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Record 1971/46

SUMMARY OF OIL SEARCH ACTIVITIES IN AUSTRALIA AND PAPUA NEW GUINEA DURING 1970

by

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INTRODUCTION

The sources of information for this Record are mainly the Final Reports of drilling and geophysical operations carried out under the Commonwealth Petroleum Search Subsidy Act (P.S.S.A.), 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 always 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 Most of those for 1970 are unpublished at present, and are referred to in this Record by their Bureau of Mineral Resources (BMR) File Numbers (Tables 1 and 2). 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.

Because the results of subsidised operations are kept confidential for a period of six months, it is not possible to include results of surveys completed late in 1970. Plate 2 of this Record shows only subsidised geophysical surveys: although numerous unsubsidised 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 subsidised surveys.

ADAVALE BASIN

There was no activity in the basin during 1970.

AMADEUS BASIN

The only activity during 1970 was the drilling of one unsubsidised well, Palm Valley No. 2 on the Palm Valley Anticline to further prove the gas field discovered during the drilling of Palm Valley No. 1 in 1965.

The structure is located about 40 miles (65 km) southwest of Alice Springs in the Henbury 1:250 000 Sheet area. The major producing formation is the Pacoota Sandstone of the Ordovician Larapinta Group. The Stairway Sandstone and fractured siltstone in the Horn Valley Siltstone are also gas reservoirs but with smaller production potential. Fracture porosity occurs in the Pacoota Sandstone and the lower part of the Stairway Sandstone in addition to some intergranular porosity. (Bur. Miner. Resour. Aust. Bull. 100, 175).

*In Palm Valley No. 2 gas flowed from the Pacoota Sandstone at the rate of 69.7 MMcfd on testing through a $2\frac{3}{4}$" surface choke. Gas was also encountered in the bottom of the Stokes Siltstone and flowed at the rate of 3.86 MMcfd on testing. The following stratigraphic sequence was penetrated:

*Information from BMR Petroleum Technology Section

Surface - 1798' (548 m)	Pertnjara Group	
1798' - 4110' (705 m)	Mereenie Sandstone	
4110' - 5170' (323 m)	Stokes Siltstone	
5170' - 6184' (309 m)	Stairway Sandstone	Larapinta Group
6184' - 6559' (114 m)	Horn Valley Siltstone	" "
6559'	Pacoota Sandstone	" "

ARCKARINGA BASIN

Weedina No. 1 was drilled in the Boorthanna Trough to test the hydrocarbon potential of Devonian and Lower Permian sediments.

The well was located on a seismically defined anticline which had been defined by two seismic events, Horizons B and D, predicted from earlier geological and geophysical work to be near the base of the Permian and the top of the Devonian respectively. In Cootanoorina No. 1 (1967) located about 39 miles (63 km) to the northwest the B horizon is correlated with a marine shale below the Mt Toondina Beds.

Weedina No. 1 was dry but the drilling confirmed the identity of the two horizons B and D and a deeper seismic event was tentatively identified as Ordovician quartzite basement. The well penetrated 2396 feet (730 m) of Devonian carbonates, clastics, and minor evaporites, the thickest Devonian sequence yet encountered in South Australia. The Devonian sequence is unconformably overlain by 2165 feet (660 m) of Lower Permian sedimentary rocks, predominantly non-marine sandstone, carbonaceous shale, and siltstone with minor coal, with a thin unit (Horizon B) (323 feet/99m) of marine shale near the base. The overlying Jurassic-Cretaceous sequence is predominantly non-marine sandstone.

All potential reservoirs were water-laden.

Two subsidised seismic and gravity surveys were completed during the year. The Lake Conway seismic and gravity survey located in the central part of the basin was programmed to check a number of gravity features for associated structure, and to investigate structures indicated by previous seismic surveys. The survey was tied to Weedina No. 1, Cootanoorina No. 1 (1967), and Boorthanna No. 1 (drilled for phosphate 1970).

Two horizons, B and D were mapped. Horizon B is a fairly consistent and continuous event over the survey area. It has been tied to the three wells, and represents the top of Unit I of the Lower Permian. Horizon D is variable in quality and character and represents the top of the Devonian or economic basement where the Devonian is absent. The structure maps (contoured in time) and the B to D isochron map show the Boorthanna Trough trending north-south, with the thickest post-Devonian sediments (about 6000 feet/1800 m) at the southern end. A series of anticlinal structures lie to the east of the trough. Weedina No. 1 and Cootanoorina No. 1 were drilled on two of these.

A Bouguer gravity map was presented incorporating data from this and previous surveys. The new data did not materially alter the earlier map. The gravity anomalies correspond closely to the structural features seen on the seismic maps.

The Peake Creek seismic and gravity survey was carried out in the northwestern part of the basin. The results had not been released by the end of the year.

BASS BASIN

Four unsubsidised exploration wells were completed, Cormorant No. 1, Pelican Nos. 1 and 2, and Whelk No. 1. The first three had hydrocarbon shows. There is no stratigraphic information available.

BONAPARTE GULF BASIN

The subsidised well, Sahul Shoals No. 1, and three unsubsidised wells Petrel No. 1A, Petrel No. 2, and Gull No. 1 were drilled during the year.

Petrel No. 1A was a relief well drilled in an attempt to kill the gas blow-out in Petrel No. 1. The attempt was only partly successful and the hole was abandoned because of mechanical difficulties. At the end of the year a line was connected to the wellhead at Petrel No. 1 and mud and cement pumped in, killing the gas blow-out in January 1971.

Petrel No. 2 located 3 miles from Petrel No. 1 was spudded in December and was drilling ahead at 3550 feet (1082 m) at the end of the year.

Information from the subsidised Petrel No.1 well drilled in 1969 is now available. The well was located on a large gently folded anticline on the Sahul Shelf in the deep central part of the basin. The only other offshore well Lacrosse No. 1 had penetrated a thick sequence of Upper Permian to Upper Carboniferous sedimentary rocks overlain by 577 feet (176 m) of Lower Triassic and Tertiary sediments. In contrast the Mesozoic sequence in Petrel No. 1 was over 7000 feet (2100 m) thick with an age range from Lower Cretaceous to Lower Triassic. This sequence had not previously been penetrated in the Bonaparte Gulf Basin. The well penetrated 1686 feet (514 m) of Permian limestone before a blow-out occurred in the bottom five feet of the well. Several potential reservoir beds and possible hydrocarbon source beds were encountered in the Mesozoic sequence.

In addition to providing important stratigraphic information the drilling identified four seismic horizons that had been mapped over a large area of the basin.

Sahul Shoals No. 1 was drilled on a large fault-bounded anticline near the outer edge of the Sahul Shelf on the northwest margin of the basin. As in Petrel No. 1 the Mesozoic sequence was very thick (6350 feet/1830 m) but in this well the lower part of the Cretaceous and all the Jurassic are missing. The marked unconformity has good stratigraphic trap potential. The well penetrated

a Lower, Middle, and Upper marine Triassic sequence (including potential source and reservoir beds) the most complete yet encountered in Australia. It bottomed in Upper Permian limestone, as in Petrel No. 1, indicating widespread carbonate deposition in the basin at this time. There were no significant hydrocarbon shows.

No stratigraphic information is available for the unsubsidised wells.

Two subsidised onshore seismic surveys were carried out during the year, one in the Burt Range and one in the Pincombe Range area. The results had not been released by the end of the year.

BOWEN BASIN

One subsidised well, Rosella Creek No. 1, was drilled in the northern Bowen Basin. The results had not been released at the end of the year.

Five unsubsidised wells were drilled, Comet River No. 1, Humboldt Creek No. 1, Memooloo No. 1, Orion No. 1, and Rolleston North No. 1. Comet River No. 1 bottomed in the Permian Cattle Creek Formation; the other four wells in the Permian Aldebaran Sandstone.

Three seismic surveys were completed, Denison East, Warrinilla West, and Shotover. The results of the Shotover seismic survey had not been released by the end of the year.

The Denison East seismic survey was located on the eastern flank of the Denison Trough. It was part of a larger project, most of which was excluded from subsidy because of the proximity of the Rolleston and Arcturus gas fields.

Two horizons were contoured, one close to the top of the Upper Permian Peawaddy Formation and the other close to the top of the Lower Permian Ingelara Formation. There are two areas of closure both of which are culminations on northerly-plunging anticlines. Each culmination has vertical closure (Ingelara reflector), of approximately 120 feet (35 m) over about 3 square miles (8km^2).

The Warrinilla West seismic survey was located in the central Denison Trough about 30 miles (50 km) southwest of Rolleston. It was programmed to detail anomalies located by the Warrinilla seismic survey. The survey resulted in further definition of the Morella Anticline. Two Lower Permian horizons were mapped, one near the top of the Ingelara Formation and the other near the top of the Cattle Creek Formation.

BROWSE BASIN

The subsidised well, Lynber No. 1, was drilling at the end of the year. It is located on an elongate anticlinal structure near the outer margin of the Leveque Platform.

CANNING BASIN

The results of five subsidised operations completed late in 1969 have now been released.

The Munro Arch seismic survey (BMR file 69/3042) was located in the southeastern part of the Canning Basin. There were two objectives. The first to confirm that a structurally high area, the Munro Arch, exists between the Willara and Kidson Sub-Basins as indicated by gravity and aeromagnetic data. The second to define the trend of the faulted hinge line (Admiral Bay Hingeline), that forms the boundary between the Willara Sub-Basin and the Broome Platform. Three horizons were mapped; Horizon A - within the Permian upper Grant Formation; Horizon B - within the Ordovician Goldwyer Formation, and Horizon C - within the Ordovician Thangoo Limestone. The maps showed a structurally high area lying to the west of the predicted position of the Munro Arch and of less magnitude. It is therefore considered that the survey failed to confirm the existence of the Munro Arch. The results indicate that the Admiral Bay Hingeline is more likely to continue across the area in an easterly direction rather than swing to the south as suggested by earlier aeromagnetic and gravity interpretation.

The Munro R-1 seismic survey (BMR file 69/3081) was also located in the southeastern part of the Canning Basin 100 miles (160 km) south of Broome. The objective was to more clearly outline the limits of the Willara Sub-Basin. Three horizons were mapped; Horizon A - within the Permian Grant Formation, Horizon B - within the Ordovician Goldwyer Formation, and Horizon C - within the Ordovician Thangoo Limestone. An isopach map of the interval between Horizons A and B was prepared. Four lines from the Munro Arch seismic survey were included in the mapping. The results confirm a basement ridge corresponding to the Anketell Gravity Ridge but add little to knowledge of the configuration of the Willara Sub-Basin.

The Jurgurra Terrace seismic survey (BMR file 69/3075) was located in the central western part of the Canning Basin, 75 miles (120 km) south of Derby. The objectives were to determine whether CDP stacking and digital processing improve the record quality of pre-Permian data on the Logue and Doran structures, and to get a better general structural interpretation of the area. Three horizons were mapped; Horizon A - within the Permian Grant Formation; Horizon B - basal Permian unconformity, and Horizon C - top Upper Devonian Clanmeyer Siltstone. Five anticlines in the central and eastern part of the survey area were mapped on Horizon C and Horizon B, but only four were mapped on Horizon A. All are considered suitable hydrocarbon traps.

Mowla No. 1 well (BMR file 69/2039) was designed to test the hydrocarbon potential of Member E of the (?) Silurian Carribuddy Formation, in a location structurally higher than in Edgar Range No. 1 well (BMR file 68/2041) on the northern edge of the Broome Platform. The results showed that the well was in fact located on the Jurgurra Terrace. The same unnamed Middle to Upper Devonian carbonate section as in Matches Springs No. 1 well (BMR file 69/2023) was encount-

ered instead of the Carribuddy Formation. The Jurassic section was thinner and the Permian section thicker than expected, the latter difference being due to a greater thickness of the Braeside Tillite Member of the Grant Formation. The southern margin of the Jurgurra Terrace (Dampier Fault) is now thought to occur somewhere between the Mowla No. 1 and Edgar Range No. 1 wells.

Napier No. 2 well (BMR file 69/2031) was drilled as a stratigraphic test of the northern margin of the Lennard Shelf about 50 miles (8 km) northeast of Derby. Napier No. 1 (BMR file 69/2015) and Hawkestone Peak No. 1 (BMR file 62/1093) are the only other wells drilled on this part of the Shelf. The well was located on a seismically determined closed anticline. Lost circulation zones adversely affected the quality and value of the cuttings and interpretation was based mainly on electric logs. The sequence was subdivided into four units from top to bottom:- Unit A (469 feet, 143 m), a friable sand with minor clay beds, possibly correlates with Unit A of Lower Carboniferous age in Napier No. 1; Unit B, 2303 feet (702 m) of calcarenite, micrite, and dolomite with interbedded clay and siltstone, possibly correlates with Unit B in Napier No. 1 and the Laurel, Fairfield, and part of the 'Reef' Formation in Hawkestone Peak No. 1 (Upper Devonian to Lower Carboniferous); Unit C, 1137 feet (347 m) of sandstone and slightly calcareous sandstone with minor shale and siltstone, possibly correlates with Unit C in Napier No. 1 and the 'Reef Terrigenous Facies' in Hawkestone Peak No. 1 (Upper Devonian), and Unit E, 1287 feet (392 m) of predominantly arkosic sandstone and conglomeratic sandstone with interbedded shale and silstone, possibly correlates with the same unit in Napier No. 1 (Middle Devonian). Unit D of Napier No. 1 does not occur in Napier No. 2. Precambrian basement consisting of mica schist with abundant feldspar and quartz inclusions was intersected at 5209 feet (1,588 m).

Four subsidised seismic surveys were completed during 1970, including two offshore. They are all listed in Table 2. The results of only three of the surveys were released by the end of the year.

Results of the Canning Marine seismic survey indicated 19 structural leads, seven of which are large anticlinal features in the Fitzroy Trough.

The King Sound seismic survey was a reconnaissance survey designed to show the structure between an area of Precambrian strata outcropping to the north of the Lennard Shelf and an area of sediments cropping out on its southern margin. The results indicate a comparatively thin undisturbed sequence, thickening southwards. Four horizons, A (Permian?), B (Carboniferous?), C (Devonian ?), and D (Ordovician-Pre-Ordovician ?) were mapped. Major faulting and indication of structural growth are confined to the Carboniferous and older sediments. Drilling in the surrounding area has shown that the Lower Carboniferous Laurel Formation, the Devonian reefs and the Ordovician limestone contain potential reservoir and source rocks.

Onshore, the Tabletop seismic survey investigated the structure of the southern flank of the Kidson Sub-Basin and the adjoining Tabletop Shelf. The survey was tied to Sahara No. 1 and Kidson No. 1 wells (BMR file 64/4129, and 65/4177). Four horizons were mapped. These are within or near the top of the following formations; Grant Formation (Permian), Tandalgoo Red Beds (Siluro-Devonian), Caributdy Formation (?Silurian) and Thangoo Limestone (Ordovician). Structures were defined in the vicinity of both Sahara No. 1 and Kidson No. 1.

Four subsidised wells were drilled (Table 1). The results had not been released by the end of the year.

CARNARVON BASIN

The results of two offshore subsidised drilling operations completed late in 1969 are now released.

Madeleine No. 1 well (BMR file 69/2006) was drilled in the Dampier Sub-Basin on the Madeleine-Dampier Trend twenty miles west of Legendre No. 1 (BMR file 68/2016). The objectives were to establish the Jurassic, Cretaceous, and Tertiary stratigraphy in a previously untested part of the sub-basin and to evaluate the hydrocarbon potential in a large seismically defined closed anticline particularly of a predicted porous sandstone in the Upper (and ?Middle) Jurassic to Lower Neocomian.

The well encountered Quaternary to Pliocene calcarenite and calcareous sandstone (1144 feet, 349 m) disconformably overlying 2665 feet (812 m) of Miocene foraminiferal calcarenite, claystone, and sandstone. The Tertiary sequence is probably disconformable on Cretaceous claystone (3070 feet thick 936 m), with three calcilutite members. This is underlain by an Upper Jurassic sequence (4030 feet thick, 1228 m) consisting predominantly of claystone and siltstone resting, probably disconformably, on 1006 feet (307 m) of ?Middle Jurassic sandy siltstone, feldspathic siltstone and shale.

There were indications of oil and gas in the Upper Jurassic between 12880 feet (3925 m) and 14000 feet (4265 m). However, due to mechanical difficulties, the most promising interval which contained fractured shale zones above 70 feet (20 m) of porous sandstone could not be tested.

The well provided the thickest and stratigraphically most complete Tertiary section in the area. The Oligocene sediments are the first recorded in the Carnarvon Basin. The Tertiary section contains sandstone and carbonate with good reservoir characteristics.

The Middle to Upper Jurassic section has lithological affinities to an Upper Jurassic section at Dampier No. 1 and a Middle to Upper Jurassic section at Legendre No. 1. The well established the widespread distribution of the Tithonian sandstone, with good reservoir characteristics, that was first encountered in Legendre No. 1 but was absent in Dampier No. 1.

Pendock ID No. 1 well (BMR file 69/2020) was located about 28 miles (45 km) west-southwest of Point Maud on a seismically defined, large, closed anticline in the Cretaceous. Structural closure had also been demonstrated in the ?Jurassic or Permian. The main purpose of the drilling was to evaluate the hydrocarbon potential of the unknown sedimentary sequence in the area. The primary targets were Tertiary and Mesozoic sediments and a secondary objective the age and prospectiveness of the sediments below the ?basal Cretaceous unconformity.

The well provided valuable stratigraphic information and new velocity control for the area. It demonstrated the absence of Jurassic, Triassic, or Permian sediments. Sediments of Carboniferous, Devonian and Silurian age, correlated with the Moogoonee, Guedna, Nannyarra and Dirk Hartog Formations, occur unconformably below the Lower Cretaceous sequence. The Dirk Hartog Formation was unexpectedly thick, and the porous Ordovician Tumblagooda Sandstone encountered in Wandajee No. 1 (BMR file 62/1215) was not reached. However, it is predicted that it can be reached within a target depth of 9000 - 10000 feet (2750-3000 m) in this part of the Carnarvon Basin.

All porous and permeable zones in the well proved to be water bearing. There were minor oil shows in the Devonian Nannyarra and Silurian Dirk Hartog Formations.

Two subsidised and four unsubsidised wells were completed during 1970, all offshore. The subsidised wells were Enderby No. 1 and Legendre No. 2, both drilled in the Dampier Sub-basin. No hydrocarbons were encountered. Details of the operations were not released at the end of the year.

The unsubsidised wells Flag No. 1, Ripple No. 1, Tryal Rocks No. 1, and Pepper No. 1 were all drilled within a 34 mile (55 km) radius of the Barrow Island Field. No significant hydrocarbon shows were reported.

Two subsidised geophysical operations were completed during the year. The Barrow Waters seismic survey and the Murchison Gascoyne gravity survey.

The Barrow Waters seismic survey covered areas in three subdivisions of the Carnarvon Basin, the Barrow Sub-basin, the Exmouth Sub-basin, and the Rough Range-Long Island Block. It resulted in further definition of structural leads from previous surveys particularly in the Tryal Rocks area and the area north of Murion Islands but did not indicate any promising new structural leads. In the area south of Murion Islands the use of modern recording techniques has greatly enhanced the data quality on the pre-Cretaceous section.

The Murchison-Gascoyne Helicopter gravity survey was designed to evaluate the suitability of the gravity method for outlining major structure and, in particular, a graben indicated by previous seismic work. The results indicated that the control provided by the 4-mile gravity grid employed was not sufficient for the resolution of structural detail. The postulated graben was not substantiated

but the survey indicated two local areas where a thick sedimentary sequence may be present. These are the Meedo Gravity Low in the east central part of the area surveyed, and the Gascoyne Gravity Depression in the centre which corresponds with the Gascoyne Sub-Basin.

CLARENCE-MORETON BASIN

Two unsubsidised wells, Hogarth Nos. 2 and 3, were drilled. There was a minor gas flow from the Jurassic coal measures in Hogarth No. 2.

COOPER BASIN

The results of four subsidised operations completed late in, or proceeding at the end of 1969, have now been released.

The Carraweena and Murta seismic and gravity surveys (BMR file 69/3045 and 69/3063) were located in the southern part of the Cooper Basin. Seismic traverses were located to explore in greater detail anomalies indicated by previous surveys, and the rest of the program was a reconnaissance to provide more regional information about the geology and structure of the basin. Three horizons were mapped; Horizon C - top of the Lower Cretaceous 'Hooray Sandstone'; Horizon P - top of the Palaeozoic, and the third horizon at the base of the Permian Gidgealpa Formation. The mapping shows a regional thickening of the sedimentary sequence to the north. There is an easterly-trending syncline in the Carraweena area faulted on its northern and southern flanks. Parallel anticlinal features also occur to the north and south. Two easterly-trending anticlinal features occur in the Murta area and a number of smaller structures in the east central part of the survey area one of which was tested by the Cherri No. 1 well (see below). Gravity readings were taken along the seismic lines at ¼ mile (2/5 km) intervals. In general there is good correlation between the gravity and seismic results.

The Epsilon Seismic Survey was located in southwest Queensland in the Orientos-Durham Downs area. Three horizons were mapped; Horizon C - top of the Lower Cretaceous 'Hooray Sandstone', Horizon P - top of the Permian Gidgealpa Formation, and Horizon Z - the pre-Permian unconformity.

The survey was in three main areas. In the Arrabury area to the north the Permian sediments, if present, are probably less than 300 feet (90 m) thick. In the Durham Downs-Karmona area in the centre further seismic work will be needed to check the thickness of the Permian. Several anticlines were indicated in the Orientos, Roseneath, and Wolgolla areas in the southern part of the survey area.

The Packsaddle-Innamincka seismic survey was located over the Packsaddle Anticline in the southern Cooper Basin to map the distribution and thickness of the Permian. Three horizons were mapped; Horizon C - Cretaceous/Jurassic boundary, Horizon P - near the top of the Permian, and Horizon Z - base of the Permian. The results were integrated with previous results in the area. The Packsaddle Anticline was shown to trend north-easterly, to be closed to the southwest, and ?faulted to the northwest and southeast. The Permian pinches out against the southeastern flank of the anticline and is absent over the crest.

Twenty one wells, ten of which were subsidised, were completed during 1970. Seventeen of the wells were drilled in the southwestern part of the basin in South Australia, and the remainder in Queensland. There were five subsidised geophysical operations, three in South Australia and three in Queensland.

In South Australia three subsidised and three unsubsidised wells, were drilled in the Innamincka 1:250 000 Sheet area. Coongie No. 1 was located on the northwestern edge of the basin, that is, at the edge of Permian deposition. It was drilled on a seismically defined closed anticlinal structure in the Cambrian with 200 feet (60 m) of structural closure and 400 feet (120 m) of fault closure at the level of the base of the Middle Cambrian. The well was a test of the hydrocarbon potential of the Cambrian section and of possible wedging out Permian sediments. After penetrating a Cretaceous to Jurassic sequence for 6412 feet (1829 m) the well intersected 285 feet (87 m) of lower Triassic, 265 feet (81 m) of Permian Gidgealpa and Merrimelia Formation and 3768 feet (1148 m) of Cambrian sedimentary rocks before entering volcanics. There were no hydrocarbon shows, but good porous zones containing salt water were present in both the Permian and the Cambrian sequence. The well established the Merrimelia Formation as a good potential hydrocarbon reservoir in the western part of the Cooper Basin. Packsaddle No. 1 was drilled to test a stratigraphic-structural trap on the Packsaddle Anticline: the primary and secondary targets being the Permian Gidgealpa Formation and the Triassic Chandos Formation respectively. The well had good shows in the lower member of the Gidgealpa Formation. Production testing gave a flow rate of 0.5 MMcfd.

Yanpurra No. 1 was drilled on a northeasterly extension of the Packsaddle Anticline. Results are not yet available. The Patchawarra Central and Patchawarra Central II seismic and gravity surveys preceded the drilling of Tirrawarra No. 1. The geophysical work was programmed to provide structural and stratigraphic control in the northwestern part of the southern end of the basin. The results indicated a Palaeozoic erosional surface dipping generally to the southeast and overlain by roughly conformable Mesozoic and younger rocks. The Permian pinches out to the northwest against south-easterly-dipping Cambrian (?) rocks. Farther to the northwest the Cambrian (?) pinches out and the Mesozoic overlies the volcanic (?) section beneath the Cambrian directly. Although the seismic evidence is inconclusive, there is some indication that the sequence reverses again to the northwest where a Bouguer gravity low suggests the existence of a basin. There was no indication of significan structural closure. Four horizons were mapped; Horizon C - approximating to the top of the Lower Cretaceous 'Hooray Sandstone', Horizon P - base of the Mesozoic, top of the Cambrian (?), and top of the volcanics/top of red beds. Tirrawarra No. 1 struck gas and oil in the Permian Gidgealpa Formation. Production testing yielded 600 barrels per day of 52.8° gravity oil and open-hole drill-stem testing produced gas at the rate of 11.8 MMcfd. The well was completed as a gas producer. The Merrimelia seismic survey was followed up by the drilling of Merrimelia No. 5. It reached total depth in the Innamincka Red Beds and struck gas and condensate in the Permian Gidgealpa Formation. Production testing gave a calculated open flow potential of 7.6 MMcfd gas. The third unsubsidised well in the Innamincka 1:250,000 Sheet area, Tindilpie No. 1 produced a non-commercial gas flow from the Permian Gidgealpa Formation on drill stem testing. Mudrangie No. 1 was drilling at the end of the year.

Four unsubsidised wells were drilled in the Strzelecki 1:250,000 Sheet area, two of which, Della Nos. 1 and 2, in the Nappacoongee-Murteree area, produced gas from the Gidgealpa Formation. Della No. 1 has a calculated absolute open-flow potential of 73 MMcfd and Della No. 2 of 20 MMcfd. Murteree No. 1 was drilled 18 miles (29 km) southwest of Della No. 1 but potential reservoirs in the Gidgealpa Formation were water-bearing. Strzelecki No. 1 was drilled about 8 miles (13 km) south of Della No. 1 and produced gas from the Gidgealpa Formation in a drill stem test at the rate of 5.2 MMcfd. Production testing has been temporarily suspended. Farther west, Pando North No. 1 was drilled 10 miles (16 km) west of Daralingie Gas field but the well was dry.

The subsidised Accalana seismic and gravity survey was carried out in the southern part of the Strzelecki and in the Callabonna 1:250 000 Sheet areas on the southwest edge of the basin. Four subsidised wells were drilled in the same area.

The main features defined by the Accalana and previous surveys are a pronounced easterly trending syncline (or graben) along latitude 29°08', a possible northeasterly trending continuation of this low, a large structural high to the northwest of the lows, and a structural high on the southern flanks of the easterly-trending low. The Permian section appears to thicken in the lows and thin rapidly away from them. The structural highs appear to have very thin section on them. A less pronounced structural complex, consisting of a series of small highs and lows lies to the northwest of these major structures. These are of economic interest because they appear to have a suitable thickness of Permian cover.

The four subsidised wells Kumbarie, Gurra, Weena, and Cherri Nos 1 were all drilled on seismically defined structures. There were no significant hydrocarbon shows but the drilling provided useful stratigraphic information, and a review of the reservoir potential of the Permian in the area. The Triassic and the upper member of the Gidgealpa Formation were absent in all the wells, and the Merrimelia Formation occurred only in Weena No. 1 and Kumbarie No. 1. The reservoir potential of the Permian sandstones ranged from poor to good.

The Lake Gregory seismic and gravity survey was carried out in the Jason and Kopperamanna 1:250 000 Sheet areas on the western edge of the basin in South Australia. The objectives were to determine whether the Cooper Basin Permian sediments extend into the survey area and if so to map their distribution together with that of Mesozoic and pre-Permian sediments. However, reflections were obtained from only two horizons - the C Horizon of Upper Jurassic to Lower Cretaceous age, and the Z Horizon representing the unconformity at the base of the Mesozoic. The gravity survey produced no major changes in the Bouguer anomaly map for the area. It confirmed the negative anomalies that extend westward from the Cooper Basin but the seismic survey failed to confirm that they are indicative of a thicker sedimentary sequence.

Three subsidised wells were completed during the year in Queensland. The results from one of them, Tallalia No. 1, are not available. The results of the drilling of the subsidised well, Roseneath No. 1, drilled in 1969 are now available. It was drilled in the Tickalara 1:250,000 Sheet area on the northeast flank of a northeasterly-trending seismically defined anticline. The well struck gas in the Permian Gidgealpa Formation. During production testing gas flowed at the rate of 8 MMcfd. The unsubisidized well Orientos North No. 1, was also drilled in the Tickalara 1:250,000 Sheet area following the Epsilon seismic survey. There were no hydrocarbon shows. The subsidised wells Arrabury No. 1, and Gilpeppie No. 1 were drilled farther north in the Durham Downs and Barrolka 1:250,000 Sheet areas respectively. They were both drilled on seismically defined anticlines. In Arrabury No. 1 the Permian sequence was reduced to 175 feet (53 m) of Gidgealpa Formation in which there were minor indications of hydrocarbons.

In Gilpeppee No. 1 the Cretaceous Tambo Formation and the Jurassic sequence were thicker than expected. As in Arrabury No. 1 the Merrimelia Formation was absent but the Gidgealpa Formation was thicker (1079 feet, 329 m). There were no significant hydrocarbon shows. Potential reservoir beds in the lower unit of the Chandos Formation and the Gidgealpa Formation were highly silicified.

The subsidised Innamincka seismic and gravity survey was completed during the year. It covered parts of the Innamincka and Durham Downs 1:250,000 Sheet areas. The gravity survey was carried out in two separate areas, Innamincka, and Patchawarra East, which are partially joined along longitude 141°00'. Contoured Bouguer gravity anomaly maps show a series of generally east to northeasterly-trending highs and lows. In the southeastern part of the Innaminka area the trend is southeasterly. The highs and lows for the most part are thought to correlate with structure in the basement although one area of more recent folding is interpreted. Three horizons were mapped during the seismic survey; C - base of the Cretaceous; P - near the top of the Permian, and Z - base of Permian. In the south of the Patchawarra East area the Packsaddle structure trends northeasterly and is closed to the north. Another anticline trends northeasterly in the northern part of the area and may be closed in the south by a possible fault. The Permian appears to pinch out near the crests of the anticlines and stratigraphic trapping is possible in the areas of onlap. An anticlinal structure was mapped in the Arrabury area to the south of the Arrabury structure. A complex of faults in the Tallalia area on the southern flank of the Innamincka structure and a possible small fault controlled structure in the centre of the area were mapped. A northerly trending anticline was indicated in the Durham Downs area, but closure was not confirmed.

EROMANGA BASIN

Final reports of two subsidised operations completed late in 1969 have now been released.

The Harkaway seismic survey was located in the Eromanga 1:250,000 Sheet area. The objectives were threefold:-

(1) To confirm Palaeozoic sediments, thickening to the west, over the Harkaway Anticline.

(2) To investigate the western flank of the Pinkilla-Canaway Anticline for structural traps.

(3) To delineate pre-Permian structure in the Neville Downs area.

Three horizons were mapped; Horizon M - Middle Devonian to Permian, Horizon P - top of the Permian, and Horizon C - top of the Jurassic. Horizon M occurs only in the central west of the area over the Neville Downs anticlinal nose. Horizon P, which is correlated with the Gidgealpa Formation, is well developed over the northwest trending Harkaway Anticline. Another high was indicated between two northwest-trending faults, to the east of the Harkaway Anticline. The Permian section onlaps against, and is faulted on, the western flank of the Pinkilla-Canaway Anticline. Horizon C closely follows the pattern of Horizon P over the Harkaway Anticline and also onlaps against the western flank of the Pinkilla-Canaway Anticline. Two drilling sites wereproposed, one on the Harkaway Anticline and one on the Pinkilla-Canaway Anticline.

The Chandos South No. 1 well was drilled in the Windorah 1:250,000 Sheet area as a near crestal test of the Chandos Anticline, with targets in both the Eromanga Basin and in the underlying Cooper Basin. The primary targets were the Yongala M Sandstone of the Jurassic Yongala group and the sandstone of the lower Chandos Formation. The sandstones of the Gidgealpa Formation were secondary targets. The Chandos Anticline is a north-trending structure forty miles long, with a number of separate culminations, three of which were the sites for previous wells - Bodalla No. 1 (BMR file 67/4267), Cumbroo No. 1 (BMR file 68/2043) and Chandos No. 1 (BMR file 66/4189). There were indications of hydrocarbons in the last two. The results of the drilling showed that the Yongala M Sandstone contained traces of oil but was water saturated, the lower Chandos Formation contained water, and the Gidgealpa Formation was tight.

Two subsidised seismic surveys were carried out and one subsidised well, Belmore No. 1, was drilled during 1970. The final result of the drilling is not yet released. The Winnathee seismic survey was carried out in the Milparinka 1:250,000 Sheet area in New South Wales over three gravity lows indicative of Permian and/or Cambro-Ordovician sediments in basement depressions below the Mesozoic. The interpretation is of a shallow basement trough containing about 500 feet (150 m) of Palaeozoic (?) sediments wedging out against the sides of the trough. The wedges are possible stratigraphic traps. The Hamilton Gate seismic refraction survey was carried out in the Bulloo and Urisino 1:250,000 Sheet areas on the Thargomindah Shelf (eastern lip of the Bulloo Depression). The survey attempted to establish north-south closure on a possible structural high indicated by a previous reflection survey, and to map high velocity refractors and to trace them to a point where they can be indentified by shallow drilling. A high velocity refractor was recorded ranging in depth from about 2150 to 3500 feet (655-1065 m). Mapping of this refractor confirmed closure over the postulated high in the north of the survey area and also indicated an anticlinal nose in the south. The refractor is shallowest on the latter structure.

The unsubsidised Yarrallee No. 1 well was drilled to determine the nature of the high speed velocity refractor. The stratigraphic interpretation of the sequence penetrated is

Formation	Thickness	Age
Tertiary sands, silcrete and	180' (55 m)	Cret.
weathered Cretaceous strata	580' (177 m)	"
Winton Formation	230' (70 m)	"
Allaru Mudstone	790' (241 m)	"

Formation	Thickness	Age
Wallumbilla Formation	520' (158 m)	Cret.
Hooray Sandstone	520' (158 m)	Up Jur - L Cret.
Metamorphosed basement rock (siltstone showing effects of low-grade regional metamorphism)	Entered at 2220' (676.7m)	?

The metamorphic rock is the high-speed refractor mapped in the area and also constitutes economic basement.

EUCLA BASIN

No wells were drilled in 1970.

The Twightlight Cove seismic survey was carried out offshore in a little known area of the basin. The interpretation is of an eroded granitic (?) basement overlain by 4000 feet (1200 m) of sediments. A maximum thickness of 7400 feet (2250 m) of sediments occurs in narrow channels in the basement. The sediments are flat lying.

GALILEE BASIN

The final report of the Booranghoop seismic survey completed at the end of 1969 has been released. It was carried out in the Alpha-Springsure area to investigate two gravity highs in the Booranghoop and Maranoa areas. The results were poor and failed to prove whether the gravity anomalies arise from structural highs at depth. The shallow section thickens towards the west in the Booranghoop area.

The Windeyer seismic survey (BMR file 69/3067) was completed late in 1969. It was located in the Tambo and Augathella 1:250,000 Sheet areas of Queensland. Two horizons, the top of the Permian and the unconformity at the base of the Permian, were mapped. Five structural leads were investigated. Closure was established on the Coreena and Valetta anticlines which were drilled in 1970 without success (see below) and a number of northwest trending anticlines were indicated northwest of Tambah.

The final report for Muttaburra No. 1, drilled in 1969, has also been released. The well was located about thirteen miles (21 km) south-southwest of Muttaburra on a seismically defined anticline with 170 feet (65 m) of closure on the top of the Permian. It tested Permian beds similar to those that had hydrocarbon shows in Thunderbolt No. 1 (BMR file 67/4245), 53 miles (85 km) to the northeast. The Muttaburra Structure has the same northeasterly trend as the Thunderbolt Structure but is located near the edge of the basin. Cretaceous and Jurassic sediments of the Eromanga Basin were penetrated to 2734 feet (833 m) where the Triassic of the Galilee Basin sequence was encountered. Triassic units correlated by the company with the Moolayember Formation, Clematis Sandstone, and Rewan Formations were penetrated to 2893 feet (882 m) followed by an Upper Permian unit, 647 feet (197 m) thick of coal measures, and a Lower Permian, mainly sandstone unit, 1060 feet (323 m) thick. The well reached total depth in pre-Permian volcanics. There were no commercial hydrocarbons although shows of gas and oil occurred in a fairly porous sandstone in the Lower Permian.

In 1970 the East Lynne seismic survey was carried out in the Tambo 1:250,000 Sheet area and was followed by the drilling of Allandale No. 1. Final reports are not yet released for either operation. The Koburra seismic survey was carried out to verify and detail two probable anticlines mapped by seismic work in 1967. The survey was carried out in two separate areas, one 30 miles (48 km) south of Torrens Creek and the other 45 miles (72 km) north of Aramac. One horizon, the Permian 'D' horizon, was mapped in each area, and the survey verified the existence of four anticlines, two in each area. The subsidised well Koburra No. 1 was drilled on one of them. The final report is not yet released. Coreena No. 1 was drilled 20 miles northeast of Barcaldine in the Longreach 1:250,000 Sheet area. It was located on the Coreena Anticline which has about 350 feet (100 m) of vertical closure over about 39 square miles (100 km^2). There were good potential reservoir and source rocks in the entire Jurassic to Carboniferous section penetrated, but drill-stem testing showed all the reservoirs to be freshwater - filled, and ny hydrocarbons were detected. The Jurassic Ronlo Beds are massive sandstone; shale units farther south having lensed out. The Permo-Carboniferous section is thinner than at Maranda No. 1 eight miles (13 km) to the north. Varved shales in the Carboniferous Joe-Joe Formation confirm its fluvio-glacial origin.

Valetta No. 1 was drilled to the southeast in the Augethella 1:250,000 Sheet area. It was drilled on a seismically defined anticline and encountered potential reservoirs of Jurassic, Triassic, and Permian age which proved to be water bearing. The Lower Permian and Upper Carboniferous are absent. The Jurassic Evergreen Shale is absent, also the Triassic Rewan Formation. The well proved the westward extension of the Permian marine Mantuan Productus Bed which unconformably overlies granodiorite (Silurian?) basement.

GEORGINA BASIN

The Toko Range Seismic Survey was located on the eastern flank of the Toko Syncline in the Mt Whelan 1:250,000 Sheet area.

Previous geophysical work has indicated that the Toko Syncline is a large asymmetrical southeast trending structure containing a thick sequence of lower to middle Palaeozoic sediments. The northeastern limb is gently dipping whereas the southwestern limb is steeply dipping and faulted. The Toko Range seismic survey confirmed this broad picture and indicated a structurally high trend to the southwest of the synclinal axis. The high is strongly faulted in the south, the faulting decreasing to the northwest where additional seismic work may establish closure.

GIPPSLAND BASIN

Four subsidised operations were completed during the year: one onshore well and three seismic surveys. Of the offshore wells, the unsubsidised Batfish No. 1, Bream No. 3, Emperor No. 1, and Tuna No. 3 had good hydrocarbon shows but were abandoned. Snapper No. 3 extended the oil and gas discoveries of Snapper Nos 1 and 2 and was completed as a producer.

The subsidised well, Hilton No. 1, was located near Buchan, in the Buchan Synclinorium. The well was located on one of a series of narrow northerly-trending surface anticlines within the Synclinorium. The objective was to test a predicted Devonian sequence consisting of the Middle Devonian Taravale Formation and Buchan Caves Limestone, and the Lower Devonian Snowy River Volcanics. Possible targets were primary or secondary porosity in the Buchan Caves Limestone, secondary porosity in the Snowy River Volcanics, or reef development in the Taravale Formation. The stratigraphic section was as predicted, but porosity and permeability was low throughout.

The results of only one of the seismic surveys, Tarwin seismic survey, are available. The objectives were to map reflectors at the top of, and within, the Mesozoic Strzelecki Group, to tie these reflectors to the Tarwin Meadows No. 1 well, and to locate the basal beds of the Lower Cretaceous. In fact, only one reflector was mapped, identified as equivalent to the Wonthaggi Coal Measures. The mapping indicated that dip reversals occur at several localities, the most important being about 1.6 km west of Tarwin Meadows No. 1 well.

LAKE FROME EMBAYMENT

The Frome Downs seismic and gravity survey was carried out during the year. The results are not yet released.

LAURA BASIN

The final reports of two seismic surveys completed in 1969 have now been released. The Breeza Plains seismic survey was carried out to further investigate two anticlinal trends indicated by the Marina Plains seismic survey (BMR file 63/1517). The anticlines, which trend northerly, have several closed culminations in the Breeza Plains and Lakefield area in sediments approximately 3000 feet (900 m) thick.

Horizon A (Upper Jurassic) was mapped; contours are thought to represent the structure of the whole section. The dominant features are a north-trending fault (Palmerville Fault) in the west and a narrow ridge, parallel to the fault, in the centre of the survey area. A drilling site was recommended on a culmination on this ridge, where basement is about 2200 feet (660 m) deep.

The offshore Princess Charlotte Bay seismic survey was designed to locate hydrocarbon traps. Previous aeromagnetic, seismic, and gravity work has shown the Laura Basin extending offshore as a north-trending trough with a depth to basement of about 6000 feet (1800 m).

The results showed the structure to be more complex. The reflections from effective basement were very poor. It appears to lie about 3000 - 4000 feet (900-1200 m) below sea level, with a maximum depth of about 7500 feet (2200 m) in a trench-like wedge in the south of the survey area. A shallower horizon within the Mesozoic was also mapped. Two sites are recommended for exploratory drilling.

Two subsidised wells, Breeza Plains No. 1 and Lakefield No. 1 were drilled during 1970. The final reports are not yet released.

MURRAY BASIN

The final report of the Jerilderie detailed gravity survey, completed at the end of 1969 is now released. It was located near Jerilderie in southern New South Wales with the object of obtaining a detailed coverage of the Oaklands Sub-Basin, previously outlined by regional gravity work.

The results show a northwest-trending Bouguer gravity low intersected by a high in the central northwest of the survey area. The low is considered to indicate the probable extent of the sub-basin.

Three subsidised wells were drilled in the Paringa Embayment in 1970. The drilling programme was designed to determine the presence and hydrocarbon potential of the basal Cretaceous sandstone. The first well, Sunset No. 1, was located on the northeast flank of the seismically defined Sunset High. A Lower Cretaceous sequence was intersected at 2104 feet (641 m) and phyllite of the Cambrian Kanmantoo Group at 3030 feet (923 m). The Lower Cretaceous sequence was divided into three lithological units. The coarse basal sandstone had good reservoir potential but lacked hydrocarbon shows and was fresh water filled. The middle unit of siltstone and mudstone was a potential source rock. The sandstone of the Eocene lower Knight Group also had good reservoir potential. The second well, Morkalla No. 1 was located to test the hydrocarbon prospects of an anticipated stratigraphic trap near the wedgeout of the Cretaceous "basal sandstone." The wedgeout occurs within the narrow distal end of a basement valley outlined by refraction to the east of the Sunset High. The "basal sandstone" was missing at the well locality and there were no hydrocarbon shows. As in Sunset No. 1 the 'middle unit' of the Lower Cretaceous sequence had good source rock potential and the sandstone of the lower Knight Group very good reservoir potential. The last well in the programme, Nadda No. 1, was located to test a similar anticipated stratigraphic trap to the west of the Sunset High. The 'basal sandstone' and the middle unit of the Cretaceous sequence, and the sandstone of the lower Knight Group were encountered, with the same reservoir and source rock potential as in the first well. Nadda No. 1 unexpectedly intersected 1297 feet (395 m) of Lower Permian shale with minor sandstone and siltstone. In all three wells a probable unconformity occurs between the lower and upper Knight Group.

Mt Emu No. 1 was a test of Lower Devonian and postulated Cambro-Ordovician sediments on a well-defined gravity positive on an estwest trending gravity 'ridge' in the Blantyre Trough. The well was located structurally higher than the subsidised well, Blantyre No. 1, drilled in 1965. The Permian, Carboniferous and Upper Devonian sequence encountered in Blantyre No. 1 are absent, and the Tertiary rests on a Middle Devonian red bed sequence. The red beds are underlain by a marine late Lower to early Middle Devonian sequence not previously recorded in the Blantyre Trough. The marine sequence was dated by a good microflora of spores and acritarcks. There were potential source rocks in the marine sequence but all potential reservoirs were hard and tight. The Mt Emu seismic survey was carried out in the Manara 1:250,000 Sheet area also in the Blantyre Trough. The objectives were to trace the marine sediments found in Mt Emu No. 1 into the trough to the northwest, where two gravity anomalies suggested the presence of two small highs. The survey mapped two horizons; 'A' - probable Upper Devonian, and 'B' - Lower or Upper Devonian. The presence of an anticline in the west of the area was confirmed. However, it was not tied to Mt Emu No. 1 because of poor data quality in the vicinity of the well.

The subsidised Narweena seismic survey was located east of the Renmark Trough, over the Lake Victoria High in the Chowilla 1:250,000 Sheet area. It was a combined reflection/refraction seismic survey designed to detail possible basal Cretaceous pinchouts on basement highs. The recorded data was very good and indicated a shallow basement (1900 - 2800 feet/580-850 m b.s.l.), and only thin sequences, up to 300 feet (90 m), of the prospective basal Cretaceous sandstone overlying basement as infill in the northern and perhaps also in the western parts of the survey area. No suitable drill sites were recommended.

The subsidised Jerilderie North seismic survey was located in the Jerilderie 1:250,000 Sheet area of southern New South Wales in the Oaklands Sub-basin. It was programmed to determine the structural significance of the positive gravity anomalies indicated by the Jerilderie gravity survey (BMR file 69/3079). Gas shows in Jerilderie No. 1 (drilled in 1962) indicate the area to be one with hydrocarbon potential; geophysical and other sub-surface data indicate that late Palaeozoic block faulting has preserved various thicknesses of Permian sediments in graben-like sub-basins. Two horizons were mapped; Horizon A - near the top of the Permian, and Horizon B - basal Permian. The reflectors were tied into Jerilderie No. 1. The isopach map shows the Permian thinning over the highs. Seismic and gravity interpretation agree in the definition of the Oaklands Sub-basin.

Six shallow unsubsidised wells were also drilled during the year. The available information indicates that Hay No. 1 encountered granite at 1,111 feet (339 m) and Booligal No. 2 reached total depth in low grade metamorphic rocks. Farther north in the Cobham Lakes and White Cliffs 1:250,000 Sheet areas Pincally Nos 1 and 2 and Nambuccurra No. 1 were drilled to identify the high speed refractor mapped in the Pincally refraction survey (BMR file 69/3034). No stratigraphic information is available.

NGALIA BASIN

The subsidised Ngalia Basin 2 gravity survey was completed toward the end of the year. The results are not yet released.

OFFICER BASIN

The subsidised Eastern Officer Basin gravity survey was aimed at delineation of basement anomalies to indicate possible traps within the Palaeozoic section in the east of the basin. The results indicated that the eastern part of the basin corresponds with a large Bouguer gravity low trending east-northeast for about 150 miles (240 km) with a strong upward gradient of over 100 mgal on its southeast flank. The axis of the Bouguer gravity low lies some 10-20 miles (16-32 km) north of the axis of the basin shown by depth to magnetic basement contours. It is thought that the Bouguer anomaly must be partly due to density contrasts in the basement rocks below the magnetic basement (= base of Adelaidian at about 15000 feet (4600 m). Residual gravity maps indicate about six significant residual gravity anomalies which may indicate structures of interest for further investigation.

OTWAY BASIN

The final reports of three subsidised operations completed late in 1969 are not released.

The Terang-Portland Gravity Survey (BMR file 69/3054) was carried out in the Terang and Portland areas of the Otway Basin to establish the regional gravity pattern and thereby define the basement structure and fault trends; the result to be used as a basis for seismic exploration. The Terang survey is a continuation of the Hawkesdale gravity survey (BMR file 68/3035) which was carried out in the area immediately to the west.

The Bouguer and residual anomaly maps show three main groups of highs and lows in the Terang area. The northwestern group which tie in with the results of the Hawkesdale gravity survey (BMR file 68/3035) is an extension of the Hawkesdale Gravity Complex defined by that survey. This group is separated from a northeastern group by a Bouguer gravity low named 'The Sisters' in the Company final report. The interpretation of 'The Sisters' sub-basin is presented as an alternative to the established interpretation of a basement high - the Warrnambool High in this area. The third group lies to the south of an easterly-trending en echelon fault system. More detailed gravity work over two of the features in this group, and a seismic profile to be shot over 'The Sisters' was recommended. The results in the Portland area were inconclusive.

Hindhaugh Creek No. 1 well was located about nine miles north of Anglesea, in the Queenscliff 1:250,000 Sheet area. It was drilled as a stratigraphic test of a poorly known area of the basin, in a negative gravity anomaly. It was hoped that the well would validate the interpretation of the gravity survey and provide subsurface density control, and also velocity control for future seismic work. The primary target was the Lower Cretaceous Pretty Hill Sandstone Formation or its equivalent. The drilling proved the stratigraphic

prognosis based on the gravity survey to be invalid. The Otway Group is much thicker than expected and the rig capacity did not allow full penetration of the sequence so that the presence of the Pretty Hill Sandstone could not be proved. The upper part of the Otway Group contains several sandstone units which can be broadly correlated with units in Anglesea No. 1 well (BMR file 62/1217) nine miles (15 km) away. Porosity and permeability of these units is higher in the Hindhaugh Creek well. A feature of the well was the steep geothermal gradient recorded. This may be a local effect due to the penetration by the well of one or more fault zones. Preliminary results of coal sample analyses by C.S.I.R.O. indicate a considerable degree of heat alteration with analyses of over 90% carbon.

The third subsidised operation was the drilling of two wells in the Portland 1:250,000 Sheet area Victoria. Moyne Falls No. 1, and Hawkesdale No. 1 were located 22 miles (35 km) and 27 miles (43 km) northwest of Warrnambool in the Tyrendarra Embayment near the northern margin of the Otway Basin.

Moyne Falls No. 1 was drilled to test for the presence of porous sandstone at the base of the Cretaceous Otway Group immediately overlying basement and the possibility of hydrocarbon accumulation in fractured or weathered basement. The well penetrated 168 feet (51 m) of Recent to Pleistocene volcanics, 919 feet (280 m) of Middle Miocene to ?Upper Oligocene Heytesbury Group carbonates, 1256 feet (383 m) of Lower Cretaceous Eumeralla Formation (Otway Group), 724 feet (221 m) of volcanics (?Upper Jurassic), and 280 feet (85 m) of quartz-mica schist of the Palaeozoic basement. The Eumeralla Formation is mainly unconsolidated lithic sand, silt, and clay with very low permeability. It did not overlie Palaeozoic basement as predicted, but a tight volcanic sequence, and there was no porosity in the basement due to weathering or fracturing. A feature of the Eumeralla Formation in this well is that it contains almost all of the spore-pollen zones known in this formation in the Otway Basin. In most of the other wells however, the zones are much thicker and rarely occur all together in one well.

Hawkesdale No. 1 was drilled to test the hydrocarbon prospects of a small wedgeout/fault trap at Cretaceous Pretty Hill Sandstone level. The well penetrated 73 feet (22 m) of Recent to Pleistocene volcanics, 985 feet (300 m) of Heytesbury Group carbonate, 2058 (627 m) of Eumeralla Formation, 823 feet of Lower Cretaceous - ?Upper Jurassic volcanic and sedimentary rocks, and 112 feet of phyllite and quartzite of the Palaeozoic basement. The Pretty Hill Sandstone contained very good reservoir rocks but only minor hydrocarbon shows were encountered.

The final report of the offshore Cape Patterson seismic survey completed at the end of 1969 (BMR file 69/3068) has now been released. The data were or poor quality and only two shallow horizons were mapped; Horizon A - assumed base of Tertiary, and Horizon B - possibly within the Upper Cretaceous. Because of the poor quality of the data the structure is suspect. The contours show a shallow south-trending trough south of Phillip Island and a high area south of Cape Paterson. The Kongwak, Tarwin, and Doomburrin faults appear to extend offshore.

There were six subsidised geophysical operations, one offshore, carried out during 1970. In addition, Shell Development (Australia) Pty Ltd carried out two unsubsidised offshore seismic surveys.

The Baudin marine seismic survey was located south of Kangaroo Island, on the continental slope between the steep slope to the west and the flat offshore extension of the Otway Basin. The objectives were to examine areas of interest indicated by previous aeromagnetic work, in particular to confirm the presence of a thick sedimentary section in parts of the survey area, and to determine whether suitable structural or stratigraphic traps may exist.

The seismic data show that over most of the survey area there is less than 2000 feet (610 m) of sedimentary section over economic basement on the continental shelf. The sediments are flat-bedded or dip gently seawards. Two main stratigraphic units were recognised; an Upper Tertiary unit (probably sand and calcarenite) covering most of the area and up to 1500 feet (457 m) thick, with a thin overlying Quaternary sequence, and a lower unit which is 2000 feet (600 m) thick in the southeast, thinning to the northwest. The lower unit is believed to be an extension from the Otway Basin of the Lower Cretaceous Geltwood Beach Formation or 'Pretty Hill Sandstone Equivalent'.

The survey was carried out in three parts of the permit area - a northwestern, central, and southwestern. In all three, the continental shelf is truncated by normal faults with trends varying from west-northwest to northwest and downthrow to the south from 5000 feet (1500 m) in the northwestern area to 250 feet (75 m) in the southeastern. The fault is interpreted to extend into the southeastern area from the northern edge of the Otway Basin, and it is suggested that this area may be near the northwestern margin of the Otway Basin.

The results of the magnetometer survey appear to indicate the low magnetic response of the basement rocks. It is suggested that they could be sedimentary rocks similar to those of the Kanmantoo Group (Lower Palaeozoic) on Kangaroo Island.

The Casterton Detailed gravity survey covered approximately 330 square miles (855 sq km^2), in southwestern Victoria between Casterton and the Victoria - South Australia border. The objectives were to add detail to previous work on the northeastern flank of a deep regional trough (Penola Trough) and to outline local structural leads. Bouguer, regional and residual gravity anomaly contour maps were produced which show a northwesterly-trending regional high occupying the whole area. The Bouguer anomaly value increases to the southeast and there is a saddle in the northeast. A series of northerly-trending highs and lows are superimposed on the regional ridge. Interpretation suggests that the high results from the northwest-trending Padthaway basement ridge intersected by a series of north trending faults. Three, rather shallow, basement highs are considered worthy of seismic investigation.

The Gambier Trough seismic survey was located at the northwestern end of the Otway Basin in the Penola 1:250,000 Sheet area, S.A. It was an experimental survey designed to obtain record data from beneath coastal sand dunes, Gambier Limestone, and fossil sand dunes, and to obtain stratigraphic and structural information. The survey produced poor quality data and most of the resulting subsurface information is considered unreliable.

The Wannon seismic survey, in the Hamilton 1:250,000 Sheet area, Victoria, sought a south-trending high in the basement surface indicated by previous geological and geophysical work in the area immediately to the north. The survey was aimed to determine whether or not the Pretty Hill Sandstone or a Jurassic sandstone are present and wedge out against basement to the north. The results confirmed the presence of a basement high, but the presence of the Pretty Hill Sandstone or a Jurassic sandstone could not be reliably predicted.

The results of the Macarthur-Portland seismic survey and the Portland-Geelong Aeromagnetic Survey are not yet released.

Two unsubsidised offshore wells, Chama Nos 1 and 1A were drilled in the Gambier Embayment off South Australia. No hydrocarbons were encountered.

OXLEY BASIN

The Bundalla seismic survey was carried out to investigate a large gravity anomaly located in the southwestern part of the Tamworth 1:250,000 Sheet area. The results are not yet released.

PARKES AREA, N.S.W.

The subsidised Parkes seismic survey was located over the east flank of the Tullamore Syncline about 14 miles (23 km) west of Parkes. The objective was to ascertain structural closure in the 17000-23000 feet (4200-6000 m) of unmetamorphosed Ordovician, Silurian, and Devonian sedimentary rocks unconformably overlying the (?Lower Ordovician) basement complex. The results confirmed the regional tends in the area but there was no conclusive evidence of structural closure. Volcanics downgrade the hydrocarbon potential of the area.

PEDIRKA BASIN

The subsidised Mount Ross seismic survey investigated an anticlinal structure near Ilbunga that had been indicated by previous exploration. A secondary objective was to investigate the possible thickening of sediments to the west of this area and to evaluate any structural leads that were disclosed. Five horizons were mapped; C - Lower Cretaceous?, P_2 - Lower Mesozoic?, P - Lower Permian, F - Finke Beds, Permo-Carboniferous?, and Z - Lower Palaeozoic?. The indentity of the seismic reflections needs further investigation and additional velocity information is needed. The anticline near Ilbunga (Mount Barr structure) appears to be a good drilling prospect. The sedimentary section actually thins to the west suggesting possible stratigraphic trapping in pinchouts.

The subsidised Mt Daer gravity survey was completed during the year. The final report is not released.

PERTH BASIN

The Koombana-Wedge Island detail marine seismic (BMR file 69/3060) was completed late in 1969. It was located in two areas - one near Wedge Island, and the other, the Koombana, offshore from Bunbury. The objective was to detail structural leads revealed by earlier surveys. Four horizons were mapped; B - basal Cretaceous unconformity, C_1 - within the Lower Jurassic (Cockleshell Gully Formation), C_2 - within the Lower Jurassic, and D - possibly Lower Triassic.

Record quality was poor in the Wedge Island area and there were navigation difficulties in shallow water. Two structures were indicated and a major north-south-trending fault which is believed to be an extension of the Beagle Fault.

The record quality was slightly better in the Koombana area. Horizon B can be correlated on all sections and eight possible anticlines are indicated, but more detail will be needed before drilling sites can be located.

Seven subsidised seismic surveys were carried out during 1970 two of which were offshore.

The Perth Waters seismic survey was located offshore, between Dongara in the north and Bunbury in the south. Data from previous seismic surveys in the northern part of the survey area, have indicated that a northern Perth Basin stratigraphic sequence 10000 to 25000 feet (3000-7600 m) thick extends for a considerable distance west of a mid-basin ridge (of which the Beagle Ridge is part), and that folding associated with tilted fault blocks have developed within it. Ineach of the four 1:250,000 Sheet areas covered by the survey two or three seismic horizons were contoured which are believed to range from within the Permian to the basal Cretaceous unconformity. In the northern part of the survey area two possible drilling targets were interpreted. The first an anticline in Permo-Triassic sediments about 2 miles by 5 miles (3 km x 8 km), and the second, which lies in the Turtledove Trend near its 'junction' with the Beagle Ridge, an anticline about 3 miles by 7 miles (5 km by 11 km) with 1500 feet (450 m) of closure, in the Permian. However, both features are poorly defined because of the poor quality of the seismic data. No significant new structures were discovered in the southern part of the survey area.

The Geelvink Channel marine seismic survey provided seismic reconnaissance and detail. The record quality was generally poor. Three horizons were mapped; Horizon A - Upper Jurassic(?), Horizon C - approximately Middle Jurassic(?), and Horizon D - Lower Jurassic. Poor record quality in the north may be due to reverberation from shallow limestone layers, and in the south (WA-40P) to faulting. The sediments dip steeply to the west in WA-39-P.

The Harvey D-1 seismic survey was completed early in 1970. It was located over in the Harvey Ridge and Pinjarra areas in the Collie and Pinjarra 1:250,000 Sheet areas. The objectives were to obtain detailed seismic control over the Harvey Ridge, and to effect a seismic tie between the Harvey and Pinjarra areas in particular to the Pinjarra No. 1 well. Three horizons

were mapped; A - near the top of the Multicoloured Member of the Lower Jurassic Cockleshell Gully Formation, B - the base of the Lesueur Sandstone, and C - near the top of the Permian (?). The Harvey Ridge showed up as a northwesterly trending structural high with its shallowest part near Lake Preston. If closure is verified by additional seismic work it would be a good drilling location, the formations being 8000 feet (2400 m) structurally higher than in Pinjarra No. 1 well. Several other potential hydrocarbon bearing structures were mapped. Additional seismic control is also recommended for these. Major fault movements in the area are thought to have occurred in the Upper Permian, Upper Jurassic, and Upper Triassic, with associated structural growth.

The Dandaragen West seismic survey was located in the central Perth Basin in the Moura 1:250,000 Sheet area to obtain seismic control over a postulated northwesterly trending pre-Cretaceous ridge, and delineate any culminations along it in order to select drilling locations. The postulated ridge was not confirmed, but a northwesterly anticlinal trend was indicated. Further work is needed to delineate any culmination that may occur along it. Two horizons were mapped; Horizon A - near the Lower Cretaceous unconformity, and Horizon B - near the top of the Lower Jurassic Cattamarra Coal Measures Member of the Cockleshell Gully Formation.

The Moore River - Lancelin seismic survey was an experimental survey, located in the central Perth Basin, designed to assess the relative merits of geoflex and dynamite energy sources in determining the onshore distribution of Cretaceous sediments. Outcropping Pleistocene Coastal Limestone and loose sand has proved a problem for conventional seismic techniques. The results of the survey were inconclusive. The quality of the data was very variable and there was little difference between the two energy sources. Two horizons were mapped; Horizon A - basal Cretaceous unconformity, and Horizon B - Cockleshell Gully Formation (Cattamarra Coal Measures Member).

Final reports of the other two seismic surveys are not released.

There were two unsubsidised seismic surveys carried out in the Dongara and Mondarra-Yardarino areas by West Australian Petroleum Pty Ltd.

The subsidised well, Roe No. 1, was completed at the end of 1970. The final report is not released. Two subsidised wells, Charlotte No. 1 and Warnbro No. 1 were drilling at the end of the year.

POLDA BASIN

The Polda Basin is a largely offshore trough lying west of Elliston at the eastern end of the Great Australian Bight. Aeromagnetic and seismic surveys have indicated that it is likely to contain up to 8000 feet (2400 m) of sediments. During 1970 the Polda Basin marine seismic survey was carried out to provide stratigraphic and structural control in the basin. The results indicate that the area is highly faulted. The basement is generally at

2000-3000 feet (600-900 m) except within a deeper trough - the Elliston Trough - extending westwards from Elliston. The trough is about twelve miles (20 km) wide and bounded by major faults. A thin horizontally bedded sedimentary sequence occurs over the survey area, but lies unconformably on a thicker sequence of randomly dipping older strata in the trough. The presence of at least three unconformities and the faults suggest the possibility of stratigraphic and structural traps.

ST VINCENT BASIN

Beach Petroleum N.L. carried out the unsubsidised Investigation Strait gravity survey offshore between Yorke Peninsular and Kangaroo Island.

SURAT BASIN

Eighteen unsubsidised wells were drilled in the Roma 1:250,000 Sheet area in the general vicinity of the Grafton Range and Pleasant Hills gasfields. Four of these were completed as gas producers. Two new gasfields were discovered - Westlands and Euthulla. In a drill stem test in Westlands No. 1 gas flowed at the rate of 4.25 MMcfd. Euthulla No. 1 produced gas during drill stem testing from both the Lower Jurassic Precipice Sandstone and the Upper Triassic Showgrounds Sandstone (= Clematis Sandstone), at the rates of 1.2 MMcfd and 4.43 MMcfd respectively. Pleasant Hills No. 11 is regarded as a new field discovery since it established a new pool in the Precipice Sandstone; previous Pleasant Hills wells produced from the Showgrounds Sandstone. Gas was produced from the Precipice Sandstone during drill-stem testing at a rate of 4.7 MMcfd. The remaining wells were dry. No significant stratigraphic information is available.

Fifteen unsubsidised exploration or stepout wells were drilled to the north of the Alton Field in the Surat 1:250,000 Sheet area. Two of the wells, Kincora Nos 3 and 5, were completed as gas producers. Kincora No. 3 reached total depth (5160 feet; 1573 m) in the Upper Devonian Timbury Hills Formation. Gas flowed at a rate of 3.85 MMcfd during production testing and an open flow potential of 9 MMcfd was calculated. Twelve barrels of condensate were recovered with every million cubic feet of gas. Two of the three intervals which produced gas on drill stem testing in the Jurassic Evergreen Sandstone in Kincora No. 5 gave a flow rate of 12 MMcfd during production testing. Boxleigh No. 1 was drilled forty eight miles (77 km) north of the Alton field. The well reached total depth (6314 feet/1925 m) in the Timbury Hills Formation, and struck gas in the lower part of the Triassic Wandoan Formation (= Clematis Sandstone?). Gas flowed at a rate of 3.28 MMcfd and 340 barrels of 60° A.P.I. gravity condensate per day during production testing. Noorindoo No. 1 was drilled eight miles west of Surat. It reached total depth (7503 feet/2287 m) in the Timbury Hills Formation and struck gas in the Permian Kianga Formation (= Blackwater Group). During production testing gas flowed at a minimum rate of 2 MMcfd and 230 barrels of condensate per day. The unsubsidised Noorindoo seismic survey determined the area of the Noorindoo gas field at about 30 square miles (80 km^2). No significant hydrocarbons were encountered in the other wells drilled in this area.

The Horrane seismic survey was located in the Cecil Plains area on the eastern edge of the Surat Basin where Jurassic sediments onlap the Kumbarilla basement arch. Previous drilling had established the existence of a depression - the Cecil Plains Trough - in which Triassic sediments underlie the Jurassic. The seismic survey was designed to record data of a higher quality than that previously recorded in the area and to obtain better stratigraphic and structural definition of the rocks below the Jurassic. The results indicate a Triassic sequence thickening northwards. The beds are almost horizontal and onlap what is probably the Permo-Carboniferous basement. Horrane No. 1 was drilled to investigate the petroleum potential of the Triassic in the Cecil Plain Trough. It was located about forty miles due east of Moonie. The results of the drilling are not yet available. The unsubsidised wells Leichhardt No. 3 and Bennett Nos 3 and 4 were drilled forty to fifty miles (64-80 km) to the north of Moonie. The first two were dry but Bennett No. 3 struck oil. Production testing gave a flow of 140 barrels per day.

The Thallon seismic and gravity survey was completed early in the year in the St George 1:250,000 Sheet area. It was located south of St George and east of Dirranbandi, just north of the New South Wales border. The stratigraphy of the area was not known in any detail and little geophysical work had been carried out. Two horizons were mapped; Horizon A - possibly top Walloon, and Horizon B - possibly economic basement. The contours indicate fairly flat-lying strata with a gentle regional dip to the north. Several anticlines were indicated - the most promising located about two miles (3 km) west of Thallon with proven closure except to the southeast. The unsubsidised well, Ningham No. 1, was drilled twenty miles (32 km) east of the town of St George. It reached total depth (5069 feet/1545 m) in the Timbury Hills Formation. Water was produced during drill-stem testing in the Evergreen Formation.

The remaining three wells drilled in the basin were all dry. They are the unsubsidised Billa Billa No. 1 and Mungallalla Nos 1 and 2. The Mungallalla wells were drilled on the southeast flank of the Nebine Ridge as a test of stratigraphic wedge out of the Jurassic Precipice Sandstone against basement. It was reported that the reservoir characteristics of the Precipice Sandstone were sufficiently good to warrant further geophysical work in the area.

SYDNEY BASIN

There were five subsidised operations in the basin during 1970; four seismic surveys and one well.

Results are available from only one of the surveys - the South Sydney Basin seismic and magnetic survey. It was located offshore between Jervis Bay and the New South Wales/Victoria border. The southern part of the survey area is bordered onshore by Lower Palaeozoic rocks of Cambrian to Devonian age and the northern part by the Permian sedimentary rocks of the Sydney Basin. The objective of the survey was to obtain information on the thickness of the sedimentary section and the velocities of the sediments and basement in four

selected locations within the Permit - two in the south and two in the north. The quality of the reflections was very good but the survey failed to record any from below about 1.2 seconds. In the north the refraction results, although inconclusive, indicate that the sedimentary section is deeper than indicated by the reflection results. The magnetic survey indicated a shallow basement, about 2000 feet (600 m) below sea level in the north, indication the presence of interbedded or intrusive basalt. A deep basement at about 10000 feet (3000 m) below sea level is indicated in the south.

The Howes Swamp No. 1 well was drilled in the Sydney 1:250,000 Sheet area, 46 miles (74 km) north of Windsor. It was located on a seismically defined plunging nose interpreted to be within the Lower Permian. It spudded in Triassic Hawkesbury Sandstone and reached total depth in the Permian Pebbley Beach Formation of the Conjola Sub-Group. The Permian section was 'tight' and there were no significant hydrocarbon shows.

TASMANIA

The West Tasmania T69A marine, seismic, and magnetic survey (BMR file 69/3000) was located off the west coast of Tasmania. An earlier aeromagnetic, survey (BMR file 66/4626) indicated a generally shallow magnetic basement, with the exception of a zone containing possibly about 15000 feet (4600 m) of sediments offshore from Macquarie Harbour graben. An earlier seismic and magnetic survey (BMR file 68/3013) indicated a major anticline off the northwest coast. Four horizons were mapped in the West Tasmania T69A survey; Economic basement, Base of Tertiary, Eocene, and Lower Miocene marker.

The survey established the southern limits of prospective Eocene and Miocene sediments. It indicated that the area south of 42°60'S is underlain by basement at shallow depth and is therefore non-prospective. In the area north of 42°50'S there is evidence of structural deformation of Cretaceous and Tertiary rocks, which warrants further investigation.

OFFSHORE NORTH AND NORTHWEST AUSTRALIA

The Adele-Scott seismic survey (BMR file 69/3038) was completed during the latter half of 1969. Three offshore areas between Legendre Island and Browse Island were surveyed.

In the northern area the work was of a semi-reconnaissance nature. Three unidentified horizons were mapped across the Browse Basin. The marginal fault systems of the Leveque Platform and Lennard Shelf were outlined and folds were indicated.

In the central area, the survey delineated the westward extension of the Fitzroy Graben and outlined several anomalies.

In the southern area the survey delineated a zone of complex faulting along the seaward margin of the Pilbara Block and to the west of this a deep trough containing about 28000 feet (8500 m) of sediments is indicated on the unidentified Horizon D. Horizon A (Upper Cretaceous) is identified from Legendre No. 1 well. A number of potential fault traps were delineated, three in sufficient detail for wells to be sited.

The West Parry Shoal seismic survey (BMR file 69/3067) was completed at the end of 1969. The survey was carried out on the northeastern edge of the Bonaparte Gulf Basin to detail structural anomalies indicated by previous seismic surveys so that a well site could be located. Three horizons were mapped; Horizon 1 - ?possible Oligocene transgression, Horizon 2 - ? Mesozoic unconformity, and Horizon 3 - ? Proterozoic basement.

The sediments generally thicken to the north but the Mesozoic section is thin and pinches out against basement in several places in the west of the survey area. No well site was located.

The subsidised Tryal-Evans marine seismic survey was completed during 1970. The results are not yet available. The subsidised Trimoulle-Dillon seismic survey was in progress at the end of the year and the unsubsidised well Tinganoo Bay No. 1 was drilling on the east coast of Melville Island.

PAPUAN BASIN

The Kaweto seismic survey (BMR file 69/3033) was completed late in 1969. It was located between the Fly and Aramia Rivers (8°00'S - 8°40'S and 142°00'E - 143°30'E) and was designed to confirm a thick sedimentary section indicated by previous work. Three horizons were mapped; A - ? top of Miocene, B - ? top of Mesozoic, and C - ? base of Mesozoic.

The results were tied to those of the Fly River Delta survey (BMR file 68/3046). They indicate sediments thickening in a northeasterly direction from about 4000 feet (1200 m) to about 16000 feet (5000 m). Several structures were delineated and recommended for more detailed work.

The Kutubu-Orokana gravity survey (BMR file 69/3049) was completed in the latter half of 1969. It was located in the vicinity of Lake Kutubu in the northern part of the Papuan Basin. The survey was a three part program consisting of (a) a photo-control survey using tellurometer and theodolite, tied via the existing Kagna control to the National Mapping geodetic grid, (b) the preparation of a topographic contour map to include bathymetric contours of the lake, and (c) a detailed land gravity survey.

Interpretation suggests that the basement deepens from the Darai Plateau (north of Lake Kutubu) northwards to Mendi and there is no basement high in the survey area. The basin tapers out south of the lake and it is considered probable that stratigraphic traps exist between Lake Kutubu and the Kikori River.

Six subsidised geophysical surveys were completed during 1970. The results of three of these are available.

The Kapuri-Orloli seismic survey began at the end of 1969. It was located in three separate areas - Kapuri, Ivo, and Orloli. The objectives were to outline in more detail possible reef structures in the Kapuri and Ivo areas and to do further reconnaissance work in the Orloli area. Two horizons were mapped in the Kapuri area. They are interpreted as top of Upper Miocene, and top of reef within the Miocene. A domal structure, which is thought to be a reef, is present on the lower horizon with its culmination at about 6400 feet (2600 m) below sea level. The section between the two horizons thins over the dome. A drilling site is recommended to about 8000 feet (2400 m). In the Ivo area reflection quality on one deep event at about 21000 feet (6400 m) is interpreted as the top of the Eocene. No reliable structures were indicated. In the Orloli area the only reflection - interpreted as the top of the Eocene was at about 23000 feet (7000 m) and the project was abandoned.

The Mubi seismic refraction pilot survey was located in the northern part of the Papuan Basin in the area between Lake Kutubu and the Wage River, extending slightly south of Lake Kutubu. The work was a pilot scheme to test the value of refraction methods in this area. The survey indicated that the refraction seismic method is not suitable for penetrating the surface limestone (Miocene Darai Limestone) which forms the surface over most of the traverse. In the centre of the traverse, the Mubi anticline, evident from the surface Cretaceous outcrop, seems to be the remnant core of an overthrust anticline.

The Lake Murray-Aramia River aeromagnetic survey covered the whole of the Permit area which includes the northern tip of the Morehead Basin. The objective was to map depth to magnetic basement. The survey indicates magnetic basement depth ranging from 0.8-1.8 miles (1.5-3.0 km) b.s.l. and defines a series of southeasterly or easterly trending highs and lows; the trends are consistent with regional trends in the area. In the northeastern corner of the area the basement anomalies are completely masked by effects due to Mt Bosavi volcano. The relief in the magnetic basement indicates the possibility of suitable structures occurring in the overlying prospective Mesozoic sediments. A regional reconnaissance seismic survey along the navigable rivers in the area such as the Fly, Strickland, and Aramia is recommended.

The subsidised well, Ipigo No. 1, was drilled on the western flank of the Aure Trough located in the Kikori 1:250,000 Sheet area to test a seismically defined possible reef reservoir. The subsurface stratigraphy is known from previous drilling. A Mesozoic terriginous sequence is overlain by an Eocene to middle Miocene (or upper Miocene?) carbonate sequence. Regionally the Miocene carbonate sequence is an argillaceous micrite - the Puri Limestone - but local reef developments have been tested in previous drilling. The well proved the seismic anomaly to be due to uplift of the limestone by faulting and not a reef.

The results of the drilling of the subsidised well Magobu Island No. 1 are not yet available.

NORTHERN NEW GUINEA BASIN

The Madang gravity survey (BMR file 69/3084) was completed late in 1969. It was carried out along the seismic lines of the Madang seismic survey. It was designed to extend the BMR regional gravity coverage and to supplement the seismic data.

The survey confirmed several of the residual anomalies suggested by the BMR data and identified several others. The residual anomaly map shows a series of generally northwest-trending gravity highs and lows. This trend is truncated in the northwestern corner of the survey area by the northeast-trending gradient zone flanking the Murik negative anomaly. The correlation of the residual anomalies with basement relief is supported by seismic data from the Madang seismic survey.

The Madang seismic survey (BMR file 69/3026) was also completed at the end of 1969. It was located in the Ramu River basin in the Sepik and Bogia 1:250,000 Sheet areas. The main objective was the establishment of northwest closure on the Josephstaal Anticline - a northwesterly-trending surface structure plunging to the southeast. In addition, a number of aeromagnetic leads were investigated.

The survey confirmed the Josephstaal Anticline at depth. An unconformity between the Josephstaal Mudstone and the overlying Anungum Formation was identified on the seismic section and indicated the northwest plunge of the structure.

A number of aeromagnetic structural leads were investigated in the areas around the Sepik and Keram Rivers. The seismic results revealed a number of anticlines but the traverses were too scattered for adequate detailing. One of the seismic lines in the Sepik area was tied into Marienburg No. 1 well, drilled between 1925 and 1928 to 2705 feet (825 m) and a possible upper Miocene horizon identified. In the Keram area there is no surface or well control. The survey indicated two major anticlinal structures separated by a trough about 8000 feet (2400 m) deep and probably partly fault controlled. Several possible reef structures were also indicated.

The Mai Mai seismic survey was carried out during 1970. The results are not yet available.

TABLE I

EXPLORATION WELLS DRILLING IN 1970

BASIN OPERATING COMPANY Well name BMR file no. if subsidised	Latitude S Longitude E ° ' "	GL/WD (feet) KB/RT (feet)	Date spudded T.D. reached	T.D. (feet)	Status
AMADEUS					
Magellan Petroleum Australia Ltd					
Palm Valley No. 2	24 00 03 132 38 47		21.12.69 2. 2.70	6,559	Completed as gas well
ARCKARINGA					
Pexa Oil N.L.					
Weedina No. 1 BMR file 70/205	28 28 31 135 39 20	GL 317 KB 329	26. 2.70 26. 3.70	5,329	PA
BASS					
Esso Exploration and Production Australia Inc.					
Cormorant No. 1	39 34 23 145 31 36	KB 100 AMSL WD 240	10. 6.70 14. 7.70	9,845	PA
Pelican No. 1	40 20 20 145 50 37	KB 100 AMSL WD 240	19. 3.70 29. 4.70	10,428	PA
Pelican No. 2	40 18 28 145 40 12	KB 100 AMSL WD 255	28. 7.70 24. 8.70	10,066	PA
Whelk No. 1	39 53 57 143 33 20.9	KB 100 AMSL WD 388	6. 3.70 17. 3.70	4,810	PA
BONAPARTE GULF					
Arco Australia Ltd					
Gull No. 1	11 56 29 127 54 37	WD 441	5. 6.70	10,765 drilling ahead	
Petrel No. 1A	12 49 51 128 28 20	WD 329	6. 2.70 8.11.70	13,418	PA
Petrel No. 2	12 51 14 128 30 50	WD 319	20.12.70	3,550 drilling ahead	

EXPLORATION WELLS DRILLING IN 1970

BASIN OPERATING COMPANY Well name BMR file no. if subsidised	Latitude S Longitude E	GL/WD (feet) KB/RT (feet)	Date spudded T.D. reached	T.D. (feet)	Status
BONAPARTE GULF (cont'd)					
Australian Aquitaine Petroleum Pty Ltd					
Flat Top No. 1	12 22 35 129 15 56	WD 135	4. 1.70 25. 1.70	7,131	PA
B.O.C. of Australia Ltd					
Sahul Shoals No. 1 BMR file 69/2042	11 25 34 124 33 47	WD 125	24.12.69 28. 3.70	12,475	PA
BOWEN					
Alliance Oil Development Aust N.L.					
Comet River No. 1	24 37 46 148 38 04	GL 755 KB 771	13. 7.70 25. 8.70	6,262	PA
Humboldt Creek No. 1	24 21 48 148 48 45	GL 836 KB 851	29.10.70 9.11.70	3,576	Plugged and converted to water well
Memooloo No. 1	24 01 35 148 37 25	GL 613 KB 628	6.10.70 20.10.70	3,118	PA
Orion No. 1	24 17 52 148 28 17	GL 743 KB 762	29. 4.70 12. 6.70	5,099	PA
Rolleston North No. 1	24 23 52 148 36 44	GL 655 KB 668	2. 9.70 20. 9.70	4,230	PA
Target Exploration Pty Ltd					
Rosella Creek No. 1 BMR file 70/729	20 52 00 147 51 30	GL 593 KB 605	9. 9.70 28. 9.70	1,975	PA
BROWSE					
B.O.C. of Australia Ltd					
Leveque No. 1 BMR file 70/670	15 45 12 122 00 18	WD 254	22. 8.70 1. 9.70	2,951	PA

EXPLORATION WELLS DRILLING IN 1970

BASIN OPERATING COMPANY Well name BMR file no. if subsidised	Latitude S Longitude E ° ' "	GL/WD (feet) KB/RT (feet)	Date spudded T.D. reached	T.D. (feet)	Status
CANNING					
B.O.C. of Australia Ltd					
Lacepede No. 1A BMR file 70/426	17 05 18 121 26 42	WD 191	21. 6.70 16. 8.70	7,500	PA
Lynher No. 1 BMR file 71/948	15 56 24 121 04 59	WD 190	25.12.70	960 drilling ahead	
Lennard Oil N.L.					
Napier No. 4 BMR file 70/589	16 55 00 124 05 35	GL 289 KB 300	15. 7.70 19. 8.70	3,166	PA
Napier No. 5 BMR file 70/750	17 06 30 124 28 06	GL 232 KB 243	8. 9.70 19.10.70	5,437	PA
CARNARVON					
B.O.C. of Australia Ltd					
Enderby No. 1 BMR file 70/737	20 09 25 116 24 24	WD 177	10. 9.70 10.10.70	7,051	PA
Legendre No. 2 BMR file 70/769	19 37 27 116 46 49	WD 190	16.10.70 16.12.70	11,871	PA
Western Australian Petroleum Pty Ltd					
Flag No. 1	20 27 55 115 38 44	RT 76 WD 44	2. 9.69 13. 1.70	12,475	PA
Pepper No. 1	21 03 29 115 18 05	KB 90 WD 25	13. 3.70 3. 5.70	9,000	PA
Ripple No. 1	21 07 10 115 24 03	KB 79 WD 26	6. 2.70 4. 3.70	7,476	PA
Tryal Rocks No. 1	20 24 42 115 09 07	WD 152	17. 5.70 16. 8.70	12,123	PA

EXPLORATION WELLS DRILLING 1970

BASIN / OPERATING COMPANY / Well name / BMR file no. if subsidised	Latitude S ° ' " / Longitude E ° ' "	GL/WD (feet) / KB/RT (feet)	Date spudded / T.D. reached	T.D. (feet)	Status
CLARENCE-MORETON					
Clarence Oil and Minerals Co. N.L.					
Hogarth No. 2	28 54 09 152 51 36	GL 307.7 DF 316	4. 8.70 3. 9.70	3,653	Completed as potential gas
Hogarth No. 3	28 54 12 152 51 50	GL 306 DF 315	21. 9.70 8.10.70	3,140	PA
COOPER BASIN					
Alliance Oil Development Aust. N.L.					
Gilpeppee No. 1 BMR file 69/2040	26 25 25 141 33 17	GL 320 KB 337	12.11.69 17. 2.70	10,713	PA
Merrimelia No. 5	27 46 30 140 09 18		6. 7.70 20. 8.70	8,989	Completed as potential gas produce
Mudrangie No. 1	27 37 46 140 16 45	GL 129 KB 146	21. 9.70	10,352 drilling ahead	
Packsaddle No. 1 BMR file 70/270	27 32 40 140 45 37	GL 426 KB 443	24. 3.70 12. 6.70	10,396	Completed as potential gas produce
Bridge Oil N.L.					
Tirrawarra No. 1	27 40 35 140 07 45	GL 112 KB 129	23. 4.70 11. 6.70	10,226	Completed as potential oil and gas producer
Flinders Petroleum N.L.					
Arrabury No. 1 BMR file 69/2035	27 11 35 141 04 50	GL 412 KB 430	18.11.69 10. 1.70	9,660	PA
Coongie No. 1 BMR file 70/106	27 12 03 140 06 56	GL 93 KB 111	31. 1.70 5. 4.70	11,941	PA

EXPLORATION WELLS DRILLING IN 1970

Well name BMR file no. if subsidised	Latitude S Longitude E ° ' "	GL/WD (feet) KB/RT (feet)	Date spudded T.D. reached	T.D. (feet)	Status
COOPER BASIN (cont'd)					
Tallalia No. 1 BMR file 70/305	27 23 00 141 16 00	GL 423.5 KB 442	1. 8.70 30. 9.70	10,471	PA
Yanpurra No. 1 BMR file 70/758	27 20 19 140 49 15	GL 349 KB 367	17.10.70 1.12.70	9,716	PA
Pexa Oil N.L.					
Cherri No. 1 BMR file 69/2044	29 07 21 140 12 45	GL 102 KB 117	1. 1.70 14. 1.70	4,596	PA
Gurra No. 1 BMR file 70/283	29 01 23 140 16 00	GL 104 KB 119	2. 4.70 10. 4.70	4,686	PA
Kumbarie No. 1 BMR file 70/365	28 54 58 140 11 00	GL 77 KB 90	27. 4.70 8. 5.70	5,534	PA
Pando North No. 1	28 23 26 139 48 04	GL 112 KB 125	13. 7.70 30. 7.70	6,460	PA
Tindilpie No. 1	27 54 27 139 56 07	GL 160 KB 173	18. 8.70 28.10.70	11,181	PA
Weena No. 1 BMR file 70/485	29 05 38 139 50 51	GL 87 KB 100	12. 6.70 27. 6.70	5,392	PA
Pursuit Oil N.L.					
Della No. 1	28 06 34 140 40 25	GL 190 KB 207	23. 7.70 16. 8.70	7,135	Completed as potential gas producer
Della No. 2	28 06 24 140 35 17	GL 131 KB 149	8.10.70 28.10.70	7,222	"
Murteree No. 1	28 23 47 140 34 24	GL 131 KB 149	1. 9.70 20. 9.70	7,231	PA

EXPLORATION WELLS DRILLING IN 1970

BASIN OPERATING COMPANY Well name BMR file no. if subsidised	Latitude S Longitude E ° ' "	GL/WD (feet) KB/RT (feet)	Date spudded T.D. reached	T.D.(feet)	Status
Strzelecki No. 1	28 13 07 140 38 16	GL 201 KB 219	19.11.70 5.12.70	6,815	Completed as potenti gas producer
Total Exploration Australia Pty Ltd					
Orientos North No. 1	28 00 15 141 25 36	GL 426 KB 444	22. 5.70 13. 6.70	7,353	PA
EROMANGA					
Longreach Oil Ltd					
Belmore No. 1 BMR file 70/555	23 00 42 143 25 35	GL 555 KB 566	20. 6.70 4. 7.70	3,472	PA
N.S.W. Oil and Gas N.L.					
Yarrallee No. 1	29 14 40 143 20 00	GL 342	16. 5.70 30. 5.70	2,250	PA
GALILEE					
Beaver Exploration Australia N.L.					
Allandale No. 1 BMR file 70/823	24 25 00 145 54 15	GL 1229 KB 1244	3.11.70	9,841 drilling ahead	

EXPLORATION WELLS DRILLING IN 1970

Well name BMR file no. if subsidised	Latitude S °Longitude E ' "	GL/WD (feet) KB/RT (feet)	Date spudded T.D. reached	T.D.(feet)	Status
BASIN OPERATING COMPANY					
Coreena No. 1 BMR file 70/162	23 18 53 145 23 19	GL 820 KB 833	11. 2.70 4. 3.70	5,208	Plugged and converted to water well
Valetta No. 1 BMR file 70/264	25 02 50' 146 36 00	GL 1785 KB 1798	19. 3.70 29. 3.70	4,396	"
Flinders Petroleum N.L.					
Koburra No. 1 BMR file 70/453	21 17 48 145 18 06	GL 1215 KB 1229	26. 5.70 16. 7.70	10,693	PA
GIPPSLAND					
Ashburton Oil N.L.					
Milton No. 1 69/2033	37 31 31 148 10 34	GL 757 KB 767	12.11.69 9. 1.70	4,098	PA
Endeavour Oil N.L.					
Albatross No. 1	37 57 40 148 03 00	WD 142	30. 6.70 14. 7.70	4,120	PA
Gannet No. 1	37 54 21 148 03 00	WD 128	19. 7.70 28. 7.70	4,786	PA

EXPLORATION WELLS DRILLING IN 1970

BASIN OPERATING COMPANY Well name BMR file no. if subsidised	Latitude S Longitude E ° ' "	GL/WD (feet) KB/RT (feet)	Date spudded T.D. reached	T.D.(feet)	Status
GIPPSLAND (cont'd)					
Esso Exploration & Production Australia Inc.					
Albacore No. 1	38 34 00 148 19 54	WD 336	6. 5.70 4. 6.70	10,686	PA
Batfish No. 1	38 13 34 148 24 13	WD 223	6. 4.70 28. 5.70	9,761	PA
Bream-3	38 10 47 148 10 34	WD 194	16.11.70 10. 1.71	11,012	PA
Emperor No. 1	38 05 59 148 00 13	WD 170	5. 6.70 28. 6.70	6,545	PA
Snapper 3	38 12 45 147 59 11	WD 186	24.11.69 22. 1.70	10,536	Suspended as potential oil and gas producer
Trevally No. 1	38 17 23 148 23 40	WD 186	28. 1.70 16. 2.70	7,493	PA
Tuna No. 3	38 10 10 148 26 50	WD 210	18. 2.70 2. 4.70	9,250	PA
Woodside Oil N.L.					
Colliers Hill No. 1	38 11 56 147 17 30	GL 934 KB 111.4	9. 1.70 3. 2.70	5,612	PA

EXPLORATION WELLS DRILLING IN 1970

BASIN OPERATING COMPANY Well name BMR file no. if subsidised	Latitude S Longitude E ° ' "	GL/WD (feet) KB/RT (feet)	Date spudded T.D. reached	T.D.(feet)	Status
GIPPSLAND (cont'd)					
Salt Lake No. 1	38 26 53 147 05 12	GL 63 KB 76	12. 4.70 7. 5.70	5,395	PA
Seacombe South No. 1	38 08 30 147 29 12		4.11.70 7. 5.71	3,890	PA
Spoon Bay No. 1	38 04 56 147 27 57		9.10.70 30.10.70	4,594	PA
Wellington Park No. 2	38 08 08 147 20 55		16. 3.70 2. 4.70	4,127	PA
LAURA					
Crusader Oil N.L.					
Breeza Plains No. 1 BMR file 70/760	14 44 20 143 59 07	GL 50 KB 105	27. 7.70 27. 8.70	3,237	PA
Lakefield No. 1 BMR File 70/650	14 53 44 143 59 05	GL 93 KB 105	16. 8.70 27. 8.70	3,052	PA
MURRAY					
Associated Australian Oilfields N.L.					
Morkalla No. 1 BMR file 70/233	34 22 25 141 09 55	GL 135 KB 146	19. 3.70 23. 3.70	2,570	PA

EXPLORATION WELLS DRILLING IN 1970

BASIN OPERATING COMPANY Well name BMR file no. if subsidised	Latitude S °Longitude E ' "	GL/WD (feet) KB/RT (feet)	Date spudded T.D. reached	T.D.(feet)	Status
MURRAY (cont'd)					
Nadda No. 1 BMR file 70/234	34 38 05 140 53 45	GL 95 KB 106	26. 3.70 3. 4.70	3,416	PA
Sunset No. 1 BMR file 70/232	34 16 30 141 06 25	GL 170 KB 181	8. 3.70 13. 3.70	3,287	PA
N.S.W. Oil & Gas N.L.					
Booligal No. 1	33 35 20 144 56 20	GL 328	6. 1.70 14. 2.70	960	PA
Booligal No. 2	33 35 20 144 56 20	GL 328	14. 2.70 20. 3.70	2,661	PA
Hay No. 1	34 54 26 144 50 29	GL 285	23. 3.70 30. 3.70	1,150	Cased and turned over to the Water Conservation and Irrigation Commission
Mt Emu No. 1 BMR file 69/2038	32 19 00 143 32 00	GL 250 KB 263	13.11.69	4,759	PA
Nambuccurra No. 1	33 19 39 142 50 11	GL 172	8. 4.70 13. 4.70	862	PA
Pincally No. 1	30 17 55 141 42 00	GL 430	8. 1.70 9. 3.70	1,067	PA
Pincally No. 2	30 17 55 141 42 00	GL 430	26. 4.70 4. 5.70	1,446	PA

EXPLORATION WELLS DRILLING IN 1970

BASIN OPERATING COMPANY Well name BMR file no. if subsidised	Latitude S Longitude E ° ' "	GL/WD (feet) KB/RT (feet)	Date spudded T.D. reached	T.D.(feet)	Status
OTWAY					
Esso Exploration and Production Aust. Inc.					
Chama No. 1	37 25 36 139 30 36	KB 93 AMSL WD 280	16. 1.70 24. 1.70	4,227	PA
Chama No. 1A	37 25 36 139 32 36	KB 93 AMSL WD 273	26. 1.70 28. 2.70	9,015	PA
PERTH					
West Australian Petroleum Pty Ltd					
Charlotte No. 1 BMR file 70/761	31 48 36 115 26 56	WD 139 RT 238 (ocean bottom)	19.12.70	5 ,153 drilling ahead	
Roe No. 1 BMR file 70/912	31 48 36 115 26 56	WD 343	23.11.70 13.12.70	7,001	PA
Warnbro No. 1 BMR file 70/825	32 14 20 115 20 45	RT to sea bed 237 WD 155	26.11.70	11,859 drilling ahead	

EXPLORATION WELLS DRILLING IN 1970

BASIN OPERATING COMPANY Well name BMR file no. if subsidised	Latitude S Longitude E ° ' "	GL/WD (feet) KB/RT (feet)	Date spudded T.D. reached	T.D. (feet)	Status
SURAT					
Amalgamated Petroleum N.L.					
Horrane No. 1	27 33 02 151 14 17	GL 1173 KB 1185	3.11.70 21.11.70	4,362	PA
Associated Australian Oilfields N.L.					
Durham No. 1	26 23 10 148 48 42	GL 1089 KB 1100	26. 9.70 1.10.70	3,273	PA
Euthulla No. 1	26 28 22 148 47 40	GL 1059 KB 1070	6. 8.70 10. 8.70	3,652	Completed as pote gas producer
Euthulla No. 2	26 29 13 148 47 48	GL 1024 KB 1035	9. 9.70 16. 9.70	3,828	"
Euthulla No. 3	26 27 39 148 47 07	GL 1,082 KB 1,093	19. 9.70 24. 9.70	3,731	PA
Euthulla No. 4	26 28 25 148 46 48	GL 1,119 KB 1,130	4.10.70 10.10.70	4,087	Plugged and conve to water well
Grafton Range No. 16	26 22 25 148 53 41	GL 1,306 KB 1,317	26. 6.70 2. 7.70	3,680	Plugged and conve to water well
Havington No. 1	26 28 08 148 50 49	GL 1,176 KB 1,187	20. 7.70 25. 7.70	3,439	"
Minka No. 1	26 30 34 148 43 17	GL 1,113 KB 1,124	13.10.70 19.11.70	3,621	"

EXPLORATION WELLS DRILLING IN 1970

BASIN OPERATING COMPANY Well name BMR file no. if subsidised	Latitude S °Longitude E ' "	GL/WD (feet) KB/RT (feet)	Date spudded T.D. reached	T.D. (feet)	Status
SURAT (cont'd)					
Pleasant Hills No. 10	26 23 06 148 57 58	GL 1,377 KB 1,388	25. 5.70 3. 6.70	4,115	Plugged and conv to water well
Pleasant Hills No. 11	26 23 14 148 58 27	GL 1,428 KB 1,439	7. 7.70 16. 7.70	3,992	Completed as pot gas producer
Pleasant Hills No. 15	26 23 03 149 02 41	GL 1,287 KB 1,298	5.12.70 16.12.70	4,134	PA
Taber's No. 1	26 23 10 148 46 47	GL 1,096 KB 1,107	15. 8.70 18. 8.70	2,973	PA
Westlands No. 1	26 25 06 148 43 30	GL 1,185 KB 1,196	28. 7.70 2. 8.70	3,262	Completed as pot gas producer
Westlands No. 2	26 24 20 148 43 58	GL 1,221 KB 1,221	21. 8.70 25. 8.70	3,265	Plugged and conv to water well
Westlands No. 3	26 24 44 148 44 47	GL 1,150 KB 1,161	28. 8.70 1. 9.70	3,168	"
Westlands No. 4	26 25 30 148 44 21	GL 1,143 KB 1,154	3. 9.70 7. 9.70	3,198	"
Union Oil Development Corp.					
Amoolee No. 1	26 55 11 149 29 00	GL 950 KB 962	8. 2.70 16. 3.70	10,004	Completed as wat well
Bennett No. 3	27 13 41 150 13 27	GL 934 KB 946	17. 4.70 28. 4.70	5,675	PA

EXPLORATION WELLS DRILLING IN 1970

BASIN OPERATING COMPANY Well name BMR file no. if subsidised	Latitude S Longitude E ° ' "	GL/WD (feet) KB/RT (feet)	Date spudded T.D. reached	T.D. (feet)	Status
SURAT (Cont'd)					
Boxleigh No. 1	27 37 39 149 03 26	GL 877 KB 901	16. 5.70 3. 6.70	6,318	Completed as poten gas producer
Farawell No. 1	27 55 02 149 33 43	GL 736 KB 748	18.12.69 6. 1.70	7,683	PA
Glenaubyn No. 1	26 26 48 149 54 50	GL 1,386 KB 1,398	2. 6.70 22. 6.70	6,570	PA
Kincora No. 3	27 02 53 148 48 35	GL 1,073 KB 1,086	22. 1.70 1. 2.70	5,157	Suspended as a gas producer
Kincora No. 4	27 05 33 148 50 13	GL 894 KB 908	16. 8.70 25. 8.70	4,872	PA
Kincora No. 5	27 04 47 148 49 28	GL 942 KB 956	1.12.70 9.12.70	4,384	Completed as a po ial gas producer
Leichhardt No. 3	27 14 39 150 11 56	GL 936 KB 948	31. 3.70 13. 4.70	5,828	PA
Major No. 3	27 37 28 148 55 07	GL 890 KB 904	31. 8.70 10. 9.70	5,580	PA
Mamaree No. 1	27 41 19 149 28 31	GL 907 KB 921	3. 7.70 9. 8.70	9,091	Plugged and conve to water well
Mourachan No. 1	27 43 32 149 04 35	GL 943 KB 956	28. 3.70 23. 4.70	6,297	PA
Ningham No. 1	28 10 55 148 49 06	GL 630 KB 643	10. 1.70 15. 1.70	5,069	Plugged and conve to water well

EXPLORATION WELLS DRILLING IN 1970

BASIN OPERATING COMPANY Well name BMR file no. if subsidised	Latitude S Longitude E ° ' "	GL/WD (feet) KB/RT (feet)	Date spudded T.D. reached	T.D. (feet)	Status
SURAT (cont'd)					
Noorindoo No. 1	27 07 25 149 11 11	GL 909 KB 921	15. 9.70 9.10.70	7,503	Completed as a potential gas prc
Paloma No. 1	27 21 30 149 41 00	GL 1,001 KB 1,014	13. 1.70 1. 2.70	7,659	Completed as a water well
Red Cap No. 1	27 18 15 149 15 30	GL 1,160 KB 1,174	29.10.70 25.11.70	8,223	PA
Riversdale No. 1	27 53 38 149 09 23	GL 771 KB 783	16.12.69 4. 1.70	6,117	PA
Talavera No. 1	27 15 19 148 56 36	GL 750 KB 763	21. 2.70 7. 3.70	5,029	PA
United Petroleum Reserves N.L.					
Mungalla No. 1	26 26 43 147 24 06	GL 1,453 KB 1,466	18. 2.70 22. 2.70	2,552	PA
Mungalla No. 2	26 26 20 147 21 50	GL 1,458 KB 1,471	26. 2.70 28. 2.70	2,360	PA
Woods Petroleum					
Billa Billa No. 1	28 01 45 150 22 45	GL 924 KB 938	30. 4.70 8. 5.70	4,264	PA

EXPLORATION WELLS DRILLING IN 1970

BASIN OPERATING COMPANY Well name BMR file no. if subsidised	Latitude S Longitude E ° ' "	GL/WD (feet) KB/RT (feet)	Date spudded T.D. reached	T.D. (feet)	Status
SYDNEY					
Esso Exploration and Production Australia Inc.					
Howes Swamp No. 1 BMR file 70/139	33 07 58 150 41 37	GL 1,011.5 KB 1,026.5	6. 2.70 10. 4.70	8,431	PA
PAPUAN					
Australasian Petroleum Company Pty Ltd					
Ipigo No. 1 BMR file 70/271	7 19 46 144 52 41	GL 15 KB 31	29. 4.70 28. 6.70	9,252	PA
Endeavour Oil Co. N.L.					
Magobu Island No. 1 BMR file 70/581	8 31 79 143 16 52	GL 05 KB 19	4.11.70 10.12.70	8,644	PA
OFFSHORE NORTH AND NORTHWEST AUSTRALIA					
Flinders Petroleum					
Tinganoo Bay No. 1	11 23 42 131 29 02	GL 05	18.12.70	230 drilling ahead	

TABLE 2

GEOPHYSICAL OPERATIONS DURING 1970

BASIN OPERATING COMPANY Survey name BMR file no.	Permit	Duration	Extent.
ARCKARINGA BASIN			
Pexa Oil N.L. Lake Conway seismic & gravity (69/3088)	PEL 5/6	25. 1.70- 1. 4.70	253 km (160 mls) seismic, 39 new stations, 610 stations metered
Peake Creek seismic & gravity (70/605)	PEL 5/6	12. 7.70-16. 8.70	80.6 km (50.4 mls) conventional subsurface coverage, 107.1 km (66.6 mls) CDP subsurface coverage
BONAPARTE GULF BASIN			
Alliance Oil Development Australia N.L. Pincombe Range seismic (70/675)	EP 54	7. 8.70- 3.11.70	146.8 km (91.1 mls) 6 fold CDP
Lennard Oil N.L. Burt Range seismic (70/647)	O.P. 168	24. 7.70- 3.10.70	229.6 km (142.5 mls) 6-fold 6.2 km (3.85 mls) 12-fold CDP
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- & 12-fold
Warrinilla West seismic (69/3089)	ATP, 100P, 119P	4. 2.70-20. 2.70	19.28 km (12 mls) 3-fold, 4.83 km (3 mls) 6-fold CDP
United Petroleum Reserves N.L. Shotover seismic (70/612)	ATP 141P	1. 8.70-22. 8.70	37 km (23 mls) 1-fold reflection
CANNING BASIN			
Australian Aquitaine Petroleum Pty Ltd Stretch Range seismic & gravity (70/600)	P.E. 151 H	1. 8.70-14.10.70	182 km (113 mls) 1200% coverage 'Geograph', 403 new gravity stations

BASIN OPERATING COMPANY Survey name BMR file no.	Permit	Duration	Extent.
CANNING BASIN			
Lennard Oil N.L. Alexander II seismic (70/449)	PE 106H, 253H	21. 5.70-20. 7.70	163 km (102 mls) 3-fold CDP
West Australian Petroleum Pty Ltd Canning marine seismic (70/158)	WA-21-P WA-2-P	18. 2.70-28. 2.70	1053 km (655 mls) 2400% airgun
King Sound seismic (70/218)	PE 30 H	28. 2.70- 1. 3.70	116.3 km (72.4 mls) airgun
Tabletop seismic (70/392)	EP 8, 15	29. 4.70-18. 6.70	235.8 km (146.5 mls) 600% reflection
Helena seismic (70/504)	EP 9, 13, 17	16. 6.70- 9. 8.70	402.2 km (250 mls) 600% reflection
Lake Betty seismic (70/657)	EP 17	29. 7.70-29. 8.70	97.7 km (60.6 mls) 600% cover, 76.6 km (47.6 mls) 1200% cover
Crossland seismic (70/687)	EP 18, 43, 44	25. 8.70-20. 9.70	135.5 km (84.2 mls) 600% reflection
Gogo-Trig seismic (70/718)	EP 42	30. 8.70-25 .9.70	72.2 km (44.8 mls) 600%, 43.9 km (27.4 mls) 1200% coverage
Laurel seismic (70/763)	EP 42, 44	23. 9.70-17.10.70	160.6 km (99.7 mls) 600%, 1200% reflection
Oscar seismic (70/765)	EP 5, 7, 42	6.10.70-20.11.70	247.2 km (152.2 mls) 600%, 113.4 km (70.6 mls) 1200% reflection
Pender seismic (70/817)	EP 6, 7	12.10.70-31.10.70	99.1 km (61.6 mls) 600% CDP
Broome-Samphire seismic (70/857)	EP 3, 6, 14, 16	2.11.70-17.12.70	237.4 km (147. 8 mls) 600% cover
Anketell seismic (70/896)	EP 3, 16, 53	26.11.70-18. 1.71	232.9 km (145 mls) 600% reflection
CARNARVON BASIN			
Barewa Oil & Mining N.L. Murchison-Gascoyne gravity (70/326)	PE 226 H	2. 4.70- 4. 5.70	956 new gravity stations
West Australian Petroleum Pty Ltd Barrow Waters seismic (70/127)	WA-24-P, 25-P, EP 51	5. 2.70-11. 2.70	214 km (133 mls) 24-fold 'airgun'

BASIN OPERATING COMPANY Survey name EMR file no.	Permit	Duration	Extent.
COOPER BASIN			
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 2/5 km intervals along seismic lines
Bridge Oil N.L. Patchawarra Central & Patchawarra Central II seismic & gravity (69/3072, 70/494)	PEL 5/6	22. 1.70-11. 6.70	312 km (194 mls) seismic, gravity along all lines
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
Coopers Creek Central seismic (70/668)	PEL 5/6, ATP 166/167 P	8. 8.70-15. 2.71	696 km (533 mls)
Pexa Oil N.L. Accalana seismic & gravity (70/322)	PEL 5/6	6. 4.70-15. 5.70	202 km (124.5 mls) reflection
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			
N.S.W. Oil & Gas Co. N.L. Hamilton Gate seismic (69/3085)	PEL 157 ATP 144P	1.12.69-24. 1.70	109 km (67 mls) refraction
Northwest Oil & Minerals Co. N.L. Winnathee seismic (69/3082)	PEL 125	10.12.69- 4. 3.70	191.5 km (119 mls) 1-fold reflection
EUCLA BASIN			
Genoa Oil N.L. Twilight Cove seismic (70/440)	WA-8, 9, 10, 41P	1. 6.70-14. 6.70	1640 km (1019 mls) 12-fold 'airgun'

BASIN OPERATING COMPANY Survey name BMR file no.	Permit	Duration	Extent.
GALILEE BASIN			
Beaver Exploration Australia N.L. East Lynne seismic (70/458)	ATP 138P	3. 6.70- 9. 9.70	114 km (71 mls) 1-fold, 106 km (66 mls) 3-fold, 92.6 km (57.8 mls) 6-fold
Flinders Petroleum N.L. Koburra seismic (69/3083)	ATP 76P	3.12.69- 7. 3.70	193 km (120 mls) conventional reflection
GEORGINA BASIN			
Alliance Oil Development Australia N.L. Toko Range seismic (70/284)	ATP 160P	25. 3.70-25. 6.70	142.4 km (88.5 mls)
GIPPSLAND BASIN			
A.P.M. Development Pty Ltd Tarwin seismic (70/122)	PEP 53	20. 2.70-13. 3.70	16 km (10 mls) 3-fold CDP 27.3 km (17 mls) 1-fold CDP
N.S.W. Oil & Gas Co. N.L. Sailfish seismic (70/884)	T1/P	28.11.70- 9.12.70	19.3 km (12 mls) refraction 527 km (328 mls) reflection 507 km (315 mls) magnetic
W.Y.P. Development Pty Ltd Bemm River seismic (70/768)	PEP 70	19.10.70-8.11.70	28.5 km (17.75 mls) continuous revered refraction profiling
LAKE FROME EMBAYMENT			
Crusader Oil N.L. Frome Downs seismic & gravity (69/3071)	PEL 5/6	20.3.70-12.12.70	890 km (555 mls), 1584 stations, 102 bases metered.
MURRAY BASIN			
N.S.W. Oil & Gas Co. N.L. Mount Emu seismic (70/177)	PEL 163	15.3.70-14.5.70	51.4 km (32 mls) 3- & 6- fold CDP
Jerilderie North seismic (70/220)	PEL 160	8.3.70-15.5.70	61 km (38 mls) 3-fold CDP
Pexa Oil N.L. Narweena seismic (70/221)	PEL 165	8.3.70-27.3.70	75.5 km (47 mls) reflect- ion 32.2 km (20 mls) refraction

BASIN OPERATING COMPANY Survey name BMR file no.	Permit	Duration	Extent.
NGALIA BASIN			
Magellan Petroleum Australia Ltd			
Ngalia Basin 2 gravity (70/704)	O.P. 165	18.8.70-12.10.70	84 bases, 3325 stations metered.
OFFICER BASIN			
Murumba Oil N.L.			
Eastern Officer Basin gravity (70/134)	PEL 10, 11	3.2.70-25.3.70	27 new bases 94 tie points, 3605 grid stations.
OTWAY BASIN			
Alliance Oil Development Australia N.L.			
Gambier Trough seismic (70/210)	PEL 8	10.3.70-6.5.70	92.6 km (57.7 mls) 6-fold 'Geograph'
Wannon seismic (70/425)	PEP 54	11.5.70-22.5.70	23.1 km (14.4 mls) 6-fold 'Geograph'
Hematite Petroleum Pty Ltd			
Baudin marine seismic (70/178)	P/1	23.2.70-3.3.70	490 km (304 mls) 'Aquapluse'
Planet Exploration Co. Pty Ltd			
Casterton Detail gravity (70/86)	PEP 26	10.1.70-26.2.70	1179 new gravity stations
Shell Development (Australia) Pty Ltd			
Macarthur-Portland seismic (69/3080)	PEP 5/6	1.12.69-14.8.70	14.4 km (8.9 mls) refraction, 362 km (224.9 mls) reflection, 400% coverage, 'Geoflex' & dynamite.
Portland-Geelong aeromagnetic (70/373)	PEP 5/6	21.4.70-11.10.70	8332 km (5177 mls)
Warrnambool-Pomborneit seismic (70/962)	PEP 5/6	14.12.70-1.8.71	76.8 km (47.7 mls) dynamite 600% CDP, 345 km (214.4 mls) Vibroseis 1200% CDP
Nelson-Koroit seismic (70/963)	PEP 5	14.12.70-6.6.71	194 km (120.6 mls) 12-fold CDP

BASIN OPERATING COMPANY Survey Name EMR file no.	Permit	Duration	Extent.
OXLEY BASIN			
Alliance Petroleum Australia N.L.			
Bundulla seismic (70/493)	PEL 85	7.6.70-29.7.70	74.3 km (46 mls) 'Geograph'
PARKES AREA			
N.S.W. Oil & Gas Co. N.L.			
Parkes seismic (70/361)	PEL 159	18.5.70-15.6.70	31.2 km (19.4 mls) 6-fold CDP
PEDIRKA BASIN			
Beach Petroleum N.L.			
Mt Daer gravity (70/487)	O.P. 57	2.6.70-12.7.70	753 field stations, 16 base stations
Vamgas N.L.			
Mount Ross seismic (70/299)	PEL 5/6	5.4.70-19.6.70	580 profiles, 312 km (194.2 mls) conventional subsurface, 16.2 km (10.1 mls) CDP subsurface coverage
PERTH BASIN			
BP Petroleum Development Australia Pty Ltd			
Geelvink Channel seismic (70/241)	WA-39-P, 40-P	13.3.70-31.3.70	1334 km (829 mls) 2400% 'Airgun'
West Australian Petroleum Pty Ltd			
Harvey D-1 seismic (69/3074)	WA-27-H	24.11.69-21.1.70	88.5 km (55 mls) detail, 47.3 km (29.4 mls) reconnaissance, 600% CDP
Perth Waters seismic (69/3090)	WA-13-P, 14-P, 20-P	7.1.70-28.1.70	899 km (558.7 mls) 'Airgun'
Dandaragan West seismic (70/104)	'Lancelin' EP 11	24.1.70-4.2.70	42.8 km (26.6 mls) 600% CDP
Moore River - Lancelin seismic (70/194)	WA-27-H	26.2.70-28.3.70	29 km (18.2 mls) 1200% & 2400% reflection.
Walyering detail seismic (70/717)	PE 24	18.8.70-20.9.70	35.4 km (21.9 mls) 600% cover
Preston detail seismic (70/858)	EP 25	30.10.70-30.11.70	87.9 km (54.6 mls) subsurface, 600% cover

BASIN OPERATING COMPANY Survey name BMR file no.	Permit	Duration	Extent.
POLDA BASIN			
Bridge Oil N.L. Polda Basin seismic (70/163)	EPP 13	6.2.70-18.2.70	478 km (297 mls) reflection, 486 km (302 mls) CDP, 8 km (5 mls) refraction
ST VINCENT BASIN			
Beach Petroleum N.L. Lake Fowler seismic, magnetic & gravity (69/3077)	PEL 7	6.11.69-28.1.70	163.4 km (101.5 mls) reflection, 1268 gravity & 1366 magnetic stations
Investigator Strait gravity (70/975)	EPP 9, PEL 7	21.12.70-29.1.71	64 underwater and 123 land stations
SURAT BASIN			
Amalgamated Petroleum N.L. Horrane seismic (70/398)	ATP 159P	10.4.70-10.5.70	19.3 km (12 mls) 600% CDP
Pexa Oil N.L. Thallon seismic & gravity (69/3087)	ATP 140P	11.12.69-27.2.70	270 km (168.3 mls) reflection, 519 gravity stations
SYDNEY BASIN			
Longreach Oil Ltd South Broken Bay seismic (70/803)	PEP 223	2.11.70-7.11.70	91.4 km (56.8 mls)
Magellan Petroleum Australia Ltd South Sydney Basin seismic & magnetic (70/486)	EPP/1	2.6.70-5.6.70	64.4 km (40 mls) refraction & reflection & magnetic
N.S.W. Oil & Gas Co. N.L. Stockton seismic (70/482)	PEL 174	21.5.70-19.9.70	41.8 km (26 mls) 3- & 6-fold CDP
Charlotte Head seismic (70/828)	PEP 5	25.10.70-31.10.80	471.3 km (292.8 mls) reflection, 13 km (8 mls) refraction, 83.6 km (52 mls) magnetic.

BASIN OPERATING COMPANY Survey name BMR file no.	Permit	Duration	Extent.
OFFSHORE NORTH AND NORTHWEST AUSTRALIA			
B.O.C. of Australia Ltd			
Tryal-Evans marine seismic (70/245)	WA-1/28, 29, 30, 31, 32, 33, 34, 35, 36, 37-P	7.3.70-18.7.70	1964 km (1221 mls) 'Aquapluse'
Trimouille-Dillon seismic (70/976)	WA-1/28, 29, 30, 31, 32, 33, 34, 35, 36, 37P, N.T. P/5, 8, 10, 13, 15, 9	20.12.70-2.5.71	1604 km (997 mls)
PAPUAN BASIN			
Australasian Petroleum Co. Pty Ltd			
Libano seismic (70/676)	PE 27	17.8.70-25.11.70	24.5 km (15.3 mls) sub-surface reflection, 24.7 km (15.4 mls) refraction
Kanau gravity (70/719)	O.P. 37, 51	3.10.70-21.10.70	162 stations, 17 bases
BP Development Australia Pty Ltd			
Mubi seismic (70/43)	P 46, 27	1.1.70-6.3.70	18 km (11.2 mls) refraction
Continental Oil Company of Australia Ltd			
Lake Murray-Aramia River aeromagnetic (70/107)	O.P. 43	28.1.70-9.3.70	covered the permit area
Fly, Strickland & Aramia Rivers seismic (70/899)	P.P. 43	5.12.70-25.1.71	62.6 km (38.9 mls) refraction, 801 km (498 mls) multiple coverage, 57.9 km (36 mls) single coverage
Marathon Petroleum Australia Ltd			
Kapuri-Orloli seismic (69/3069)	P 22	19.10.69-3.3.70	74.8 km (46.5 mls) 6-fold CDP, 1.6 km (1 ml) 1-fold CDP
Texaco Overseas Petroleum Co.			
Cecilia seismic & gravity (70/569)	O.P. 27	27.6.70-25.11.70	215.6 km (133.9 mls) 6-fold CDP, 49 bases, 530 stations, 66 repeated stations

BASIN OPERATING COMPANY Survey name BMR file no.	Permit	Duration	Extent.
NORTHERN NEW GUINEA BASIN			
Australian Aquitaine Petroleum Pty Ltd			
Mai Mai seismic (70/491)	O.P. 45	21.6.70-7.7.70	3.45 km (2.1 mls) refraction & reflection.

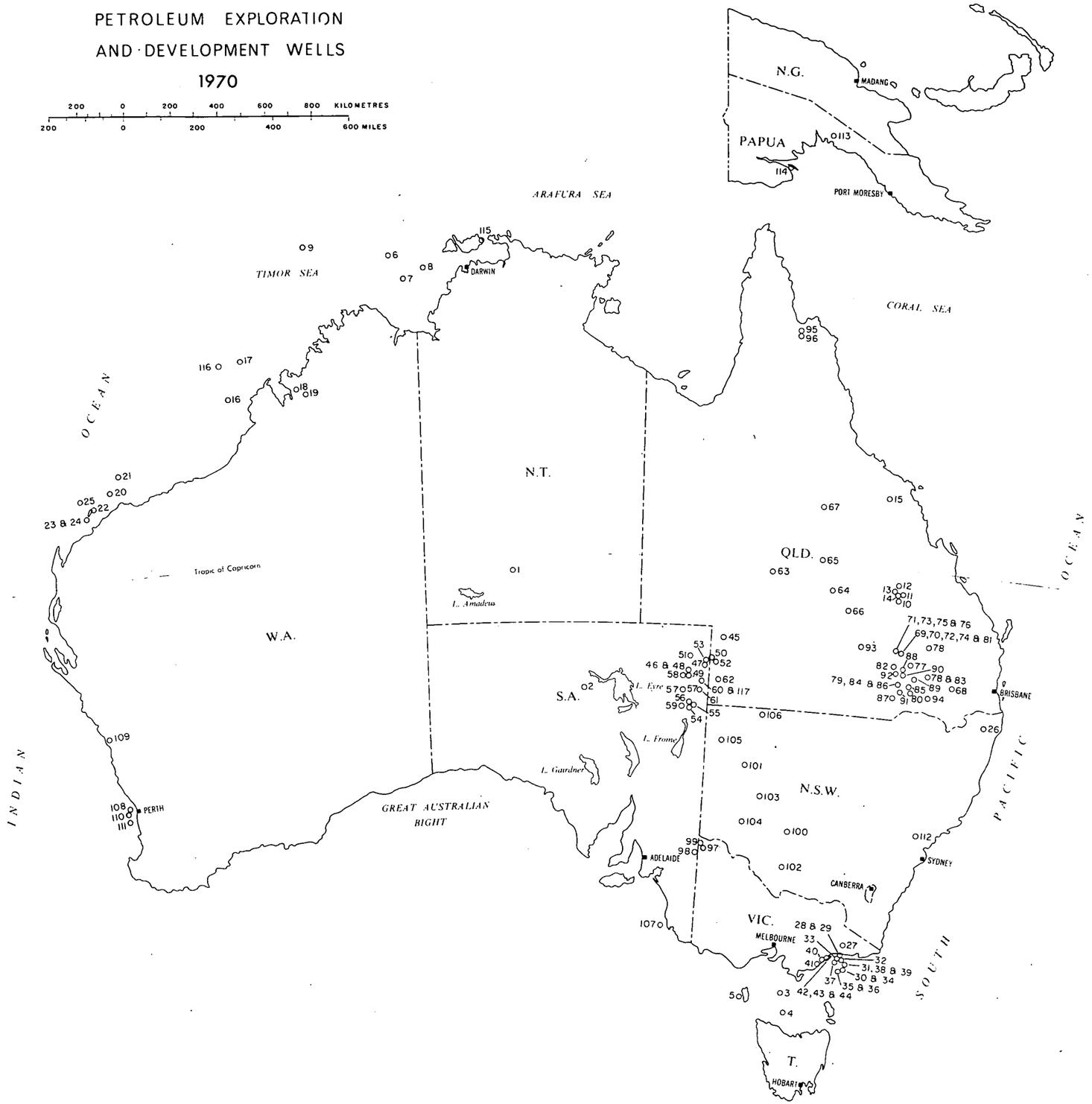
AUSTRALIA AND PAPUA NEW GUINEA

PETROLEUM EXPLORATION AND DEVELOPMENT WELLS

1970

200 0 200 400 600 800 KILOMETRES

200 0 200 400 600 MILES



Note: Unless otherwise stated, well locations refer to No. 1 well.

1. Palm Valley 2, N.T.
2. Weedina, S.A.
3. Cormorant, Tas.
4. Pelican 1-2, Tas.
5. Whelk, Tas.
6. Gull, N.T.
7. Petrel 1A-2, N.T.
8. Flat Top, N.T.
9. Sahul Shoals, N.T.
10. Comet River, Old.
11. Humboldt Creek, Old.
12. Memooloo, Old.
13. Orion, Old.
14. Rolleston North, Old.
15. Rosella Creek, Old.
16. Lacepede 1A, W.A.
17. Leveque, W.A.
18. Napier 4, W.A.
19. Napier 5, W.A.
20. Enderby, W.A.
21. Legendre, W.A.
22. Flag, W.A.
23. Pepper, W.A.
24. Ripple, W.A.
25. Tryal Rocks, W.A.
26. Hogarth 2-3, N.S.W.
27. Milton, Vic.
28. Albatross, Vic.
29. Gannet, Vic.
30. Albacore, Vic.
31. Batfish, Vic.
32. Bream 3, Vic.
33. Emperor, Vic.
34. Halibut A11-A21, Vic.
35. Kingfish A1-A19, Vic.
36. Kingfish B1-B6, Vic.
37. Snapper 3, Vic.
38. Trevally, Vic.
39. Tuna, Vic.
40. Colliers Hill, Vic.
41. Salt Lake, Vic.
42. Seacombe South, Vic.
43. Spoon Bay, Vic.
44. Wellington Park 2, Vic.
45. Gilpeppee, Old.
46. Merrimelia, S.A.
47. Packsaddle, S.A.
48. Tirrawarra, S.A.
49. Gidgealpa 11-12, S.A.
50. Arrabury, Old.
51. Coongie, S.A.
52. Tallalia, Old.
53. Yanpurra, S.A.
54. Cherri, S.A.
55. Gurra, S.A.
56. Kumbarie, S.A.
57. Pando North, S.A.
58. Tindilpie, S.A.
59. Weena, S.A.
60. Della 1-2, S.A.
61. Murteree, S.A.
62. Orientos North, Old.
63. Belmore, Old.
64. Allandale, Old.
65. Coreena, Old.
66. Valetta, Old.
67. Koburra, Old.
68. Horrane, Old.
69. Durham, Old.
70. Euthulla 1-4, Old.
71. Grafton Range 15-16, Old.
72. Havington, Old.
73. Minka, Old.
74. Pleasant Hills 13-16, Old.
75. Taber's, Old.
76. Westlands 1-4, Old.
77. Amoolee, Old.
78. Bennett 3-4, Old.
79. Boxleigh, Old.
80. Farawell, Old.
81. Glenaubyn, Old.
82. Kincora 3-5, Old.
83. Leichardt 3, Old.
84. Major 3, Old.
85. Marraree, Old.
86. Mourachan, Old.
87. Ningham, Old.
88. Noorindoo, Old.
89. Paloma, Old.
90. Red Cap, Old.
91. Riversdale, Old.
92. Talavera, Old.
93. Mungalla 1-2, Old.
94. Billa Billa, Old.
95. Breeza Plains, Old.
96. Lakefield, Old.
97. Morkalla, Vic.
98. Nadda, S.A.
99. Sunset, Vic.
100. Booligal 1-2, N.S.W.
101. Gnalta, N.S.W.
102. Hay, N.S.W.
103. Mt. Emu, N.S.W.
104. Narrbuccurra, N.S.W.
105. Pincally 1-2, N.S.W.
106. Yarralleo, N.S.W.
107. Chama 1-1A, S.A.
108. Charlotte, W.A.
109. Dongara 18-19, W.A.
110. Roe, W.A.
111. Warnbro, W.A.
112. Howes Swamp, N.S.W.
113. Ipigo, PNG.
114. Magobu Island, PNG.
115. Tinganoo Bay, N.T.
116. Lynher, W.A.
117. Strzelecki, S.A.

B.M.R. Petroleum Exploration Branch, 1972. To accompany Record No. 1971/46

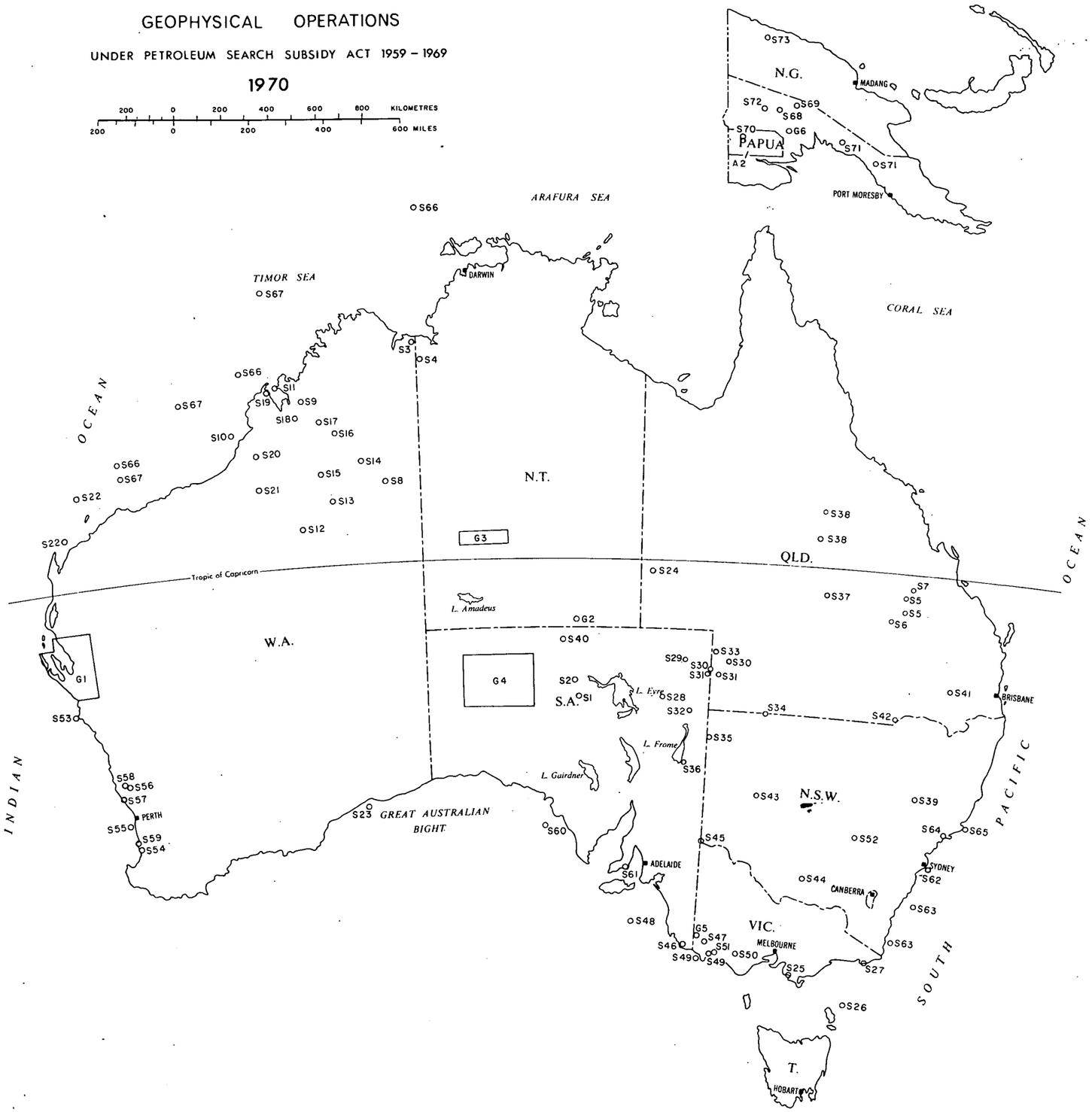
AUSTRALIA AND PAPUA NEW GUINEA

GEOPHYSICAL OPERATIONS

UNDER PETROLEUM SEARCH SUBSIDY ACT 1959 – 1969

1970

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



S-SEISMIC SURVEYS

S1. Lake Conway, S.A. (& Gravity)
S2. Peake Creek, S.A. (& Gravity)
S3. Pincombe Range, W.A.
S4. Burt Range, N.T.
S5. Denison East, Qld.
S6. Warrinilla West, Qld.
S7. Shotover, Qld.
S8. Stretch-Range, W.A. (& Gravity)
S9. Alexander II, W.A.
S10. Canning Marine, W.A.
S11. King Sound Marine, W.A.
S12. Tabletop, W.A.
S13. Helena, W.A.
S14. Lake Betty, W.A.
S15. Crossland, W.A.
S16. Gogo-Trig , W.A.
S17. Laurel, W.A.
S18. Oscar, W.A.
S19. Pender, W.A.
S20. Broome-Samphire, W.A.
S21. Anketell, W.A.
S22. Barrow Waters Marine, W.A.
S23. Twilight Cove Marine, W.A.
S24. Toko Range, Qld.
S25. Tarwin, Vic.
S26. Sailfish Marine, Tas.
S27. Bemm River, Vic.
S28. Lake Gregory, S.A. (& Gravity)
S29. Patchawarra Central I & II, S.A. (& Gravity)
S30. Innaminka, Qld. & S.A. (& Gravity)
S31. Coopers Creek Central, Qld. & S.A.
S32. Accalana, S.A. (& Gravity)
S33. Epsilon, Qld.
S34. Hamilton Gate, N.S.W. & Qld.
S35. Winnathee, N.S.W.
S36. Frome Downs, S.A. (& Gravity)
S37. East Lynne, Qld.
S38. Koburra, Qld.
S39. Bundulla, N.S.W.
S40. Mt. Ross, S.A.
S41. Horrane, Qld.
S42. Thallon, Qld. (& Gravity)
S43. Mount Emu, N.S.W.
S44. Jerilderie North, N.S.W.
S45. Narweena, N.S.W.
S46. Gambier Trough, S.A.
S47. Wannon, Vic.
S48. Baudin Marine, S.A.
S49. Macarthur-Portland, Vic.
S50. Warrnambool-Pomborneit, Vic.
S51. Nelson-Koroit, Vic.
S52. Parkes, N.S.W.
S53. Geelvink Channel Marine, W.A.
S54. Harvey D-1, W.A.
S55. Perth Waters Marine; W.A.
S56. Dandaragan West, W.A.
S57. Moore River-Lancelin, W.A.
S58. Walyering Detail, W.A.
S59. Preston Detail, W.A.
S60. Polda Basin, S.A.
S61. Lake Fowler, S.A. (Magnetic & Gravity)
S62. South Broken Bay Marine, N.S.W.
S63. South Sydney Basin, N.S.W. (& Magnetic)
S64. Stockton, N.S.W.
S65. Charlotte Head Marine, N.S.W.
S66. Tryal-Evans Marine, W.A.
S67. Trimouille-Dillon Marine, W.A. & N.T.
S68. Libano, PNG.
S69. Mubi, PNG.
S70. Fly, Strickland & Aramia Rivers, PNG.
S71. Kapuri-Orloli, PNG.
S72. Cecilia, PNG. (& Gravity)
S73. Mai Mai, PNG.

G-GRAVITY SURVEYS

G1. Murchison-Gascoyne, W.A.
G2. Mt. Daer, N.T.
G3. Ngalia Basin 2, N.T.
G4. Eastern Officer Basin, S.A.
G5. Casterton Detail, Vic.
G6. Kanau, PNG.

A-AEROMAGNETIC SURVEYS

A1. Portland-Geelong, Vic.
A2. Lake Murray-Aramia River, PNG.

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