

### 3.0 THE EVOLUTION OF THE BASS BASIN

The Otway basin is generally regarded as an intracratonic trough that extended across a wide area of the present southern margins of Australia (Fig 2). Wilcox et al (1990) suggested that the concept of a linear rift-valley is incorrect and that oblique extensional grabens may have formed in an echelon pattern along the incipient continental margins. There is subsurface and seismic evidence of an early Jurassic to Neocomian half-graben extensional phase (Bein & Taylor, 1981; Kopsen & Scholefield, 1990). By Albo-Aptian times, however, this topography was obscured and deposition continued in a slowly subsiding trough (Encl 1).

Rupture of Australia from Antarctica at 98Ma initiated spreading. The Bass and Gippsland Basins were isolated from the zone of rupture by the Tasman Fracture Zone, which formed contemporaneously with the spreading centres. Otway and Strzelecki Group sediments were faulted, rotated, and eroded, with varying degrees of severity within these two basins.

A northwest to southeast fault pattern was now imposed on sediments of the Otway Group in the Bass Basin. Carey (1985) cited evidence of transcurrent faults, northeast-trending compressional synclines and anticlines, northwest-trending extensional structures, and continued seismicity and vulcanism along the southern margins of Australia, as evidence of dextral shear along the Gambier-Gabo lineament. This explanation could as well apply to the origin of the northwest to southeast fault pattern.

Sedimentation now proceeded during regional dextral movements. Smith (1985) pointed out that a further extensional force now operated on the Bass and Gippsland Basins: that associated with the incipient Tasman rift zone. Three asymmetric rotated blocks, those of the Boobyalla, Anderson, and Bark, now formed. The largest, the Boobyalla Sub-Basin, formed adjacent to the Tasman rift zone. The sub-basins decreased in amplitude in proportion to their distance from the rift.

The sub-basins received large volumes of sediments. Sedimentation began with very high burial rates which decreased with time (Smith 1985). The Tasman Rift Phase of burial (98-80 Ma) was in excess of 300m/Ma, being greatest in the Boobyalla Sub-Basin, where depositional isopachs exceeded 5,000 m in the depocentres adjacent to listric bounding faults. The provenance of the sediments in the sub-basins of T/15P, was Tasmania (Fig 3).

The initiation of spreading in the Tasman Sea (80 Ma) caused major upheavals within the Bass-Gippsland region. The Bassian Rise, King Island High, Tasmania, and the Northern Platform of the Gippsland Basin were uplifted. Huge volumes of sediments were stripped from these areas and redeposited. The regime of faults created by the onset of spreading in the Tasman Sea was orientated in a WNW-ESE direction. These faults were overprinted on the earlier grain.

Sediments within the sub-basins of T/15P were faulted and rotated along listric faults. Synthetic and antithetic directions of dipping blocks are mapped within the Boobyalla Sub-Basin, with antithetically dipping blocks being confined to the northeastern margins of the sub-basin. Rollover structures developed along the structural margins of the Boobyalla Sub-Basin.

The Tasman Sea breakup unconformity, identified as the Golden Beach and Durroon Megasequence Boundary in the Gippsland and Bass Basins respectively, was formed at this time. Subsidence within the Gippsland now coincided with