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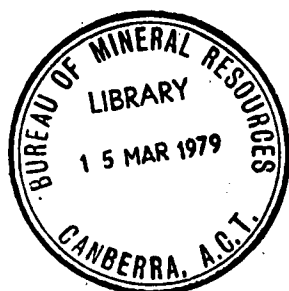
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Record 1978/40

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An Appraisal of Petroleum Exploration Title Areas

Bonaparte Gulf Basin

WA-36-P, NT/P4, NT/P6, NT/P11, NT/P12, NT/P19

June 1975

by

E. Riesz and P.R. Temple

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SUMMARY

This Record is the result of a brief examination of data relevant to the title areas. All available data have been used in its preparation, including confidential company reports, but no original interpretation has been made.

Summaries are given of the regional setting, the geophysical history, the regional geology, and the depositional history of the area of the petroleum titles concerned. Assessments have been made of the prospectivity of each of the title areas and recommendations are made for further exploration.

Drilling to date has been somewhat dissappointing, although gas discoveries have been made on the Sahul Platform which appears to have the best prospects in the title areas under consideration.

Introduction

This Record is the result of a brief examination of data relevant to the title areas under consideration. All available data were used in its preparation and these include reports received under the Petroleum Search Subsidy Act (PSSA) and the Petroleum (Submerged Lands) Act (P(SL)A), review reports from private companies, and BMR data. No original interpretations were made.

Because a large proportion of the data used is confidential and not available to the general public this Record must be classified as confidential.

Regional setting

The title areas under consideration are located in the Bonaparte Gulf, Timor Sea, and Arafura Sea along the boundary between Australia, Timor, and Indonesia.

Much of the area lies in water depths less than 200 m although water depths increase to the north and water depths up to 500 m occur in the northern parts of some of the title areas. A line of reefs and shoals running along the northwestern edge of the shelf occurs beyond the 200-m bathymetric contour. These could provide suitable drilling locations in water depths often less than 40 m.

GEOPHYSICS

Aeromagnetic surveys

In 1963, Mid-Eastern Oil N.L. and Woodside (Lakes Entrance) Oil Co. N.L. conducted the Rowley Shoals, Scott Reef, and Sahul Banks Aeromagnetic Survey (63/1709) over most of the subject title areas. The results indicated that a thick sedimentary wedge exists from the coast to the edge of the deep Timor Trough. In 1965, Arco conducted the Timor Sea Aeromagnetic Survey (64/4613) in its permits (including NT/P4) and Shell conducted the Arafura Sea Aeromagnetic survey (65/4616) in NT/P17, 20, and 21. The results from these two surveys indicated the main structural units in the area and located large areas of thick sedimentation.

Additional magnetic data were obtained from a number of marine surveys in the area when magnetometers were towed. The results from these are in agreement with the earlier aeromagnetic data.

Gravity surveys

In 1967, BMR conducted a combined gravity-magnetic-sparker survey in the Timor Sea (Timor Sea gravity, magnetic and seismic survey, 1967) which provided gravity data along lines about 20 km apart over parts of permits NT/P19, NT/P6, NT/P4, NT/P12, NT/P11 and WA-36-P. The results show a pronounced gravity high over the Sahul Platform and a number of smaller highs in the south of NT/P6 and NT/P19, marking the edge of the Bathurst Terrace. The Malita Graben appears as a rather indistinct low.

Seismic surveys

The seismic surveys in the area can be separated into two fairly distinct periods. The first, from 1965 to 1967, was one of preliminary exploration with surveys using less sophisticated techniques and covering large areas with a coarse reconnaissance grid. The second period, from 1968, was one of increasing sophistication in techniques and in data quality whereby structures were detected and detailed. Data quality improved rapidly over the years 1968-72 but appears to have levelled off somewhat more recently.

B.O.C. conducted the Montebello-Mermaid marine seismic survey (65/11015) in NT/P12 and other title areas using an explosives source and analogue 2-fold recording. The results confirmed and helped to define the regional trends in the area. In 1965-66, Shell conducted the Arafura marine seismic survey (65/11044) over permits NT/P19, NT/P20, and NT/P21 using an explosives source and F.M. analogue recorder. The data were recorded mainly 3-fold, but with some 2 and 6-fold recording. The results show sediments thickening to the north to more than 4000 m of post-Palaeozoic sediments. In the same year Arco carried out the Timor Sea marine seismic survey using a single-channel cable, sparker source, and analogue recorder over their permits which include NT/P4. The results confirmed the earlier aeromagnetic indications of a large sedimentary basin in the area with structurally interesting areas. These surveys were followed up in 1966 by the Sahul Shelf

marine seismic survey (66/11088) recorded for Arco in NT/P4 and neighbouring permits using a 130 000 joule sparker and analogue 6-fold recording, which outlined some of the major structural units in the area including the Sahul Rise. The Lynedoch Bank marine seismic survey (66/11117) recorded for Shell in NT/P19, 20, and 21 using an explosives source and 6-fold recording, outlined the major structural units in NT/P19, including the Malita Graben and the mobile hinge zone separating it from the 'stable' area to the east, as well as locating the Lynedoch Bank lead. The Rankin-Troubadour marine seismic survey (66/11104) recorded for BOC in NT/P6 and NT/P12, as well as other BOC permits used an explosives source and 2 or 3-fold analogue recording, which provided reconnaissance coverage over the two permits and discovered the large Troubadour structure.

In 1967, Arco conducted the Sahul Rise marine seismic survey (67/11166) in its permits including NT/P4 as a follow up to the 1966 survey, using airguns and explosives sources and 6 or 12-fold digital recording. The results confirmed the previous conception of the structural picture and provided further detail. It appeared that the structural trends that occur in the area are an older northwest trend (Palaeozoic) and a younger north-east trend. In 1967, BMR ran its combined gravity, magnetic, and seismic survey over the entire area with 20 km line spacing using a sparker energy source. The survey extended regional coverage over the whole area, and a number of interesting structural anomalies were uncovered.

Shell conducted the Arafura D-1 marine seismic survey (68/3020) in 1968 in permits NT/P19, NT/P20, and NT/P21 using an airgun energy source and 24-fold or 2-sum 12-fold digital recording. The structure on which Lynedoch-1 was subsequently drilled was partly detailed. In the same year Arco carried out the Londonderry Rise marine seismic survey using explosives and some flexotir shooting and 24-fold digital recording. A number of structures in NT/P4 including the Anson structure were discovered.

The Legendre-Marie marine seismic survey (69/3008) conducted by BOC in 1969 in permits WA-36-P, NT/P12, NT/P6, and NT/P4 as well as others using an aquapulse energy source and sum 2, 24-fold or sum 3, 12-fold digital recording provided partial detailing over the Kelp and Troubadour structures as well as extending the reconnaissance coverage over the BOC title areas. Shell conducted the Arafura D-2 (69/3006) and Arafura D-3 marine seismic surveys in 1969 in permits NT/P19, 20 and 21 using Airguns and 24-fold digital

recording. The D-2 survey provided semi-detail coverage over the Lynedoch structure, and the D-3 survey extended the regional grid. In 1969 Arco conducted the Van Diemen Rise marine seismic survey over NT/P4 and its other permits using explosives and 6-fold digital recording. The results provided detail over a number of previously discovered structures including Heron and Anson.

Arco conducted the Holothuria Rise marine seismic survey in its permits in the area in 1970 using an aquapulse energy source and 24-fold digital recording. The only lines recorded in the subject permits were a few short tie-lines to BOC data on WA-36-P. In the same year BOC carried out the Tryal-Evans marine seismic survey (70/245) over its permits, including all those in the subject area, using an Aquapulse source and 24-fold digital recording. Detail was provided on the Kelp, Heron, Troubadour, and Sunrise structures as well as smaller anomalies such as Evans Shoal in the vicinity of these large features.

The only survey conducted in the area in 1971 was the Arafura D-4 marine seismic survey carried out by Shell over permits NT/P19, 20, and 21 using Airguns and 24-fold digital recording. Two deep water leads were detailed including the Lynedoch structure.

BOC carried out the Calder-Evans marine seismic survey (72/3038) mainly over permits NT/P6 and NT/P12 using a Maxipulse energy source and 24-fold digital processing. The results were of good quality and detailing was achieved over the Anson and Evans Shoal prospects as well as coverage over the South Lynedoch and Cootamundra features. Arco carried out the Pago and Baldwin Bank marine seismic surveys in the same year over NT/P4 and its other permits in the area using an Aquapulse energy source and 24-fold digital recording. The Baldwin Bank survey provides most of the recent coverage over NT/P4. A number of low-relief structures including Shearwater were mapped on the northern flank of the Malita Graben, on the edge of the Sahul Rise.

The Arafura D-5 survey conducted by Shell in 1972 using airguns provided coverage on part of the hinge zone separating the Malita Graben from the 'Stable Block' to the east and detailed an interesting structure in the hinge zone.

The coverage along the hinge zone was extended in 1973 with the recording of the Arafura D-6 marine seismic survey by Shell in permits NT/P19 and 21 using airguns and 24-fold digital recording. No new structures were found. BOC carried out the Dillon Shoals marine seismic survey in 1973 over WA-36-P as well as other of its permits not in the subject area using Maxipulse and 24-fold digital recording. Detailing on the western flank of the Kelp structure uncovered two small structures and another was discovered in the western end of WA-36-P in deep water.

Arco conducted the Cartier and Hat Point marine seismic surveys in 1973 over its permits in the area including NT/P4. One line from the Hat Point survey crosses a northern lobe of the Anson structure but did little to alter the existing interpretation. Two lines from the Cartier survey cross structure A44 and have helped to refine the interpretation of this structure. The Kendrew-Cootamundra marine seismic survey carried out by BOC in 1973-1974 using a combination of airguns, Magnapulse and Aquapulse energy sources and 24-fold digital recording extended detail coverage in permits NT/P6 and NT/P12 as well as other BOC title areas. In NT/P12 the Troubadour and Sunrise structures were confirmed as essentially the same as previously interpreted and 2 small structures were located farther to the east. In NT/P6 further detailing was provided over the Cootamundra structures on the north side of the Malita Graben.

In 1974 Arco conducted the Cape Talbot marine seismic survey over their permits in the area including NT/P4 using airguns and 24-fold CDP recording. The only work in the subject title areas was done over the Shearwater prospect. The structural detail was refined sufficiently to mature a well site.

REGIONAL GEOLOGY

Regionally the title areas under consideration are located partly in the more prominent Bonaparte Gulf Basin and partly in the Arafura-Money Shoal Basins.

The Bonaparte Gulf Basin is bounded to the east and south by the Precambrian Sturt and Kimberley Blocks respectively. The axis of the Bonaparte Gulf Basin strikes north out of the Gulf and then swings northeast into the subject areas as the Malita (Calder) Graben situated between the Darwin Shelf/Bathurst Terrace and the Sahul Platform. The southeastern margin of the Malita Graben is a complicated hinge zone passing through NT/P6 and NT/P19.

The results of wells drilled in these regions and numerous seismic surveys have enabled the area to be divided into a number of distinct tectonic provinces which will now be discussed in further detail. The following provinces fall within the title areas under consideration: Sahul Platform, Malita Graben, Bathurst Terrace-Darwin Shelf, Hinge zone and the 'Stable Block' area (Arafura Basin?).

Sahul Platform

The Sahul Platform (also referred to as the Sahul Ridge) lies to the north of and parallel to the Malita Graben. It is limited to the north by the Timor Trough, Plio-Pleistocene faulting marks the boundary, and to the west by the Sahul Syncline. The eastern extent of the Sahul Platform is not clear, but it appears that the boundary between the Platform and the Malita Graben occurs in the eastern part of NT/P12. The Sahul Platform is well-defined on gravity and aeromagnetics and has a bathymetric expression.

The Sahul Platform has been structurally high since at least Permian time. It is characterised by a series of northeast-trending folds crossing the platform and is limited to the west by the structurally simple Sahul Syncline. These broad anticlines and synclines are considered to reflect a Permo-Triassic basement fault pattern which was partly rejuvenated in the Jurassic and Cretaceous. Before the mid-Jurassic, the Sahul Platform, Sahul Syncline and Petrel Sub-basin probably formed a single structural entity which was subsequently interrupted by the formation of the Malita Graben.

Results from the drilling of wells on the Platform, together with seismic work, indicate that the Triassic to Palaeocene sediments thin northwards across the Platform, partly owing to thinning on to a high considered to have been present in the Timor Trough area during most of the Mesozoic.

A number of structures have been defined on the Sahul Platform. Within the title areas under consideration two large northeast anticlinal trends, Kelp in the west and Troubadour in the east, have been defined. These structurally high areas are separated by a north-trending synclinal depression. Two wells Troubadour-1 and the recently completed Sunrise-1 have been drilled and suspended as gas/condensate discoveries on the Troubadour structure within NT/P12.

Troubadour-1 was drilled on a fault-controlled culmination of the Troubadour structure. The well drilled Tertiary to 4600 ft (1402 m), Cretaceous to 7085 ft (2159.5 m), Jurassic to 9069 ft (2764 m), Triassic to 10808 ft (3294 m), possible Upper Permian to 10877 ft (3315 m), where altered granite was encountered and drilled to TD 11349 ft (3459 m). Hydrocarbon shows were encountered in Jurassic sandstones overlain by Upper Neocomian claystones and tight Albian limestones. The recovery of oil from a core and the testing of $0.3205 \text{ M m}^3/\text{d}$ of gas from sandstone intervals showed the presence of significant hydrocarbon accumulations on the Sahul Platform. The well was suspended as a gas/condensate discovery.

Sunrise-1 was drilled on a separate culmination on the Troubadour structure some 10 mls (16 km) to the north-northeast of Troubadour-1. The well encountered a similar stratigraphic section as Troubadour-1 and terminated in Middle Jurassic sediments at TD 7681 ft (2341 m). Hydrocarbon shows were encountered in Upper Jurassic sandstones and the well was suspended as a gas/condensate discovery.

In summary the Sahul Platform has been structurally high since at least Permian time with reservoir and cap rocks draped over it and with thick sequences of potential source rocks surrounding it. The Platform is considered to have excellent hydrocarbon prospects; potential reservoirs exist in the fluvio-deltaic sandstones of Triassic, Jurassic, and Lower Cretaceous age. Permian sandstones and Tertiary carbonate and sandstones are secondary targets.

Malita Graben

The Malita Graben (also referred to as the Calder or Heron Graben) portion of the offshore Bonaparte Gulf Basin extends into the title areas under consideration (NT/P4, NT/P6, NT/P12 and NT/P19).

It is a major northeast trending faulted trough terminating at its southern end in the Petrel Sub-basin. It is bounded to the north by the Sahul Platform and to the south by the Bathurst Terrace Darwin Shelf.

The sedimentary section thins onto the Bathurst Terrace Darwin Shelf and within NT/P19 seismic work indicates that the fault-controlled boundary of the Malita Graben is a complicated hinge zone separating it from an eastern 'stable block' (Arafura Basin).

Well evidence and seismic control demonstrates that subsidence of the Malita Graben took place in the Callovian-Oxfordian (Upper Jurassic) although it is possible that the Malita Graben did have some expression during the Palaeozoic.

Three wells, Heron-1, Shearwater-1, and Lynedoch-1 have been drilled within the Malita Graben.

Heron-1 was drilled on a large, faulted anticlinal structure centrally located in the Malita Graben and straddling the NT/P4, NT/P6, boundary. A thick sequence of sediments ranging from Tertiary to Upper Jurassic was penetrated to TD 13808 ft (4209 m). Several shows of hydrocarbons were recorded in the Cretaceous-Upper Jurassic section but these were mostly associated with thin stringers of limestone or thick shale successions. Results from Heron-1 are valuable in demonstrating the Malita Graben section penetrated has important source potential.

Shearwater-1 was drilled on an elongate northeast-trending horst feature on the margin of the Malita Graben/Sahul Platform hinge. The well penetrated a section ranging from Tertiary to Middle Jurassic and reached TD at 10425 ft (3178 m). No sandstones were encountered in the Cretaceous section and a high degree of secondary silicification in Jurassic sandstones almost completely destroyed effective porosity and permeability (a phenomenon noted in several other Bonaparte Gulf wells at depths greater than 9000 ft (2743 m) e.g. Gull-1). Only slight traces of hydrocarbons were detected in the well, which was plugged and abandoned as a dry hole at TD 10 425 ft (3178 m) (1500 ft (457 m) higher than programmed).

Lynedoch-1 was drilled by Shell in NT/P19 on a low-relief anticlinal structure in the northeastern part of the Malita Graben. The well penetrated a section ranging from Tertiary to Upper Jurassic and reached TD at 13015 ft (3967 m). A thin hydrocarbon-bearing zone (32 ft (10m)-probably gas) was encountered within the Lower Cretaceous carbonate interval 12054 ft - 12189 ft (3674 m - 3715 m). The Company regarded the interval

as being too tight and not worthy of testing and the well was plugged and abandoned.

Bathurst Terrace/Darwin Shelf

The Bathurst Terrace and Darwin Shelf represent a thin wedge of sediments flanking the western and northern margins of the Sturt Block.

Within the title areas under consideration the Bathurst Terrace flanks the southeastern portion of NT/P4 and the southern part of NT/P6, and extends into NT/P19. Two wells, Flat Top-1 and Newby-1, have been drilled in the offshore portion of the Darwin Shelf but outside the study area.

On the western edge of the Darwin Shelf at Flat Top-1 and perhaps on the Bathurst Terrace a thin wedge of Permian sediments is present. However, in general, Cretaceous and uppermost Jurassic sediments overlie Precambrian basement. No structures are known on the Bathurst Terrace so stratigraphic traps provide the only drilling targets. Principal targets will be the wedgeout possibilities of porous Lower Cretaceous and Upper Jurassic sandstones against basement and sealed by Upper Cretaceous marine shales. In addition, Permian-Jurassic wedgeouts against basement can be also expected in the area. These stratigraphic plays must be considered high risk owing to the very subjective nature of their seismic definition.

Hinge Zone and 'Stable Block'

Shell have recognised three distinct geological regions in NT/P19.

- i) A 'Stable Block' covered by Mesozoic continental to deltaic sediments tested by Money Shoal-1.
- ii) A mobile marine zone - tested by Heron-1.
- iii) Transitional area of disturbance:- The 'hinge-zone' where coastal sands may have accumulated while the area was tectonically active.

Region (ii) is regarded as being part of the Bonaparte Gulf Basin (Malita Graben).

Region (i) and (iii), the 'stable block' and hinge zone, are regarded as being part of the Arafura Basin. This Arafura Basin is also referred to as the Money Shoal Basin (Williams et al., Indonesian Petroleum Convention, 1973 Jakarta).

No wells have been drilled in the Arafura Basin within NT/P19 although Money Shoal-1 was drilled on the 'stable block' in NT/P20.

Little structural deformation has been observed in the Mesozoic and Cainozoic of the 'stable block'. The Money Shoal structure is therefore interpreted to be the result of faulting and drape folding over a major Lower Cretaceous river channel and alluvial plain complex that carried terrigenous clastics from the Australian craton to the Early Cretaceous Arafura Basin. Money Shoal-1 was drilled to test this structure which was mapped at the top Lower Cretaceous seismic horizon as a low-relief, fault-closed anticlinal anomaly. The well drilled Tertiary, Mesozoic, and Lower Palaeozoic sediments overlying a sequence of extremely indurated sedimentary rocks of probable Precambrian age. Good-quality reservoir rocks were present in the Cretaceous and Jurassic sequences which were deposited in predominantly fluviatile and paralic environments. Silurian non-marine sandstones had poor reservoir characteristics and the indurated probable Precambrian quartzites exhibited no reservoir properties. No hydrocarbons were encountered while drilling Money Shoal-1 and all porous zones are interpreted as being water-bearing.

The most striking feature in the Arafura Basin is the pre-Mesozoic graben which occurs mostly in NT/P20 and possibly extends into the eastern extremity of NT/P19. Seismic interpretation in the graben indicates some 20 000 ft (6096 m) of sedimentary fill.

The dominantly fluviatile and deltaic Mesozoic and Cainozoic strata on the 'stable block' gradually thicken seaward towards the Malita Graben and as the graben is approached from the direction of Money Shoal-1, the base Mesozoic seismic horizon is faulted down-to-the-basin along a hinge zone by a series of normal faults, and is no longer a mappable seismic reflector. It is suggested that the hinge zone between the mobile and 'stable blocks' (Malita Graben and Arafura Basin) is an area where deeper-water sediments in the subsiding mobile graben change to strand line and deltaic sediments on the 'stable block'. This zone of abrupt change in depositional environment would be ideally suited for development of beaches and dunes along a coast line that was receiving a maximum influx of coarse clastics during the Lower Cretaceous. The effect of the structural hinge zone becomes less and less pronounced in the Upper Cretaceous and seems to have had little effect on depositional trends during Cainozoic to Recent.

A brief summary of the depositional history

Warris (APEA J., 1973) has suggested that the origin of the Bonaparte Gulf Basin may be tied to rift development following northward movement of the Darwin Block along the Halls Creek Mobile Belt.

Within the Bonaparte Gulf Basin Lower to Middle Palaeozoic sediments have been encountered only in the onshore portion of the Petrel Sub-basin and offshore in wells drilled on diapiric structures. The early depositional history within the initial rift followed the typical 'Rift Valley' and 'Red Sea' stages (Schneider, 1972, Geol. Soc. Am. Mem. 132) with initial outpourings of basalt (early Cambrian) followed by clastics (Cambro-Ordovician), evaporites (Silurian to Devonian?) and fringing reef carbonates (Devonian).

Within the Arafura Basin, Money Shoal-1 demonstrated that a thin veneer of Silurian non-marine sandstones (390 ft (119 m) unconformably overlies Precambrian quartzites and are in turn unconformably overlain by Lower Jurassic sediments. Seismic data have also established that a pre-Mesozoic graben is located within the Arafura Basin.

The pre-Permian stratigraphy is not well known within the title areas under consideration and will not be discussed in any further detail. Permian and post-Permian sedimentation has far better regional control and is summarised.

Lower Permian Sedimentation is dominantly alluvial. A landmass is envisaged west of the present-day Ashmore and Scott Reefs. The Lower Permian river systems are believed to flow in a generally northerly direction with the development of the main deltaic complex at Timor.

Upper Permian Started with a major marine transgression, sedimentation over a broad stable shelf extending over a large area and gradually deepening towards Timor. This marine transgression extended into the Lower Triassic, resulting in the deposition of marine shales and siltstones over the entire area.

Upper Middle and Upper Triassic A major regression took place with fluvio-deltaic complexes prograding across the area. Timor was the site of marine deposition with minor clastics. The river systems of this time are inferred to drain northeast away from the Kimberley Block and Western Landmass eventually draining into the area somewhere northeast of Heron-1.

Upper Triassic Another marine transgression swamped the alluvial and deltaic plains and a shallow shelf to marginal marine sedimentation took place in the Browse Basin - Ashmore - Sahul areas.

Late Triassic - early Jurassic The shallow seas withdrew and the area reverted to a fluvial-alluvial plain environment. Conditions are believed similar to the upper Middle and Upper Triassic regression with the river systems draining to the northeast and eventually entering the sea somewhere north of Heron-1. Timor was the site of marine, outer shelf to slope sedimentation, being protected from receiving deltaic clastics by a barrier island complex associated with the Sahul Platform.

Lower Jurassic Sometime late in the Lower Jurassic the Ashmore - Sahul Block and Northeast Londonderry Ridge became emergent land areas thus separating the Browse and Bonaparte Gulf Basins. Severe faulting and erosion of the Permo-Triassic took place. Sedimentation continued and uplift caused an increase in rate of sedimentation.

Middle Jurassic It is possible that the river systems draining the Bonaparte Gulf broke through the barrier island complex and contributed a clastic component of sedimentation to Timor. (The Sahul Platform may have subsided at this time, thus promoting the destruction of the flanking barrier island complex.)

During the Upper Jurassic and Lower Cretaceous the Western Landmass became completely detached and the Indian Ocean was established. Extensive volcanic activity took place at Ashmore Reef. A marine transgression took place swamping the Sahul Platform and depositing thick shale sequences at Heron-1 and Flamingo-1. At the end of Lower Cretaceous the Ashmore - Sahul Block, Sahul Platform, Timor, and the western Browse Basin rapidly subsided into very deep water resulting in a regionally northwesterly tilt and a major marine transgression. At this time a broad shelf existed over the Bonaparte Gulf Basin and Sturt Block.

For most of the Upper Cretaceous, the shoreline or coastal plain was generally narrow except to the northwest off the Kimberley Block where thick marginal marine sands are developed in the Puffin area.

This sedimentation continued into the Eocene. As the outer basins filled, the environment of deposition became progressively shallower and upper Eocene carbonates prograded across the shelf reaching as far to the northwest as Timor.

During the Oligocene bathyal sedimentation took place north of the Sahul Platform and in the western Browse Basin. The Bonaparte Gulf Basin, Sahul Platform, Northeast Londonderry Ridge, eastern Browse Basin, and most of the Ashmore-Sahul Block were areas of shallow-water deposition or were perhaps emerged land areas.

Lower Miocene carbonate deposition took place on the outer parts of the shelf and in the Timor Sea and Bonaparte Gulf and has continued to present day.

Hydrocarbon potential

The principle hydrocarbon targets in the title areas under consideration are porous Triassic, Jurassic, and Lower Cretaceous fluvio-deltaic sandstones sealed intraformationally or by the overlying Upper Cretaceous marine shales and marls. Porous Maestrichtian sandstones and Tertiary carbonates are also present but lack of seal downgrades their hydrocarbon potential. In the areas under consideration the Permian so far encountered has lacked good permeability and is not rated too highly.

TITLE ASSESSMENT WA-36-P

<u>TITLE HOLDER</u>	Woodside Oil N.L. Shell Development (Aust.) Pty Ltd BOC of Australia Ltd
<u>NO. OF BLOCKS</u>	57
<u>EXPIRY DATE</u>	18.5.75
<u>NOTES</u>	BOC of Australia, Woodside Oil N.L. and Mid-Eastern Oil N.L. now operate as Woodside-Burmah Oil N.L. The title has still to be re-issued in the name of the new

company. BOC of Australia Ltd a wholly owned subsidiary of Woodside-Burmah Oil NL, is operator on behalf of the group.

PREVIOUS SIX YEAR CONDITIONS (A\$)

First year	10 000	175.44 per block/year
Second "	30 000	526.32 " "
Third "	170 000	2982.46 " "
Fourth "	170 000	2982.46 " "
Fifth "	170 000	2982.46 " "
Sixth "	20 000	350.88 " "
TOTAL		10 000
		Average 1666.6 per block/year

WELLS DRILLED To date no wells have been drilled within WA-36-P.

Geophysical Coverage Cf. basin notes, data sheets of geophysical surveys, and line density maps. The edge of the Sahul Platform in this area was outlined by aeromagnetic reconnaissance carried out in 1963 by BOC and in 1965 by Arco.

BMR conducted a reconnaissance marine seismic and gravity survey over the area in 1967 which provided gravity data over the permit. The gravity data over the permit give indications of the location of Sahul Block in this area.

The permit has been covered by a reconnaissance grid of 1970 and 1973 seismic coverage which is quite sparse in the west but more detailed on the eastern part of the permit, or the western flank of the Kelp structure. The seismic data are good to fair down to the top of the Permian horizon.

Regional Setting WA-36-P lies on the outer margin of the continental shelf on the as yet, undefined boundary between Australia and Portuguese Timor.

Water depths vary from (less than) 200 m along the eastern boundary to in excess of 700 m along the northern boundary.

Prospectivity

WA-36-P can be conveniently divided into two distinct areas, the eastern area located on the Sahul Platform and the western area between the Sahul Platform and the Sahul Syncline.

Western Area This area lies in water depths in excess of 200 m.

No wells have been drilled in this area and it has only been covered by broad reconnaissance seismic coverage.

The area lies between the Sahul Platform to the east and the Sahul Syncline to the west. Seismic mapping indicates that the sediments dip off the Sahul Platform into the Sahul Syncline but a southeast high trend cutting across the southwestern corner of WA-36-P is apparent. The trend extends into NT/P8 and a large faulted structural lead has been defined partly extending into WA-36-P.

Prospects in this area will be confined to sands within the Cretaceous/Jurassic and Triassic. The Permian section is probably too deep to be prospective.

Recommendations Further reconnaissance seismic work is warranted over the entire area and some detailing over the existing lead and over leads indicated by the reconnaissance work.

Eastern Area This area is located on the Sahul Platform and includes the western flank of the Kelp Structure. Part of this area lies in water depths less than 200 m.

The Kelp Structure is a large feature extending over most of NT/P11 and this part of WA-36-P. To date no wells have been drilled on the structure and the area has been covered by 1969/1970 lines of fair quality.

Within WA-36-P one large culmination and several smaller culminations have already been defined.

Prospective horizons in this area are expected to be sands within the Triassic, Jurassic, and Cretaceous.

Recommendations Further high effort seismic is required to detail the entire area and to mature a well location. A well can then be recommended to test the Cretaceous, Jurassic and Triassic. ((16400 ft, 5000 m) or prior Permian.)).

TITLE ASSESSMENT NT/P4

TITLE HOLDER Arco Australia Ltd
 Australian Aquitaine Petroleum Pty Ltd
 Esso Exploration and Production Aust. Inc.

NO. OF BLOCKS 390

EXPIRY DATE 1.7.75

FARMOUT NEGOTIATIONS Nil

PREVIOUS SIX YEAR CONDITIONS (\$A)

First year)	200 000	256.41 per block/year
Second ")		256.41 " "
Third "		2 500 000	3205.13 " "
Fourth "			3205.13 " "
Fifth "		100 000	256.41 " "
Sixth "		2 500 000	6410.26 " "
TOTAL		5 300 000	13,589.75
			2 264.96

WELLS DRILLED Two wells, Heron -1 and Shearwater -1, have been drilled within the Malita Graben in NT/P4. Heron -1 was drilled on a large faulted anticlinal structure centrally located in the Malita Graben and straddling the NT/P4, NT/P6 boundary. A thick sequence of sediments ranging from Tertiary to Upper Jurassic was penetrated to TD 13 808 ft (4209 m). Several shows of hydrocarbons were recorded in the Cretaceous-Upper Jurassic section but these were mostly associated with thin stringers of limestone or thick shale successions. Results from Heron -1 are valuable in demonstrating that the Malita Graben section penetrated has important source potential.

Shearwater -1 was drilled on an elongate northeast-trending horst feature on the Sahul Platform/Malita Graben hinge area. The well penetrated a section ranging from Tertiary to Middle Jurassic and reached TD at 10 425 ft (3178 m). No sandstones were encountered in the Cretaceous section and a

high degree of secondary silicification in Jurassic sandstones almost completely destroyed effective porosity and permeability. Only slight traces of hydrocarbons were detected and the well was plugged and abandoned.

Geophysical coverage Cf. basin notes, data sheets of geophysical surveys, and line density maps. The main structural units in the area, the Sahul Shelf, Malita Graben, and Bathurst Terrace, were outlined by aeromagnetic reconnaissance carried out in 1965 by Arco.

BMR conducted reconnaissance marine seismic, magnetic, and gravity surveys over the title area in 1967 and 1971 which provide the only gravity coverage over the permit. The results appear to express the major structural units in the area.

The whole of the title area has been covered by a reconnaissance grid of seismic traverses. The northernmost and southernmost portions are covered by a relatively sparser grid of mainly older lines (pre-1970) while the larger central portion is covered by a denser grid which contains a higher proportion of more recent data. Much of the data is concentrated along the northern edge of the Malita Graben where a number of structures have been detailed including Shearwater and A44.

The more recent data are generally of good to fair quality down to 'horizon 4' (Top Permian).

Regional Setting NT/P4 is located on the northern margin of the continental shelf on the boundary between Australia and Portuguese Timor. Water depths vary from 40 m in the south to 600 m along the northern margins.

Prospectivity NT/P4 can be conveniently divided into three distinct regions; Sahul Platform, Malita Graben (and Bonaparte Gulf Basin), and the Darwin Shelf/Bathurst Terrace.

Sahul Platform The Sahul Platform covers well over half of NT/P4. Only one well, Shearwater -1, has been drilled on the Platform within the title area. This well was located on the southern margin of the Platform just north of Malita Graben bounding fault. The prospective Jurassic Petrel sands were found to be tight owing to secondary silicification at the Shear-

water - 1 location, a fact which appears common in wells drilled on the Malita Graben boundaries (e.g. Gull - 1).

The northern part of the Sahul Platform within NT/P4 has only been covered by a reconnaissance grid of early seismic lines. Interpretation indicates a northwest-trending synclinal depression occurring between the Kelp and Troubadour highs. The Troubadour and Sunrise culminations extend into this northern area.

An extensive grid of semi-detailed seismic coverage, of which a large portion is recent high-effort work has been carried out in the central portion of the permit. Two features have been delineated along an apparent structural trend extending southwest from Troubadour (A41, A42).

A number of anomalies have been mapped along the boundary fault between the Sahul Platform and the Malita Graben. One of these anomalies, Shearwater (A45), has been drilled with disappointing results (see previous discussion). The largest structural feature of interest, Anson (A40) extends into NT/P6.

Recommendations In the northern part of the title area between Kelp and Troubadour, a modern semi-detail seismic grid is recommended to further refine the interpretation. Further detail seismic work is required over the NT/P4 portions of the Sunrise and Troubadour structures to define a well location (possibly a joint well with BOC) 9845 ft (3000 m).

In the central portion of the area seismic work is recommended over the two anomalies of interest to mature either into a drillable prospect. (11484 ft - 13124 m) (3500 - 4000 m).

The Anson structure has been sufficiently detailed to recommend a well location. (11484 ft - 3500 m). Further seismic detailing is necessary to upgrade the other anomalies on the marginal trend which include A44, A31, and A28.

Malita Graben Heron No. 1 well has been drilled in this area. The well encountered an extremely shaly Cretaceous-Jurassic section with no potential reservoir rocks. As it tested the largest structure centrally located in the Graben the potential of this area cannot be regarded as being very good. The area is covered by a reconnaissance grid and no other significant features have been recognised.

Recommendation The whole area should be regarded as poorly prospective except along the Graben marginal faults where fault-controlled traps are possibilities. There is a chance that coarse-grained sands could have been deposited in these regions. However, these must be regarded with caution because of the results from Shearwater 1 and Gull-1 wells. At this stage no further work is recommended.

Darwin Shelf/Bathurst Terrace This area flanks the southeast portion of the Malita Graben in NT/P4. A thin sedimentary wedge onlaps the Bathurst Terrace/Darwin Shelf. In general Cretaceous - Upper Jurassic sediments overlies Precambrian basement. Permian sediments may be present.

The area is covered by a reconnaissance grid of seismic lines most of which are of pre-1970 vintage. No structures are known so stratigraphic traps provide the only drilling target. Principal targets are porous Permian to Jurassic sands but these must be regarded as speculative.

Recommendations At this stage no further work is recommended.

TITLE ASSESSMENT NT/P6

TITLE HOLDER BOC of Australia Ltd
Shell Development (Aust.) Pty Ltd
Woodside Oil N.L.
Mid-Eastern Oil N.L.

NOTES BOC of Australia, Woodside Oil N.L. and, Mid-Eastern Oil N.L. now operate as Woodside-Burmah Oil N.L. BOC of Australia Ltd, Woodside Oil N.L. and Mid-Eastern Oil N.L. now operate as Woodside-Burmah Oil N.L. The title has still to be re-issued in the name of the new company.

NO. OF BLOCKS 192
EXPIRY DATE 29.5.75
FARMOUNT NEGOTIATIONS Nil

PREVIOUS SIX YEAR CONDITIONS (\$A)

First year	95 000	494.8 per block/year
Second "	Nil	-
Third "	Nil	-
Fourth "	45 000	234.4 " "
Fifth "	Nil	-
Sixth "	35 000	182.3 " "
<hr/>		
TOTAL	175 000	911.5 " "
		151.9 average "

and in association with NT/P11 or NT/P12

First Year	Nil
Second ")	3 000 000
Third ")	
Fourth "	Nil
Fifth "	3 000 000
Sixth "	Nil
<hr/>	
	6 000 000

WELLS DRILLED

No wells have been drilled within NT/P6. Heron -1 well was drilled on a large faulted anticlinal feature located centrally in the Malita Graben and straddling the NT/P4 NT/P6 boundary. The well site was in NT/P4. Heron -1 drilled Tertiary to 3374 ft (1028 m), Cretaceous to 10 350 ft (3154 m) and Lower Cretaceous/Upper Jurassic Petrel Formation to TD 13 808 ft (4209 m). Several shows of hydrocarbons were recorded in the Cretaceous/Upper Jurassic section but these were mostly associated with thin stringers of limestone or thick shale successions. Results from Heron -1 are valuable in demonstrating that the Malita Graben section penetrated has important source potential.

Geophysical Coverage Cf. basin notes, data sheets of geophysical surveys, and line density maps. The only magnetic data recorded in the title are a few lines from the Timor Sea aeromagnetic survey recorded for Arco in 1965, and surface traverses recorded by the BMR in 1967 as part of their combined gravity-magnetics-seismic survey. The results give some indications of the large-scale structure.

The gravity data in the area, from the 1967 BMR survey, appear to express intra-basement anomalies though the Malita Graben appears to be characterised by a moderate gravity gradient.

The permit is covered by a reconnaissance grid of 1969-1974 seismic which varies from fair to good in data quality. Generally events down to the Top Triassic horizon can be picked reliably. A considerable amount of detailing was done over the Anson structure in 1970.

Regional Setting NT/P6 lies on the Australian continental shelf offshore from Cape Van Diemen in the Northern Territory. Water depths throughout the title area are less than 200 m and are extremely shallow in the south and around the Shoal areas.

Prospectivity The title area can be divided into three distinct areas, the Sahul Platform, Malita Graben, and the Bathurst Terrace.

Sahul Platform Only a small portion of the Sahul Platform occurs in the northwest corner of NT/P6. This area is covered by a semi-detailed seismic grid and one structure, Anson, extends into the title area.

Recommendation The Anson structure has been sufficiently detailed to recommend a well location. As the structure straddles the NT/P4, NT/P6 boundary it is suggested that this could be a joint program well. The prospective section will be sands within the Lower Cretaceous/Upper Jurassic. A well to 11484 ft (3500 m) should adequately test these objectives.

Malita Graben The Graben covers most of the northern half of the permit. One well, Heron No. 1, has been drilled on a large structure straddling the NT/P4 - NT/P6 boundary. The well results were disappointing from a reservoir aspect, however the section possessed excellent source potential. The area has been covered by a reconnaissance grid of seismic

traverses. A number of structural trends with definite culminations have been mapped. The most significant anomalies are Evans Shoals, South Lynedoch, and an unnamed centrally located feature. On the northern side of the major hinge line separating the Bathurst Terrace from the Calder Graben a number of small features have been revealed. These fault-controlled stratigraphic traps are referred to as the Cootamundra structure. The prospective section within the Malita Graben is expected to be sands within the Lower Cretaceous-Jurassic. Evidence from wells already drilled must downgrade the potential of the area as no suitable reservoir rocks have been located.

Recommendations Prospectivity of the area is not rated highly, but if the area requires further work the detailing of present structural leads is recommended, possibly followed by drilling. The two largest features are South Lynedoch and Evans Shoals (Top Triassic approx. (14765 ft) 4500 m). Recent seismic detailing over the Cootamundra structures indicates that the structures are of small areal extent and at this stage would not seem to warrant drilling.

Bathurst Terrace The Bathurst Terrace flanks the southern margin of the Malita Graben. Seismic reconnaissance indicates Cretaceous and Upper Jurassic sediments overlie Precambrian basement. A thin wedge of Permian sediments may be present. No structures have been located so stratigraphic traps provide the only drilling targets. These must be considered high risk.

Recommendation No further work is recommended at this stage.

TITLE ASSESSMENT NT/P11

TITLE HOLDER

BOC of Australia Ltd
Shell Development (Aust.) Pty Ltd
Woodside Oil N.L.
Mid-Eastern Oil N.L.

NOTES

BOC of Australia Ltd holds half of its 33¹/₃% interest in trust for BP Petroleum Development Australia Pty Ltd. BOC of Australia Ltd, Woodside Oil N.L. and Mid-Eastern Oil N.L. now operate as Woodside-Burmah Oil

N.L. The title has still to be re-issued in the name of the new company.

NO. OF BLOCKS 39
EXPIRY DATE 9.9.75
FARMOUT NEGOTIATIONS Nil
PREVIOUS SIX YEAR CONDITIONS (\$A)

First year	28 500	730.77 per block/year
Second "	Nil	-
Third "	Nil	-
Fourth "	20 000	512.82 " "
Fifth "	Nil	-
Sixth "	20 000	512.82 " "
TOTAL	68 500	1756.41
		\$292.74 average "

and in association with NT/12 +/-or NT/P6

First year	Nil
Second ")	3 000 000
Third ")	
Fourth "	Nil
Fifth "	3 000 000
Sixth "	Nil
	6 000 000

WELLS DRILLED

To date no wells have been drilled within NT/P11.

Geophysical Coverage : Cf. basin notes, data sheets of geophysical surveys, and line density maps. The edge of the Sahul Platform in this area was outlined by aeromagnetic reconnaissance carried out in 1963 by BOC and in 1965 by Arco.

BMR conducted reconnaissance marine seismic and gravity surveys over the area in 1967 and 1971, which provided gravity data over the permit.

The permit has been covered by a reconnaissance grid of 1969-70 seismic data of fair quality which has enabled the detailing of the large Kelp structure. Seismic data are fair down to the top of the Permian horizon.

Regional Setting: NT/P11 lies on the northern margin of the Continental Shelf on the as yet, undefined boundary between Australia and Portuguese Timor. Water depths in NT/P11 vary from 100 metres in the southeast corner to over 400 metres in the northwest corner.

Prospectivity NT/P11 lies towards the western end of the Sahul Platform, a positive feature, since at least late Palaeozoic time. The large Kelp structure falls largely within NT/P11 and occupies most of the title area. No wells have been drilled within NT/P11 and the area has only been covered by semi-detailed 1969-1970 seismic coverage.

Recent encouraging results from Troubadour -1 must upgrade the prospects of the Kelp structure. Hydrocarbon objectives will be sands within the Cretaceous, Triassic and especially the Jurassic.

Existing seismic coverage is sufficient to detail the structure, but a small number of modern high effort seismic lines will be useful to improve quality.

Recommendations: Modern high effort seismic to locate an optimum well-site followed by the drilling of a well. A well to 14765 ft (4500 m) (or prior Permian) should adequately test the Kelp structure.

TITLE ASSESSMENT NT/P12

TITLE HOLDER

BOC of Australia Ltd
Shell Development (Aust.) Pty Ltd
Woodside Oil N.L.
Mid-Eastern Oil N.L.

NOTES

BOC of Australia holds half of its 33 1/3% interest in trust for BP Petroleum Development Australia Pty Ltd. BOC of Australia Ltd, Woodside Oil N.L. and Mid-Eastern Oil N.L. now operate as Woodside-Burmah Oil N.L. The title has still to be re-issued in the name of the new company.

NO. OF BLOCKS 140
EXPIRY DATE 9.9.75
FARMOUT NEGOTIATIONS Nil
PREVIOUS SIX YEAR CONDITIONS (\$A)

First year	75 000	535.71 per block/year
Second "	Nil	-
Third "	Nil	-
Fourth "	35 000	250.00
Fifth "	Nil	-
Sixth "	45 000	321.43

TOTAL	155 000	1107.14
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Average 184.52 per block/year

and in association with NT/P6 or NT/11

First year	Nil
Second ")	3 000 000
Third ")	
Fourth "	Nil
Fifth "	3 000 000
Sixth "	Nil

6 000 000

WELLS DRILLED Two wells, Troubadour -1 and Sunrise -1, have been drilled within NT/P12. The wells were located on separate culminations of the Troubadour structure.

Troubadour -1 drilled Tertiary to 4600 ft (1402 m), Cretaceous to 7085 ft (2159.5 m), Jurassic to 9069 ft (2764 m), Triassic to 10808 ft (3294 m) and possible Upper Permian to 10877 ft (3315 m) where altered granite was encountered and drilled to TD 71349 ft (3459 m). Hydrocarbon shows were encountered in Jurassic sandstones overlain by Upper Neocomian claystones and tight Albian limestones. The recovery of oil from a core and the testing of 0.3205M m³/d of gas from sandstone intervals showed the presence of significant hydrocarbon accumulations on the Sahul Platform. The well was suspended as a gas/condensate discovery.

Sunrise -1 drilled on a separate culmination of the Troubadour structure some 10 mls (16 km) to the north-northeast of Troubadour -1 encountered a similar stratigraphic section as Troubadour -1 terminating in Middle Jurassic sediments at TD 17681 ft (2341 m). Hydrocarbon shows were encountered in Upper Jurassic sandstones and the well was suspended as a gas/condensate discovery.

Geophysical Coverage: Cf. basin notes, data sheets of geophysical surveys, and line density maps. The only magnetic data recorded in the title area are a few lines from the Timor Sea aeromagnetic survey recorded for Arco in 1965 and surface traverses recorded by BMR in 1967 and 1971 as part of their combined gravity-magnetics-seismic surveys. The results give some indications of the regional basement trends in the area.

The gravity data in the area, from the 1967 and 1971 BMR surveys, appear to express large-scale regional trends though a local low appears to be superimposed on the regional trend over the Troubadour structure.

The title area is covered by a reconnaissance grid of early to recent seismic data. The eastern half is covered by a relatively coarser grid but contains some recent coverage. The western half has more detailed coverage particularly over the Troubadour structure. The more recent data are reliable down to the 'T' horizon (Top Triassic).

Regional Setting NT/P12 lies on the outer margin of the Continental Shelf on the boundary between Australia and Indonesia. Water depths vary from 60 m along the southern boundary and around shoals to over 400 m along the northern margin of the title area.

Prospectivity NT/P12 can be conveniently divided into two distinct regions, the Sahul Platform and the Malita Graben

Sahul Platform NT/P12 covers most of the eastern portion of the Sahul Platform, a positive feature since at least late Palaeozoic times. Two wells, Troubadour -1 and Sunrise -1, have been drilled within the title area. Both wells were drilled on separate culminations of the large Troubadour structure which covers the Western third of NT/P12 and extends into NT/P4. The wells were completed and suspended as gas/condensate discoveries, the producing horizon being sandstones within the Jurassic sequence.

The western third of NT/P12 which covers the Troubadour structure has been covered by a semi-detailed seismic grid of modern seismic lines. A large number of fault-controlled culminations have been delineated on the Troubadour structure, all of which must be regarded as prospective.

The eastern flanks of the structure have been covered by a reconnaissance grid of modern seismic lines. These indicate that the eastern flank of the structure dips fairly uniformly with only a few very minor culminations.

Recommendations Because of the recent discoveries of gas/condensate in Troubadour -1 and Sunrise -1, this part of the Sahul Platform must be regarded as highly prospective.

Obviously the Company will want to evaluate thoroughly the entire Troubadour structure. At least three other well locations can be recommended on separate culminations on the Troubadour structure and possibly a flank well. (This program is not allowing for step-out wells to the Troubadour-1 and Sunrise-1 wells.) (9843 ft 3000 m).

The proposed drilling program should be accompanied by additional detailed seismic coverage.

Malita Graben The Malita Graben only extends into the very eastern portion of NT/P12. No wells have been drilled in this area and it has only been covered by broad reconnaissance seismic coverage.

Two small high culminations, possibly an extension of the Heron-Evans Shoal trend, extend into the title area.

Recommendations If work is to be conducted in the area initially further reconnaissance seismic is required followed by detailing any leads and possibly the drilling of a well. (16400 ft) (5000 m).

TITLE ASSESSMENT NT/P19

<u>TITLE HOLDER</u>	Shell Development (Aust.) Pty Ltd
<u>NO. OF BLOCKS</u>	268
<u>EXPIRY DATE</u>	6.7.75
<u>FARMOUT NEGOTIATIONS</u>	Nil
<u>PREVIOUS SIX YEAR CONDITIONS</u>	Not on file

WELLS DRILLED

One well, Lynedoch -1, has been drilled in NT/P19. Lynedoch -1 was drilled on a low-relief anticlinal structure in the north-eastern part of the Malita Graben. The well penetrated Tertiary to 5090 ft, (1551 m) Cretaceous to 12 850 ft (3917 m) and Upper Jurassic to TD 13015 ft (3967 m). A thin hydrocarbon-bearing zone (32 ft (10 m) - probably gas) was encountered within the Lower Cretaceous carbonate interval 12 054 ft - 12 189 ft (3674 m - 3715 m). The Company regarded the interval as being too tight and not worthy of testing and the well was plugged and abandoned.

Geophysical Coverage Cf. basin notes, data sheets of geophysical surveys, and line density maps.

The title area was covered by reconnaissance aeromagnetic traversing carried out by Shell in 1965. The results indicate that magnetic basement is deepest in the northwest part of the title area, about 10 000 m.

BMR recorded gravity data over the area in 1967 and 1971. The data appear to reflect intra-basement anomalies.

The title area is covered by a reconnaissance network of early to recent seismic lines, with most of the recent work concentrated on detailing several structures, namely Lynedoch and a hinge zone structure. The more recent data are considered fair to the base Middle Jurassic horizon ("C").

Regional Setting NT/P19 is located offshore from the northern coast of Northern Australia on the outer continental shelf. Water depths vary from 100 m to in excess of 400 m along the northern boundary.

Prospectivity NT/P19 can be conveniently divided into three distinct regions, the Malita Graben, a 'stable block', and a hinge zone area between these areas.

Malita Graben The Malita Graben covers the western half of NT/P19 - this is regarded by Shell as the 'Mobile Belt' and is separated from the 'Stable Block' in the east by a hinge zone.

One well, Lynedoch - 1, has been drilled on a large structure within the Malita Graben. No significant hydrocarbon shows were encountered and the well was plugged and abandoned at TD 13015 ft (3967 m) in Upper Jurassic sediments.

The area has been covered by a reconnaissance grid of early to recent seismic lines which has detected three significant anomalies. Lynedoch 1 was drilled on the largest of these. The results of Lynedoch - 1 and Heron - 1 wells downgrade the prospectiveness of the Malita Graben structures.

Recommendations Further seismic coverage is necessary to detail known structural leads and to extend reconnaissance over the area. The southern structural lead could prove to be more interesting as it is the larger and is structurally higher than both Heron - 1 and Lynedoch - 1.

'Stable Block' No wells have been drilled on the 'Stable Block' within NT/P19 and the area has only been covered by a broad reconnaissance grid. Money Shoal - 1, drilled farther to the east in NT/P20, encountered a Cretaceous/Jurassic section unconformably overlying Lower Palaeozoic sediments resting unconformably on basement. Within NT/P19 a similar section can be anticipated.

No structural leads have been found and stratigraphic traps appear to be the best prospect.

Recommendation At this stage the area does not appear too prospective but if further work is to be done more seismic coverage is recommended.

Hinge zone Seismic interpretation indicates that the base Mesozoic seismic horizon is faulted down-to-the-basin along a hinge zone by a series of normal faults, and is no longer a mappable seismic reflector. It is suggested that the hinge zone is an area where deeper-water sediments in the subsiding Malita Graben change to strand line and deltaic sediments on the 'Stable Block' during the Lower Cretaceous. Therefore the hinge zone is an area of abrupt change in depositional environment and would be ideally suited for development of beaches and dunes.

APPENDIX

Details of Geophysical Surveys

SURVEY: TIMOR SEA M/S SURVEY NO: 65/11042 MAP CODE: _____
DATES: 12 - 31.10.65 COMPANY: ARCO CONTRACTOR: G.A.I.
TENEMENTS: NT/P4, etc
SEISMIC SOURCE: Sparker PROCESSING:
CABLE: 1100 ft RECORDER: E.G.G. Mod 254
MULTIPLE COVERAGE:
MILEAGE: 1437 miles (total)
REFRACTION: -
GRAVITY: -
MAGNETIC: -
DATA QUALITY: P
RESULTS: Confirmed previous indications of a large sedimentary basin
in the area with structurally interesting areas.

SURVEY: MONTEBELLO-MERMAID M/S NO: 65/11015 MAP CODE: _____
DATES: August-Nov. 1965 COMPANY: BOC CONTRACTOR: Western
TENEMENTS: WA-33P, -34P etc.
SEISMIC SOURCE: Dynamite (251b) 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: Provided reconnaissance coverage into NT/P12.

RANKIN-TROUBADOUR M/S SURVEY

SURVEY: (NORTHERN PORTION) NO: 66/11104 MAP CODE: _____
 DATES: 3.7.66-19.7.66 COMPANY: BOC CONTRACTOR: WESTERN
 TENEMENTS: NT/P6, NT/P12
 SEISMIC SOURCE: Explosives PROCESSING: WESTERN (DIGITAL)
 CABLE: 1200-1200 m RECORDER: F M Analogue
 MULTIPLE COVERAGE: 3 or 2 f
 MILEAGE: 1715.5 (Survey total)
 REFRACTION: 5 Profiles
 GRAVITY: -
 MAGNETIC: -
 DATA QUALITY: P
 RESULTS: Located the Troubadour Structure

SURVEY: ARAFURA M/S SURVEY

NO: 65/11044 MAP CODE: _____
 DATES: 18.11.65-8.1.66 COMPANY: SHELL CONTRACTOR: WESTERN
 TENEMENTS: NT/P19, NT/P20, NT/P21
 SEISMIC SOURCE: Explosives PROCESSING: WESTERN
 CABLE: 1200-1200 m RECORDER: SIE PMR-20 FM (Analogue)
 MULTIPLE COVERAGE: Mainly 3 f, some 6 f, 2 f
 MILEAGE: 664 miles
 REFRACTION: -
 GRAVITY: -
 MAGNETIC: -
 DATA QUALITY: P
 RESULTS: The survey results show sediments thickening to the north.
 (Includes sparker traverse - extension of BMR 65 survey).

SURVEY: LYNEDOGH BANK M/S SURVEY NO: 66/11117 MAP CODE: _____
DATES: 18.9.-21.9.66 & COMPANY: SHELL CONTRACTOR: WESTERN
25.12.66-6.1.67
TENEMENTS: NT/P19, NT/P20, NT/P21
SEISMIC SOURCE: Explosives PROCESSING: WESTERN
CABLE: 1200-1200 m RECORDER: SDS 1010 or Analogue
MULTIPLE COVERAGE: 3 f
MILEAGE: 650.25 miles
REFRACTION: -
GRAVITY: -
MAGNETIC: -
DATA QUALITY: F
RESULTS: Provided regional coverage and outlined the major tectonic
units existing in the 3 permits.

SURVEY: SAHUL SHELF M/S SURVEY NO: 66/11088 MAP CODE: _____
DATES: 2.5.66-25.11.66 COMPANY: ARCO CONTRACTOR: CGG
TENEMENTS: NT/P4, etc
SEISMIC SOURCE: SPARKER 130 kjoule 4 days PROCESSING:
FLEXOTIR
CABLE: RECORDER:
MULTIPLE COVERAGE: 6 f
MILEAGE: 12050 km
REFRACTION: -
GRAVITY: -
MAGNETIC: -
DATA QUALITY: P
RESULTS: The survey outlined the major structural units in the area
including the Sahul Rise.

TIMOR SEA GRAVITY, MAGNETIC
SURVEY: & SEISMIC SURVEY 1967 NO: MAP CODE: — —
DATES: COMPANY: BMR CONTRACTOR: UNITED
TENEMENTS: NT/P19, NT/P6, NT/P4, NT/P12, NT/P11, WA-36-P
SEISMIC SOURCE: 21,000 j sparker PROCESSING:
CABLE: 4600 ft RECORDER: ANALOGUE
MULTIPLE COVERAGE: -
MILEAGE: 13000 miles
REFRACTION:
GRAVITY:
MAGNETIC:
DATA QUALITY: P
RESULTS: Provided a reconnaissance cover over the whole area.

SURVEY: SAHUL RISE M/S SURVEY NO: 67/11166 MAP CODE: — —
DATES: 15.6.67-4.11.67 COMPANY: ARCO CONTRACTOR: C G G, WESTERN &
TENEMENTS: NT/P4, etc NAMCO
SEISMIC SOURCE: -Airguns (NAMCO) -Explosives PROCESSING:
CABLE: 2400 m WESTERN (NAMCO, WESTERN)
2450 m NAMCO RECORDER: Digital - DRF-200 (WESTERN) SDS 1010
MULTIPLE COVERAGE: 6 f (WESTERN), 12 f (NAMCO) (NAMCO)
MILEAGE: 6988 km
REFRACTION: Reversed refractions
GRAVITY: -
MAGNETIC: -
DATA QUALITY: P
RESULTS: The survey confirmed the regional interpretation involving the
Sahul Rise, the Londonderry Rise, the Van Diemen Rise, and the
Bonaparte Depression. Two structural trends are evident, an
older NW trend (Paleozoic) and a younger NE Trend.

SURVEY: ARAFURA D-1 M/S SURVEY NO: 68/3020 MAP CODE: — —
DATES: 22.5.68-30.7.68 COMPANY: SHELL CONTRACTOR: GSI
TENEMENTS: NT/P19, NT/P20, NT/P21
SEISMIC SOURCE: Airgun PROCESSING: GSI
CABLE: 2400 m RECORDER: T.I. 10,000
MULTIPLE COVERAGE: 2 x 12 f, 24 f
MILEAGE: 680 miles
REFRACTION: -
GRAVITY: -
MAGNETIC:
DATA QUALITY: P - F
RESULTS: A number of structural leads were found including the
Lynedoch structure.

LEGENDRE-MARIE M/S SURVEY
SURVEY: PROJECTS J, H, D. NO: 69/3005 MAP CODE: —————
DATES: 12.4.69-1.5.69 COMPANY: BOC CONTRACTOR: WESTERN
TENEMENTS: WA-36-P, NT/P12, NT/P6, NT/P4
SEISMIC SOURCE: AQUA PULSE PROCESSING: WESTERN
CABLE: 7590 ft RECORDER: SDS-1010 (DFR-300)
MULTIPLE COVERAGE: Sum 2, 24-f or Sum 3, 12-f
MILEAGE: 4348.5 (Total)
REFRACTION: -
GRAVITY: -
MAGNETIC: -
DATA QUALITY: P - F
RESULTS: Kelp & Troubadour structures partly detailed.

SURVEY: ARAFURA D-2 M/S SURVEY NO: 69/3006 MAP CODE: _____
DATES: 12.2.69 - 2.3.69 COMPANY: SHELL CONTRACTOR: SHELL (PETREL)
TENEMENTS: NT/P19, NT/P20, NT/P21
SEISMIC SOURCE: Airguns PROCESSING: G.S.I.
CABLE: 2408 m RECORDER: LEACH ACS 1021
MULTIPLE COVERAGE: 24 f
MILEAGE: 1200 km
REFRACTION: -
GRAVITY: -
MAGNETIC: -
DATA QUALITY: F
RESULTS: Coverage over Lynedoch Bank (NT/P19) Structure detailed at
intersection of lines A6929 and A6943 (Lynedoch).

SURVEY: LONDONDERRY RISE M/S NO: 68/3024 MAP CODE: _____
SURVEY
DATES: 12.6.68 - 17.12.68 COMPANY: ARCO CONTRACTOR: C G G
TENEMENTS: NT/P4, etc
SEISMIC SOURCE: Explosives and flexotir PROCESSING: C G G
CABLE: 2400 m RECORDER: Digital
MULTIPLE COVERAGE: 24 f
MILEAGE: 5140 (8270.7 km)
REFRACTION: -
GRAVITY: -
MAGNETIC: -
DATA QUALITY: F - P
RESULTS: A number of structures detailed including Anson.

SURVEY: ARAFURA D-3 M/S SURVEY NO: 69/6 MAP CODE: — —
DATES: 4.10.69-19.10.69 COMPANY: SHELL CONTRACTOR: G.S.I.
TENEMENTS: NT/P19, NT/P20, NT/P21
SEISMIC SOURCE: Airgun (900 cu. inch) PROCESSING: G.S.I.
CABLE: 2400 m RECORDER: DFS 111
MULTIPLE COVERAGE: 24 f
MILEAGE: 2230 km
REFRACTION: -
GRAVITY: -
MAGNETIC: 1525 km
DATA QUALITY: f - g
RESULTS: Provided further detail. No new structural leads.

SURVEY: VAN DIEMEN RISE M/S SURVEY NO: 69/3044 MAP CODE: —————
DATES: 7.7.69-21.8.69 COMPANY: ARCO CONTRACTOR: C G G
TENEMENTS: NT/P4 etc
SEISMIC SOURCE: Explosives PROCESSING: C G G
CABLE: 2400 m RECORDER: SERCEL AS-626
MULTIPLE COVERAGE: 6 f
MILEAGE: 1414.8 km
REFRACTION: -
GRAVITY: -
MAGNETIC: -
DATA QUALITY: f
RESULTS: Several structures detailed (incl. Anson & Heron)

SURVEY: HOLOTHURIA RISE M/S SURVEY NO: 70/8

MAP CODE: _____

DATES: 17.10.70-11.12.70 COMPANY: ARCO

CONTRACTOR: WESTERN

TENEMENTS: WA-36-P, NT/P2, NT/P3 etc.

SEISMIC SOURCE: AQUA PULSE

PROCESSING: WESTERN

CABLE: 2400 m

RECORDER: DDS 777

MULTIPLE COVERAGE: 24 f

MILEAGE: 1068.2 (Total)

REFRACTION: -

GRAVITY: -

MAGNETIC: -

DATA QUALITY: f

RESULTS: Few tie lines to BOC data in WA-36-P.

TRYAL EVANS M/S SURVEY

SURVEY: PROJECTS 70 H, I, J

NO: 70/245

MAP CODE: _____

DATES: 6.3.70-18.7.70

COMPANY: BOC

CONTRACTOR: WESTERN

TENEMENTS: WA-36-P, NT/P11, NT/P12, NT/P6, NT/P4

SEISMIC SOURCE: AQUAPULSE

PROCESSING: WESTERN

CABLE: 9590 ft

RECORDER: SDS 1010

MULTIPLE COVERAGE: 24 f

MILEAGE: 4604.3 (Total)

REFRACTION: -

GRAVITY: -

MAGNETIC: -

DATA QUALITY: g - f

RESULTS: A number of new structures detailed and further detail on named Kelp & Calder structures. Seismic data is superior to earlier work.

SURVEY: BALDWIN BANK M/S SURVEY NO: 72/1 MAP CODE: —
DATES: 13.1.72-20.3.72 COMPANY: ARCO AUST. CONTRACTOR: WESTERN
TENEMENTS: WA-15-P, WA-16-P, WA-17-P, NT/P2, NT/P3, NT/P4, NT/P12, NT/P15, NT/P14
SEISMIC SOURCE: AQUA PULSE PROCESSING: WESTERN
CABLE: 2369 m RECORDER: SDS 1010
MULTIPLE COVERAGE: 24 f
MILEAGE: 1345 km
REFRACTION: -
GRAVITY: -
MAGNETIC: -
DATA QUALITY: f - g
RESULTS: The survey provided detail to semi-detail coverage in NT/P4.
Several low-relief anomalies mapped on the Sahul Rise.

SURVEY: ARAFURA D-4 M/S SURVEY NO: 71/9 MAP CODE: —
DATES: 9.10.71-22.10.71 COMPANY: SHELL CONTRACTOR: G.S.I.
TENEMENTS: NT/P19, NT/P20, NT/P21
SEISMIC SOURCE: Airgun (800 cu. inch) PROCESSING: G.S.I.
CABLE: 2400 m RECORDER: DFS 111
MULTIPLE COVERAGE: 24 fold
MILEAGE: 1385 miles
REFRACTION: -
GRAVITY: -
MAGNETIC: 953 miles
DATA QUALITY: f
RESULTS: 2 structures (incl. Lynedoch) mapped in Calder graben. A
prospective hinge zone on the edge of the graben has been
outlined for further detailing.

SURVEY: CALDER EVANS M/S SURVEY NO: 72/3038 MAP CODE: _____
DATES: 17.9.72-1.10.72 COMPANY: BOC CONTRACTOR: WESTERN
TENEMENTS: NT/P6, NT/P12, NT/P4, NT/P19
SEISMIC SOURCE: Maxipulse PROCESSING: WESTERN
CABLE: 3200 m RECORDER: DDS 777
MULTIPLE COVERAGE: 24 f
MILEAGE: 394
REFRACTION: -
GRAVITY: -
MAGNETIC: -
DATA QUALITY: G
RESULTS: Detailed Anson & Evans Shoal prospects (on southern flanks of
Sahul Ridge). Work also on South Lynedoch & Cootamundra
prospects.

SURVEY: PAGO SEISMIC SURVEY NO: 72/13 MAP CODE: _____
DATES: 25.4.72-25.7.72 COMPANY: ARCO AUSTRALIA CONTRACTOR: WESTERN
TENEMENTS: WA-15-P, WA-16-P, WA-17-P, WA-18-P, NT/P2, NT/P3, NT/P4
SEISMIC SOURCE: Aqua pulse PROCESSING: WESTERN
CABLE: 7590 ft RECORDER: SDS or G.S.I. (2000 km)
MULTIPLE COVERAGE: 24 fold
MILEAGE: 2709 (4359 km)
REFRACTION: -
GRAVITY: -
MAGNETIC: -
DATA QUALITY: f - g
RESULTS: Two lines in NT/P4 on northern boundary of Malita Trough.

SURVEY: ARAFURA D-6 NO: 73/10 MAP CODE: _____
DATES: 22.2.73-3.3.73 COMPANY: SHELL CONTRACTOR: G.S.I.
TENEMENTS: NT P-19, NT P-21
SEISMIC SOURCE: Airgun PROCESSING: G.S.I. (SYD & Singapore)
CABLE: 2400 m RECORDER: DFS 111
MULTIPLE COVERAGE: 24 f
MILEAGE: 910 km
REFRACTION: -
GRAVITY: -
MAGNETIC: -
DATA QUALITY: f - g
RESULTS: No new prospects. 'Hinge zone' prospect detailed in 1972 DS
survey only remaining sizable prospect.

SURVEY: HAT POINT M/S SURVEY NO: 73/5 MAP CODE: _____
DATES: 16.1.73-19.2.73 COMPANY: ARCO AUST CONTRACTOR: G.S.I.
TENEMENTS: WA-15-P, WA-16-P, WA-17-P, WA-18-P, NT/P2, NT/P4
SEISMIC SOURCE: Airgun PROCESSING:
CABLE: 2400 m, 3200 m RECORDER: DFS 111
MULTIPLE COVERAGE: 24 & 48 f
MILEAGE: 2345.5 km
REFRACTION: -
GRAVITY: -
MAGNETIC: 2345.5 km
DATA QUALITY: G
RESULTS: One line recorded over Anson in NT/P4 (H.P. 82).

SURVEY: DILLON SHOALS M/S NO: 73/9 MAP CODE: _____
DATES: 21.6.73-15.7.73 COMPANY: BOC CONTRACTOR: WESTERN
TENEMENTS: WA-36-P, NT/P8, NT/P9, NT/P15
SEISMIC SOURCE: Maxipulse PROCESSING: WESTERN
CABLE: 3200 m RECORDER: DDS 777
MULTIPLE COVERAGE: 24 f
MILEAGE: 533 miles
REFRACTION: -
GRAVITY: -
MAGNETIC: -
DATA QUALITY: G
RESULTS: Western flank of Kelp further detailed 2 small structures
outlined as well as one in western end of WA-36-P.

SURVEY: CARTIER M/S SURVEY NO: 73/11 MAP CODE: _____
DATES: 21.6.73-4.7.73 COMPANY: ARCO AUST. CONTRACTOR: G.S.I.
TENEMENTS: WA-15-P, WA-16-P, WA-17-P, WA-18-P, WA-19-P, NT/P2, NT/P3, NT/P4
SEISMIC SOURCE: Airguns PROCESSING: G.S.I.
CABLE: 2400 m RECORDER: DFS 111
MULTIPLE COVERAGE: 24 f
MILEAGE: 2043 km
REFRACTION: -
GRAVITY: -
MAGNETIC: -
DATA QUALITY: G
RESULTS: In NT/P4: 2 lines crossed structure A-44 and helped to substantiate
the anomaly C52, 54. The northern boundary of the Malita trough has
been crossed by cortier lines which are of sufficient quality to make
some lithological distinctions across the fault boundary. A number
of low-relief structures lie along this boundary - A40, A28, A45, A30,
A43, A44, A31 some of which could be caused by velocity anomalies.

SURVEY: KENDREW-COOTAMUNDRA M/S NO: 74/31. MAP CODE: — —
DATES: 16.12.73-8.9.74 ^{SURVEY} COMPANY: BOC CONTRACTOR: G.S.I. & Western
TENEMENTS: NT/P6, NT/P12, etc.
SEISMIC SOURCE: Airguns & Magnapulse PROCESSING: G.S.I. & Western
CABLE: 3200 m - Aquapulse RECORDER: DFS 111
MULTIPLE COVERAGE: 24 f
MILEAGE: 9191 km
REFRACTION: -
GRAVITY: -
MAGNETIC: -
DATA QUALITY: G
RESULTS: Provided extensive coverage over NT/P6 and NT/P12

SURVEY: CAPE TALBOT M/S SURVEY NO: 74/6 MAP CODE:
DATES: 5.8.74-24.8.74 COMPANY: ARCO AUST CONTRACTOR: G.S.I.
TENEMENTS: NT/P2, NT/P3, NT/P4, WA-15-P, WA-16-P, WA-17-P.
SEISMIC SOURCE: Airgun - 1200 cu. in. PROCESSING: G.S.I.
CABLE: 2400 m RECORDER: DFS 111
MULTIPLE COVERAGE: 24 f
MILEAGE: 1879 km
REFRACTION: -
GRAVITY: -
MAGNETIC: -
DATA QUALITY: G
RESULTS: Detailed the Shearwater Prospect.

SURVEY: ARAFURA - D5 M/S SURVEY NO: MAP CODE: —
DATES: 3.6.72-10.6.72 COMPANY: SHELL CONTRACTOR: S.S.L.
TENEMENTS: NT/P19
SEISMIC SOURCE: Airguns PROCESSING: S.S.L.
CABLE: 2400 m RECORDER: DFS 111
MULTIPLE COVERAGE: 24 f
MILEAGE: 492 km
REFRACTION: -
GRAVITY: -
MAGNETIC: -
DATA QUALITY: G
RESULTS: Detailed coverage over Lynedoch and coverage over the hinge zone between the Malita trough and Arafura.

AUST. CONTINENTAL MARGIN M/S
SURVEY: (TIMOR TROUGH PORTION) NO: MAP CODE: —
DATES: 6.10.72-19.11.72 COMPANY: BMR CONTRACTOR: C.G.G.
TENEMENTS: NT/P4, NT/P12m, NT/P19 etc.
SEISMIC SOURCE: 120 KJ Sparker PROCESSING: BMR
CABLE: 1000 m RECORDER: SIE PT 700 ANALOGUE
MULTIPLE COVERAGE: 6 f
MILEAGE: 4000
REFRACTION:
GRAVITY:
MAGNETIC:
DATA QUALITY: P
RESULTS: Provided reconnaissance seismic, gravity, and magnetic coverage in the Timor Trough.

SURVEY: GULFEX-NT M/S SURVEY NO: 72/8 MAP CODE: —
DATES: 20.6.72-18.7.72 COMPANY: AUST.GULF CONTRACTOR:
TENEMENTS: NT/P4, NT/P6, NT/P12, NT/P19
SEISMIC SOURCE: Aquapulse PROCESSING: On board
CABLE: 5290 ft RECORDER: DDS 777
MULTIPLE COVERAGE: 24 f
MILEAGE: 1813.1 miles
REFRACTION:
GRAVITY:
MAGNETIC:
DATA QUALITY: p-f
RESULTS: Extended reconnaissance coverage outside existing title areas.

SURVEY: NO: MAP CODE:
DATES: COMPANY: CONTRACTOR:
TENEMENTS:
SEISMIC SOURCE: PROCESSING:
CABLE: RECORDER:
MULTIPLE COVERAGE:
MILEAGE:
REFRACTION:
GRAVITY:
MAGNETIC:
DATA QUALITY:
RESULTS:

SURVEY: N.W. Shelf M/S NO: 64/4529 MAP CODE: --- --- ---
DATES: 12.7.64-17.10.64 COMPANY: BOC CONTRACTOR: WESTERN
TENEMENTS: OP108, OP90 (1) and (2), OP92(A), 92(B), 105, 106, PE232H, NE part of
213H, SW part of PE213H
SEISMIC SOURCE: Explosives PROCESSING:
CABLE: 1200 m/2400 m RECORDER: Western Techno magnetic Tape
MULTIPLE COVERAGE: Singlefold
MILEAGE: 3720 km
REFRACTION:
GRAVITY: -
MAGNETIC: -
DATA QUALITY: P-F Multiples obscure deep data
RESULTS: Indications of structural relief were noted on the Sahul Shelf

SURVEY: NO: MAP CODE:
DATES: COMPANY: CONTRACTOR:
TENEMENTS:
SEISMIC SOURCE: PROCESSING:
CABLE: RECORDER:
MULTIPLE COVERAGE:
MILEAGE:
REFRACTION:
GRAVITY:
MAGNETIC:
DATA QUALITY:
RESULTS:

OFFSHORE WELLS - GENERAL DATA.

Well	Title	Rig release	Rig	wd/kb	TD	Deepest horizon
Heron - 1 71/623	NT/P4	5.2.72	Navigator	126'/39'	13808'	U. Jurassic
Lynedoch - 1	NT/P19	8.6.73	Sedco 445	773'/37'	13015'	U. Jurassic
Troubadour - 1 74/113	NT/P12	2.9.74	Big John	(315'/43') 96 m/13 m	(11349') 3459 m	(altered granite) Basement?
Shearwater - 1 74/121	NT/P4	4.11.74	Margie	229'/82'	10425'	M. Jurassic
Sunrise - 1 74/123	NT/P12	2.2.75	Ocean Digger	(522'/98') 159 m/30 m	(7681') 2341 m	L. Jurassic
Money Shoal - 1	NT/P20	21.7.71	Tasman	225'/31'	8498'	Precambrian
Newby - 1	NT/P17	31.12.69	Investigator	245'/40'	3768'	Proterozoic
Flat Top - 1	NT/P17	14.2.70	Investigator	135'/40'	7131'	Proterozoic

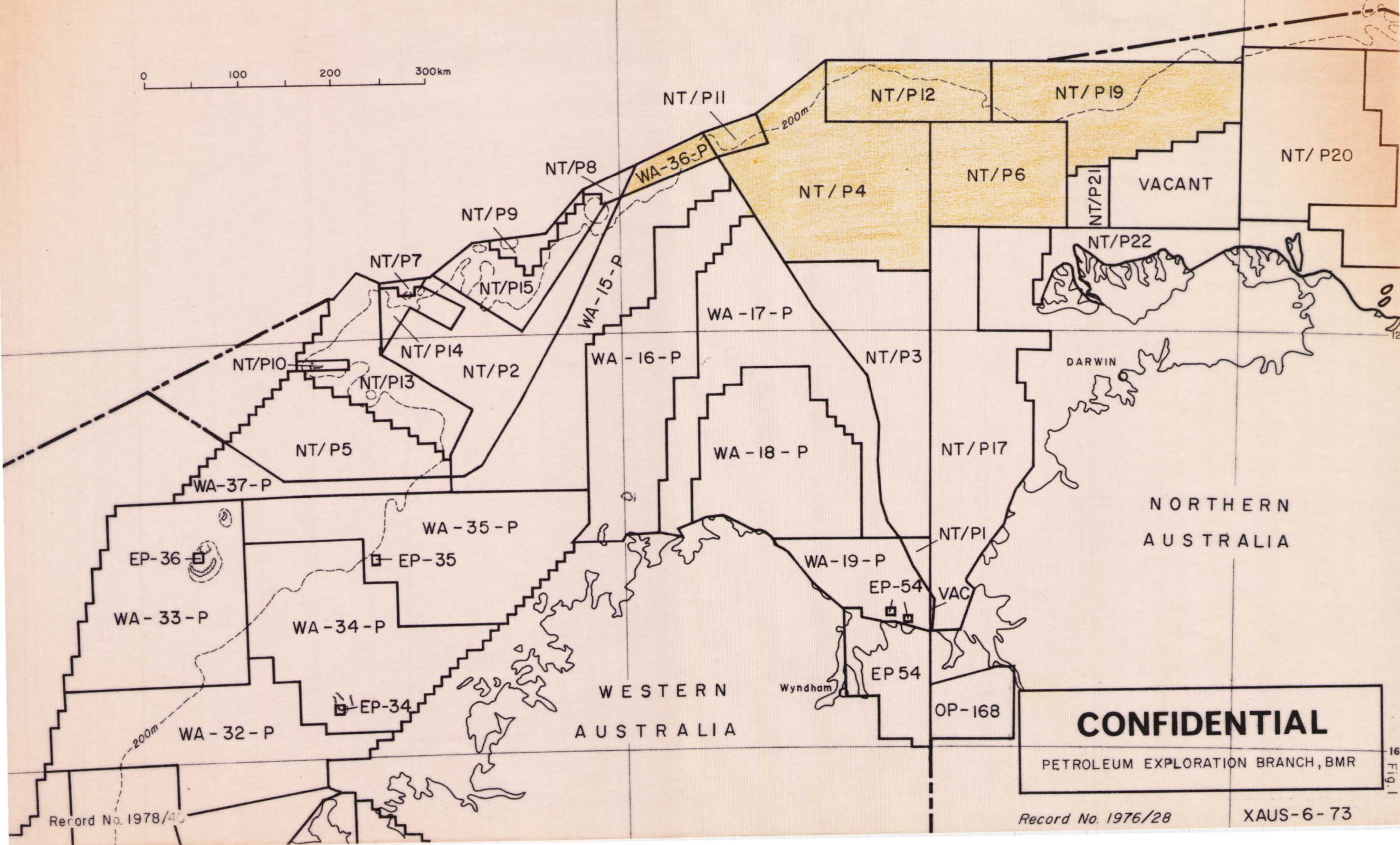
(KB) Top Jurassic	Trap	Tectonic division	Cost \$AMM	Remarks
10350'+	faulted anticline	Malita Graben	3.9	HC in Cretaceous/U. Jurassic Petrel Fm. enhances these intervals as potential source.
12850'	anticline	Malita Graben	5.5	Thin HC interval 12045'-12189' in L. Cret. carbonate.
(7085 ft) 2159.5 m	faulted anticline	Sahul Platform	3.3	Suspended gas/condensate dis- covery from Jurassic sandstones.
10021'	faulted anticline	Malita Graben	?	Slow penetration rates - lack of Ø & HC led to an early abandonment.
(6879 ft) 2096.5 m	faulted anticline	Sahul Platform	1.8	Suspended potential gas/condensate producer.
6712'	anticline	Arafura basin	1.6	Jurassic overlies Silurian overlies Precambrian. No signif. shows.
3150'	strat. pinchout	Darwin Shelf	1.0	No shows
2565'	strat. pinchout	Darwin Shelf	1.2	No shows

Table 2

OFFSHORE WELLS - STRATIGRAPHY		HT/P4	HT/P19	HT/P4	HT/P12 (43')	HT/P12 (98')	HT/P20	HT/P17	HT/P17
		KB + 39'	HT + 37'	KB + 82'	KB + 13m	KB + 30m	KB + 31'	KB + 40'	KB + 40'
		Berco-1	Lynedoch-1	Shearwater-1	Troubadour-1	Sunrise-1	Money Shoal-1	Newby-1	Flat Top-1
Sea bed		165'	810'	311'	(358') 109m	(620') 189m	256'	285'	175'
Tertiary	P				(1378')				
	M	650'	1810'	720'	420m (2846')				
	Oligo				867.5m (3304')				
	E	1750'		2100'	1007m (4072')				
Palaeo					1241m (4600')	(4830')			
U. Cret.	Maes	3374'	5090'	5138'	1402m	1472m (5000')	1007'	816'	620'
	Camp.		7250'		(4856')	1524m (5089')	1330'		
	Sant.		9655'		1480m (4935')	1551m (5168')			
	Coniacian		?11480'		1504m (5072')	1575m (5291')	2700'		
	Turonian				1546m (5132')	1612.5m (5414')			
	Cenoman		11590'		1564m (6956')	1650m (6775')	3870'		
L. Cret.	Alb.	9180'	12058'	9025'	2120m	2066m	5900'		
	Apt		12168'		Abs (7061')	Abs (6864')			
	Neocomian	(top Petrel) 10350'	U 12550'		2152m	2092m		3150'	
U. Jurassic	Tith	10850' ?		10021'					2565'
	Kimm.				(7085')	(6879')			
	Ox.		12850'	Petrel 'C'	2159.5m	2096.5m (6884')			
M. Jurassic	Call.					2098m			
	Bath					(7238')	6712'		
	Baj					2206m			
L. Jurassic					(8107')		7620'		
U. Trias					2471m (9069')				
M. Trias					2764m (9174')				
L. Trias					2796m (9853')				
U. Perm.					3003m (10808')				3210'
L. Perm.					3294m?				
Silurian							8010'		4770'
Proterozoic					(10877')	(7681')			
T.D.		13,808'	13,015'	10,425'	3315'(11349')	3459m	8400'	3660'	7105'
						2341m	8490'	3768'	7131'

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

XAUS-6-73

TIMOR-ARAFURA SEA
PROSPECTIVITY

1 : 1 000 000

Water depth < 200 m > 200 m

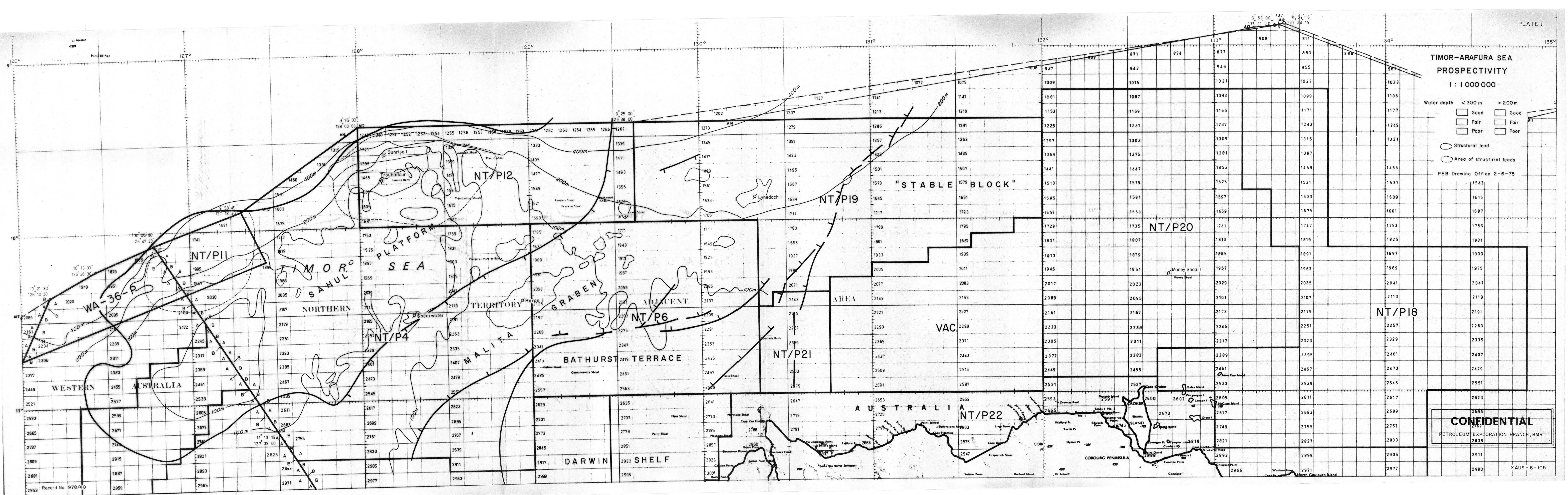
Good Fair Poor

Structural lead
Area of structural leads

PEB Drawing Office 2-6-75

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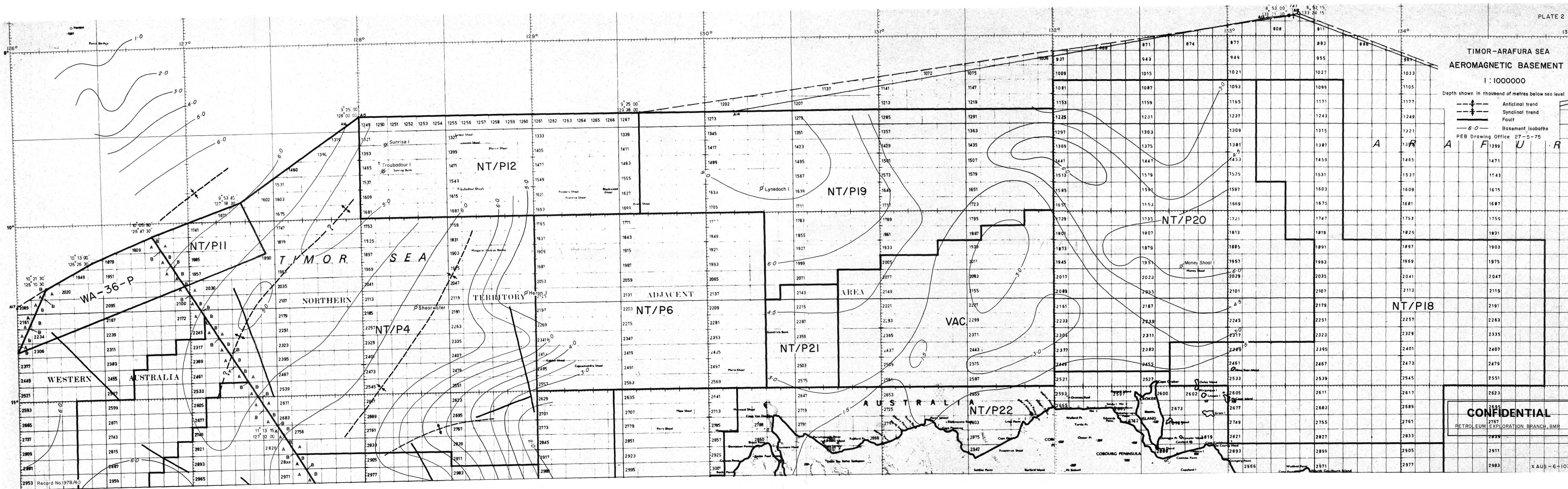


TIMOR-ARAFURA SEA
AEROMAGNETIC BASEMENT

1 : 1000000

Depth shown in thousand of metres below sea level

- Anticlinal trend
 - Synclinal trend
 - Fault
 - Basement isobaths
- PEB Drawing Office 27-5-75



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TIMOR-ARAFURA SEA
SEISMIC REFLECTION LINES

1:1000000

----- 1965-70
———— 1971-74

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