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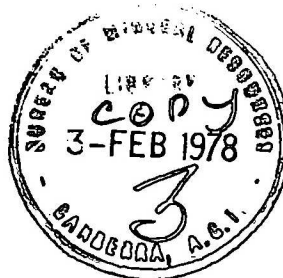


BUREAU OF MINERAL RESOURCES,
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AN APPRAISAL OF PETROLEUM EXPLORATION TITLE AREAS
WA-33P, WA-34P, WA-35P, WA-37P, NT/P5

CANCELLED

by

S.J. Mayne and J. Rasidi

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INTRODUCTION

This Record has been produced after a five-week examination of data pertaining to tenements WA-33P, WA-34P, WA-35P, WA-37P, and NT/P5.

These data include reports made in accordance with the Petroleum Search Subsidy Act (PSSA) and the Petroleum (Submerged Lands) Act (P(SL)A), also review-reports from private companies, and miscellaneous BMR data. No original interpretations were made.

As many of the data are confidential and not available to the public, this Record must also be classified as confidential.

PART 1

REGIONAL GEOLOGY OF THE BROWSE BASIN

Basin limits:

The Browse Basin is a part of the Northwest Shelf of Australia. It is confined between the Scott Plateau Block on the northwest, the Ashmore-Sahul Block on the northeast, the Kimberley Block on the southeast, and the Leveque Shelf on the southwest.

Brief outline of geology:

The Browse Basin owes its origin to the breakup of East Gondwanaland in the Mesozoic, when a "western land mass" separated from the Australian segment by the mechanism of sea-floor-spreading from ridges and sliding along transforms. The spreading-ridge system with associated faults probably had a dominantly northeast trend, whilst the transforms followed the grain of the ancient craton, i.e. northwest-southeast.

The development of the Browse Basin was fairly closely in accord with the classic model. The pre-faulting period of lowland clastic sedimentation was chiefly the Triassic, and the period of block-faulting with some accompanying volcanism, was the Jurassic, with the climax in the Callovian. There was contemporaneous deposition of clastics from the erosion of topographic highs, and this was of regional occurrence at the time of regional uplift accompanying the ascent of the asthenosphere. Erosion of the horst-blocks was such that Triassic rocks were commonly, and Permian rocks sometimes, exposed. Environment of deposition ranged from coastal plain and deltaic to shallow marine. The horst-blocks, or their erosional remnants, are arranged in subparallel lines trending northeast. During the stage of crustal sag due to the cooling of the sublithosphere the great marine transgression of the Cretaceous and Tertiary began. In the early stages coastal clastics were laid down, but most of the Cretaceous and all the Tertiary were times of carbonate-bank deposition. Plate-margin tectonics in the Timor region in the later Cainozoic had repercussions in the Australian region, where there was a virtual collapse of the outer cratonic margin into very deep water.

In summary, the Browse Basin consists of a bowl of Lower Mesozoic fault-blocks, which is infilled with Upper Mesozoic clastics, and the whole buried beneath a thick carbonate bank of largely Cainozoic age.

Browse Basin Subdivisions:

The Browse Basin has been divided into provinces which are shown in Plate 1 and Figure 4.

The Kimberly Block Margin is the immediately seaward extension of the Kimberley Block. The Precambrian rocks of the basement have prominent erosional relief and are overlain by virtually horizontal Cretaceous or Tertiary rocks up to about 1000 m thick. Londonderry No. 1 reached total depth (T.D.) at 1146 m, revealing Neocomian clastics resting on Precambrian.

The Browse Slope is a broad belt seaward of the Kimberley Block Margin. The Precambrian basement declines, probably by step-faulting, somewhat more steeply basinward and is overlain by Permian, Jurassic, and Cretaceous sediments. Faulting in this sedimentary blanket seems to be confined chiefly to the northern limits of the Slope where it abuts the Londonderry Arch, and to the southern limits where it has been influenced by the Buccaneer Nose. Rob Roy No. 1 was drilled to a T.D. of 2295 m in a graben in the northern fault-zone; it revealed about 700 m of Permian resting on Precambrian. Yampi No. 1, farther down the slope, reached T.D. at 4176 m in Lower Permian sediments. The gross Jurassic depocentre lies down-dip from Yampi No. 1.

The Buccaneer-Heywood trend is essentially a line of Permo-Triassic horst-blocks that separate the Browse Slope from the Central Browse Basin. Faulting is particularly prominent in the northeastern half of the division, where the Prudhoe-Heywood Main Fault is about 200 km long. Prudhoe No. 1 was drilled on the upthrow side of this fault; it bottomed at 3322 m in Lower Permian sediments, and revealed an absence of most of the Jurassic and all the Triassic. Heywood No. 1 was drilled on the downthrow side and bottomed in Middle Jurassics at 4572 m.

The Central Browse Basin Trough is a belt wherein the so-called Triassic Unconformity or Rift-onset Unconformity is at its greatest mid-basinal depth; it also corresponds in large measure with the Cretaceous depocentre. The trough lies between the Buccaneer-Heywood and Scott Reef trends and connects in the northeast with the Vulcan Sub-basin and in the southwest with the Rowley Sub-basin. No wells have been drilled in it.

The Scott Reef "trend" is another line of Permo-Triassic horst-blocks. In the northeast this trend comes to an end against the Ashmore-Sahul Block Margin, but within the Margin the same trend is still apparent in the orientation of a set of minor horsts, grabens, and faults. The only well is Scott Reef No. 1, which bottomed at 4730 m in the Upper Triassic. A highly significant accumulation of gas-condensate was encountered in the Triassic and the thin overlying Jurassic. The Scott Reef "trend" is possibly an analogue of the Rankin Platform, to the southwest.

The Scott Plateau is the farthest seaward part of the Browse Basin. There are few data pertaining to it, but it is surmised to be an outer bastion of the Australian craton, similar to the Exmouth Plateau, and to have been a structural and sometimes a topographic high which survived, as a western boundary of the Basin, until the end of the Mesozoic, when it began to founder into deep water with the development of the Timor Trough. The Seringapatam trend in the Scott Plateau is a short line of horst-blocks close to and parallel with the Scott Reef trend, and forming the southeastern edge of the Scott Plateau.

The stratigraphy of the Browse Basin is summarized in Figure 1. Crystalline rocks of the Precambrian Kimberley Block make up the southeastern margins of the basin and are derived to form a shallow basement to the Kimberley Block Margin. They have been encountered in Londonderry No. 1, Rob Roy No. 1, and also in Leveque No. 1 just beyond the basin limits.

No lower or Middle Palaeozoic rocks have been met with in the Browse Basin, but in view of their known occurrence in other parts it is entirely plausible that they exist in the deeper parts of the Basin.

Permian sediments are widespread on the Northwest Shelf, where they indicate the existence of coastal plain and shallow marine conditions. In the Browse Basin fine sandstone, siltstone, shale, and minor coal have been encountered in three wells (Yampi No. 1, Prudhoe, No. 1, and Rob Roy No. 1) on the Browse Slope. These sediments are all Lower Permian, and there seems to be a stratigraphic hiatus in the Browse Basin until the Upper Triassic, when sandstone, siltstone, claystone, and some carbonate rocks were laid down in marginal marine conditions, as at Scott Reef No. 1 and Yampi No. 1.

The sedimentation and erosion consequent on the taphrogenic phenomena of the Mesozoic have resulted in an erratic occurrence of fluvial and deltaic clastics of Jurassic age, particularly in the mid-basinal area.

The post-breakup era of marine deposition that has persisted to the present day began with the laying down of thick sands in the nearer-shore regions as at Londonderry No. 1 and Rob Roy No. 1, and of claystone siltstone, calcilutite, and minor sandstone in the more offshore regions, as at Yampi No. 1, Heywood No. 1, Prudhoe No. 1, and Scott Reef No. 1. This lutite-type of sedimentation was dominant throughout the rest of the Cretaceous, the chief periods being the Neocomian, the Albian-Cenomanian, and the Senonian-Maastrichtian. Basin-margin sandstones were deposited fringing the Kimberley Block and the Londonderry Ridge which was emergent in the Cretaceous.

The Cainozoic era of carbonate-bank deposition, with calcarenite as the commonest lithologic type, is divisible into an older and a younger part by the cutting out of the whole of the Oligocene over the whole basin except the most seaward part e.g. at Scott Reef. Londonderry No. 1 and Rob Roy No. 1, the wells nearest the shoreline environment, have minor sandstones interbedded with the carbonate members.

The Ashmore Block Margin forms a southern apron to the Ashmore-Sahul Block from which it may be separated by a zone of strike-slip faulting. Northeast-trending structures are seemingly subordinate to the old Palaeozoic grain but are represented by a distinct fault and horst-and-graben province oriented in alignment with the Scott Reef trend. Volcanics associated with the rift-valley stage of continental breakup are probably prominent in the western parts, and there is probably at least one major igneous intrusion - called in this report Mount Bocal (Pl. 1). There are no wells in the area but the stratigraphy is probably rather similar to that at Ashmore Reef No. 1, Brown Gannet No. 1, and Scott Reef No. 1.

Hydrocarbon potential:

The stratigraphy of the Browse Basin is indicated in Figures 1 and 2, and from these it may be seen that the Basin is essentially a Mesozoic prospect. Permian and older Palaeozoic rocks probably occur but only in the deeper parts of the basin. Their potential is quite unknown - the Permian has produced good gas shows in the Bonaparte Gulf to the north, but is unproductive in the Canning Basin to the south.

Source rocks:

The source of petroleum being the organic matter buried with a fine-grained sediment, it will be apparent from Figure 1 that there are several lutites in the Mesozoic sequences that could be adequate source rocks. Two samples from Scott Reef 1, where the only noteworthy occurrence of petroleum in the basin has been made, are described as being of very good oil source potential, prospective for light oil, with gas and condensate.

Reservoir rocks:

There are widespread Triassic and Jurassic sandstones that are suitable as reservoir rocks, and indeed have proved to be so, as at Scott Reef. Details of the Scott Reef occurrence are given in the Title Assessment of WA-33-P. These beds are far and away the most prospective targets in the Browse Basin. They are most likely to be met with on or in the immediate neighbourhood of the horst blocks on the "Trends".

There are also some Cretaceous and Lower Tertiary shoreline sands, and some porous limestones in the carbonate-bank sequence that are suitable as reservoirs.

Cap rocks:

The major cap rocks are Upper Cretaceous shale, but in addition there are shales throughout the basinal sequence that at least locally could act as seals. In the Tertiary there are marl and calcilutite suitable as cap rocks. At Scott Reef the oil-bearing sandstone is capped by Upper Jurassic volcanics and claystone.

Traps:

The most likely traps to be encountered in the Browse Basin are combinations of structural-stratigraphic conditions. These will be most likely to be found around the horst blocks, where stratigraphic drape, pre-, syn-, and post-depositional faulting, pinch-out, onlap, and slump phenomena are liable to have taken place. The Scott Reef occurrence is in such a horst-block situation. There is little or no evidence of folding due to compression in the basin. In basin-margin situations, stratigraphic pinchouts and facies changes can be expected, but it should be borne in mind that no well drilled on the Northwest Shelf to test such plays has been successful: in all cases the target-horizon has been shaled up, has suffered secondary silicification or has been water-saturated. It is for these reasons that interest in the Browse Slope has dimmed, whilst the Kimberley Block Margin has never been highly rated.

There is no undoubted sign of reefal or salt-dome development in the Browse Basin. However, the seismically-revealed phenomenon called, in this report, Mount Bocal, may be a plug of some kind.

Conclusion:

It may be said that the most prospective plays will be found around the horst-blocks, where the Triassic-Jurassic sandstones have received hydrocarbons generated in adjacent shale so disposed as to encourage migration, and where thick Cretaceous lutite acts as caprocks.

Geophysics

Geophysical exploration in the basin began in 1963 when Woodside (Lakes Entrance) Oil Co. N.L. and Mid Eastern Oil N.L. conducted a reconnaissance airborne magnetic survey. The presence of thick sediment, up to 6500 m, within the area was indicated. Up to the end of 1974 a total of 19 geophysical surveys have been partly or wholly undertaken within the Browse Basin by BMR and by oil companies.

In the first seven years of exploration a large number of structural features were outlined by several reconnaissance surveys. Detailed seismic programs which were undertaken after 1970 have successfully established some of these structural features as drillable prospects.

Gravity

The gravity contours covering the whole area of the basin have been taken from "Marine Geophysical Survey of the North-west Continental Shelf, 1968" (Whitworth, BMR Record 1969/99). Along the coast and within the Kimberley Block Margin area the Bouguer anomaly shows a gradual rise seaward indicating a shallowing of crystalline basement. Farther to the west of this feature is a large, almost circular, Bouguer anomaly low with its centre located slightly to the west of Browse Island, suggesting a basinal structure.

A Bouguer anomaly high approximately 45 km south of Ashmore Reef coincides with a seismically revealed diapir-like feature of pre-Oligocene age.

The northeast-trending steep gravity gradient over the Scott-Seringapatam Reefs area may be the southern extension of the Ashmore Regional Gravity Gradient (Jones, BMR Record 1969/40), which is associated with the crustal thinning at the edge of the continental shelf.

Magnetic

Two geophysical surveys by BMR provided a complete magnetic coverage of the basin. The Timor Sea Gravity, Magnetic and Seismic Survey (Jones, 1969) covered the northern part of the basin. The results were presented in the form of profiles. Profiles 31B, 32A, 32B, and 96A on the western corner of NT/P5 show magnetic anomaly features which suggest the presence of basic igneous intrusives at depths in the range of 4 km to 9 km. The rest of the area shows no significant magnetic features. The absence of anomalous magnetic and gravity features over the Scott Reef area may indicate that the Scott Reef structure is not associated with a basement ridge.

Seismic

The first seismic survey in the Browse Basin was undertaken in 1964. It was followed in 1965 by a large reconnaissance seismic survey from the Montebello Island group in the south to parts of WA-33P and WA-34P in the north. In 1967, another reconnaissance survey was conducted in the Scott-Seringapatam Reefs area in which the Scott Reef structure was mapped, the apex of which was considered within reach of drilling in the Scott Reef

lagoon. In 1969, two large reconnaissance seismic surveys covering most of the area within the Browse Slope were undertaken. With improved energy source, higher density of shooting, and stacking, the quality of seismic data obtained was much better than that of data obtained previously. Some structures associated with a feature later known as the Buccaneer Nose and many structural features at an Upper Cretaceous horizon were indicated.

A large seismic survey, undertaken in 1970, delineated a northeast-trending ridge associated with minor faulting in the Browse Slope area.

Most seismic surveys undertaken after 1970 are detail or semi-detail projects. Fault-controlled structures in the Browse Slope were detailed in 1971. The Scott Reef structure was detailed, and three culminations of the structure were shown to exist. The North Reef structure was mapped as a closed structure with an apex inside the reef.

The Mermaid-Cartier Marine Seismic Survey undertaken in 1973 mostly covered an area with water depth of 300 m or more. A large number of closed structures were outlined, one of which overlies a circular feature about 45 km south of Ashmore Reef and within NT/P5, and which appears to be a diapir. It is associated with a Bouguer anomaly high but has no significant magnetic expression. The most recent seismic survey to cover the area was undertaken in 1974. Some of the previously indicated structures have been successfully confirmed and are considered drillable.

Several seismic horizons have been identified, and are indicated on Figure 2. The most important of these in the likely prospective section are the Jb and T horizons.

PART 2

TITLE ASSESSMENT - WA-33-P

Title holder: Woodside Oil N.L.
Shell Development (Aust.) Pty Ltd
Bocal Pty Ltd

BOCAL Pty Ltd is the operator on behalf of this group.

No. of Blocks: 389 blocks

Expiry Date: 18 May, 1975

Previous six year commitments:

Year of Term of Permit	Amount to be Expended
1st	\$ 164,100
2nd	81,000
3rd	3,200,000
4th	10,000
5th	217,450
6th	217,450
	<hr/> 3,890,000 <hr/>

Regional setting:

WA-33-P is located offshore on the northwest shelf of Australia. It is almost square, lacking only the northwest corner. The Scott Reef and the Seringapatam Reef are in the northeast corner of the permit, which is bounded to the south by WA-32-P, to the east by WA-34-P and WA-35-P, and to the north by WA-37-P. There are no permits to the west and northwest, i.e. the ocean-facing boundaries.

Water depths range from about 150 m in the southeast to over 1800 m in the northwest. Around the two reefs the water deepens rapidly from zero to over 450 m. About three-quarters of the permit is in water over 450 m deep, whilst only about 7% is in water less than 180 m deep.

Regional geology:

The Permit covers the greater part of the Scott Reef trend, and parts of the Browse Slope, the Buccaneer-Heywood trend, the Central Browse Basin Trough, and the Seringapatam trend. Table 1 shows the sediment thicknesses to be expected, and Figure 1 indicates the kind of lithology that may occur.

Wells drilled:

Only one well has been drilled within WA-33-P. This is Scott Reef No. 1, which met with a potentially important gas-condensate pay zone in the thin Middle Jurassic and uppermost Triassic beds.

Lombardina No. 1 is only a few kilometres south of the boundary between WA-33-P and WA-32-P and showed signs of residual hydrocarbons in rocks of from Early Cretaceous to Middle Jurassic age.

BOCAL has applied to relinquish 36 blocks in the south-east corner, and 159 blocks in the northwestern half of the permit.

Geophysical coverage:

Refer to basin notes, data sheets of geophysical surveys, and line density map. About 70% of WA-33-P is covered by reconnaissance gravity and magnetic surveys. The seismic density in WA-33P varies from reconnaissance lines about 40 km apart, in the western and northwestern side of the permit area where water depth exceeds 1000 m, to detail grid of less than 10 sq. km in area within Scott Reef area.

Since 1964, 15 seismic surveys have covered various parts of WA-33-P, of which 14 surveys were undertaken under PSSA and one under PSLA. Up to the end of 1970, seismic exploration had successfully outlined many closed structural anomalies. Penetration was limited to a rather shallow depth. Subsequent seismic surveys have conformed the existence of most structures previously mapped, have eliminated a few, and have indicated some new structures. The base-of-Tertiary unconformity and the intra Upper Cretaceous unconformity are the most prominent reflectors in this area.

PROSPECTIVITY

The prospectivity is described according to the tectonic subdivisions in the permit.

TABLE 1. GROSS SEDIMENT THICKNESSES, METRES

	Browse Slope	Buccaneer- Heywood trend	Central Browse Basin Trough	Scott Reef trend	Seringapatam trend
Tertiary	1300 - 2300	1300 - 2600	1600 - 3300	2300 - 4000	1600 - 2600
Cretaceous	1300 - 2600	1600 - 2600	1000 - 2600	1000 - 2600	300 - 1000
Jurassic	600 - 2000	1000 - 1600	160 - 1000	30 - 1000	? 0 - 160
Triassic	Present	Present	Present	Present	Present
Permian	Present	Present	Present	Present	Present

Browse Slope

The southeastern corner of the Permit is on the Browse Slope covering about 52 blocks. Most of the region has a fairly smooth slope, but there is some faulting in the neighbourhood of the Buccaneer Nose, which is a basement feature probably at the intersection of northeast and northwest structural lines.

Lombardina No. 1 provides the only definite knowledge of the local geology although this well is actually in WA-32-P. It penetrated a Middle Jurassic reservoir sequence with up to 30% of residual hydrocarbon saturation in sandstone beneath a very thick lutitic assemblage, and overlying Middle Jurassic volcanics. Precambrian rocks are thought to form a basement at depths of about 3000 m in those parts of the region near the Kimberley Block Margin.

Water depths are from 60 m to 180 m.

Recommendation: That a semi-detailed seismic survey be made over 12 blocks and near the Buccaneer Nose to determine the existence of fault-controlled structures. Jurassic targets would be at a depth of about 2500 m and Triassic targets at about 3000 m. No further work of any kind is recommended in other parts of this province.

Buccaneer-Heywood trend

The southwestern end of this trend lies within WA-33-P, and on it lie the Champagne Prospect and the greater part of the Buccaneer Nose. There are no wells here, but the Mesozoic stratigraphy could well be similar to that at Scott Reef, except that the Jurassic is probably thicker and more complete. On the other hand conditions could resemble those at Prudhoe, towards the north of the trend, where all the Triassic and much of the Jurassic are missing.

The Champagne Prospect is near the eastern limits of the Permit. It probably has several culminations, and the following data pertain to it:

Water depth	ca 300 m
Depth to T	ca 5600 m B.S.L.
Depth to Jb	ca 5300 m B.S.L.
Vertical closure on T	ca 100 m (0.05 secs.)
Vertical closure on Jb culminations	less than 100 m

Recommendation: That a semi-detailed seismic survey be made over 7 blocks on the Champagne Prospect to elucidate the structure more fully and to select areas where a later detailed survey might determine a drilling site.

Central Browse Basin Trough

This region crosses the Permit from northeast to southwest. There are no wells in the Trough, the nearest well being Scott Reef No. 1. The sedimentary pile is probably very thick, with a dearth of sandstone or other suitable reservoir rocks, and a maximum development of silt and shale. Source rocks are probably abundant, and hydrocarbons could have migrated up-dip, if permeability in postulated sandstones had not been ruined by shaling up. No structures have hitherto been delineated within the area.

Recommendations: As water depths are from 300 m to 450 m, no further work is recommended here.

Scott Reef Trend

The greater part of this trend lies within WA-33-P, of which it forms the northeast diagonal. The trend is thought to be due to a series of Permo-Triassic horsts buried in Jurassic and younger sediments.

Water depths range from zero at Scott Reef to 1000 m.

Scott Reef No. 1 well revealed a potentially important pay zone of gas and condensate, similar in quality to those from the Rankin-Dampier area, in a thin sequence of rocks ranging from lower Middle Jurassic to upper Upper Triassic. Details are as follows:

<u>Depth (m)</u>	<u>Thickness (m)</u>	<u>Lithology</u>	<u>Porosity</u>	<u>Yield</u>	<u>Condensate ratio</u>	<u>Choke</u>
4293.1-4306.8	13.7	f.gr.sst.	14%	18 mm c.f.d.	20 barrels million cu. ft gas	1" surface 3/8" Bottom
Jur.						
(4337.3-4349.5'	12.2	f.gr.sst.	12% av.)			
(4351.0-4354.1	<u>3.05</u>)			
()			
(Total J = 29)	11 mm	not	
()	c.f.d.	measured	
()			
(4359.6-4369.3	9.8	dolomite	12%)		
Tri. 4373 -4386.1	<u>13.1</u>	f.dolo.sst.	16%	9.8 mm c.f.d.	20 barrels million cu. ft gas.	1" surface 3/8" bottom
Total Tri. 22.9 m mm						

Interbedded shales, with overlying volcanics beneath Cretaceous claystone provide the caprocks.

Most of the prospects on the Scott Reef trend are within WA-33-P. These are, from south to north: Lombardina West, Pender, Scott Reef South, Scott Reef North, Scott Reef North Nose, and Seringapatam East.

The Lombardina West prospect straddles the border with WA-32-P in an area covered hitherto by only the broadest seismic reconnaissance survey.

Water depth	ca 1000 m
Depth to T	ca 5200 m
Depth to Y (Neocomian)	ca 4300 m
Vertical closure on T	ca 200 m
Vertical closure on Y	?

Pender Prospect

Water depth	ca 600 m
Depth to Jb	ca 3800 m
Vertical closure on Jb	ca 350 m

Seringapatam East

Water depth	ca 500 feet
Depth to T	ca 5000 m
Vertical closure on T	ca 150 m

There is no expression on D.

Scott Reef South

Water depth	50 m in lagoon to ca 450 m outside the reef.
Depth to T	ca 4500 m
Depth to D	ca 3700 m
Vertical closure	too few data available for estimation

Scott Reef North

Water depth	0 - 60 m
Depth to T	ca 4800 m
Vertical closure on T	ca 450 m

There is expression of the closed structure up to the X horizon at base of Tertiary.

Recommendations: That a detailed seismic survey be made over Scott Reef South to determine the best site for a well to test the hydrocarbon potential of a thicker Triassic-Jurassic sequence than at Scott Reef No. 1.

That detailed seismic surveys be made over 4 blocks on Pender and one on Scott Reef North to delineate the structures further and to determine if any suitable sites for wells exist.

That the above mentioned surveys be extended to cover 3 blocks on the Scott Reef North Nose and 3 blocks on Seringapatam East.

That a reconnaissance survey be made over 4 blocks at Lombardina West to define the structure further.

Scott Plateau Block

The northwestern third of the Permit lies on this block of little-known northeast-trending structures. The best known of these is the Seringapatam trend, the easternmost feature of the block and parallel to the Scott Reef trend. The Scott Plateau Block is thought to have formed the western rim of the Browse Basin in the Mesozoic and that some strata thin over it or even wedge out against it. It was only in the Cainozoic that it subsided greatly, such that water depths now range from about 1000 m to over 2000 m.

In WA-33-P there is only one noteworthy prospect, the Seringapatam West Prospect, situated on the Seringapatam trend and about 15 km west of the Seringapatam Reef.

Water depth c. 1000 m

Depth to T c. 4900 m

Closure on T c. 150 m

No closure on D_0 .

Recommendations: That a semi-detailed seismic survey covering 2 blocks be made on the Seringapatam West Prospect to elucidate its structure and to suggest the desirability of choosing a well-site.

TITLE ASSESSMENT WA-34-P

Title Holder: Woodside Oil N.L.
Shell Development (Aust.) Pty Ltd
BOCAL Pty Ltd

BOCAL Pty Ltd is the operator on behalf of the group.

No. of blocks: 397 blocks

Expiry date: 2 July 1975

Previous six year commitments

<u>Year of Term of Permit</u>	<u>Amount to be expended</u>
1st	\$ 282,500
2nd	100,000
3rd	75,000
4th	3,100,000
5th	10,000
6th	402,500
	<u>\$3,970,000</u>

Regional setting:

WA-34-P is located offshore on the northwest shelf of Australia. It is a stepped rectangle and extends from the middle of the Browse Basin to its southeast corner, that is, from a little east of Scott Reef to the southern islands of the Bonaparte Archipelago. The Permit is bounded to the south by WA-32-P, to the west by WA-33-P, and to the north by WA-35-P. There are no permits on the landward-facing southeastern side.

Water depths range from zero around the Bonaparte Archipelago to about 350 m in the northwestern corner. About 25% lies in water less than 60 m deep, about 18% in water more than 200 m deep, and 57% in water between 60 m and 200 m.

Regional geology:

The Permit covers parts of the Kimberley Block Margin, the Browse Slope, the Buccaneer-Heywood trend, and the Central Browse Basin Trough. The following table shows the sediment thicknesses to be expected, and Figure indicates the kind of lithology that may occur.

TABLE 2. GROSS SEDIMENT THICKNESSES, METRES

	Kimberley Block Margin	Browse Slope	Buccaneer- Heywood Trend	Central Browse Basin Trough
Tertiary	0-600	600-900	ca 1500	3000-3500
Cretaceous	400-500	800-1500	ca 1800	2000-3000
Jurassic	-	100-1000	ca 1200	1500-2000
Triassic	-	0-200	0-200	Present
Permian etc.	-	ca 600	Present	?
Precambrian	Present	Present	?	?

Wells drilled:

Yampi No. 1 is the only well in the Permit, and its geology (Fig. 1) is probably a good representative sample of the southeastern half of the Browse Basin. There are basin-margin sands throughout the sequence, including the Tertiary, where they are associated with minor coals. Tertiary carbonate rocks are of lesser importance. Volcanics were intersected in the Jurassic.

Geophysical coverage:

Refer to basin notes, data sheets of geophysical surveys, and line density map. WA-34-P area has been completely covered by reconnaissance gravity and magnetic surveys. About one half of WA-34-P has adequate semi-detail seismic coverage. The Kimberley Block Margin area has been covered only by very widely spaced seismic lines and the northwest corner of the permit has a reconnaissance coverage on about a 5 km square grid.

The first seismic survey to cover a substantial part of this Permit was undertaken in 1968 by BMR, then followed in 1969 by a large B.O.C. seismic survey in which a number of closed structures were indicated. Detail and semi-detail seismic projects undertaken in the following years have successfully conformed and delineated some of these structures.

The base-of-Tertiary (X) and the Upper Cretaceous (D) unconformity are good reflecting horizons in this area.

PROSPECTIVITY

The prospectivity is described according to the tectonic subdivisions in the permit.

Kimberley-Block Margin

This corresponds approximately with the southeastern quarter of the Permit, i.e. that part that lies within the 60-m isobath.

The sedimentary sequence is probably thin, and no older than Neocomian. Basin-margin sands probably exist at intervals throughout the sequence, but no structures, other than possible pinch-out, seem to be present. It is probable that what hydrocarbons may exist in the sandstones will have migrated up-dip from deeper parts of the basin.

Londonderry No. 1 (Figs. 1, 2, 3) is the only well to have been drilled in this province: it struck Precambrian basement at only 1135 m, and yielded some small shows of gas in Cretaceous basin-margin sandstones and carbonaceous claystone.

Recommendations: That no further attention be given to this province.

Browse Slope

This region occupies about half the Permit, across which it extends in a broad band from northeast to southwest. It includes the belt of the gross Jurassic depocentre and much of the gross Cretaceous depocentre. There is also a fair likelihood that the basin margin in the Mesozoic fluctuated within a fairly narrow zone passing northeast through Yampi No. 1.

Yampi No. 1 (Figs. 1, 2, 3 and 4; Pl. 1) is the only well on the Browse Slope and its geology is probably representative of the region. Abundant traces of gas and indications of light oil were found in porous Jurassic sandstone but permeability was poor. Seismic surveys made after Yampi No. 1 was drilled have delineated the Talbot Prospect to the southeast of the well:

Water Depth	ca 60 m
Depth to Jb	ca 2700 m
Vertical close on Jb	ca 70 m

It is reasonable to assume that Yampi No. 1 was drilled down the flank of the Talbot Prospect into the water-saturated zone beneath a possible hydrocarbon-bearing zone. If this was so

it would upgrade the Talbot Prospect, but it must be remembered that permeability in Yampi was poor and may not have changed in the 10 km between the well and the crest of the Talbot Prospect.

Recommendations: Nothing further remains to test the Talbot Prospect than to drill a well on it.

Buccaneer-Heywood trend

The greater part of the belt of highs that are aligned on the Buccaneer-Heywood Trend lies within WA-34-P in its north-western quarter. These highs find their chief expression in the Triassic and Jurassic, and whatever attractiveness they may have is due to the likelihood of Upper Triassic to Middle Jurassic reservoir sandstones existing on them. There are no wells in this Permit on this trend, but it may be noted that Prudhoe No. 1, on the trend in the next Permit, had little expression as a high, no Lower or Middle Jurassic sediments, and no significant hydrocarbon shows, and was plugged and abandoned.

Two structures that are discernible on the T horizon may be regarded as prospects.

Camden West:	Water depth	ca 300 m
(poor data)	Depth to T	ca 5600 m
	No expression on D	

This large structure may be resolvable into two, both with culminations.

Camden:	Water depth	ca 180 m
(data poor to good)	Depth to T	ca 5800 m
	No expression on D	

This is a heavily fault-modified structure, with culminations.

Recommendations: That a semi-detailed seismic survey be made over 6 blocks on the Camden West Prospect to delineate the structure more adequately.

That a detailed seismic survey be made over 3 blocks on the Camden Structure to determine the disposition of faults and the possible siting of a well.

Central Browse Basin Trough

Only the northwestern corner of the Permit lies in this province, in water about 300 m or more deep. The Jurassic and

Cretaceous sequence is probably very thick here and probably consists of mid-basin type lutites with a minimal development of coarser clastics suitable for reservoir rocks.

No structure have hitherto been revealed, but it is conceivable that pinchouts may occur against the flanks of blocks in the Buccaneer-Heywood trend.

Recommendation: That no further work be undertaken in this area.

TITLE ASSESSMENT WA-35-P

Title holder: Woodside Oil N.L.
Shell Development (Aust.) Pty Ltd
BOCAL Pty Ltd.

BOCAL Pty Ltd is the operator on behalf of the group.

Number of blocks: 400 blocks (graticular sections)

Expiry date: 2 July 1975

Previous six-year commitments:

Year of Term of Permit	Amount to be expended
1st	\$ 253,000
2nd	150,000
3rd	3,100,000
4th	10,000
5th	50,000
6th	437,000
	<u>\$4,000,000</u>

Regional setting:

WA-35-P is located offshore on the Northwest Shelf of Australia. It is somewhat rectangular, and stretches from near the Seringapatam Reef to the Admiralty Gulf. The Permit's long northern border coincides with the southern borders of WA-37-P and WA-15-P; to the west it is bounded by WA-33-P, to the east by WA-16-P, to the south by WA-34-P, whilst its southeastern border fronts the northern islands of the Bonaparte Archipelago.

Water depths range from zero around the Bonaparte Archipelago to about 450 m in the northwestern corner.

Regional geology:

About two-thirds of the Permit is on the Kimberley Block Margin and the Browse Slope; and one-third on other divisions of the Basin. Table 3 shows the sediment thicknesses to be expected, and Figure 1 indicates the kind of lithology that may occur.

TABLE 3. GROSS SEDIMENT THICKNESSES, METRES

	Kimberley Block Margin	Browse Slope	Buccaneer- Heywood Trend	Central Browse Basin Trough	Scott Reef Trend
Tertiary	150-350	350-1000	100-1500	2000-3500	2500-3500
Cretaceous	0-350	350-1500	350-3500	2000-3500	2000-3500
Jurassic	-	0-2000	650-2000	350-1000	150-500
Triassic	-	-	possible	probable	probable
Permian	-	0-650	possible	probable	probable
Precambrian	Present	Present	?	?	?

Wells drilled:

Three wells have been drilled in this Permit. Londonderry No. 1 was drilled on the Kimberley Block Margin near the Londonderry Arch as a stratigraphic hole, to tap a basin-margin pinch-out; Rob Roy No. 1 was drilled in a graben on the Browse Slope; Prudhoe No. 1 was drilled on the Buccaneer-Heywood trend on a seemingly favourable high but whereon the Lower and Middle Jurassics with their good reservoir horizons proved to be missing. None encountered more than traces of hydrocarbons and all were plugged and abandoned.

Geophysical coverage:

Refer to basin notes, data sheets of geophysical surveys, and line density map. The whole area of WA-35-P has been covered by reconnaissance gravity and shipborne magnetic surveys. Seismic density in the permit area range from about 4 km square grid in the vicinity of Browse Island and Rob Roy No. 1, to a reconnaissance grid of about 25 km square in the western end of the Permit area, where water depth exceeds 300 m. The southeastern side of WA-35-P within the Kimberley Block Margin area has not been covered by seismic work. This area constitutes approximately 30% of the total permit area.

The first seismic exploration to cover parts of this permit area was undertaken in 1964. No further exploration activities took place until late 1968 when a combined marine geophysical reconnaissance survey was undertaken by BMR. However, the generally poor quality of data obtained from this survey has

resulted in the mapping of only the base-of-Tertiary horizon. Reconnaissance and detail seismic surveys undertaken in subsequent years have produced mostly good seismic data although in most areas an Upper Cretaceous horizon constituted seismic basement. The base-of-Tertiary horizon is the most prominent reflections in this area.

PROSPECTIVITY

The prospectivity is described according to the tectonic subdivisions in the Permit.

Kimberley Block Margin

The southeastern half of the Permit lies within this area. Here an irregular topography in the Precambrian rocks is buried beneath up to 1000 m of flat-lying Cretaceous and Tertiary sediments. Basin-margin sands of these ages occur, and it was to test their productivity that Londonderry No. 1 was drilled. The prospectivity of the Kimberley Block Margin is rated as low.

Water depths are from 50 m to 100 m.

Recommendation: That no further work be undertaken here.

Browse Slope

About 50 blocks in the middle of the Permit lie over the Browse Slope. Towards the northern end of the zone some faulting has occurred, due, it is assumed, to the influence of northwest-trending elements in the basement. It was in a graben in this faulted region that Rob Roy No. 1 was drilled; the stratigraphy was intermediate between typical Kimberley Block Margin (as in Londonderry No. 1) and typical Slope (as in Yampi No. 1).

Water depths are from 100 m to 130 m.

Two small structures are discernible in this part of the Permit: the Browse Structure below Browse Island, with a vertical closure of 100 milliseconds on the T horizon, and the Fox Structure slightly to the east and of doubtful validity. Both structures have expression only on the T horizon.

Recommendation: That no further work be undertaken here.

Buccaneer-Heywood trend

About 1/10 of the Permit covers this structural element, which hereabouts has the form of a horst-and-graben province. The horsts and grabens are bounded by major northeast-trending faults and minor north-south cross-faults.

Evidence from the only well in the area, Prudhoe No. 1, (see Fig. 1) shows that there are few or no Lower and Middle Jurassic strata present. This is probably due to their having been removed by erosion in pre-Tithonian times following uplift of the horsts, but perhaps to their never having been deposited, as the horst blocks could have been emergent during the depositional periods. To the west and southwest of the Prudhoe Main Fault, however, i.e. on the downthrow side of the fault, seismic data show the Jurassic to be about 200 m thicker; in that case the major prospective reservoir sandstones (Lower to Middle Jurassic) of the Browse Basin may be present there and have faulted or pinch-out relationships with the horst blocks. There are two Prospects in this area:

Browse Island	Water depth	ca 230 m
Northwest	Depth to T	ca 5000 m
	Depth to Jb	ca 3900 m
	Vertical Closure on Jb	ca 170 m

Partly fault-controlled with several culminations, all with some vertical closure on T.

Prudhoe Northwest	Water depth	ca 200 m
	Depth to Jb	ca 2950 m
	Vertical closure on Jb	ca 400 m

Recommendations: That a detailed seismic survey covering 2 blocks on Browse Island Northwest, and another covering 9 blocks on Prudhoe Northwest, be made to elucidate the structures more fully and to determine possible drilling sites.

Central Browse Basin Trough

About 1/10 of the Permit covers this structural division, which hereabouts coincides with the gross Cretaceous depocentre, and is indeed virtually at the centre of the Browse Basin. There is probably a very thick development of fine-grained Cretaceous beds and Tertiary carbonates overlying a fairly complete Jurassic and Triassic deltaic sequence.

No structures have hitherto been revealed in this area.

Water depths are about 350 m.

Recommendations: That no further work be undertaken here.

Scott Reef trend

The northwestern corner of the Permit is on this tectonic element.

The gross Tertiary depocentre lies here and the Cretaceous is also very thick, so that up to 7000 m of carbonates and lutite could overlie a comparatively thin sequence of Jurassic and Triassic deltaics. Water depths are about 400 m.

Only one structure is discernible: the Seringapatam East Prospect, which straddles the border with WA-33-P.

Water depth	ca 450 m
Depth to T	ca 5200 m
Vertical closure on T	ca 150 m
There is no expression on D	

The prospect is dislocated by a fault with a throw of about 300 m.

Recommendation: That a semi-detailed seismic survey be made over 2 blocks on the Seringapatam Prospect.

TITLE ASSESSMENT WA-37-P

Title holder: Woodside Oil N.L.
Shell Development (Aust.) Pty Ltd
BOCAL Pty Ltd

BOCAL Pty Ltd is the operator on behalf of the group.

Number of blocks: 118 graticular sections

Expiry date: 2 June 1975

Previous six-year commitments:

<u>Year of Term of Permit</u>	<u>Amount to be expended</u>
1st	\$ 25,000
2nd	5,000
3rd	5,000
4th	15,000
5th	565,000
6th	565,000
	<u>\$1,180,000</u>

BOCAL Pty Ltd has applied to relinquish 65 blocks and to retain 53 blocks.

Regional setting:

WA-37-P is located offshore on the Northwest Shelf of Australia. The western half is roughly triangular, whilst the eastern half is elongate-rectangular. The Permit is about half-way between Ashmore and Scott Reefs. To the north it borders NT/P5, to the east WA-15-P, to the south WA-35-P and WA-33-P, whilst to the west and northwest there are no permits.

In the rectangular section the sea is from 150 m to 500 m deep; in the triangular portion it is from 500 m to 1500 m.

Regional geology:

The Permit, because of its elongate shape, affords a representative cross-section of much of the central north of the Basin from the edge of the Browse Slope to the Scott Plateau. Table 4 shows the sediment thicknesses to be expected, and Figure 1 indicates the kind of lithology that may occur.

TABLE 4. GROSS SEDIMENT THICKNESSES, METRES

	Buccaneer- Heywood trend	Central Browse Basin Trough	Scott Reef Trend	Seringapatam Trend
Tertiary	1500-2000	2000-2500	2500-3500	2600-3000
Cretaceous	1000-3000	3000-3500	2000-3000	present
Jurassic	800-1150	700-1000	250- 350	probable
Triassic	-	probable	probable	probable
Permian	present	probable	probable	possible

Wells drilled:

The only well is Heywood No. 1 near the eastern end of the Permit on a Permo-Triassic/Mid Jurassic horst. High gas readings and intermittent traces of live oil occurred throughout the Jurassic and Neocomian sequence, but the sandstones lacked permeability. The Triassic and Permian beds that were forecast for all the well were not present, although they may occur at considerably greater depths. Heywood No. 1 is on the downthrow side of the major Prudhoe-Heywood Fault, and its thick Jurassic sequence of interbedded siltstone, sandstone, and claystone contrasts strongly with the thin Jurassic at Prudhoe No. 1 on the upthrow side (Figs. 1 and 4).

Geophysical coverage:

Also refer to data sheets of geophysical surveys, and line density map. WA-37-P has been covered by reconnaissance gravity and magnetic surveys. Almost three-quarters of the total area has only a reconnaissance seismic coverage with an average grid area of about 200 sq. km. The rest of the area has a seismic coverage grid of about 30 sq. km area within the vicinity of Heywood No. 1.

The results of the 1973 survey indicated 2 closed structures within the permit area but further seismic work is required to confirm their existence. Two strong reflections appear to have originated from near the base of Tertiary and within Cretaceous sediments.

PROSPECTIVITY

The prospectivity is described according to the tectonic subdivisions in the permit.

Buccaneer-Heywood trend :

The 12 eastern blocks of the Permit are on this tectonic element. The only structure of any significance has already been drilled (Heywood No. 1) and encouraging traces of hydrocarbons were found in the thick Jurassic sequence.

Water depths are from 120 m to 180 m.

Recommendations: That no further work be undertaken.

Central Browse Basin Trough

This part of the Permit coincides with the crossing of the northeast-trending Trough with the northwest-trending basement feature termed the Echuca Nose. There is a large and at present rather ill-defined high straddling the boundary with NT/P5, and conditions are surmised to resemble those of the Vulcan Sub-basin farther to the northeast where several wells have already been drilled. In these wells (e.g. Skua No. 1 and Swan No. 1) the primary objective was Upper Cretaceous sandstones of the Bathurst Island Formation at depths of about 2000 m. Water depths range from about 200 m to 350 m.

Echuca Nose High:	Water depth	ca 200 m
	Depth to T	ca 4150 m
	Vertical Closure on T	ca 0.100 sec.

Recommendations: That a semi-detailed seismic survey be made to determine culminations on the more detailed structure of the high.

Scott Reef trend

The western end of the rectangular part of the Permit is on the Scott Reef trend. The only noteworthy high is the extension of the Echuca Nose High, although there are suggestions of inconsequential highs farther west.

Water depths are from about 350 m to about 500 m.

Recommendation: That a semi-detailed seismic survey be made on 6 blocks over the Echuca Nose High to elucidate the structure more fully.

That a semi-detailed seismic survey be made farther west on 9 blocks as a part of a survey recommended elsewhere for neighbouring prospects.

Seringapatam trend

There are few data available for the triangular part of the Permit, especially the oceanward half, where the sea is about 1500 m deep. On the Seringapatam trend the quite large Seringapatam North prospect has expression as high as the base of the Tertiary.

Seringapatam North:	Water depth	ca 650 m
	Depth to T	ca 4200 m
	Vertical closure on T	ca 350 m.

The stratigraphy could well be similar to that at Scott Reef (Fig. 1). Magnetic data from the northern corner of the Permit suggest the presence of basic dykes at between 4 and 9 km: taking an average figure, these could be feeder dykes for Jurassic volcanics, and as oil migration was probably post-Jurassic, the dykes could function as traps.

Recommendation: That a detailed seismic survey be made over 3 blocks on the Seringapatam North Prospect to elucidate the structure, and possibly to pin-point a well-site.

TITLE ASSESSMENT - NT/P5

Title holder: Woodside Oil N.L.,
Shell Development (Aust.) Pty Ltd,
BOCAL Pty Ltd

BOCAL Pty Ltd is the operator on behalf of the group.

Number of blocks: 206

Expiry date: 9 September 1975

Previous six year commitments:

<u>Year of term of permit:</u>	<u>Amount to be expended:</u>
1st	\$ 5,000
2nd	25,000
3rd	50,000
4th	Nil
5th	Nil
6th	50,000
	<u>\$130,000</u>

and in association with NT/P10 or NT/P13, \$3,000,000 in the 5th year.

Regional setting:

NT/P5 is located offshore on the Northwest Shelf of Australia, in the southwestern part of the region of the Ashmore and Cartier Islands. It is a rough quadrilateral, with a northern corner near the Ashmore Reef. On the long northeastern side it borders NT/P13, in the southeastern corner it borders NT/P2, on the southern and southwest sides it borders on WA-37-P, whilst there are no permits adjacent to the northwestern oceanward side.

Water depths range from about 180 m in the southeast corner to about 1300 m along the northwestern side. 5% of the area is in water-depths less than 180 m, 20% between 180 m and 300 m, 30% between 300 m and 450 m, 35% between 450 m and 900 m, and 10% over 900 m.

Regional geology:

The southwestern half of the Permit is dominated by Northwest Shelf tectonics, whilst the northeastern half is strongly influenced by the Palaeozoic Ashmore Block and its subsidiary the Echuca Nose. The following table shows the sediment thicknesses to be expected, and Figure 1 indicates the kind of lithology that may occur.

TABLE 5. GROSS SEDIMENT THICKNESSES, METRES

	Buccaneer/ Heywood trend	Central Browse Basin Trough	Scott Reef trend	Seringapatam trend	Ashmore Block Margin
Tertiary	1500-2000	2000-2300	2300-3000	2600-3000	2300-2600
Cretaceous	2600-3000	3000-3600	2000-3000	1500-2000	600-3300
Jurassic	ca 1000	ca 1000	up to 300*	up to 300*	??
Triassic	probable	probable	probable	probable	probable
Permian	probable	probable	probable	probable	probable

*there is a probability of Jurassic volcanics occurring in these areas.

Wells drilled:

No wells have been drilled in NT/P5. The nearest wells are Ashmore Reef No. 1 just north of the northern tip of the Permit, and Heywood No. 1 just south of the southeast corner.

Geophysical coverage:

Compare with basin notes, data sheets of geophysical surveys, and line density map. The NT/P5 area was covered by the Timor Sea Gravity, Magnetic and Seismic Survey undertaken by BMR in 1967. Almost 95% of the area has only reconnaissance seismic coverage on a 20 km square grid. The rest, in the eastern corner of the title area, is covered by a semi-detail grid of about 5 km x 10 km.

The results of the BMR survey were presented in the form of profiles. In the western corner of NT/P5, magnetic profiles suggest the presence of magnetic body at the depth range

from 4½ km to 9 km below sea level. Reconnaissance seismic surveys undertaken in 1971 and 1973 have provided most seismic coverage in NT/P5. Although seismic data obtained from these surveys are mainly poor to fair, several closed structures have been outlined. A circular structure about 45 km south of Ashmore Reef, interpreted as an intrusive feature, is associated with Bouguer anomaly maxima but has no magnetic expression. The lack of energy and considerable multiple interference appeared to have been responsible for the poor quality of data. The base-of-Miocene horizon was the most prominent reflector.

PROSPECTIVITY

The prospectivity is described according to the tectonic subdivisions in the permit (Table 5).

The Buccaneer/Heywood trend

This area is on the downthrow side of the Prudhoe-Heywood Main Fault, and so the geology is probably similar to that at Heywood No. 1 (Fig. 1), in which case there would probably be a Jurassic sequence over 1000 m thick with favourable source, reservoir, and caprock development.

As the region is near the Londonderry Arch there is a chance that marginal sands of Cretaceous age or younger may occur.

Recommendations: As no noteworthy structures, apart perhaps from a slight high with a closure of about 50 m on the D (mid-Cretaceous) horizon, have shown up on the semi-detailed seismic surveys already made, it is recommended that no further work be undertaken here.

Central Browse Basin Trough

The northeastern end of this tectonic division lies within the Permit and is contiguous with the saddle between the Ashmore Block and the Londonderry Arch, which saddle in turn is the southwestern end of the Vulcan Sub-basin (Cartier Trough). The influence of the Echuca Nose is also apparent here.

It is not unreasonable to assume that the stratigraphy is similar to that in nearby areas of ARCO's permits NT/P2 and NT/P3. Skua No. 1 is most likely to indicate conditions prevailing in NT/P5, i.e., a fairly thick Triassic and Jurassic sequence with much development of sandstone; sandstone in the Upper Cretaceous (Bathurst Island Formation); and Tertiary carbonates. No worthwhile hydrocarbons were found in Skua, although the Paleocene does have source-rock potential. Oil has been found in the Upper Cretaceous sandstone of the Puffin Wells farther to the north on the flanks of the Ashmore Block.

Water depths are about 150 m.

Recommendations: That a semi-detailed seismic survey be made over 24 blocks to determine whether or not structures similar to ARCO's exist. It is surmised that depths to the Upper Cretaceous horizons would be of the order of 2500 m.

The Scott Reef and the Seringapatam trends :

The northeastern part of these trends where they impinge on the Ashmore Block Margin, lies within NT/P5. There are no wells in the area, but it may be reasonably assumed that the geology is fairly similar to that at Scott Reef No. 1, i.e., very thick Tertiary and Cretaceous carbonates overlies thin Upper Jurassic which in turn drape over horst-blocks composed of Triassic and Permian clastics. Seeing that Jurassic volcanics occur at both Ashmore Reef No. 1 and Scott Reef No. 1, they may be expected to figure in the stratigraphy of the western part of NT/P5. In the southwest corner of the Permit, and extending into the northwest corner of WA-37-P, are magnetic anomalies that can be construed as indicating the presence of basic intrusive dykes. The depth to the top of one of these is in the range 4000 to 9000 m, i.e., it could be at a level consistent with its being a feeder dyke of Jurassic age. The prospectivity of the area is probably not enhanced by the presence of such igneous bodies, although they could act as caprocks to hydrocarbons that migrated after the dykes were emplaced.

There are two distinct prospects recognizable on the T horizon: Echuca Nose High: The northwestern end of this structure, which has already been dealt with, lies in this region.

NT/P5 South	Water depth	ca 400 m
	Depth to T	ca 5200 m
	Vertical closure on T	0.100 sec

Recommendations: That a semi-detailed seismic survey be made over 3 blocks of the Echuca Nose High to determine possible culminations thereon, and the disposition of possible Cretaceous sandstones.

That a detailed seismic survey be made over 4 blocks on NT/P5 South to elucidate the structure further and to determine a possible wellsite.

Ashmore Block Margin :

This is a large, roughly rectangular area occupying about half of NT/P5, and forming hereabouts a southwestern margin to the Ashmore-Sahul Block. Northeast tectonics trends are

represented by a series of faults and horst-graben structures, many of which extend well up into the Cretaceous. These features are especially strongly developed in the southeastern half of the Permit. Water depths range from about 300 m to 900 m.

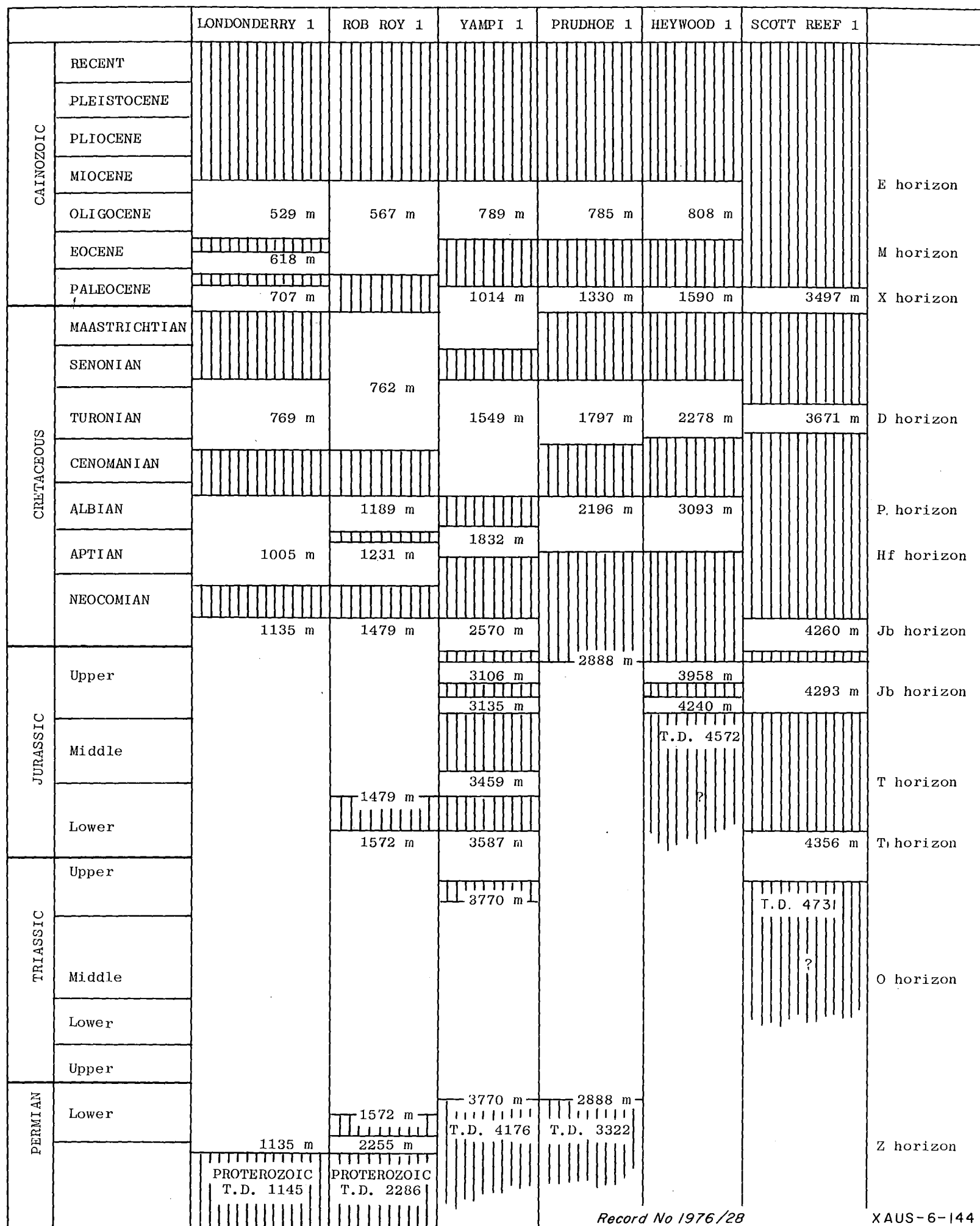
The stratigraphy of the Ashmore Block Margin is suggested by such neighbouring wells as Ashmore Reef No. 1, Brown Gannet No. 1, and Prior No. 1. It will probably be found to be characterized by the absence of much or even all of the Jurassic. There is a possibility of there being thin Oligocene sandstones at depths of about 1000 m, and of thin Upper Cretaceous sandstones at depths of from 2000 to 2500 m. The Jurassic, where present, and the Triassic should have substantial developments of the coarser clastics, but at depths in the vicinity of 3000 m. Neighbouring wells have had only very meagre trace of hydrocarbons.

Near the northern limits of the Permit there is a large and outstanding intrusive-type structure which has expression as high as seismic horizon E. Above this level, beds assumed to be basal Miocene rest with angular unconformity on rocks assumed to be of approximately Santonian age. As no salt-diapirs are known nearer than the Petrel Graben, the feature is thought not to be a salt-diapir but rather an igneous plug, and its age to be Oligocene, coeval with the Barique Volcanics on Timor. There is also the slight possibility that it may be due to shock-metamorphism. As the feature has no magnetic expression the intrusive plug is thought to be of acidic composition. It is herein referred to as Mount Bocal. (the term 'Mount Bocal' is preferred to 'Mount Ashmore'. The word 'Ashmore' already figures in enough names). The sediments intruded by the plug will have had any initial prospectivity destroyed by volcanic emanations. On the other hand it is feasible that this same aureole may itself serve as a seal in conjunction with a caprock bed. Also, erosion of the pre-Miocene dome may have produced shore-sands in the neighbourhood that could serve as reservoir rocks for hydrocarbons generated in older source rocks off on the flanks: the chances, however, of there being good caprock present in the overlying Miocene carbonates are not good.

Jurassic volcanics may well be present in the western half of the region - they are over 300 m thick in Ashmore Reef No. 1 and about 30 m thick in Scott Reef No. 1.

Recommendations: That a semi-detailed seismic survey be carried out over the horst-and-graben belt in order to determine structures with fault closure in the Cretaceous. Depths to possible horizons of interest might well be in the 3000 m to 6000 m depth-range. Water depths are about 300 m.

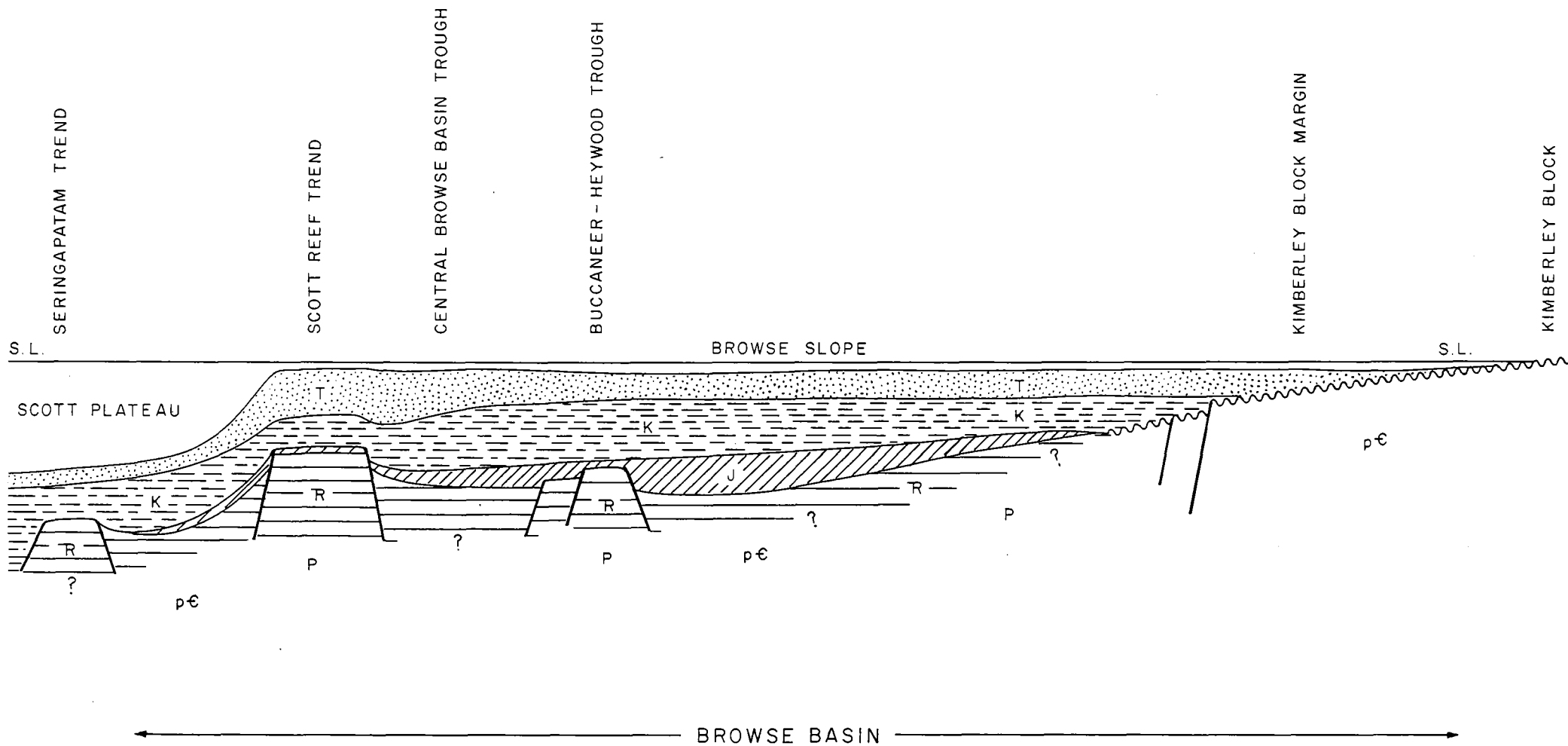
Equivalent Formations elsewhere			LONDONDERRY NO. 1	ROB ROY NO. 1	(LOMBARDINA NO. 1)	YAMPI NO. 1	HEYWOOD NO. 1	PRUDHOE NO. 1	SCOTT REEF NO. 1	Environment	Fig. 1
CAINOZOIC	Rec. Mio.		Ca/ar + minor sst & Ca/slt 526 m+	Ca/ar + minor sst & dol. 455 m	Ca/ar + minor Ca/slt, Ca/lu, Dolo 462 m	Ca/ar, Ca/slt, sst, dolo 789 m	Ca/ar, sst, dolo 763 m	Ca/ar, dolo, Ca/slt, sst 580 m	Ca/ar, ca/slt Dolo C.2340	CARBONATE SHELF, REEFAL, BATHYAL	
	Oligo.	Cartier Beds			calcarenite 37 m				marl, 0.66 m	SHORELINE TO DEEP MARINE	
	Eo.	Giralia Calcarenite Hibernia Beds	sst & minor c/st. 89 m		Ca/ar, ca/lu, dolo, mino sst. 253 m	Sst, minor coal 153 m	266 m Sst, ca/ar, minor coal	Sst, ca/ar, minor clyst & coal 505 m	Ca/lut, ca/ar, marl c.980 m	SHORELINE, DELTAIC, CARBONATE SHELF	
	Paleo	Cardabia Group Woodbine Beds	clst, Ca/ar Ca/lu, sst 89 m	Clyst. + sst 133.2 m	marl & calc. clayst. 89 m	Sst, minor coal 72 m	Sst, dolo, ca/ar, ca/slt, coal, lst. 516 m	Sst, minor clayst 40 m	Calcilutite c.60 m	DELTHIC-CARBONATE SHELF, BATHYAL	
CRETACEOUS	Maas.	Miria Marl & Toolonga	sst. 62 m	& minor silst 62.2 m	Calc. clayst. 155 m		Sst, clayst, marl coal 506 m	Sst, minor clayst 300 m	Calcilutite	OPEN MARINE	
	Sen.	Calcilutite Bathurst			Calc. clayst 107 m	Sltst, sst, clayst 185 m	Marl 182 m	calc. clayst & marl 167 m			
	Tur.	Island			Marl, calc. clayst 38 m						
	Ceno.	Gearle Sltst. Broome Sst Formation	Clst, sst & minor Sltst 236 m	Clayst, + sst, 427.3 m			142 m Claystone	Claystone 57 m	c.400 m Claystone + minor sst c.440 m	MARGINAL MARINE	
	Alb.				451 m Clayst, minor marl, sltst.	Marl, Clayst, + sst. 283 m	Clayst, sltst 473 m	Claystone, tr sst 342 m			
	Apt.			Clyst 45 m	Clayst. 581 m	Sst, clayst/sh, sltst. 392 m	Sltst, sst, 312 m	Clayst minor Sst & ca/slt 190 m			
	Neo	Barrow Fm Petrel Formation	Sst, carb., + minor Clst. 130 m	Sst + minor Clyst. 248 m		Clayst, sltst, 346 m Ca/lu, tr sst.	Clayst, gr. sand	Clayst, sltst, sst, lst 370 m			
JURASSIC	Upper	Dingo Claystone Formation			Clayst., sltst, sst 201 m	Sst, Cong, Sltst 565 m	Clayst, sst, sltst, ?halite 835 m	Sst, sltst, clayst. 132 m	Clayst, volcanics sst c.200 m	MARGINAL MARINE	
	Middle				Clayst. sltst, sst 192 m volcanics	Clayst, sltst, clay sst, volcanics 324 m	Sst, clayst, sltst, coal, ?halite 332 m			FLUVIO-DELTAIC	
	Lower			Sst; + clayst & coal 93 m	Sst, clayst, + minor Lst. 154+ m	Sst, clayst 128 m				FLUVIAL, ALLUVIAL FLOOD PLAIN	
TRIASSIC	Upper	Mungaroo Beds				Sst, clayst minor sltst. 183 m			dolo, clayst, sst, lst. c.200+ m	FLUVIAL; MARGINAL MARINE	
	Middle	Locker Sh.								FLUVIO-DELTAIC	
	Lower	Blina Sh.									
PERMIAN	Upper										
	Lower	Kennedy Byro Wooramel Lyons Groups		Clayst, sst, + minor Lst. 713 m		Sst, sltst, clay; + tr dolo 406+ m		Clayst, sst, lst, minor coal & ca/lut 434+ m		ALLUVIAL & FLUVIAL	
			Precamb.	Precamb.							
Record No.1976/28											XAUS-6-143



SUMMARY OF DRILLING ACTIVITY IN THE BROWSE BASIN

Fig. 3

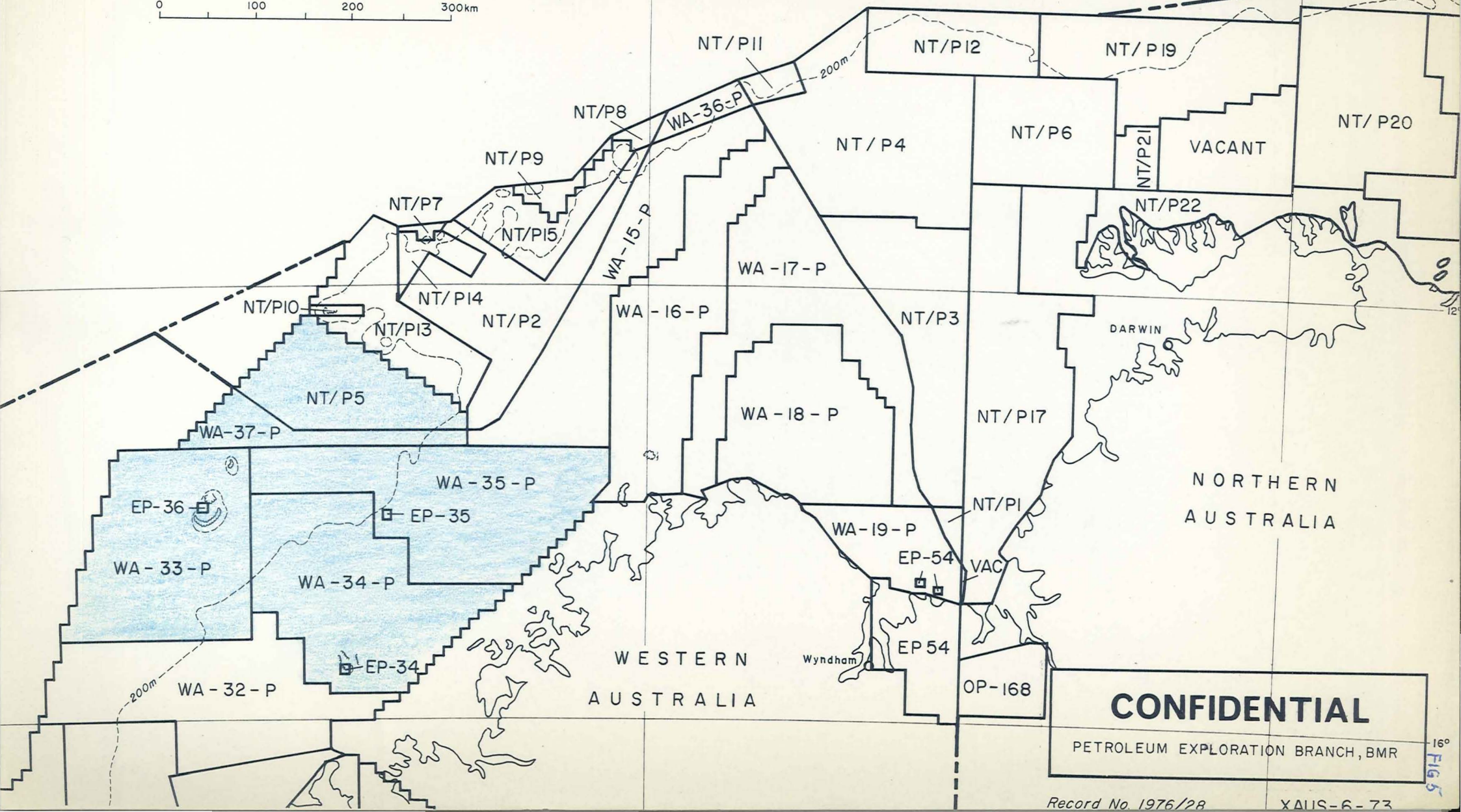
Name	File	Permit	Latitude & Longitude	Elevation	Rig	Contractor	T.D. & T.D. Horizon	Rig release	Cost	Basin Subdivision	Results
SCOTT REEF 1	71/82	WA-33-P	14°04'34"S 121°49'29"E	Rotary Table is 1305m above M.L.I. Springs Seabed 59.13m	Glomar Tasman	Global Marine	4731 m Upper Triassic	9.6.71	\$3,057,464	Scott Reef trend	Gas+condensate zones between 4292m-4388m
ROB ROY 1	71/853	WA-35-P	13°58'16"S 124°11'57"E	Rotary Table 13.5m above M.L.I. Spring Seabed 111.6m	Glomar Tasman	Global Marine	2286 m Permian on Proterozoic	28.2.72	\$1,272,921	Browse Slope	No hydrocarbon-bearing zones Plugged & Abandoned
LONDON-DERRY 1	73/1007	WA-35-P	13°36'53"S 124°30'43"E	Datum seafloor +90m R.T.-13m	Big John	Atwood Oceanics	145 m Lower Cretaceous on Proterozoic	8.10.73	\$365.000	Kimberley Block Margin	No significant signs of hydrocarbons Plugged & Abandoned
YAMPI 1	73/214	WA-34-P	14°33'32"S 123°16'34"E	Datum Seafloor +91m R.T.-13m	Big John	Atwood Oceanics	4176 m Lower Permian	27.9.73	\$3,461,087	Browse Slope	Residual oil in Mid-J; many minor gas shows 1640-T.D. 100% water-saturated Plugged & Abandoned
HEYWOOD 1	74/120	WA-37-P	13° 27' 46 " 124° 04' 00 "	Datum Seafloor +35m R.T.-10m	Glomar Tasman	Global Marine	4572 m Upper Jurassic	14.7.74	\$3,471,500	Buccaneer-Heywood trend	High gas readings 3240m-T.D. Traces of live oil. Sands lack permeability. Plugged & Abandoned
PRUDHOE 1	74/103	WA-35-P	13°44'56"S 123°51'51"E	Rotary Table 30m Seafloor 175m	Ocean Digger	Australian Odeco	3322 m Lower Permian	12.11.74	\$1,458,000	Buccaneer-Heywood trend	Minor gas in Tithonian & Neocomian. 100% water-saturated. Plugged & Abandoned



Schematic cross-section through Browse Basin

OFFSHORE WESTERN AUSTRALIA AND NORTHERN TERRITORY PETROLEUM TITLE LOCATIONS

0 100 200 300km



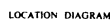
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PETROLEUM EXPLORATION BRANCH, BMR

Record No. 1976/28

XALIS-6-73

Fig. 5



DEPARTMENT OF NATIONAL DEVELOPMENT
MINERAL RESOURCES, GEOLOGY
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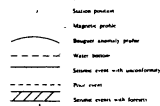


The figure consists of two schematic diagrams of an experimental setup. The top diagram shows a horizontal tube with a piston on the left and a gas reservoir on the right. The bottom diagram shows a similar setup, but with a different internal structure for the gas reservoir, featuring a series of vertical tubes or channels. Both diagrams are labeled with 'MILLS' and 'KILN' and have a scale from 0 to 20.

KEY TO STATION POSITION NUMBERS

Treatment No. _____

LEGEND



EXPLANATORY NOTES

This map was compiled from a mixture survey of the continental shelf in the Indian Sea area during 1967 by United Geophysical Corporation for the Bureau of Mineral Resources. The survey was made by a surface vessel using magnetic tape - wire line spaced normally near magnetic poles apart. Straightened sections of survey lines have been made to serve as baselines for the profiles.

The average magnetic measurements at 42 buoyed intersections was 1.2 nautical miles.

The magnetic profiles were obtained by means of a towed proton precession magnetometer. Readings have been corrected for magnetic diurnal variation, and for regional total magnetic field intensity as shown in the location diagram.

APPENDIX

Geophysical coverage

SURVEY: Rowley Shoals, Scott Reef and Sahul, Banks No: 63/1709 MAPCODE:
Aeromagnetic
DATES: August-Oct, 1963 COMPANY: Woodside (Lake Entrance) CONTRACTOR: Aero Service Ltd.
Oil Co. NL Mid Eastern
TENEMENTS: WA-33P, -34P, -35P,
-37P, NT/P5 etc.
SEISMIC SOURCE: PROCESSING:
CABLE: RECORDER: Fluxgate
MULTIPLE COVERAGE:
MILEAGE: 6100 miles of traverse.
REFRACTION:
GRAVITY:
MAGNETIC: Reconnaissance
DATA QUALITY:
RESULTS:
The presence of thick sediment, up to 20,000 ft within the area and approximately 15,000 ft below most of reefs, shoals and banks were indicated.

SURVEY: Northwest Shelf M/S No.: 64/4529 MAPCODE: _____
DATES: June-Sept, 1964 COMPANY: BOC CONTRACTOR: Western
TENEMENTS: WA-33P, -35P, -37P, NT/P5
SEISMIC SOURCE: Dynamite PROCESSING: Seismograph Service
Ltd (Eng.).
CABLE: 600-0-600m RECORDING: Techno, FA-325
1200-0-1200m
MULTIPLE COVERAGE: 2-fold, 4-fold
MILEAGE: 2,150 miles (total survey)
REFRACTION: 3 profiles
GRAVITY:
MAGNETIC:
DATA QUALITY: mostly fair, but some severely affected by multiples
RESULTS:
About 9000 ft thick of sediment in the area was suggested to exist.

SURVEY: Montebello-Mermaid M/S

No: 65/11015

MAPCODE: _____

DATES: August-Nov. 1965

COMPANY: BOC

CONTRACTOR: Western

TENEMENTS: WA-33P, -34P etc.

SEISMIC SOURCE: Dynamite (25lb)

PROCESSING: Western

CABLE: 600-0- 600m

RECORDER: Techno, FA-32S

1200-0-1200m

MULTIPLE COVERAGE: 2-fold

MILEAGE: 3700 miles (total survey)

REFRACTION:

GRAVITY:

MAGNETIC:

DATA QUALITY: Poor to fair

RESULTS:

Very small part of Wa-33P and WA-34P were covered by this survey.

SURVEY: Scott-Cartier M/S

No.: 67/11173

MAPCODE: _____

DATES: July-Sept., 1967

COMPANY: BOC

CONTRACTOR: Western

TENEMENTS: WA-33P, etc.

SEISMIC SOURCE: Dynamite

PROCESSING: Western

CABLE: 1200-0-1200m

RECORDING: SDS-1010/DFR-300

MULTIPLE COVERAGE: 3-fold

MILEAGE: 212 miles (part of large survey)

REFRACTION: 4 profiles

GRAVITY:

MAGNETIC:

DATA QUALITY: -Generally fair

RESULTS:

A broad regional structure beneath Scott Reef with at least 15,000 ft of sedimentary rock was indicated.

SURVEY: Timor Sea Gravity, Magnetic and Seismic Survey,
1967

No: BMR Rec 1969/40

MAPCODE: _____

DATES: Sept-Dec., 1967

COMPANY: BMR

CONTRACTOR: United Geoph.

TENEMENTS: NT/P5, WA-37P etc.

SEISMIC SOURCE: "Spark-array"

PROCESSING:

CABLE: 2200 ft

RECORDER: SIE-MU500/TGA-1

MULTIPLE COVERAGE:

MILEAGE: 1000 miles within NT/P5 and WA-37P. (total survey 13000 miles)

REFRACTION:

GRAVITY: Reconnaissance

MAGNETIC: Reconnaissance

DATA QUALITY: Seismic, generally poor quality due to insufficient energy.

RESULTS:

Presented in the form of profiles. Presence of several intrusives type structures including one in the west corner of NT/P5.

SURVEY: Marine Geophysical Survey of the North West
Continental Shelf, 1968

No.: BMR Rec. 1969/99

MAPCODE: _____

DATES: Dec. 1968

COMPANY: BMR

CONTRACTOR: Ray Geoph.

TENEMENTS: WA-37P, -35P, -34P, -33P etc.

SEISMIC SOURCE: "Spark-array"

PROCESSING:

CABLE: 2200 ft

RECORDING: SIE-MU500/TGA-1

MULTIPLE COVERAGE:

MILEAGE: 15000 miles (total survey)

REFRACTION: 10 profiles within WA-33P, -34P, -35P, -37P.

GRAVITY: Reconnaissance

MAGNETIC: Reconnaissance

DATA QUALITY: Seismic - mostly poor

RESULTS:

Map of near base Tertiary horizon was presented. Absence of anomalous magnetic and gravity features over Scott Reef ~~and~~ suggests that basement Ridge does not exist in the vicinity of Scott Reef.

SURVEY: Offshore Canning - Seringapatae M/S No: 68/3027 MAPCODE: _____
DATES: June-Sept., 1968 COMPANY: BOC CONTRACTOR: Western
TENEMENTS: WA-33P.
SEISMIC SOURCE: Aquapulse PROCESSING: Western
CABLE: 2300m } 270m offset
 } 320m offset RECORDER: SDS-1010/DFR-300
MULTIPLE COVERAGE: 12-fold
MILEAGE: 191 miles (part of large survey)
REFRACTION: One profile within WA-33P.
GRAVITY:
MAGNETIC:
DATA QUALITY: Mostly fair
RESULTS:
Structural high east-southeast of Scott Reef Atoll was mapped. The approx. of this structure was considered within reach of drilling in Scott Reef Lagoon.

SURVEY: Legendre-Marie M/S No.: 69/3005 MAPCODE: _____
DATES: Oct., 1969 COMPANY: BOC CONTRACTOR: Western
TENEMENTS: WA-33P, -34P, -35P, -37P, NT/P5 etc.
SEISMIC SOURCE: Aquapulse PROCESSING: Western
CABLE: 7590 ft } 707 ft offset
 } 907 ft offset RECORDING: SDS-1010/DFR-300
MULTIPLE COVERAGE: 24-fold, 48-fold
MILEAGE: 820 miles (part of large survey)
REFRACTION:
GRAVITY:
MAGNETIC:
DATA QUALITY: generally good
RESULTS:
Structures within thick sedimentary sequence were indicated on western margin of Leveque Arch.

SURVEY: Adele-Scott M/S

No: 69/3038

MAPCODE: _____

DATES: June-August, 1969

COMPANY: BOC

CONTRACTOR: Western

TENEMENTS: WA-33P, -34P, -35P, -37P, NT/P5 etc.

SEISMIC SOURCE: Aquapulse

PROCESSING: Western

CABLE: 7590 ft, offset 646 ft RECORDER: SDS-1010/DFR-300

MULTIPLE COVERAGE: 36-fold, 48-fold

MILEAGE: 3,264 miles (part of large survey)

REFRACTION:

GRAVITY:

MAGNETIC:

DATA QUALITY: generally good

RESULTS:

Leverque Marginal structure was outlined. Many structural anomalies shown at D horizon level more detailed seismic work should be undertaken to confirm their existence.

SURVEY: Iryal-Evans M/S

No.: 70/245

MAPCODE: _____

DATES: August, 1970

COMPANY: BOC

CONTRACTOR: Western

TENEMENTS: WA-33P, WA-35P etc.

SEISMIC SOURCE: Aquapulse

PROCESSING: Western

CABLE: 5290 ft, offset 707 ft
7590 ft, offset 974 ft RECORDING: SDS-1010/DFR-300

MULTIPLE COVERAGE: 12-fold, 24-fold

MILEAGE: 652 miles (part of large survey)

REFRACTION:

GRAVITY:

MAGNETIC:

DATA QUALITY: fair to good

RESULTS:

Southwest trending ridge associated with minor faulting in the Browse slope area was indicated. Large closed structure within Scott Reef area was outlined.

SURVEY: Trimaville-Dillon H/S

No: 70/976

MAPCODE: _____

DATES: Dec. 1970-May, 1971

COMPANY: BOC

CONTRACTOR: Western

TENEMENTS: WA-33P, -34P, -35P, -37P, NI/P5 etc.

SEISMIC SOURCE: Maxipulse

PROCESSING: Western

CABLE: 7773 ft, 605 ft offset RECORDER: DDS-777

MULTIPLE COVERAGE: 12-fold, 24-fold

MILEAGE: 1185 miles (part of large survey)

REFRACTION:

GRAVITY:

MAGNETIC:

DATA QUALITY: Varies from poor to very good. No reflection below D horizon

RESULTS:

Some structural features inferred by previous survey in the Browse shelf were proven not to exist. Cretaceous pinchout was suggested. NE-SW trending fold on the down thrown side of the main Fault was outlined.

SURVEY: Scott-Reef Detail Seismic

No.: 71/481

MAPCODE: _____

DATES: July-Sept., 1971

COMPANY: BOC

CONTRACTOR: Western

TENEMENTS: WA-33P

SEISMIC SOURCE: Maxipulse ($\frac{1}{2}$ lb)

PROCESSING: Western

CABLE: 0-150-7740 ft

RECORDING: SDS-1010/DFR-300

MULTIPLE COVERAGE: 24-fold

MILEAGE: 448.75 miles

REFRACTION:

GRAVITY:

MAGNETIC:

DATA QUALITY: Generally good

RESULTS:

3 culminations of Scott Reef structures shown; at E. Hook Is., Sandy Is., and at Scott-Reef No. 1 location.

Large feature N.E. of North Reef, which is considered highly prospective was outlined.

SURVEY: North Reef Detail M/S

No: 72/1017

MAPCODE: _____

DATES: April, 1972

COMPANY: BOC

CONTRACTOR: GSI

TENEMENTS: WA-33P

SEISMIC SOURCE: Dynamite (66.7lb) Aquaflex (2x100ft)

PROCESSING: GSI

CABLE: 0-300 - 1900 m

RECORDER: 10,000/DFS200

MULTIPLE COVERAGE: 6-fold, 12-fold

MILEAGE: 81 kms

REFRACTION:

GRAVITY:

MAGNETIC:

DATA QUALITY: Mostly good, very small part poor

RESULTS:

Existence of prospective anticlinal structures culminating inside the reef was confirmed.

SURVEY: Browse Basin M/S

No.: 72/791

MAPCODE: _____

DATES: March, 1972

COMPANY: BOC

CONTRACTOR: GSI

TENEMENTS: WA-34P, WA-33P, WA-35P and WA-32P.

SEISMIC SOURCE: Airguns

PROCESSING: GSI

CABLE: var. offset 3200 m cable RECORDING: DFS III

MULTIPLE COVERAGE: 48-fold

MILEAGE: 1464 miles

REFRACTION:

GRAVITY:

MAGNETIC:

DATA QUALITY: overall record quality was good

RESULTS:

NW trending Regional dip was indicated on all horizons. No obvious closed structure shown within the area surveyed.

SURVEY: Browse Island M/S

No: PSIA 72/2

MAPCODE: _____

DATES: Nov. 1972

COMPANY: BOC

CONTRACTOR: Western

TENEMENTS: WA-35P, WA-34P

SEISMIC SOURCE: Aquapulse

PROCESSING: Western

CABLE: 3200 m, 886' offset

RECORDER: DDS-777

MULTIPLE COVERAGE: 24-fold

MILEAGE: 91 miles

REFRACTION:

GRAVITY:

MAGNETIC:

DATA QUALITY: good down to T (Intra triassic unconformity) horizon

RESULTS:

Fault block structures underlying T horizon have been delineated. The Browse Island and Fox features were outlined.

SURVEY: Regional Geophysical Reconnaissance

No.: PSIA 72/9

MAPCODE: _____

DATES: August, 197

COMPANY: Gulf Research Dev.
Aust Gulf Oil.

CONTRACTOR: Gulf R. & D.C.

TENEMENTS: WA-33P, -35P, -37P. etc

SEISMIC SOURCE: Aquapulse
5290 ft

PROCESSING: Gulf R. & D.C.

CABLE: 1298.5 ft offset

RECORDING: DDS-777

MULTIPLE COVERAGE: 1 fold, 24-fold

MILEAGE: 880 km within WA-33P-35P and -37P.

REFRACTION: 5km within WA-33P

GRAVITY: 880km along seismic profiles

MAGNETIC:

DATA QUALITY:

RESULTS:

Tertiary Sediment thickens seaward accompanied by thinning of older sediment. Probable Reef Structures within Tertiary Sediment were indicated. Refraction data indicated 3 apparent velocities of 10300 $1/5$, 11000 $1/5$ and 15,700 $1/5$. The first 2 layers being Tertiary Carbonate and the 3rd could be pre Tertiary Calcareous bed or volcanics at 12,950 feet.

SURVEY: Prudhoe - Hibernia M/S

No: 72/2530

MAPCODE: _____

DATES: May-June, 1972

COMPANY: BOC

CONTRACTOR: Western

TENEMENTS: WA-35P, WA-37P NT/P5 etc.

SEISMIC SOURCE: Maxipulse ($\frac{1}{2}$ lb)

PROCESSING: Western

CABLE: 3200m } 240 m offset
 } 300 m offset

RECORDER: DDS-777

MULTIPLE COVERAGE: 24-fold

MILEAGE: 285.2 miles (part of large survey)

REFRACTION:

GRAVITY:

MAGNETIC:

DATA QUALITY: Mostly good

RESULTS:

Shows NW Regional dip but no structural features of consequence indicated.

SURVEY: Mermaid-Cartier M/S

No.: 73/204

MAPCODE: _____

DATES: Febr. - April, 1973

COMPANY: BOC

CONTRACTOR: Western

TENEMENTS: WA-33P, WA-34P, -35P, -37P, NT/P5 etc

SEISMIC SOURCE: Maxipulse

PROCESSING: Western

CABLE: 3200 m, 230 m offset

RECORDING: DDS-777

MULTIPLE COVERAGE: 24-fold

MILEAGE: 2,100 miles (part of survey)

REFRACTION:

GRAVITY:

MAGNETIC:

DATA QUALITY: Fair to 2.5 secs from sea bottom and poor at greater depth

RESULTS:

A number of new closed structures within Scott-Reef trend and a few other similar structures were indicated. A very prominent intrusive type feature south of Ashmore Reef but within NT/P5 was outlined. NW-SE trending fault controlled anomalies within NT/P5 area were also indicated.

SURVEY: Kendrew - Cootamundra M/S

No: 74/31

MAPCODE: _____

DATES: Sept. 1974

COMPANY: BOC

CONTRACTOR: GSI Western

TENEMENTS: Wa-33P, -34P, -35P, -37P; NT/P5 etc.

SEISMIC SOURCE: Air gun, aquapulse

PROCESSING: GSI Western

CABLE: 3200 m var. Offset
292 m offset

RECORDER: DPS III (GSI)

MULTIPLE COVERAGE: 24-fold (Browse), 48-fold

MILEAGE: 2740 kms within WA-33P, -34P, -35P, -37P and NT/P5

REFRACTION:

GRAVITY:

MAGNETIC:

DATA QUALITY: Generally good, but in areas of known poor record, only marginally improved

RESULTS:

New structural leads have been identified. Some previously identified Structures have been delineated and considered drillable - Pender and Camden Structures.

The inshore margin of the basin has insufficient thickness of sediment to be considered prospective.

SURVEY:

No.:

MAPCODE:

DATES:

COMPANY:

CONTRACTOR:

TENEMENTS:

SEISMIC SOURCE:

PROCESSING:

CABLE:

RECORDING:

MULTIPLE COVERAGE:

MILEAGE:

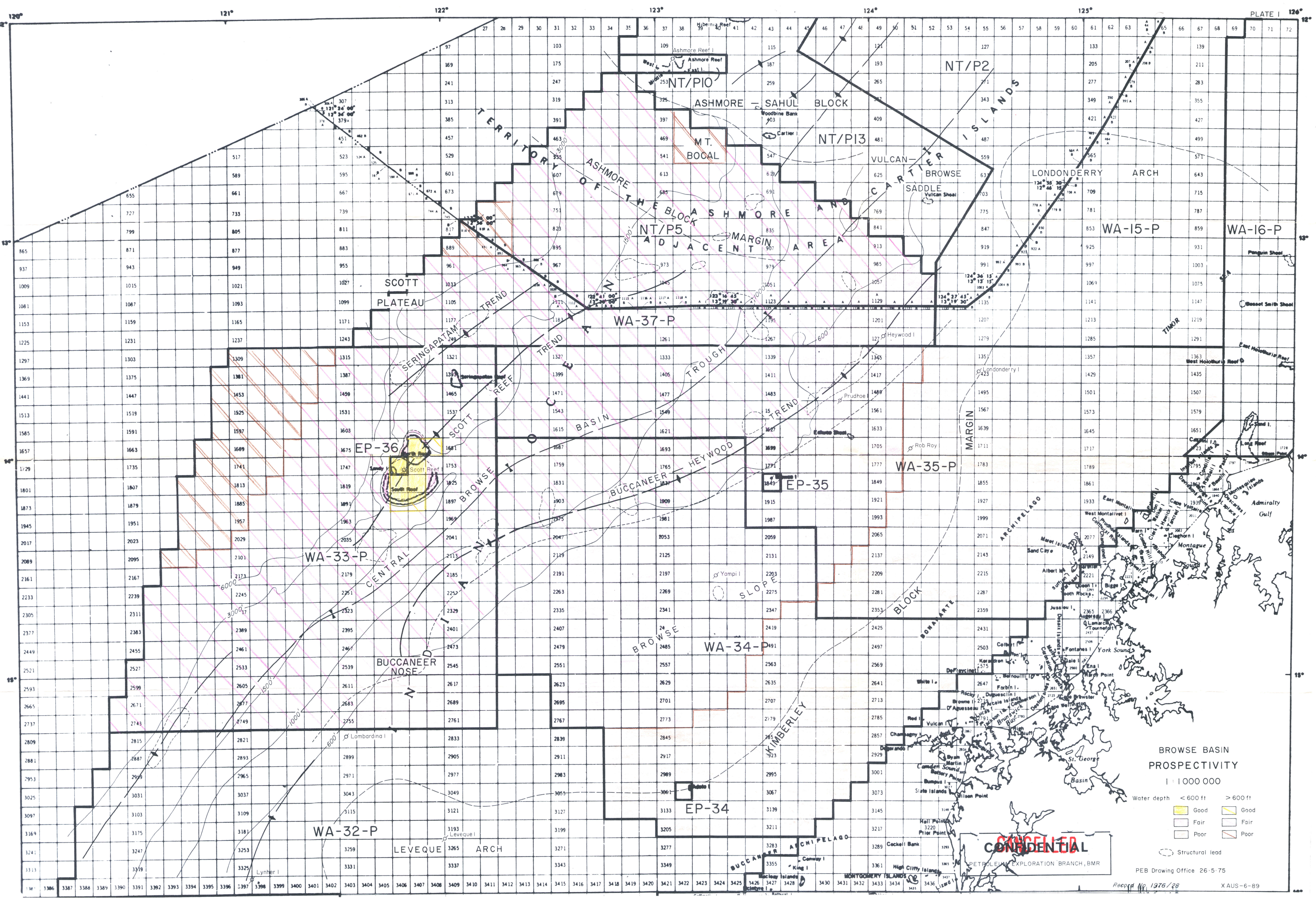
REFRACTION:

GRAVITY:

MAGNETIC:

DATA QUALITY:

RESULTS:



BROWSE BASIN
PROSPECTIVITY

1:1 000 000

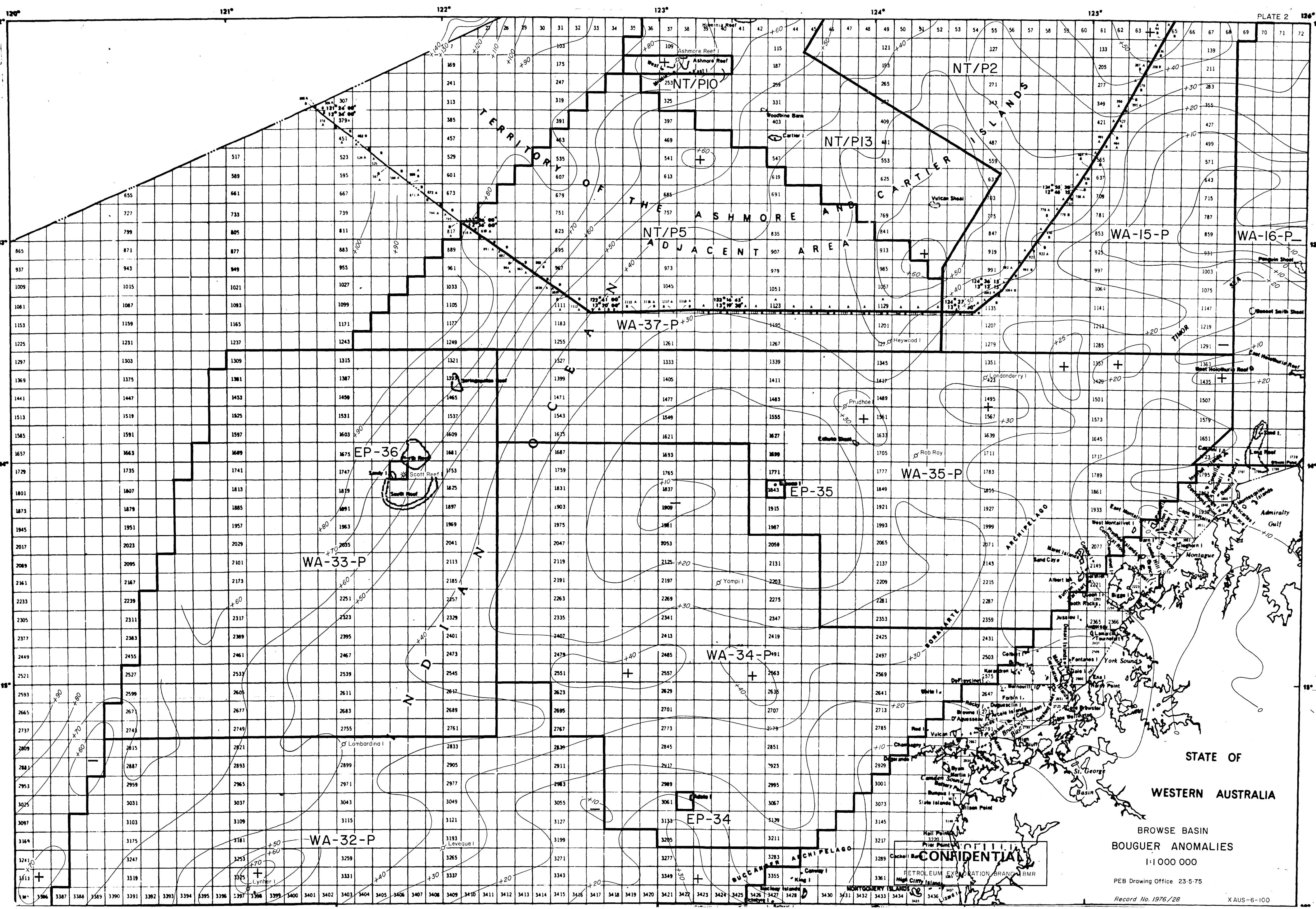
Water depth < 600 ft > 600 ft
Good Fair Poor
Good Fair Poor

Structural lead

PEB Drawing Office 26-5-75

Record No. 1976/88

X AUS-6-89

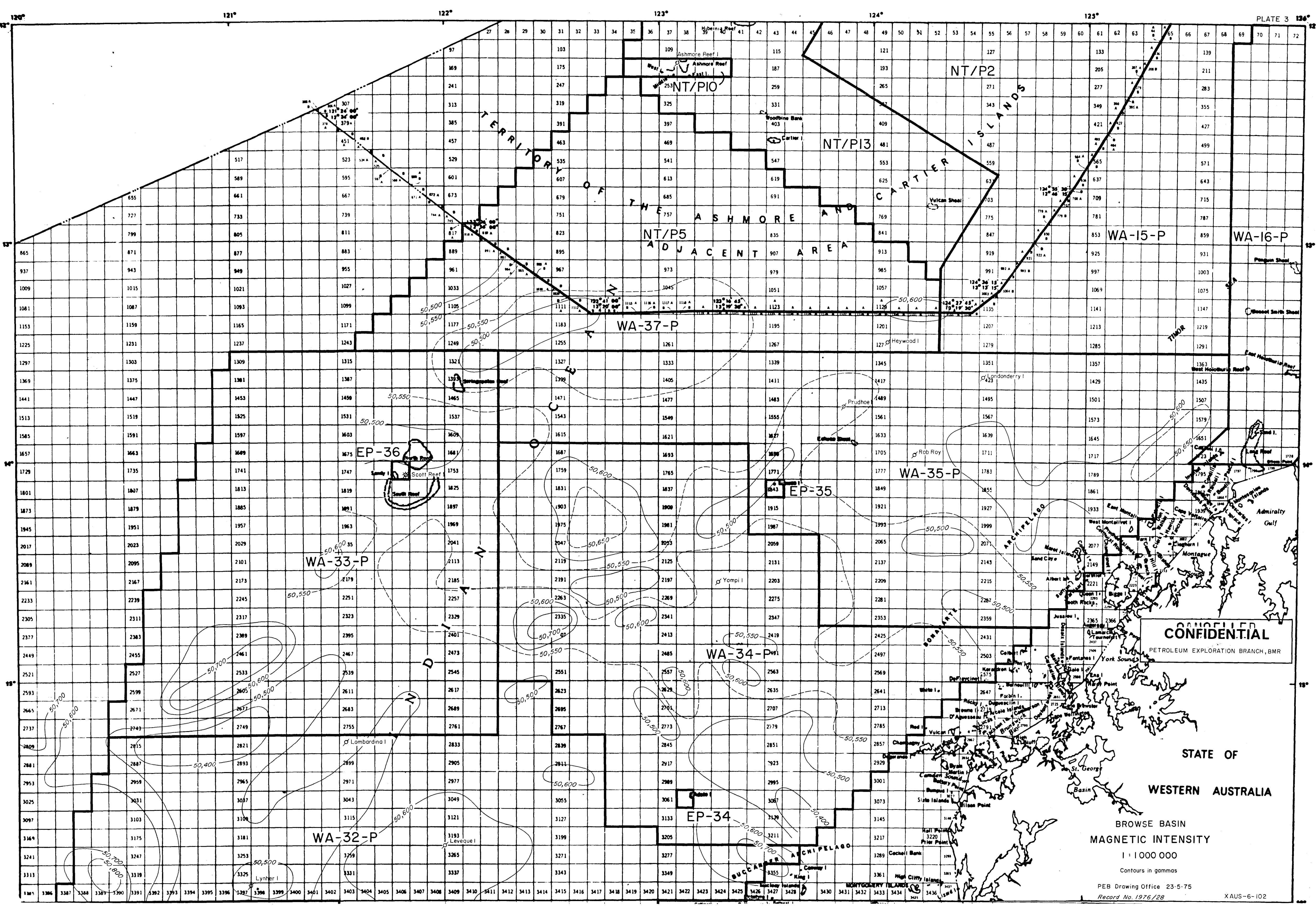


STATE OF
WESTERN AUSTRALIA

BROWSE BASIN
BOUGUER ANOMALIES
1:1 000 000

PEB Drawing Office 23-5-75

Record No. 1976/28 X AUS-6-100



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PETROLEUM EXPLORATION BRANCH, BMR

STATE OF
WESTERN AUSTRALIA

BROWSE BASIN
MAGNETIC INTENSITY

1:1 000 000

Contours in gammas

PEB Drawing Office 23-5-75

Record No. 1976/28

XAUS-6-102

