

matrix material, which results in low permeabilities. A clean quartzose sandstone of basal Lower Cretaceous age was encountered at Frome-Broken Hill-1 which exhibited excellent reservoir characteristics. The sandstone is 1910 feet thick with measured porosities of 19% to 25% and high permeabilities that range from 198 to 2756 millidarcies. An equivalent age sandstone section was drilled at Esso Crayfish A-1 that was in excess of 5257 feet thick. The sand was more fine grained than at Pretty Hill-1, and suffered from clay choking. However, subsequent production tests proved the Crayfish sandstone capable of sustained fluid output. The top of this massive sandstone is an angular unconformity in the Crayfish area, where early Lower Cretaceous sediments were uplifted and truncated.

Later Lower Cretaceous, Otway Group sediments were deposited unconformably over this older Lower Cretaceous unconformity, or over Jurassic and Paleozoic rocks of various types. The axis of Otway deposition is northwest-southeast, parallel to the present coast of Victoria and South Australia from Gippsland to Cape Jaffa. The section is non-marine greywackes, mudstones and coal that is up to 8976 feet thick in more basal areas. The clastics were probably derived from uplifted Mesozoic and Paleozoic highlands to the north and south of the depositional trough. While the highland to the north of the Otway trough is easily outlined from geological evidence, the highland to the south is largely conjectural and is not documented in fact. The non-marine character of the Lower Cretaceous Otway group of rocks, plus widespread north dipping events seen on seismic under the top of the Lower Cretaceous south of Port Campbell and Portland areas, infer an ancient high on the south front of the Otway Basin.

At the close of Lower Cretaceous (Otway) time there were some areas of uplift with accompanying truncation and erosion. This truncation is seen on seismic in the areas of Shell Pecten 1-A and Shell Nerita 1-A. However, to the west in the area of Esso Crayfish A-1, there is no obvious angular unconformity. In the Gambier Sub-Basin, deposition may be continuous between Lower and Upper Cretaceous, with the subtle marine drowning of the Otway non-marine sediments representing the break between the two ages.

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 over 10,000 feet in the depositional centres of the basin. Large fault displacements contemporaneous with deposition are documented in the Port Campbell area and are seen by seismic in the off-shore area between Geltwood Beach-1 and Shell Voluta 1-A. At the close of Upper Cretaceous, there was uplift and accompanying erosion as documented by seismic in some areas.

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 thin by way of clinoform slopes basinward on to Upper Cretaceous beds. 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. Volcanism was widespread during this time