

Seismic survey at Oakleigh Creek (formerly Mt Pelion wolfram) mine.

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Abstract

A refraction seismic survey over glacio-fluvial gravels immediately north and east of the Oakleigh Creek mine indicated the gravels are variable in thickness (generally 15 - 20 m) and overlie an open jointed and probably water saturated basement layer (Precambrian quartzite and schist). The water table lies within the gravels, 3 - 5 m below the surface.

INTRODUCTION

The Oakleigh Creek mine (formerly Mt Pelion wolfram mine) is situated on the eastern edge of the Forth River valley, just above the valley floor, at DP193745. A refraction seismic survey was undertaken in the vicinity of areas designated for tailings disposal and a proposed decline, and along the projected strike of the lode to ascertain the depth of the glacio-fluvial fill in the valley floor.

GEOLOGY

The Forth River valley displays a striking glacial topography with a steep-sided valley and a relatively flat lying valley floor.

At the Oakleigh Creek mine, the steep east side of the valley consists of E-W trending, near-horizontal Precambrian quartzite, mica schist and quartz mica schist of the Fisher Group (Macleod et al., 1961). The Precambrian rocks are strongly jointed with two prominent near-vertical sets trending approximately N-S and E-W. This jointing, combined with the near-horizontal bedding imparts an open jointed rectangular blocky texture to the rock.

In the valley floor west and north of the mine the Precambrian rock is overlain by Pleistocene(?) glacio-fluvial gravels which consist of rounded boulders in a poorly sorted pebble to silt matrix. Recent alluvium has been deposited by the meandering Forth River which has dissected much of the glacio-fluvial deposits.

There is an abrupt change of slope between the glacio-fluvial deposits in the valley floor and the steep east side of the valley. The only previous indication of the thickness of the glacio-fluvial fill is at least 27.5 m in a drill hole (D.D.H. MP4) which bottomed in the glacial sediment.

SEISMIC SURVEY

A refraction seismic survey consisting of six spreads with a geophone spacing of 7.6 m was carried out over a relatively flat area of glacio-fluvial sediment north of the mine (fig. 1).

In five of the spreads three layers are apparent, as indicated in the seismic profiles in Figure 1 and summarised below:-

Seismic velocity (m/s)

Surface layer	460 - 610
Second layer	1525 - 1675
Basement layer	3050 - 3660

In spread 4 a 975 m/s layer is interpreted to overlie a 3350 m/s layer. The data quality is only fair and depths are not reliable to better than $\pm 10\%$. All levels indicated in Figure 1 are relative to the 240 m adit level.

The two top layers are interpreted as poorly sorted glacio-fluvial sediment which is probably very variable in texture. The 1525 - 1675 m/s layer is interpreted as water saturated glacial sediment and therefore the top of this layer is the water table.

The basement layer is interpreted as the Precambrian quartzite and schist which is the host rock for the mineralisation. Its seismic velocity is rather low for this kind of rock, and this implies an open-jointed rock mass. Similar open-jointed rocks in the north-west of Tasmania are usually good fracture aquifers, capable of yielding up to 600 l/min to a 120 mm bore hole.

In spread 4, the 975 m/s layer mentioned above probably represents a partially saturated situation. The results of this spread are not entirely satisfactory.

CONCLUSIONS

The seismic survey should only be regarded as a general guide to the subsurface geology and if more accurate information is required then further drilling is necessary.

However, three main conclusions are derived from the survey:

- (1) The glacio-fluvial sediments are variable in thickness (generally 15 - 20 m) and in texture. The subsurface topography of the bedrock is irregular and the drill hole (D.D.H. MP4) appears to have been sunk into a depression.
- (2) The glacio-fluvial sediments have a water table generally 3 - 5 m below the surface.
- (3) The bedrock is open jointed and therefore probably water saturated.

The last two conclusions are probably the most significant, indicating what water may be a problem in the proposed decline and future underground development from the decline.

REFERENCE

MACLEOD, W.N.; JACK, R.H.; THREADER, V.M. 1961. One mile geological map series. K/55-11-52. Du Cane. *Explan.Rep.geol.Surv.Tasm.*

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