

Hope Beach is the 4 km long south-facing side of the tie-bar connecting the Clifton portion of South Arm to the Opossum Bay section. The tie-bar varies greatly in width from a few hundred metres to more than 1 km. The north side of the isthmus faces the shallow Ralphs Bay, and it is on this side of the bar that the road runs and all geophysical work was undertaken.

The regional geology shows Permian siltstones to east and west dipping westward at up to 15°. At least one N-S fault is inferred to pass through Ralphs Bay in order to satisfy stratigraphic requirements. Dolerite intrudes Middle Permian rocks east of the isthmus. In order to make conclusions about the form of the rocks underlying the neck a gravity survey supported by the more quantitative seismic method was undertaken.

A gravity traverse along the road showed a residual anomaly of -8 to -9 mgal slightly west of its centre. The profile suggests, by its smoothness, that a depression filled with light clays and sands either is a valley fill or a fault block with many step faults.

While the gravity survey (Leaman, 1972) reveals that a major Tertiary (?) depression filled with sand and clay is present it is not possible to establish its scale or the composition of the underlying rocks.

The seismic refraction survey undertaken in the region of maximum gravity anomaly revealed 120 m of sand and clay (1,700 m/s) flatly overlying a refractor with a seismic velocity 4,200 m/s. The refractor velocity obtained implies a Permian siltstone 'basement'.

Assuming 120 m of sediment and a 700 m column of Permian rocks in a 2-dimensional structure the total anomaly would be -7.4 mgal compared with an actual anomaly of -8 to -9 mgal. This solution is based on the assumption of major Tertiary (?) faulting of at least 180-270 m and no dolerite. However a dolerite sheet is present to the east in Permian rocks at a lower stratigraphic level than those exposed at Ralphs Bay and the gravity survey to the west definitely implies dolerite in the South Arm - Opossum Bay region at unknown depth. Thus it appears likely that a dolerite sill is included in the dropped Ralphs Bay fault block. An average sill is equivalent to 4.0 mgal anomaly and thus there would be a total anomaly deficiency of -4.6 to -5.6 mgal. This cannot be accounted for in any way with the known post-Carboniferous rocks. This value for mass deficiency in the Hobart District has been found elsewhere (Leaman, 1972) and suggest either a total error in the regional gravity assumptions or a mass deficient basement, i.e. basement rocks with density less than 2.67 g/cm³. As it is unlikely for the regional estimation to be in error by more than 0.5 to 1.0 mgal the latter conclusion is that to be accepted.

REFERENCE

- LEAMAN, D.E. 1972. Gravity survey of the Hobart district. *Bull.geol.Surv. Tasm.* 52.