLE DESCRIPTION:- Chocolate brown to black massive mud stone.

SOURCE ROCK

SAMPLE NO.	R 5169
WELL:	Mudlalee 2.
SAMPLE IDENTIFICATION:	
DEPTH:	5932 ft
TYPE OF SAMPLE:	(SWC 11) Sidewall Core

Total organic carbon (TOC)	2.30	%
Weight of sample extracted	17.20	gm
Extracted organic matter (EOM)	1 210	ppm (20.8 mg)
EOM as fraction of TOC	52.6	mg/g

Analysis of extracted organic matter:-

Asphaltenes	60.4	% (wt)
Saturates	3.5	%
Aromatics	10.0	%
Resins	18.8	%
Loss on column	7.3	%

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	3.5	7.2	10.8	12.8	13.0	11.7	10.6	9.1	8.2
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.	6.3	4.5	1.3	0.3							

Pristane/phytane ratio	3.61
Pristane/C_{17} ratio	0.42

SAMPLE DESCRIPTION:- Friable brown to dark grey massive mud stone/silt stone

SOURCE ROCK

SAMPLE NO.	RS170
WELL:	Mudlalee 2.
SAMPLE IDENTIFICATION:	
DEPTH:	5941 ft
TYPE OF SAMPLE:	(SWC 10) Sidewall Core

Total organic carbon (TOC)	3.10	%
Weight of sample extracted	14.05	gm
Extracted organic matter (EOM)	2 198	ppm (30.9 mg)
EOM as fraction of TOC	70.9	mg/g

Analysis of extracted organic matter:-

Asphaltenes	35.0	% (wt)
Saturates	5.6	%
Aromatics	12.3	%
Resins	26.2	%
Loss on column	20.9	%

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.	0.5	2.4	6.7	10.8	12.9	12.7	12.0	10.5	9.1	7.8	6.4
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.	5.0	2.7	0.5								

Pristane/phytane ratio	4.44
Pristane/C_{17} ratio	0.74

SAMPLE DESCRIPTION:- Moderately coarsely banded shale with black/white alternations.

SOURCE ROCK

SAMPLE NO.	RS171
WELL:	Mudlalee 2.
SAMPLE IDENTIFICATION:	
DEPTH:	5947 ft
TYPE OF SAMPLE:	(SWC 9) Sidewall Core

Total organic carbon (TOC)	3.66	%
Weight of sample extracted	6.95	gm
Extracted organic matter (EOM)	2 905	ppm (20.2 mg)
EOM as fraction of TOC	79.4	mg/g

Analysis of extracted organic matter:-

Asphaltenes	22.8	% (wt)
Saturates	6.9	%
Aromatics	12.4	%
Resins	26.2	%
Loss on column	31.7	%

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.	0.4	2.2	4.4	6.9	9.4	11.3	12.2	11.4	10.2	8.7	7.8
n-Alkane	C_{24}	C_{25}	C_{26}	C_{27}	C_{28}	C_{29}	C_{30}	C_{31}	C_{32}	C_{33}	C_{34}
Rel abund.	6.1	5.6	2.9	0.8							

Pristane/phytane ratio 4.71

Pristane/C_{17} ratio 0.75

SAMPLE DESCRIPTION:- Dark brown to black shale/mud stone: some laminations: fairly compact.

SAMPLE NO.	RS 172
WELL:	Mudlalee 2.
SAMPLE IDENTIFICATION:	
DEPTH:	5972 ft
TYPE OF SAMPLE:	(SWC 8) Sidewall Core.

Total organic carbon (TOC)	2.76	%
Weight of sample extracted	19.9	gm
Extracted organic matter (EOM)	1 760	ppm (35.0 mg)
EOM as fraction of TOC	63.8	mg/g

Analysis of extracted organic matter:-

Asphaltenes	30.9	% (wt)
Saturates	5.4	%
Aromatics	13.7	%
Resins	26.3	%
Loss on column	23.7	%

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.	-	0.7	2.9	6.1	9.9	10.9	11.7	11.0	10.5	9.6	9.0
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.	7.4	6.6	3.0	0.7							

Pristane/phytane ratio	3.74
Pristane/C_{17} ratio	0.49

SAMPLE DESCRIPTION:- Fairly compact and massive shale/silt stone with fine colour banding.

SAMPLE NO.	RS173
WELL:	Mudlalee 2.
SAMPLE IDENTIFICATION:	
DEPTH:	6000 ft
TYPE OF SAMPLE:	(SWC 7) Sidewall Core

Total organic carbon (TOC)	2.38	%
Weight of sample extracted	4.40	gm
Extracted organic matter (EOM)	2 320	ppm (10.2 mg)
EOM as fraction of TOC	97.5	mg/g

Analysis of extracted organic matter:-

Asphaltenes	40.2	% (wt)
Saturates	3.9	%
Aromatics	11.8	%
Resins	30.4	%
Loss on column	13.7	%

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.	-	0.7	4.6	10.0	15.3	17.1	16.2	12.7	9.0	5.6	13.9
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.	2.8	1.6	0.5								

Pristane/phytane ratio	5.20
Pristane/C_{17} ratio	0.79

SAMPLE DESCRIPTION:- Finely laminated pale grey and white shale.

SOURCE ROCK

SAMPLE NO.	RS174
WELL:	Mudlalee 2.
SAMPLE IDENTIFICATION:	
DEPTH:	6020 ft
TYPE OF SAMPLE:	(SWC 6) Sidewall Core

Total organic carbon (TOC)	3.62	%
Weight of sample extracted	2.00	gm
Extracted organic matter (EOM)	2 150	ppm (4.3 mg)
EOM as fraction of TOC	59.4	mg/g

Analysis of extracted organic matter:-

Asphaltenes	56.7	% (wt)
Saturates	11.4	%
Aromatics	11.4	%
Resins	20.5	%
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 abund.	-	0.2	1.7	4.9	8.2	10.3	11.0	10.8	10.8	10.5	10.3
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.	8.9	7.3	3.5	1.3	0.3						

Pristane/phytane ratio	2.43
Pristane/C_{17} ratio	0.44

SAMPLE DESCRIPTION:- Dark grey mud stone with indefinite banding

SOURCE ROCK

SAMPLE NO. RS175

WELL: Mudlalee 2.

SAMPLE IDENTIFICATION:

DEPTH: 6130 ft

TYPE OF SAMPLE: (SWC 5) Sidewall Core.

Total organic carbon (TOC)	2.58	%
Weight of sample extracted	2.45	gm
Extracted organic matter (EOM)	1 795	ppm (4.4 mg)
EOM as fraction of TOC	69.6	mg/g

Analysis of extracted organic matter:-

Asphaltenes	68.2	% (wt)
Saturates	-	%
Aromatics	-	%
Resins	-	%
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 abund.	I N S U F F I C I E N T					S A M P L E					
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.											

Pristane/phytane ratio

Pristane/C_{17} ratio

SAMPLE DESCRIPTION:- Friable grey shale rather heterogeneous - fine laminar banding in places.

SOURCE ROCK

SAMPLE NO.	RS176
WELL:	Mudlalee 2.
SAMPLE IDENTIFICATION:	
DEPTH:	6232 ft
TYPE OF SAMPLE:	(SWC 3) Sidewall Core

Total organic carbon (TOC)	0.09	%
Weight of sample extracted	19.05	gm
Extracted organic matter (EOM)	126	ppm (2.4 mg)
EOM as fraction of TOC	140	mg/g

Analysis of extracted organic matter:-

Asphaltenes	50	% (wt)
Saturates	-	%
Aromatics	-	%
Resins	-	%
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 abund.	I N S U F F I C I E N T					S A M P L E					
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.											

Pristane/phytane ratio

Pristane/C_{17} ratio

SAMPLE DESCRIPTION:- Compact pale grey silt stone: massive possibly sandy in places.

SOURCE ROCK

SAMPLE NO.	RS 177
WELL:	Mudlalee 2.
SAMPLE IDENTIFICATION:	
DEPTH:	6272 ft
TYPE OF SAMPLE:	(SWC 2.)

Total organic carbon (TOC)	0.59	%	
Weight of sample extracted	16.75	gm	
Extracted organic matter (EOM)	221	ppm	(3.7 mg)
EOM as fraction of TOC	37.5	mg/g	

Analysis of extracted organic matter:-

Asphaltenes	51.4	% (wt)
Saturates	21.6	%
Aromatics	10.8	%
Resins	13.5	%
Loss on column	2.7	%

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	5.9	11.4	15.5	16.8	17.0	13.4	8.2	4.9	2.8
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.	1.5	1.0	0.3								

Pristane/phytane ratio	5.41
Pristane/C_{17} ratio	0.76

SAMPLE DESCRIPTION:- Compact grey shale: minor medium grey mica and some fissile bands.

SOURCE ROCK

SAMPLE NO.	RS178
WELL:	Mudlalee 2.
SAMPLE IDENTIFICATION:	
DEPTH:	6280 ft
TYPE OF SAMPLE:	(SWC 1) Sidewall Core.

Total organic carbon (TOC)	0.48	%
Weight of sample extracted	7.15	gm
Extracted organic matter (EOM)	308	ppm (2.2 mg)
EOM as fraction of TOC	64.2	mg/g

Analysis of extracted organic matter:-

Asphaltenes	46	% (wt)
Saturates	-	%
Aromatics	-	%
Resins	-	%
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 abund.	I N S U F F I C I E N T					S A M P L E					
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.											

Pristane/phytane ratio

Pristane/C_{17} ratio

SAMPLE DESCRIPTION:- Compact grey shale with minor medium grained mica