UR1973_72

1973/72. Seismic survey, South Mt Cameron.

D.E. Leaman

A series of spreads was fired adjacent to the old Herrick-Boobyalla Road and two other spreads were fired on Picketts Plain between Ruby Creek and Corduroy Creek at the request of regional geologist, A.V. Brown (fig. 1). The objective of the survey was:

(1) to determine the thickness of Tertiary sediment in the presumed lake deposit at Picketts Plain, and
(2) to establish whether any outlet channels are present east of the Endurance mine in a region where no granite crops out.

Refraction spreads 1-9 complete an overlapping traverse between granitic areas while spreads 10, 11 are soundings.

RESULTS AND DISCUSSION

Traverse spreads 1-9: Boobyalla Road

The interpretation and velocity values are indicated in Figure 2. There are four layers.

Layer 1: Velocity range 700-1000 m/s; thickness variable (up to 30 m)
Layer 2: Velocity range 1400-1850 m/s; thickness variable (up to 40 m)
Layer 3: Velocity range 2000-3200 m/s; discontinuous (up to 30 m thick)
Layer 4: Velocity range 3700-7000 m/s; average 6000-7000 m/s.

Layer 1 represents soil and weathered overburden whether derived from the weathering of granite or deposited. It is presumably dry or not compact.

Layer 2 is considered to represent Tertiary sediment which must be both wet and well compacted. The values recorded are near the maxima for Tasmanian Tertiary materials. Much clay must be present at depth. This interpretation is based on the known presence of Tertiary sediment in the bore hole near spread 7, the form of layer overlaps where rock is known to be present and the velocity values generally. It is likely that layer 1 is a weathered or sandy version of this sediment. The interpretation shows that there are two distinct depressions in the granite basement, each to about 40 m above sea level.

Layer 3 represents moderately weathered or fractured granite and is not always present.

Layer 4 represents massive or fresh rock.

It is possible that layer 2 could include some very deeply weathered granite but this cannot be determined seismically. It should also be noted that refraction methods usually overestimate the depth of layer interfaces where weathering is pronounced. Thus portions of the traverse may be in error by up to 10 m, especially in parts of spreads 5-8. However where layer 2 directly overlies layer 4 and the velocity contrast exceeds 4000 m/s the interpretation is likely to be correct since the interface has probably been cleared of weathering products by erosion prior to the deposition of the Tertiary sediments.

Spreads 10, 11: Picketts Plain

The following general observations were made:

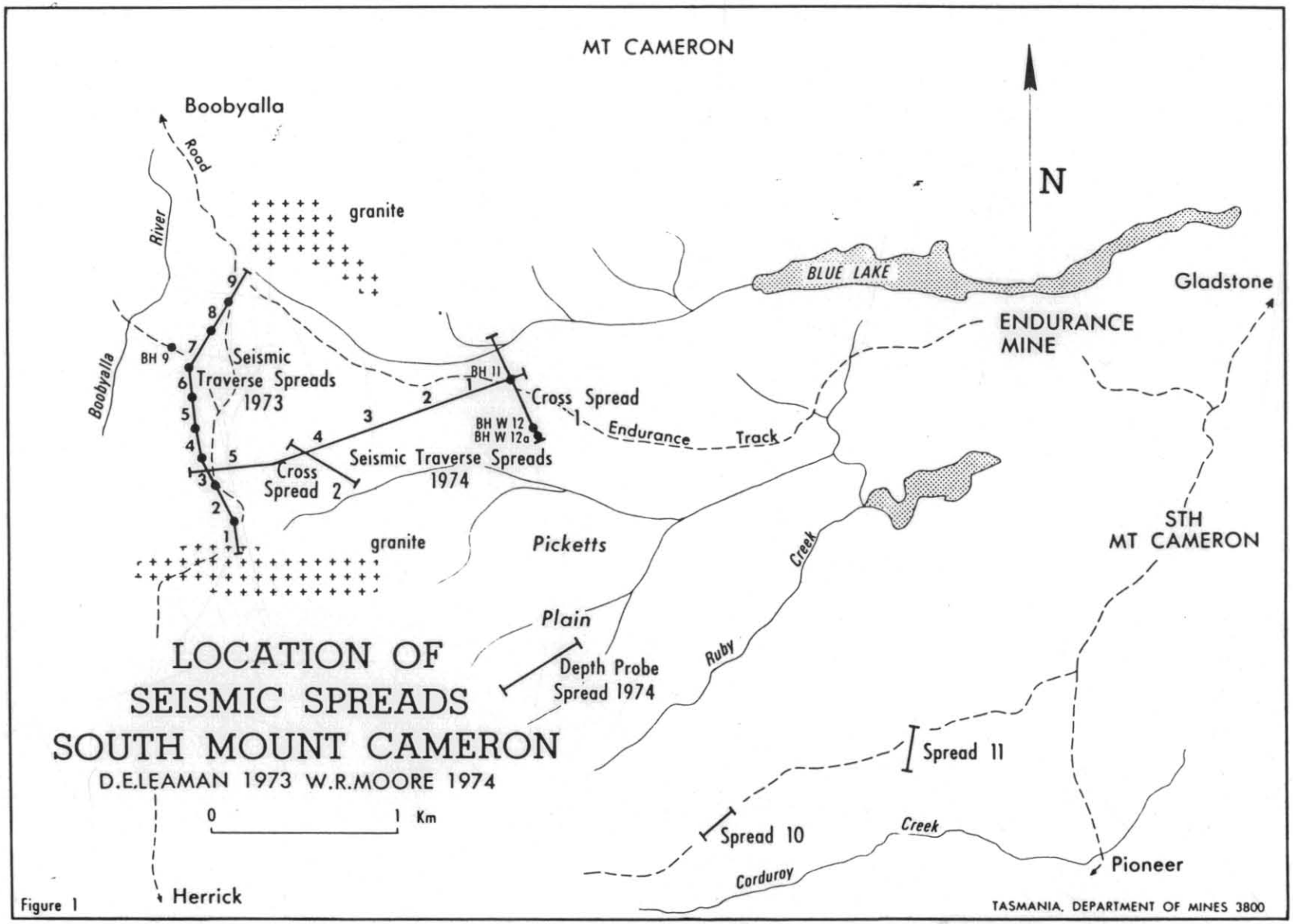
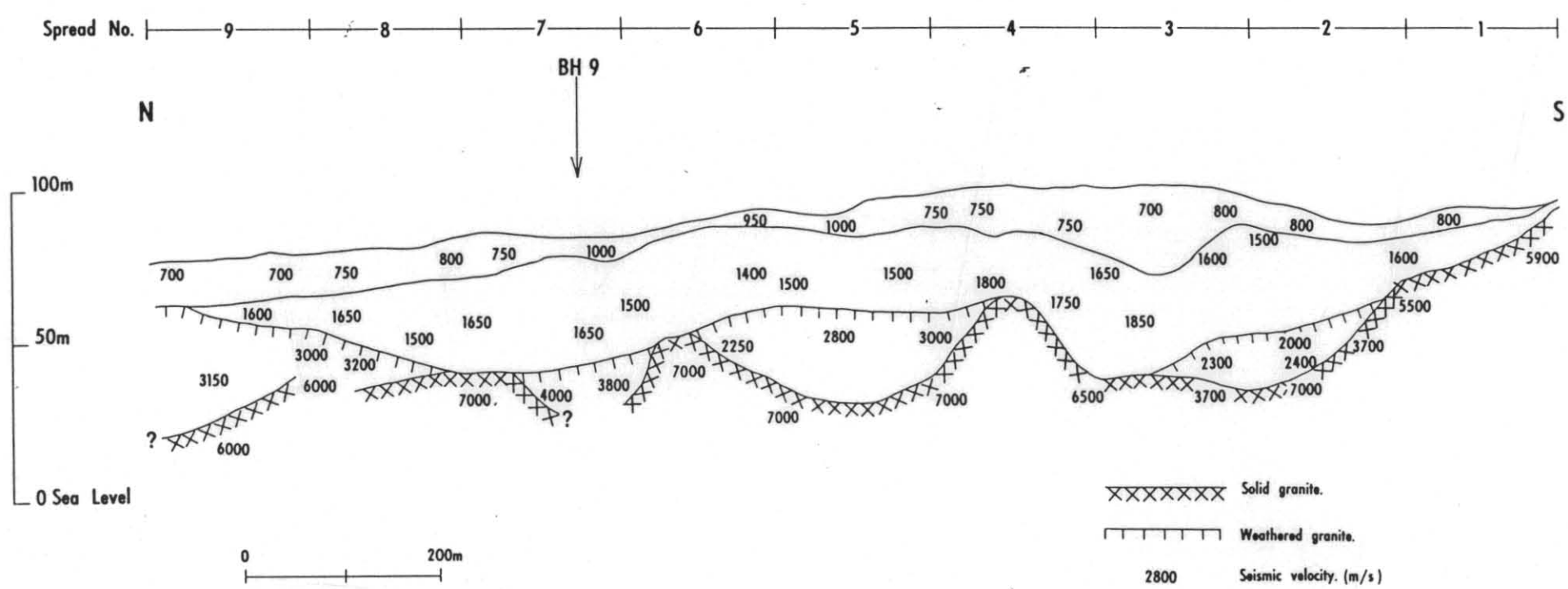


Figure 1

5 cm

72-2

9/8



SEISMIC PROFILES, SOUTH MT CAMERON.

D.E.LEAMAN 1973

Figure 2

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72-3

5 cm

3/6

Layer 1: Velocity range 400-800 m/s; thickness variable (up to 7 m)
Layer 2: Velocity range 1400-1800 m/s; thickness variable (up to 57 m)
Layer 3: Velocity range 4500-6700 m/s.

The interpretation of these layers is as for layers 1, 2 and 4 in spreads 4-9. Significant weathering of the granite appears to be absent in this region.

In spread 10 the depth of the Tertiary sediment/granite interface increased from 39 m in the west to 64 m in the east and thus had a slope of 8° to the east.

The interpretation of spread 11 is not as certain but the depth of the granite interface ranges from 53 m in the north to 49 m in the south.

In view of the velocity contrasts recorded it is possible that the interpreted depths quoted above may be in error by an excess of 5-10 m as explained above.

CONCLUSIONS

The traverse along the old Boobyalla Road has revealed the presence of at least one gutter or channel. The maximum thickness of Tertiary materials in this region is around 60 m (spread 3).

Refraction soundings on Picketts Plain indicate a thickness of up to 64 m of Tertiary sediment, at least in the areas examined.

[20 September 1973]

APPENDIX 1.
Second seismic survey, South Mount Cameron, 1974.

W.R. Moore

An additional seismic survey, made at the request of A.V. Brown of the Regional Geology Section, was completed in March 1974 in the South Mount Cameron area. This work was an extension of the work carried out by Leaman in 1973 in the same area.

An ENE-WSW seismic traverse 1.9 km in length comprising five spreads was run from the Endurance track to the Boobyalla road across low undulating country forming the south-eastern margin to Picketts Plain. The western end of this traverse crossed the previous seismic traverse of 1973 at Spread 2 (fig. 1). In addition to the control provided by the 1973 traverse two further cross spreads were fired for control purposes.

In addition a further depth probe for sounding was requested at a location 600 m north of Ruby Creek.

The velocity values, and the calculated depths to the interfaces of these layers with their suggested geological interpretation is given in Figure 3.

In the seismic traverse and cross spreads four layers were present.

Layer	*Velocity range (m/s)*	*Thickness (m)*	*Geological interpretation*	*Comment*
1	900-1060	7-100	Tertiary sediments above the water table.	Only present in the western half.
2	1500-1820	15-80	Water saturated Tertiary sediments.	Thickest at eastern end.
3	2000-2500	40-110	Weathered granite.	Thickness variable. Lenses cut in east.
4	3000-6000		Unweathered granite.	Interface often has strong slope.

These velocities are as found by Leaman and as their interpretation is the same there is consequently no need to repeat the description already given.

A valley in the granite appears to exist at the eastern end of the seismic traverse (fig. 3, Spread 1). Here the thickness of Tertiary sediments (V = 1500 m/s) has increased to 80 m. The weathered granite layer (V = 2000-2500) is not present in Spreads 1 and 2 and lenses out in Spread 3. In Spreads 1 and 2 the interface between the 1500 m/s and 3000-3400 m/s velocity layer slopes down at 15° to the west. Such a strongly sloping interface is likely to create errors in depth calculations. It is in areas with such a seismic velocity contrast where a layer with a velocity 1500 m/s overlies a layer with a velocity of 300-3500 m/s that have produced large quantities of groundwater in West Scottsdale. It would be interesting to see if this relation also exists for the South Mount Cameron basin by drilling at Spread 1.

In the depth probe no intermediate velocity layer of weathered granite exists. The depth of the Tertiary sediments appear to be 64-67 m with only a gently sloping interface. This depth is of the same order as that calculated by Leaman at the west end of his sounding of Spread 10.

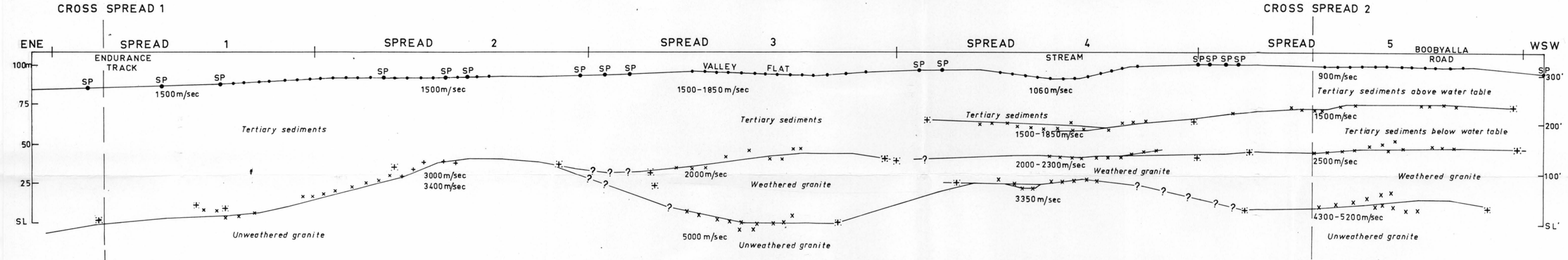
No intermediate velocities indicating weathered granite were found by Leaman in his two soundings at Spreads 10 and 11.

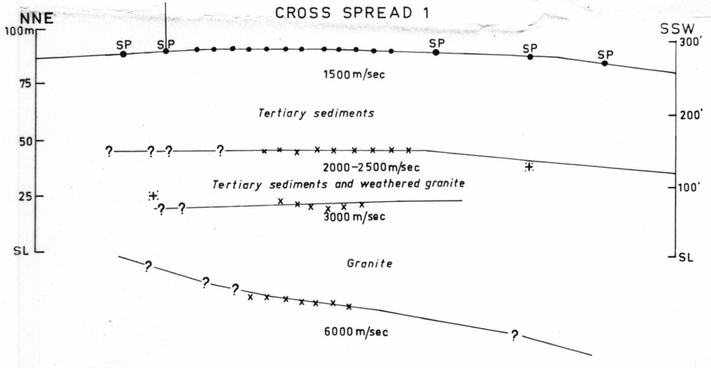
For reasons explained by Leaman all the above calculated depth figures may be 5-10 m too great.

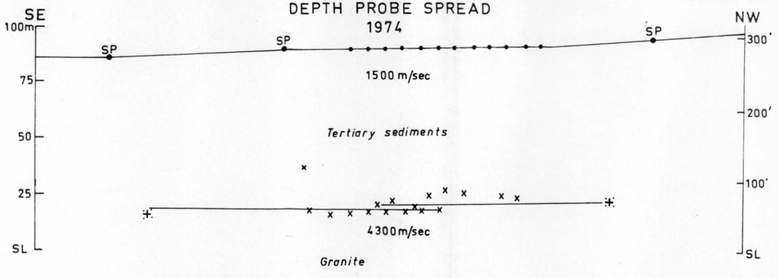
[13 June 1974]

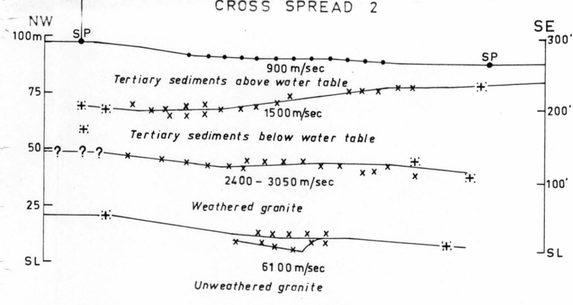
SEISMIC SURVEY 1974 SOUTH MT. CAMERON

ENE SEISMIC TRAVERSE ÷ BOOBYALLA ROAD – ENDURANCE TRACK









Horizontal scale 1:2400
Vertical scale 1:1200

5 cm

Seismic velocities in metres/second.

SP Shot point.
• Geophone position.
⁂ Calculated shot point depth.
× Calculated depth position.

GEOLOGIST : W.R.MOORE. 1974

Drawn : B.E.Cook. June 1974

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FIGURE 3