

An innovation on normal interpretation methods was used in Encounter Bay to map Economic Basement (plates 2(a,b,c)). The reflecting horizon was too shallow to be mapped reliably on reflection VDF sections. Therefore VDF refraction displays were taken approximately every fifty shot points to identify the Basement refractor. The location of the refraction displays is shown on plate 11a, and the displays are included with this report. The following interpretive procedure was used:

First arrivals at successive geophones on the uncorrected VDF displays, in the case of true refractions are colinear. This alignment of first arrivals was projected to the edges of the display, and to a point vertically below the shot point, 850 feet from the first geophone.

The velocity of the refractor was calculated according to the formula

$$V_2 = \frac{L}{\Delta t} \quad \text{where } V_2 = \text{velocity of refractor}$$

$$L = \text{cable length}$$

$$\Delta t = \text{difference in time of first arrival at first and last groups of geophones}$$

The refractor is related to events on the seismic section by the formulas

$$h = \frac{t_0 V_1}{2 \cos \theta} \quad \theta = \sin^{-1} \frac{V_1}{V_2}$$

where h = depth to reflector
 t_0 = intercept time projected to zero spread
 θ = critical angle
 V_1 = velocity of overburden (estimated at 6,000 ft./sec)
 V_2 = velocity of reflector (as calculated above)

The average velocity of the reflector is 17,300 ft/sec, with values ranging from 14,740 ft/sec to 19,460 ft/sec, the variation being generally related to down-dip or up-dip shooting. Some anomalous values were disregarded.

D. REPRESENTATIVE BASIN CROSS SECTIONS

Six VDF sections that demonstrate the Otway Basin regional geology with seismic correlations are shown in figures 5 (a to f). The location of the sections is on all maps.

1) Section A-A' Figure 5 (a)

This section runs from Encounter Bay parallel to the coastline to near the South Australia-Victoria border. Seismic markers shown are Economic Basement, Top Crayfish Sand, Senonian Marker, Base Tertiary and Top Eocene Sandstone. From west to east, the features of interest are:

- a) The Cape Jaffa Hinge line (about shot point 3200) on Economic Basement with Crayfish Sand pinching out against rising Basement.
- b) The Crayfish Platform (between SP 3200 and 1355) where the Top Crayfish Sand is a gently dipping plane.
- c) The Geltwood Beach Hinge Line (around S.P. 1355) which marks the western edge of thick Upper Cretaceous sedimentation.
- d) The general area east of SP 1355 which shows densely faulted Upper Cretaceous and Lower Tertiary rocks, with the Esso Argonaut A-1 location testing the upthrown side of a large fault block. This faulted area falls in the area known as the Gambier Sunlands.

2) Section B-B' Figure 5 (b)

The section is a dip line through the Gambier Sunlands to illustrate the densely faulted nature of Upper Cretaceous and Lower Tertiary rocks. Also of note is the south dipping clinofolding attitude of reflectors between Top Eocene Sandstone and Base Tertiary markers, and the gross clinofold on the Top Eocene Sandstone at the south end of the line.