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4. SEISMIC TRAVERSE — LINE 14 GREAT NORTHERN PLAINS

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INTRODUCTION

A seismic traverse along Line 14, Great Northern Plains was undertaken to determine the possibility of delineating tin bearing areas by seismic means. The line extends from the Ringarooma River towards Portland Road. The results were correlated with known drill holes in the area.

GEOPHYSICS

Method and Equipment

The seismic equipment used was a 12 channel refractor seismograph type G.T. 2 manufactured by Geospace Corporation, Houston, Texas, and Hall Sears X2 model K geophones with a natural frequency of 14 cycles/second.

Spreads consisted of 12 geophones spaced 50 feet apart between Bore Holes 11 and Bore Hole 26, and shot points were placed 50 feet and 600 feet from each end of the spread. Between Bore Holes 26 and 38 a geophone spacing of 100 feet was used and shot points were 50 feet from each end of the spread.

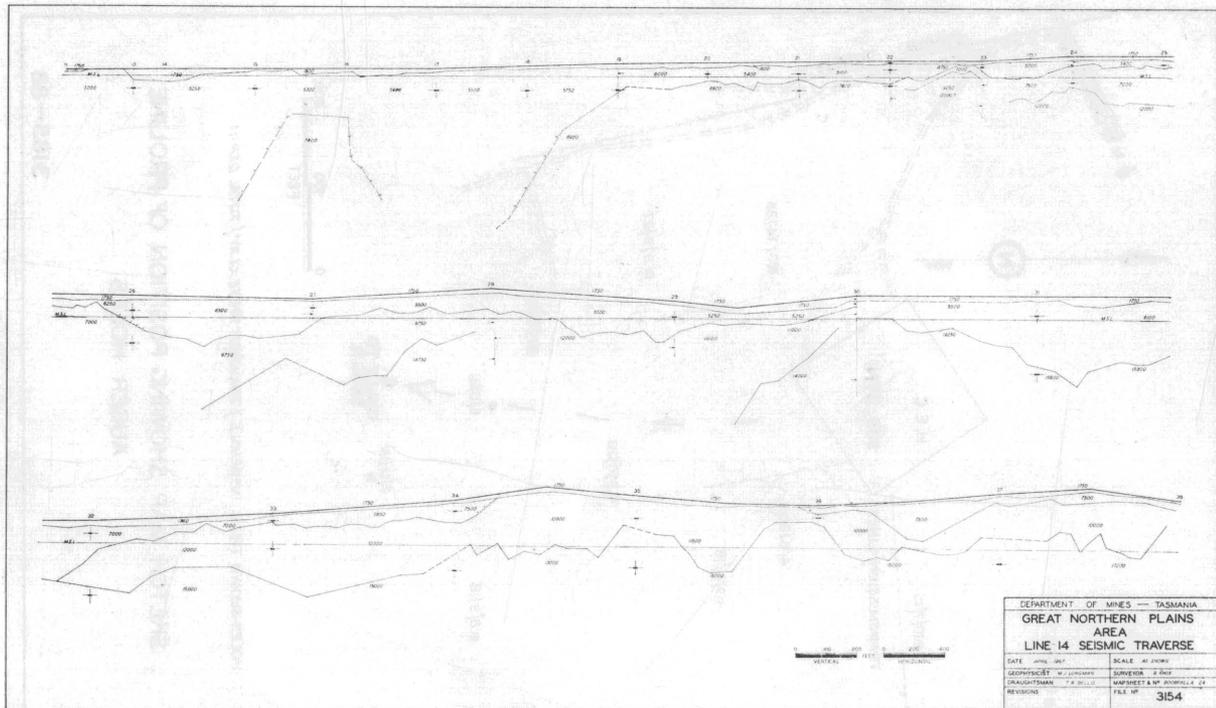


FIGURE 5.

As few details of the basement were obtained between Bore Hole 13 and 18 two extra spreads of 12 geophones 100 feet apart were used in this area and charges were detonated 1,200 feet from each end of these spreads.

Results

The seismic results are presented as a profile (fig. 5).

The main features are:—

1. Two deep leads composed dominantly of clay 500+ feet deep occur beneath Bore Holes 16, 17, 18, 13, 14 and 15. These leads were not expected from the known geology.
2. A smaller lead approximately 200 feet deep occurs beneath Bore Holes 31 and 32 and probably corresponds to the N extension of the Scotia Lead.
3. Basement rock underlying Bore Holes 15 to 30 is dolerite which is deeply weathered.
4. Basement rocks which underlie Bore Holes 30 and 38 are Mathinna quartzite and slate, intruded by dolerite at depth.
5. Tin bearing areas in the Tertiary deposits have a lower seismic velocity than non-tin bearing areas (i.e. 4,750-5,100 feet/sec. as opposed to 5,500-6,000 feet/sec.).

The geological sequence and the seismic velocity of the rocks is:—

Rock type	Depth feet	Seismic velocity
<i>Sedimentary Rock:</i>		
Recent—alluvium and weathered rock	10+	1,750
Tertiary—gravel, sand and clay	500+?	4,750-6,500
Permian—shale and sandstone	200+	{ unknown
Silurian and Devonian quartzite and slate	unknown	{ 10,000-12,000 7,500 weathered
<i>Igneous Rocks:</i>		
Jurassic dolerite	400+	{ 7,000 (weathered)
Devonian granite	unknown	{ 12,000-20,000

CONCLUSIONS

When correlated with the drilling information (fig. 6) it is apparent that the seismic results obtained locate deep leads accurately but exaggerate the depth to basement. In this region seismic methods can be used to locate shallow potential tin bearing areas. This could be done by searching outwards from known drill holes for areas approximately 50 feet deep with a seismic velocity of 4,750-5,000 feet/second. Detailed traverses with a geophone spacing not exceeding 50 feet would be required.

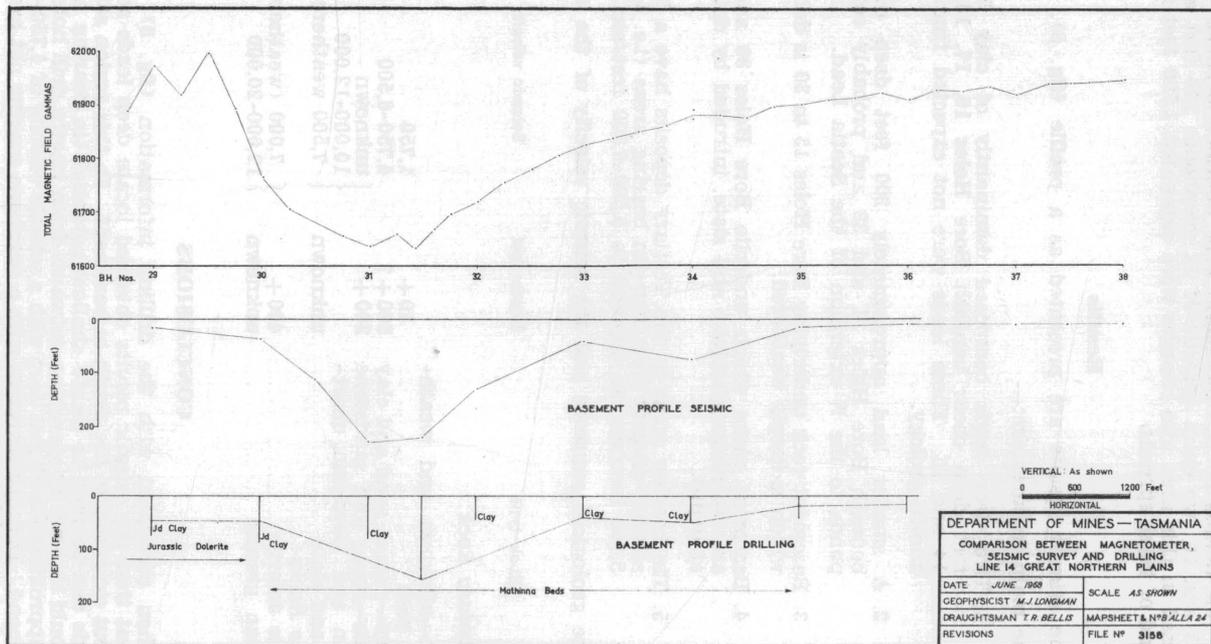


FIGURE 6.