

T/8P part-VI*

FINAL EXPLORATION REPORT

FOR PERMIT T/8P and EL 18/65

by

J.S. Bain
V.A. Robinson

October, 1972.

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INTRODUCTION

Exploration Licence 18/65 was granted to Esso Exploration Inc. on September 16, 1965.

Under the Petroleum (Submerged Lands) Acts Commonwealth 1967-68 and Tasmania 1967, EL 18/65 was transitioned to T/8P (offshore) and EL 18/65 (enclosed waters) on September 6, 1968, and the title to these permits was granted to Esso Exploration and Production Australia, Inc.

Permit T/8P on transition consisted of 400 graticular blocks and covered an area of 9017 square miles while EL 18/65 (internal waters) covered approximately 230 sq. miles.

Application for Consent to Surrender the southern portion of T/8P consisting of 195 graticular blocks totalling 4417 square miles was submitted to the Tasmanian Designated Authority on September 3, 1971 and approval for the surrender of these blocks was granted by the Tasmanian Designated Authority on November 25, 1971.

Final application for Consent to Surrender the remaining 205 graticular blocks of T/8P was lodged with the Designated Authority on April 26, 1972 and the formal consent of the D.A. was signed on September 5, 1972.

Application for Consent to Surrender EL 18/65 (internal waters) totalling approximately 230 square miles was submitted to the Tasmanian D.A. on September 1, 1972, and approved on September 6, 1972. This final report is to meet the requirements of the Petroleum (Submerged Lands Act 1967) for both T/8P and EL 18/65 which are outlined on the enclosed locality map (Plate I).

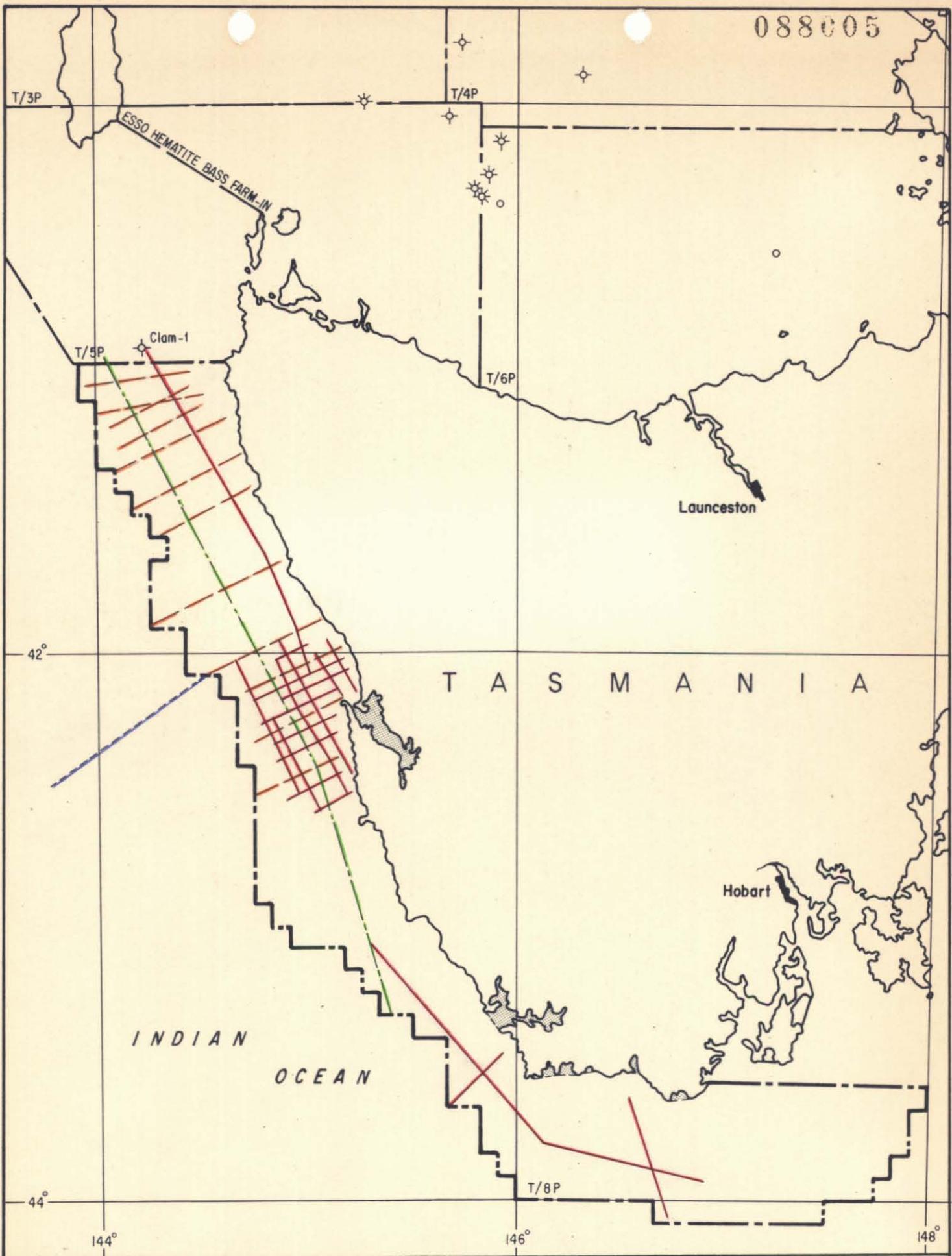
EXPLORATION HISTORYGeological and Geophysical Surveys

Geological reconnaissance of the adjacent onshore area was carried out in 1965 with particular attention given to the Tertiary rocks. In 1966 airphoto interpretation of coastal Tasmania was carried out by Geophoto Resources Consultants for general reconnaissance of structural trends. An airborne magnetometer survey was carried out over the permit area in 1967 by Geophysical Associates Pty Ltd. Results of these surveys have previously been forwarded to the Mines Department. The results of the magnetometer survey outlined a number of areas which were interpreted to have more than 3000 feet of total sediment, and the later seismic surveys were designed to investigate these areas of thicker sediments.

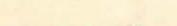
The first reflection seismic and magnetic survey (EE-68) was commenced on September 2, 1968 and completed on December 2, 1968 after numerous interruptions due to bad weather. This survey consisted of a single reconnaissance line (EE-1) which was 180.5 miles long oriented parallel to the west coast line of Tasmania (Fig. 1). The seismic data were recorded on digital magnetic tape by Western Geophysical Company using an Aquapulse energy source. These data were processed by Geophysical Service International in Sydney, Australia, and displayed as a twelve fold stack, variable density seismic section. This survey was subsidized by the Commonwealth Government, and the results have been submitted in a subsidy report dated April, 1969.

The second seismic and survey (T69A) was commenced on January 24, 1969 and completed on February 4, 1969. A total of 274.6 miles of seismic data were recorded by Western Geophysical Company using an Aquapulse energy source and digital magnetic tape equipment. Processing was done in Sydney by G.S.I. and displayed using a twelve fold stack, variable density presentation. This survey was subsidized by the Commonwealth Government, and a report was submitted in June, 1969.

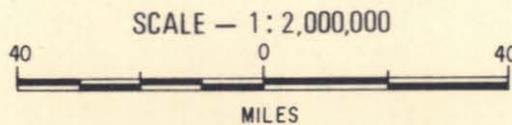
A third seismic and magnetic survey (T70A) was commenced on January 28, 1970 and completed on February 10, 1970. The survey was conducted by Western Geophysical Company utilizing the Aquapulse seismic energy source and digital magnetic tape recording instruments. A total of 557.35 line miles were recorded primarily



LEGEND

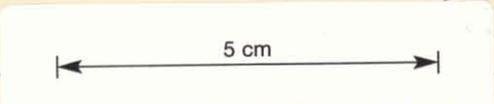
-  E.L. 18/65 Internal Waters (Relinquished)
-  Relinquished Permit Boundary
-  Seismic Survey (EE-68)
-  Seismic Survey (T-69A)
-  Seismic Survey (T-70A)
-  Seismic Survey (T-70C)

ESSO EXPLORATION & PRODUCTION AUSTRALIA INC.
WEST TASMANIA BASIN
TASMANIA
SEISMIC COVERAGE



AUTHOR : V.A. ROBINSON DRAFTED BY: K. ANDRAWIS
 TO ACCOMP. : FINAL REPT. T/8P DATE : NOV., 1972

FIG. 1



in the offshore area adjacent to Macquarie Harbour. Reconnaissance lines were also completed in the offshore area between Port Davey and South Cape. The seismic data were processed in Sydney by Geophysical Service International and the basic twelve fold stack seismic sections are displayed using a variable density presentation. Two copies of each seismic section and two copies of the shot point location map were submitted on August 27, 1970.

The fourth and last seismic survey (T70C) was commenced on January 2, 1971 and completed on January 3, 1971 consisting of a single reconnaissance line. This survey was conducted by Geophysical Service International using a pneumatic acoustic energy source (airguns) and digital magnetic tape recording instruments. The line was 46.70 miles long and located in deep water adjacent to the permit boundary and to the west of Macquarie Harbour. Processing was also done by G.S.I. in Sydney, and the basic time section (twenty four fold stack) using a variable density presentation was submitted on June 30, 1971.

A fathometer was used to record continuous water depths on each line, and water depth values are plotted below each posted shot point number on the seismic sections. A contour map of the bathymetry has been made using all available data from the various seismic surveys which is included with this report (Plate II).

The magnetic profiles are plotted on the bottom portion of the seismic sections on the lines where the magnetometer was operating.

Drilling

No wells have been drilled within this permit; however, the Esso Clam-1 test, located five miles north of the T8/P boundary, was completed as a dry hole on August 3, 1969 after reaching a total depth of 5323 feet in Paleozoic metamorphics.

REGIONAL GEOLOGY

Little is known about the geology of the offshore part of the West Tasmanian Basin because of the sparsity of outcrops of uppermost Tertiary sediments onshore and the lack of well control offshore.

The stratigraphic chart (Figure 2) for the West Tasmanian Basin is based on data from the Clam-1 well located north of the permit area, and general regional considerations from both the Otway Basin to the west, and the onshore Tasmanian geology.

Basement in the area is interpreted to be Devonian granites or the older rocks which are present along the west coast of Tasmania, or pre-Mesozoic metamorphics. The structural configuration of the basement surface based on seismic control is shown on Plate III. Overlying the Pre-Cambrian phylite basement in the Clam-1 well is a section of 'red beds' consisting of non-porous conglomerates and massive red siltstones which are most likely Upper Devonian - Lower Carboniferous in age.

Permo-Triassic sediments consisting of tillites, sandstones, shales, coals and limestones are present in onshore Tasmania. The lower Permian sediments are recognised as being glacial in origin, and are deposited in a marine environment. There is evidence of predominately shallow marine deposition in the Upper Permian. The Triassic, on the other hand, is usually deposited in a non-marine environment. Both disconformable and conformable relationships have been seen between the Permian and the Triassic systems. Porosity and permeabilities of both the Permian and Triassic sediments are generally poor; probably a result of depth of burial and compaction.

During Jurassic time vast sheets of dolerite intruded the earlier sediments, generally in the form of sills.

WEST TASMANIA BASIN

TASMANIA

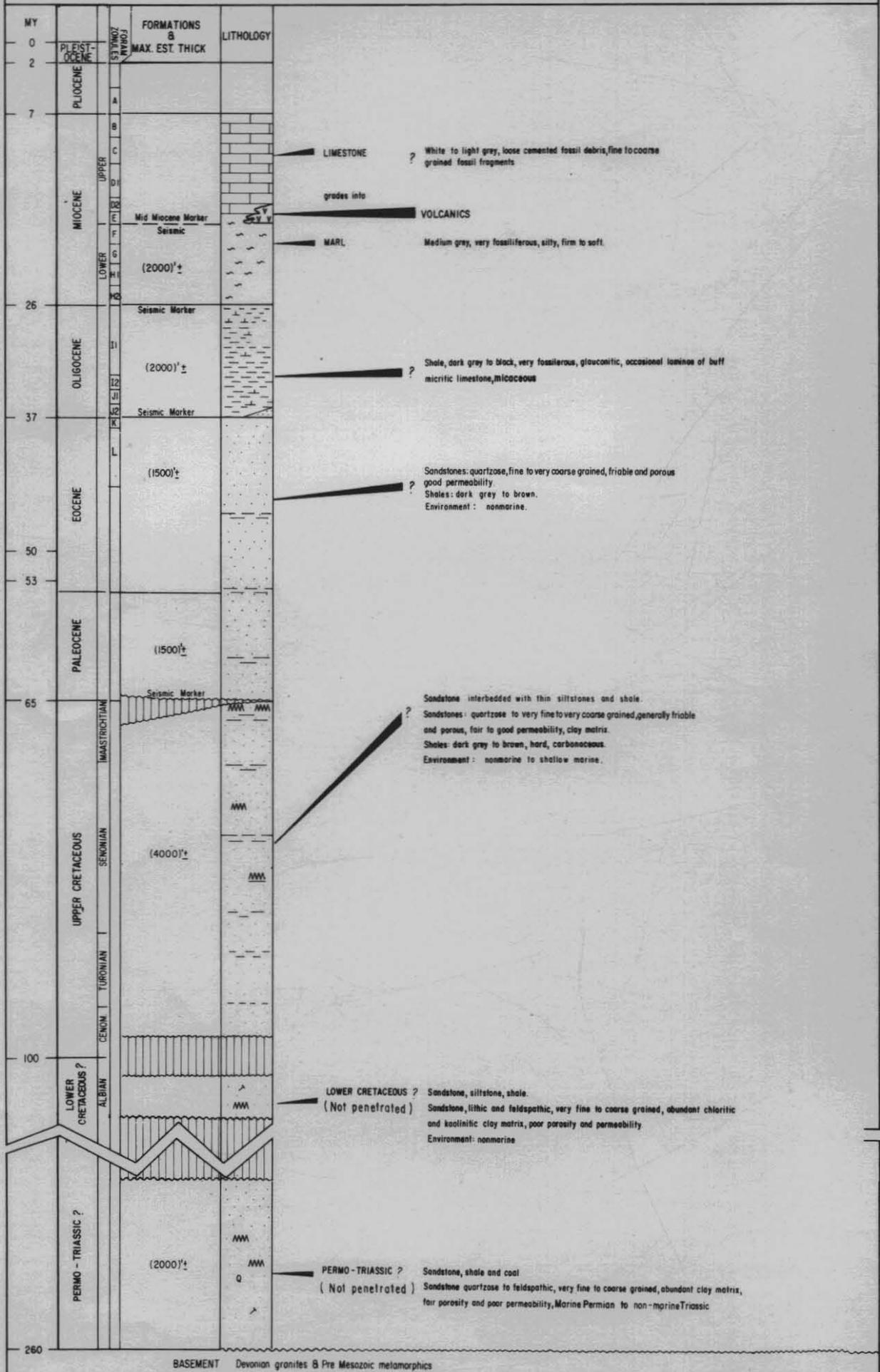
STRATIGRAPHIC CHART

SCALE: 1 INCH = 5 MILLION YEARS

TO ACCOMPANY FINAL REPORT T/8P

DATE: AUGUST 31, 1971

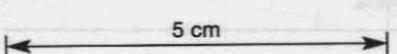
AUTHOR: J.K. DAVIDSON



LEGEND

- Sandstones predominate
- Nonmarine shales, siltstones and greywacke sandstones
- Mudstones and shales
- Interbedded sands and shales
- Carbonates
- Marl
- Volcanics

FIG. 2



No Lower or Upper Cretaceous sediments are known in onshore Tasmania, but thick sequences of sediments belonging to these ages are widespread in the Otway Basin to the west of the West Tasmanian Basin. The non-marine Lower Cretaceous (Otway Group), which was not present in Clam-1, consists of lithic and feldspathic sandstones, very immature in character and generally with poor porosity and permeability. The Upper Cretaceous (Sherbrook Group) in the Otway Basin consists of sandstones, siltstones and shales of non-marine and marine origin. The distribution of these types of sediments are representative of a transgressive - regressive cycle. As seen in the Clam-1 well, this sequence is over 1000 feet thick and very sandy throughout. The equivalent time-rock unit is interpreted to be one of the most prospective intervals in the West Tasmanian Basin. Structure maps have been made on a seismic reflection event interpreted to be from the top of the Upper Cretaceous in the Clam-1 well (Plates IV and V).

The Lower Tertiary section (Paleocene and Eocene) is considered to be dominantly non-marine in character as is the case in the Bass and Gippsland Basins and should consist of friable, porous sandstones, dark grey siltstones and shales and possibly coal beds.

The Oligocene and Miocene sediments in the Otway and Bass Basins are marine in character and consist primarily of calcareous, fossiliferous shales and marls in the Oligocene and fossiliferous limestones in the Miocene. A similar section should be anticipated in the West Tasmanian basin. Volcanic activity (both effusive and explosive) has occurred from Oligocene through the Pliocene and evidence of this vulcanism can be seen on some of the seismic sections in the West Tasmania Basin.

INTERPRETATION

A. REFLECTION IDENTIFICATION

1. Economic Basement

The Basement reflection is usually recognised by certain distinctive characteristics such as: high amplitude, low frequency, lack of reflections below it and associated diffraction energy. It has been correlated with the top of the pre-Cambrian (-4954') in the Clam-1 well.

2. Permo-Triassic

This reflection is only recognised in the Macquarie Harbour area of permit T/8P and it is not possible to map it with much confidence in this area. It is typically a high amplitude, low frequency reflection which truncates underlying reflections and which is interpreted to be Permo-Triassic in age but no well tie is available. An alternative correlation for this reflection could be that it comes from Jurassic extrusives, which are widespread in Tasmania. An interpretation of Permo-Triassic is shown on the attached geological cross section (A-A') included as Plate VI in this report.

3. Top of Upper Cretaceous

This reflection is a high amplitude, low frequency reflection over much of the area mapped. It forms the base of a prograding sequence and frequently truncates underlying reflections.

Onshore, in the area of the Macquarie Harbour graben, fossil evidence points to an early Eocene age for sediments overlying basement. If the same situation occurs in the offshore extension of the graben, then the mapped horizon is pre-Paleocene, as it predates the formation of the Macquarie Harbour graben. In the Clam-1 well in the King Island Sub-basin, Upper Cretaceous (A. disto-
carinatus Zone) sediments rest on Devonian(?) red beds. This suggests that the basin formed late in Early Cretaceous time. Both King Island and West Tasmania Basins may have developed as a result of the separation of Tasmania from Antarctica. If their development was contemporaneous, sediments overlying basement in the latter basin, should be of Late Cretaceous age.

From a consideration of the above evidence, the marker at the top of the initial cycle of sedimentation in the West Tasmania Basin, may be dated as pre-Eocene probably pre-Paleocene and very possibly Late Cretaceous.

The marker is affected by numerous faults with comparatively small throws, and in this respect, it is likened to the "base of Tertiary" horizon mapped in the Otway Basin. Based on this relationship, it is considered that the reflection arises from an unconformity surface at the top of the Upper Cretaceous.

No Upper Cretaceous sediments have been recognised onshore in Tasmania. The nearest known Upper Cretaceous sedimentary sequence is that penetrated in the Clam-1 well, about 100 miles N.N.W. of Macquarie Harbour. Unfortunately, the reflecting horizon in the Macquarie Harbour area cannot be tied directly to that in the vicinity of Clam-1 because those reflections terminate against shallow basement which intervenes between the two areas.

B. DEPTH MAPPING

Time-depth conversions have been made from a compilation chart based on data from the time-depth curve for Clam-1 and from G.S.I. automated velocity scans.

DISCUSSION OF MAPS

1. Structure Contour Map on Basement 1:500,000 Plate III

This map shows the evidence of continuous shallow basement along the continental shelf south of the Macquarie Harbour area down to the southern most extremities of the mainland, as well as interpreted shallow basement east of the estuary of the Pieman River. Sediments overlying basement are relatively thick in two areas within the permit, viz., the northern part towards the Clam-1 well and the offshore extension to the west of the Macquarie Harbour graben area. In the latter area, the map shows evidence of considerable faulting. This faulting, as well as overlying sediment compaction, is primarily responsible for any structure and hence prospective hydrocarbon traps in this area. In the northern area the Clam-1 well was a valid test on the flank of one of these basement structures.

2. Structure Contour Map of Upper Cretaceous 1:500,000 Plate IV

This map is considered to be representative of the top of the sedimentary section which could be prospective for hydrocarbons. The overlying Lower Tertiary section (probably Paleocene and Eocene) is generally thin, and at a relatively shallow depth on the continental shelf within the permit. In the Clam-1 well, this Lower Tertiary section consists dominantly of sandstone with only minor interbedded shales.

This map is more reliable than the Basement map, and indicates the areas of shallow basement and thicker sedimentary section as mentioned previously.

3. Structure Contour Map of Upper Cretaceous 1:100,000 (Macquarie Harbour Area) Plate V)

The offshore area adjacent to Macquarie Harbour has a relatively thick sequence of sediment compared to rest of the T/8P area. Therefore, this area is considered to be more prospective and structural features mapped using the available seismic data are interpreted to be potential traps for oil and gas.

The most significant anticlinal feature is named Venus, and a smaller faulted anticline is named Murex.

The Venus feature, as shown on this map, has about 15.5 square miles of area closure, and vertical relief of about 200 feet. The top of the interpreted Upper Cretaceous is at -4000 feet, and the structure is in 325 feet of water some 13 miles from the shoreline.

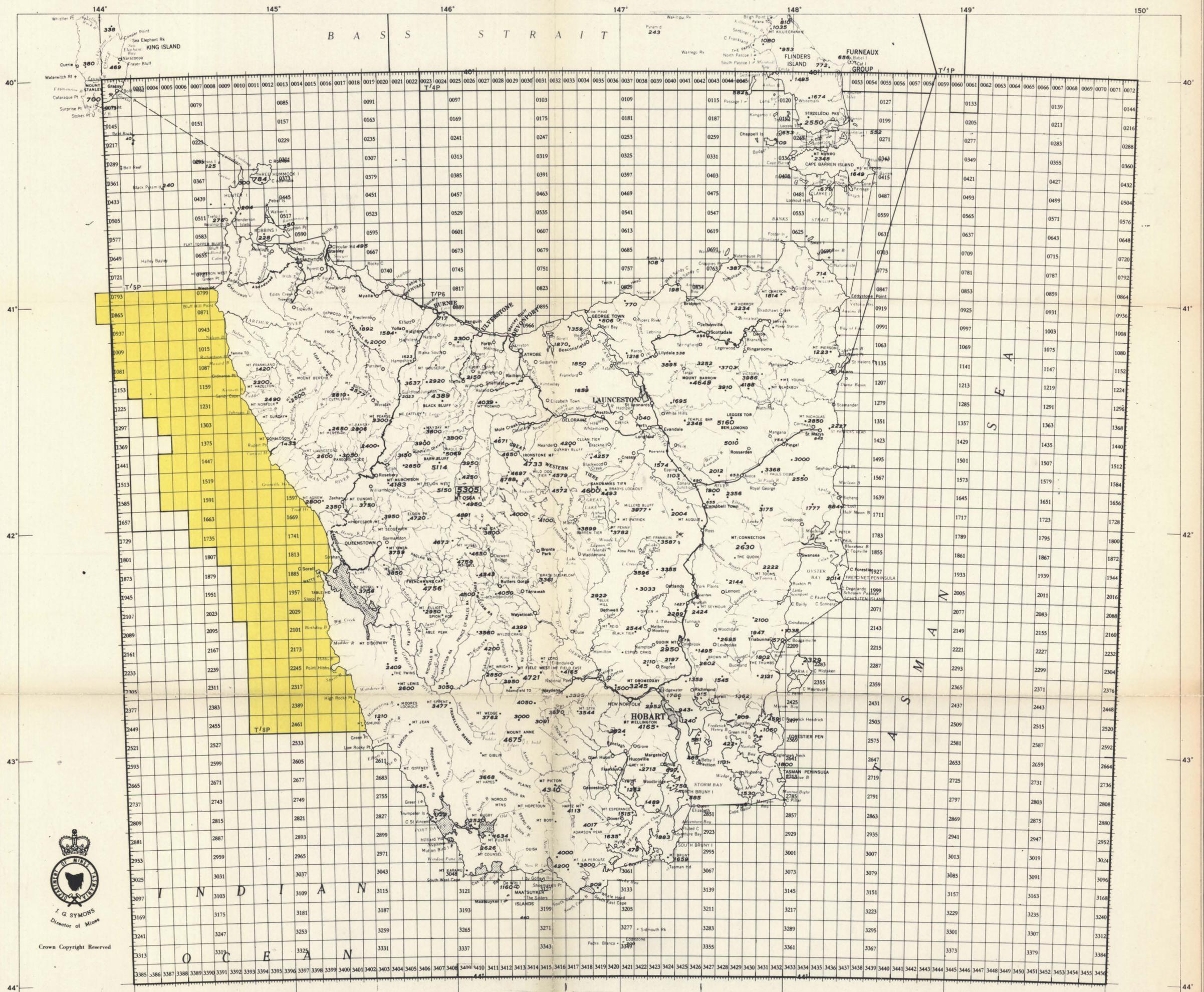
The feature is interpreted to be caused by the downwarping of the sediments into the downthrown side of N.N.W. trending tensional faults, and differential compaction over tilted basement fault blocks. The structure apparently grew during Lower Tertiary time, probably in response to fault movements which were contemporaneous with sedimentation.

The Murex structure is a fault closure at a shallower depth than Venus, and it has about 11.7 square miles of areal closure and 300 feet of vertical relief. This feature grew at approximately the same time as the Venus feature, and it appears to be associated with a tensional fault system that trends N.N.W.

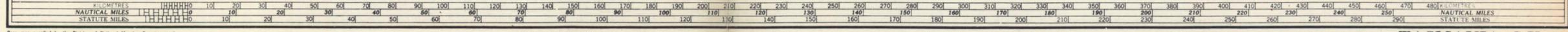
CONCLUSIONS

The results of the exploration program carried out on permit T/8P and EL18/65 during the period from 1965 to 1972 indicate that this acreage has a limited potential for commercial hydrocarbon accumulation.

Reconnaissance surface geology, airphoto interpretation of the coastal area, airborne magnetometer interpretation, the interpretation of approximately 1059 line miles of reflection seismic data, and the results of a nearby exploration well (Clam-1) indicate that the portion of the West Tasmania Basin within the permit area has a relatively small volume of sediment and only two significant structural closures (Venus and Murex). The lack of hydrocarbon potential for this area is also reflected in the lack of success in attempting to farm-out the most favourable area to twenty-four other companies during 1971.



I. G. SYMONS
Director of Mines
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Base map supplied by the Division of National Mapping, Department of National Development, Canberra, A.C.T. Lambert Conformal Conic Projection Standard Parallels 40°40' and 43°20' Topographic Information Compiled Dec. 1963



INDEX TO ADJOINING SHEETS

HAMILTON S.J.54	MELBOURNE S.J.55
KING ISLAND S.K.54	TASMANIA S.K.55



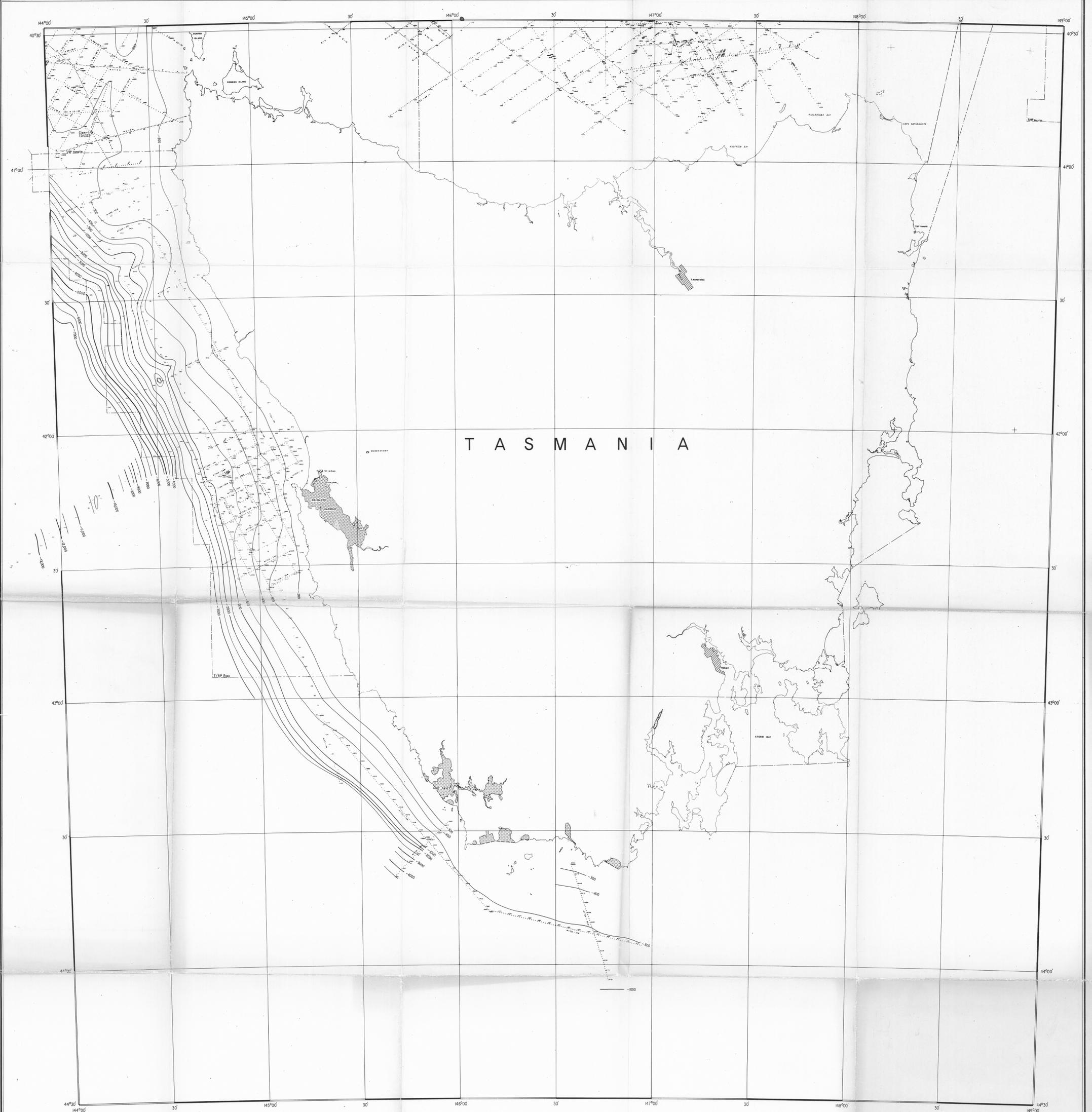
E.L. 18/65

This map has been prepared and published by the Drafting Section, Department of Mines, Tasmania for the purposes of the Petroleum (Submerged Lands) Act 1967-1968 of the Commonwealth and the Petroleum (Submerged Lands) Act 1967 of the State of Tasmania under the authority of the Designated Authority
Produced by the LANDS AND SURVEYS DEPARTMENT Hobart, Tasmania 1968

WEST TASMANIA
LOCALITY MAP
TO ACCOMPANY: FINAL REPORT T/8P
PLATE I AUGUST, 1972

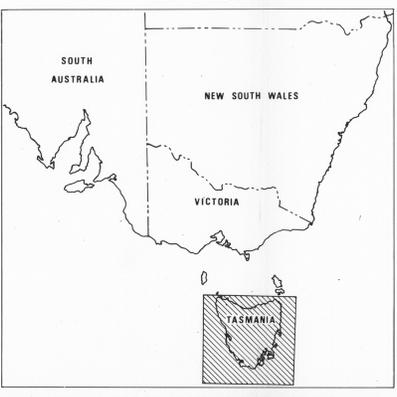
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T/8P part-VI*

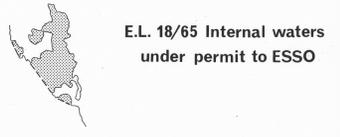


T A S M A N I A

MAP INDEX



LEGEND



ESSO EXPLORATION AND PRODUCTION AUSTRALIA INC.
WEST TASMANIA BASIN
 TASMANIA

BATHYMETRIC MAP
 5 cm

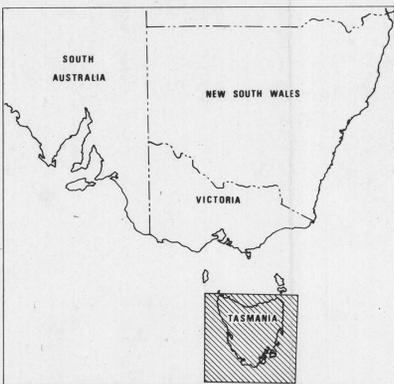
088c12

CONTOUR INTERVAL 100 FEET AND 500 FEET DATUM SEA LEVEL
 SCALE: 1:500,000
 0 5 10 15 20
 MILES

AUTHOR: J.S. ISOM, I.P. HAWKSHAW, R.A. BROTHERTON
 TO ACCOMPANY FINAL REPORT T/SP
 DRAFTED BY: S.R. SMITH
 DATE: SEPTEMBER, 1971
 PLATE II

T A S M A N I A

MAP INDEX



LEGEND

E.L. 18/65 Internal waters
under permit to ESSO



ESSO EXPLORATION AND PRODUCTION AUSTRALIA INC.

WEST TASMANIA BASIN
TASMANIA

STRUCTURE MAP
TOP OF BASEMENT



088013

CONTOUR INTERVAL 200, 1000 & 2500 FT. DATUM SEA LEVEL

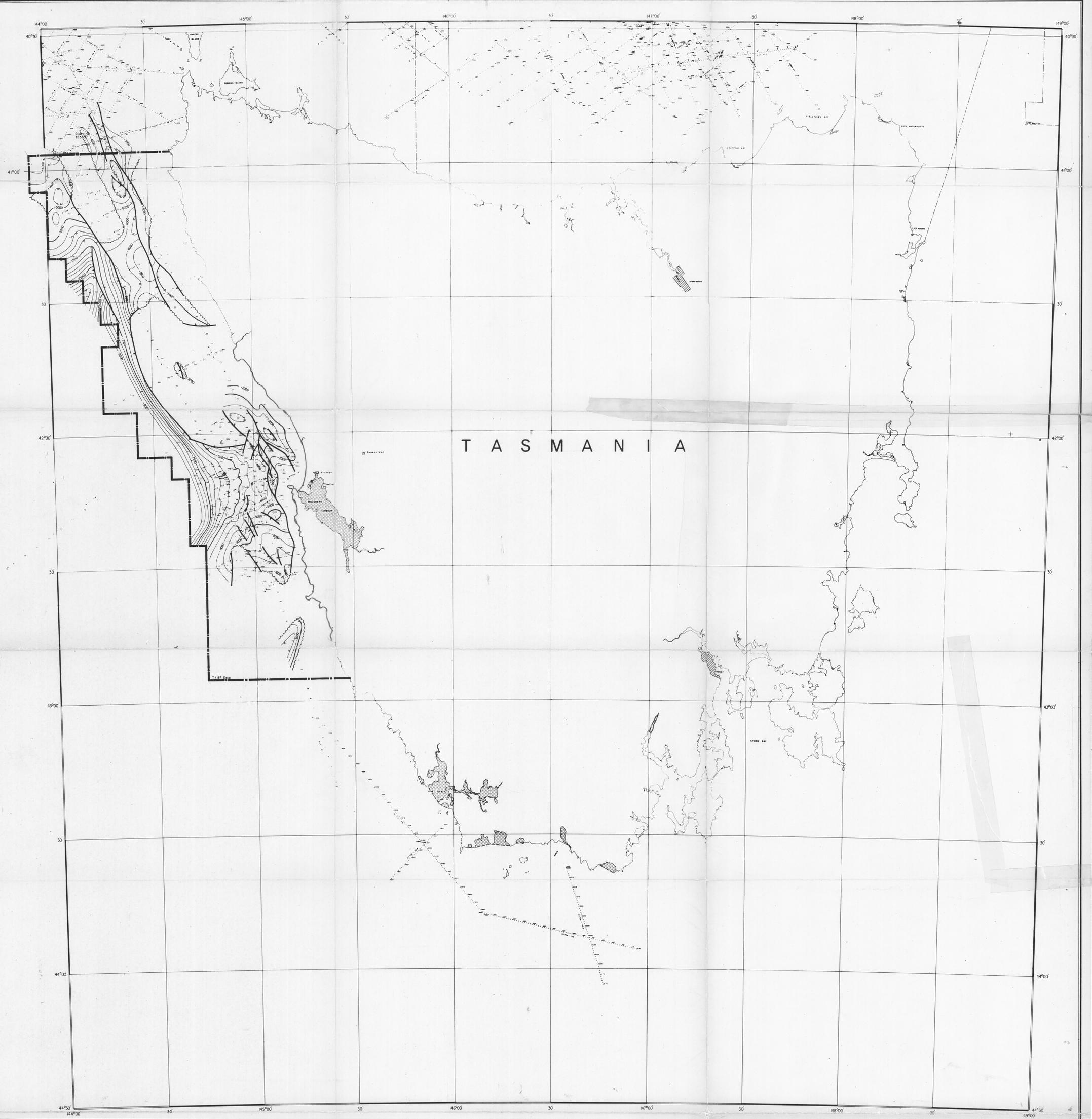
SCALE: 1:500,000



AUTHOR C.C.HORGAN, R.W.DAY, J.S.ISOM
DRAFTED BY S.R.SMITH
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DATE: SEPTEMBER 1971
PLATE III

T/8P part-VI*

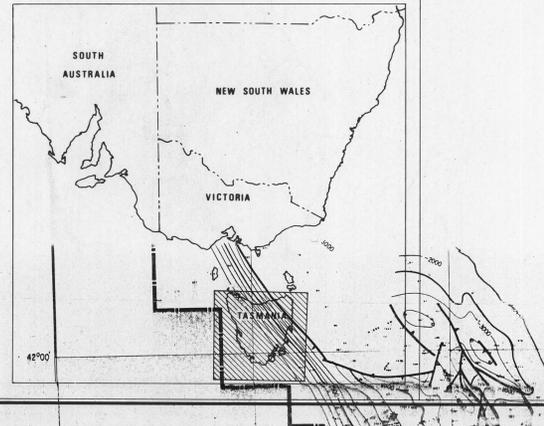
Dwg 1488/OP/2



T A S M A N I A

T A S M A N I A

MAP INDEX



LEGEND

E.L. 18/65 Internal waters
under permit to ESSO

ESSO EXPLORATION AND PRODUCTION AUSTRALIA INC.
WEST TASMANIA BASIN
TASMANIA

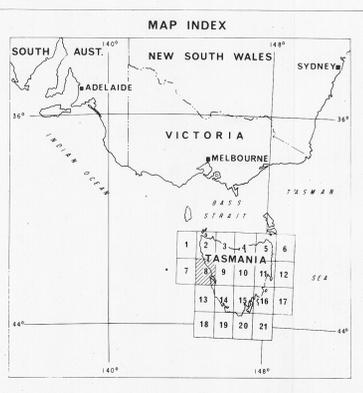
STRUCTURE MAP
ON UPPER CRETACEOUS

5 cm 088014

CONTOUR INTERVAL 500 FT. SCALE: 1:500,000 DATUM: SEA LEVEL

MILES
DRAWN BY S. R. SMITH
CHECKED BY J. K. DAVIDSON
DATE: DEC. 1971
PLATE IV

T/OP part-VI-3 OR-079



LEGEND

Localized Volcanics

ESSO EXPLORATION AND PRODUCTION AUSTRALIA INC.
WEST TASMANIA BASIN
 AUSTRALIA

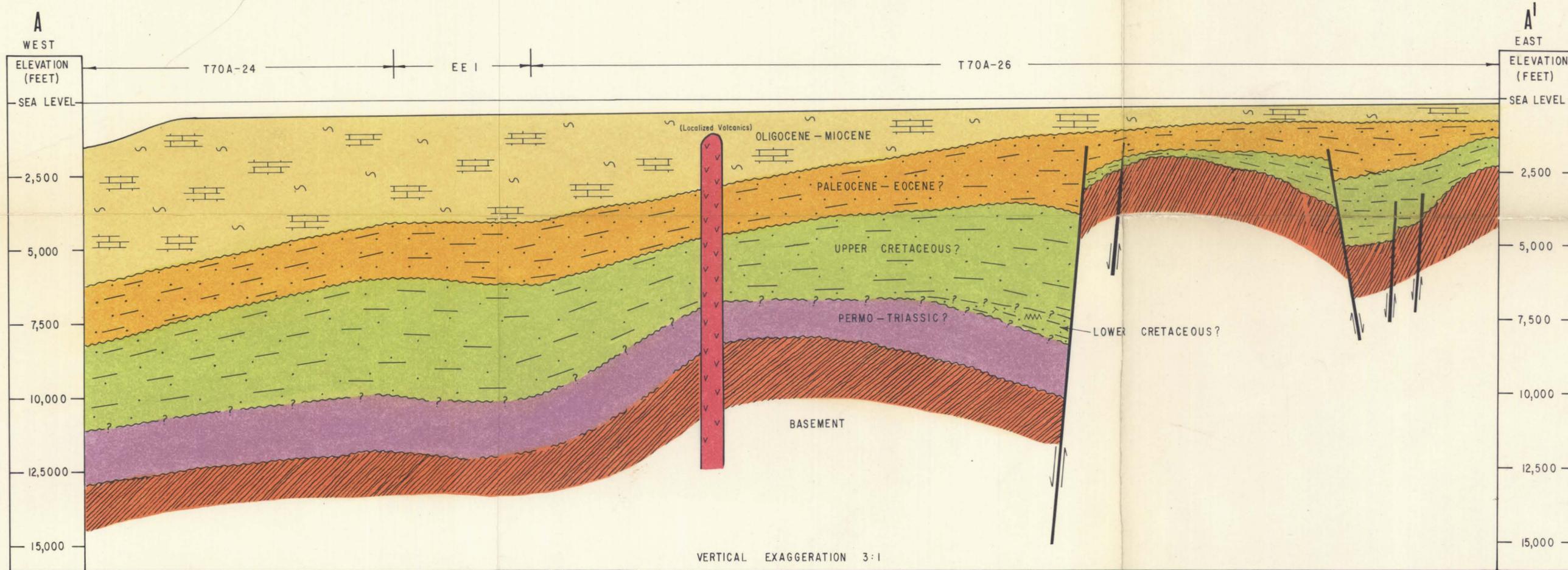
STRUCTURE CONTOUR MAP
ON TOP OF UPPER CRETACEOUS

088615
 DATUM: SEA LEVEL

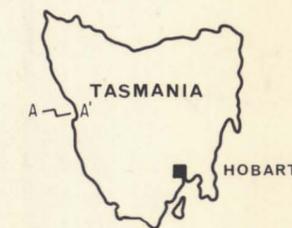
Scale 1:100,000
 2 1 0 2 4
 MILES

AUTHOR: R.W. DAY, V.A. ROBINSON
 TO ACCOMPANY FINAL REPORT T/8P
 DRAFTED BY: K.H. REISS
 DATE: SEPT. 1971

PLATE V



LOCALITY MAP



LEGEND

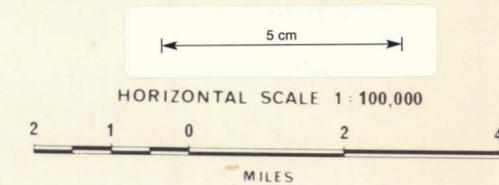
- Sandstone may contain minor siltstone and shale
- Sandstone and shale probably deposited in shoreline environment
- Volcanics
- Marl and limestone
- Mudstone, siltstone and lithic sandstone deposited in nonmarine environment
- Basement "Pre Permian"

088016

ESSO EXPLORATION AND PRODUCTION AUSTRALIA INC.

WEST TASMANIA BASIN
TASMANIA

STRUCTURE CROSS SECTION A-A'



VERTICAL SCALE 1" = 2500'

AUTHOR J.K. DAVIDSON
SEISMIC CONTROL R.W. DAY DRAFTED BY J.R. SCHMIDT
V.A. ROBINSON
TO ACCOMPANY: FINAL REPORT T/8P DATE: SEPT. 1971

PLATE VI REVISED: OCT. 1972

OR-079 Dwg. 1425/BS/5

T/8P part-VI*