COMMONWEALTH OF AUSTRALIA

DEPARTMENT OF NATIONAL DEVELOPMENT

BUREAU OF MINERAL RESOURCES, GEOLOGY AND GEOPHYSICS

Record No. 1969 / 143

Petroleum Exploration Branch Summary of Activities 1969

(Period from 1 November 1968 to 31 October 1969)

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PETROLEUM EXPLORATION BRANCH

SUMMARY OF ACTIVITIES

1969

(Period from 1.11.68 to 31.10.69)

CONTENTS

SUBSURFACE SECTION

SEDIMENTARY BASINS STUDY GROUP

This group has been engaged on a detailed review of the Sydney Basin, and in addition has made preparations for the collation and compilation of all available data on the sedimentary basins of Australia and New Guinea.

Sydney Basin:

The review of the Sydney Basin has been done with the co-operation of the Geological Survey of New South Wales and petroleum exploration companies; it entailed a review of all available geological and geophysical data, and re-interpretation where necessary. On 31st October, 1969 the geological work had been completed and integrated with the available geophysical results; about 85 per cent of the geophysical review had been completed, but two seismic surveys remained to be reprocessed.

The geological results confirmed that the Permian sediments in particular, and most of the Triassic ones, lack porosity for one or more of the following reasons: overgrowth of quartz grains, abundant kaolin, tuffaceous matrix, and abundant volcanic lithics. Three sandstone units of the Shoalhaven/Maitland Groups (Permian "Upper Marine Series") can be traced, on lithological and wire-line log characteristics, over large areas of the Sydney Basin and they could form fair reservoirs but have been tested unsuccessfully in all known favourable locations.

Records were issued on the results of petrological examinations of each of the Kirkham No. 1, Kurrajong Heights No. 1, Martindale No. 1, Kulnura No. 1, East Maitland No. 1 and Mellong No. 1 Wells, and a paper on the mineral dawsonite was written for publication in a proposed B.M.R. Bulletin. This mineral was discovered in eight wells - Martindale, Loder, Belford, East Maitland, Kulnura, Kurrajong Heights, Dural South and Kirkham. The mineral has attracted considerable attention in North America as a source of aluminium, but only where it can be extracted along with other commodities, e.g. petroleum from oil shale. No dawsonite has been reported previously from the oil shales of the Sydney Basin, and no samples have been examined during the Bureau's review.

General:

The collation and compilation of data on sedimentary basins has involved mainly the recording of data as it becomes available but a compilation of available data on the Canning Basin has begun, in collaboration with the Geological Survey of Western Australia. Bibliographies of the Canning and Perth Basins have been completed, and also ones for the Papuan and Clarence - Moreton Basins. The Bibliographies will be issued as Records when final checking is complete.

CORE AND CUTTINGS LABORATORY

During the year 152 Bureau personnel and 85 company personnel (representing 32 organisations), visited the Core and Cuttings Laboratory. Out of these, 9 B.M.R. personnel spent 24 weeks and 21 company personnel spent a total of 207 working days in the Laboratory, examining cores, cuttings, and thin sections - (sedimentary, petrology studies, phosphate testing, extraction of evaporites for bromine analysis, heavy mineral separations, calcimetry, visual examinations, etc.).

Major Works Carried Out in the Laboratory:

- 4235 wells/bores plotted and documented in the Laboratory's Well Information System.
- All Bureau scout bores drilled between 1955 and 1968 listed and re-named according to a uniform system. Currently available numbers in relevant grid areas were distributed to field party leaders.
- 5 B.M.R. field parties equipped with core boxes, cartons, polythene tubing, labelled cuttings bags, staplers, marking pegs, etc.
- Pads of Sample Submission Forms distributed to all companies submitting material to the Laboratory (242 wells during the year).
- 22,055 pre-labelled polythene cuttings bags sent to 30 well sites.
- A semi-automatic cuttings washing and drying machine installed (maximum capacity - 800 samples per day)
- A new technique for digitising Differential Thermal Analysis (D.T.A.) curves worked out.
- Details of 1773 minerals and mineral assemblages coded and curves (40) digitised for D.T.A. analysis.
- A pilot run of DTA well-logging is in progress on 3000 feet of cuttings.
- 4053 thin sections registered, indexed and arranged in a new room, together with all available lithological descriptions.
- 1,633 feet of cores were slabbed and 825 feet of cores despatched to the N.S.W. Mines Department (exchange arrangements).
- 112 cores were covered and 65 cuttings sampled embedded in a transparent resin. A draft submitted describing these techniques.
- Carried out changes in the Sample registration procedures which more than doubled the monthly output figures.
- Proposals for the use of EDP techniques submitted.
- Began to apply EDP methods in the calibration of the Deltatherm, Differential Thermal Analysis apparatus, in the processing of DTA results, and in the processing of general information concerning oil wells and seismic surveys.

Store:

During the period 1.11.68 to 31.10.69, the laboratory continued to receive, label, catalogue, index and store subsurface samples from wells and bores drilled for oil or water.

Receipts for the Period 1.11.68 to 31.10.69:

Core samples from subsidised operations	5,781
Cuttings samples " "	29,943
Core samples (Submerged Lands Act)	150
Cuttings samples " " "	262
Core samples from B.M.R. operations	4,150
Cuttings samples " "	2,676
Seismic shothole samples	2,255
Side-wall cores	57
Drill-Stem-Test samples	18
Cuttings samples donated by Companies	892
Core samples donated by Qld. Geol. Surv.	261
Core samples donated from S.A. Mines Dept.	3,312
Total of subsurface samples -	49,757

Total number of samples registered, labelled, catalogued, indexed and stored during the period 1.11.68 to 31.10.69: 66,773
Grand Total of registered samples stored in the Laboratory:

Cuttings - 351,341 (representative of over 3½ million feet of drilled interval).

Cores - 63,381 (over 6 miles of actual core material if samples laid end to end).

Side-wall cores - 2,409

Thin Sections - 4,096

SUBSIDY SECTION

From 1 November, 1968 to 31 October, 1969 the Subsidy Section dealt with 41 applications for subsidy for drilling projects and 92 applications for geophysical projects, compared with 58 drilling applications and 65 geophysical applications during the previous year. The drilling applications consisted of 18 stratigraphic wells (one of which was recommended as test drilling), 11 test wells, one application for a programme of three test wells, one for a programme of two test wells, and nine for exploration drilling. One application was withdrawn. The geophysical applications consisted of 24 marine seismic surveys, eight marine seismic and magnetic surveys, 36 land seismic surveys,

11 seismic and gravity surveys, eight aeromagnetic surveys, and five gravity surveys. One application was withdrawn and one was refused. The applications involved 43 wells, 22,000 miles of seismic coverage, 25,000 line miles of aeromagnetic survey, and 7000 gravity stations. Only 4500 miles of the seismic work was on land. Most of the gravity and magnetic work was undertaken to supplement seismic operations rather than to initiate exploration and only the Van Diemen Gulf Aeromagnetic Survey covered territory not previously explored. All relevant wells and surveys are listed on Tables 1 and 2 and are shown on the accompanying maps.

The only basins in which no subsidised work was undertaken were the Officer and Georgina Basins. Those basins in which the results were particularly interesting and significant are discussed separately. In addition geophysical surveys and drilling were undertaken in the Perth, Carnarvon, Eucla, Sydney, Laura, Bonaparte Gulf, Papuan, New Guinea, Galilee and Amadeus onshore basins and the offshore Laura Basin and the Great Barrier Reef area. Work in the New Guinea Basin has not yet reached the drilling stage and all that can be said at this stage is that, despite field problems, some promising structural leads have been obtained.

Western and Northwestern Offshore Areas:

Almost half of the seismic work and 40% of the aeromagnetic work was undertaken in these areas which cover the offshore Perth, Carnarvon, and Canning Basins, and the Timor and Arafura Sea areas. With 2,000 miles of seismic survey in the Perth and Carnarvon basins and 10,000 miles in the remainder, reconnaissance has been extended over practically the whole area and detailed seismic work has already been extended over those areas which are structurally most promising. Five wells were spudded in the area, of which one was drilled in the north, in the Timor Sea (Joseph Bonaparte Gulf) area, three in the northern part, and one in the southern part of the Carnarvon Basin, and one in the central part of the Perth Basin. The most significant of these wells was Petrel No. 1 drilled by Arco in the Joseph Bonaparte Gulf, 150 miles west of Darwin, which had to be abandoned by the rig on 6th August after a gas blowout at a depth of 13,057 feet followed by a fire on the rig. The well is thought to be in Permian marine sediments at total depth but records and samples were destroyed in the fire. If the well cannot be controlled with the existing subsea equipment a relief well will be drilled.

Madeleine No. 1, by B.O.C. of Australia Ltd. in the southern part of the offshore Canning and Pendock ID no. 1, in the southern part of the offshore Carnarvon Basin are still drilling. Madeleine No. 1 was originally programmed to 13,500 feet but this has since been extended to 15,000 feet, for stratigraphic reasons. It had reached 14,173 feet on 1st November, but the last confirmed age of the sediments was Tithonian from about 11,000 feet. Pendock ID No. 1 had expected to drill a thick Mesozoic section although the correlations below the base of the Cretaceous were not very certain and Permian sediments seemed possible. In fact the well entered Lower Carboniferous below the Cretaceous at about 3500 feet and entered the equivalent of the Silurian Dirk Hartog Limestone at 6000 feet. Drilling continued at 7,300 feet on 31st October.

Onshore Canning Basin and adjoining area:

About 750 miles of seismic survey have been undertaken in the Canning Basin and adjoining areas, two wells have been drilled and one well is still drilling. The most significant results were obtained from Napier No. 1 well, drilled by Lennard Oil N.L. in the Lennard Shelf area, which had been expected to reach economic basement before 4500 feet but which, in fact, drilled to a total depth of 5902 feet before stopping in Lower Devonian sediments. The unexpectedly thick section has enhanced the petroleum prospects of the area but difficulties are being experienced in obtaining useable seismic data.

Otway, Bass and Gippsland Offshore Basins:

These three basins are grouped together because of overlap in several seismic surveys. Seismic cover of the three basins was increased by 3500 miles and is now almost complete. Two subsidized wells were drilled in each of the Otway and Gippsland Basins but no significant hydrocarbons shows were obtained.

Onshore Otway Basin:

As knowledge of the extent of the Pretty Hill Sandstone member of the Otway Group increases, great stress is being placed on its potential value as a reservoir rock and there has been a revival of exploration activity in the onshore Otway Basin.

The discovery of more than 5000 feet of Pretty Hill sandstone equivalent, in the offshore well Crayfish No. 1, in the west of the Otway Basin, and its apparent extension into the onshore areas, led to an increase in seismic work onshore. More sophisticated methods of interpreting data, and a new field approach, involving detailed gravity surveys followed by selective seismic surveys, have resulted in the mapping of several structures in which the Pretty Hill Sandstone appeared to be present.

Two of the structures mapped by Esso in the western areas have been drilled and one is being drilled. At Lake Eliza No. 1, the Pretty Hill sandstone was present but no commercial hydrocarbons were produced. At Lake George No. 1, the sandstone was absent. Lucindale No. 1 is now being drilled. Shell propose to drill two wells in the central area, and Pursuit are drilling Hindhaugh Creek No. 1 in the east. Hindhaugh Creek was proposed as a stratigraphic well in an area in which less than 5000 feet of sediments were expected and in fact reached a total depth of 7781 feet in Otway Group sediments.

Papuan Basin and adjoining areas:

Almost 3000 miles of seismic survey were undertaken in these areas. One subsidised well, Anchor Cay No. 1, was drilled offshore and one, Tovala No. 1A well, was drilled onshore to a total depth of 10,522 feet after encountering considerable difficulty with an abnormally pressured mudstone. Anchor Cay No. 1, drilled by Tenneco, penetrated 6950 feet of Tertiary sediments before reaching total depth of 11,888 feet in Lower Cretaceous to Jurassic sediments. No hydrocarbons were recorded and the well was plugged and abandoned after mechanical problems. Another onshore well is planned.

Cooper Basin:

More than 2500 miles of the 4500 miles of onshore seismic exploration was done in the Cooper Basin. This infrabasin of the Eromanga Basin contains the Gidgealpa and associated gas fields, and five exploration companies have undertaken seismic surveys to locate drillsites. The only subsidized well drilled was Alliance Chandos South No. 1, in the northeast corner of the basin, which drilled a Mesozoic sequence to about 7700 feet and was abandoned in Permian sediments at 8032 feet. Arrabury No. 1, to be drilled by Flinders, Gilpeppee No. 1, (Alliance) and Roseneath No. 1 (Total) will all spud in November in this area.

Northern Eromanga and adjoining Basins:

Very little geophysical work has been done in the Northern Eromanga, Adavale, Bowen, and Surat Basins but several wells have been drilled on structures located by earlier surveys or to obtain stratigraphic data.

Associated drilled the dry Eastwood No. 1 Well to a depth of 11,106 feet in the Adavale Basin, to test the marine Devonian below the Lower Carboniferous-Devonian Buckabie Beds. Longreach Oil drilled Stormhill No. 1 and Rand No. 1 to obtain stratigraphic data and to test sands in the Permo-Carboniferous sediments. Both wells were dry and were plugged and abandoned. Harbourside drilled two unsuccessful wells, Werrina No. 1 and No. 2 in the Surat Basin, and Target drilled Moura No. 1 to a depth of 10,000 feet in the Bowen Basin. An application by Lucky Oil for approval of three wells in the Surat Basin has lapsed.

Murray Basin and adjacent areas:

A revival of interest in the Murray Basin and adjacent areas has resulted in 700 miles of seismic survey and one test well. Jupiter No. 1 was drilled by one of the Planet group of companies in the Bancannia Trough to test the Carboniferous-Devonian section in a large closed seismic structure. The well was plugged and abandoned after drilling Tertiary - Mesozoic sediments to 1060 feet and Carboniferous-Devonian red beds to total depth of 6008 feet.

Most of the seismic work has been directed towards confirming the presence of troughs of Permian and older sediments beneath the veneer of Mesozoic and younger sediments which cover most of the Murray Basin. The results of the work are not yet available.

Table 1

Drilling operations Approved or Pending 1 Nov - 31 Oct 69

1	Gage Roads, W.A.	(Wapet)
2	Budgerygar, Qld.	(Alliance)
3	Dampier, W.A.	(B.O.C.)
4	Lacrosse, W.A.	(Arco)
5	(Withdrawn)	
6	Anchor Cay, Qld.	(Tenneco)
7	Petrel, N.T.	(Arco)
8	Tovala 1 and 1A, Papua	(Basin Oil)
9	Jerry Plains, N.S.W.	(Esso)
10	Jupiter, N.S.W.	(N.S.W. O.G.)
11	Madeleine, W.A.	(B.O.C.)
12	Stormhill, Qld.	(Longreach)
13	Moura, Qld.	(Target)
14	Rand, Qld.	(Longreach)
15	Coonemia, N.S.W.	(Genoa)
16	Werrina 1, N.S.W.	(Harbourside)
17	Werrina 2, N.S.W.	(Harbourside)
18	Bonus Downs, Qld.	(Lucky Oil)
19	Marshalls, Qld.	(Lucky Oil)
20	Ularunda, Qld.	(Lucky Oil)
21	Mallabie, S.A.	(Outback)
22	Poopelloe Lake, N.S.W.	(Planet)
23	Napier, W.A.	(Lennard)
24	Clam, Tas.	(Esso)
25	Blackwood, W.A.	(Union)
26	Anchor, W.A.	(Wapet)
27	Pendock ID, W.A.	(Genoa)
28	Mussel, Vic.	(Esso)
29	Mackay, Qld.	(Japex)
30	Matches Springs, W.A.	(Total)
31	Eastwood, Qld.	(A.A.O.)
32	Chandos South, Qld.	(Alliance)
33	Hindhaugh Creek, Vic.	(Pursuit)
34	Lake Eliza, S.A.	(Esso)
35	Groper 2, Vic.	(Esso)
36	Bluebone, Vic.	(Esso)
37	Lake George, S.A.	(Esso)
38	Napier 2, W.A.	(Lennard)
39	Moyne Falls, S.A.	(Shell)
40	Hawkesdale, S.A.	(Shell)
41	Milton, Vic.	(Ashburton)
42	Lucindale, S.A.	(Esso)
43	Arrabury, Qld.	(Flinders)
44	Roseneath, Qld.	(Total)

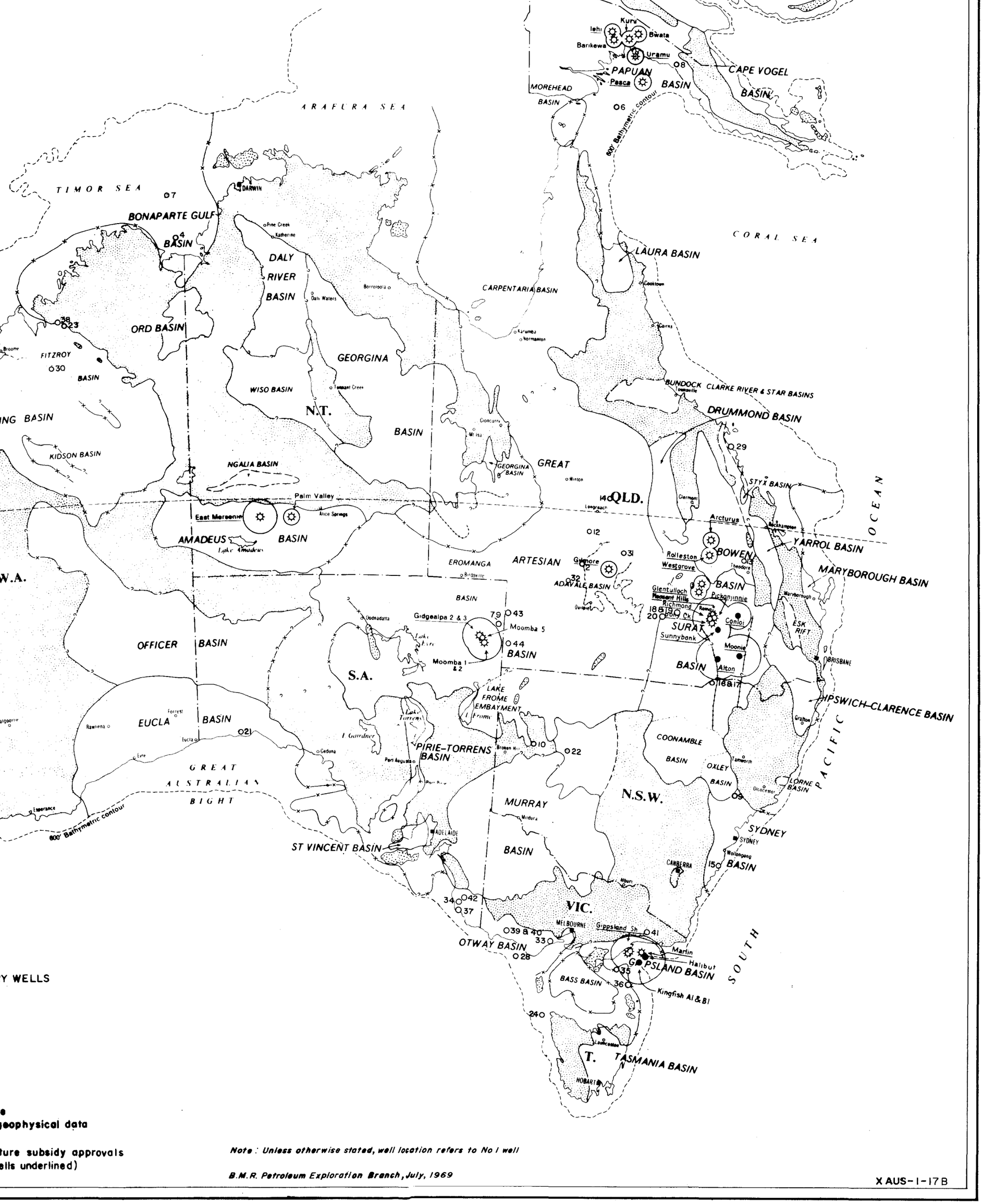
AUSTRALIA AND NEW GUINEA

PETROLEUM SEARCH SUBSIDY ACT 1959 – 1967

DRILLING OPERATIONS APPROVED OR PENDING 1 Nov. 1968 – 31 Oct. 1969

200 0 200 400 600

MILES



REFERENCE

01 DRILLING OPERATIONS

PROCLAIMED DISCOVERY WELLS

- ● Oil Well
- ☼ Gas Well
- ✸ Oil and gas Well

Non-prospective areas

Main basin

Subdivision of basin

Basin under main basin

Other basin and province

Boundary indicated by geophysical data

Areas excluded from future subsidy approvals (Names of subsidised wells underlined)

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

B.M.R. Petroleum Exploration Branch, July, 1969

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Table 2

Geophysical Surveys Approved or Submitted 1 Nov 68 - 31 Oct 69

SEISMIC SURVEYS

S1	Keep River, N.T.	(Westralian)
S2	Fly River Delta, Papua	(A.P.C.)
S3	South Australian Shelf R3, S.A.	(Shell)
S4	East Gippsland Basin, Vic & Tas (& Magnetic)	(Magellan)
S5	Bligh Entrance, Papua	(Phillips)
S6	Otway EU-68, S.A. (& Magnetic)	(Shell)
S7	Hawkesdale, Vic.	(Shell)
S8	Bass B - 69A, Tas (& Magnetic)	(Esso)
S9	Gippsland G-69A, Vic. (& Magnetic)	(Esso)
S10	Jurabi, W.A.	(Wapet)
S11	Wannerup - Flinders, W.A.	(Union)
S12	Troubridge Island, S.A.	(Beach)
S13	West Tasmania T-69A, Tas (& Magnetic)	(Esso)
S14	East Tasmania T-69B, Tas (& Magnetic)	(Esso)
S15	Hervey Bay R-1, Qld.	(Shell)
S16	Otway 069A, S.A.	(Esso)
S17	Nelyambo, N.S.W.	(Alliance)
S18	Legendre - Marie, W.A. & N.T.	(B.O.C.)
S19	Arafura D-2, N.T.	(Shell)
S20	Blackville, N.S.W.	(Alliance)
S21	Koombana, W.A.	(Wapet)
S22	Lake Poopelloe R-3, N.S.W.	(Planet)
S23	Southern Cooper Basin, S.A. (& Gravity)	(Delhi)
S24	Parry Shoal, N.T.	(Longreach)
S25	Bedout, W.A.	(Wapet)
S26	Pelsart, W.A.	(Wapet)
S27	Fraser, W.A.	(Wapet)
S28	Currambene, N.S.W.	(Genoa)
S29	Sunset, S.A. & Vic.	(A.A.O.)
S30	Geltwood Beach, S.A.	(Beach)
S31	Yamma Yamma, Qld.	(Alliance)
S32	Harvey, W.A.	(Wapet)
S33	Tasman-Bass Strait, Tas, Vic. & NSW	(Magellan)
S34	Pearce Cay, Qld.	(Texaco)
S35	Namban, W.A.	(Wapet)
S36	Madang, New Guinea	(Continental)
S37	Epsilon, Qld.	(Total)
S38	Matches Springs, W.A.	(Total)
S39	Mayurra - Panhandle, S.A. (& Gravity)	(Beach)
S40	Kaweto, Papua	(Texaco)
S41	Pincally, N.S.W.	(N.S.W. O.G.)
S42	Thomson River, Qld.	(Longreach)
S43	Contention Heights, W.A. (& Gravity)	(Aust. Aquitaine)
S44	Adele Scott, W.A. & N.T.	(B.O.C.)
S45	Redbank, N.S.W.	(N. Aust. Pet. Co.)
S46	Offshore Laura Basin, Qld.	(Endeavour)
S47	Munro Arch, W.A.	(Wapet)

SEISMIC SURVEYS (Cont.)

S48	Maprik, New Guinea (& Gravity)	(Aust. Aquitaine)
S49	Van Dieman Rise, W.A. & N.T.	(Aroc)
S50	Carraweena, S.A. (& Gravity)	(Pexa)
S51	Nambuccurra, N.S.W.	(N.S.W. O.G.)
S52	Princess Charlotte Bay, Qld.	(Flinders)
S53	South Chandos, Qld.	(Alliance)
S54	Lone Hill, N.T. (& Gravity)	(Aust. Aquitaine)
S55	Baron Range, W.A. (& Gravity)	(Aust. Aquitaine)
S56	Mossgiel, N.S.W.	(N.S.W. O.G.)
S57	Denison East, Qld.	(Planet)
S58	Alexander, W.A.	(Lennard)
S59	Harkaway, Qld.	(Alliance)
S60	Breeza Plains, Qld.	(Crusader)
S61	Koombana-Wedge Island, W.A.	(Wapet)
S62	Otway 069-B, Vic. (& Magnetic)	(Esso)
S63	Bass B69-B, Tas. (& Magnetic)	(Esso)
S64	Murta, S.A. (& Gravity)	(Pexa)
S65	Hay, N.S.W.	(N.S.W. O.G.)
S66	Lake Gregory, S.A. (& Gravity)	(Ashburton)
S67	Wagoo, Qld.	(Bridge)
S68	Windeyer, Qld.	(Beaver)
S69	Cape Patterson, Vic.	(Mid-Eastern)
S70	Kapuri-Orloli, Papua	(Marathon)
S71	Broken Bay, N.S.W.	(Longreach)
S72	Frome Downs, S.A. (& Gravity)	(Crusader)
S73	Patchawarra Central, S.A. (& Gravity)	(Bridge)
S74	Booranghoop, Qld.	(Alliance)
S75	Harvey D-1, W.A.	(Wapet)
S76	Jurgurra Terrace, W.A.	(Wapet)
S77	West Parry Shoal, N.T.	(Longreach)
S78	Lake Fowler, S.A. (Magnetic & Gravity)	(Beach)
S79	Packsaddle - Innamincka, S.A.	(Alliance)

GRAVITY SURVEYS

G1	Ngalia Basin, N.T.	(Magellan)
G2	Otway EV-68, S.A.	(Esso)
G3	Blantyre Basin, N.S.W.	(Planet)
G4	Kutubu-Orokana, Papua	(A.P.C.)
G5	Terang-Portland, Vic.	(Shell)

AEROMAGNETIC SURVEYS

A1	Makumbu, New Guinea	(Aust. Aquitaine)
A2	Young Rocks, S.A.	(Hematite)
A3	Townsville, Qld.	(Aust. Gulf)
A4	Offshore Bernier, W.A.	(Wapet)
A5	Wallal, W.A.	(Wapet)
A6	Van Diemen Gulf, N.T.	(Flinders)
A7	Offshore West Beagle, W.A.	(Wapet)
A8	Offshore Leeuwin, W.A.	(Wapet)

AUSTRALIA AND NEW GUINEA

PETROLEUM SEARCH SUBSIDY ACT 1959 – 1969

GEOPHYSICAL SURVEYS APPROVED OR PENDING 1 Nov. 1968 – 31 Oct. 1969

200 0 200 400 600

MILES

REFERENCE

- OA Aeromagnetic
- OG Gravity
- OS Seismic
- Non-prospective areas
- Main basin
- Subdivision of basin
- Basin under main basin
- Other basin and province
- Boundary indicated by geophysical data
- Areas excluded from future subsidy approvals

B.M.R. Petroleum Exploration Branch, Oct 1969

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