

poorly defined east-west trending trough which extended from offshore South Australia south of Cape Jaffa to Western Victoria near Casterton. Only one well, Planet Oil Casterton-1, encountered Jurassic rocks, where 1282 feet of clastics and dolerite lay unconformably over Paleozoic slate. The section consists of a 490 foot thick sub-greywacke underlain by dark grey, carbonaceous shale, siltstone and two dolerite sills.

The Lower Cretaceous may have a maximum thickness of 15,000 feet. This section is predominantly non-marine and consists of greywackes, sub-greywackes, carbonaceous siltstones and chloritic mudstones. The sandstones usually contain abundant matrix material, which results in low permeabilities. A clean quartzose sandstone of basal Lower Cretaceous age was encountered at Frome-Broken Hill Pretty Hill-1 which exhibited excellent reservoir characteristics. The sandstone was 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-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 this 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.

Similar aged porous and permeable Lower Cretaceous sands were also encountered at Planet Casterton-1, Interstate Woolsthorpe-1 and Garvoc-1, Esso's Lake Eliza-1 and Lucindale-1, and Shell's Hawksdale-1.

Late 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. Recent papers (le Pichon, X., Heirtzler, J.R., 1968 Magnetic anomalies in the Indian Ocean and ocean floor spreading; Jour. Geophys. Res. 73 (6). Isacks B. et al, 1968, Seismology and the new global tectonics, Jour. Geophys. Res. 73 (28). Vine, F.J. 1966, Spreading of the ocean floor; new evidence, Science 1954) on the theory of continental drift suggest that the southern highland may have been the present day Antarctic continental landmass and that Jurassic through Lower Cretaceous represents the first rifting of Antarctica from the south coast of Australia.

At the close of Lower Cretaceous (Otway) time, there were areas of uplift, faulting, truncation and erosion. The truncation and faulting is seen by seismic in the Victorian and Tasmanian portions of the Otway Basin. However, to the west in the area of Esso Crayfish-1, there is no obvious angular unconformity. In the Gambier Sunlands, deposition may have been 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 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.

These faults may be more evidence of the continued rifting of Antarctica from Southern Australia. At the close of Upper Cretaceous there was some uplift and erosion.