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REPRODUCED

MEMORANDUM REPORT  
RECONNAISSANCE STRUCTURAL EVALUATION

COASTAL TASMANIA

OPEN FILE

Prepared for

ESSO EXPLORATION AUSTRALIA

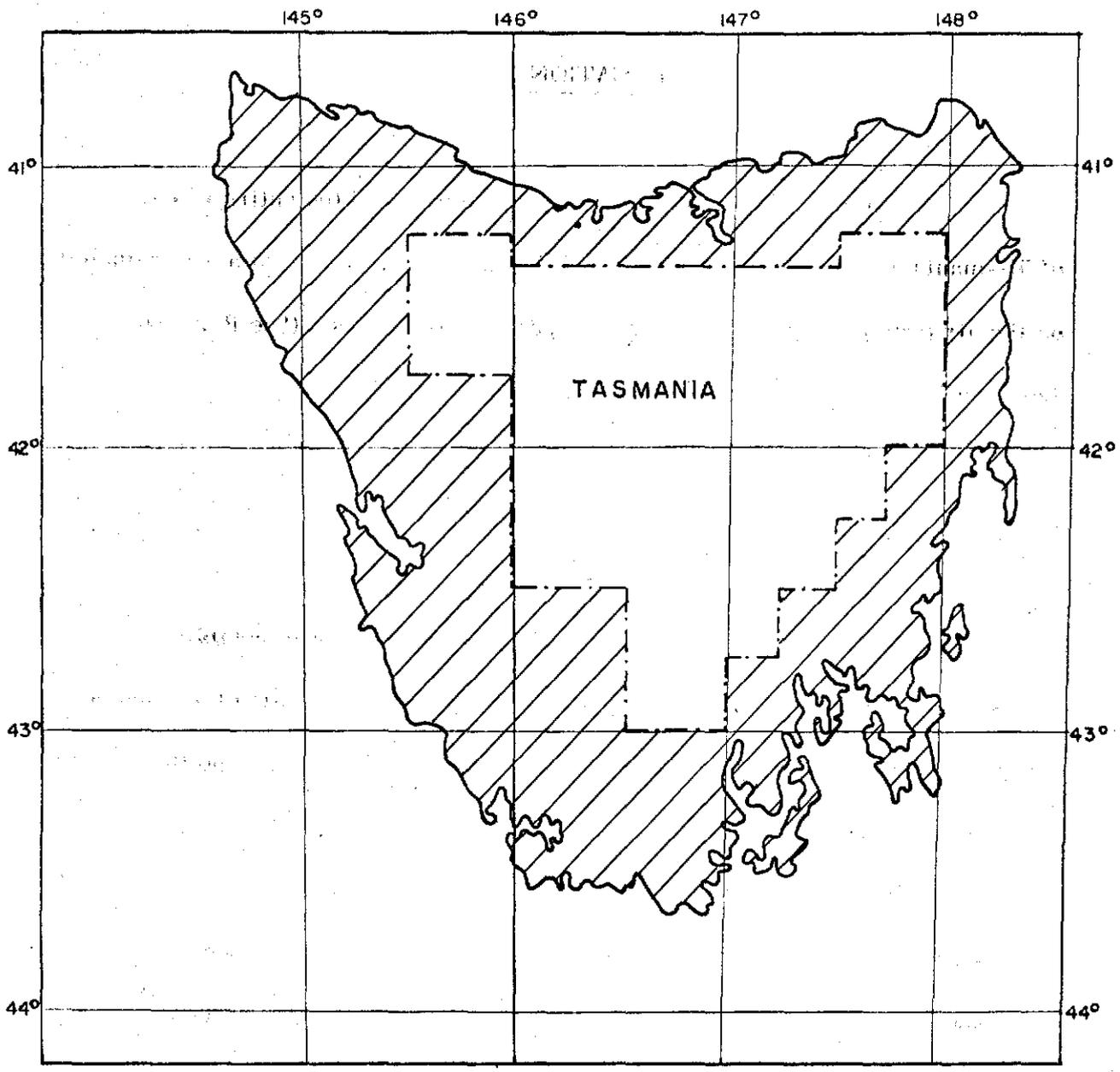
by

GEOPHOTO RESOURCES CONSULTANTS

DECEMBER 1966

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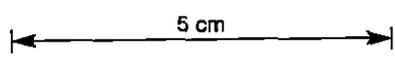
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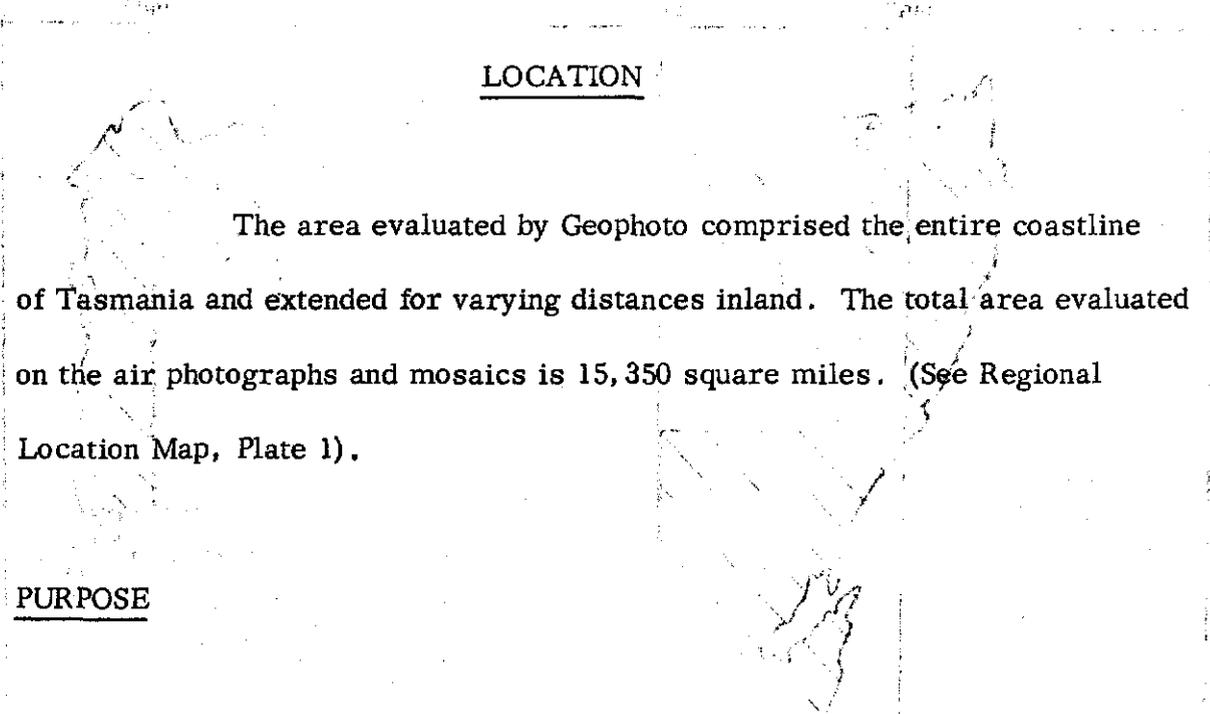


REGIONAL INDEX MAP



Project area





LOCATION

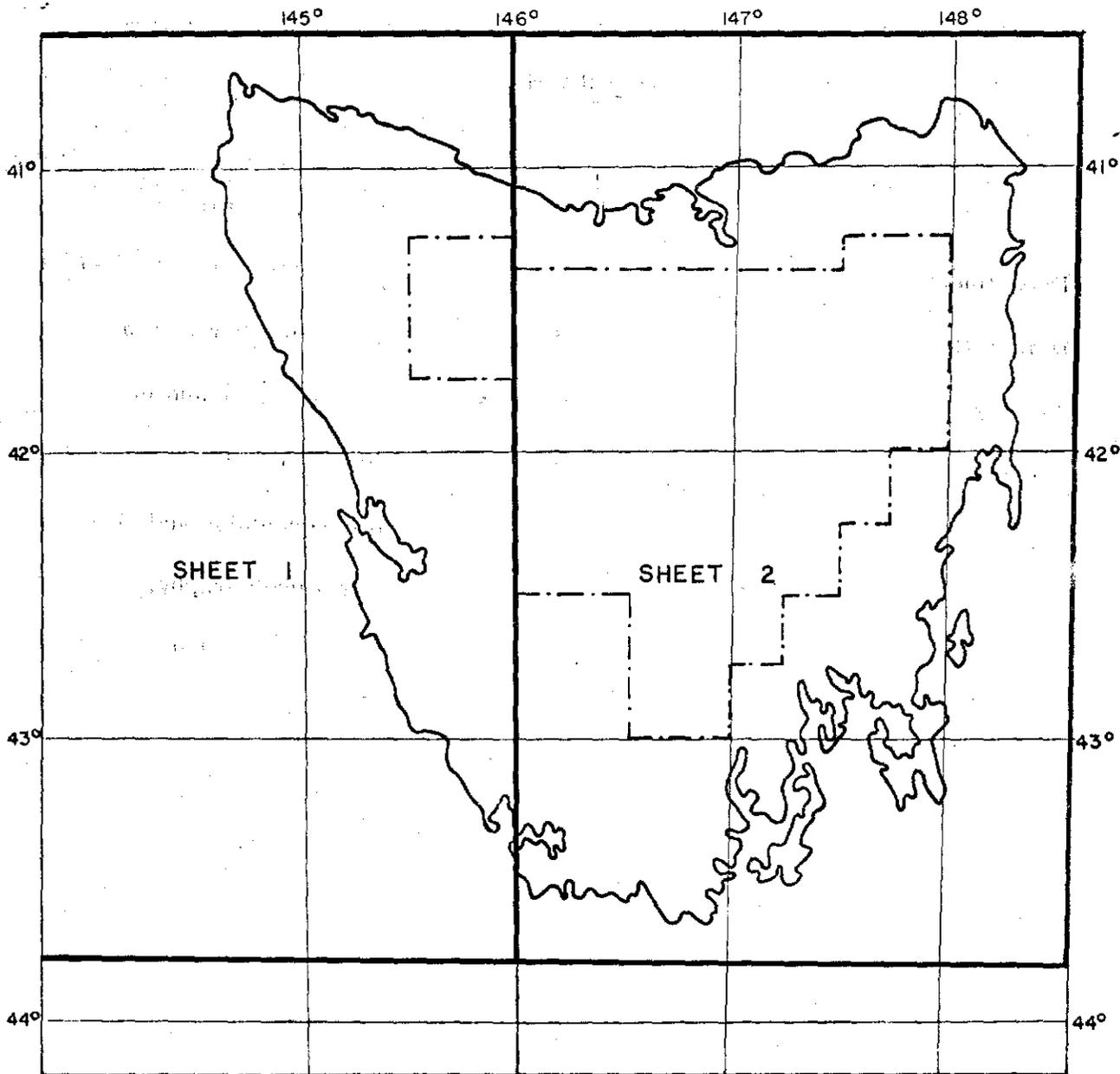
The area evaluated by Geophoto comprised the entire coastline of Tasmania and extended for varying distances inland. The total area evaluated on the air photographs and mosaics is 15,350 square miles. (See Regional Location Map, Plate 1).

PURPOSE

The purpose of this evaluation was an attempt to establish a regional reconnaissance structural framework of the coastal part of Tasmania. Mapping of the stratigraphy is beyond the scope of this evaluation and the stratigraphic changes are shown only where they could be readily observed on the mosaics and where they have a bearing on an understanding of the tectonics of the region. It must be emphasized that this evaluation is strictly a reconnaissance one and does not claim to show every mappable surface structure. *Emphasis was placed on those structures that are terminated by the coast and would afford some indication of the structural trends that can be anticipated to occur in the off-shore area.*

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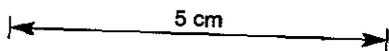


Plate 2



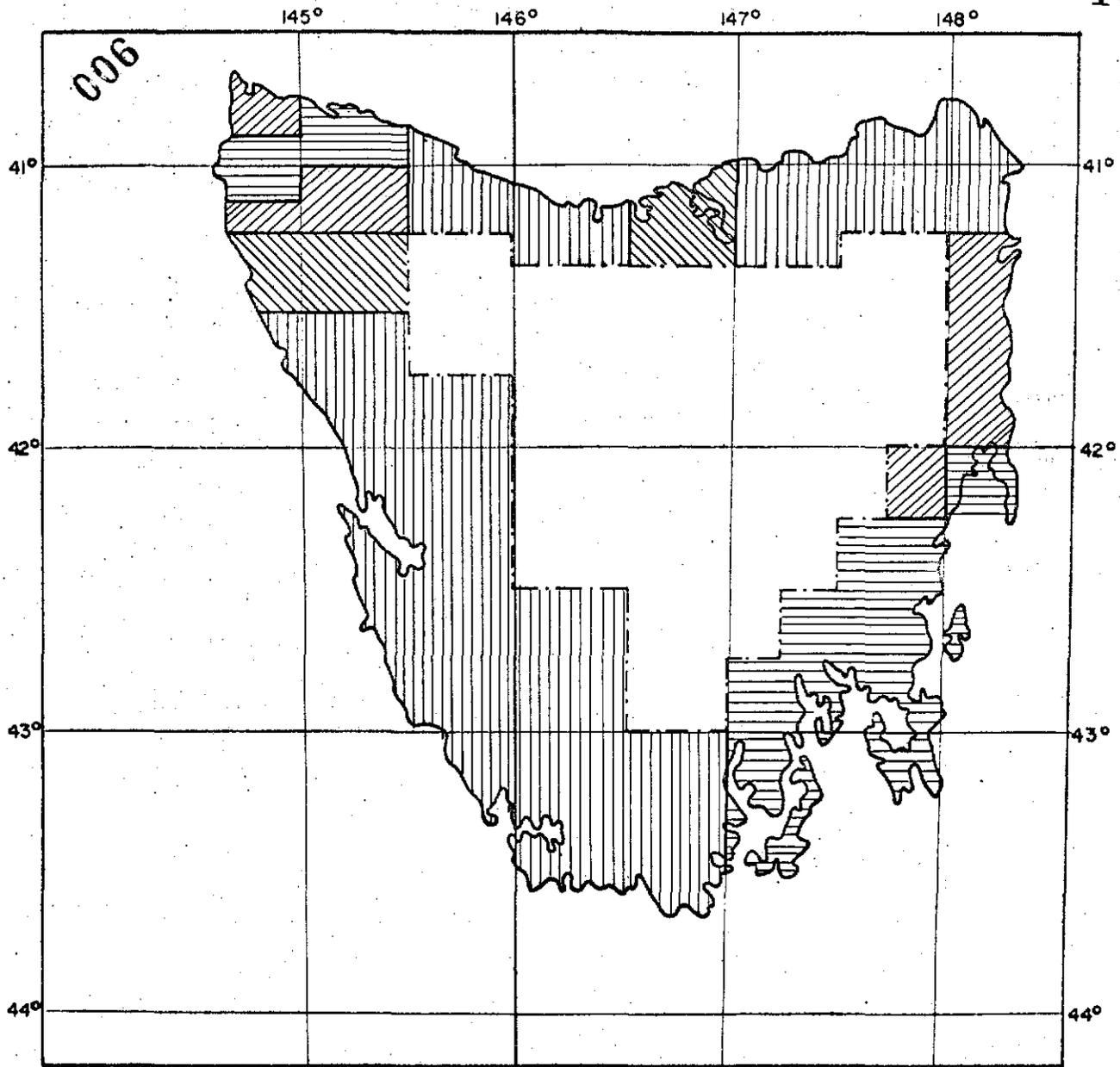
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## PHOTOGRAPHY

The photography used in this evaluation was obtained from the Department of Lands, Hobart, Tasmania. This photography was flown at different scales (See Index to Photography Plate 2). Most of the photography is at a scale which is not ideal for regional reconnaissance structural work and in excess of 6,000 photographs was necessary to cover this area. The examination of this great quantity of photographs was time consuming and in addition, when mosaics are constructed from such low level photography, structural details tend to get obscured among the many photo edges that are unavoidably present in these mosaics.

## METHOD OF ANALYSIS

Originally the reconnaissance structural evaluation was to be carried out primarily by studying the air photograph mosaics. As was previously stated due to the scale of the photography, the mosaics because of the numerous photo-edges present do not lend themselves too well for this type of analysis. Consequently, the individual air photographs had to be studied in more detail than was originally anticipated, resulting in the evaluation taking longer than planned.



INDEX TO PHOTOGRAPHY

-  1:15,840
-  1:23,760
-  1:35,640
-  1:51,480

5 cm



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MAP COMPILATION

The reconnaissance structural maps accompanying this report are at a scale of 1:250,000. Two maps were needed to cover the island at this scale with the  $146^{\circ}$  line being the common line of longitude. (See Index to Map Sheets, Plate 3).

A transverse mercator projection was constructed and ink drafted onto scale-stable film. The planimetric detail for the base map was taken from 1:250,000 published maps which cover the entire island of Tasmania. The position accuracy of the reconnaissance structural evaluation planimetry is only as good as the accuracy of the maps used as control. To assure position accuracy for the geologic structures the interpreted detail was transferred from the individual air photographs onto mosaics and was then transferred from these mosaics to the base map sheets. This procedure was necessary as a single photograph covers too small an area at the 1:250,000 map scale to be certain of its accurate planimetric position. Final drafting of the geologic detail is in ink.

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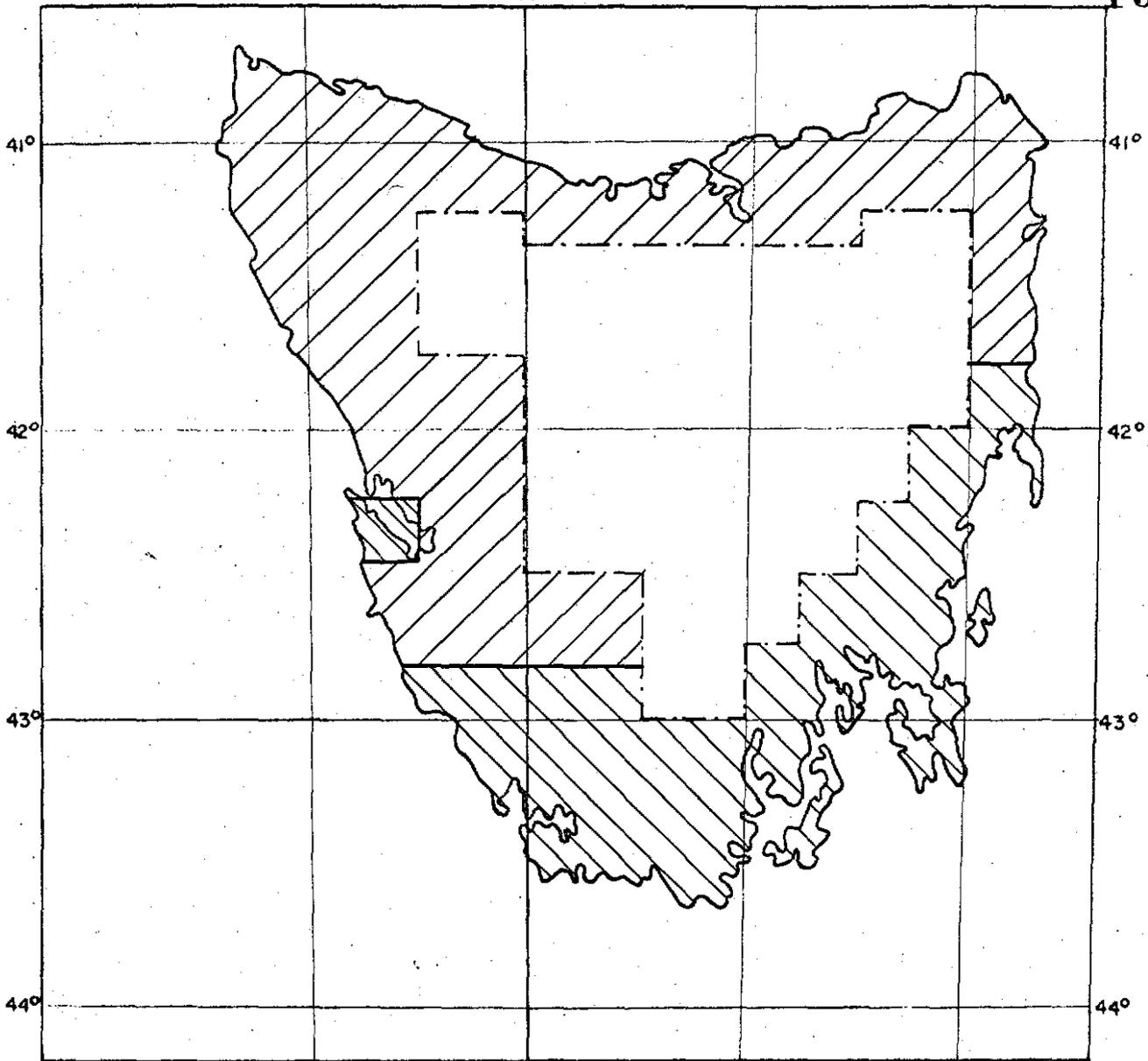
145°

146°

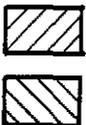
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148°

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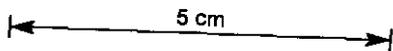


MOSAIC AVAILABILTY



Mosaics available Department of Lands, Hobart Tasmania

Geophoto constructed mosaics



MOSAIC CONSTRUCTION

Published photo mosaics are only available for the northern and northwestern part of Tasmania (See Plate 4). For the remainder of the project area the mosaics were constructed by Geophoto. To facilitate the transfer of the geologic data the Geophoto mosaics were printed at a scale of 1:250,000 to conform to the reconnaissance structural map scale.

The mosaics were constructed by stapling alternate prints along flight lines. Control was taken from whatever published information was available. As the published control is variable in quality absolute planimetric accuracy of the co-ordinant positions cannot be guaranteed. In addition, excessive amounts of photographic tilt are present over large parts of this photography, thereby making it impossible to construct mosaics of absolute uniform scale. In order to achieve photo mosaic scale uniformity, the individual photographs would have had to be corrected for tilt and reprinted. Such a procedure is beyond the scope of this reconnaissance evaluation.

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REGIONAL GEOLOGIC SETTING

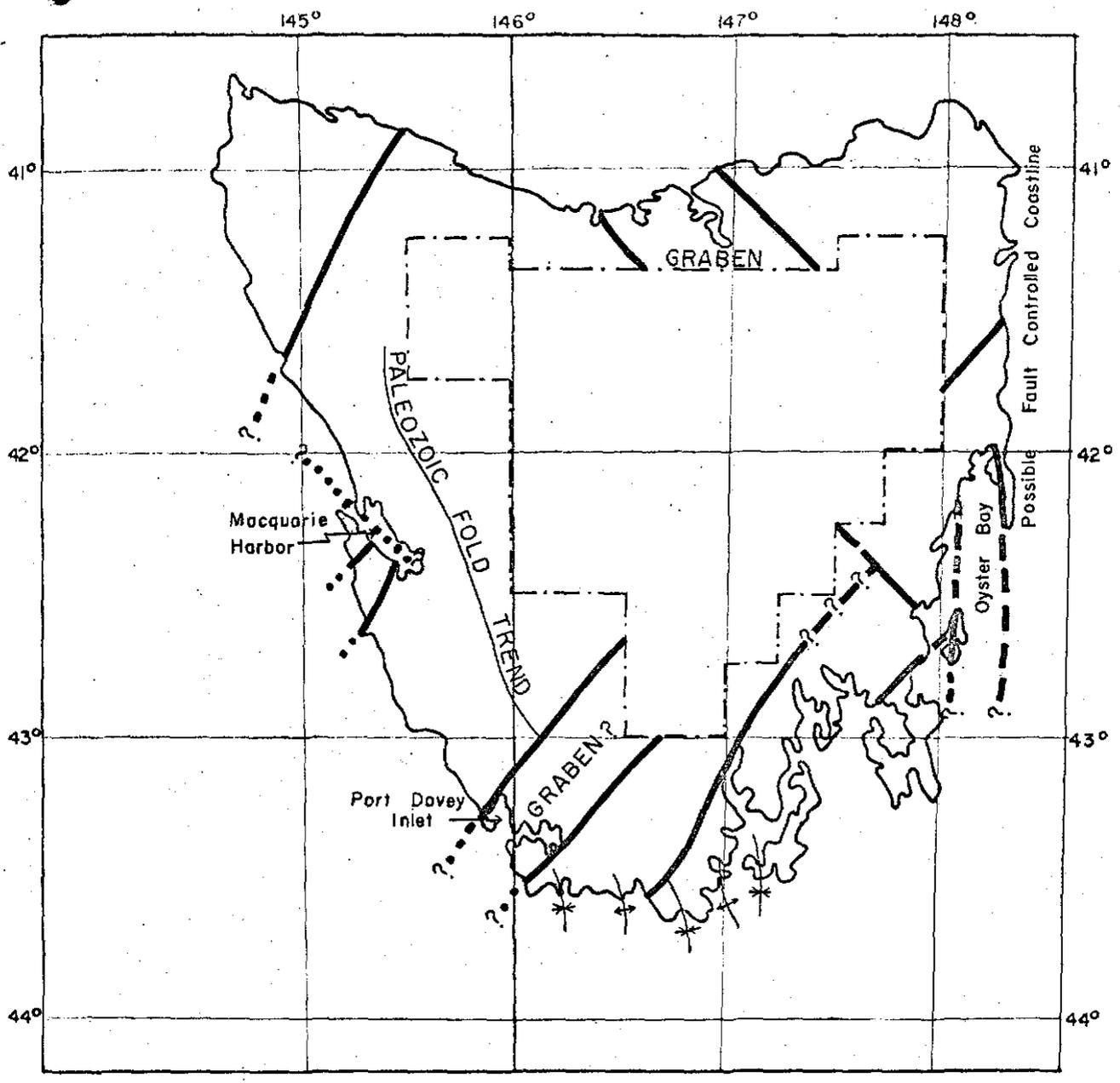
Regionally the island of Tasmania can be divided into a number of geologic provinces. The western coastline consists primarily of Precambrian shield in which elongate, folded Paleozoic rocks occur. The southeastern region, centered about Hobart, contains primarily gently folded Permian and Triassic sediments which have been subsequently covered by Jurassic dolerites. The northeastern region is dominated by granites which have been assigned to the Devonian. These granites generally intrude Devonian and Silurian rocks.

A large part of the island is now covered by Jurassic dolerite which obscures the distribution of sediments below this dolerite. Carey (1958) has postulated that the Tasmanian dolerites are essentially a lopolithic (saucer shape) mass with the main feeder stocks being in the Central Lakes Region of Tasmania.

The most comprehensive survey of the general geology of the entire island of Tasmania is found in the Geology of Tasmania published by the Geological Society of Australia (1961). For a recent discussion on the Tasmania dolerite distribution and its origin the reader is referred to

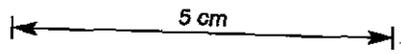
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TECTONIC FRAMEWORK

Plate 5



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Jones, Haigh and Green (1966).

### STRATIGRAPHY

As was previously mentioned the detailed and continuous mapping of stratigraphy was not undertaken in this reconnaissance structural evaluation. Stratigraphic information, where it could be readily determined, is indicated on the maps by notes.

### REGIONAL STRUCTURE

The structural geology of Coastal Tasmania is generally complex. Some of the major structural features as interpreted from this photogeologic reconnaissance evaluation are shown on Plate 5. To simplify the discussion the project area will be divided into the North Coast Region, the West Coast Region, the Hobart Area and the East Coast Region.

### THE NORTH COAST REGION

Extensive cultivation and sand dune mantle obscure the surface structural geology of this area. Considerable areas of granite outcrop are

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present in the northeast corner. A pronounced, northwesterly trending set of lineaments occur in the general Launceston-Devonport area. These lineaments probably reflect faults and, furthermore, are probably a surface manifestation of the Launceston graben.

#### WEST COAST REGION

The West Coast Region contains the best expressed surface structures and consequently more detail can be shown in this region than in the other coastal areas. Two major structural trends are observed. These are, a sinuous generally north northwesterly trending fold belt expressed primarily in Paleozoic rocks, and a pronounced northeasterly trending set of faults.

A very pronounced northeasterly trending fault zone is present in the northwestern part of Tasmania and was generally mapped from slightly north of the junction of  $145^{\circ}$  Longitude and  $41^{\circ} 45'$  Latitude to approximately 10 miles west of Wynyard on the north coast. The southwestern end of this fault zone is topographically expressed along the coast by a head land. Granite emplacement also appears to be associated with this fault zone at its southwestern termination with the coast. This fault zone is believed to be one

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of the major lines of weakness of this part of Tasmania, and probably extends in a southwesterly direction for some distance off-shore.

The sinuous fold belt developed within the Paleozoic rocks is most pronounced south of the major fault zone just described. The folds generally parallel the coast and none were observed to be truncated by the coastline in this area.

The position of Macquarie Harbour Inlet is anomalous and its location may be controlled by a northwesterly trending fault zone. No definitive surface evidence for such a fault however, was found in the air photographic examination and if such a fault exists it would have to be located within the inlet itself. The peninsula west of the Macquarie Harbour Inlet contains some pronounced northeasterly trending postulated fault zones. These faults probably extend southwestwards for some distance off-shore. These northeasterly trending faults do not appear on the east side of the Macquarie Harbour inlet and may be terminated by the postulated Macquarie Harbour inlet fault.

The Paleozoic fold trend of the western coast region appears to be interrupted in the vicinity of Port Davey Inlet. This general area contains a major drainage dislocation which is indicated on the maps accompanying this

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report by a note. In addition to the drainage location, the coastline is anomalous in the Port Davey Inlet area. Both to the north and south of this inlet, the coast appears emergent exhibiting sea cliffs and a general straight coastline. The Port Davey Inlet, on the other hand, has the appearance of a drowned system. This rapid alternation from apparent emergent to submergent back to apparent emergent coastline in conjunction with the pronounced drainage dislocation, suggests tectonic control for this section of the Island. It is postulated that a northeasterly trending graben may exist in the Port Davey area and that this graben may extend in a southwesterly direction off-shore. If such a graben does exist than it has apparently interrupted the Paleozoic fold trend and would therefore be younger. South of the graben the southerly fold trend appears to continue.

It is not possible from this reconnaissance photo study alone to come to more definite conclusions concerning this possible structure in the Port Davey Inlet area. Likewise it cannot be definitely stated whether appreciable thicknesses of younger sediments would exist off-shore in this area. Geophysical exploration would be required to establish whether a graben exists in the Port Davey Inlet area.

SOUTH COAST AND HOBART AREA

The southern end of Tasmania appears to contain a number of folds which are truncated by the coastline and probably extend in a southerly direction off-shore.

The general Hobart region exhibits a different tectonic framework from the rest of Tasmania. Numerous faults can be mapped however, bedrock folds are not easily recognized. The recognition of folds is complicated by the extensive dolerite capping that is found throughout this region. The sedimentary rocks are mainly Permian and Triassic in age and where they can be seen with any clarity appear to be dipping rather gently. Three interpreted southerly trending Permian folds are shown on the map south of Hobart. These folds may extend for some distance off-shore.

The major structural features in the Hobart area consist of numerous lineaments, some of which are interpreted to be faults whereas others may be reflections of jointing within the dolerite cap. A general northeasterly trending fault zone occurs and this zone may be one of the boundary areas of the so called Hobart graben. Additional evidence for a possible sinking in the

general Hobart area is derived from the coastline morphology. Most of the coastline of Tasmania exhibits rugged cliffs and generally has an emergent appearance. The Hobart area is notable for its conspicuous drowned configuration.

#### EAST COAST REGION

Most of the east coast north of Schouten Island is remarkably straight and the entire coastline may be fault controlled. No direct evidence for such a fault was found from studying the air photographs of the coast and if such a fault does exist it probably occurs some distance off-shore.

Oyster Bay itself may be structurally controlled in which case it would be a minor graben. Not a great deal of significance as far as build up of sediments is attached to this graben as extensive granite outcrops notably on Maria Island and the peninsula forming the eastern boundary of Oyster Bay are present.

A northeasterly trending fault zone is postulated to occur in the vicinity of the coast at approximately  $41^{\circ} 30'$ . This fault zone is on trend with the Port Davey graben structure and may be controlled by the same tectonic line

of weakness. However, as the intervening area is outside of the project this connection is put forward as a tentative suggestion only.

SUMMARY AND CONCLUSIONS

A reconnaissance structural evaluation was carried out by Geophoto on behalf of Esso Exploration over an area of about 15,350 square miles encompassing the entire coastline of Tasmania. The emphasis was on regional structural interpretations. Stratigraphic boundaries were not mapped however, significant stratigraphic changes and unconformities are indicated on the maps by notes.

The following are the major conclusions derived from this reconnaissance evaluation :

1. A major northeasterly trending fault zone or line of weakness is present across the northwestern corner of the island of Tasmania. Granites are associated with this fault zone where it intersects the west coast. This fault zone probably extends for some distance off-shore.
2. The Macquarie Harbour Inlet itself may be fault controlled. No evidence for such a fault was found on land, necessitating the surface trace of this controlling fault to be located under the water of this inlet. The possibility exists that the inlet is a reflection

of a graben structure. However, such a graben would have to be narrow and its seaward extension would be interrupted by the fault zone mentioned in conclusion 1. It is unlikely that a sufficiently large area exists in the Macquarie Harbour region in which a significant accumulation of young sediments could be present.

3. A zone of folds expressed primarily in Paleozoic rocks generally parallels the central west coast. It is postulated that this fold belt is interrupted in the Part Davey Inlet area.

4. The Port Davey Inlet area is anomalous, first, because it is a drowned area in the otherwise generally emergent southwestern coast line; and second, a distinctive northeasterly trending drainage dislocation is present inland from Port Davey. This area is postulated to be a graben which could extend in a southwesterly direction off-shore from Port Davey Inlet.

This possible graben may be up to fifteen (15) miles wide and as such could be large enough for an appreciable accumulation of younger sediments off-shore. It must be emphasised that the interpretation of the faults is based on good geomorphic evidence, namely the anomalous drainage

alignments. However, the interpretation that this feature represents a graben in the off-shore area is presented only as a suggestion which needs further verification.

5. South of the Port Davey drainage dislocation, the general southerly trending fold belt appears to continue. A number of folds were mapped in the extreme southern end of the island which should continue in a southerly direction off-shore.

6. The general area around Hobart presents a different coastline morphology from the remainder of the island. In this area the coast has a decided drowned appearance with numerous inlets. The interpretation of structure is complicated in this area by the extensive dolerite caps that are present throughout this region. Faults appear to dominate the folds although some postulated Permian folds which may extend off-shore were mapped in the area south of Hobart.

7. A graben may exist in the Oyster Bay area located in the central east coast. The presence of granite along the eastern boundary of the bay as well as on Schouten and Maria Islands detracts from its potential as an oil area.

8. The remainder of the east coast north of Oyster Bay is remarkably straight and may be fault controlled. No direct evidence, other than the linear coastline, was found along the land in this area. Therefore, if such a fault exists it could be located parallel to the coast and slightly off-shore.

9. The north coast of the island contains granites which intrude Devonian and Silurian rocks in the northeastern corner of the island. A pronounced series of northwesterly trending lineaments are present in the general Launceston area and probably are reflections of faults and the "Launceston graben". The entire north coast is extensively mantled by sand dune and recent deposits making it difficult to recognize specific structural trends.

10. This entire reconnaissance study and the conclusions based on it are the results of an air photograph and mosaic study only. The conclusions therefore, should not be considered final and are presented in the hope that they will assist more detailed investigations.

Respectfully submitted  
GEOPHOTO RESOURCES CONSULTANTS



Robert H. Barton  
MANAGER.

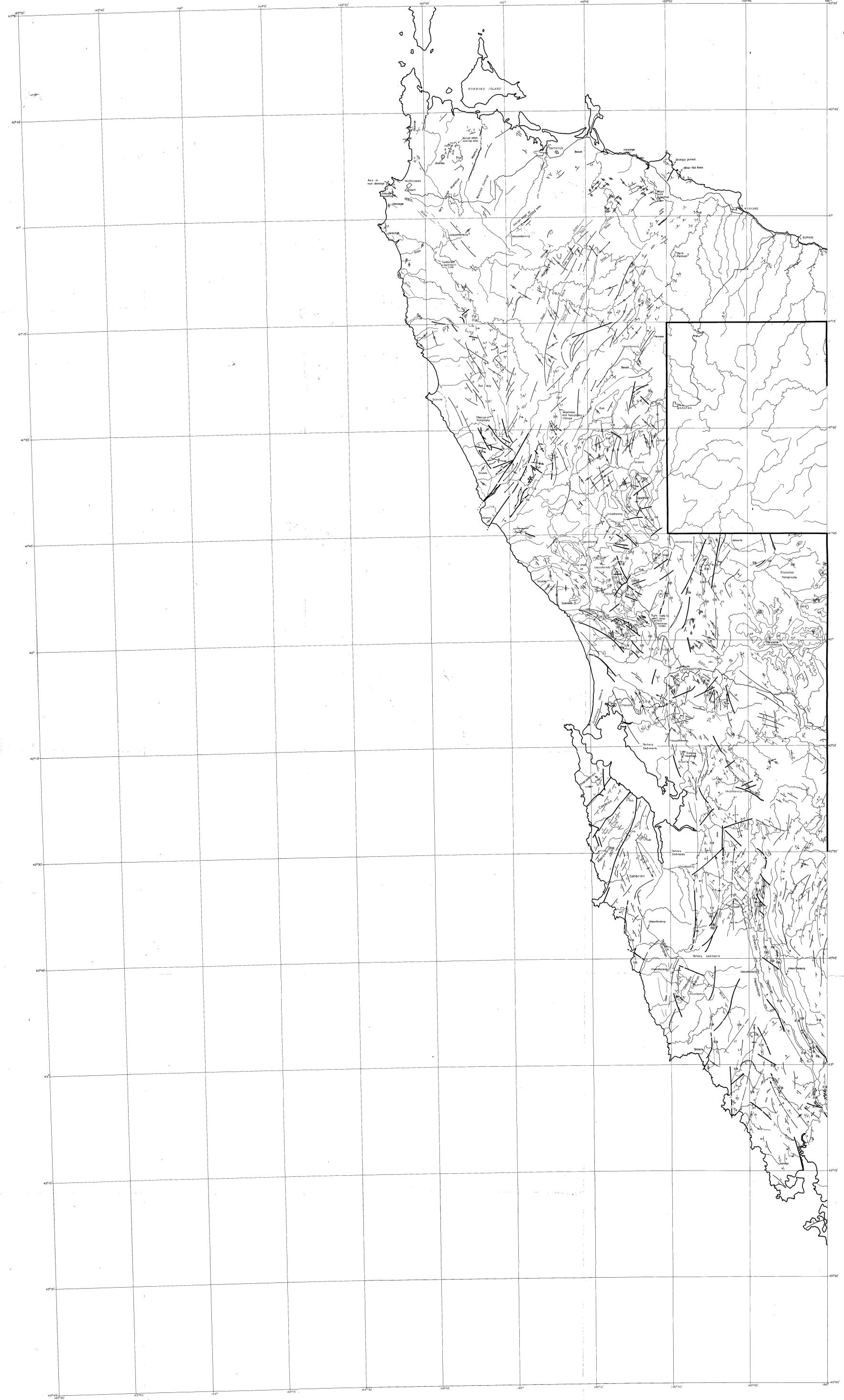
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JONES, B.F., HAIGH, J., GREEN, R., 1966, The Structure of the Tasmanian Dolerite at Great Lake ; J. Geol. Soc. Aust. v. 13 pt.2.

SPRY, A, BANKS, M.R. ed., 1962, The Geology of Tasmania, J. Geol. Soc. Aust. v.9, pt. 2.



GEOLOGIC SYMBOLS

- ⊕ Bedding appears horizontal on photographs
- Dip group 1, less than 5°
- Dip group 2, 5° to 10°
- Dip group 3, 10° to 25°
- Dip group 4, 25° to 45°
- Dip group 5, 45° to nearly vertical
- Bedding appears vertical on photographs
- Overturned bedding
- Dip and strike Amount of dip cannot be determined on photographs
- Dip component
- Geomantic dip (Possible dip slope)
- Strike line Direction of dip cannot be determined on photographs
- Fault, normal or reverse
- Fault, position indefinite
- Fault, strike
- Transcurrent fault
- Dashed line Delineation probable fault
- Delineation lineation
- Dike or sill
- Fracture or joint
- Anticline Arrow denotes plunge, diamond denotes apex, dashed where indefinite, questioned where inferred
- Syncline Arrow denotes plunge, diamond denotes high point, dashed where indefinite, questioned where inferred
- Anticline and syncline, questioned Arrows denote direction of dip, if limbs are on side of same dip
- Contact, dashed where indefinite, questioned where inferred
- Key bed
- Stratigraphic break
- Member isolated or faulted segment with labelled area
- Scarp
- Cob Common ultra-basalt rocks
- P Permian sediments
- T Tertiary sediments

SHEET INDEX



RECONNAISSANCE STRUCTURAL EVALUATION, COASTAL TASMANIA.

PREPARED BY GEOPHOTO RESOURCES CONSULTANTS, BRISBANE.



FOR ESSO EXPLORATION AUSTRALIA INC.

SCALE 1:50,000

Transverse Mercator Projection. December 1966.

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