

UR1973-61

Ground water prospects at Wiltshire Junction.

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The Transport Commission requested advice on underground water prospects at Wiltshire Junction [CQ544781] which could serve the railway station and several houses. The present supply is drawn from a dam which becomes silted and is situated in an area where it is in danger of becoming polluted from farming areas in the catchment of the creek.

GEOLOGY AND RELIEF

The area around the station is relatively flat and forms part of a terrace about 8 m above sea level. It is probably a marine terrace formed when sea level was higher than at present. Small areas of more resistant rock rise a few metres above the general level of the terrace. South of the terrace, the land rises to a dissected basalt plateau about 60 m above sea level.

East of the station, around Black River, Precambrian siltstone, quartzite, conglomerate and dolomite are exposed. North-west, south-west and west of the station, banded siltstone and greywacke sandstone beds occur. In isolated areas these Cambrian sediments are largely unweathered and are very hard. Tertiary basalt overlies the Cambrian rocks to the south. The flat area is underlain mainly by sand and gravel, the gravel consisting of quartzite and basalt boulders.

HYDROLOGY

Five bores in a semi-circle around the station have been drilled on private properties in the past.

Their positions are shown on Figure 1. The results of these bores are shown below.

Bore No.	Height above sea level (m)	Depth (m)	Depth water struck (m)	Output (l/min)	Quality (T.D.S)	Aquifer
1	13.1	18	8.1	25	300	Cambrian mudstone
2	9.8	24.6	13.1	25	350	Cambrian mudstone
3	16.4	16.9	11.5	40	200	Cambrian mudstone
4	62.3	40	26.1	15	-	Cambrian mudstone
5	19.6	19.6	18	20	200	Precambrian quartzite.

It can be seen that every bore was successful in obtaining water both from Cambrian and Precambrian rocks and that the water quality from at least four of them, is good. Water from bore no. 3 is used for all purposes including a domestic supply.

The water is stored in fractures in the rocks and it is likely that these rocks would be struck at depth in the vicinity of the station. There are few surface exposures closer to the station than the positions of the bores, however, and it is difficult to predict how deep they would be struck on drilling. The station is probably near the contact between the Cambrian and Precambrian rocks as Precambrian rocks were struck in hole 5 and Cambrian rocks in the other four.

An inlet of the sea comes to within 600 m of the station and it was

thought possible, from a surface inspection, that there could be some deep Tertiary-Recent sedimentation in the vicinity of the station (as occurs sometimes in the Hobart area in similar circumstances) which is sometimes a less reliable source of water than the fractured rocks. It was therefore decided to undertake some geophysical work in an effort to determine the approximate depth to basement rocks.

GEOPHYSICAL RESULTS

Seismic spreads

Three seismic spreads were fired in the areas shown on Figure 2 and the interpreted cross sections resulting from the spreads are shown on Figure 3. There are four seismic velocities indicated from the plots of the spreads which indicate that there are probably four layers of different materials underlying the area at various depths. The velocities are about 430, 1130, 1570-1900 and 2300-2720 m/s. The material with a seismic velocity of 1130 m/s is indicated from Spread 1, a spread with a geophone spacing of 3 m, whereas the geophone spacing for the other spreads was 7.5 m. Material with this velocity probably occurs under the other spreads but is too thin to be clearly indicated from the plots. Using a knowledge of the geology of the area these velocities may be interpreted as follows:

<i>Seismic velocity (m/s)</i>	<i>Material</i>
430	Dry or unsaturated sand.
1130	Wet and near saturated sand.
1570-1900	Weathered or open-jointed rock.
>2300	Less weathered rock.

It is apparent from Spread 1 that the drier superficial material is about 1-3 m thick and that the weathered rock is 3-5 m below the surface with a thin wet sand layer in between. Spread 2 results suggest 2.5-3 m of superficial material overlying some 9-14 m of weathered or open-jointed rock which in turn overlies less weathered rock. Spread 3 indicates 0.5-3 m of superficial material and some 7-16 m of weathered rock.

The north-west end of Spread 3 indicated a higher velocity at depth which could indicate quartzite or hard Cambrian rocks in this area. Two boulders of quartzite about 0.4 m across were noted in the vicinity.

Resistivity probes

Two resistivity probes were undertaken along the directions of seismic spreads 1 and 2 with centres indicated on Figure 2. The two curves almost coincide (fig. 4). Resistivities of about 200, 250, 100 and 35 Ω -m were interpreted from these curves possibly indicating four different materials with interfaces at about 0.4, 1.3 and 6.6 m from the surface with a similar interpretation for the various materials as in the seismic interpretations. The various resistivities suggest that mudstone is the basement rock although variation of the salinity of water in quartzite could give the same shaped curve.

CONCLUSIONS

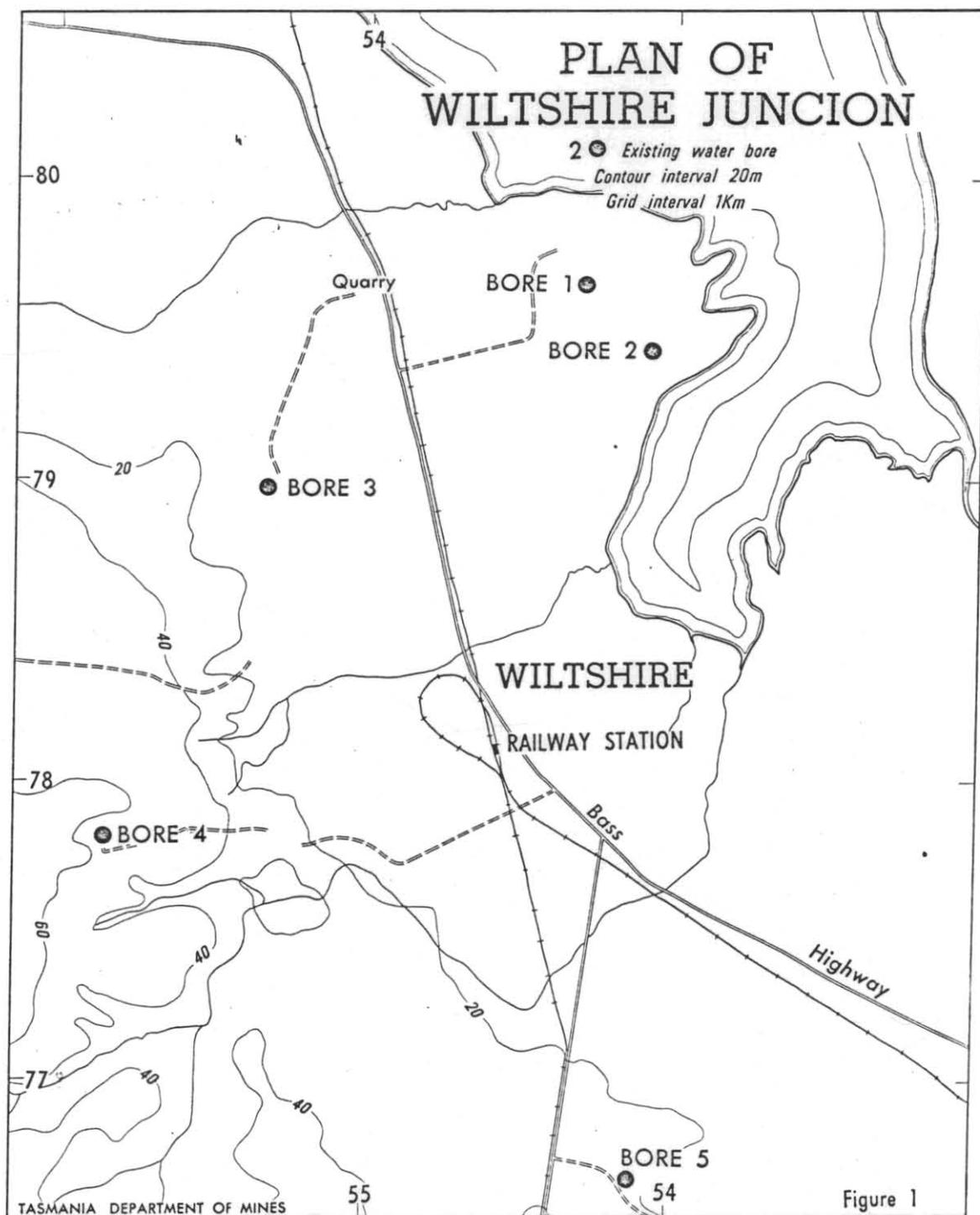
Past drilling in the area has met with success in obtaining good quality water in both Cambrian and Precambrian rocks. The water is contained in weathered zones and fractures in these rocks.

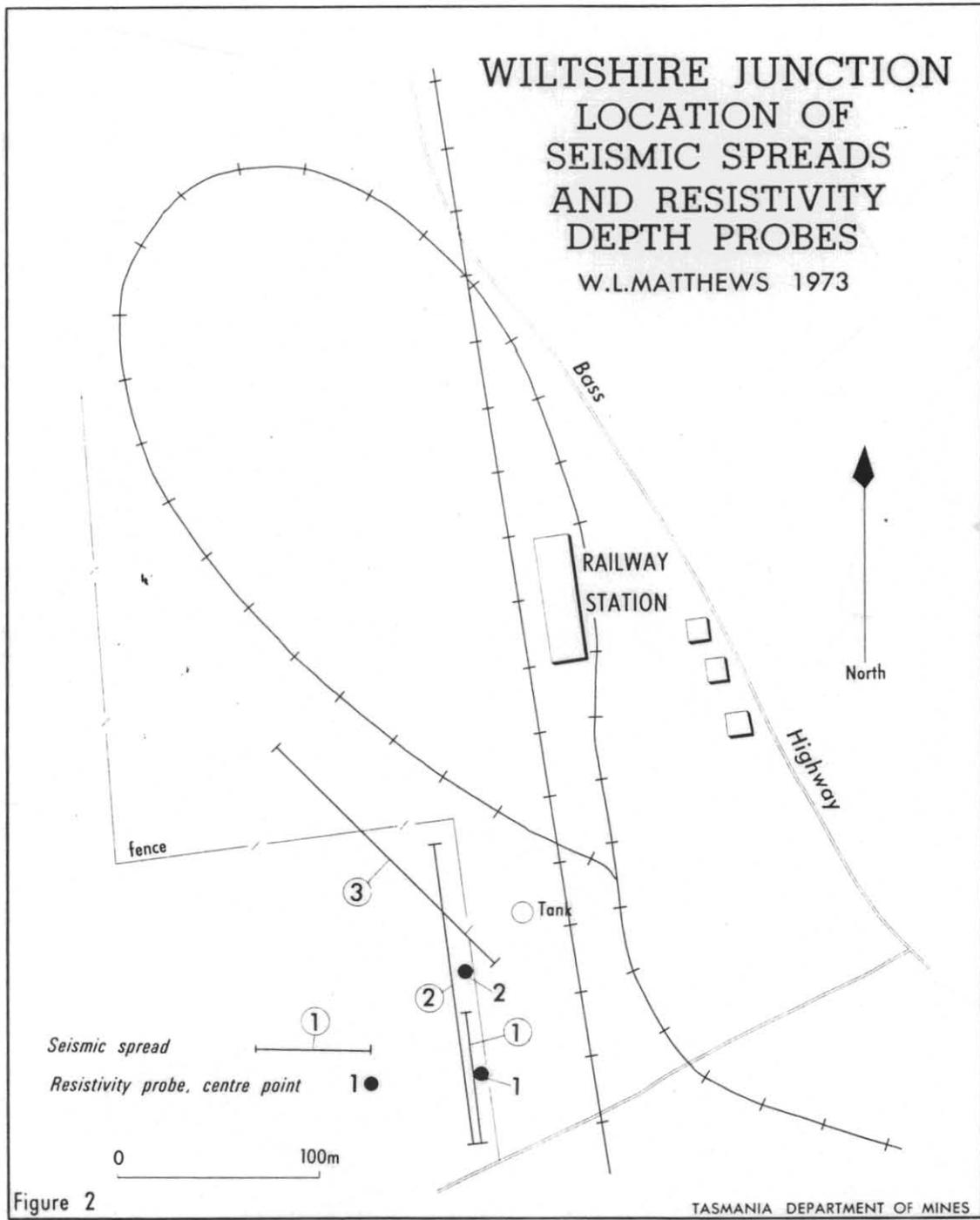
From the geophysical work it is apparent that weathered or jointed

rock will be struck at depths in the order of 0.5-6 m from the surface, where it is expected that a reliable source of water should be obtained. The bore might have to be extended to 25 m in depth before enough fractures are intersected to give the desired amount of water.

Although the station is quite close to the sea, bore no. 2 (fig. 1) is closer and still has good quality water. The station is situated in an extensive flat area and water from bores in similar areas in parts of the Circular Head region has a slight yellow colour.

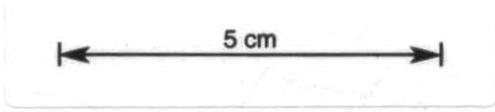
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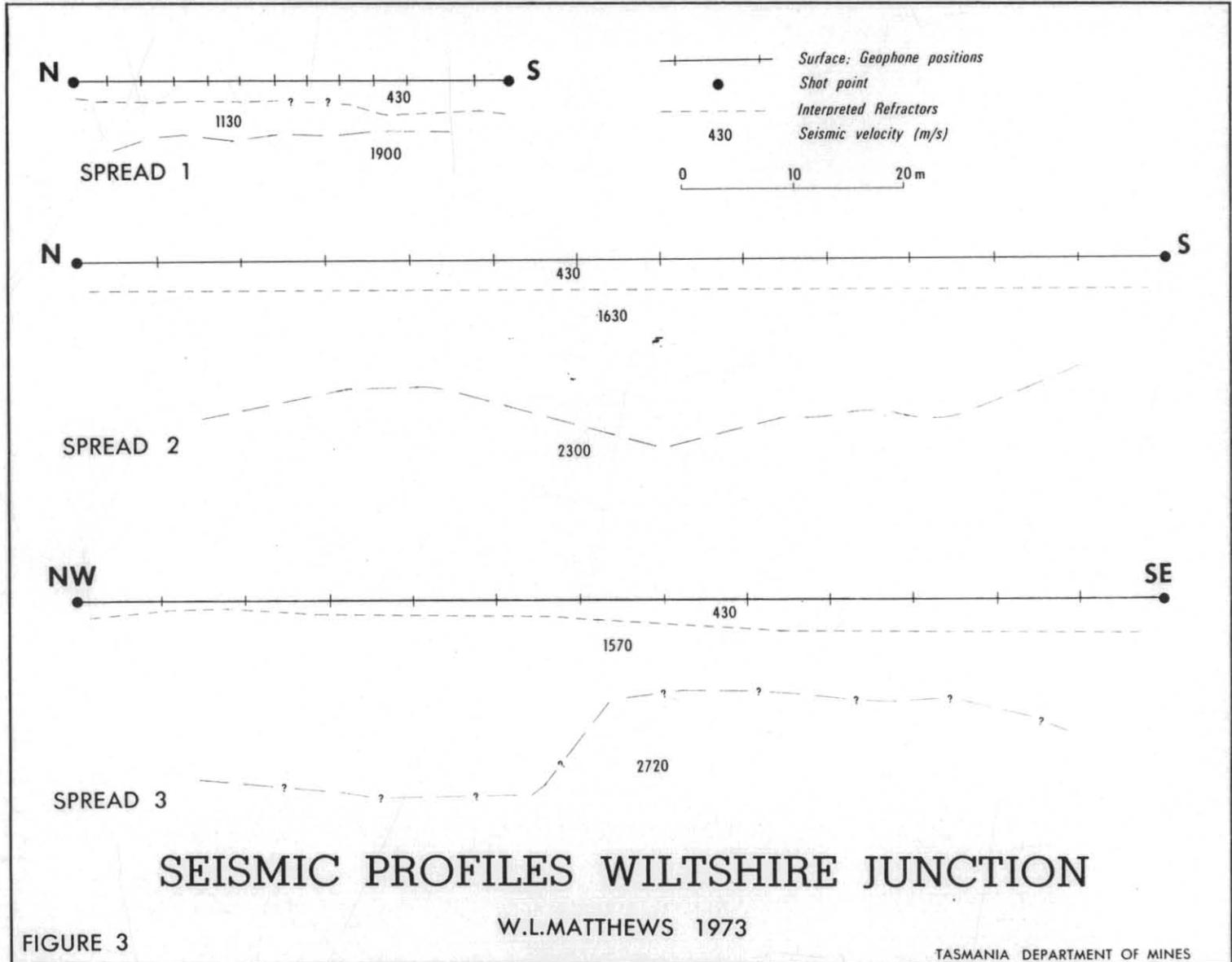




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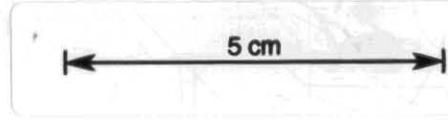
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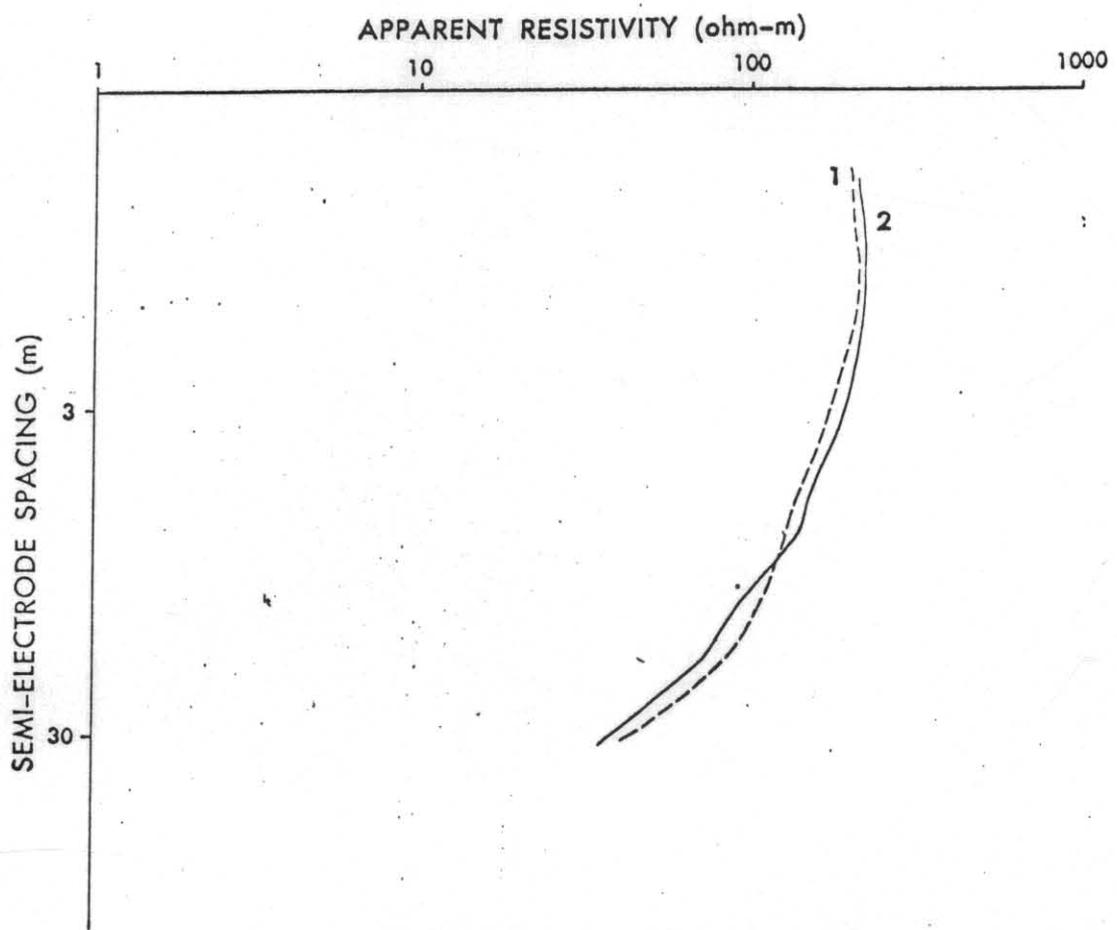
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RESISTIVITY DEPTH PROBES WILTSHIRE JUNCTION

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FIGURE 4

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