DEPARTMENT OF
~~NATIONAL RESOURCES~~
NATIONAL DEVELOPMENT

BUREAU OF MINERAL RESOURCES, GEOLOGY AND GEOPHYSICS

IN CONFIDENCE

RECORD 1978/36

AN APPRAISAL OF PETROLEUM EXPLORATION TITLE AREAS

SA 2, SA 8

OFFSHORE OTWAY BASIN (GAMBIER SUB-BASIN)

~~Restricted~~

by

W.J. McAvoy and P.R. Temple

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SUMMARY

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

Summaries are given of the regional geology and structural development of the Offshore Gambier Sub-basin, geophysical coverage, and results of offshore wells. Assessments have been made of the prospectivity of the title areas and recommendations are made for further exploration.

The title areas have been covered by reconnaissance and semi-detail seismic traverses. Five wells have been drilled; no significant hydrocarbon shows have been recorded.

The prospective section in the area is the basal Lower Cretaceous Pretty Hill Formation (where it is shallow enough) and the basal Upper Cretaceous Waarre Formation.

The area north of latitude 37^{o}S is considered to have poor prospectivity because of the thin sedimentary section. South of this latitude the title areas are considered to have only fair prospectivity.

INTRODUCTION

The following report and maps give a reconnaissance review of the title areas under consideration; only two weeks were allotted to the work.

All available data received in the Petroleum Exploration Branch under the Petroleum Search Subsidy Act and the Petroleum (Submerged Lands) Act were studied. No time was allowed for interpretative work and thus all the interpretations presented are those of contractors and the title holders.

As applications for subsidy as well as confidential company reports and files have been used in this assessment, this Record must be classified as confidential.

The title assessment of SA-8 was carried out at a later date than SA-2 and has not been incorporated into the main report; however, it is included as an appendix (Appendix 2).

REGIONAL SETTING

The petroleum exploration title areas under consideration, SA-2 and SA-8, are located along the eastern coastline of South Australia between Encounter Bay and the South Australia/Victoria boundary (figure 1). Only a minor portion of the seaward edge of SA-2 lies in water depths greater than 600 ft (200m).

SA-8 is a 3 mile (5 km) wide coastal strip bordering the western boundary of onshore title area PEL 8 and the eastern boundary of offshore title area SA-2. The entire title area lies in very shallow water.

GEOPHYSICS (SA-2)

Aeromagnetic: Reconnaissance aeromagnetic coverage of SA-2 was completed in 1961 in the Bass Strait - Encounter Bay Aeromagnetic Survey (62/1710, 62/1711) carried out for Haematite Explorations Pty Ltd, by Aero Service Limited. Total magnetic contours show a sharp transition from a zone of numerous high-amplitude high frequency anomalies to one of relatively broad anomalies. This E-W trend is

interpreted as the northern boundary of the Otway Basin. North of this line basement depths are generally less than 2000ft (600m) except in an embayment extending northwards towards the Coorong where 4,000ft (1200m) of sediments may be present. The transition line correlates well with a steep gravity gradient onshore and marine seismic data confirm the abrupt decrease in basement depth.

A broad magnetic anomaly offshore from Beachport is interpreted as a basement ridge and two smaller anomalies south west of Beachport are attributed to volcanics. A broad east west magnetic minimum extending onshore south of Mr. Gambier is believed to represent a trough containing more than 10,000 ft (3000m) of sediments.

Gravity: The only marine gravity coverage in SA-2 was broad reconnaissance recorded in the BMR Continental Margins survey in 1970-73. Onshore gravity coverage has greatly assisted in the understanding of basin configuration. The gravity contours reflect basement structure and can be usefully extrapolated offshore into SA-2. The principal structural elements in SA-2 would appear to be from north to south, the Padthaway Horst, the "Crayfish Shelf', the Beachport Basement High, and the southern regional synclinal area west of Mt. Gambier.

Seismic: Since 1961 seismic surveys have been carried out for Heamatite and Esso in SA-2. Record quality of the early work was poor because of the surface Gambier Limestone and complex faulting of Cretaceous formations. Useable shallow data only resulted and it was only after the introduction of digital recording and processing in 1968 that definition of the faulted older sediments was possible.

This work confirmed the structural features described above - an area of shallow basement overlain by less than 2,000ft (600 m) of Tertiary sediments, a shelf area with up to 8000ft of Tertiary and Lower Cretaceous sediments, and a zone of rapidly thickening Upper and Lower Cretaceous sediments up to 20,000 ft (600 m) thick.

Most recent seismic coverage in SA-2 consists of four unsubsidised seismic surveys. However, no information has to date been supplied to BMR concerning objectives or results of these projects.

REGIONAL GEOLOGY

The Otway Basin is a Jurassic (?) - Lower Cretaceous to Tertiary basin extending east - west across southwestern Victoria and South Australia, almost at right angles to the major trend in the underlying basement rocks, which are largely clastic metasediments deposited in the Tasman Geosyncline.

The Lower Cretaceous Otway Group unconformably overlies older Jurassic or Palaeozoic rocks of various ages. The Otway Group comprises non-marine greywackes, mudstones, and coals deposited in a northwest to southeast trending trough, parelleling the present day coastline. These deposits were probably derived from uplifted areas, Palaozoic and Mesozoic highlands, then present to the north and south of the developing trough. A clean quartzose basal sand, the Pretty Hill Formation is present at the norhtern and western margins of the basin. This is the age equivalent of Otway Group greywackes in some offshore areas.

Following the deposition of the Otway Group, block faulting divided the basin into several embayments, and together with faulting that took place during the Upper Cretaceous, the basin was divided into a number of WNW-trending horst and graben. In this way the Otway Basin was subdivided into a number of sub-basins or embayments separated by highs. These are from east to west; the Torquay Embayment, the Port Campbell Embayment, the Tyrendarra Embayment, and the Gambier Sub-basin.

Title area SA-2 is located in the latter of these subdivisions, the Gambier Sub-basin, which is defined as that part of the Otway Basin west of the Merino Uplift. Broadly speaking the western two-thirds of the area is in South Australia and the eastern third in Victoria.

Because of the lack of surface expression, the northern boundary of the basin is not well defined, but from seismic data it is placed at the northern subsurface limit of Lower Cretaceous sediments. This boundary also corresponds approximately to the boundary on the gravity contour map between a complex of gravity high and lows to the north (representing shallow basement) and the large gravity low or trough to the south. The offshore boundary is not well known but is probably the continental slope.

The Upper Cretaceous sequence in the Otway Basin represents a complete sequence, starting with a marine transgression and ending with prograding sandy units. The total sequence is known as the Sherbrook Group. This sequence consists of a basal sandstone (Waarre Formation), an overlying ferruginous sandstone (Flaxmans Beds) which in turn is overlain by mudstones of the Belfast sandstone. This mudstone grades upward into shallow water marine sandstones and siltstones of the Paaratte Formation overlain by non-marine sandstones and coal of the Curdies Formation. At the close of Upper Cretaceous time, the area was subject to some uplift and accompanying erosion.

The regressive cycle continued into the Tertiary resulting in lagoonal to shallow neritic mudstones, sandstones, and conglomerates of the Wangerrip Group and Mepunga Formation during Palaeocene to Eocene times. During Upper Eocene to Pliocene an overall transgression of the sea covered the sandy regressive phase with a thick marl sequence which culiminated with Miocene shelfal limestone deposits. During Pliocene time much of southeastern Australia was uplifted and the sea transgressed to its present coastline. The uplift was associated with extensive vulcanism and lava flows now cover large areas of the onshore regions of the Otway Basin.

Results from offshore wells drilled in SA-2

Five wells, Crayfish A-1, Argonant A-1, Chama-1A, Neptune-1 and Trumpet-1, have been drilled in SA-2 at the time of writing (Oct 1974).

Crayfish A-1, was drilled to test the hydrocarbon potential of Lower Cretaceous sands on the crest of a northeast - southwest anticlinal closure as mapped on a "pre - Lower Cretaceous" unconformity. Results of drilling proved the unconformity to be within the Lower Cretaceous and the 'original picutre' of a closed anticline at the unconformity appears to have been destroyed. Crayfish A-1 drilled Tertiary to 1200 ft (366m). Upper Cretaceous to 5,240 ft (1597m) and Lower Cretaceous to T.D. 10,497 ft (3199m). Although no significant shows of hydrocarbons were recorded the section proved encouraging for hydrocarbon accumulations. The Cretaceous proved to be unexpectedly thick (8932 ft 2722m). to T.D.

Argonaut A-1, located to evaluate the hydrocarbon potential of the Argonaut fault closure structure in the southern part of SA-2, drilled Tertiary to 2385 ft. (727m) and Upper Cretaceous to T.D. 12,163ft (3707m). The well terminated in the basal Upper Cretaceous Waarre Formation and did not penetrate the Lower Cretaceous Otway Group. No shows of hydrocarbons were encountered and the well was plugged and abandoned.

Chama-1A was drilled to evaluate the Pretty Hill Formation on a closure (without any evidence of truncation) along the northern margin of the offshore Gambier Sub-basin. At Crayfish A-1, 10 miles NNE of Chama-1A, a thickness of over 5000 ft (1524m) of interbedded sandstones and siltstones was penetrated without reaching the base of the unit. A seismic event at the top of this sequence at Crayfish A-1 at about 5250 ft (1611m) and was traced to the Chama prospect where its predicted depth was 7650 ft (2347m). The Pretty Hill Formation at Crayfish A-1 was found to have excellent reservoir characteristics with interbedded shales as potential seals.

Drilling of the Chama-1A well indicates that the reflection is related to an interbedded coal sequence with only minor sandstones. Sandstones both in the Otway Group and the section interpreted to be Pretty Hill equivalent are all poorly developed with log derived porosities in the range of 15-25% and generally tight due to clay content. No hydrocarbon shows at all were present and the well was plugged and abondoned at TD 9015ft (2748m).

Trumpet-1 well was drilled to test a faulted anticline along the fault bounding the northern margin of the Gambie Sub-basin. The well penetrated a Tertiary section to 1500ft (457m). Lower Cretaceous Otway Group to 4276 ft (1303m) and the Pretty Hill Formation to T.D. 7402 ft (2256m). No shows of hydrocarbons were recorded and the well was plugged and abandoned.

Neptune-1 was drilled to test a fault closure on a large regional high 8 miles east of and updip of Grayfish A-1. The well penetrated Tertiary to 1220 ft (372m), Upper Cretaceous to 1608 ft (490m). Lower Cretaceous Otway Group to 4665 to (1422m) and Pretty Hill Formation to TD 7992 ft (2436m). No shows of hydrocarbons were recorded and the well was plugged and abandoned.

STRUCTURAL DEVELOPMENT

Regional geophysical surveys and the results of wells drilled in the offshore area have enabled a number of major structural features to be defined. The basic features from north to south are the Padthaway Ridge, the Robe-Penola Trough (only the Robe Trough extends offshore), the Beachport High, and the regional synclinal structure to the south.

The Padthaway Ridge has remained a positive structure throughout the history of the Gambier Sub-basin and the hingeline along the south flank of the ridge controlled sedimentation during the ? Upper Jurassic and Lower Cretaceous. Some overlap of Lower Cretaceous sediments took place along the southern flank, but it was not until the Middle Tertiary that any large area of the Padthaway Ridge received accummulations of sediments.

?Upper Jurassic downfaulting and downwarping along the southern flank of the Padthaway Ridge resulted in an elongate trough or basin, of which the Penola-Robe Trough represents an eroded remnant. The orientation and nature of the southern flank of this sedimentary area is not known, because post-sedimentary uplift of the Kalangadoo-Beachport High has truncated the Otway Group - lower unit sediments which were deposited in this period.

The area from the Kalangadoo-Beachport High to the Padthaway Ridge comprises one structural unit of the Gambier Sub-basin which received sediments of the Upper Jurassic to lowermost Cretaceous lower unit of the Otway Group. Offshore, the Robe Trough represents an overdeepened area within this structural unit which received a greater thickness of sediments. Offshore, the Beachport High forms the southern flank of the Robe Trough. It was an area of sedimentation during the Upper to Lower Cretaceous and represents an original downwarp area of the Gambier Sub-basin. However uplift at or towards the end of Otway Group lower unit deposition created a new structural unit in the form of a "high", from which the lower unit of the Otway Group was eroded. At the end of Otway Group sedimentation the Beachport High had become consolidated with the Robe Trough to form a shelf area over which sediments were laid down. This area stabilised during the upper unit of the Otway Group.

The area of deposition south of the Beachport High in the offshore area is poorly defined and post depositional faulting and uplift has obscured the original relationships. A hinge line developed south of the Beachport High and is responsible for the regional syncline in the southern part of SA-2. Whether this hingeline represents partly Lower Cretaceous or entirely post-Lower Cretaceous movement is not known.

Downwarping of the southern area relative to the Robe Trough continued into the Upper Cretaceous and a thicker section is evident in this area. (Argonaut A-1 penetrated 9433 ft (2875m) + of Upper Cretaceous sediments compared to 683 ft (208m) at Chama-1A and 365ft (111m) at Crayfish A-1).

Towards the end of the Upper Cretaceous period, uplift, possibly with some contemporaneous faulting in the offshore area produced a broad synclinal structure with its axis almost parallel to the edge of the continental shelf. This uplift probably took place during formation of the present continental margin, as the truncated southern limb of the syncline forms the platform or shelf on which the Tertiary sediments have been deposited. In addition, no major post-Mesozoic structural features are yet defined. The Tertiary sediments appear to be built out across a gently sloping surface in which minor depressions represent compaction of the older sediments, perhaps with some latent warping and small scale faults along the old hingelines.

APPENDIX 1

GEOPHYSICAL SURVEYS SA-2

Survey		Dates	Company	Contractor	Tenements
Seismic					
Flinders Is.-Kingston	62/1645	11/62 - /5/63	Hematite	Western	SA1-SA11
Cape Grim to Cape Jaffa	64/4561	14/12/64-7/4/65	Hematite	Western	OFL 26,E.L.1/60T PEP's 40 & 48 Vic
Otway ER-68 S & M	68/3036	10/10/68-23/11/68	Esso	Western	SA-P2, P3, TP3
Otway 069B S & M	69/3061	26/ 9/69- 1/10/69	Esso	Western	PEP's 40,49,22V
Otway EP 67 S & M	67/11188	23/ 9/69- 9/1/69	Esso	G.S.I.	OEL 26 EL 1/60 PEP 40,49 Vic
Port MacDonnell	72/1089	10/ 5/72-14/ 5/72	A.O.D.	Geo - surveys	SA8P
Aeromagnetic					
Encounter Bay A-M	62/1710	1/12/61-21/12/61	Hematite	Aero Service	SA-2
Young Rocks	68/3055	7/12/68-17/12/68	Hematite	C.Co.	Co.SA-P1, OEL 38
PSLA					
073A	73/3	26/ 4/73-10/ 5/73	Esso	G.S.I.	SA-2
072B	72/11	6/ 9/72-11/ 9/72	Esso	G.S.I.	SA-2
070A	70/4	12/12/70- 5/ 2/71	Esso	G.S.I.	SA2
072A	72/10	26/11/71-20/ 1/72	Esso	G.S.I.	SA2

Seismic Source	Cable	Recorder	Coverage	Mileage	Refr. Grav.	Mag.	Quality	Remarks
Expl			100%	460.8(737km)			P	Shallow data only.
Expl	2400m	Western FA-40	300%	450.4 (721km)			P	Comprehensive coverage of Offshore Otway B.
Aqua-pulse	2400m	SDS-1010	1200%	101.60 (163km)			P-F	Shallow basement in Encounter Bay vicinity.
Aqua-pulse	5290 ft.	SDS-1010	1200%	487.2 (780km)			F	One structure matured. Complex faulting
Exp	2400m	DFS 10000	600%	240 (384km)			F	Matured Nautilus A-1 site
Exp	½ m	Geo-space 111	400%	44 (70 km)			P	Data Poor
				5992 (9587km)				
				875 (1400km)				
Air-gun	2400m	DFS-111	4800%	94(150km)			F-G	No interpretation report.
Air-gun	3200m	DFS-111	4800%	64 (102km)			F-G	No interpretation report.
Air-gun	2400	DFS-111	2400%	22 (35km)			F-G	No interpretation report.
Air-gun	2400m	DFS-111	2400%	309 (494km)			F-G	No interpretation report.

APPENDIX 2

SA-8 Geophysical Survey

Survey	Number	Completion Date	Company	Contractor	Map Code
Bass Strait-Encounter Bay Aeromagnetic	62/1710-11	Dec 1961	Hematite	Aero Service	
Flinders Island-Kingston M/S	62/1645	May 1963	Hematite	Western	
Cape Grimto Cape Jaffa M/S	64/4561	April 1965	Hematite	Western	
Otway EU M/S	68/3052	Nov 1968	Esso	Western	
Geltwood Beach M/S	69/3019	April 1969	Beach	Geoseismic	
Port MacDonnell M/S	72/1089	May 1972	Alliance O.D.	Geosurveys	
073 A M/S	PSLA 73/3	May 1973	Esso	GSI	
Offshore Otway Basin M/S (EO)	66/11121	May 1967	Esso	GSI)	Some lines extend into SA-8
EP 67 M/S & M	67/11188	Jan 1968	Esso	GSI)	

APPENDIX 3

Title Assessment SA - 2

Title holder:	Hematite Petroleum Pty Ltd
No. of blocks:	363 blocks
Expiry Date	23.1.75
Farmout negotiations:	Nil
Previous six year conditions:	not known

Regional setting: SA - 2 is located along the eastern coastline of South Australia between Encounter Bay and the South Australia/Victorian boundary. Only a minor portion of the seaward edge of the title lies in water depths in excess of 600ft (200 m).

Wells drilled: (refer to basin notes). Five wells, Crayfish A-1, Argonaut A-1, Chama-1A, Trumpet-1 and Neptune-1 have been drilled within SA-2. All these wells except Argonaut A-1 were drilled in the "Crayfish shelf" area between Cape Jaffa and Cape Martin. Argonaut A-1 was drilled in the southern part of the title area offshore from Cape Banks.

No significant show of hydrocarbons were recorded in any of these wells.

Geophysical coverage: Refer to seismic line density maps, the table of geophysical surveys (Appendix 1), and basin notes.

Prospectivity: The area may be conveniently divided into three features: Padthaway Ridge, "Crayfish Shelf", and the southern regional synclinal area.

Padthaway Ridge: The prospective section is restricted to Tertiary sediments indicated by aeromagnetic and sparse seismic coverage to be generally less than 2000 ft (600m) thick. There is some aeromagnetic evidence for the existence of a north trending trough with up to 4000 ft (1200m) of sediments. To date although exhibiting good reservoir characteristics the Tertiary sediments have always been found to be water flushed in the Otway Basin and are thus regarded as unprospective.

Recommendations: Prospects of the area would be dependent on confirmation of the trough by reconnaissance seismic coverage. However from regional geological considerations it seems likely that only Tertiary sediments are likely to be present north of the boundary as shown.

"Crayfish Shelf": This is an informal name given in this report for the area between the Padthaway Ridge and the hinge to the south. It includes the Robe Trough and the Beachport High.

The prospective section is restricted to sands within the Lower Cretaceous Otway Group and especially the Pretty Hill Formation, where present. The prospective Waarre Formation at the base of the Upper Cretaceous has not been encountered to date on this shelf area. It is because the Upper Cretaceous Sherbrook Group is so thin on the shelf that the Otway Group is at economic drilling depths in this area. Over the Beachport High the lower Otway Group has been removed by erosion and prospects on the high are rated as poor. Recent drilling on the flank of the Beachport High onshore (Beachport East No. 1) failed to encounter sands with good reservoir characteristics. Part of the shelf lies in water depth in excess of 200 metres.

Recommendations: First priority should be given to the evaluation of the results of recent seismic surveys in SA-2. (Interpretation reports have not yet been supplied). A known deep water prospect straddling the outer margin of the title area (Morum Prospect) seems to have been detailed sufficiently to recommend a well location. The top of the prospective Lower Cretaceous section is anticipated at 8500 - 9000 ft (2590 - 2745m).

Southern Regional Synclinal area: Only one offshore well, Argonaut A-1, has been drilled south of the 'hinge' in SA-2. The penetrated section indicates a greatly increased thickness of Upper Cretaceous sediments and that the prospective Otway Group increases in depth to the south. Neither Argonaut A-1 (TD 12163 ft) (3707m) nor Voluta -1 (TD 13,037 ft (3974m) penetrated into the Otway Group. A secondary objective in this area is the basal Upper Cretaceous sandstone Waarre Formation (11630 ft (3545m) at Argonaut A-1). The area is complicated especially at the deeper horizons by complex northwest trending fault systems.

The better prospects in this area would seem to be confined to the region between the hinge and Argonaut A-1 where both the Waarre Formation and Otway Group can be expected to be within reach of the drill.

Recommendations: Evaluation of the results of P(SL)A surveys may indicate structural leads worthy of further investigation.

APPENDIX 4

Title Assessment - SA-8

Title Holder:	General Exploration Co. of Australia Pty Ltd
No. of blocks:	51 blocks
Expiry date	23.1.75
Previous six year conditions $A	
First	50,000
Second	10,000
Third to Sixth	Expenditure to be incurred to be dependent on information gained from work in first two years, and works and expenditure proposals for each following year to be submitted annually at the commencement of each year.

Schedule - 1 Programme of work - first two years

1. During the first year of the permit, a marine seismic survey to be carried out over approximately 47 line miles (75m) plus office evaluation of the data obtained therefrom. This work to be followed by a marine seismic survey over approximately 8 to 10 miles (13 to 16km) to link as closely as possible with surveys made previously in the southern and northern portions of the area.

2. During the second year of the permit, providing that the previous surveys show evidence of possible worthwhile petroleum targets, a further programme of approximately 20 line miles (32km) of marine seismic survey is to be undertaken.

Geophysical coverage: For geophysical coverage refer to seismic line density maps, basins notes and data sheets of geophysical surveys (Appendix 2).

Wells drilled: No wells have been drilled within SA-8.

Regional setting: SA-8 is a 3 mile (5km) wide coastal strip bordering the western boundary of PEL 8 in South Australia. The entire title area lies in very shallow water.

Prospectivity: The area may be conveniently divided into three areas, the Padthaway Ridge, 'Crayfish Fhelf" and the southern regional synclinal area.

Padthaway Ridge: The Padthaway Ridge has remained a positive area throughout the geological history of the Gambier Sub basin and it was not until the middle Tertiary that any large area of the Padthaway Ridge received accumulations of sediments. Sediments are confined to shallow water shelf limestones which are not considered prospective.

Recommendations: No work is considered necessary in this area.

"Crayfish Shelf": This area is defined in this report as the area between the Padthaway Ridge and a "hinge" line to the south. This area received Upper Jurassic (?) to basal Cretaceous sediments but remained a shelf region during Upper Cretaceous and Tertiary times.

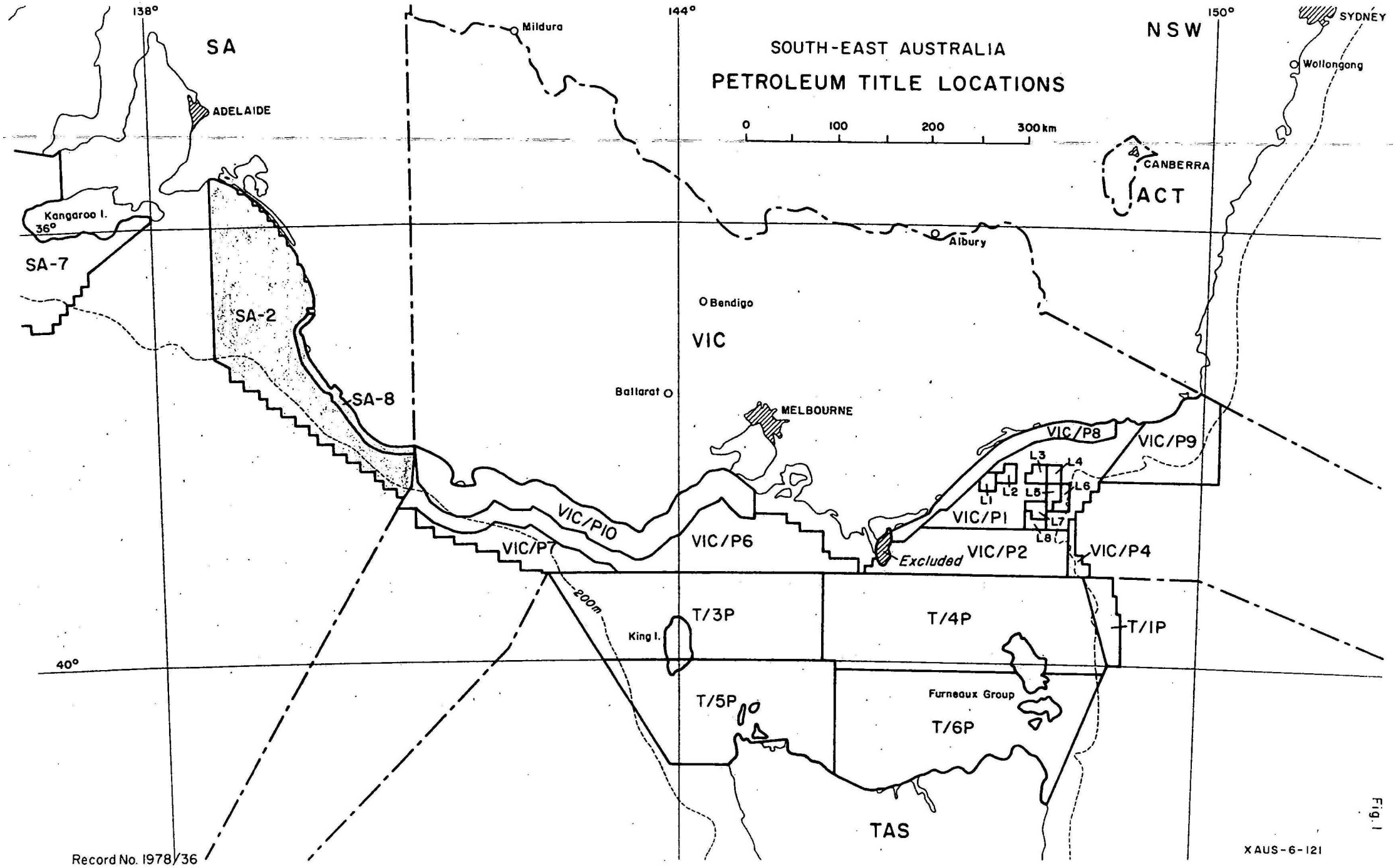
On the "Crayfish Shelf" the prospective section is considered to be sands within the Lower Cretaceous Otway Group and especially the Pretty Hill Formation, where present. The prospective Waarre Formation at the base of the Upper Cretaceous has not been reported on this shelf area to date. In fact it is because the Upper Cretaceous Sherbrook Group is so thin on the Shelf that the Otway Group is at economic drilling depths in this area. Over the Beachport High the lower Otway Group is not present, either by non-deposition or erosion, and prospects over the high are rated as poor. Recent drilling on the flank of the Beachport High onshore (Beachport East No. 1) failed to encounter sands with good reservoir characteristics.

Recommendations: From the results of onshore and offshore drilling the area cannot be rated very highly. No structural leads have been indicated but stratigraphic traps on the flanks of the Beachport High, where the Pretty Hills Formation may be present,

are considered to be the best prospects in this area. Further detailed seismic work is required to locate an optimum drill location.

Southern Regional Synclinal Area: Drilling of one offshore well and numerous onshore wells south of the hinge indicate that the basal Otway Group (Pretty Hill Formation) is probably at uneconomic depth except perhaps in the area just south of the hinge. For this reason the major objective in this area is the basal Upper Cretaceous Waarre Formation.

Recommendations: Only limited, poor quality seismic data have been obtained in the area. One possible lead was indicated in the Port MacDonell area. The area should be covered with semi-detailed high-effort seismic work and detailed coverage over the possible lead.


SOUTH-EAST AUSTRALIA
PETROLEUM TITLE LOCATIONS
0 100 200 300 km
138°
144°
150°
SA
NSW
VIC
TAS
ACT
Mildura
ADELAIDE
SYDNEY
Wollongong
CANBERRA
Albury
Bendigo
Ballarat
MELBOURNE
Kangaroo I.
36°
40°
SA-7
SA-2
SA-8
VIC/P10
VIC/P7
VIC/P6
VIC/P8
VIC/P9
VIC/P1
VIC/P2
VIC/P4
Excluded
L1
L2
L3
L4
L5
L6
L7
L8
200m
T/3P
T/4P
T/1P
T/5P
T/6P
King I.
Furneaux Group
Record No. 1978/36
XAUS-6-121
Fig. 1

OTWAY BASIN

STRATIGRAPHIC CHART

Fig. 2

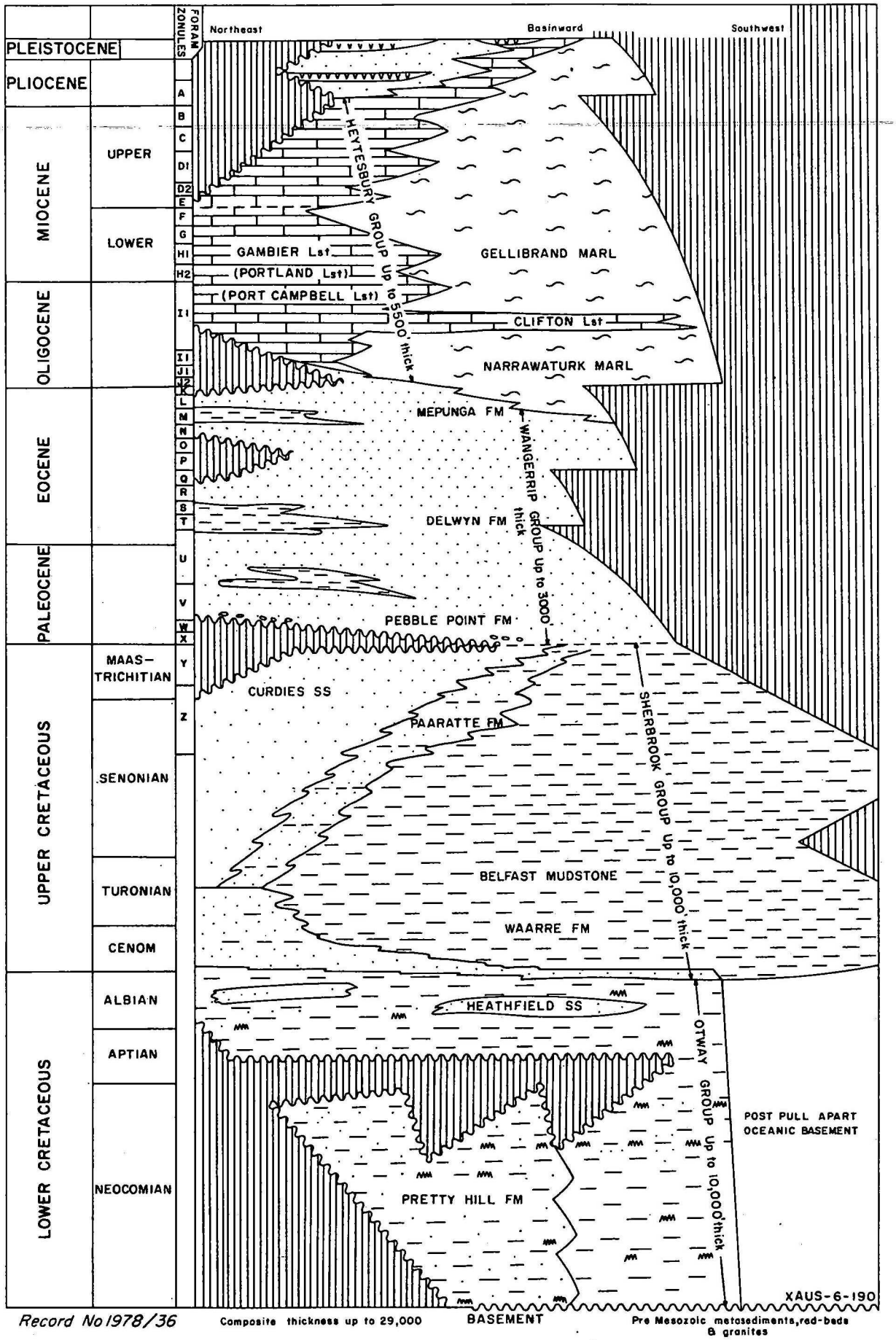


TABLE 1

OFFSHORE WELLS - GAMBIER SUB-BASIN - GENERAL DATA

Well		Title Area	Rig	Rig Release	KB / WD	T.D. (K.B.)	Deepest Horizon	Subsea Top Waarre
Crayfish A - 1	67/4266	SA 2	Ocean Digger	24.12.67	28m 49m (3199m) +93'/162'	10,497'	Otway Pretty Hill	?
Argonaut A - 1	68/2018	SA 2	Ocean Digger	4. 7.68	28m 77m (3707m) +93'/253'	12,163'	Waarre	(3512m) 11523'
Chama - 1A	P(SL)A	SA 2	Ocean Digger	2. 3.70	28m 83m (2748m) +93'/273'	9,015'	Otway	N.P.
Trumpet - 1	(73/1013) P(SL)A	SA 2	Glomar Conception	26.12.73	10m 49m (2256m) +32'/162'	7,402'	Pretty Hill	N.P.
Neptune - 1	(74/100) P(SL)A	SA 2	Glomar Conception	12. 1.74	10m 35m (2436m) +32'/116'	7,992'	Pretty Hill	?
Voluta - 1	67/4263	VIC/P10	Sedco 135E	21.12.67	34m 92m (3974m) +112'/301'	13,037'	Belfast Mdst.	N.R.

Subsea Top Otway	Thickness Upper Cret.	Trap	$MM Cost	Status	Remarks
(449m)	(111m)				
1472'	365'	Faulted Anticline	2.17.	Ø	Good reservoir sands. No shows
	(2875+m)				
NR	9433'+	Fault block	1.13.	Ø	Otway Gp. not reached. No shows
(769m)	(208m)				
2523'	683'	Faulted Anticline	?	Ø	Pretty Hill Fm. equiv. penetrated. No shows
(447m)					
1468'(?)	N.P.	Faulted Anticline	?	Ø	Upper Cret. absent. No shows
(480m)	(118m)				
1576'	388'	Faulted Anticline	?	Ø	No shows
	(2637+m)				
N.R.	8652'+	Anticline	2.27.	Ø	Waarre Fm and Otway Group not reached. No shows.

Offshore and onshore wells - Gambier Sub-basin Stratigraphy

ONSHORE

Table 2

			(28m) RT + 93'	(28m) KB + 93'	(29m) KB + 93'	(10m) KB + 32'	(10m) KB + 32'	(34m) DF + 112'			
			Crayfish A-1	Argonaut A-1	Chama-1 A	Trumpet-1	Neptune-1	Voluta-1	Mt Salt-1	Goltwood Beach-1	Beachport-1
Plio											
Miocene	UPPER	Gambier Ls	255'(78m)	880'(268m)	366'(116m)		540'(165m)	966'(294m)	Surface	60'(18m)	280'(85m)
		Clifton Ls									
	LOWER	HEYTESBURY GROUP									
		Narrawaturh Marl									
Oligo											
Eocene		Mepunga Fm.	1096'(334m)	1162'(354m)	1209'(369m)	1090'(?)(332m)		2754(839m)	590(180m)	920'(280m)	840'(256m)
		WANGERRIP GROUP									
Paleo		Dilwyn Fm									
						Absent					
Upper Cretaceous	MAAS.	Pebble Point Fm.		2330'(710m)				4275'(1303m)	3131' (954m)	1920'(585m)	
			1200'(366m)				1220'(372m)				
	SENONIAN	Curdies		2385'(727m)	1404'(428m)			4385'(1337m)	N.P.		
		Paaralte			2087'(636m)			5080'(1548m	3260'(994m)		
						Absent					1820'(555m)
		SHERBROOK GROUP									Paaralte or
	TURONIAN	Belfast		10050'(3063m)				7100'(2164m)	5900'(1798m)		Waave ?
		Flaxmans							9200'(2804m)		
	CENO	Waarre		11630'(3545m)					9900'(3018m)	3680'(1122m)	1910'?(582m)
	ALB.		1565'(477m)		2630'(802m)	1500'(?)(457m)	1608'(490m)			7120'(2170m)	
Lower Cretaceous	APT								N.P.		N.P.
	MAAS TRICHTIAN									Merino	
		OTWAY GROUP								Group ?	
		Pretty Hill Fm.	5240'(1597m)			4276'(1303m)	4665'(1422m)				
										N.P.	
											(1219m) 4000'
Pre-Mesozoic - basement			(3199m)	(3707m)	(2748m)	(2256m)	(2436m)	(3974m)	(3061m)	(3749m)	(1280m)
		T.D.	10497'	12163'	9015'	7402'	7992'	13037'	10044'	12300'	4200'

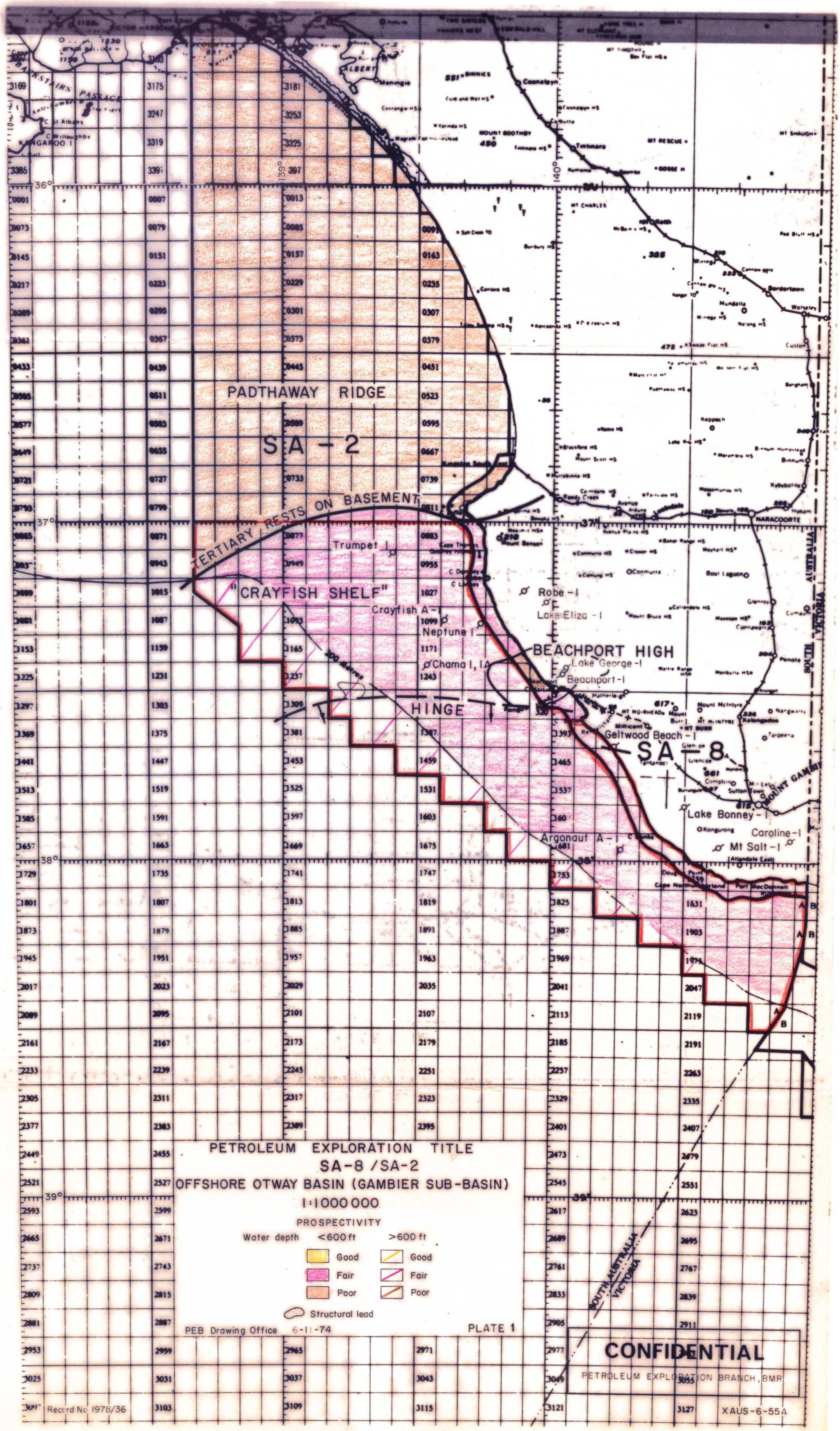

PADTHAWAY RIDGE
SA - 2
TERTIARY RESTS ON BASEMENT
"CRAYFISH SHELF"
Trumpet I
Crayfish A-I
Neptune I
Chama I, IA
Robe - I
Lake Eliza - I
BEACHPORT HIGH
Lake George - I
Beachport - I
HINGE
200 Metres
Geltwood Beach - I
SA - 8
Lake Bonney - I
Caroline - I
Mt Salt - I
Argonaut A - I
KANGAROO I
BACKSTAIRS PASSAGE
ALBERT
Meningie
Coonalpyn
Tintinara
MOUNT BOOTHBY
MT RESCUE
MT CHARLES
Keith
Bordertown
Wolseley
Mundalla
Keppoch
Binnum
Kybybolite
Reedy Creek
Avenue
NARACOORTE
Mount Benson
Conmurra
Bool Lagoon
Glenroy
Penola
Millicent
Mount McIntyre
Kalangadoo
Tarpeena
Compton
Glencoe
MOUNT GAMBIER
Port MacDonnell
Cape Northumberland
SOUTH AUSTRALIA
VICTORIA
36°
37°
38°
39°
139°
140°
PETROLEUM EXPLORATION TITLE
SA-8 /SA-2
OFFSHORE OTWAY BASIN (GAMBIER SUB-BASIN)
1:1000 000
PROSPECTIVITY
Water depth <600 ft >600 ft
Good Good
Fair Fair
Poor Poor
Structural lead
PEB Drawing Office 6-11-74
PLATE 1
CONFIDENTIAL
PETROLEUM EXPLORATION BRANCH, BMR
Record No 1978/36
XAUS-6-55A

PLATE 2

SEISMIC LINES

OFFSHORE OTWAY BASIN, (GAMBIER SUB-BASIN)

1 : 1,000,000

———	1962
- - - - - - - - -	1964
— — — —	1967
.....	1968
———	1969

SA - 2

SA - 8

AUSTRALIA

SOUTH AUSTRALIA

VICTORIA

MOUNT GAMBIER

CONFIDENTIAL

PETROLEUM EXPLORATION BRANCH, BMR

Record No. 1978/36

XAUS-6-57A

PLATE 3

SEISMIC LINES

OFFSHORE OTWAY BASIN, (GAMBIER SUB-BASIN)

1 : 1,000,000

1970
1972
1972
1973
BMR

SA - 2

SA - 8

Trumpet - 1
Crayfish A - 1
Neptune 1
Chama 1, 1A
Robe - 1
Beachport - 1
Geltwood Beach - 1
Lake Bonney - 1
Argonaut A - 1
Mt Salt - 1

200 Metres

SOUTH AUSTRALIA
VICTORIA
AUSTRALIA

CONFIDENTIAL

PETROLEUM EXPLORATION BRANCH, BMR

Record No. 1978/36

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