

(1) History of Exploration

Prior to the completion of Esso Bass-1, the Bass Basin was virtually unknown geologically. No wells had been drilled in the basin, while the several wells drilled in the adjacent Otway and Gippsland Basins were at such considerable distances away as to provide information of regional significance only. Reconnaissance surface geological investigations of the very few Upper Tertiary outcrop areas around the margins of this water-covered basin have been made at various times by government agencies, and more recently by Esso geologists, with only limited value.

Geophysical information, however, was somewhat more detailed. Haematite Explorations had made aeromagnetic and reconnaissance seismic surveys over the basin in 1961 and 1963. Esso Exploration completed a more detailed seismic survey in 1965.

The geophysical data combined with extrapolated regional geology indicated the basin to be primarily of Cenozoic depositional origin, covering an area of some 25,000 square miles, and to contain a sedimentary section some 12,000 feet thick in the centre. Further, it was possible that this section included Tertiary marine sediments favourable for petroleum generation and accumulation. Of the prospects outlined by the Haematite seismic survey, the reef-like anomalies were deemed the most interesting, and after detailed seismic work by Esso, the Esso Bass-1 well was located at the apex of one of these anomalies. These anomalies proved to be of volcanic origin. Esso Bass-2 was located at the top of an anticlinal feature 32 miles southeast of Esso Bass-1.

(2) Regional and Historical Geology

The Bass Basin lies at the southern end of the Paleozoic Tasman Geosyncline whose rocks probably exceed 25,000 feet in thickness on the Mornington Peninsula, north of the basin (Keble, 1950). The strata range in age from Cambrian through Carboniferous and are made up of a complexity of folded, faulted and intruded marine to non-marine sedimentary metamorphic, and extrusive and intrusive igneous rocks. In Tasmania, similar complex rocks, tens of thousands of feet thick, occur along with more than 25,000 feet of pre-Cambrian sedimentary and metamorphic rocks. It is logical to expect Bass to be underlain by any of these rocks. They would extend from shallow depths at the basin edge, and downwards from 12,000 feet in its deepest part.

Bass is essentially a Cenozoic basin, although it may contain Permian, Triassic, Jurassic and Lower-Mid Cretaceous rocks between the relatively undisturbed Tertiary above and complexly folded and intruded pre-Permian rocks below. Permian "tillites" are known from small outcrops along the northern Tasmanian coastline. These may extend northward for some distance into the Bass Basin. The Triassic is represented by sandstone and shale with minor conglomerate and coal in Tasmania, and by minor glacial beds in Victoria. The Jurassic-Lower Cretaceous, generally non-marine, Otway Group occurs in the Gippsland and Otway Basins, and may be present in the Bass Basin.

During the Paleocene and Eocene time, gentle regional downwarping occurred in the Gippsland and Otway Basins and similar downwarp occurred in the Bass Basin. Tasmania remained a positive area. Volcanism and lava flows were abundant from the western part of Gippsland westward to the eastern part of Otway. Similarly, a few small flows occurred in Tasmania. No volcanic rocks of this age were deposited in the axial portion of the Bass Basin (at the Esso Bass-1 location). During this time in Bass, there were widespread swamp conditions under which peat, clay, sand, silt, and gravel were deposited. During Lower and Middle Eocene occasional thin marine sediments may have intercalated with these non-marine