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SUMMARY OF OIL SEARCH ACTIVITIES IN AUSTRALIA AND PAPUA NEW GUINEA DURING 1969

by

K.G. Smith, Evelyn Nicholas, and Marlene J. Raine

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Plate 1. Australia and Papua New Guinea, Petroleum Exploration and Development Wells 1969.

Plate 2. Australia and Papua New Guinea, Geophysical Operations under Petroleum Search Subsidy Act 1959-1969, 1969.

Table 1. Wells drilling in 1969

Table 2. Geophysical operations during 1969.

SUMMARY

During 1969 history was made in mainland Australia by the introduction of natural gas to three capital cities: gas was piped from Roma to Brisbane, from Barracouta Field (offshore - Gippsland Shelf) to Melbourne, and from Gidgealpa - Moomba to Adelaide. Gas reserves were increased in the Pleasant Hills area near Roma, Queensland, the new Grafton Range Field was discovered in the same area, and a few successful gas wells were also drilled on the Mooga area, which adjoins the Grafton Range area on the west. Another important addition to gas reserves came from the Dongara Field in the northern onshore Perth Basin, Western Australia; additional gas reserves were proved in the Mondarra area, about 5 km southeast of the Dongara Field. The operators announced a feasibility study of a pipe line from Dongara to Perth, some 415 km to the south, and another feasibility study in the centre of Australia was conducted to assess the viability of a small refinery at Alice Springs, Northern Territory, to utilize crude oil from the Mereenie Field in the Amadeus Basin. Other promising gas discoveries were made at Toolachee No. 1, South Australia, and Roseneath No. 1, Queensland, both in the Cooper Basin, and Petrel No. 1 in the Bonaparte Gulf, Northern Territory.

The search for oil continued to be disappointing and no new fields were discovered, either onshore or offshore, although confirmation of oil in previously - drilled structures in Bass Strait was obtained, and three oil - producers were drilled on the Dongara Field. Plans for production of oil from the Halibut Field in Bass Strait were deferred until 1970, but the development of the Barrow Island Field, Western Australia proceeded on schedule, and by November 1969 the daily production exceeded 46 000 barrels. On the other hand, production at the Moonie Field, Queensland, declined to about 3 800 bpd, but the decline was halted and daily production rose to about 4 200 barrels by the end of the year.

A noticeable impetus to exploration was given by the formation of some 20 new Australian oil exploration companies, which became very active in appraising sedimentary basins before taking farm-outs from established explorers. The new companies were responsible for drilling seventeen onshore wells and one offshore, and they ran 12 subsidized seismic and one aeromagnetic surveys. None of the new companies discovered oil or gas in commercial quantities but many earned interests of various kinds in farm-out areas and provided valuable stratigraphic and geophysical information for future exploration.

During the year about 300 wells were drilled or in progress and geophysical surveys subsidized under the Commonwealth Government's Petroleum Search Subsidy Act included 75 seismic, 4 gravity, and 6 aeromagnetic surveys. Most of the wells were development and/or water injection wells, on Barrow Island, but about 135 were exploratory wells, of which 36 were either completed, suspended, or drilling offshore and the remainder were either completed or drilling onshore.

The total expenditure on exploration in 1969 was about $88.8 million of which about $14.9 million was paid under the Petroleum Search Subsidy Act. The cost of geological and geophysical surveys made by the Bureau of Mineral Resources, Geology and Geophysics is not included in the total expenditure.

INTRODUCTION

The sources of information for this report are mainly the Final Reports of drilling and geophysical operations carried out under the Commonwealth Government's Petroleum Search Subsidy Act (PSSA), but other information from Press reports, commercial scouting services, the Petroleum Newsletter issued quarterly by BMR, and publications in various journals has been used. It is not possible to verify the accuracy of some of this information.

The Final Reports of operations conducted under the Petroleum Search Subsidy Act deserve special mention. Most of the Final Reports for 1969 are unpublished at present, and are referred to in this report by their Bureau of Mineral Resources (BMR) file number, following their official titles. This is a convenient method, which removes the necessity for long lists of References in this report. The reader should bear in mind that the interpretations in some Final Reports may be changed slightly when they are published by the Bureau, because author and publisher sometimes have the opportunity to revise an interpretation in the light of later knowledge.

Since the results of subsidized operations are kept confidential for a period of six months, it is not possible to include results of surveys completed late in 1969. Plate 2 of this report shows only subsidized geophysical surveys: although numerous unsubsidized surveys were reported during the year, their locations are not always available and their titles are sometimes confusing with regard to the Bureau's nomenclature of subsidized surveys.

ADAVALE BASIN

The only activity during the year was the drilling to 11 106 feet of the subsidized well Eastwood No. 1 by Associated Australian Oilfields N.L. The well was located 87 km northeast of Gilmore on the crest of a seismically determined closure of 70 milliseconds on the "Cooladdi Reflection", with an areal closure of 40 km^2.

After spudding in alluvium the well intersected a thick Cretaceous and Jurassic section (5 000+ feet), some 1 300 feet of Permian, and 3 000+ feet of Carboniferous and Devonian sediments. The Sandstone Member of the Log Creek Formation in the Devonian was the target; only minor gas shows were recorded, and a drillstem test recovered only salt water.

The well was completed as a flowing water well.

AMADEUS BASIN

Magellan Petroleum (N.T.) Pty Ltd was active in the Amadeus Basin throughout the year. Geological field work was carried out during the first six months and four wells were completed.

Tyler No. 1 (spudded on 29 June 1968) was drilled 40 km north of Palm Valley No. 1, high on the east flank of a small seismically defined anticline. Stratigraphically it correlated well with Palm Valley No. 1, spudding in the Brewer Conglomerate of the Pertnjara Group and reaching T.D. at 12 599 feet in the Stairway

Sandstone. There were no significant hydrocarbon shows. The formations were generally thicker than expected, and the porosity was reduced by secondary silicification.

The unsubsidized northwest Mereenie No. 1 was plugged and abandoned after reaching T.D. 5 000 feet in the Pacoota Sandstone, which lacked porosity.

The subsidized West Waterhouse No. 1 (T.D. 6 528 feet) was completed as a shut-in water well. It spudded in the Pertnjara Group and bottomed in the Pacoota Sandstone, where there was a small gas show.

The unsubsidized Palm Valley No. 2 was drilling on the Palm Valley Anticline at the end of the year.

ARCKARINGA BASIN

The South Australian Government carried out three crew months of seismic work in the western part of the basin and drilled four shallow wells.

BONAPARTE GULF BASIN

Three subsidized wells were drilled during the year, one onshore and two offshore.

Australian Aquitaine Petroleum Pty Ltd drilled the deepest hole in Australia, Keep River No. 1, about 150 km east of Wyndham. The well was spudded in September 1968 and reached T.D. 15 623 feet in February 1969. Keep River No. 1 spudded in the Kulshill Formation of the Lower Permian, and penetrated some 10 000 feet of Carboniferous and 6 000 feet of Upper Devonian strata. It bottomed in a sandstone of Upper Devonian (Cockatoo Sandstone) or Proterozoic age. There were strong gas shows at a number of depths in the Carboniferous, equivalent to the hydrocarbon yielding intervals in Bonaparte No. 2, drilled in 1964.

Arco Ltd drilled the first offshore well in the basin, Lacrosse No. 1, followed by Petrel No. 1, both subsidized. Lacrosse No. 1 was drilled on a seismically determined faulted anticline. It penetrated some 300 feet of Tertiary-Quaternary sediments, 250 feet of Triassic, and 9 000 feet of Permian, reaching T.D. at 10 020 feet in the Permian. Although there were good shows of oil in the cores drillstem tests were disappointing owing to the poor permeability of the reservoirs. Stratigraphically, the well verified the offshore extension of Palaeozoic sediments known onshore.

Petrel No. 1 was located on a large, seismically determined closed anticline. The well blew out with high pressure gas when drilling at 13 057 feet and was suspended. Final results of the drilling are not available.

Australian Aquitaine Petroleum Pty Ltd drilled an unsubsidized offshore well, about 200 km northwest of Darwin. Newby No. 1 was drilled to 3 768 feet, there were no hydrocarbon shows.

Three subsidized seismic surveys were completed during the year:

1. Parry Shoal Marine Seismic Survey (BMR File 69/3011) in L2.

2. Van Diemen Rise Seismic Survey (BMR File 69/3044) in W.A. 15P, 16P, 17P, N.T. P2, 3, 4.

3. Lone Hill Seismic and Gravity Survey (BMR File 69/3051) in O.P. 162, N.T.

The first survey was by Longreach Oil Ltd and covered 610 line miles (981 km). The objectives were to determine the thickness of section, to delineate closed anomalies and to examine the possibility that Cretaceous source beds truncate known reservoir horizons.

Record quality was an improvement on previous surveys. The results showed that the sedimentary section in L2 is rather thin, 2 200 feet - 7 000 feet. The pre-Cretaceous sediments thicken to the northeast.

The Van Diemen Rise survey by Arco Australia Ltd covered 879 miles (1415 km) and was planned to give detailed and semi-detailed coverage in the north and west parts of the permits and a short detailed survey of a structure in the central area. The results confirmed the previously recognized structures with better definition of their extent and closure, and one new structure was discovered in the eastern area. Five main seismic horizons were recorded in the Sahul Shelf area from the top of the Lower Permian to the bottom of the Tertiary.

The Lone Hill survey by Australian Aquitaine Petroleum Pty Ltd consisted of refraction and gravity work in the Keep River area, and reflection work in the Kulshill area.

The results are as follows:

1. Keep River area: The approximate extent of the seismic marker MI (Ningbing Limestone) south of Keep River No. 1 was delineated, and new information on marker M2 (Milligan Beds) was obtained.

2. Kulshill Area: The Providence Hill Structure was better defined. The anticline is subcircular in shape, and seems to be closed.

Closure on the Tree Point Prospect was not confirmed.

Additional Bouguer data were obtained in the Keep River Area.

Australian Aquitaine Petroleum Pty Ltd drilled the unsubsidized well, Newby No. 1, 130 miles (209 km) northwest of Darwin. There is no available information. The subsidized well, Sahul Shoals No. 1 by B.O.C. of Australia Ltd, was drilling at the end of the year.

BOWEN BASIN

One well was drilled in the Bowen Basin in 1969.

Target Exploration Pty Ltd, drilled the subsidized well Moura No. 1, about 160 km southwest of Gladstone, on the crest of a small, faulted, seismically determined anticline on the eastern flank of the Mimosa Syncline. It penetrated

a thick section of Permian to Recent sediments and was plugged and abandoned at a T.D. of 10 000 feet in the Cottenham Sandstone Member of the upper Permian Barfield Formation. There were no reservoir rocks, and no significant hydrocarbon shows.

Planet Exploration Co Pty Ltd started the subsidized Denison East seismic survey which was in progress at the end of the year.

CANNING BASIN

The following geophysical surveys were carried out during the year:

1. Contention Heights Seismic Refraction and Gravity Survey (BMR File 69/3036) in W.A., P.E., 151H and 152H.

2. Baron Range Seismic and Gravity Survey (BMR File 69/3052) in P.E. 205H.

3. Bedout Marine Seismic Survey (BMR File 69/3013) in W.A. 2-P, 21-P, 22-P, 23-P.

4. Wallal Aeromagnetic Survey (BMR File 69/3037) in W.A. 21-P and P.E. 30H.

5. Munro Arch Seismic Survey (BMR File 69/3042) in P.E. 30H.

6. Matches Springs Seismic Survey (BMR File 69/3023) in P.E. 259H.

7. Alexander Seismic Survey (BMR File 69/3057) in P.E. 151H and 152H.

8. Jurgurra Terrace Seismic Survey (BMR File 69/3075) in P.E. 270H.

9. Munro R-1 Seismic Survey (BMR File 69/3081) in P.E. 270H.

The Contention Heights Survey was carried out by Australian Aquitaine Petroleum Pty Ltd, with the objective of the mapping of the eastern edge of the south-east Kidson Sub-Basin, the delineation of structures, the delineation of the northeasterly extension of the Ordovician refractor, and the investigation of the possibility of pinch-out. The results were generally good.

The basement was shown to rise to the north and east. Four markers were recorded, one in Upper Proterozoic 'basement', one in the Ordovician (top of the 'Middle Formation'), and two in the Devonian (top of the Carribuddy Formation, and top of the Mellingerie Limestone). The Ordovician marker pinches out onto the basement and is totally covered by the Carribuddy. Closure may have been confirmed on two anticlines.

The Baron Range Survey by Australian Aquitaine Petroleum Pty Ltd was carried out to the south of the Contention Heights Survey. Its objectives were to map the eastern border of the southeastern Kidson Sub-Basin, to correlate refractors with those in the Wilson Cliffs area, to delineate the geographic extent of Palaeozoic sediments, to check a gravity anomaly possibly representing a structural high, and to investigate the possibilities of pinch-out.

The seismic quality was good enough to yield the following results:

1. The basement rises to the east.

2. The Ordovician? thins towards the east.

3. The Carribuddy Formation totally covers the Ordovician and overlaps the limit of pinch-out.

4. Two anticlines were delineated.

During April West Australian Petroleum Pty Limited (WAPET) carried out the Bedout Marine Seismic Survey in the Point Sampson - Cape Leveque area. This was a reconnaissance survey covering 784 line miles (1262 km). The objectives were to determine structure and thickness of strata, to map the offshore extension of the Fitzroy Trough and the Baskerville Anticline, and to obtain information on the thickening of Jurassic-Cretaceous sediments in the southern part of the offshore Canning Basin.

The results were generally good. The northern limit of the Fitzroy Trough offshore could not be defined, but the southern limit (Dampier Fault) was shown to extend offshore; the Baskerville Anticline plunged northwest through the area surveyed. The Jurassic-Cretaceous sediments seem to be an offshore extension of the Willara Sub-basin. Nineteen structural anomalies were mapped and there were numerous stratigraphic anomalies (pinch-outs, truncations etc.).

WAPET carried out the Wallal Aeromagnetic Survey, of 1 410 flight line miles (2 270 km) covering about 14 800 km^2. The main aim was to delineate the offshore extension of the Wallal Platform and Wallal Embayment and the faults separating these features, and to define the depth to basement and the basement configuration.

Four main zones were delineated from the results:

Zone 1 - shallow basement, in the west and south, of the order of 3 000 feet.

Zone 2 - immediately east of zone 1, forming the extension of the Wallal Embayment, which continues northwest to the edge of the survey area. The basement rises from 13 000 feet near the coast to 7 000 feet in the northwest. The eastern limit of the zone a fault at the edge of the "Wallal Platform" which is known onshore and continues northwest out of the survey area. The throw on the fault ranges from 5 000 to 9 000 feet.

Zone 3 - representing the Wallal Platform. The basement depth is constant at 3 000 feet except in the west where it is about 5 000 feet. No extension of the Wallal Fault was found.

Zone 4 - this is north of the Wallal Platform and marks the beginning of a basin which develops northward.

WAPET completed the Munro Arch Seismic Survey in December. The results are not yet available.

Total Exploration Australia Pty Ltd carried out the Matches Springs Seismic Survey, about 68 miles south-southeast of Broome, the objectives being to evaluate anomalous gravity features, and to extend control north and east of the Edgar Range No. 1 well. The record quality ranged from poor to fair except on one line, where it was 'fair to good'.

Two horizon maps and one isochron map were prepared. Horizon A, within the Lower Permian Grant Formation, and horizon B within the Ordovician Thangoo Limestone were both identified from Edgar Range No. 1. Five anomalies were discovered, one of which had been the site for Edgar Range No. 1. Matches Springs No. 1 and Mowla No. 1 were later drilled on two others.

Lennard Oil N.L. completed the Alexander Seismic Survey of over 110 line miles (180 km). The objective was to evaluate anomalous gravity features, and to check dispersals indicated by the Napier Refraction Survey (BMR 68/3033).

Four horizons were mapped but not identified, and a number of features were recommended for further detailed work.

The Munro R-1 and Jurgurra Terrace seismic surveys were both carried out by WAPET. The first in an area about 150 km south of Broome, and the second in the central western part of the basin, 120 km south of Derby. No results are available to date.

The two wells drilled by Lennard Oil N.L., Napier Nos 1 and 2, were located on the Lennard Shelf north of the Fitzroy Trough. The first was drilled on a closed seismic structure to determine the fluid content of reservoirs. Precambrian basement was intersected at 5 816 feet underlying Lower Carboniferous to Middle Devonian, no hydrocarbons were recorded. Although permeability was generally very low, several permeable water-saturated sands were revealed on the electrical logs.

Napier No. 2, 30 km northeast of the first well, was sited on a small 'high' delineated by refraction seismic work (BMR File 68/3033). No final results are available as yet but information released to the press suggests that a very similar section was encountered to that found in Napier 1. The well was terminated at 5 272 feet and although three gas zones were tested in a zone consisting mainly of Devonian limestones and sandstones no commercial hydrocarbons were recorded.

Total Exploration Australia Pty Ltd drilled Matches Springs No. 1 on a seismic structure to test Middle to Upper Devonian carbonates and Member 'E' of the (?)Upper Ordovician to (?)Upper Devonian Carribuddy Formation. The Permian was thinner than had been expected; the Poole Sandstone was absent, and the Grant Formation was eroded to the Cuncudgerie Sandstone Member. The Middle to Upper Devonian carbonates were much thicker than expected and were thought to be deposited in a reef environment. The Carribuddy Formation was thinner than expected, and beneath Member 'E', a thick unnamed limestone conformably overlies the Goldwyer Formation.

No reservoirs were found either in the Carribuddy or the Goldwyer Formation, T.D. was 9 300 feet.

Mowla No. 1 was located about 25 km southwest of Matches Springs No. 1 and about the same distance from Edgar Range No. 1 to the northeast. It was spudded in November and no results are available.

CARNARVON BASIN

The following geophysical work was completed by WAPET.

1. Jurabi Marine Seismic Survey (BMR File 68/3059)
2. Offshore Bernier Aeromagnetic Survey (BMR File 69/3031)
3. Fraser Marine Seismic Survey (BMR File 69/3015).

The Jurabi Survey was included in BMR Record 1969/153.

The Bernier Survey covered an area west of Bernier Island eastwards to the coast where the Rough Range Trend and structures associated with it extend offshore.

The results showed that the area can be divided into three distinct magnetic regions which are, from north to south:

1. A region of many small anomalies. The magnetic trends are easterly and northeasterly. One large magnetic anomaly occurs in the extreme north.
2. A region of wide anomalies. The magnetic trend is northeast.
3. A region of large anomalies with relatively large amplitudes.

The magnetic trends are northwest and easterly.

The depth to magnetic basement was at 30 000 feet near Cuivier No. 1, rising southwards towards Carnarvon to 15 000 feet. The Rough Range Fault was recognized north of Cuivier No. 1. North of the fault the magnetic anomalies originate within the sediments from depths between 5 000 feet and 14 000 feet.

The Fraser Marine Seismic Survey covered an area from 110 km north of Barrow Island to Point Cloates, with 357 line miles (571 km) of reflection traversing.

It had seven objectives:

1. To get semi-detailed control on several northeast trending anticlines in the survey area.
2. To determine the depth to basement on the Oceanic High by means of a refraction probe.

3. By means of a refraction probe, to check depth to basement in an area where deep pre-Cretaceous data was lacking (? shallow basement).

4. To provide additional control on the Vlaming Trend.

5. To improve seismic control in Exmouth Gulf, south of Muiron Island.

6. To improve structural control on a north plunging anticline which had a hydrocarbon show in Observation Island No. 1.

7. To extend reconnaissance to 600 feet water depth near Muiron Island and 70 miles north of Barrow Island.

The following results were obtained:

1. Two anticlinal features were confirmed and evidence found of another.

2. The depth to basement was 18 000 feet, so that the high suggested by aeromagnetic survey was not confirmed.

3. At least 5 000 feet of pre-Cretaceous sediments were indicated.

4. Additional control was gained in the Vlaming area and Exmouth Gulf south of Muiron Island.

5. Additional control was gained in the Observation Island area, but further definition of features is required.

WAPET drilled four unsubsidized wells during the year. The following information was released to the press.

Flinders Shoal No. 1 was located about 30 km south-southeast of Barrow Island. It reached a depth of 11 861 feet before being plugged and abandoned. Gas shows proved to be non-commercial when tested.

Wonangara No. 1 was located 73 km south of Onslow. It was terminated at 1 888 feet.

Beagle No. 1 was drilled 76 km northeast of Onslow. It was plugged and abandoned at 1 835 feet.

Fortescue No. 1 was a stratigraphic core hole. It was located on an island about 45 km southeast of Barrow Island. It was terminated at 2 000 feet.

WAPET completed the subsidized well, Anchor No. 1. It was located at the southern end of the 'Barrow Basin', on a seismically determined fault trap in Mesozoic rocks about 44 km west-northwest of Onslow, 105 km southeast of the Barrow Island Oil Field, and 5 km west of Anchor Island. The well was plugged and abandoned at T.D. 10 002 feet; there was no evidence of hydrocarbons.

Pendock ID No. 1 was drilling in the last half of the year and there are no final results available as yet.

Remarkable Hill No. 1 started in 1968 and reached T.D. of 10 520 feet in 1969. It was located in the southern part of the basin on a seismically determined anticline and penetrated strata of Lower Cretaceous to Permo-Carboniferous age. It correlated stratigraphically with Quail No. 1 and Giralia No. 1. There were no hydrocarbons but several sandstones in the upper 2 000 feet of Permian showed good reservoir characteristics although containing only water. The Birdrong Sandstone youngest of the Cretaceous sediments and lying unconformably on the Permian, was also an excellent potential oil reservoir but contained only brackish water.

B.O.C. of Australia Ltd drilled Dampier No. 1 about 150 km northwest of Point Sampson and 45 km south of Madeleine No. 1, on a seismically determined anticline. It penetrated sediments of Tertiary to Upper Jurassic age, and reached T.D. at 13 588 feet. The Upper Jurassic sediments contained hydrocarbons, but had insufficient porosity and permeability. It was plugged and abandoned.

B.O.C. also drilled Madeleine No. 1 following the completion of Dampier No. 1. Final results are not available but the following information was released to the press; the well was abandoned at 14 526 feet when fishing operations failed to release a stuck drill pipe. There were hydrocarbon shows at a number of intervals, and before the failure of fishing operations, an extensive testing programme had been announced.

CARPENTARIA BASIN

BMR mapped the 1:250,000 Sheets of Millungera, Donors Hill, and Burketown, and parts of Cloncurry, Dobbyn, Croydon and Gilberton, and drilled five shallow stratigraphic holes. No other exploration activity was reported, either onshore or offshore.

CLARENCE-MORETON BASIN

Clarence River Basin Oil Exploration Co. N.L., drilled the unsubsidized Clifden No. 6 well. This well was located some ten miles north of Grafton, N.S.W., and near the site of Clifden No. 2 well, which reported gas shows. The Clifden No. 6 well failed to find hydrocarbons and was abandoned at 1 980 feet.

DALY RIVER-WISO BASIN

There was no exploration activity in 1969.

COOPER BASIN

The following subsidized geophysical work was completed during the year:

1. Southern Cooper Basin Seismic and Gravity Survey (BMR File 69/3010) in O.E.L. 20 and 21, S.A.

2. Yamma Yamma Seismic Survey (BMR File 69/3021) A.T.P. 66/67P, Qld.

3. Carraweena and Murta Seismic and Gravity Surveys (BMR Files 69/3045, 69/3063) in O.E.L. 20/21, S.A.

4. Packsaddle - Innamincka Seismic and Gravity Survey (BMR File 69/3078) P.E.L. 5, 6 S.A.

Delhi-Australian Petroleum Ltd carried out the first survey, of approximately 565 line miles (910 km) in the desert country on the southeast flank of the basin.

There were three objectives:

1. To detect anomalies found on previous surveys.

2. To define seismically the area between Toolachee Nos 1 and 2 wells.

3. To provide more regional information, particularly at the edge of the Permian basin to locate stratigraphic traps.

The results indicated a regional thickening of the prospective Gidgealpa Formation to the north and west, with some truncation of this section to the south and east. A thin but persistent Permian section extends farther southeast than expected but the limit was not defined. Three horizons were mapped, C(Mesozoic), P(Top of Permian) and the base of the Gidgealpa Formation.

The Delhi/Santos wells, Toolachee Nos 1 and 2 and Mulga No. 1 encountered the C and P horizons at shallower depths than expected owing to an unexpected decrease in Mesozoic velocities.

The data for the upper horizon around Tinga Tingana No. 1 (1968) was re-interpreted, and major changes in the maps of the upper two horizons resulted. All the horizons will therefore need to be re-calculated to tie the wells, using revised contouring.

The sediments thin over nearly all of the structural highs, except in the Dulingarie area, where C-P and the Gidgealpa Formation thicken down-dip to the east from Dullingarrie No. 1.

Most of the faults found were believed to have developed either during deposition of the middle or lower Gidgealpa Formation or before.

Alliance Oil Development Australia N.L. carried out the Yamma Yamma Seismic Survey in the Lake Yamma Yamma area of Queensland. The objectives were to define the closure of the Gilpeppee Anticline, and to evaluate the extension of the Permian into the area and seek new structures.

The quality of the data varied from good to poor. The C and P horizons were mapped. The Lake Yamma Yamma depression may be a graben. There appears to be little or no Permian on top of the Gilpeppee Structure, but the Permian thickens on the flanks.

Total Exploration Australia Pty Ltd carried out the Epsilon Seismic Survey. It is intended to link this with the Lake Yamma Yamma Survey, and the work was continuing at the end of the year.

Pexa Oil N.L. carried out the Carraweena and Murta Seismic and Gravity Surveys in the Murta block adjacent to the Daralingie and Gidgealpa fields. This was completed in October, but no results are available.

Alliance Petroleum Australia N.L. completed the subsidized Packsaddle-Innamincka Seismic Survey at the end of the year. Flinders Petroleum and Asburton Oil N.L. were conducting the subsidized Innamincka Seismic and Gravity, and the Lake Gregory Seismic and Gravity Surveys respectively.

Six unsubsidized and three subsdizied wells were drilled during the year.

Delhi Australian Petroleum Ltd and Santos Limited drilled Pando No. 2, Toolachee Nos 1 and 2, and Mulga No. 1, all unsubsidized. The following information was released to the press:

Pando No. 2 was located 2.5 km southeast of No. 1 and 48 km south-southwest of Gidgealpa No. 7. It was plugged and abandoned at 6 219 feet. The Permian sequence included tight sands and although a trace of gas was recorded in a core, a drillstem test yielded only water.

Toolachee No. 1 was located 13 miles west of South Australia - Queensland border. It struck gas at 6 826 feet, which flowed at a rate of 6.9MMcfd through a 7/16" choke, and at 6 942 feet yielding 4.1MMcfd through a 7/16" choke.

Toolachee No. 2 located 13 km north of No. 1 reached a T.D. of 7 203 feet and was plugged and abandoned without any appreciable hydrocarbon shows being recorded.

Mulga No. 1 was located 35 km southwest of Toolachee No. 1, and 64 km south-east of Moomba. It was plugged and abandoned at 6 477 feet as a dry hole.

Pexa Oil N.L., drilled Wirrarie No. 1 to test the Gidgealpa Formation and identify the basement. It was located about 39 km west-southwest of Moomba No. 1. It was plugged and abandoned at 7 258 feet in pre-Permian basement. There were no significant hydrocarbon shows.

Pexa also drilled Topwee No. 1 about 16 km to the north of Wirrarie No. 1. In a drillstem test gas flowed from Permian sands at the rate of 25 000 cfp/D. The well was plugged and abandoned at 7 310 feet.

Total Exploration Australia Pty Ltd drilled the subsidized well, Roseneath No. 1, in Queensland, about 32 km from the South Australian border to T.D. of 7 208 feet. Final results are not available, but the following information has been released to the Press:

12/12/69	DST	7MMcfd "very wet gas", ½" choke, 1500 psi st sfc over interval 6 950 feet - 7 258 feet.
6/1/70	DST	5.8MMcf/d from two intervals - 6 965 feet - 6 990 feet and 6 957 feet - 6 962 feet.

Flinders Petroleum N.L. drilled the subsidized well Arrabury No. 1 in the northern part of the basin in Queensland, very close to the South Australian border. The well was in progress at the end of the year.

Alliance Oil Development Australia N.L. drilled the subsidized well Gilpeppee No. 1, 96 km northeast of Arrabury No. 1, and 255 km west of Quilpie. The well was in progress at the end of the year.

EROMANGA BASIN

The following subsidized geophysical work was carried out during the year:

1. Thomson River Seismic Survey (BMR File 69/3035) in A.T.P. 130P, Qld
2. South Chandos Seismic Survey (BMR File 69/3048) in A.T.P. 98P, Qld
3. Harkaway Seismic Survey (BMR File 69/3058) in A.T.P. 99P, Qld
4. Hamilton Gate Seismic Refraction Survey (BMR File 69/3085) in A.T.P. 144P, Qld and P.E.L. 157 and 146, N.S.W.
5. Carraweena Seismic and Gravity Survey (BMR File 69/3045) in O.E.L. 20/21, S.A.
6. Winnathee Seismic Survey (BMR File 69/3082) in P.E.L. 125, N.S.W.

Longreach Oil Ltd carried out the Thomson River Survey to check the area west of Stromhill No. 1 for structural entrapment conditions which had been indicated by previous surveys. 72.75 miles (117.1 km) of conventional reflection work was completed. The record quality was good throughout the area.

The results indicated that little or no Permian occurs.

Four horizons were mapped:

1. A- Toolebuc Limestone ? (Lower Cretaceous)
2. B- Hooray Sandstone ? (Jurassic - Lower Cretaceous)
3. C- Adori Sandstone ? (Jurassic - Lower Cretaceous)
4. D- Basement

The structure of each horizon was similar. Two major faults, Stormhill and Thomson River were delineated. The Thomson River Fault was previously unreported, but the Stormhill Fault was known from previous geophysical surveys.

One major closed anticline truncated by the Thomson River Fault was found in the northwest. This was recommended for drilling. Two other anticlines were also found by the survey, one of which was the location for Stormhill No. 1, subsequently plugged and abandoned as a dry hole.

Alliance Oil Development Australia N.L. carried out the South Chandos Seismic Survey. The objective was to locate a closed culmination on the Chandos Anticline, between Chandos No. 1 and Cumbroo No. 1 wells. The results were good, and a closed structure was indicated.

The same company completed the Harkaway Seismic Survey in October. The results are not yet available.

N.S.W. Oil and Gas Company N.L. was conducting the Hamilton Gate Seismic Refraction Survey at the end of the year. This is located on the Thargomindah Gravity Platform and straddles the western end of the Queensland - N.S.W. border, east of the Bulloo River.

North West Oil and Minerals Co. N.L. were conducting the Winnathee Seismic Survey at the end of the year. The results are not yet available.

Following the South Chandos Seismic Survey, Alliance drilled the subsidized well, Chandos South No. 1, located 13 km south-southeast of Chandos No. 1 and 30 km north of Cumbroo No. 1, i.e. up-dip from Chandos No. 1 and down-dip from Cumbroo No. 1.

The well did not encounter significant hydrocarbons, and was terminated at 8 032 feet. The final results are not available.

Following the Thomson River Seismic Survey, Longreach drilled the subsidized Stormhill No. 1 well, located on the flank of a seismically determined anticline apparently closed against the Stormhill Fault. The vertical closure was 400 feet over an area of 39 km^2. The survey indicated that the structure was open to the south.

The well drilled through some 5 000 feet of Mesozoic sediments before reaching basement (Palaeozoic) and was plugged and abandoned at 5 099 feet.

There were minor traces of hydrocarbons. The Hutton Sandstone and younger (lower Jurassic?) sandstone contained freshwater. The Hooray and Adori (lower Cretaceous to Jurassic) sandstones, and the Hutton Sandstone had good porosity and permeability.

EUCLA BASIN

The only activity in 1969 was the drilling of one subsidized well, Mallabie No. 1 by outback Oil Co. N.L. It was drilled following gravity surveys, and one refraction seismic survey, to confirm the presence of a broad trough or sub-basin.

It penetrated strata of Tertiary (Lower Miocene, Eocene), Lower Cretaceous, Permian, pre-Permian (Cambro-Ordovician?), Proterozoic?, and Archaean age and was plugged and abandoned at 4 902 feet in granitic gneiss. The sedimentary section was thicker than previous data indicated. The presence of sediments beneath the pre-Permian volcanics was confirmed. There were no significant hydrocarbon shows.

GALILEE BASIN

Two wells were drilled during the year, both subsidized.

Longreach Oil Ltd drilled Rand No. 1, 4 km west of Marchmont Homestead and up-dip from Marchmont No. 1 well, as a test of the basal Permian sandstone found in Marchmont No. 1 and in a position to reach the stratigraphic pinch-out indicated by the re-interpretation of Rodney Downs and Rodney Creek Seismic Surveys.

The well spudded in Lower Cretaceous (Tambo Formation) and penetrated some 3 000 feet of Cretaceous and Jurassic sediments before entering the Permian. It passed into Carboniferous sands at approximately 6 000 feet and was plugged and abandoned at a depth of 6 516 feet.

There were no significant hydrocarbon shows. The Jurassic sandstone was flushed by freshwater and is considered non-prospective. The Blythesdale Formation (Cretaceous) and Hutton Sandstone (Jurassic) have porosities of 20-25% and excellent permeability.

Muttaburra No. 1 was drilled by Pursuit Oil N.L., 21.7 km south-southwest of Muttaburra, as a test of Permian and ?Upper Carboniferous sands, in a seismically-defined structure. It was plugged and abandoned at 4 753 feet in volcanic basement. No final results are available.

Alliance Oil Development Australia N.L. conducted the Booranghoop Seismic Survey (BMR File 69/3073) in A.T.P. 126P, Qld, but no Final Report is available at present.

Flinders Petroleum N.L. were conducting the Koburra Seismic Survey at the end of the year.

GEORGINA BASIN

There was no exploration activity in 1969.

GIPPSLAND BASIN

This section of the report includes work in the Bass Basin, which joins the Gippsland Basin Off-shore. During 1969 there was much more drilling than in 1968, but less geophysical work. Unfortunately the drilling met with scant success and Esso Exploration and Production Australia Inc. drilled eighteen consecutive wildcats, all of which were dry, but confirmed the previous interpretation of the size and outline of the Barracouta Gas Field by drilling Barracouta-3 some 5.5 km west of the Barracouta platform. Esso-BHP's Snapper-2 'confirmed the gas column and oil show' in the Snapper Field, and their Bream-2 found 'oil below 5 900 feet' and 'hydrocarbon shows below 8 900 feet'.

Gas was piped from the Barracouta Field to Melbourne, but the expected production of oil from Halibut and Kingfish fields did not eventuate due to the Marlin A-6 blowout of December 1968, industrial trouble, and delays to pipe-laying and platform construction caused by bad weather. Later in the year, Hematite Petroleum Pty Ltd (a wholly owned subsidiary of one of the partners, the Broken Hill Pty Co Ltd) negotiated a contract to sell its share (50%) of liquid petroleum gas from Bass Strait to a Japanese company.

Esso Exploration and Production Australia Inc. was the operator for a marine seismic and magnetic survey in the Gippsland Basin, and two similar surveys in the Bass Basin. Woodside Oil N.L. conducted an unsubsidized seismic survey in the Seaspray-Paradise Beach area, and Magellan Petroleum Southern Pty Ltd completed a marine magnetic survey in the east Gippsland Basin.

Esso's Gippsland G69A Marine Seismic and Magnetic Survey (BMR File 68/3058) commenced in 1968 but was not completed until March 1969. It was carried out in P.E.P. 38 and 39, Vic, and E.L. 1/60, Tas. The objective was to get detailed information on structure in a part of the southwestern Gippsland Basin where stratigraphic traps had been indicated by previous surveys. The G69A Survey involved a total of 1 598 miles (2573 km), but only 272 miles (438 km) were subsidized.

The results confirmed the onlap of the Tertiary Latrobe Valley Coal Measures onto shallow basement, and the promising nature of the stratigraphic trap. Water depth was generally less than 300 feet.

The East Gippsland Basin Marine Magnetic Survey (BMR File 68/3049) was conducted by Magellan Petroleum Southern Pty Ltd in P.E.P. 63A, 63B (Vic.) and T 1/P (Tas.). 640 miles (1 030 km) were surveyed, the primary objective being a comparison of basement configuration by the two methods was seriously hampered by the poor quality of the marine magnetic data.

Esso's Bass B69A Marine Seismic and Magnetic Survey (BMR File 68/3057) consisted of about 1 100 km of survey digitally recorded, in the southeastern part of the Bass Basin, in TP4 and TP6, Tas. The objectives were to obtain additional

reconnaissance control, and some detail, over the "Heron" area, which had been partly surveyed by the Bass EF-68 Seismic Survey (BMR File 68/3014) during 1968. The B69A survey showed that of the following five horizons could be mapped: top of Oligocene, top of Eocene, top of Palaeocene, Cretaceous unconformity and basement.

No structural anomalies were observed on the younger three horizons, all of which dip gently towards the centre of the basin. Several igneous intrusions into the top of Oligocene horizon were noted in the southwest of the survey area, and volcanic extrusives (the oldest known extrusives in the Bass Basin) were interpreted in the top of Eocene Horizon, again in the southwest. The Cretaceous unconformity is regional in extent, but cannot be mapped in the southwest, in the southeast it shallows and overlies an unknown sedimentary section about 18 000 feet thick. The basement is extremely faulted; a prominent anomaly extends northwest from near the Tasmanian coast, parallel to line B69A-8A, and is interpreted as a large horst 95 km long with complex faulting on the crest and northwestern flank. The seismic event reflecting basement is difficult to correlate in much of the area. The magnetic results of the B69A survey are inconsistent with the seismic, and depths to basement by magnetic determinations are generally 30-50%, less than seismic calculations.

Magellan Petroleum Australia Limited conducted a large survey - the Tasman - Bass Strait Marine Seismic and Magnetic Survey (BMR File 69/3025), using Sparker and air-gun energy sources, from about Nowra in N.S.W. to N.W. Tasmania. In the eastern part of the Gippsland Basin the survey delineated one drilling prospect, and found several others in deep water.

Only two of the wells (drilled by Esso Exploration and Production Australia Inc. as Operator for Esso-BHP - Table 1) were subsidized.

Groper No. 2 was drilled to test a large stratigraphic trap at an up-dip location from Groper No. 1; sands of the Eocene Latrobe Valley Coal Measures were the primary objective. All horizons were lower than expected because of errors in velocity data; the target formation (2 501-2 761 feet) contained exeellent reservoir sands (net thickness of 139 feet) but these contained water. Beneath the Eocene section the basement consisted of ?Devonian Avon River Group and this was completely unexpected.

Bluebone No. 1 Well (BMR File 69/2029) was drilled in Tasmanian waters, 32 km north of Flinders Island. Like Groper No. 2 it was located on a stratigraphic pinch-out of the Latrobe Valley Coal Measures onto basement, with a seal of overlying Oligocene Lakes Entrance Formation.

The target formation (1 714-1 940 feet) contained sands of only moderate porosity, and poor permeability. The formation contained water. Basement in this well was granite, at 1 940 feet.

Ashburton Oil N.L. were drilling the onshore subsidized well Milton No. 1 at the end of the year.

LAURA BASIN

Exploration activity in this basin consisted of two marine seismic surveys and one on land; all three were subsidized. No drilling was done.

The Offshore Laura Basin Seismic Survey (BMR File 69/3041) was conducted in Q9-P by Endeavour Oil Company N.L. The survey consisted of 336 miles (541 km) of 6-fold reflection coverage, digitally recorded, and its objective was to obtain information on the gross structure of the northern, offshore part of the basin. Two horizons were mapped - A, near the top of the Mesozoic; and B, basement. The regional dip of the basement is east, and its maximum depth was interpreted as 3 150 feet. The regional dip of horizon B is west. Two reversals were indicated.

Exoil N.L. was the operator for the Princess Charlotte Bay Offshore Seismic Survey (BMR File 69/3047), and Crusader Oil N.L. conducted the onshore Breeza Plains Seismic Survey (BMR File 69/3059). The results of these surveys are not available at present.

MARYBOROUGH BASIN

There was one marine seismic survey, but no other activity was recorded. Shell Development (Australia) Pty Ltd was the operator for the subsidized Hervey Bay R-1 Marine Seismic Survey (BMR File 69/3002). The objectives were to follow up some leads from the subsidized Hervey Bay Seismic Survey (BMR File 64/4569) in the north of Q13-P and to do experimental and reconnaissance work in the southern part of the title area. 128 miles (206 km) of reflection work with 2400% cover, using air-gun methods, were completed.

Two horizons were mapped, and in general the survey showed that the section is thicker than indicated by the Swain Reef Aeromagnetic Survey of 1966 (BMR File 63/1712), and is about 19 000 feet in places. Large scale block-faulting is interpreted, of late Lower Cretaceous or early Tertiary age. The faults trend north and northwest. There is evidence of another minor period of faulting in early Lower Cretaceous time.

MURRAY BASIN

No wells were drilled in 1969, but some subsidized seismic surveys were completed, and several others commenced. Interest in the northern part of the basin was maintained, but some of the exploration effort was transferred to the southeast. Here the N.S.W. Oil and Gas Company N.L. began the following surveys, which received Ministerial approval for Subsidy entitlement, but for which no results are yet available: The Mossgiel Seismic Refraction Survey, NSW (BMR File 69/3055) in P.E.L. 161; the Hay Seismic Refraction Survey, NSW (BMR File 69/3064) in P.E.L. 162 and the Jerilderie Detailed Gravity Survey, NSW (BMR File 69/3079) in P.E.L. 160.

In the northern Murray Basin, Associated Australian Oilfields N.L. conducted the subsidized Sunset Seismic Survey (BMR File 69/3018) in P.E.L. 3, (South Australia) and P.E.P. 64 (Victoria). This was a reflection and refraction survey of 318 line miles (512 km) to determine basement depth and configuration,

and the location and depth of a basal Cretaceous sandstone which might be prospective.

The refraction work achieved its objectives and outlined a small sub-basin southeast of the Renmark Trough. The quality of the reflection data was poorer than anticipated, but pinch-out of ?basal Cretaceous sand over some highs in the sub-basin were indicated. Three pinch outs, all at about -2 300 feet (sub-sea) and designated the Meribah, Meringur, and Yarrara prospects, provide reasonable drilling targets provided that the regional water level does not much exceed - 2 490 feet (sub-sea) i.e. the top of the water filled sandstone in Berri North No. 1 drilled in the area in 1967. Cretaceous sediments were absent in the southern part of P.E.P. 64 (Vic.) and this area is now regarded as non-prospective.

The N.S.W. Oil & Gas Company N.L. was operator for the Nambucurra Refraction Survey (BMR File 69/3046) in P.E.L. 156. The survey area was about 150 km southeast of Broken Hill, on both sides of the Darling River. 87.5 line miles (141 km) of reconnaissance refraction coverage were obtained. The following refraction events were recorded:

1. 4 400-6 000 ft/sec. - shallow layer;

2. 10 000 ft/sec. on E. end of Line 3;

3. 15 500-16 100 ft/sec. over part of the area;

4. 18 500 ft/sec. (basement), over the whole area.

An interpretation of the results suggests a regional nose plunging southwest, with the 15 500-16 100 f.p.s. refractor onlapping the flanks of this structure.

The Redbank Seismic Survey (BMR File 69/3039) was carried out in P.E.L. 113 by North Australian Petroleum Company to define the limits of a structure centred on Station 38, Line R-7 of the 1968 Tandon-Coombah Survey (BMR File 68/3007). The 'thumper' method was used on the Redbank survey, and records were generally fair to good; three horizons were mapped, one in Tertiary, one near the top of the Middle Devonian, and the third at basement. An interpretation of the results shows (1) that the anomly centred on Station 38, Line R-7 of the 1968 survey does not extend to the northeast; (2) evidence of stratigraphic pinch-outs in sediments overlying basement; (3) structural closures against a major fault with the east block upthrown.

N.S.W. Oil and Gas Co. N.L. completed two seismic refraction surveys in the Murray Basin in 1969. The Hay Seismic Refraction Survey (BMR File 69/3064) was carried out in the Killendoo Trough, P.E.L. 162, N.S.W., and consisted of 62.5 miles (100.5 km) of refraction work. A refraction with velocity of 18 000 ft/sec had a depth ranging from 800 to 3 700 feet, and was assumed to be either metamorphic/crystalline basement or compacted Lower Palaeozoic sediments. A core hole was proposed to identify this basement at shallow depth.

The Mossgiel Seismic Refraction Survey (BMR File 69/3055) consisted of 47.5 miles (16.5 km) refraction coverage in the Dolmoreve Trough. Results were somewhat similar to those of the Hay Refraction Survey, in that a 17 200 ft/sec refractor was observed reliably over the whole area, and is considered to be basement. However, a possible deeper refractor was indicated in one locality.

A belt of Devonian sediments to the north and northeast of the Murray Basin, and extending beneath it, has been given several names, in whole or in part, and some confusion exists with regard to what basin these sediments occupy. They will not fit the definition of Murray Basin in the BMR 1969 E.C.A.F.E. paper*, but it is appropriate to consider them in a section of the report adjacent to that on the Murray Basin, because exploration in both areas overlaps.

In 1969, the N.S.W. Oil & Gas Company N.L. carried out field work, drilling, and geophysical exploration in this area.

The subsidized Nelyambo Seismic Survey (BMR File 69/3004) in P.E.L. 163, N.S.W., was a 6-fold CDP reflection survey. The data quality ranged from good to unreliable, and most of the good data came from the eastern side of the survey area. In general, the seismic results agreed well with previous gravity data, and indicated two distinct geological zones - a lower one of steeply-dipping sediments, and an upper one of gently-dipping rocks. No structures suitable for drilling were found.

The subsidized Blantyre Basin Gravity Survey (BMR File 69/3029) in P.E.L. 163, N.S.W., covered an area of 1 450 km^2, with the establishment of 2 341 new stations. It was a detailed survey to follow previous reconnaissance in the East Blantyre Sub-Basin, and a "gravity spur" to the south. The results showed anomalous trends which may indicate structural closure, and they showed that the 'gravity spur' trends west and includes two separate positive anomalies. The easternmost anomaly was later tested by Mt Emu No. 1 well (BMR File 69/2038).

The subsidized Pinnally Refraction Seismic Survey (BMR File 69/3034) was conducted in P.E.L. 114 and 164, N.S.W., and consisted of 80 miles (130 km) of reconnaissance refraction work. The objectives were to evaluate structure and stratigraphy in the northwest part of the Bancannia Trough, and to locate a drill site for the identification of seismic refractors. Four refractors were mapped, including one with velocity of 18 100 ft/sec, which is believed to be either basement or compacted sediments of Lower Palaeozoic age. This refractor was mapped over the whole area, and its depth is generally about 3 000 to 5 000 feet, but it rises to about 1 000 feet below the surface in the northwest of the survey area.

Planet Exploration Company Pty Ltd carried out the Lake Poopelloe R-3 Seismic Survey to analyse structural conditions in the area which is one where prospective palaeozoic rocks could occur below Quaternary and Tertiary cover. The results were generally poor in terms of reflection quality. The results were interpreted to indicate the presence of a monotonous unprospective sedimentary section down to (?) 12 000 feet accompanied by (?) complex folding and faulting.

The N.S.W. Oil and Gas Co. N.L. drilled Gnalta No. 1 to a total depth of 2 356 feet in P.E.L. 155, N.S.W., some 65 km northwest of Wilcannia, but this was an unsubsidized shallow stratigraphic well and the results are not available.

*BMR, 1967 - The Sedimentary Basins of Australia and Papua-New Guinea and the Stratigraphic Occurrence of Hydrocarbons. ECAFE Symp. Devel. Petrol. Resour. Asia Far East, Canberra, 1969.

The Company also drilled three subsidized wells. Poopelloe Lake No. 1 (BMR File 69/2014) was located on a surface anticline where Lower Devonian sediments were exposed. The objective was to obtain stratigraphic information on Lower Devonian and older sediments. No significant formation changes were evident from surface to total depth (2 377 feet) and no fossils were found. All sandstones penetrated were strongly silicified.

Mount Emu No. 1 well (BMR File 69/2038) was drilled to test the sequence in P.E.L. 163, N.S.W., and was located on a well-defined positive gravity anomaly which was determined by the Blantyre Basin Gravity Survey (BMR File 69/3029). The well was drilling at the end of 1969.

Jupiter No. 1 well (BMR File 69/2005) was also drilled by N.S.W. Oil and Gas Co. N.L. in P.E.L. 114, N.S.W., and the well was located about 80 km northeast of Broken Hill. No significant hydrocarbons were found, and there was insufficient cap rock in the sequence. The well reached total depth of 6 008 feet in Upper Devonian sediments.

NGALIA BASIN

There was no activity during the year.

OFFICER BASIN

Murumba Oil N.L. carried out field work in the eastern part of the basin. Otherwise there was no activity.

OTWAY BASIN

Eight geophysical surveys were completed and one was still in progress at the end of the year:

1. Otway 069A Seismic Survey (BMR File 69/3003) in O.E.L. 22, S.A.
2. Mayurra - Panhandle Seismic and Gravity Survey (BMR File 69/3032) in P.E.L. 8, S.A.
3. Otway 069B Marine Seismic and Magnetic Survey (BMR File 69/3061) in S.A. 2, P.E.P.s 40 and 41, S.A.
4. Otway EV-68 Gravity Survey (BMR File 68/3056) in O.E.L. 22, S.A.
5. Cape Patterson Seismic Survey (BMR File 69/3068) in Vic/P5, Vic.
6. Geltwood Beach Marine Seismic Survey (BMR File 69/3019) in P.E.L. 8 (formerly O.E.L. 22), S.A.
7. Terang-Portland Gravity Survey (BMR File 69/3054) in P.E.P. 5 and 6, Vic.
8. Hawkesdale Seismic Survey (BMR File 68/3053) in P.E.P. 5 and 6, Vic.

9. Macarthur-Portland Seismic Survey (BMR File 69/3080) in P.E.P. 5, Vic.

The last survey was in progress at the end of the year.

The Otway 069A Survey by Esso Exploration and Production Australia Inc. completed 182 line miles (155 of 6-fold CDP, 24 of 3-fold CDP, and 3 of single fold CDP). The objective was to map the Beachport, Lake Eliza, Lucindale, Camelback, and Mount Hope basement highs, which were outlined by previous gravity and magnetic surveys and by sparse seismic coverage.

The following results were obtained:

1. Top of economic basement. Reflection quality was poor to fair. A structure map on the basement shows block faulting, with the major faults oriented northwest. Five significant horst blocks were located and identified as Lucindale, Camelback, Lake Eliza, Beachport and Mount Hope.

2. Top of Pretty Hill Sandstone. This horizon is an unconformity within the Lower Cretaceous Otway Group between the Pretty Hill Sandstone, and the overlying mudstone. Reflection identification was by correlation of land and marine data and tying to Crayfish No. 1. The Pretty Hill Sandstone thins abruptly over the basement highs.

3. Base of the Tertiary. This is difficult to correlate on the seismic sections and is a minor unconformity. It does not reflect the buried basement, or the Lower Cretaceous structures. The Tertiary thins regionally to the northwest.

The Mayurra-Panhandle Seismic Survey by Beach Petroleum N.L. was located in the area between Millicent and the coast and completed 12 miles (20 km) of 6-fold CDP coverage. It defined a series of seismic highs, trending parallel to the coastline, and plunging south under Lake Bonney. The Upper Cretaceous section thins over the highs.

The Otway 069B Survey was carried out by Esso Exploration and Production Australia Inc. 206 line miles (332 km) of 12-fold CDP coverage were completed. This was digitally recorded and the results integrated with previous surveys.

It was hoped to obtain additional detailed information on known structural anomalies in three areas:

1. 32 km south of Warrnambool - a faulted anticline at the base of the Tertiary.

2. An area near the South Australian-Victorian border to the southeast of a seismic anomaly.

3. A faulted anticline 30 km southeast of Crayfish No. 1 well.

The quality of the data was an improvement over previous surveys. The third prospect was confirmed and is a reasonable drilling target, but faulting is so complex in others that structural closure is small, and an unfavourable growth history for hydrocarbon accumulation can be demonstrated.

The Cape Patterson seismic survey by Mid-Eastern Oil N.L. extended 25 km offshore between Cape Liptrap and Cape Schank. No final report is yet available.

The Geltwood Beach Seismic Survey was by Beach Petroleum N.L. Seventeen miles of 6-fold CDP coverage were completed, the results confirming closure on the Geltwood Beach Anticline at the pre-Upper Cretaceous unconformity level and indicating the southwesterly trend of the anticline offshore. The possibility of wedge-out and/or thinning of the Upper Cretaceous onto the Beachport High was not confirmed.

The Terang-Portland Gravity Survey by Shell Development (Australia) Pty Ltd covered the area from Woolsthorpe and Caramit eastward through Terang and Camperdown to the western shore of Lake Corongamite and the area between the towns of Portland and Nelson. No final report is available as yet.

The Hawkesdale Seismic Survey by Shell was programmed to delineate basement structural anomalies (Woolsthorpe, Moyne, Corrigan and Branholme highs) indicated by previous gravity surveys. The results confirmed that the Moyne, Corrigan and Branholme gravity highs were basement highs, although the basement topography proved to be very complex. The reflections from the basement were good, but rather poor from shallower formations. However, it was possible to select two drillsites: Moyne No. 1 and Hawkesdale No. 1. The survey was the first use of Geoflex explosive in Australia. It proved successful as an adequate energy source, in time saving compared with conventional explosives, and in low cost.

The last survey, also by Shell, was not completed by the end of the year.

Seven subsidized wells were drilled during the year by Esso Exploration and Production Australia Inc., Pursuit Oil N.L., and Shell Development (Australia) Pty Ltd.

Esso drilled three wells in South Australia on the Crayfish Platform structures defined by the Otway 069A survey: Lake Eliza No. 1, Lake George No. 1 and Lucindale No. 1. The target was the Pretty Hill Sandstone of the Otway Group (Lower Cretaceous).

Lake Eliza No. 1 drilled through some 1 200 feet of Tertiary sediments before intersecting the Otway Group. The Pretty Hill Sandstone was present (811 feet thick). Two drillstem tests in the target sand recorded only mud and gas-cut saltwater. The well was terminated in steeply dipping ?Palaeozoic metasediments at 4 831 feet.

Lake George No. 1 drilled through some 1 300 feet of Tertiary and some 500 feet of Upper Cretaceous sediments before reaching the Otway Group. It was

terminated in ?Palaeozoic metasediments at 4 491 feet without encountering the Pretty Hill Sandstone.

Lucindale No. 1 drilled through a Tertiary sequence into the Otway Group. The Pretty Hill Sandstone was present (749 feet thick), but a drillstem test recorded mud and slightly muddly salt water. The well was terminated in ?Palaeozoic basement at 3 203 feet.

Esso drilled one offshore well, Mussel No. 1, Vic., located on a seismically - determined north-dipping tilted fault block to test the Upper Cretaceous Waarre Formation with Tertiary sands as a secondary target.

After drilling through some 4 500 feet of Tertiary sediments the Upper Cretaceous Sherbrook Group was intersected:

Sherbrook Group	Feet
Belfast Formation	2 000 +
Flaxmans Formation	200 +
Waarre Formation	450 +

The sandstones of the Waarre Formation had porosity up to 25% and permeability up to 1650 MD.

There were no significant hydrocarbon shows and the well was terminated in the Otway Group (Lower Cretaceous) at 8 038 feet.

Pursuit Oil N.L. drilled Hindhaugh Creek No. 1 in Victoria. This was located on geophysical evidence. Final results are not yet available.

OXLEY BASIN

No wells were drilled during the year.

Alliance Petroleum Australia N.L. completed the Blackville Seismic Survey (BMR File 69/3007) in P.E.L. 85, N.S.W.

Four lines of 6-fold CDP reflection survey, digitally processed, were shot in an area west and northwest of Quirindi, the objective being to obtain useful data below the top of the Permian, and to investigate gravity highs.

The record quality ranged from poor to fair.

Two horizons were mapped:

(A) 'Top' of Permian?

(B) Top of Werrie Formation?

(A) is possibly a lower coal seam of the Upper Coal Measures. It is correlated with the 'top' of Permian mapped in the Breeza Seismic Survey (BMR File 68/3034). A clear structural picture was not obtained. No closure could be determined over a gravity high.

PERTH BASIN

1969 saw a considerable increase (over 1968) in drilling onshore, and considerable success in finding hydrocarbons. Ten wells were drilled in the Dongara area and only one was dry - six produced gas, and three produced oil, in commercial quantities. Offshore, an encouraging show of oil was found in Gage Roads No. 1 well, and this was the first oil from Lower Cretaceous sediments in the basin. A feasibility study was announced for a pipe-line from Dongara to Perth, some 420 km to the south. Marine and land seismic work continued, and some aeromagnetic surveys were conducted. West Australian Petroleum Pty Ltd was the sole explorer, except for a well drilled by Union Oil Development Corporation in the southern part of the basin.

WAPET'S Pelsart Marine Seismic Survey (BMR File 69/3014) was run in the northern part of the basin, in WA-13-P and 14-P. The objectives were to provide reconnaissance coverage north of Geraldton (western extension of lines west of Dongara and Beagle Ridge) and semi-detailed work over the Turtle Dove anomaly (to establish the western flank), the Geelvink anomaly, and the Wedge Island - Green Island area (to establish an island drilling site).

The reconnaissance work showed:

1. A featureless, thin section (1 000 - 6 500 feet) north of Geraldton.
2. Regional west dip, and northwest trending faults, upthrown to the west, on the extension of lines west of Dongara.
3. Two broad anticlines west of the Beagle Ridge; closure was inferred.

The detailed work showed:

1. Definite west dip could not be established on the Turtle Dove anomaly, but closure against a northwest fault along the western side of the anomaly was indicated. Closure was also indicated on a series of northwest trending anticlines southwest of the Turtle Dove anomaly.
2. North plunge at pre-Jurassic levels was confirmed on the Geelvink anomaly, with the plunge terminating at a fault.
3. A structure suitable for an island drilling site could not be established because several programmed lines near Wedge Island could not be surveyed due to shallow water and local fishing activities.

Onshore in the northern Perth Basin, WAPET'S Namban Seismic Survey (BMR File 69/3025) in WA-14-P was designed to determine the presence of an embayment of thick Cretaceous rocks which are present offshore near Gage Roads No. 1 and Quinns Rock No. 1 wells. This was part of a larger survey in adjoining areas excluded from Commonwealth Subsidy. The Namban Seismic Survey was partly experimental in testing methods of improving record quality through the Coastal Limestone. The experiments were reasonably successful and the 'Geoflex' 12-fold work proved superior to 6-fold dynamite shooting.

Data quality was fair to good, and the margin of a Cretaceous embayment was delineated. Several interesting structural features were noted, but all requires more work.

WAPET'S Koombana - Wedge Island detail marine seismic survey (BMR File 69/3060) was completed in WA-13-P and WA-14-P during 1969, but results are not yet available.

The only other geophysical survey in the northern Perth Basin was the Offshore West Beagle aeromagnetic survey (BMR File 69/3050) in WA-13-P, WA-14-P, PE 27H and PE 228H. This survey covered an area averaging 65 km wide offshore, and its primary objective was to map basement on the Turtle Dove trend. The results showed that basement is at 6 000 - 7 000 feet; the survey also clearly outlined the western margin of the Beagle Ridge and showed the deep sedimentary trough between the Greenough Block and the Turtle Dove Trend.

In the southern Perth Basin the Wonnerup-Flinders Seismic Survey (BMR File 68/3060) of Union Oil Development Corporation was conducted in P.E. 261H to evaluate anomalies indicated in previous surveys, and to extend detailed contral southwards. The survey consisted of 81.44 line miles (131 km) of 6-fold CDP reflection survey digitally processed.

The data ranged from very poor to good. Five horizons were mapped (two shallow, three deep) and identified from Whicher Range No. 1 well. The shallow horizons were reliably mapped, but mapping of the deeper ones was hindered by faulting. Two attractive structures were discovered, and one was regarded as a suitable drilling target without additional work.

WAPET'S Koombana Marine Seismic Survey (BMR File 69/3008) was designed primarily to obtain reconnaissance control in an unexplored area west, south, and southeast of the Precambrian Leevwin Block, and to extend existing control to the northwest of Cape Naturaliste.

The results showed a thin sedimentary sequence to the south and east of the Leevwin Block, and no further work was recommended there. However, the survey confirmed the presence of a thick sequence of prospective sediments north and northwest of Cape Naturaliste. Several faulted anticlines trending north were indicated in pre-Cretaceous sediments, but no attractive closed structures were found in Cretaceous and younger rocks.

WAPET'S Harvey Seismic Survey (BMR File 60/2022) was an onshore survey in the southern Perth Basin in PE 27H and 261H. It was completed in 1969 but results are not yet available.

Late in 1969 WAPET began the Harvey D-1 Seismic Survey (BMR File 69/3074) over the Harvey Ridge, but the results are unknown at present.

The Offshore Leeuwin Aeromagnetic Survey (BMR File 69/3053) was conducted by WAPET in WA-13-P and 14-P. The survey covered about 13 000 km^2 of the southern

Perth Basin, between Cape Naturaliste and Point D'Entrecasteaux, plus a small area near Mandurah.

The survey showed that a north-trending basin over 6 000 feet deep begins some 19 - 22 km west of the Leeuwin Block. The results confirmed the southern extension of the Perth Basin. The Dunsborough and Darling Faults were located. In the Mandurah area basement is from 6 000 to 10 000 feet deep.

The only offshore well drilled was WAPET'S Gage Roads No. 1 (BMR File 68/2039) in WA-13-P, located 14 km west-northwest of Rottnest Island, to test a seismically-determined feature trending north, with about 1 000 feet of vertical closure against a fault. The seismic evidence suggested that closure was restricted to beds below an unconformity at the base of the Lower Cretaceous section. However, oil (of high paraffin content) was discovered in the Lower Cretaceous 'Gage Sandstone Member' (informal name) of the South Perth Formation. This was the first oil discovered in the Lower Cretaceous of the Perth Basin, and although it was not commercial, rates of up to 500 bopd (plus saltwater) were recorded. The oil was discovered in the interval 5 720 - 5 886 feet, where sandstone beds had porosities exceeding 25% and permeabilities ranging to 1 130 md, but averaging 350 md. Hydrocarbon shows were also encountered in the Yarragadee Formation, in the interval 8 590 - 8 680 feet, but porosity was less than 15%; in general, porosity and permeability decreased from 5 900 feet to total depth in this well. An important stratigraphic result from the well was the discovery of a previously unknown upper Miocene dolomite which was very porous and permeable.

The only onshore well in the southern Perth Basin was Union Oil Development Corporation's Blackwood No. 1 (BMR File 69/2017) which was drilled 26.5 km northeast of Augusta to test the Permian Irwin River Coal Measures in a seismically-determined anticline with closure of 450 feet on the Permian 'D' horizon. Gas shows (methane) were recorded in the Permian sequence but permeability of cores was low to moderate, and three open hole drillstem tests (9 199 - 9 994 feet) indicated that sandstone beds were tight. The Mesozoic and Permian sequences were generally similar to those drilled in the Whicher Range No. 1 well in 1968.

In the northern Perth Basin, ten wells were drilled in the Dongara area. Three other wells were drilled to the east and southeast, but all of these were dry. All the wells were drilled by WAPET, and none were subsidized.

The Dongara wells were Nos 8-17 inclusive; No. 13 was dry, Nos 8, 14, and 17 produced oil, and Nos 9, 10, 11, 12, 15, and 16 produced gas. In all cases, the producing intervals were at about 5 500 ± 200 feet. Few details are publicly available, but the reservoirs are probably of Triassic age.

Mondarra No. 3, some 5 km east of the southern part of the Dongara Field, had only minor shows of hydrocarbons, and Mondarra No. 4 showed no hydrocarbons. Strawberry Hill No. 1, a few kilometres northeast of the Mondarra wells, also failed to produce significant hydrocarbons.

PIRIE - TORRENS BASIN

There was no activity during the year.

ST VINCENTS BASIN

No wells were drilled during the year.

Beach Petroleum N.L. completed the Troubridge Island seismic survey (BMR File 68/3061) in O.E.L. 24 S.A.

A total of 114 miles (183 km) was shot during this marine survey. The lines crossed anomalous areas previously defined in the St Vincent Gulf marine seismic survey (BMR File 67/11192), and it was hoped that this survey would establish critical 'closure' over anomalies found during the earlier one.

The structures investigated included the Troubridge Island structure, and the Point Stanvac structure. A refraction probe was shot over the Troubridge Island structure to establish depths to Cambrian limestone, and shallower reflectors.

Results from the Yorketown-Point Vincent seismic survey (BMR File 66/11101) were reviewed, and some processed digitally to improve the quality.

Two horizons were mapped, 'T' or top Cambrian, and 'C' or tentative lower Middle Cambrian. Unconformity, and two structures - the Sultana Point Anticline and the Point Stanvac structure - are outlined at both levels, the first being the more pronounced.

A northeast trend across the Gulf of St Vincent, from the Edithburgh Anticline to the general Port Gawler region, seems to be associated with both structures, and there is a cross trend across the Gulf from the Stansbury area towards Carrickalinga Head.

Beach Petroleum N.L. were conducting the subsidized Lake Fowler seismic, magnetic and gravity survey at the end of the year.

SURAT BASIN

Forty five wells were drilled during the year. 18 were development, 2 were subsidized, and the remainder unsubsidized.

Harbourside Oil N.L. drilled the subsidized operation - Werrina Nos 1 and 2 wells to 4 652 and 5 132 feet respectively. They were drilled to evaluate the west flank of the southern Surat Basin and located on a seismic closure on the Jurassic Hutton Sandstone over a basement high. Seismic evidence indicated that the Wandoan Formation was overlapped by the Jurassic Evergreen Formation a short distance west of the drill site.

A normal Surat Basin Jurassic sequence was drilled at Werrina No. 1 to the upper Evergreen Shale, but dolerite basement was encountered at 4 550 feet. The main target - the 'Wandoan Formation' - was absent. The 'Blythesdale' and Hutton Formations were porous and permeable. The thin sands in the Evergreen Shale were tight. The well encountered no significant hydrocarbons and was plugged and abandoned at T.D. 4 652 feet.

Werrina No. 2 was drilled on the same structure with the same objective as No. 1. In this case Mesozoic was present below the Evergreen Shale, the 'Wandoan Formation', Moolayember Shale and Clematis Sandstone were encountered. The Clematis Sandstone was underlain by Kuttung volcanics.

There were no significant hydrocarbons and the well was plugged and abandoned at 5 133 feet.

Associated Australian Oilfields N.L. drilled 29 unsubsidized wells (Table 1). No stratigraphic information is available.

Associated Australian Oilfields N.L. carried out the Yingerbay seismic survey northeast of Roma in the Pleasant Hills area. This was an unsubsidized survey and no information is available. Another unsubsidized survey conducted by the company is the Orallo Seismic survey in the Mooga area, to the north of Roma. This was continuing at the end of the year.

Union Oil Development Corporation farmed out blocks in its title areas to Bridge Oil N.L., Genoa Oil N.L., Exoil N.L., and Australian Oil and Gas Corporation Ltd.

Bridge Oil N.L. drilled two unsubsidized wells, Noona No. 1 and Glenmore No. 1. They were 2.5 km apart and some 40 km northwest of the Alton Oilfield. Both penetrated the Hutton Sandstone and Evergreen Shale and reached a T.D. of 6 296 feet and 6 490 feet respectively. Noona No. 1 was completed as a water well. Glenmore No. 1 was plugged and abandoned.

Genoa Oil N.L. drilled Yambugle No. 1 in the Colgoon farmout block. This unsubsidized well penetrated the Evergreen Shale and 'Wandoan Formation'. Although certain promising intervals were tested, the well was plugged and abandoned at a T.D. of 5 941 feet.

Exoil N.L. drilled two unsubsidized wells, Meandarra No. 1 and Woleebee No. 1. The second well was located about 190 km north-northwest of the Moonie oilfield. It intersected the 'Wondoan Formation' and was plugged and abandoned at a T.D. of 6 632 feet.

Australian Oil and Gas Corporation Ltd drilled five unsubsidized wells, Nomby No. 1, Dilbong No. 1, Alton North No. 1, Myra No. 1, and Cameby No. 1.

Nomby No. 1 and Myra No. 1 were some 50 km south of the Moonie Oilfield. Dilbong No. 1 was drilled 22 km north-northeast of it. Alton North No. 1 was 16 km northwest of Alton Oilfield, Cameby No. 1 was 105 km north of Moonie Oilfield.

No stratigraphic information is available for any of the wells except Myra No. 1 which was reported to have intersected the Hutton Sandstone and 'Wandoan Formation'.

Pexa Oil N.L. drilled Tinowon No. 1, located 6.5 km east of Sunnybank No. 1 (1962). This was plugged and abandoned at a T.D. of 7 549 feet in basement.

Beaver Exploration Australia N.L. completed the Windeyer Seismic survey (BMR File 69/3067) in A.T.P. 138P.

A final report is not yet available.

BMR mapped three 1:250 000 Sheet areas: Homeboin, Dirranbandi, and St George.

Pexa Oil N.L. and Bridge Oil N.L. were conducting the subsidized Thallon Seismic and Gravity, and the Wagoo Seismic surveys respectively, at the end of the year.

SYDNEY BASIN

Two wells were drilled during the year, both subsidized.

Esso Exploration and Production Australia Inc. drilled Jerrys Plains No. 1 in the Hunter Valley 24 km south of Muswellbrook on the south-plunging nose of the Muswellbrook Anticline.

It was hoped that an updip pinchout of inferred Lower Permian 'shoreline' sands might be located. The well penetrated a Permian sequence spudding in the Singleton Coal Measures, and penetrated the Maitland Group, the Greta Coal Measures and the Farley and Rutherford Formations of the Dalwood Group. The Allandale Formation of the Dalwood Group was intersected at 5 044 feet (andesitic volcanics) and the well was terminated in this at 5 234 feet.

There were no commercial hydrocarbons and no reservoir sands. All the sands penetrated contained a high percentage (10-20%) of clay matrix which was assumed to be weathered feldspar, and the porosity and permeability were very low.

At the southern end of the basin, Genoa Oil N.L. drilled Coonemia No. 1, 13 km east-southeast of Nowra. It drilled through the Permian Shoalhaven Group into metamorphosed sedimentary rocks, having penetrated a full but thin sequence of the Shoalhaven Group. There were only traces of gas.

The following seismic surveys were completed:

1. Currambene Seismic Survey (BMR File 69/3016) in PEL 154, N.S.W.

2. Broken Bay Marine Seismic Survey (BMR File 69/3070) in N.S.W. P3.

The Currambene Survey and Broken Bay survey were subsidized.

Magellan Petroleum Australia Limited conducted the subsidized Tasman Bass Strait Marine Seismic and Magnetic Survey (BMR File 69/3023) in part of the Sydney Basin as well as continuing down the coast into the eastern Gippsland Basin and then to Tasmanian waters. In the offshore Sydney Basin, from latitudes 35° to 35°45'S and from latitude 36°30' south to the southern boundary of N.S.W./P1, about 3 500 feet of sediments were present, with some possible anticlines in the northern part, and a closed dome in the southern section, in about 400 feet of water. Between these two areas the sediments are about 1 500 feet thick.

TASMANIA

Esso Exploration and Production Australia Inc. were active in this area during the year.

The following subsidized geophysical surveys were carried out:

1. East Tasmania T69B Marine Seismic and Magnetic Survey (BMR File 69/3001) in T/7P.

2. West Tasmania T69A Marine Seismic Survey (BMR File 69/3000).

The first survey was located off the east coast of Tasmania. 98.24 line miles (159.0 km) were shot to provide reconnaissance control.

The results show shallow economic basement in most of the area, except near the eastern edge, which seems to be extensively faulted. The maximum depth to economic basement is 2 500 feet at the edge of the continental shelf. The total sediment Isochron map shows a general thickening of sediments out to the edge of the continental shelf, with basement dipping east. Beyond the shelf, the sediments thin towards the faulted margin, except for an area where thicker sediments were deposited in a basement depression.

No magnetic data were recorded owing to malfunctioning equipment.

The second survey was located off the west coast of Tasmania in an area considered to be the most prospective of the offshore west coast. No results are available as yet.

Esso also drilled one subsidized well, Clam No. 1 in the King Island Sub-basin off the northwest coast of Tasmania. It was drilled to evaluate a thick sedimentary sequence in a 2 100 km^2 area comprising the King Island Sub-basin.

The well penetrated some 2 000 feet of Tertiary sediments, before entering the Upper Cretaceous. The Waarre Formation equivalent was not porous in this well and rested on Devonian 'Red beds'. Drilling was terminated in Upper Precambrian basement (Rockey Cape Group); a core was isotopically dated at 630 ($\pm$ 21) x 10^6 years by the K-Ar method. No significant hydrocarbons were recorded.

The Tasman-Bass Strait Marine Seismic Magnetic Survey (BMR File 69/3023) was conducted off northwestern Tasmania by Magellan Petroleum Australia Limited. The results showed that a structural ridge in trend with King Island divides the

eastern flank of the Otway Basin from a sub-basin of the Bass Basin. Tertiary rocks are 1 000 - 5 000 feet thick and they thin to the south and west. Pre-Tertiary rocks are 10 000 feet thick in the north, but only 6 000 feet thick in the south. Several anticlines were located and one of them extends into shallow water.

YARROL BASIN

There was no activity in this basin during the year.

QUEENSLAND GREAT BARRIER REEF AREA

This prospective area has not been formally subdivided into basins or sub-basins. In 1969 Australian Gulf Oil Company completed the Townsville Aeromagnetic Survey (BMR File 69/3012) in Q/6P and Q/7P. The survey covered about 67 000 km^2 of the Great Barrier Reef near Mackay, Townsville, and Cairns.

The objectives were to outline the tectonic framework of the Great Barrier Reef and the structure and configuration of the underlying basement. The interpretation of the results shows that basement is composed of Palaeozoic crystalline rocks with a dominant northwest tectonic grain and a general slope to the northeast. Basement depth ranges from 0 to 5 000 feet, with an average depth of 2 000 - 3 000 feet below sea level. A persistent magnetic lineament trending northwest separates a shallower inshore area from a deeper offshore one. 'Highs' and 'lows' in the basement are non-linear, and their shape indicates an erosional origin.

OFFSHORE, NORTH AND NORTH-WEST AUSTRALIA

This areal classification is not used in the BMR 1969 ECAFE paper, but is used here for much of the Timor Sea/North-west shelf and Arafura Sea areas where basin and sub-basin names are mostly informal. Inevitably some overlap into more established basins, e.g. Bonaparte Gulf Basin, will occur.

The only drilling in 1969 was the Sahul Shoals No. 1 well (BMR File 69/2042) of B.O.C. of Australia Ltd, which spudded late in the year and was still drilling on 31/12/69.

Geophysical exploration was active. Off the northern coast of Arnhem Land, Shell Development (Australia) Pty Ltd completed the Arafura D-2 Marine Seismic Survey (BMR File 69/3006) in NTP/19, 20, 21. The survey consisted of 766 line miles (1233 km) as follows: 296 miles (476 km) on Lynedoch Bank, in NTP/19, 301 on Money Shoal, in NTP/20, and 163 miles (262 km) on Goodrich Bank, in NTP/21. The survey was a follow-up to the Arafura D-1 survey (BMR File 68/3020) of 1968.

In NTP/19, three horizons were mapped - A1, within Tertiary, A, near base of Tertiary, and B, near the top of Triassic - as well as horizon C (base of Mesozoic). There is little if any structural deformation of horizons A and A1 which plunge gently north. The (?)Jurassic - Cretaceous rocks (between horizons A and B) show some structure and a large structural lead was found, but the water depth exceeds 650 feet.

In NTP/20, a new horizon, F, was selected for deep reflections and could be reliably traced in the northern part of the survey area. Five structures were outlined, and indications are that a thick section has been eroded from them. In the central part of the survey area a fault-bounded trough trends northwest. The fault bounding the northeast side of the trough coincides with a fault indicated by an aeromagnetic survey flown in 1965.

In NTP/21, horizons A, A1, B, and C were selected on good seismic results, but no closed structures were found, and no stratigraphic traps were interpreted.

The Van Diemen Gulf Aeromagnetic Survey, N.T. (BMR File 69/3040) of Flinders Petroleum N.L. was flown in OP167, NT, to resolve conflicting geophysical evidence of the sedimentary thickness in Dundas Strait - previous gravity and aeromagnetic work had indicated about 10 000 feet of section but a 'sparker' survey had indicated 3 000 feet.

The survey of 1 893 line miles (3047 km), showed that basement is shallow everywhere - 1 500 to 3 000 feet near the northeast coast of Melville Island and 1 000 to 2 000 feet near Colmarg Peninsula. Strong magnetic basement trends are aligned northeast.

Off the northwest coast, B.O.C. of Australia Limited conducted the Legendre - Marie Marine Seismic Survey (BMR File 69/3005) which was a large survey offshore from each of the Carnarvon, Canning, and Bonaparte Gulf Basins. It involved 4 348 new line miles (7000 km) of Aquapulse, the reprocessing of 326 line miles (525 km) of previous data, and the incorporation of 2 548 line miles (4 101 km) in a new interpretation.

Eight structures were either detected or confirmed. Some require additional detail, but four may be drilled without extra work.

The Adele-Scott Marine Seismic Survey (BMR File 69/3038) of B.O.C. of Australia Limited consisted of about 1 900 miles (3 000 km) of reconnaissance offshore from the Precambrian Kimberley Block. The survey used the Aquapulse method. It was completed in 1969, but results are not yet available.

Another seismic survey was completed in L2 by Longreach Oil Limited. This was the West Parry Shoal Marine Seismic Survey, which was conducted immediately west of Bathurst Island. The results are unknown at present.

PAPUAN BASIN

Exploration activity was considerably less than in 1968: only four wells were drilled, and two seismic surveys completed, apart from those others in progress from 1968. In addition, one seismic and one gravity survey were in progress at the end of the year.

The Australasian Petroleum Company Pty Ltd completed the Era-Pie-Purari D1 Detail Reflection Survey (BMR File 68/3044) in L1; this survey had commenced in 1968, and it involved 130 miles (210 km) of CDP work to detail two anomalies (from the Era-Pie-Purari Seismic Reflection Survey, 67/11199) which may be Miocene reefs. The anomalies are named Ipigo and Beara.

The survey mapped the C and E horizons in Tertiary limestones, and in Wana No. 1 well these horizons are identified as:

C horizon - top of Miocene limestone

E horizon - base of Eocene limestone.

The C horizon clearly shows the Ipigo and Beara anomalies. However, there is no direct evidence of reefing since there are no definite reflections from the top of the reef, and no diffraction patterns from the edges. The indirect evidence is that there is an increase in velocity in the suspected reefs producing an uplift in time of all horizons below the reef; both the Ipigo and Beara anomalies, as well as some of the smaller, incompletely defined anomalies in the area, show this. Supporting evidence comes from the northeast trend of the Ipigo and Beara anomalies, whereas known structures in the area trend west-northwest. It is a meritorious interpretation which deserves success when the Ipigo structure is drilled in 1970.

The Fly River Delta Seismic Survey (BMR File 68/3046) was also conducted by the Australian Petroleum Company Pty Ltd in L6 and L7. It involved 430 line miles (690 km) of shallow water (12 feet) marine, and 37 miles (60 km) of land survey on islands. The objective was to seek drilling targets in Mesozoic sandstone sequences.

Two generally good reflectors were mapped, and a deeper event of poor quality was used in an attempt to map a horizon near basement. The results show general similarity of structure on all horizons. The Tertiary and Mesozoic sequences thicken regionally northeastwards, and both are virtually unfaulted, whilst the deeper horizon has been faulted. No definite closed structures were found.

The Bligh Entrance Marine Seismic Survey (BMR File 68/3050) of Phillips Australian Oil Company was a survey in PNG 1P, 2P, and 3P. It consisted of 1 347 line miles(2168 km) of Aquapulse, and 1 249 line miles (2 010 km) of previous work were incorporated in the interpretation. The objective was to get detailed coverage over anomalies discovered previously, and to extend reconnaissance coverage to PNG2P and 1P. The data were generally of good quality, particularly down to the top of the Mesozoic section. No new structural anomalies were found, and only one of the previously detected anomalies proved to be a drilling target: one structure lost appeal because dip reversal was not confirmed, and several large Jurassic or pre-Jurassic structures were rejected because their crests were at depths of about 16 000 feet. One Eocene structure on the western shelf area is at a drillable depth of about 7 000 feet.

The Pearce Cay Marine Seismic Survey (BMR File 69/3024) was conducted by Texaco Overseas Petroleum Company in Q10-P (formerly ATP133P); it was a reconnaissance survey of 118 miles (190 km) on a total of 6 lines, using the Aquapulse method, and with digital recording. Navigation was controlled by a Shoran Radiolocation system. The objectives of the survey were to examine the unexplored sedimentary section both to the east and west of the Warrior Reefs, and to examine a postulated basement ridge underlying them (Warrior Reef Seismic Survey, 68/3011). These objectives were partly achieved, but some difficulty was experienced in mapping and correlating a seismic event in the Mesozoic, and another near the base of the Tertiary.

The presence of a basement ridge beneath the Warrior Reefs was not confirmed. West of the Warrior Reefs, a sedimentary thickness of about 5 000 feet was determined, and the Mesozoic component of this thickness thins rapidly to the west and northwest and eventually the Tertiary sequence rests directly on granite basement. However, the Mesozoic is present over a northtrending basement ridge. East of the Warrior Reefs, the sedimentary section is about 8 000 feet thick, and the Mesozoic component is present over two basement ridges, one trending northeast and the other east-northeast. Over the whole area faults in the basement extend into Mesozoic sequences but the Tertiary sediments are unaffected. Fault closures of Mesozoic against basement are possible in some areas.

The Kaweto Seismic Survey (BMR File 69/3033) was conducted by Texaco Overseas Petroleum Company, in P55. The survey area was between the Fly and Aramia Rivers and was completed on 15/11/69, but results are not yet available.

Marathon Petroleum Australia Inc. began the Kapuri-Orlobi Seismic Survey (BMR File 69/3069) in P22 in 1969, and the survey was in progress at the end of the year.

The Australasian Petroleum Company Pty Ltd completed the Kutubu - Orakana Gravity Survey (BMR File 69/3049) in P27 and parts of P37 and P46. The results of this survey are not yet available.

The only mainland well was Tovala No. 1A (BMR File 69/2003) which was drilled by Basin Oil N.L. in P22. This well was drilled to test a seismic structure, and replaced Tovala No. 1, which was abandoned at 4 636 feet after experiencing an uncontrollable gas blow-out at 4 495 feet. Both wells were drilled in the projected axis of a line of Miocene limestone reef, but no reefs and no volcanic rocks were found in either well. Methane was found in Tovala 1A, but in non-commercial quantities.

Phillips Australian Oil Company drilled two unsubsidized wells in the Pasca area of the Gulf of Papua. Pasca A No. 2 was spudded in December 1968 but was not completed until 1969. The target was a Miocene reef, and an open hole DST in the top 38 feet of the reef (7 210 - 7 248 feet) produced gas at the rate of 17.2 MMcfd, plus 1 375 bbls condensate. A test of a 'lower 20-foot section' of the reef produced gas at the rate of 15.7 MMcfd, plus 1 100 bbl condensate.

The Anchor Cay No. 1 well (BMR File 69/2000) of Tenneco Australia Inc. was mainly a stratigraphic well, although located on a seismically-determined anticline, in Q1P. The well penetrated Tertiary sediments to 6 950 feet, and then Lower

Cretaceous - Jurassic sediments (with no clear boundary between them) to total depth of 11 888 feet. Massive Pliocene pinnacle reef rock was drilled (c.f. Pliocene mudstones in other offshore wells of the Papuan Basin), and several potential reservoirs were found in the Miocene sequence. Sandstones with good porosity occur in the upper part of the Lower Cretaceous, but no porous and permeable zones were found lower in the well. No shows of oil or gas were recorded and the well was abandoned.

NORTHERN NEW GUINEA BASIN

No drilling was done in 1969, and exploration efforts were directed to geophysical work.

Continental Oil Company of Australia completed the Madang Seismic Survey (BMR File 69/3026) in P41, but results are not yet available. One purpose of this work was to follow leads provided by the 1968 Madang Aeromagnetic Survey (BMR File 68/3040). The same company also completed the Madang Gravity Survey in P41, but again no results are known.

The Maprik Seismic and Gravity Survey (BMR File 69/3043) of Australian Aquitaine Petroleum Pty Ltd in P45, checked the existence of a basement high and enabled a comparison of aeromagnetic and gravity results with seismic.

The Maprik survey consisted of 42 miles (67 km) of single-fold reflection, and a refraction profile (on line M1). The results confirmed the general basement trend as outlined by the 1968 Makambu Aeromagnetic Survey (68/3054), but the basement is interpreted as being considerably shallower than the 6 500 - 8 200 feet (2 000 - 2 500 metres) indicated by the aeromagnetic work. Other conclusions from the Maprik survey are that gravity work can indicate basement highs in the area, if the isostatic effect is not predominant, and that single-fold reflection methods are suitable for reconnaissance in the area.

CAPE VOGEL BASIN

No exploration activity was reported.

TABLE 1

WELLS DRILLING IN 1969

BASIN Operating Company Well Name BMR file no. if subsidized	Latitude Longitude	G.L./W.D. K.B./R.T.	Date spudded T.D. date	Basis for location	T.D.'	DST's	Status
ADAVALE BASIN							
ASSOCIATED AUSTRALIAN OILFIELDS N.L.							
Eastwood No. 1 BMR file 69/2024	24° 46' 23"S 145° 20' 56"E	G.L. 910' K.B. 925'	19/8/69 20/10/69	Seismic	11 106'	DST No. 1, 10 002-10 109', rec. 2 000' water cushion, 90' mud, 1 063' salt water.	PA
AMADEUS BASIN							
MAGELLAN PETROLEUM (N.T.) PTY LTD							
West Waterhouse No. 1 BMR file 68/2032	24° 00' 00"S 133° 06' 00"E	G.L. 2197' K.B. 2214'	30/8/69 9/10/69		6 528'	DST 5 650-6 528', Misrun.	PA
Tyler No. 1 BMR file 68/2031	23° 45' 23"S 132° 24' 45"E	G.L. 2528' K.B. 2538'	29/6/68 21/6/69	Seismic	12 599'	DST No. 1, 8 805-9 143', Misrun, rec. 30' drilling water.	PA
North West Mereenie No. 1	23° 53' 22"S 131° 22' 27"E		11/7/69 6/8/69		5 000'		PA
Palm Valley No. 2	24° 00' 03"S 132° 38' 47"E		21/12/69		3 000' drilling ahead		
ARCKARINGA BASIN							
SOUTH AUSTRALIAN GOVERNMENT							
Wallira No. 1	29° 27' 03"S 134° 04' 31"E	G.L. 492' R.T. 495'	3/8/69 8/8/69		722'		PA
Wallira No. 2	29° 20' 26"S 133° 49' 42"E	G.L. 548' K.B. 551'	13/8/69 23/8/69		1 101'		PA
Karkoro No. 1	28° 35' 58"S 133° 46' 27"E	G.L. 675' R.T. 678'	15/5/69 1/6/69		1 579'		PA
Mt Furner No. 1	28° 06' 15"S 134° 28' 00"E	G.L. 613' R.T. 616'	6/6/69 17/6/69		1 821'		Completed as water well

BONAPARTE GULF BASIN							
ARCO LTD							
Lacrosse No. 1 BMR file 68/2053	14° 17' 51"S 128° 34' 58"E	W.D. 103' K.B. 85'	21/2/69 5/5/69	Seismic	10 020'	DST No. 1, 5634-5770', rec. water cut drilling mud DST No. 2, 9188-9275', rec. 5213' Fm. salt water.	PA
Petrel No. 1 BMR file 69/2001	12° 49' 35"S 128° 28' 27"E	W.D. 328' K.B. 113'	12/5/69 6/8/69	Seismic	13 057'	6/8/69, blew out with high pressure gas, 13 057'.	Well suspended 6/8/69.
AUSTRALIAN AQUITAINE PETROLEUM PTY LTD							
Keep River No. 1 BMR file 68/2029	15° 10' 05"S 129° 05' 22"E	G.L. 75' R.T. 91'	3/9/68 23/2/69	Seismic	15 623'	DST No. 1, 6893-6963', (open hole) rec. 5920' salt water. DST No. 2, 13 252-13 310', (open hole) rec. 366' mud and salt water. DST No. 3, 12 702-12 760' (open hole) rec. 150' mud and salt water. DST No. 4, 8475-11 000', rec. 6725' gas cut mud. DST No. 5, 7510-7600', rec. 187' mud. DST No. 6, 7177-7235', rec. 350' gas cut mud, 4450' salt water. DST No. 7, 6443-6479', rec. 4500' salt water. DST No. 8, 6174-6200', rec. 450' salt water.	PA
Newby No. 1	11° 50' 07"S 129° 06' 27"E	W.D. 247'	6/12/69 30/12/69		3 768'		PA
B.O.C. OF AUSTRALIA LTD							
Sahul Shoals No. 1 BMR file 69/2042	11° 25' 35"S 124° 33' 46"E	W.D. 124' R.T. 31'	24/12/69	Seismic	1044' Drilling ahead		
BOWEN BASIN							
TARGET PETROLEUM N.L.							
Moura No. 1 BMR file 69/2008	24° 31' 30"S 149° 56' 30"E	G.L. 358' K.B. 372'	9/5/69 28/7/69	Seismic	10 000'		PA

CANNING BASIN							
LENNARD OIL N.L.							
Napier No. 1 BMR file 69/2015	17° 12' 20"S 124° 31' 36"E	G.L. 231' K.B. 244'	4/7/69 8/8/69	Strat.	5 910'		PA
Napier No. 2 BMR file 69/2031	17° 04' 55"S 124° 21' 20"E	G.L. 270' R.T. 283'	9/10/69 28/11/69		5 272'		PA
TOTAL EXPLORATION AUSTRALIA PTY LTD							
Matches Spring No. 1 BMR file 69/2023	18° 41' 28"S 124° 03' 11*E	G.L. 473' K.B. 487'	26/8/69 13/11/69	Seismic	9 300'		PA
Mowla No. 1 BMR file 69/2039	18° 43' 50"S 123° 42' 35"E	G.L. 404'	24/11/69 5/12/69	Strat.	2 500'		PA
CARNARVON BASIN							
B.O.C. OF AUSTRALIA LTD							
Dampier No. 1 BMR file 68/2052	19° 52' 21"S 116° 00' 49"E	W.D. 250' R.T. 30'	22/11/68 9/4/69	Seismic	13 588'	DST 1, 9666-9805' (perforated in parts), misrun. DST 2, 9666-9805', (perforated in parts), weak blow; rec. 1890' gas cut mud. DST 3, 10 000-10 057', (perforated in parts), misrun. DST 4, 10 000-10 057', (perforated in parts), weak blow; rec. 1530' gas cut mud. DST 5, 12 084-13 588' (open hole), weak-moderate blow; rec. 42.5 bbls gas cut mud.	PA
Madeleine No. 1 BMR file 69/2006	19° 38' 59"S 116° 21' 31"E	W.D. 226' R.T. 30'	15/5/69 10/11/69		14 526		PA
GENOA OIL N.L.							
Pendock ID No. 1 BMR file 69/2020	23° 17' 02"S 113° 20' 10"E	W.D. 430' K.B. 34'	18/7/69 30/7/69		796'		PA
Pendock ID No. 1A BMR file 69/2020	23° 17' 02"S 113° 20' 10"E	W.D. 430' K.B. 34'	29/7/69 13/11/69		8 205'		PA

MARATHON PETROLEUM AUSTRALIA LTD							
Remarkable Hill No. 1 BMR file 68/2050	22° 57' 20"S 114° 09' 20"E	G.L. 350' K.B. 364'	15/10/68 2/2/69	Seismic	10 520'		PA
WEST AUSTRALIAN PETROLEUM PTY LTD							
Anchor No. 1 BMR file 69/2019	21° 32' 51"S 114° 42' 37"E	W.D. 59' R.T. 80'	12/7/69 28/8/69	Seismic	10 002'	DST 4417-4466', rec. flow of salt water	PA
Beagle No. 1 (Core hole)	21° 11' 50"S 115° 38' 00"E	G.L. 15 R.T. 20	31/5/69 16/6/69		1 835'		PA
Flinders Shoal No. 1	21° 04' 16"S 115° 31' 18"E	W.D. 49' R.T. 85'	10/4/69 9/7/69		11 864'	DST 2597-2622', gas flowed to surface, 24/64" choke, 2/4 MMcfd.	Non-commercial gas
Fortescue No. 1 (Core hole)	21° 01' 05"S 115° 51' 17"E	G.L. 15' R.T. 20'	20/6/69 26/6/69		2 000'		PA
Mardie No. 1 (Core hole)	21° 20' 42"S 115° 43' 28"E	G.L. 20' R.T. 26'	17/5/69 12/5/69		541'		PA
Wonangarra No. 1 (Core hole)	22° 09' 03"S 114° 41' 20"E	G.L. 20' R.T. 26'	21/4/69 2/5/69		1 888'		PA
CLARENCE-MORETON BASIN							
CLARENCE RIVER BASIN OIL EXPLORATION CO.							
Clifden No. 6	29° 34' 00"S 152° 55' 30"E	G.L. 188' K.B. 198'	14/12/69 6/3/69		1 980'		PA
COOPER BASIN							
ALLIANCE OIL DEVELOPMENT AUSTRALIA N.L.							
Gilpeppee No. 1 BMR file 69/2040	26° 25' 25"S 141° 33' 17"E	G.L. 320' K.B. 338'	13/11/69		8 665' drilling ahead		
DELHI AUSTRALIAN							
Mulga No. 1	28° 39' 35"S 140° 31' 50"E	G.L. 129' K.B. 145'	9/4/69 21/4/69		6 477'		PA

Pando No. 2	28° 25' 48"S 139° 49' 44"E	G.L. 125' K.B. 141'	7/1/69 9/2.69		6 219'		PA
Toolachee No. 1	28° 25' 58"S 140° 46' 54"E	G.L. 169' K.B. 185'	3/3/69 22/3/69		7 227'	DST 5949-6131', rec. gas cut water. DST 6136-6311', rec. gas cut water. DST 6826-6890', rec. 6.9 MMcfd DST 6942-7113', 4.1 MMcfd, condensate in unspecified quantity. Production Test, 3 MMcfd, ¼" choke, plus 74 bbls condensate.	Cased for production as gas well.
Toolachee No. 2	28° 18' 48"S 140° 49' 32"E	G.L. 221' K.B. 237'	4/5/69 19/5/69		7 203'		PA
FLINDERS PETROLEUM N.L.							
Arrabury No. 1 BMR file 69/2035	27° 11' 35"S 141° 04' 50"E	G.L. 412' K.B. 428'	18/11/69		8 996' drilling ahead		
PEXA OIL N.L.							
Topwee No. 1	28° 15' 40"S 139° 59' 09"E	G.L. 96' K.B. 109'	30/10/69 11/12/69		7 310'	DST ? gas flowed at rate of 25 000 cfd in Permian sand.	PA
Wirrarie No. 1	28° 15' 04"S 139° 54' 32"E	G.L. 83' K.B. 96'	30/9/69 15/10/69		7 258'		
TOTAL EXPLORATION							
Roseneath No. 1 BMR file 69/2036	28° 09' 48"S	G.L. 423'	18/11/69	Strat.	7 208'	DST 6950-7208', 7 MMcfd very wet gas, ½" choke, 1500 psi at surface.	Completed as gas well.
EROMANGA BASIN							
ALLIANCE OIL DEVELOPMENT AUSTRALIA N.L.							
Chandos South No. 1 BMR file 69/2025	25° 57' 02"S 143° 22' 00"E	G.L. 669' K.B. 687'	9/9/69 26/10/69	Seismic	8 032'	DST 6792-6848', rec. 150' mud. DST 7650-7727', rec. 13 bbls brackish water.	PA
LONGREACH OIL LTD							
Stormhill No. 1 BMR file 69/2007	24° 08' 45"S 143° 35' 06"E	G.L. 580' K.B. 594'	22/4/69 10/5/69	Seismic	5 099'	DST 1, 5015-5099', rec. 190' drilling mud. DST 2, 4890-5099', rec. 1400' mud cut water.	PA

EUCLA BASIN							
OUTBACK OIL N.L.							
Mallabie No. 1 BMR file 69/2013	31° 32' 14"S 130° 36' 06"E	G.L. 184' K.B. 196'	21/6/69 5/8/69	Gravity	4 907'		PA
GALILEE BASIN							
LONGREACH OIL LTD							
Rand No. 1 BMR file 69/2009	23° 07' 23"S 144° 43' 06"E	G.L. 760' K.B. 774'	21/5/69 22/6/69	Strat.	6 516'	DST 1, 6516-6150, Misrun. DST 2, 6516-6160', Rec. 100' mud 200' muddy water, 1400' fresh water. DST 3, 5650-5820', tool failed. DST 4, 5660-5820', bottom packer failed. DST 5, 5655-5840, Rec. 800' mud, 400' fresh water.	PA
PURSUIT OIL N.L.							
Muttaburra No. 1 BMR file 69/2043	22° 47' 33"S 144° 31' 35"E	G.L. 693' K.B. 705'	25/11/69 10/12/69		4 753'		PA
GIPPSLAND BASIN							
ASHBURTON OIL N.L.							
Milton No. 1 BMR file 69/2033	37° 31' 31"S 148° 10' 31"E		12/11/69		3 300' drilling ahead		
ESSO EXPLORATION AND PRODUCTION AUSTRALIA INC.							
Groper No. 2 BMR file 69/2028	38° 58' 40"S 147° 14' 12"E	W.D. 194' K.B. 31'	9/9/69 21/9/69	Strat.	2 870'		PA
Bluebone No. 1 BMR file 69/2029	39° 24' 24"S 147° 50' 53"E	K.B. 31' W.D. 158'	26/9/69 1/10/69	Seismic	1 984'		PA
Barracouta - 3	38° 19' 19"S 147° 37' 03"E	W.D. 145'	3/8/69 16/9/69		9 651'	3812', small (non commercial) quantities of oil, beneath the Barracouta gas reservoir.	suspended
Barracouta A-1	38° 17' 53"S 147° 40' 35"E	R.T. 80'	1/1/69 15/1/69		3 720'		oil&gas well

Bonita - 1	38° 33' 47"S 148° 17' 09"E		15/10/69 22/10/69	500'	Abandoned for technical reasons on 22/10/69.	
Bonita - 1A	70' NE of Bonita - 1		22/10/69 13/11/69	10 430'		PA
Bream - 1	38° 31' 09"S 147° 47' 45"E		20/1/69 22/1/69	790'	Suspended at 790', Glomar III drydecked.	
Bream - 2	38° 31' 21"S 147° 47' 53"E	W.D. 191'	24/2/69 17/4/69	10 657'	Oil below 5900'. Hydrocarbon shows below 8900'.	PA
Bream - 3	38° 30' 47"S 147° 46' 15"E		16/11/69	10 500 drilling ahead		
Flathead - 1	38° 01' 21"S 148° 32' 04"E	W.D. 173'	30/4/69 15/5/69	3 494'	No hydrocarbons in tests.	PA
Flounder - 2	38° 19' 18"S 148° 26' 43"E		19/2/69 28/3/69	9 321'	8329' Wireline Fm. test recovered oil.	PA
Flounder - 3	38° 18' 58"S 148° 28' 23"E	W.D. 363'	26/4/69 12/5/69	8 415'	8399' & 8415', hydrocarbons from wire line tests of thin sands.	suspended
Groper 1	38° 56' 20"S 147° 24' 56"E		19/12/68 10/1/69	3 379'		PA
Gurnard - 1	38° 35' 33"S 147° 58' 38"E		3/10/69 30/10/69	9 724'		PA
Halibut A-1	38° 24' 22"S 148° 19' 17"E	W.D. 238'	24/3/69 6/5/69	8 329'		Completed as oil well
Halibut A-2	38° 24' 22"S 148° 19' 17"E	W.D. 238'	3/5/69 12/5/69	4 201'	Abandoned for mechanical difficulties on 15/5/69.	PA
Halibut A-3	38° 24' 22"S 148° 19' 17"E	W.D. 238'	12/5/69 23/5/69	8 414'		Completed as oil well
Halibut A-4	38° 24' 22"S 148° 19' 17"E	W.D. 238'	17/6/69 3/7/69	10 394'		"
Halibut A-5	38° 24' 22"S 148° 19' 17"E	W.D. 238'	9/7/69 7/8/69	10 998'		"

Halibut A-6	38° 24' 22"S 148° 19' 17"E	W.D. 238'	10/8/69 14/8/69	9 302'		Completed as oil well
Halibut A-7	38° 24' 22"S 148° 19' 17"E	W.D. 238'	27/8/69 24/11/69	10 850'		"
Halibut A-8	38° 24' 22"S 148° 19' 17"E	W.D. 238'	31/8/69 16/10/69	10 950'		"
Halibut A-9	38° 24' 22"S 148° 19' 17"E	W.D. 238'	19/10/69 29/10/69	8 673'		"
Halibut A-10	38° 24' 22"S 148° 19' 17"E	W.D. 238'	17/11/69 25/11/69	8 425'		"
Halibut A-11	38° 24' 22"S 148° 18' 17"E	W.D. 238'	29/11/69	8 000' drilling ahead		
Mackerel - 1	38° 28' 54"S 148° 21' 26"E		27/3/69 13/4/69	10 003'	Non-commerical, but oil shows reported.	PA
Mullet - 1	39° 13' 02"S 147° 51' 22"E	W.D. 180'	9/1/69 16/1/69	2 463'	"Zone of interest" much closer to surface than other wells.	PA
Salmon - 1	38° 25' 14"S 147° 59' 15"E	W.D. 210'	13/1/69 16/2/69	9 865'		Suspended
Snapper - 2	38° 11' 16"S 148° 02' 37"E	W.D. 175'	16/6/69 23/7/69	10 010'	17/6/69, Production test rec. 1.1. MMcfd.	Plugged
Snapper - 3	38° 12' 45"S 147° 59' 11"E		24/11/69	7 500' Drilling ahead		
Tailor - 1	38° 29' 32"S 148° 16' 25"E		5/11/69 20/11/69	8 498'		PA
Turrum - 1	38° 12' 10"S 148° 14' 41"E	W.D. 192'	19/5/69 26/6/69	10 029'		PA
Wahoo - 1	38° 01' 42"S 148° 44' 48"E	W.D. 245'	27/5/69 11/6/69	2 446'		PA

MURRAY BASIN/BANCANNIA TROUGH

NEW SOUTH WALES OIL & GAS CO. LTD

Jupiter No. 1 BMR file 69/2005	31° 30' 30"S 142° 09' 00"E	G.L. 455' K.B. 469'	21/4/69 23/5/69		6 008'		PA
Poopelloe Lake No. 1 BMR file 69/2014	31° 43' 23"S 143° 55' 18"E	G.L. 429' K.B. 443'	25/6/69 15/7/69		2 337'		PA
Mount Emu No. 1 BMR file 69/2038	32° 19' 56"S 143° 32' 33"E	G.L. 250' K.B. 263'	13/11/69	Gravity	3 984' drilling ahead		
Gnalta No. 1	31° 13' 34"S 142° 45' 48"E	G.L. 1038' K.B. 1043'	12/10/69 21/12/69		2 356'		PA
OTWAY BASIN							
ESSO EXPLORATION & PRODUCTION AUSTRALIA INC.							
Mussel No. 1 BMR file 69/2021	38° 57' 46"S 142° 46' 22"E	W.D. 280' R.T. 99'	18/8/69 7/9/69	Seismic	8 038'		PA
Lake Eliza No. 1	37° 13' 56"S 139° 59' 06"E	G.L. 28' K.B. 40'	6/9/69 22/9/69	Gravity	4 832'	DST 1, 3515-3562', rec. 2915' mud & gas cut salt water. DST 2, 3500-3515', rec. 2993' fluid (120' gas cut muddy salt water & 2873' gas cut salt water).	PA
Lake George No. 1 BMR file 69/2030	37° 27' 09"S 140° 02' 35"E	G.L. 12' K.B. 24'	4/10/69 15/10/69	Seismic & Gravity	4 491'		PA
Lucindale No. 1 BMR file 69/2034	37° 05' 56"S 140° 18' 42"E	G.L. 156' K.B. 167'	31/10/69 8/11/69	Gravity	3 215'	DST 1, 2405-2462', rec. 279' mud 1325' of slightly muddy salt water.	PA
PURSUIT OIL N.L.							
Hindhaugh Creek No. 1 BMR file 69/2026	38° 16' 43"S 144° 12' 07"E	G.L. 232' K.B. 245'	21/8/69 3/11/69	Gravity	7 781'	DST 5071-5131', rec. 30' mud	PA
SHELL DEVELOPMENT (AUSTRALIA) PTY LTD							
Hawkesdale No. 1 BMR file 69/2032	38° 04' 51"S 142° 17' 57"E	G.L. 444' R.T. 456'	2/12/69 28/12/69		5 820'		PA
Moyne Falls No. 1 BMR file 69/2032	38° 04' 09"S 142° 11' 30"E	G.L. 480'S R.T. 492'	15/11/69 26/11/69		3 308'		PA

PERTH BASIN

UNION OIL DEVELOPMENT CORPORATION

Blackwood No. 1 BMR File 69/2017	34° 08' 55"S 115° 21' 20"E	G.L. 214' K.B. 231'	18/8/69 3/10/69	Seismic	10 935'		PA

WEST AUSTRALIAN PETROLEUM PTY LTD

Gage Roads No. 1 BMR File 69/2039	31° 57' 20"S 115° 22' 33"E	W.D. 191' R.T. 70'	27/11/68 24/1/69	Seismic	12 009'	DST 5775-5781', 5790-5804', rec. 40 bbls 37° gravity oil plus 82 bbls salt water after swabbing. DST 5838-5847', rec. oil at rate 300 bbls/day, 31.2° gravity.	PA
Dongara No. 8	29° 15' 08"S 115° 01' 13"E	G.L. 162' R.T. 176'	13/5/69 27/5/69		6 004'	2/6/69, Production tests, 9 hrs, 600-800 bbl/hr 40° oil, $\frac{3}{8}$" surface choke, flowed to surface through csg, interval 5605-5615'. 19/6/69, Production test, 900 BOPD flowed to surface, 17/64" surface choke.	Completed as oil well
Dongara No. 9	29° 13' 23"S 115° 00' 00"E	G.L. 273' R.T. 284'	15/4/69 7/6/69		6 266'	DST 5457-5487', gas at rate of 6 MMcfd, $\frac{3}{8}$" surface choke. DST 5533-5665', gas at rate of 10 MMcfd.	Completed as gas well
Dongara No. 10	29° 14' 17"S 115° 00' 07"E	G.L. 227' R.T. 236'	14/6/69 1/7/69		6 700'	Production test, 8 hrs, $\frac{3}{8}$" surface choke, rate of 6 MMcfd flowed to surface, from interval 5670-5690'.	"
Dongara No. 11	29° 17' 00"S 115° 00' 24"E	G.L. 208' R.T. 219'	9/7/69 24/7/69		6 000'	Production test, 5594-5610', 9 MMcfd, $\frac{1}{2}$" choke.	"
Dongara No. 12	29° 14' 18"S 115° 01' 10"E	G.L. 84' R.T. 95'	30/7/69 18/8/69		6 603'	Production test, 5422-5442', rec. 10 MMcfd, $\frac{1}{2}$" surface choke.	"
Dongara No. 13	29° 12' 46"S 114° 59' 40"E	G.L. 274' R.J. 289'	21/8/69 13/9/69		6 663'		PA

Dongara No. 14	29° 13' 26"S 115° 00' 59"E	F.F. 241' R.T. 253'	21/9/69 9/10/69	6 293'	DST (Open hole) 5692-5752', Completed 500 BOPD. as oil well Production test, 5720-5752', 5746-5755', 1400 bbls, ½" surface choke.
Dongara No. 15	29° 16' 28"S 115° 00' 55"E	G.L. 205' R.T. 216'	16/10/69 1/11/69	6 363'	Production test, 5359-5636' Completed gas flowed at daily as gas well rate 10 MMcfd, ½" surface choke, 14 hrs.
Dongara No. 16	29° 16' 13"S 114° 59' 28"E	G.L. 83' R.T. 96'	8/11/69 26/11/69	6 312'	Production test, 5421-5457', " gas at rate 9 MMcfd, 3 hrs, ½" choke.
Dongara No. 17	29° 17' 06"S 115° 01' 29"E	G.L. 255' R.T. 269'	5/12/69 24/12/69	6 393'	DST 5716-5750', oil at rate Completed of 600 BOPD, ¼" surface as oil well choke, open hole. Completion test, 5716-5750', through casing, ½" surface choke 800-1000 BOPD, estimated.
Mondarra No. 2	29° 21' 07"S 115° 06' 05"E	G.L. 87' K.B. 101'	19/12/68 22/1/69	9 363'	Completion test, 8975-8991' Completed produced 2.5 MMcfd as gas well gas on ½" choke after frac.
Mondarra No. 3	29° 17' 32"S 115° 06' 44"E	G.L. 324' K.B. 337'	5/4/69 10/5/69	9 800'	PA
Mondarra No. 4	29° 19' 09"S 115° 05' 59"E	G.L. 148' R.T. 162	19/7/69 22/8/69	9 499'	PA
Strawberry Hill No. 1	29° 15' 17"S 115° 07' 13"E	G.L. 192' R.T. 201'	28/5/69 9/7/69	9 416'	PA
SURAT BASIN					
ASSOCIATED AUSTRALIAN OILFIELDS N.L.					
Alice Downs No. 1	26° 38' 35"S 148° 46' 53"E	G.L. 975' K.B. 986'	26/10/69 2/11/69	4 291'	PA
Grafton Range No. 1	26° 23' 55"S 148° 56' 55"E	G.L. 1447' K.B. 1458'	8/2/69 22/2/69	4 223'	PA

Grafton Range No. 2	26° 23' 50"S 148° 55' 45"E	G.L. 1553' K.B. 1570'	15/3/69 22/3/69	3 615'	DST 3480-3500', gas at rate of 4.9 MMcfd, ½" bottom choke. DST 3537-3577', gas at rate of 1.5 MMcfd, ½" bottom choke.	Cased for production as gas well.
Grafton Range No. 3	26° 24' 38"S 148° 55' 52"E	G.L. 1447' K.B. 1458'	24/3/69 1/4/69	3 700'	DST 3438-3479', rate of 4.1 MMcfd for 4½ hrs, ½" choke	Cased for production as gas well.
Grafton Range No. 4	26° 25' 55"S 148° 56' 18"E	G.L. 1319' K.B. 1330'	5/4/69 10/4/69	3 624'	DST 3405-3470', gas at rate of 1.8 MMcfd, ½" bottom choke.	Cased for production as gas well.
Grafton Range No. 5	26° 25' 48"S 148° 55' 22"E	G.L. 1339' K.B. 1350'	13/4/69 18/4/69	3 415'		PA
Grafton Range No. 6	26° 26' 30"S 148° 55' 50"E	G.L. 1305' K.B. 1316'	21/4/69 26/4/69	3 499'		PA
Grafton Range No. 7	26° 27' 20"S 148° 56' 20"E	G.L. 1291' K.B. 1302'	27/4/69 21/5/69	3 430'		PA
Grafton Range No. 8	26° 23' 45"S 148° 54' 25"E	G.L. 1510' K.B. 1521'	6/5/69 12/5/69	3 862'		PA
Grafton Range No. 9	26° 25' 25"S 148° 53' 35"E	G.L. 1430' K.B. 1441'	17/5/69 24/5/69	3 764'	DST 3530-3553', rec. 4.5 MMcfd rate for 4 hrs, ½" bottom choke.	Cased for production as gas well.
Grafton Range No. 10	26° 22' 57"S 148° 55' 35"E	G.L. 1507' K.B. 1518'	8/8/69 16/8/69	3 846'	DST 3550-3580', 1.06 MMcfd 3 hrs., ½" bottom choke.	"
Grafton Range No. 11	26° 26' 10"S 148° 53' 06"E	G.L. 1319' K.B. 1330'	19/8/69 24/8/69	3 596'	DST 3420-3461', 2.75 MMcfd 3 hrs, ½" bottom choke.	"
Grafton Range No. 12	26° 24' 02"S 148° 55' 00"E	G.L. 1773' K.B. 1784'	19/9/69 26/9/69	3 992'		PA
Grafton Range No. 13	26° 26' 59"S 148° 52' 30"E	G.L. 1229' K.B. 1240'	28/9/69 5/10/69	3 504'	DST 3380-3405', rec. 2.3 MMcfd 7 hrs, ½" bottom choke.	Cased for production as gas well.
Grafton Range No. 14	26° 24' 20"S 148° 53' 45"E	G.L. 1362' K.B. 1373'	14/10/69 20/10/69	3 641'	DST 3467-3497', rec. 4.2 MMcfd, ½" bottom choke, 5 hrs.	"
Hollyrood No. 2	26° 47' 14"S 148° 45' 15"E	G.L. 1066' K.B. 1077'	27/11/69 3/12/69	4 681'		PA

Maffra No. 6	26° 44' 20"S 148° 47' 06"E	G.L. 988' K.B. 999'	4/12/69 12/12/69		4 429'		PA
Mooga No. 1	26° 25' 00"S 148° 50' 17"E	G.L. 1189' K.B. 1200'	21/7/69 26/7/69		3 750'	DST 3311-3361', rec. 4.5 MMcfd, ½" choke, 4 hrs.	Cased for production as gas wel
Mooga No. 2	26° 25' 56"S 148° 50' 23"E	G.L. 1107' K.B. 1118'	27/8/69 31/8/69		3 396'	DST 3225-3253', rec. 3 MMcfd	"
Mooga No. 3	26° 24' 27"S 148° 50' 49"E	G.L. 1181' K.B. 1192'	11/9/69 16/9/69		3 484'	DST 3295-3349', rec. 1.0 Mmcfd ½" bottom choke, 7 hrs.	Plugged
Mooga No. 4	26° 23' 50"S 148° 50' 07"E	G.L. 1115' K.B. 1126'	7/10/69 12/10/69		3 368'		PA
Mount Beagle No. 1	26° 20' 12"S 148° 47' 50"E	G.L. 1338' K.B. 1349'	4/9/69 8/9/69		3 088'		PA
Niella No. 1	26° 21' 20"S 148° 56' 18"E	G.L. 1429' K.B. 1440'	23/2/69 2/3/69		3 752'		PA
Niella No. 2	26° 20' 42"S 148° 57' 00"E	G.L. 1536" K.B. 1547'	30/7/69 7/8/69		3 742'		PA
Pleasant Hills No. 7	26° 24' 42"S 149° 02' 08"E	G.L. 1218' K.B. 1229'	7/1/69 13/1/69		3 350'		PA
Pleasant Hills No. 8	26° 24' 12"S 149° 00' 04"E	G.L. 1296' K.B. 1307'	15/1/69 29/1/69		3 686'	DST 3442-3465', 3.7 MMcfd for 3 hrs, ½" bottom choke.	Cased for production as gas well
Pleasant Hills No. 8A	26° 24' 12"S 149° 01' 04"E	G.L. 1296' K.B. 1307'	1/2/69 4/2/69		1 330'	DST 800-904', 0.75 MMcfd, ½" bottom choke, 3 hrs.	"
Pleasant Hills No. 9	26° 26' 00"S 149° 02' 08"E	G.L. 1292' K.B. 1303'	5/3/69 12/3/69		3 697'		PA
Pringle Downs No. 5	26° 41' 47"S 148° 43' 29"E	G.L. 963' K.B. 974'	12/11/69 20/11/69		4 252		PA
HARBOURSIDE OIL N.L.							
Werrina No. 1 BMR file 69/2011	28° 43' 26"S 149° 20' 50"E	G.L. 574' K.B. 588'	27/5/69 6/6/69	Seismic	4 652'		PA
Werrina No. 2 BMR file 69/2011	28° 47' 49"S 149° 24' 00"E	G.L. 573' K.B. 587'	14/6/69 24/6/69	Seismic	5 132'	DST 1, 5086-5132', rec. 2790' fresh water (1000 ppm NaCl), 182' mud.	PA

UNION OIL DEVELOPMENT CORPORATION						
Alton North No. 1	27° 49' 35"S 149° 16' 43"E	G.L. 780' K.B. 794'	4/8/69 17/8/69	6 770'		PA
Cameby No. 1	26° 40' 06"S 150° 16' 07"E	G.L. 1198' K.B. 1212'	12/10/69 21/10/69	3 697'		PA
Dilbong No. 1	27° 34' 20"S 150° 22' 40"E	G.L. 942' K.B. 956'	16/8/69 4/9/69	5 771'		PA
Farawell No. 1	27° 55' 02"S 149° 33' 43"E	G.L. 736' K.B. 748'	18/12/69	7 050' Drilling ahead		
Glenmore No. 1	27° 38' 49"S 149° 07' 50"E	G.L. 935' K.B. 949'	17/10/69 8/11/69	6 490'	DST 6288-6392', flowed highly gas cut water to surface at rate of approx. 180 bbls/day with traces of oil.	PA
Myra No. 1	27° 12' 27"S 150° 21' 51"E	G.L. 972' K.B. 986'	13/9/69 3/10/69	6 373'		PA
Kincora No. 2	27° 04' 10"S 148° 47' 36"E	G.L. 1070' K.B. 1083'	26/11/69 2/12/69	5 294'		PA
Noona No. 1	27° 37' 36"S 149° 08' 28"E	G.L. 980' K.B. 994'	22/8/69 3/9/69	6 296'		PA
Nomby No. 1	28° 14' 19"S 150° 17' 27"E	G.L. 711' K.B. 725'	22/7/69 10/8/69	5 186'		PA
Riversdale No. 1	27° 53' 38"S 149° 09' 23"E	G.L. 771' K.B. 783'	16/12/69	6 012' Drilling ahead		
Woleebee No. 1	26° 18' 43"S 149° 42' 45"E	G.L. 1297' K.B. 1311'	27/10/69 12/11/69	6 632'		PA
Meandarra No. 1	27° 13' 11"S 149° 52' 52"E	G.L. 919' K.B. 933'	11/9/69 7/10/69	7 836'		PA
Yambugle No. 1	27° 02' 18"S 149° 01' 22"E	G.L. 863' K.B. 876'	26/11/69 8/12/69	5 941'		PA
PEXA OIL N.L.						
Tinowon No. 1	26° 58' 32"S 149° 15' 58"E	G.L. 823' K.B. 836'	12/8/69 30/8/69	7 549'		PA

SYDNEY BASIN							
ESSO EXPLORATION AND PRODUCTION AUSTRALIA INC.							
Jerrys Plains No. 1 BMR file 69/2004	32° 28' 29"S 150° 56' 24"E	G.L. 389' K.B. 403'	23/3/69 3/5/69		5 234'	DST 2784-2995' (open Hole), rec. mud.	PA
GENOA OIL N.L.							
Coonemia No. 1 BMR file 69/2010	34° 58' 20"S 150° 42' 50"E	G.L. 50' K.B. 62'	19/5/69 12/6/69		2 614'		PA
TASMANIA							
ESSO EXPLORATION AND PRODUCTION AUSTRALIA INC.							
Clam No. 1 BMR file 69/2016	40° 51' 52"S 144° 12' 55"E	W.D. 334' K.B. 99'	19/7/69 3/8/69	Strat.	5 323'		PA
PAPUAN BASIN							
TENNECO AUSTRALIA INC.							
Anchor Cay No. 1 BMR file 69/2000	9° 26' 29"S 144° 03' 30"E	W.D. 206' K.B. 34'	26/2/69 6/5/69	Seismic	11 888'		PA
BASIN OIL N.L.							
Tovala No. 1 BMR file 69/2003	8° 04' 23"S 146° 07' 45"E	G.L. 42' K.B. 57'	4/4/69 12/5/69	Seismic		Blew out at 4495', was later abandoned.	
Tovala No. 1A BMR file 69/2003	8° 04' 23"S 146° 08' 45"E	G.L. 42' K.B. 57'	30/5/69 24/7/69	Seismic	10 522'	DST 1, 8657-9528', rec. water, mud & gas cut mud. DST 2, 9481-9520', rec. water, 4000' gas & salt water. DST 3, 7870-7910', gas to surface too small to measure. DST 4, 5875-5890', gas to surface 1½ - 2 MMcfd+ 10 bbls water. DST 5, 4850 - 4620', gas to surface, too small to measure.	PA
PHILLIPS AUSTRALIAN OIL COMPANY							
Pasca A No. 2	8° 36' 22"S 144° 54' 44"E	W.D. 314'	13/12/68 13/2/69		8 506'	DST 7210-7248', (open hole), rate 17.2 MMcfd + 1375 bbls condensate. DST lower 20' section, 1100 bbls condensate & gas at rate of 15.7 MMcfd 26/64" choke.	PA

Pascac No. 2	8° 30' 47"S 144° 59' 11"E	W.D. 307'	8/5/69 13/6/69	10 475'		PA

TABLE 2

GEOPHYSICAL OPERATIONS DURING 1969

BASIN Operating Company Survey Name BMR file No.	Permit	Duration	Extent
BONAPARTE GULF BASIN			
ARCO AUSTRALIA LTD			
Van Dieman Rise seismic (69/3011)	WA 15-P, 16-P, 17-P NT/P2,P3,P4	7/7/69-21/8/69	1415 km (879 mls) conventional reflection
AUSTRALIAN AQUITAINE PETROLEUM PTY LTD			
Lone Hill seismic & gravity (69/3051)	OP 162	2/8/69-9/10/69	87 km (54 mls) refraction 50 km (31 mls) reflection
LONGREACH OIL LTD			
Parry Shoal marine seismic (69/3011)	L2	4/4/69-10/4/69	981 km (610 mls) 1200% CDP, Airgun
BOWEN BASIN			
PLANET EXPLORATION CO. PTY LTD			
Denison East seismic (69/3056)	ATP 119P	20/8/69-22/1/70	137 km (85 mls) mainly 1-fold CDP, some 6 and 12-fold
CANNING BASIN			
AUSTRALIAN AQUITAINE PETROLEUM PTY LTD			
Contention Heights seismic & gravity (69/3036)	PE 151H, 152H	2/6/69-3/8/69	342 km (212 mls) refraction
Baron Range seismic (69/3052)	PE 205H	22/8/69-19/9/69	162 km (100 mls) refraction
LENNARD OIL N.L.			
Alexander Seismic (69/3057)	PE 106H, 253H	3/9/69-7/11/69	169 km (105 mls) 3-fold CDP 8 km (5 mls) 6-fold CDP
TOTAL EXPLORATION (AUST.) PTY LTD			
Matches Springs seismic (69/3028)	PE 259H	12/5/69-29/8/69	410 km (254 mls) conventional, 8 km (5 mls) 60fold CDP, 18 km (11 mls) uphole survey, 34 km (21 mls) expanded spread

WEST AUSTRALIAN PETROLEUM PTY LTD

Bedout marine seismic (69/3013)	WA 2-P, 21-P, 22-P, 23-P	3/4/69-17/4/69	1262 km (784 mls) 2400% airgun reflection
Wallal aeromagnetic (69/3037)	WA 21-P	2/7/69-17/7/69	2269 km (1410 flight mls) reconnaissance
Munro Arch seismic (69/3042)	PE 30H	15/7/69-28/10/69	375 km (233 mls) 6-fold CDP
Jurgurra Terrace seismic (69/3075)	PE 30H	31/10/69-11/11/69	43 km (27 mls) 12-fold reflection
Munro R-1 seismic (69/3081)	PT 30H	28/11/69-14/12/69	95 km (59 mls) 6-fold reflection

CARNARVON BASIN

WEST AUSTRALIAN PETROLEUM PTY LTD

Jurabi marine seismic (68/3059)	WA 24-P, 25-P	1/1/69-8/1/69	14 km (9 mls)
Fraser marine seismic (69/3015)	WA 24-P, 25-P, 28-P	12/3/69-2/4/69	197 km (123 mls) 1200% dynamite, 178 km (111 mls) 600% dynamite, 197 km (123 mls) 3600% airgun, 2 refraction profiles.
Offshore Bernier aeromagnetic (69/3031)	WA 24-P,25-P	28/5/69-30/6/69	4303 km (2674 mls)

COOPER BASIN

ALLIANCE OIL DEVELOPMENT AUSTRALIA N.L.

Yamma Yamma seismic (69/3021)	ATP66-67P	23/4/69-22/8/69	23 km (14 mls) 6-fold CDP 471 km (293 mls) conventional

ALLIANCE PETROLEUM AUSTRALIA N.L.

Packsaddle-Innamincka seismic (69/3078)	PEL 5/6	14/11/69-11/12/69	55 km (34 mls) 'Geograph' 6-fold CDP.

ASHBURTON OIL N.L.

Lake Gregory seismic & gravity (69/3065)	PEL 5/6	6/10/69-19/1/70	292 km (182 mls) CDP, 1 offset profile & expanded spread, gravity stations $\frac{1}{4}$ ml intervals along seismic lines.

DELHI AUSTRALIAN PETROLEUM LTD

Southern Cooper Basin seismic & gravity (69/3010)	OEL 20, 21	5/2/69-25/6/69	909 km (565 mls)

FLINDERS PETROLEUM N.L.			
Innamincka seismic & gravity (69/3086)	PEL 5/6 ATP 66/67P	12/12/69-29/6/70	282 km (175 mls) 6-fold
PEXA OIL N.L.			
Carraweena & Murta seismic & gravity (69/3045, 69/3063)	PEL 5/6	19/7/69-24/10/69	784 km (487 mls) CDP.
TOTAL EXPLORATION (AUST.) PTY LTD			
Epsilon seismic (69/3027)	ATP 66/67P	6/5/69-17/2/70	1231 km (765 mls) single coverage.
EROMANGA BASIN			
ALLIANCE OIL DEVELOPMENT AUSTRALIA N.L.			
South Chandos seismic (69/3048)	ATP 98P	12/8/69-13/8/69	17 km (11 mls) reflection
Harkaway seismic (69/3058)	ATP 99P	25/8/69-28/10/69	278 km (173 mls) conventional, 116 km (72 mls) CDP.
LONGREACH OIL LTD			
Thomson River seismic (69/3035)	ATP 130P	24/5/69-14/6/69	117 km (73 mls) conventional
N.S.W. OIL AND GAS CO. N.L.			
Hamilton Gate seismic (69/3085)	PEL 157 ATP 144P	1/12/69-24/1/70	109 km (69 mls) refraction
NORTHWEST OIL AND MINERALS CO. N.L.			
Winnathee seismic (69/3082)	PEL 125	10/12/69-4/3/70	191 km (119 mls) single fold reflection
GALILEE BASIN			
ALLIANCE OIL DEVELOPMENT AUSTRALIA N.L.			
Booranghoop seismic (69/3073)	ATP 126P	12/11/69-12/12/69	75 km (46 mls)
FLINDERS PETROLEUM N.L.			
Koburra Seismic (69/3083)	ATP 76P	3/12/69-2/3/70	193 km (120 mls) conventional reflection.
GIPPSLAND BASIN			
ESSO EXPLORATION AND PRODUCTION AUSTRALIA INC.			
Bass B69A marine seismic & magnetic (69/3057)	TP 4, 6	21/12/68-16/1/69	1145 km (711 mls) Aquapulse

Gippsland G69A marine seismic & magnetic (68/3058)	PEP 38, 39 EL 1/60	24/12/68-21/3/69	438 (272 mls) 12-fold CDP Aquapulse
MAGELLAN PETROLEUM AUSTRALIA LTD			
Tasman-Bass Strait marine seismic & magnetic (69/3023)	**N.S.W. EPP/1 Vic. P3, P4 Tas. T/1P, T/9P, T/2P, T/10P**	**16/8/69-18/9/69**	**2953 km (1835 mls) reconnaissance, 230 km (143 mls) detail, magnetic on all lines.**
MAGELLAN PETROLEUM SOUTHERN PTY LTD			
East Gippsland Basin marine seismic & magnetic (68/3049)	PEP 63, PEL T/1P	1/11/68-13/3/69	555 km (345 mls) Aquapulse
LAURA BASIN			
CRUSADER OIL N.L.			
Breeza Plains seismic (69/3059)	ATP 143P	10/9/69-30/10/69	161 km (100 mls) single cover, continuous profiling.
ENDEAVOUR OIL CO. N.L.			
Offshore Laura Basin seismic (69/3041)	9-P	31/7/69-22/8/69	541 km (336 mls) 6-fold reflection, digital.
EXOIL N.L.			
Princess Charlotte Bay seismic (69/3047)	Q/8P	25/8/69-31/8/69	743 km (462 mls) 6-fold reflection, airgun, digital
MARYBOROUGH BASIN			
SHELL DEVELOPMENT (AUSTRALIA) PTY LTD			
Hervey Bay R-1 marine seismic (69/3002)	Q 13-P	19/1/69-23/1/69	206 km (128 mls) 2400% cover reflection.
MURRAY BASIN			
ASSOCIATED AUSTRALIAN OILFIELDS N.L.			
Sunset seismic (69/3018)	PEL 3, PEP 64	8/5/69-28/7/69	512 km (318 mls) refraction & reflection
N.S.W. OIL AND GAS CO. N.L.			
Nelyambo seismic (69/3004)	PEL 237	16/1/69-19/6/69	6-fold CDP
Blantyre Basin gravity (69/3029)	PEL 163	3/5/69-23/9/69	2341 new stations.

Pincally seismic (69/3034)	PEL 114, 164	29/5/69-4/7/69	129 km (80 mls) reconnaissance refraction
Nambucurra seismic (69/3046)	PEL 156	21/7/69-4/9/69	141 km (87 mls) reconnaissance refraction
Mossgiel seismic (69/3055)	PEL 161	22/10/69-26/11/69	76 km (47 mls) refraction
Hay seismic (69/3064)	PEL 162	15/9/69-17/10/69	100 km (62 mls) refraction
Jerilderie detailed gravity (69/3079)	PEL 160	12/11/69-20/12/69	1,544 new stations
Redbank seismic (69/3039)	PEL 113	12/6/69-10/7/69	42 km (26 mls) reflection 'thumper'
PLANET EXPLORATION CO. PTY LTD			
Lake Poopelloe R-3 seismic (69/3009)	PEL 141	24/1/69-24/4/69	306 3-fold coverage spreads, 37 experimental shots & 197 weathering shots were recorded.

OTWAY BASIN

BEACH PETROLEUM N.L.			
Geltwood Beach marine seismic (69/3019)	EPP SA 8	1/4/69-3/4/69	28 km (17 mls) 6-fold CDP
Mayurra-Panhandle seismic (69/3032)	PEL 8	13/5/69-22/6/69	19 km (12 mls) 6-fold CDP
ESSO EXPLORATION AND PRODUCTION AUSTRALIA INC.			
Otway 069A seismic (69/3003)	PEL 8	22/1/69-12/5/69	249 km (155 mls) 6-fold CDP, 39 km (24 mls) 3-fold CDP, 5 km (3 mls) single-fold CDP
Otway EV68 gravity (68/3056)	OEL 22	10/12/68-17/1/69	2,088 new stations.
Otway 069B marine seismic & magnetic (69/3061)	SA P/2, PEP 40, 41	26/9/69-1/10/69	331 km (206 mls) 12-fold CDP, Aquapulse, digital.
MID-EASTERN OIL N.L.			
Cape Patterson seismic (69/3068)	P5	26/11/69-30/11/69	241 km (150 mls) 6-fold reflection, 26 km (16 mls) refraction.

SHELL DEVELOPMENT (AUSTRALIA) PTY LTD			
Hawkesdale seismic (68/3053)	PEP 5, 6	9/12/68-24/4/69	412 km (256 mls) 6-fold CDP coverage.
Terang-Portland gravity (69/3054)	PEP 5, 6	16/8/69-19/11/69	3344 new stations
Macarthur-Portland seismic (69/3080)	PEP 5, 6	1/12/69-14/8/70	362 km (225 mls) 400% reflection, 14 km (9 mls) refraction.
OXLEY BASIN			
ALLIANCE PETROLEUM AUSTRALIA N.L.			
Blackville seismic (69/3007)	PEL 85	18/2/69-13/4/69	80 km (50 mls) 6-fold CDP digital
PERTH BASIN			
UNION OIL DEVELOPMENT CORP.			
Wonnerup-Flinders seismic (68/3060)	PE 261H	28/2/69-13/4/69	131 km (81 mls) 6-fold CDP digital
WEST AUSTRALIAN PETROLEUM PTY LTD			
Koombana marine seismic (69/3008)	WA-13-P, 14-P	6/1/69-27/2/69	114 km (692 mls) 2400% airgun, 205 km (126 mls) 600% dynamite
Pelsart marine seismic (69/3014)	WA-13-P, 14-P	28/2/69-11/3/69	298 km (185 mls) 2400% airgun, 206 km (128 mls) 600% dynamite
Harvey seismic (69/3022)	WA-27-H, 261-H	22/4/69-21/5/69	64 km (40 mls) 6-fold CDP
Namban seismic (69/3025)	WA-14-P	2/6/69-18/6/69	32 km (20 mls) 12-fold CDP, 18 km (11 mls) 6-fold CDP
Offshore West Beagle aeromagnetic (69/3050)	WA-13-P, 14-P, PE 27H, 228H	24/7/69-19/8/69	4011 km (2492 mls)
Offshore Leeuwin aeromagnetic (69/3053)	WA-13-P, 14-P	25/8/69-13/9/69	12,950 sq km (5000 sq mls)
Koombana-Wedge Island detail marine seismic (69/3060)	WA-13-P, 14-P	10/9/69-20/10/69	378.9 km (235 mls) 6-fold CDP dynamite.

Harvey D-1 seismic (69/3074)	WA-27-H	24/11/69-21/1/70	88 km (55 mls) detail, 47 km (29 mls) reconnaissance 6000% CDP
ST VINCENTS BASIN			
BEACH PETROLEUM N.L.			
Troubridge Island seismic (68/3061)	OEL 24	13/2/69-22/3/69	183 km (114 mls) 6-fold CDP
Lake Fowler seismic, magnetic & gravity (69/3077)	PEL 7	6/11/69-12/1/70	162 km (101 mls) seismic, 1268 new gravity & 1366 new magnetic stations.
SURAT BASIN			
BEAVER EXPLORATION AUSTRALIA N.L.			
Windeyer seismic (69/3067)	ATP 138P	21/9/69-22/12/69	328 km (204 mls) single fold analogue
BRIDGE OIL N.L.			
Wagoo seismic (69/3066)	ATP 145P	23/10/69-29/4/70	59 km (37 mls) 6-fold CDP, 600%
PEXA OIL N.L.			
Thallon seismic & gravity (69/3087)	ATP 140P	11/12/69-27/2/70	270 km (168 mls) reflection, 519 gravity stations.
SYDNEY BASIN			
GENOA OIL N.L.			
Currambene seismic (69/3016)	PEL 154	25/3/69-24/5/69	37.1 km (23 mls) single fold, 441 km (3 mls) refraction.
LONGREACH OIL LTD			
Broken Bay marine seismic (69/3070)	PA 6/7	24/10/69-6/11/69	1400 km (870 mls) airgun
TASMANIA			
ESSO EXPLORATION AND PRODUCTION AUSTRALIA INC.			
West Tasmania T69A seismic & magnetic (69/3000)	T/8P	31/1/69-4/2/69	442 km (275 mls) 12-fold CDP Aquapulse.
East Tasmania T69B seismic magnetic (69/3001)	T/7P	7/2/69-11/2/69	158 km (98 mls) 12-fold CDP Aquapulse

QUEENSLAND GREAT BARRIER REEF AREA

AUSTRALIAN GULF OIL COMPANY

Townsville aeromagnetic (69/3012)	Q6P, 7P	6/3/69-19/4/69	6734 sq km (2600 sq. mls)

OFFSHORE NORTH AND NORTHWEST AUSTRALIA

B.O.C. OF AUSTRALIA LTD

Legendre-Marie seismic (69/3005)	WA 1P, 28P, 30-37P, NT P5-6, 11-12, 15	23/2/69-12/6/69	6998 km (4348 mls) Aquapulse
Adele-Scott seismic (69/3038)	WA-29-35P, 37P NT P5, P13	13/6/69-14/8/69	3058 km (1900 mls) reconnaissance

FLINDERS PETROLEUM N.L.

Van Dieman Gulf aeromagnetic (69/3040)	OP 167	22/6/69-24/6/69	3046 km (1893 mls)

LONGREACH OIL LTD

West Parry Shoal seismic (69/3076)	P 16	19/12/69-24/12/69	153 km (95 mls) reconnaissance reflection

SHELL DEVELOPMENT (AUSTRALIA) PTY LTD

Arafura D-2 seismic (69/3006)	NT P19, 20, 21	10/2/69-3/3/69	1233 km (766 mls) airgun

PAPUAN BASIN

AUSTRALIAN PETROLEUM COMPANY PTY LTD

Era-Pie-Purari D1 seismic (68/3044)	L1	26/10/68-30/5/69	209 km (130 mls) CDP reflection
Fly River Delta seismic (68/3046)	L6, L7	25/11/68-16/5/69	692 km (430 mls) marine reflection 59 km (37 mls) 600% land
Kutubu-Orokana gravity (69/3049)	P27, 37, 46	17/7/69-26/9/69	

MARATHON PETROLEUM AUSTRALIA LTD

Kapuri-Orloli seismic (69/3069)	P22	19/10/69-3/3/70	75 km (46 mls) 6-fold CDP, 2 km (1 ml) 1-fold CDP

PHILLIPS AUSTRALIAN OIL COMPANY

Bligh Entrance marine seismic (68/3050)	PNG 1P, 2P, 3P	20/11/68-19/1/69	2168 km (1347 mls) Aquapulse

TEXACO OVERSEAS PETROLEUM COMPANY

Pearce Cay seismic (69/3024)	Q 10P	23/9/68-28/9/69	190 km (118 mls) Aquapulse
Kaweta seismic (69/3033)	PEP 55	8/6/69-15/11/69	418 km (260 mls)

NORTHERN NEW GUINEA BASIN

AUSTRALIAN AQUITAINE PETROLEUM PTY LTD

Maprik seismic & gravity (69/3043)	P 45	8/7/69-3/9/69	67 km (42 mls) 1-fold reflection

CONTINENTAL OIL COMPANY OF AUSTRALIA LTD

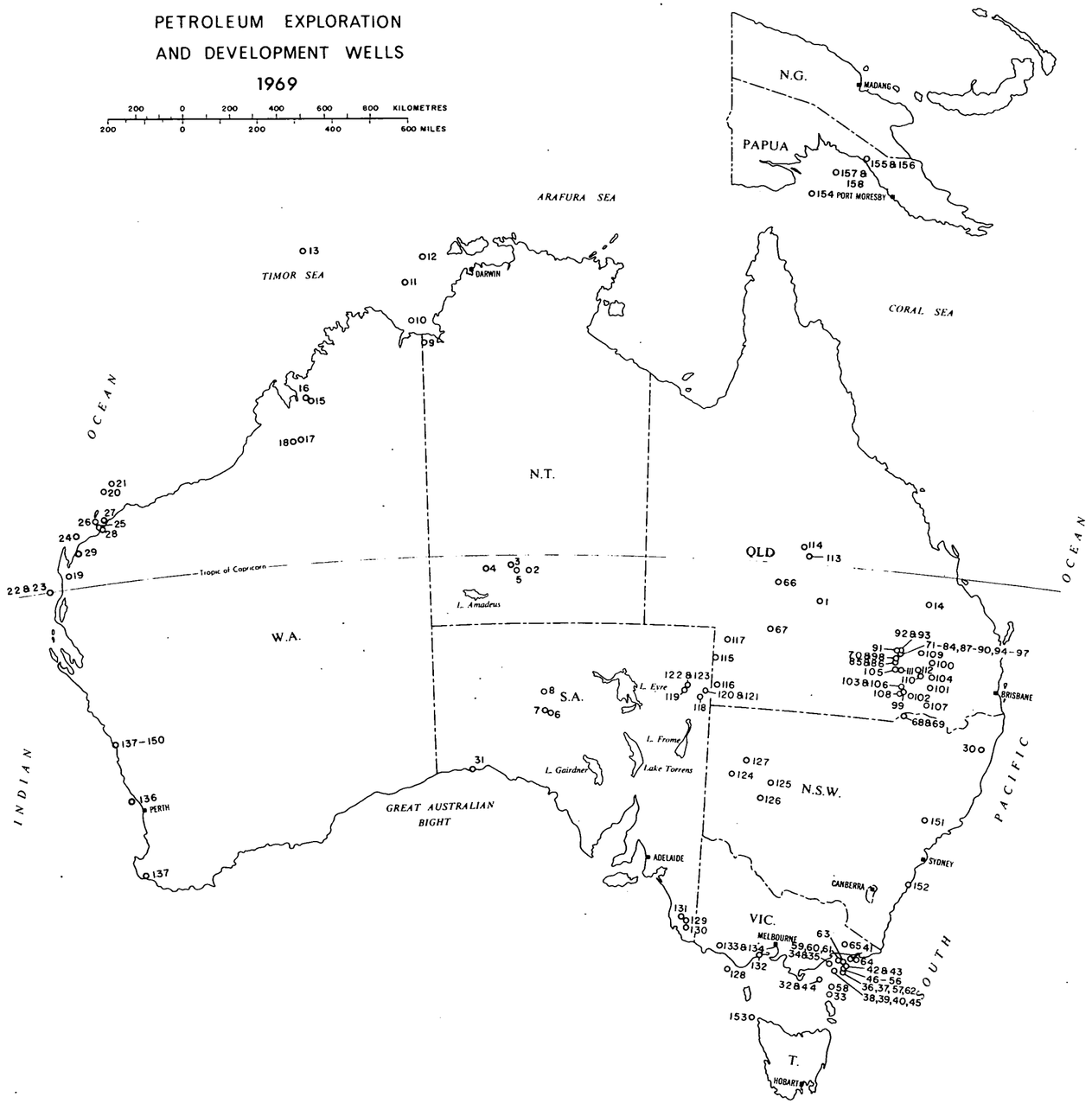
Madang seismic (69/3026)	P 41	6/7/69-12/10/69	249 km (155 mls) 600% CDP
Madang gravity (69/3084)	P 41	1/12/69-15/12/69	on all lines in Madang seismic.

AUSTRALIA AND PAPUA NEW GUINEA

PETROLEUM EXPLORATION AND DEVELOPMENT WELLS

1969

200 0 200 400 600 800 KILOMETRES
200 0 200 400 600 MILES



Note: Unless otherwise stated, well location refers to No. 1 well.

1. Eastwood, Qld.
2. West Waterhouse, N.T.
3. Tyler, N.T.
4. North West Mereenie, N.T.
5. Palm Valley 2, N.T.
6. Wallira, S.A.
7. Wallira 2, S.A.
8. Karkoro, S.A.
9. Keep River, N.T.
10. Lacrosse, W.A.
11. Petrel, W.A.
12. Newby, N.T.
13. Sahul Shoals, W.A.
14. Moura, Qld.
15. Napier, W.A.
16. Napier 2, W.A.
17. Matches Springs, W.A.
18. Mowla, W.A.
19. Remarkable Hill, W.A.
20. Dampier, W.A.
21. Madeleine, W.A.
22. Pendock ID, W.A.
23. Pendock ID 1A, W.A.
24. Anchor, W.A.
25. Beagle, W.A.
26. Flinders Shoal, W.A.
27. Fortescue, W.A.
28. Mardie 2, W.A.
29. Wonangarra, W.A.
30. Clifden 6, N.S.W.
31. Mallabie, S.A.
32. Groper 2, Vic.
33. Bluebone, Vic.
34. Barracouta 3, Vic.
35. Barracouta A1, Vic.
36. Bonita, Vic.
37. Bonita 1A, Vic.
38. Bream, Vic.
39. Bream 2, Vic.
40. Bream 3, Vic.
41. Flathead, Vic.
42. Flounder 2, Vic.
43. Flounder 3, Vic.
44. Groper, Vic.
45. Gurnard, Vic.
46. Halibut A1, Vic.
47. Halibut A2, Vic.
48. Halibut A3, Vic.
49. Halibut A4, Vic.
50. Halibut A5, Vic.
51. Halibut A6, Vic.
52. Halibut A7, Vic.
53. Halibut A8, Vic.
54. Halibut A9, Vic.
55. Halibut A10, Vic.
56. Halibut A11, Vic.
57. Mackerel, Vic.
58. Mullet, Vic.
59. Salmon, Vic.
60. Snapper 2, Vic.
61. Snapper 3, Vic.
62. Tailor, Vic.
63. Turrum, Vic.
64. Wahoo, Vic.
65. Milton, Vic.
66. Stormhill, Qld.
67. Chandos South, Qld.
68. Werrina, Qld.
69. Werrina 2, Qld.
70. Alice Downs, Qld.
71. Grafton Range, Qld.
72. Grafton Range 2, Qld.
73. Grafton Range 3, Qld.
74. Grafton Range 4, Qld.
75. Grafton Range 5, Qld.
76. Grafton Range 6, Qld.
77. Grafton Range 7, Qld.
78. Grafton Range 8, Qld.
79. Grafton Range 9, Qld.
80. Grafton Range 10, Qld.
81. Grafton Range 11, Qld.
82. Grafton Range 12, Qld.
83. Grafton Range 13, Qld.
84. Grafton Range 14, Qld.
85. Hollyrood 2, Qld.
86. Maffra 6, Qld.
87. Mooga, Qld.
88. Mooga 2, Qld.
89. Mooga 3, Qld.
90. Mooga 4, Qld.
91. Mount Beagle, Qld.
92. Niella, Qld.
93. Niella 2, Qld.
94. Pleasant Hills 7, Qld.
95. Pleasant Hills 8, Qld.
96. Pleasant Hills 8A, Qld.
97. Pleasant Hills 9, Qld.
98. Pringle Downs 5, Qld.
99. Alton North, Qld.
100. Cameby, Qld.
101. Dilbong, Qld.
102. Farawell, Qld.
103. Glenmore, Qld.
104. Myra, Qld.
105. Kincora2, Qld.
106. Noona, Qld.
107. Nomby, Qld.
108. Riversdale, Qld.
109. Woleebee, Qld.
110. Meandarra, Qld.
111. Yambugle, Qld.
112. Tinowon, Qld.
113. Rand, Qld.
114. Muttaburra, Qld.
115. Arrabury, Qld.
116. Roseneath, Qld.
117. Gilpeppee, Qld.
118. Mulga, S.A.
119. Pando 2, S.A.
120. Toolachie, S.A.
121. Toolachee 2, S.A.
122. Topwee, S.A.
123. Wirrarie, S.A.
124. Jupiter, N.S.W.
125. Poopelloe Lake, N.S.W.
126. Mount Emu, N.S.W.
127. Gnalta, N.S.W.
128. Mussel, Vic.
129. Lake Eliza, S.A.
130. Lake George, S.A.
131. Lucindale, S.A.
132. Hindhaugh Creek, Vic.
133. Hawksdale, Vic.
134. Moyne Falls, Vic.
135. Blackwood, W.A.
136. Gage Roads, W.A.
137. Dongara 8, W.A.
138. Dongara 9, W.A.
139. Dongara 10, W.A.
140. Dongara 11, W.A.
141. Dongara 12, W.A.
142. Dongara 13, W.A.
143. Dongara 14, W.A.
144. Dongara 15, W.A.
145. Dongara 16, W.A.
146. Dongara 17, W.A.
147. Mondarra 2, W.A.
148. Mondarra 3, W.A.
149. Mondarra 4, W.A.
150. Strawberry Hill, W.A.
151. Jerrys Plains, N.S.W.
152. Coonemia, N.S.W.
153. Clam, Tas.
154. Anchor Cay, Qld.
155. Tovala, PNG.
156. Tovala 1A, PNG.
157. Pasca A2, PNG.
158. Pasca C2, PNG.

B.M.R. Petroleum Exploration Branch. To accompany Record No. 1970/37

AUSTRALIA AND PAPUA NEW GUINEA

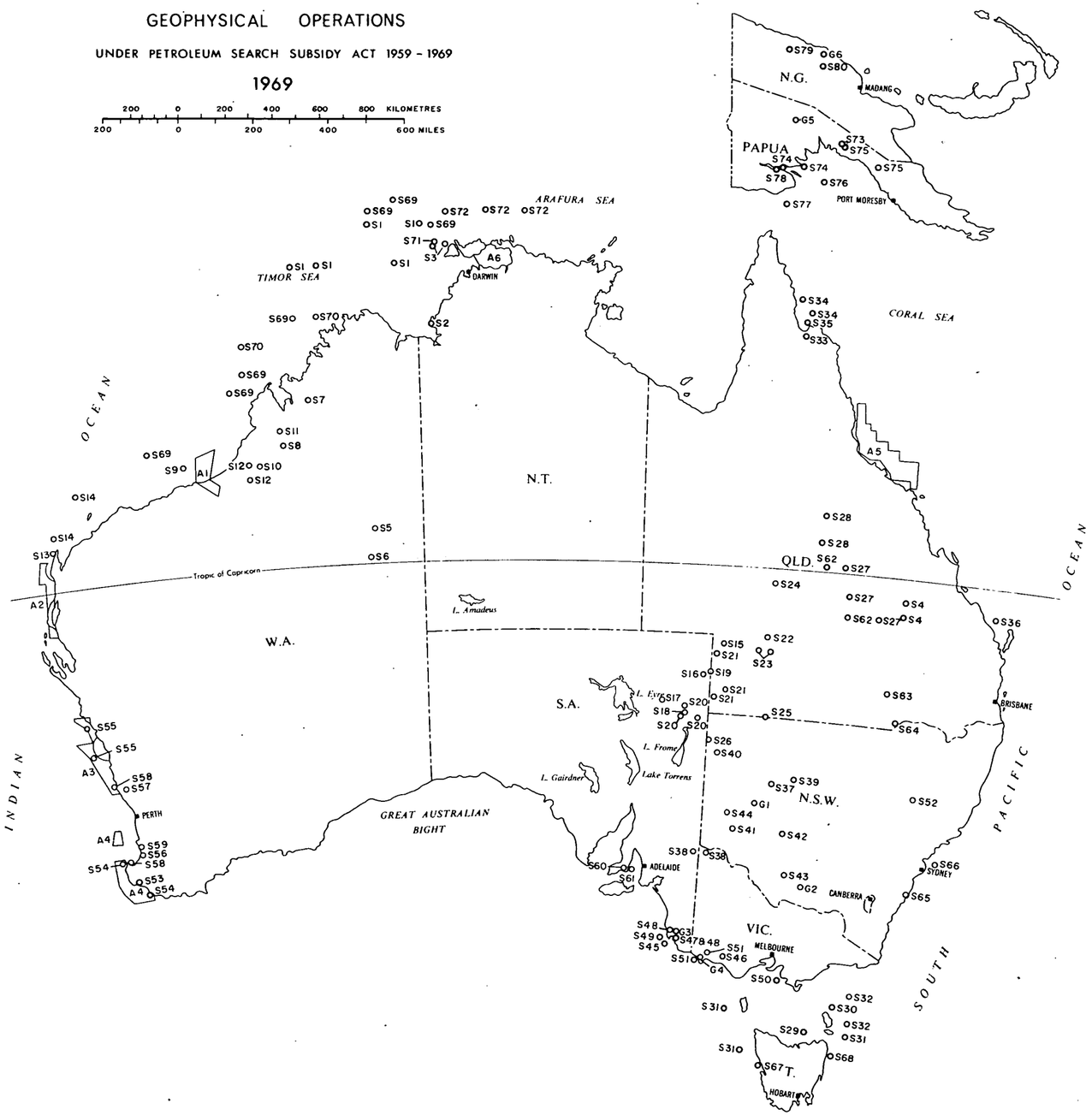
GEOPHYSICAL OPERATIONS

UNDER PETROLEUM SEARCH SUBSIDY ACT 1959 - 1969

1969

200 0 200 400 600 800 KILOMETRES

200 0 200 400 600 MILES



S - SEISMIC SURVEYS

S1. Van Diemen Rise, W.A. & N.T.
S2. Lone Hill, N.T. (& Gravity)
S3. Parry Shoal, N.T.
S4. Denison East, Qld.
S5. Contention Heights, W.A. (& Gravity)
S6. Baron Range, W.A. (& Gravity)
S7. Alexander, W.A.
S8. Matches Springs, W.A.
S9. Bedout, W.A.
S10. Munro Arch, W.A.
S11. Jurgurra Terrace, W.A.
S12. Munro R-1, W.A.
S13. Jurabi, W.A.
S14. Fraser, W.A.
S15. Yamma Yamma, Qld.
S16. Packsaddle-Innaminka, S.A.
S17. Lake Gregory, S.A. (& Gravity)
S18. Southern Cooper Basin, S.A. (& Gravity)
S19. Innaminka, Qld. & S.A. (& Gravity)
S20. Carraweena & Murta, S.A. (& Gravity)
S21. Epsilon, Qld.
S22. South Chandos, Qld.
S23. Harkaway, Qld.
S24. Thomson River, Qld.
S25. Hamilton Gate, N.S.W. & Qld.
S26. Winnathee, N.S.W.
S27. Booranghoop, Qld.
S28. Koburra, Qld.
S29. Bass B-69A, Tas. (& Magnetic)
S30. Gippsland G-69A, Vic. (& Magnetic)
S31. Tasman-Bass Strait, Vic. & Tas. (& Magnetic)
S32. East Gippsland Basin, Vic. & Tas. (& Magnetic)
S33. Breeza Plains, Qld.
S34. Offshore Laura Basin, Qld.
S35. Princess Charlotte Bay, Qld.
S36. Harvey Bay R-1, Qld.
S37. Lake Poopelloe R-3, N.S.W.
S38. Sunset, S.A. & Vic.
S39. Nelyambo, N.S.W.
S40. Pincally, N.S.W.
S41. Nambuccurra, N.S.W.
S42 Mossgiel, N.S.W.
S43. Hay, N.S.W.
S44. Redbank, N.S.W.
S45. Geltwood Beach, S.A.
S46. Hawksdale, Vic.
S47. Mayurra-Panhandle, S.A. (& Gravity)
S48. Otway O-69A, S.A.
S49. Otway O-69B, Vic. & S.A. (& Magnetic)
S50. Cape Patterson, Vic.
S51. MacArthur-Portland, Vic.
S52. Blackville, N.S.W.
S53. Wonnerup-Flinders, W.A.
S54. Koombana, W.A.
S55. Pelsart, W.A.
S56. Harvey, W.A.
S57. Namban, W.A.
S58. Koombana-Wedge Island, W.A.
S59. Harvey D-1, W.A.
S60. Lake Fowler, S.A. (& Magnetic & Gravity)
S61. Troubridge Island, S.A.
S62. Windeyer, Qld.
S63. Wagoo, Qld.
S64. Thallon, Qld. (& Gravity)
S65. Currambene, N.S.W.
S66. Broken Bay, N.S.W.
S67. West Tasmania T-69A, Tas. (& Magnetic)
S68. East Tasmania T-69B, Tas. (& Magnetic)
S69. Legendre-Marie, W.A. & N.T.
S70. Adele-Scott, W.A. & N.T.
S71. West Parry Shoal, N.T.
S72. Arafura D-2, N.T.
S73. Era-Pie-Purari D-1, PNG
S74. Fly River Delta, PNG
S75. Kapuri-Orloli, PNG
S76. Bligh Entrance, PNG
S77. Pearce Cay, Qld.
S78. Kaweto, PNG
S79. Maprik, PNG (& Gravity)
S80. Madang, PNG

A - AEROMAGNETIC SURVEYS

A1. Wallal, W.A.
A2. Offshore Bernier, W.A.
A3. Offshore West Beagle, W.A.
A4. Offshore Leeuwin, W.A.
A5. Townsville, Qld.
A6. Van Diemen Gulf, N.T.

G - GRAVITY SURVEYS

G1. Blantyre Basin, N.S.W.
G2. Jerilderie, N.S.W.
G3. Otway EV-68, S.A.
G4. Terang-Portland, Vic.
G5. Kutubu-Orokana, PNG
G6. Madang, PNG

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