

TR19-82-83

8. Foundation and groundwater investigation for Scottsdale Pine Industries, Tonganah.

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A seismic survey to determine the foundation conditions likely to be encountered at a proposed site for a milling complex at Tonganah [EQ492405] was undertaken at the request of E.D. Shield. An evaluation of the groundwater prospects of the area was also requested.

GEOLOGY

The proposed site is the flat-topped N-S trending spur which extends north from the North Eastern railway line to the Tasman highway. The site slopes down to the west to the alluvial river flats of the Great Forester River. No outcrops occur on the site but further to the east Tertiary sediments are exposed in two small gravel and sand pits at the base of the spur on the Rocky Gully road.

Granite crops out along the railway line which forms the southern boundary of the site. South of the railway line a steep scarp rises to the high granite plateau of Mount Cuckoo. Two bores have been drilled by the Department of Mines near the area investigated. A percussion bore hole [EQ503427] is situated on the same ridge approximately one kilometre north of the Tasman highway. In this bore 36 m of gravel, sand and clay were penetrated, overlying granite. A rotary bore hole [EQ507466] was drilled on the western side of Rocky Gully approximately 2 km north-west of the mill site. This bore was drilled through 6 m of gravel, sand and clay of Tertiary age followed by 3 m of clay of uncertain age and then weathered and decomposed granite to 30 m where hard unweathered granite was encountered.

GEOPHYSICAL WORK

A seismic spread 450 m in length was run in a N-S direction on the Tasman highway south from the access track. The geophone spacing was 15 m.

Three velocity layers were present; a surface layer, V_0 , (seismic velocity 1067-1219 m/s), an intermediate layer, V_1 , (1676-1829 m/s) and a third layer, V_2 , (3350 m/s - southern shot point; 4880 m/s - northern shot point).

The surface layer seismic velocities are in the range of superficial sand, gravel and clay of Tertiary age lying above the water table. The depth of this water table is calculated to be 6-9 m. The intermediate layer velocities are those of saturated Tertiary gravel, sand and clay, and deeply weathered granite. These sediments appear to be very thick in this locality with a calculated depth of 75-90 m to the V_1/V_2 interface using an averaged V_2 velocity of 4000 m/s for the third layer. The V_1/V_2 interface slopes steeply down to the north and is thought to represent the unweathered profile of the granite.

From the south end of the seismic spread a velocity layer of 2133 m/s was distinguishable on the records from three geophones between the V_2 and V_3 velocities. This velocity coincides with that found for weathered granite elsewhere in the Scottsdale area and could not be distinguished from the northern end of the spread because of the slope of the V_2/V_3 interface. If a weathered granite layer is included in the calculations the thickness of the Tertiary sediments is reduced to 30 m and the top of the granite occurs at a depth of 45-60 m.

GEOHYDROLOGY

The yield from the percussion bore was low; less than 7 l/min being bailed from the hole. The water quality was high (78 ppm total dissolved solids). The water table in this bore was deep (24 m) and there were only 12 m of Tertiary sediments between it and granite. This bore was sited early in the underground water investigation of the Scottsdale area as a stratigraphic hole, without preliminary geophysical work.

The rotary drill bore hole yield was also low (54 l/min) with an 11 m drawdown during a 4-hour pump test. Water quality was good (55 ppm total dissolved solids). The low yield is explained by the presence of only 6 m Tertiary gravel, sand and clay.

Both of these bores now appear sited on the margins of the Tonganah Tertiary basin. Any bore sited towards the deeper part of the basin is likely to give higher yields, because the percentage of clay present in the Tertiary sediments should become less, and the Tertiary sequence thicker. At the mill site the Tertiary sequence is thicker but the percentage of clay present can only be established by drilling.

CONCLUSIONS

The seismic spread indicates that the steep granite scarp exposed south of the railway line continues beneath the Tertiary sediments to a depth of 45 m. As in other Tertiary basins of the Scottsdale region the Tertiary sediments of Tonganah basin were deposited over a granite surface with a high relief. No granite is likely to be encountered during excavations for foundations on this site.

In spite of the poor yields of the two previous bores a bore sited on the western flank of the spur at the northern end of the seismic spread should give yields of more than 80 l/min of good quality water.

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