Observations on Some Geophysical Data at Elura

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Data used

Numerous geophysical surveys, using different methods, and geochemical surveys, have been conducted at Elura.

The data used in this note are from:

(i) reports submitted by Electrolytic Zinc Company of Australasia to the Department of Mineral Resources in fulfilment of tenement conditions (N.S.W. Geological Survey Files GS1974/310, GS1975/053 and GS1975/081);

(ii) Bureau of Mineral Resources Record 1976/47.

Geochemical and Radiometric linear trend

Figure 1 shows a linear trend along exploration grid line 20000N, delineated by a lead geochemical anomaly and a high radiometric anomaly. This trend is reflected (Figure 2) as a zone of higher apparent resistivities recorded during gradient array surveys (greater than 50 ohm-m in a background of 40 ohm-m).

Mathematical modelling of the high resistivity zone

Figure 3 shows the apparent resistivity profile along exploration grid line 20100E (data obtained by Seigel Associates Australasia Pty Ltd), and values obtained by mathematical modelling of a resistive channel. The modelling was done at Macquarie University and utilised a modified Geoscience program using the network approach. (Geoscience Incorporated: RESCAL. A computer program to compute theoretical apparent resistivity structures, February 1970).

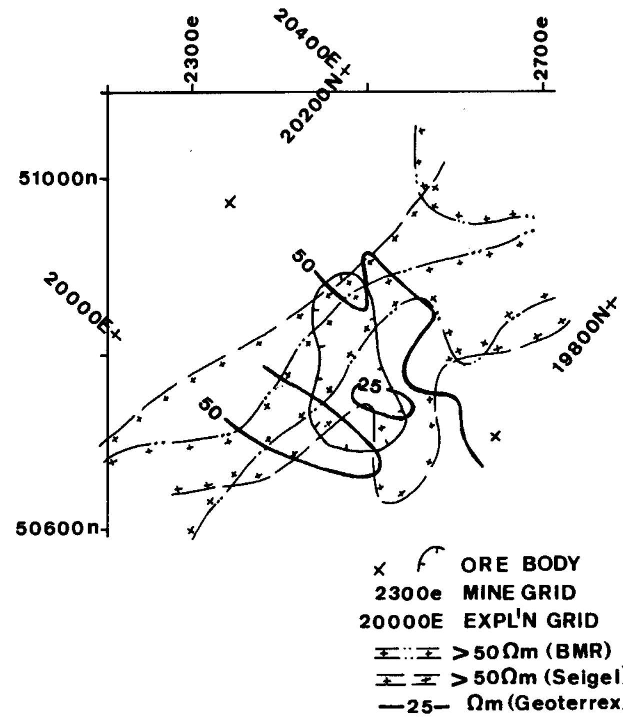

FIGURE 2. Gradient array surveys. Apparent resistivities.

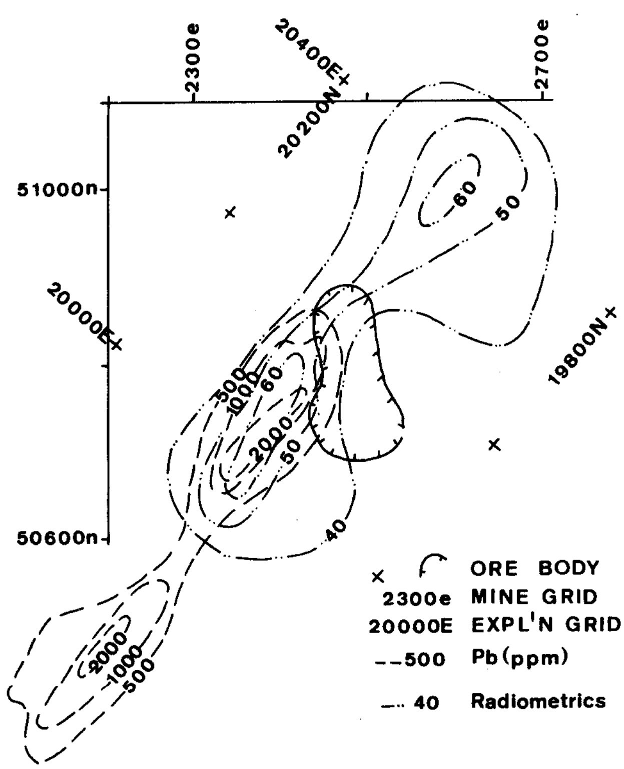

FIGURE 1. Lead geochemistry. Radiometrics

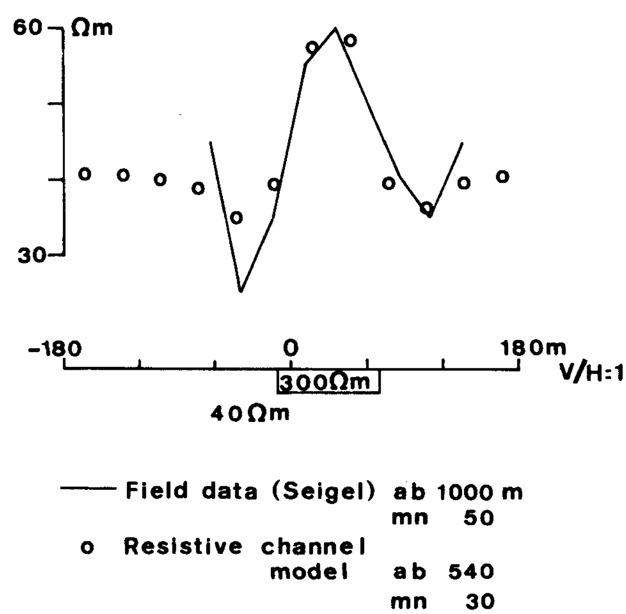

FIGURE 3 Resistive channel. Gradient array profile.

The computed values agree reasonably with the field profile.

The trend along exploration grid line 20000N is thus inferred to be a high resistivity channel, about 80 metres wide and extending from the surface to a depth of 20 metres.

Nature of the high resistivity zone

The nature of the source of the high resistivity zone is not known.

A suggestion is that the zone is a maghemite-rich channel, based on the following criteria:

(a) magnetic profiles over the zone show large amplitude, short wave-length anomalies which could be caused by the presence of maghemite;

(b) the higher apparent resistivities may be due to the cementation of the maghemite-rich channel;

(c) the high lead concentrations and the higher radioactivity in the zone may be due to scavenging properties of these types of zones, a feature observed elsewhere in the Cobar area (see Schmidt in GS1975/053).

Detection of ore body by electrical surveys

The modified Geoscience program was also used to obtain a comparison of the detectability of a body such as Elura, using both gradient and dipole-dipole arrays. The model used was a 100-metre wide ore body (three model resistivities of 3 ohm-m, 1 ohm-m and 0.3 ohm-m, and intrinsic PFE of 30%) within a host rock (500 ohm-m), both beneath 100 metres of 10 ohm-m overburden.

Figures 4 and 5 show the apparent resistivity and apparent PFE anomalies which would result using the gradient and dipole-dipole arrays. The figures show that a body such as the ore modelled has a greater chance of being detected using the dipole-dipole array than the gradient array.

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Professor K. Vozoff of Macquarie University provided the opportunity and the guidance to run the computer models in this paper. His assistance is greatly appreciated.

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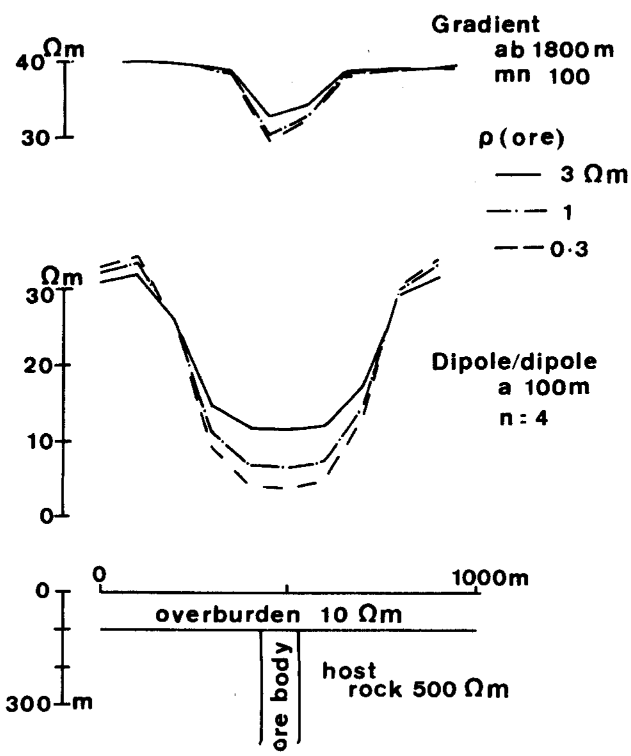

FIGURE 4 2D ore body detection tests. Apparent resistivities.

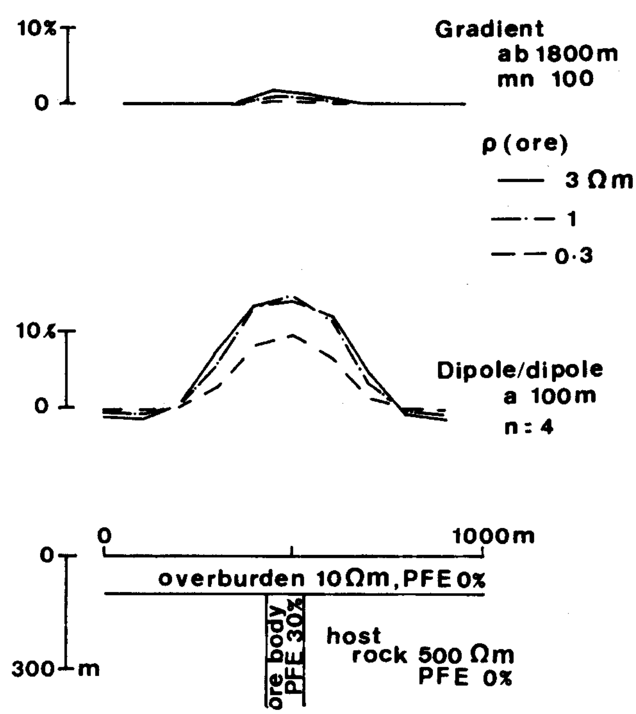

FIGURE 5 2D ore body detection tests. Apparent P.F.E.