

TIP, T/90

A REVIEW OF THE SEISMIC DATA
OVER VIC P/4 AND ADJOINING
AREAS OF THE GIPPSLAND BASIN
AUSTRALIA

Part 6.

F. A. Gibson
Dallas, Texas
April, 1972

TABLE OF CONTENTS

	<u>Page</u>
I. INTRODUCTION-----	1 - 2
II. INTERPRETATION-----	3 - 6
III. SUMMARY AND CONCLUSIONS-----	6
IV. PROGRAM RECOMMENDATIONS-----	7 - 8

LIST OF ENCLOSURES

Fig. 1. A	Location plat	1-250,000
Fig. 1.	Isotime values on regional unconformity	1-100,000
Fig. 2.	Isotime values on Latrobe event	1-100,000
Fig. 3.	Bathymmetry	1-100,000
Fig. 4.	Program Recommendations	1-100,000
Fig. 5.	Seismic Profile A-A'	
Fig. 6.	Seismic Profile B-B'	

I. INTRODUCTION

The interpretation of this report of the Gippsland seismic data is centered mainly on an evaluation of the prospects of the Magellan concession area Vic. P/4. In the review, the data of the Magellan surveys in Blk. T/1P; the data of the detailed N.S.W. Oil and Gas Co. survey over T/1P of December, 1970; and the data of the 1969 Magellan survey over the area adjacent to Blks. Vic. P/4 and T/1P on the west and northwest to the Kingfish-Halibut area were used. Generally the quality of the data is considered as fair to good with some points of the interpretation hinged on a marked change in reflection character from the thick Eocene-Paleocene-Cretaceous section in the Halibut-Kingfish area to a thinner sedimentary sequence resting on a "basement" positive over a portion of the Vic. P/4 and T/1P areas.

The drilling data and the seismic data of the N.S.W. survey in the area of the Sailfish well in T/1P also contributed useful data to the interpretation. The presence of the Latrobe Group sediments over the areas of T/1P and Vic. P/4 is a major requirement for hydrocarbon prospects, but the presence of these prospective sediments has not been clearly established by previous seismic work. The G.S.I. report dated June, 1969, entitled "Final Report East Gippsland Basin Area" concludes "Earliest interpretations indicated little if any Oligocene-Eocene deposits east of PEP 38. As more information was obtained, it became clear that this was incorrect, and the bald-headed basement highs (where Latrobe and Lakes Entrance deposits appeared to be missing) were small localized features. With the presence of

the Latrobe and Lakes Entrance established, PEP 63B and T/1P became favorable areas for similar traps to those found in PEP 38." This present review is not in complete agreement with the G.S.I. conclusions and considers that there is seismic evidence of a large "basement" positive that restricted the deposition of the Latrobe sediments over much of the western portion of T/1P and a portion of the southwest corner of Vic. P/4, and over this area middle to upper Miocene rests on this "basement" surface. Drilling data from Sailfish No. 1 in Block T/1P failed to show the presence of Latrobe sediments as the well was bottomed in Miocene section just above the basal reflection. The section below the basal reflection is indicated by refraction data on Line 10 to be "economic basement" of Strezlecki greywackes or crystalline basement. The refraction data shows a section velocity related to the basal reflection in the 18000-19000 ft./sec. range which may be correlated to greywackes or granites. It is noted that refraction velocity data may be the key to a precise determination on the presence or absence of prospective Latrobe section and in following discussions on forward program, additional comments will be made on this technique.

The area covered in this review described by Geographical coordinates lies generally between latitudes $38^{\circ} 30' S$ and $39^{\circ} 30' S$ and between longitudes $148^{\circ} 15'$ and $148^{\circ} 45'$.

Water depths over the area of review range from 200 feet on the west to 2500 feet at the southeast limits of Vic. P/4 and to 5000 feet at the north limits of P/4. (Fig. 3).

II. INTERPRETATION

The interpretation of the prospects of Vic. P/4 of this review is based on the mapping of two prominent reflection events, the first present over the entire area, and the second associated with the area where Latrobe sediments are interpreted to be present. Correlation of the two events to discrete stratigraphic horizons at the Halibut well is possible and it is considered that the continuity of the two events is sufficiently good to maintain the approximate stratigraphic equivalent over the mapped area.

In arriving at conclusions on the tectonic and structural history of the area, reflection character as may be related to reflective indices, becomes an important factor in outlining areas of section pinchout and identification of the event which continues beyond pinchout zones. It should also be noted that considerable weight is attached to a single refraction profile in the identification of "basement" areas.

A discussion of the review of the data of the two events follows:

A. Event No. 1 (U.) (Fig. 1)

This continuous reflection event is considered to represent an erosional surface reflecting regional topography at the end of Eocene time. This surface is represented by the Latrobe Group of sediments in the northwest portion of the area at Halibut No. 1, but progressively represents older truncated section and basement complex to the south and east. The sediments in overlying contact with this unconformity surface ranges from Oligocene in the northwest at Halibut to middle to upper Miocene in the south and east. The truncation of the older sediments is indicated on Line

G 69A-277, B-B' (Fig. 6) as well as the progressive onlap of the overlying Miocene section above the unconformity. Truncation is also seen on Line G 69A-276 as well as on most of the other NE-SW trending profiles.

Composite profile A-A' (Fig. 5) extending from the Halibut area south and east to the southwest corner of Vic. P/4 illustrates (a) the change in character of the event which reflects the change in reflective index from a thick Tertiary section with low velocity contrasts to the contact of middle to upper Miocene and "basement"; (b) the truncation of the Eocene-Paleocene section by the unconformity horizon; (c) the complete extinction of the Eocene against the unconformity; and (d) again the progressive onlap of the overlying Miocene onto the unconformity surface. Referring to the section A-A' for specific examples illustrating the points (a) to (d), the unconformity surface is a relatively weak event in the Halibut area, Line E.T.67; truncation of the older section by the unconformity is indicated on Line E.T.67, but is better expressed on Line G 69A-175 from Sp 9210 on to total extinction of the Latrobe section on Line G 69A-287. The onlap of the overlying Miocene onto the unconformity surface is seen on G 69A-287 and on the short northeast portion of Line G 69A-276.

Apart from the structural anomalies of the Kingfish-Halibut area and referring only to Blks. T/1P and Vic. P/4, the regional dip of this unconformity surface is northeast from the shallow basement complex to the west of T/1P to the northeastern area of Vic. P/4. The order of regional dip is approximately 7000 feet over a distance of approximately 50 miles, or \pm 140 feet per mile (based on reference to sea level). No

structure, other than gentle nosing, is seen on this northeast dipping surface.

B. Event No. 2 (L.) (Fig. 2)

Event No. 2, (L.) by correlation to Halibut represents a point in the Latrobe Group which is associated with the reservoir section of the producing area. The interval between the unconformity (U.) and the Latrobe event (L.) in the Halibut area is not great and the event is mapped to show extinction of the prospective area against the "basement" complex on the south and east portion of the area reviewed and the absence of Latrobe section along the western portion of T/1P and over the southwestern portion of Vic. P/4. This conclusion on the limits of prospective Latrobe section is based on reflection character and refraction data from Line 10 of the N.S.W. survey in T/1P. While we consider that the evidence of loss of Latrobe is convincing, we do not entirely discount the possibility that Latrobe section may be present over our "basement" complex and our recommendation of refraction work in Section IV is made to prove or disprove this premise.

Again disregarding the structural anomalies associated with the Kingfish-Halibut areas, the regional dip of this reflection interface is from the southwest to the northeast with rapid increase of section to the northeast beyond the "basement" complex. Two structural noses closed against the "basement" complex area are associated with the south and western portions of Vic. P/4. The major area of closure centers to the west of the Vic. P/4 west boundary at about $39^{\circ} 03' S - 148^{\circ} 25E$ with the

closing contours extending northeast into Vic. P/4 at about $39^{\circ}\text{S} - 148^{\circ} 30\text{E}$.

A second, smaller but independent closure against "basement" centers in the southern portion of Vic. P/4 at $39^{\circ} 08' \text{S} - 148^{\circ} 36\text{E}$. The possibility exists that this closure might be extended south to the T/lP boundary by further detail work.

III. SUMMARY AND CONCLUSIONS

The interpretation of this review shows a northeast tilted unconformity surface reflecting regional topography at the close of Eocene time. Structure on this surface associated with Blks. T/lP and Vic. P/4 is limited to a strong positive nosing along the boundary of T/lP and Vic. P/4 which appears to reflect structure in depth in the Latrobe. The interpretation shows an area of shallow "basement" complex along the western portion of T/lP and the southwestern portion of Vic. P/4 overlain by middle to upper Miocene non-prospective section.

The interpretation based on a deeper event which has been correlated to prospective Latrobe section shows a large prospective area of closure against the "basement" complex with the crestal area located about 5 miles west of the west boundary of Vic. P/4. The down dip extension of the nose continues into Vic. P/4. A second closure against the "basement" complex is located in the southwest portion of Vic. P/4 and is considered as a prospect requiring further evaluation. A controlling factor of this prospect at the present time is the depth of water (Fig. 3). Further detail work on this prospect might show the feature to extend to the southwest across what is presently shown as the questionable boundary of the "basement" complex.

IV. PROGRAM RECOMMENDATIONS

The primary objective of a forward geophysical program over the Vic. P/4 area would be to clarify the interpretation of the presence of shallow "basement" over the southwest portion of the block and to extend to the southwest the "interpreted" Latrobe wedge. To achieve this objective, the refraction technique is recommended. Five single coverage refraction profiles shot out to at least 35,000 feet have been laid out on Fig. 4. These profiles, two of which are sited in T/1P, should provide data on depth to basement and give a measure of thickness of the Latrobe section.

Further reflection coverage, apart from approximately 15 miles of profile on the nosing along the west boundary of the block, will be dependent on the results of the refraction work. If the refraction profiles numbers 3-4 and 5, indicate a greater depth to "basement" than shown in the present interpretation, additional reflection coverage will be required to further delineate the Latrobe nose in the southwest portion of Vic. P/4.

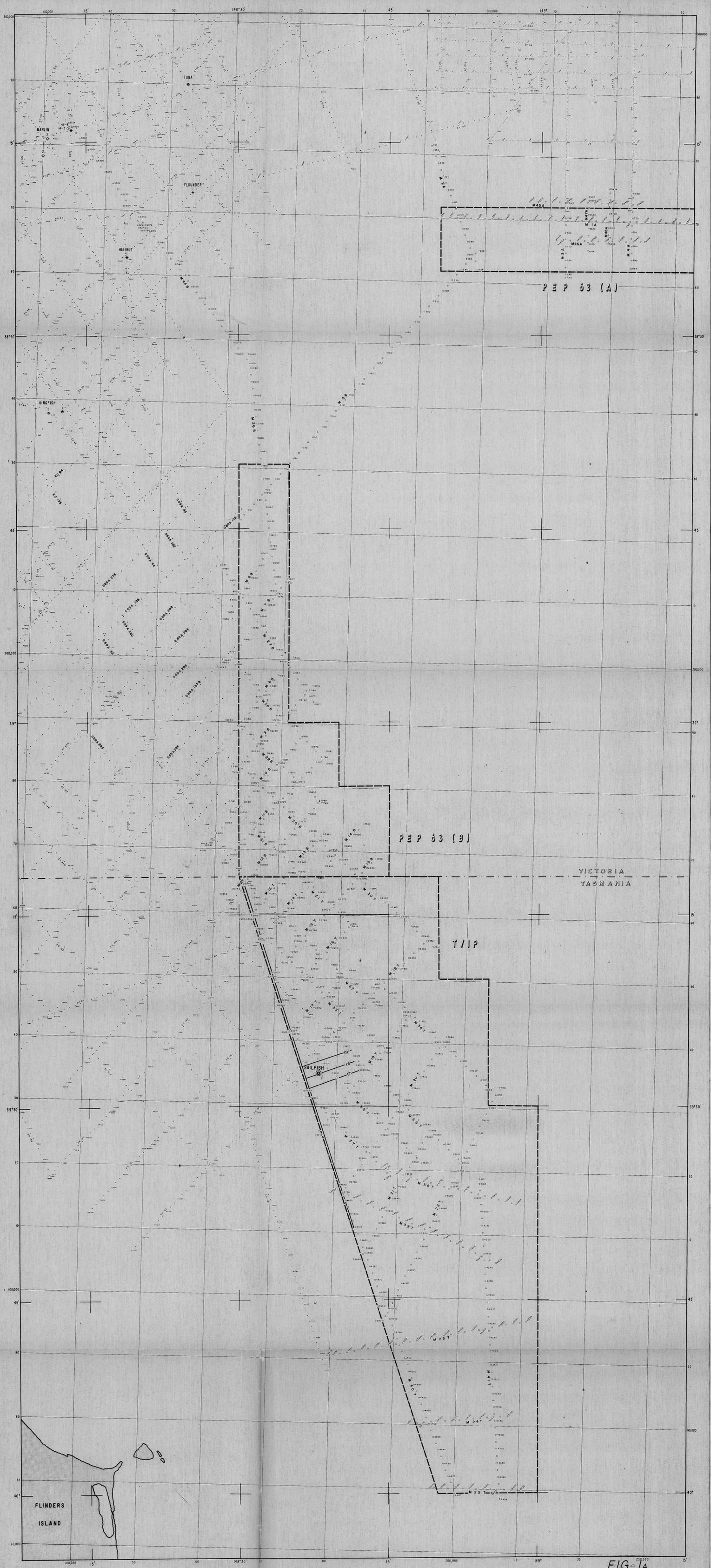
The costs of the minimum program as laid out on Fig. 4 would be on the order of:

Refraction	-	5 profiles	-	\$4,000
Reflection	-	15 miles	-	\$4,500

These estimates do not include positioning charges or additional reflection work which might be required.

We would recommend that the minimum program be considered since this work would add much to the evaluation of the prospects of both T/lP and Vic. P/4.

F. A. Gibson
Dallas, Texas
April, 1972



PEP 03 (A)

PEP 03 (B)

VICTORIA
TASMANIA

TIP

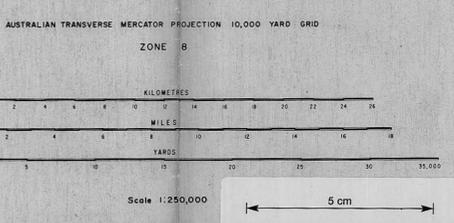
SAILFISH

FIG. 1A

MAGELLAN PETROLEUM SOUTHERN PTY. LTD.
MARINE SEISMIC SURVEY
EAST GIPPSLAND BASIN AREA
SHOT POINT LOCATIONS

025012

AUTHOR D. C. Clarke DATE April 1969
SHEET 1



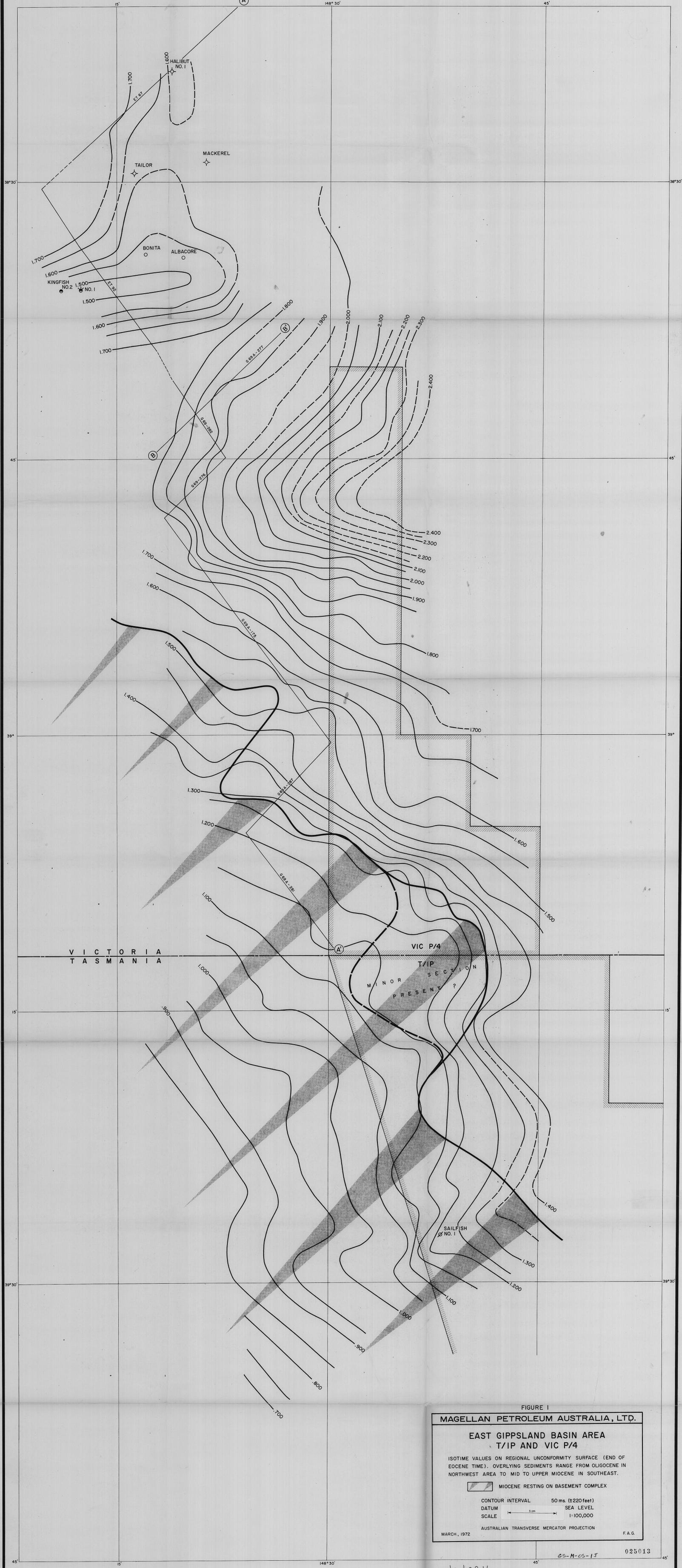
SHOT POINTS
MAGELLAN PETROLEUM SOUTHERN PTY. LTD.
ESSO EXPLORATION & PRODUCTION AUSTRALIA INC.
SHELL DEVELOPMENT (AUSTRALIA) PTY. LTD.

GS-M-05-1J

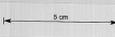
TIP, T19P Part 6

OR-052





VICTORIA
TASMANIA

FIGURE 1
MAGELLAN PETROLEUM AUSTRALIA, LTD.
EAST GIPPSLAND BASIN AREA
T/IP AND VIC P/4
ISOTIME VALUES ON REGIONAL UNCONFORMITY SURFACE (END OF EOCENE TIME). OVERLYING SEDIMENTS RANGE FROM OLILOCENE IN NORTHWEST AREA TO MID TO UPPER MIOCENE IN SOUTHEAST.
 MIOCENE RESTING ON BASEMENT COMPLEX
 CONTOUR INTERVAL 50 ms. (±220 feet)
 DATUM SEA LEVEL
 SCALE  1:100,000
 AUSTRALIAN TRANSVERSE MERCATOR PROJECTION
 MARCH, 1972 F.A.G.

GS-M-05-11 025013

TIP, TQP Part 6

AR-052

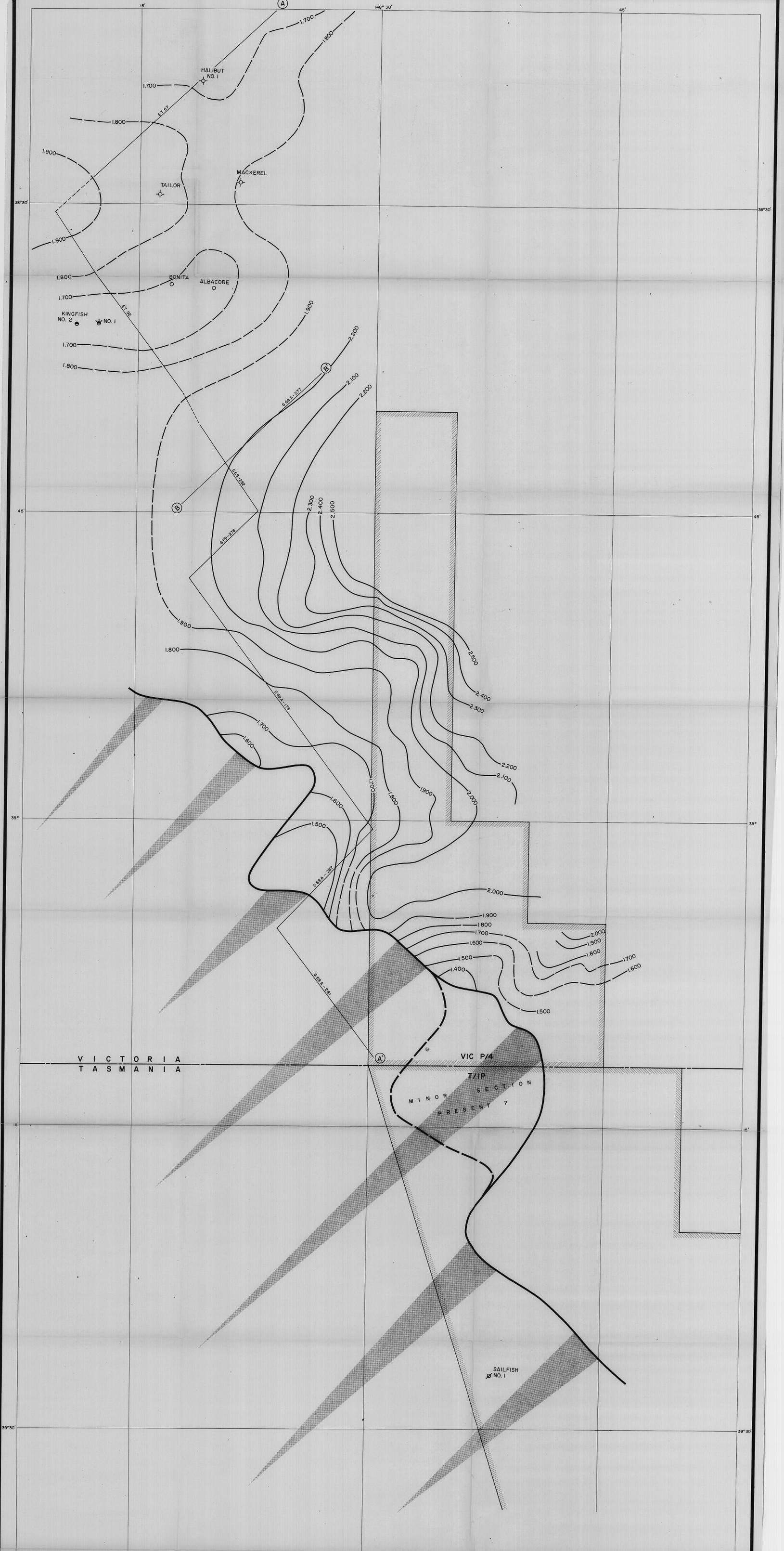


FIGURE 2
MAGELLAN PETROLEUM AUSTRALIA, LTD.
EAST GIPPSLAND BASIN AREA
T/1P AND VIC P/4
 ISOTIME CONTOURS ON A REFLECTION EVENT IN THE LATROBE GROUP (BASED ON A CORRELATION AT HALIBUT NO. 1)
 MIOCENE RESTING ON BASEMENT COMPLEX
 CONTOUR INTERVAL 100 ms. (±440 feet)
 DATUM SEA LEVEL
 SCALE 1:100,000
 AUSTRALIAN TRANSVERSE MERCATOR PROJECTION
 MARCH, 1972 F.A.G.



V I C T O R I A
T A S M A N I A

VIC P/4
T/IP
MINOR SECTION
PRESENT?

SAILFISH NO. 1

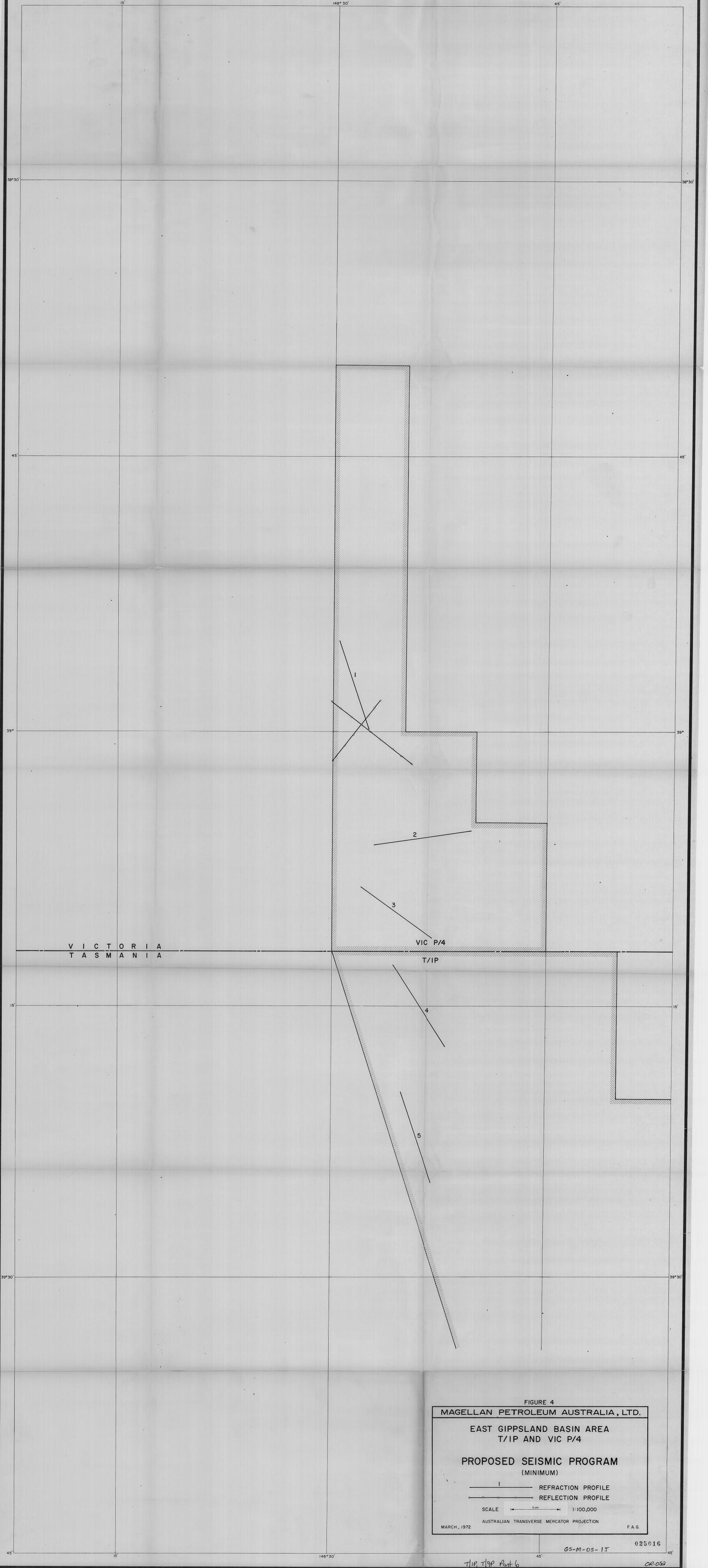
FIGURE 3
MAGELLAN PETROLEUM AUSTRALIA, LTD.
EAST GIPPSLAND BASIN AREA
T/IP AND VIC P/4
BATHYMETRY

 MIocene RESTING ON BASEMENT COMPLEX
 CONTOUR INTERVAL 100 FEET TO DEPTH OF 500 FEET
 GRADING TO 500 FEET BEYOND
 WATER DEPTH OF 500 FEET
 DATUM SEA LEVEL
 SCALE 1:100,000
 AUSTRALIAN TRANSVERSE MERCATOR PROJECTION
 MARCH, 1972 F. A. G.

GS-M-DS-13 025015

TIP TAP Part 6

OR-053



V I C T O R I A
T A S M A N I A

VIC P/4
T/IP

FIGURE 4
MAGELLAN PETROLEUM AUSTRALIA, LTD.
EAST GIPPSLAND BASIN AREA
T/IP AND VIC P/4
PROPOSED SEISMIC PROGRAM
(MINIMUM)
REFRACTION PROFILE
REFLECTION PROFILE
SCALE 1:100,000
AUSTRALIAN TRANSVERSE MERCATOR PROJECTION
MARCH, 1972 F.A.G.

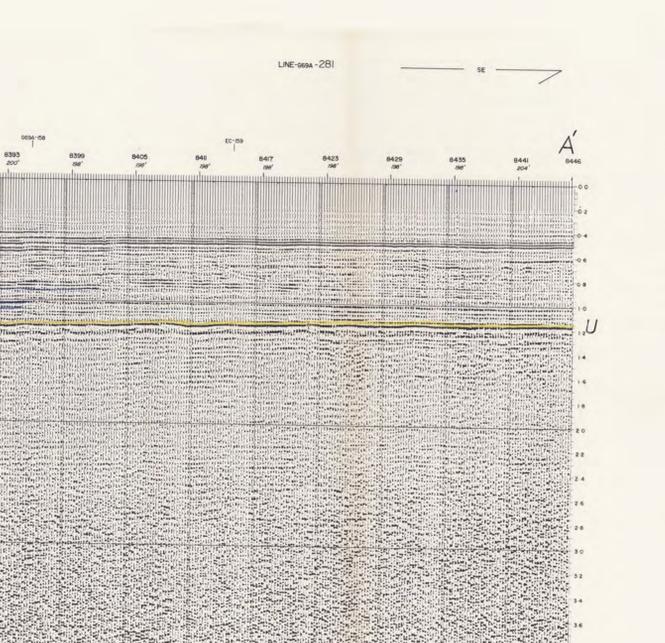
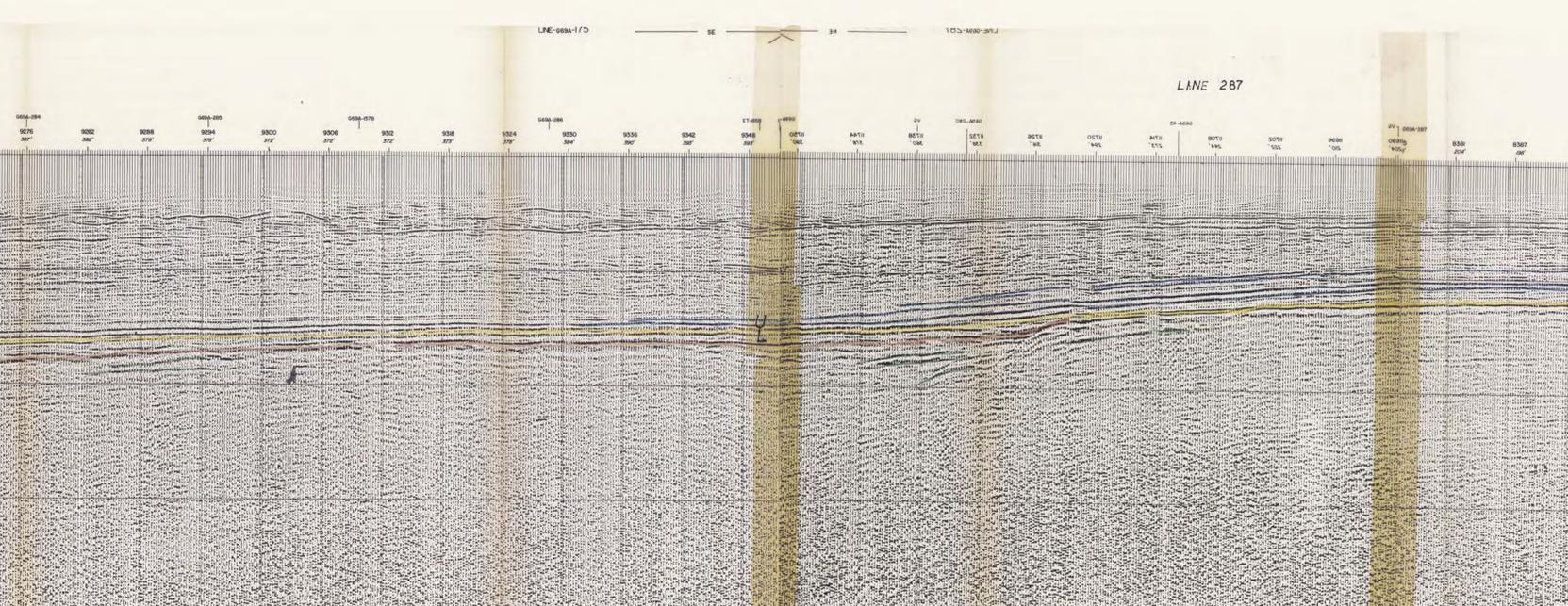
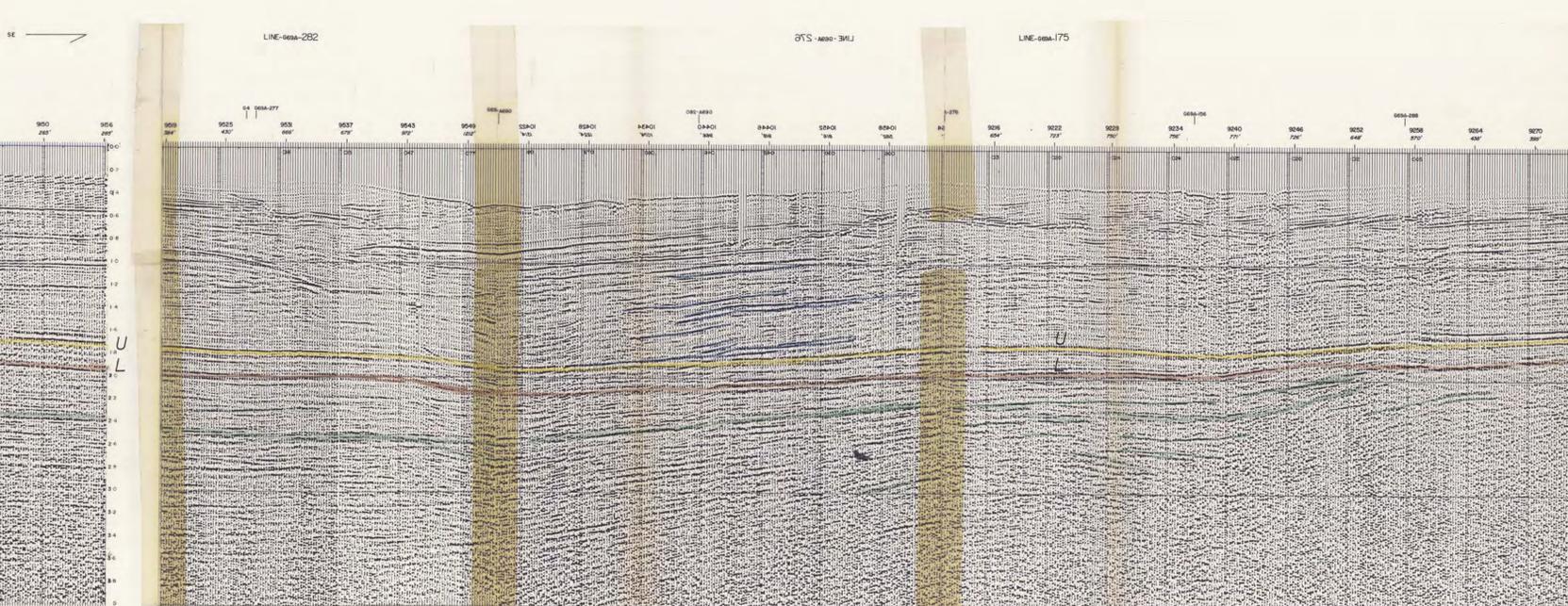
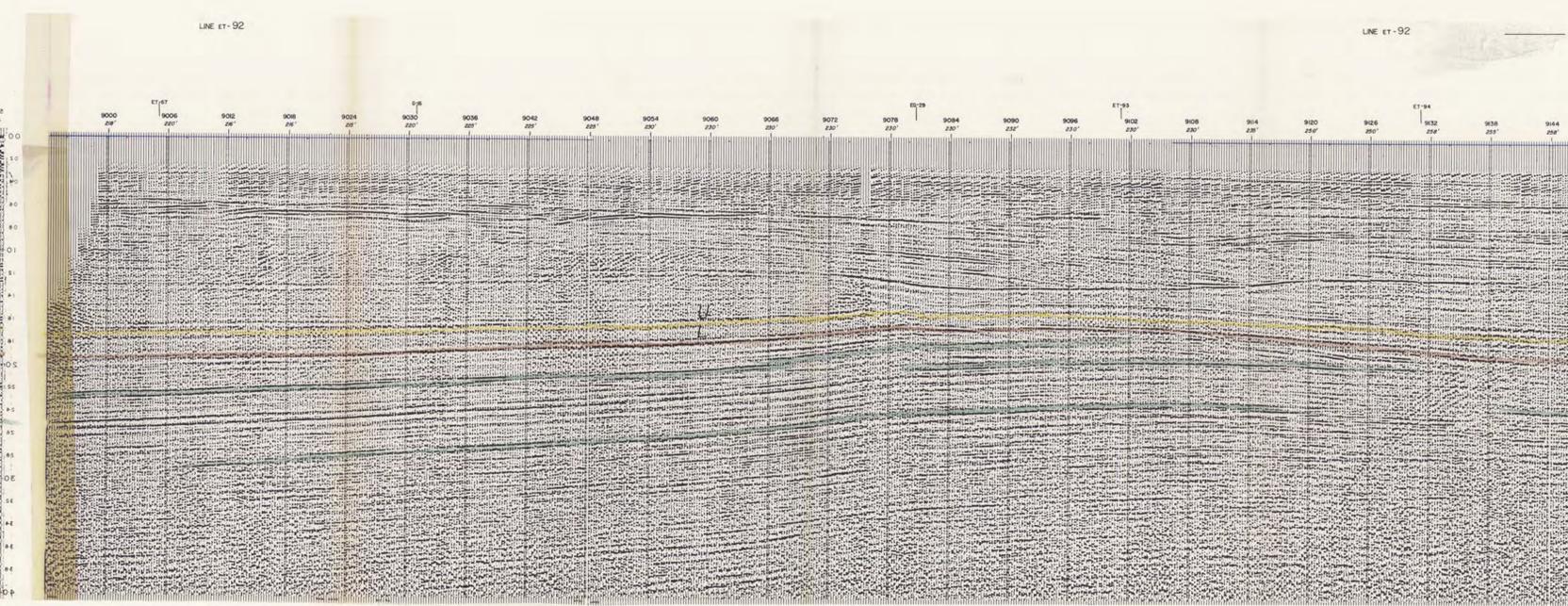
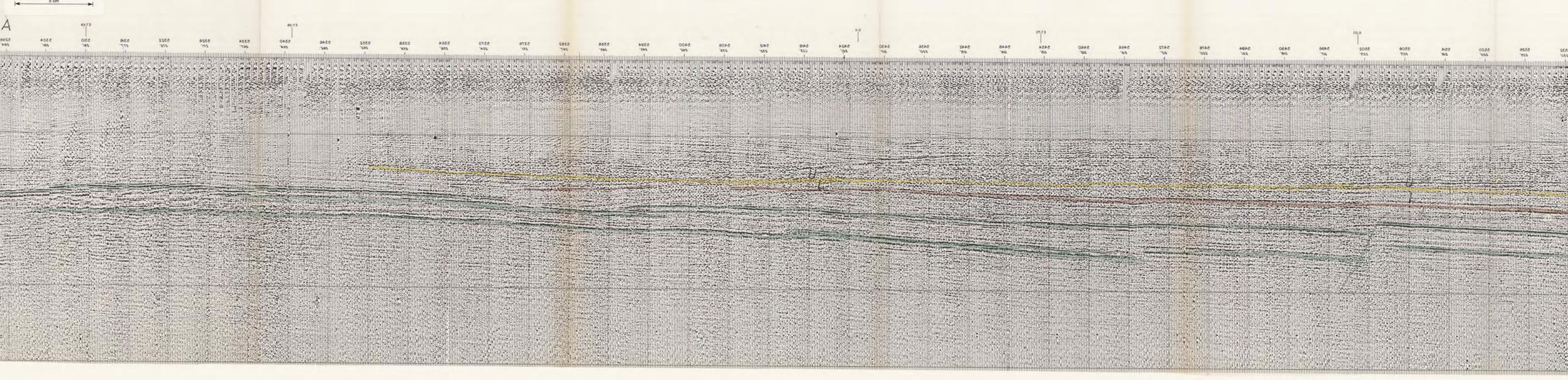
GS-M-05-15 025016

TIP, T/P Part 6

CR-052

025017

cross
FIG. 5
65-M-05-1J
T1P, T1P Part 6



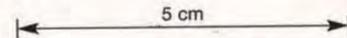
A

U
L

FIG 6

TVD APPLICATIONS

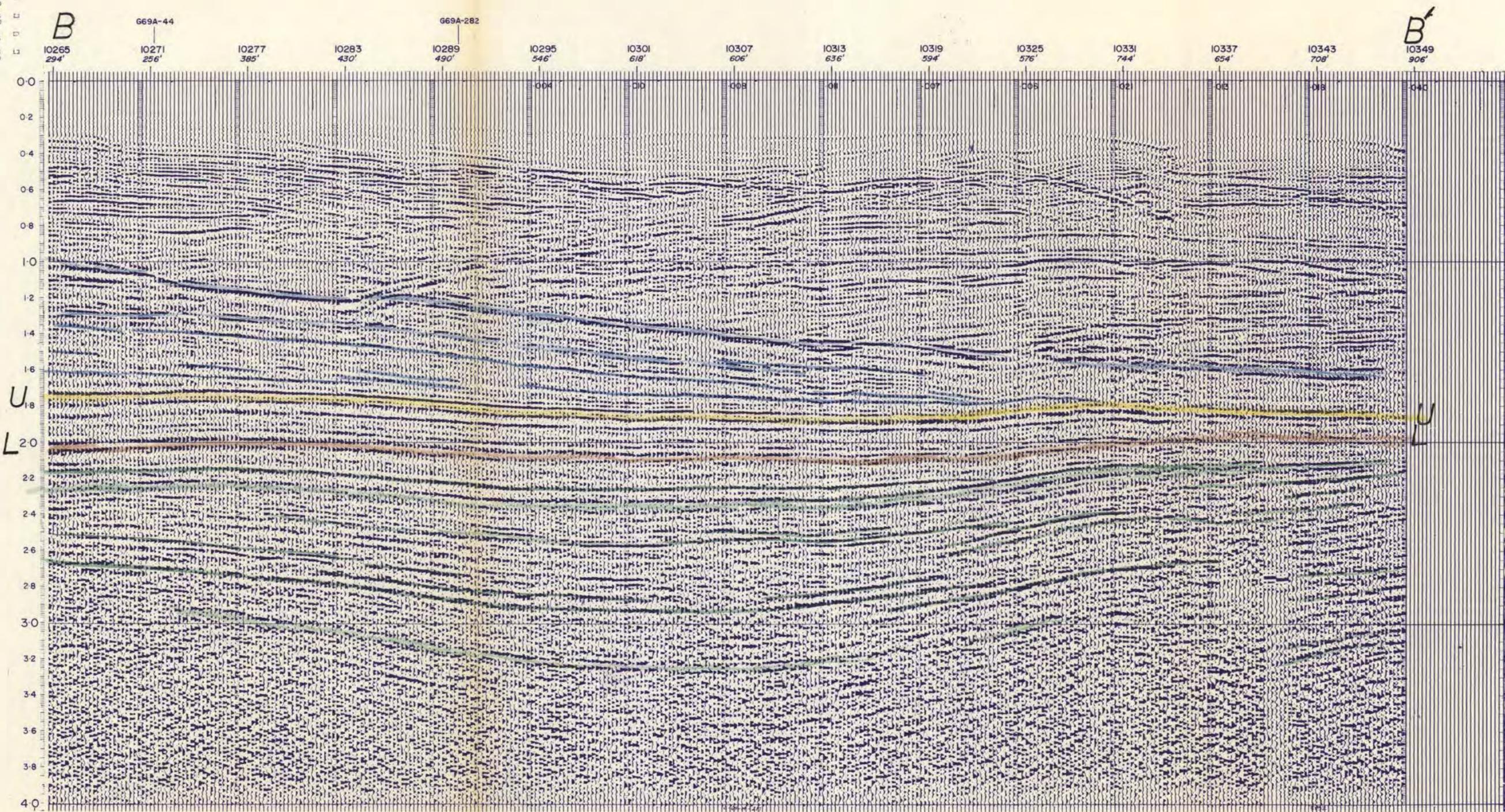
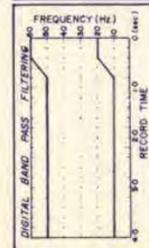
W.D.	OPS./PTS	GATES (Sec)
0' - 750'	2/64	0.200 - 2.734 1.467 - 4.000
750' - 1500'	2/60	0.400 - 2.800 1.600 - 4.000
1500' - 2500'	2/56	0.400 - 2.866 1.733 - 4.000
2500' - 4000'	2/52	0.400 - 2.966 1.933 - 4.000
4000' - 5500'	2/48	0.400 - 3.066 2.133 - 4.000
5500' - 7000'	2/34	1.500 - 3.032 2.267 - 3.800
OVER 7000'	2/34	1.600 - 3.066 2.367 - 3.800



MEDIUM DIGITAL AGC.

MAGELLAN PET. SOUTHERN PTY. LTD.
 STONEY NSW AUST
 AREA GIPPSLAND LINE G69A-277
 RECORDING PARAMETERS B Pops/SP SP off gp 24
 Source AQUAPULSE Charge size lbs
 Fill time 1.5 sec Oxy 50 lbs Prop 20 lbs
 Cable length 7544 ft Group interval 3.28 ft
 SP interval 656 ft
 Pops/Vertical Sum 211 Processed 24 Fold
 Recording filters 100 5 Hz
 WGC Field Crew 64 Date MAR 69

GS1 DIGITAL PROCESSING CENTRE.
 STONEY NSW AUST
 1 SAMPLE PERIOD 4 ms 2 TAR B -10 db α = 3.5 db/sec
 GATE 0 to 4000 ms
 3 NMO Equalization gate 2000 to 3000 ms
 4 DECON pfs ms dec. Design gate to ms
 No. of gates/trace
 5 DIGITAL FILTER 35 pfs 4 ms dec. Hz
 6 DPS OWBS D, TVD D, DCN D, ARD D, AR2 D, DGF D, TVF M-5 D
 7 TIAC Req. 2248 B Hold Top 1725 9 P/B Gain 20 db
 GS1 INPUT CREW 852 Date AUG 69



T1P, T1P Part 6