

Upper Cretaceous sediments generally consist of a basal sandstone unit overlain by a marine shale-mudstone which changes facies vertically into a shallow marine sand-mudstone sequence and culminates at the top of Upper Cretaceous in a non-marine deltaic sand sequence. The axis of deposition roughly coincides with that of Lower Cretaceous. The Upper Cretaceous is more than 8000 feet thick at Shell Voluta 1-A and probably exceeds 10,000 feet in the depositional centres of the basin. Large Upper Cretaceous fault displacements contemporaneous with deposition are documented in the Port Campbell area and are seen by seismic in the general area between West King Island to a hinge line near Geltwood Beach.

During Paleocene through to Upper Eocene time, gentle subsidence took place in the Otway Basin and up to 4000 feet of clastic sediments were deposited in an environment that ranges from paralic to neritic. These clastics were sourced from the north, and they thicken to the centre of the basin then thin southernward in clinoform slopes onto Upper Cretaceous beds. There is seismic evidence of complex Paleocene faulting from south of Warrnambool to the Geltwood Beach Hinge Line, while the eastern half of the basin is undisturbed. Faulting during Eocene time is recognized only in the Gambier Sunlands, and by Oligocene and Lower Miocene time major faulting has stopped.

In Upper Eocene through Lower Pliocene times, marls and limestones were deposited by a transgressive sea. Marine conditions persisted into late Miocene time when transgression reached its fullest extent. During Pliocene time the Otway Basin was subjected to epirogenic uplift which was probably accompanied by some gentle folding and faulting. Vulcanism was widespread during this time in Tasmania and west-central Victoria. In late Pliocene and Pleistocene time the sea assumed its present position.

#### D. REGIONAL BASIN CROSS SECTION

Figure 2 is a regional basin cross section between Esso's four offshore tests to demonstrate regional stratigraphy and the concepts of regional geology. Exaggeration of the vertical scale is forty times, and structural detail has been omitted.

#### E. HISTORY OF EXPLORATION

The search for petroleum has been carried out in the Otway Basin for many years and although no commercial occurrences of hydrocarbons have been found to date, several wells have recorded shows of gas and oil. Frome-Broken Hill Port Campbell No. 1 recorded an initial gas flow of 4.2 MMCF per day with some condensate from the Waarre Formation. Rapidly declining pressure, however, provided the interval to be non-commercial in this well. An offset, Port Campbell No. 4, produced small quantities of oil emulsion with gas cut salt water.

The second stage of exploration in the Otway Basin commenced with a program by Shell Development (Australia) Pty. Ltd. when three offshore wells were drilled during 1967. Their first test, Pecten 1-A, flowed gas at the rate of 145 Mcf per day plus salt water from a 42 foot interval of the Waarre Formation, and the well was subsequently abandoned. The two other Shell tests, Nerita 1-A and Voluta 1-A were abandoned without shows.

Esso's offshore drilling program between September 1967 and June 1968 has resulted in four abandonments, Crayfish A-1, Prawn A-1, Nautilus A-1 and Argonaut A-1. Interstate reactivated interest in onshore exploration late in 1968 with their tests at Woolsthorpe-1, Garvoc-1 and Purumbeete-1. No hydrocarbon shows were encountered, but the distribution of the Lower Cretaceous Pretty Hill sandstone was found to be more widespread than previously forecast.

There has been no drilling activity in the first quarter of 1969.