

RB 41/41

DEPARTMENT OF MINES

SOUTH AUSTRALIA

GEO PHYSICAL SECTION

MAGNETOMETER SURVEY
OF PORTION OF THE
ETHIUDNA COBALT COPPER MINES

BY

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Geophysical Report 8/55

ASSOCIATED PLAN 55-286

MICROFILME

SUMMARY

A magnetometer survey was carried out by the writer at the Ethiodna Cobalt-Copper Mine on the recommendation of D. King (geologist) to attempt to locate cupriferous lodes which may occur concealed under alluvium by virtue of their association with pyrrhotite.

An area of 6200 feet by 1800 feet was gridded by the writer, the results computed and an isogam plan prepared. (see plan No. 57 a86)

This plan shows clearly the existence of a regional vertical face magnetic variation with a gradient of + 16 gammas per 100 feet in a southerly direction. This is probably due to the emplacement of the centrally located granitic core.

The granitic body introduced the pyrometasomatic deposits of copper, cobalt, nickel and tungsten into the sandstones and marble horizons adjacent to the granite metasedimentary contact.

No magnetic anomalies were located which could be directly related to concealed pyrrhotite rich cupriferous lodes.

Traverse O crosses the known lode but no magnetic anomaly was found showing that the amount of pyrrhotite associated with the cupriferous lode is small.

A small magnetic disturbance marked AB occurs on the plan.

This may be associated with shallow seated mineralization and the writer recommends that geochemical work be carried out across this anomalous zone and the metals, cobalt, nickel, copper lead and zinc be tested for by microchemical techniques.

INTRODUCTION

A Watt's vertical force magnetometer was used by the writer on this survey.

The magnetometer consists of two parallel magnetized bars attached to an aluminium cube which carries a knife edge, mirror, two lateral screws (latitude and temperature) and a vertical sensitivity screw.

The magnetic system was adjusted so that it was horizontal in the area and variations in its inclination which are a measure of variations in the vertical component of the earth's magnetic field are read by means of a mirror attached to the magnetic system and an autocollimation telescope.

The magnetic system is contained in an aluminium case which also contains copper dampers, levels, and a thermometer. The case is lined with cork to reduce temperature changes.

For reading, the instrument is attached to a tripod and readings are taken with the balance in both east and west directions.

The sensitivity of the instrument was 30.0 gammas per division at 20°C.

The levels of the magnetometer were adjusted to minimize optical and magnetic errors.

The magnetic readings were computed and an isogam plan prepared. (see plan No 55-286)

GEOLOGY

Both detailed and regional geological mapping was carried out at this prospect by D. King and B. Campana, and presented in the geological report C.W. 27 (The relation of structure to mineral deposits in the Bthiudna Mining area).

Essentially the rocks consist of archaean metasediments which have been intruded by granite and pegmatites carrying copper bearing solutions which were deposited as pyrometasomatic deposits around the margins of the granite mass in the metasedimentary rocks.

Some additional mapping was carried out by the writer as an aid to the interpretation of the magnetic results.

METHOD USED

A base line was laid out 1800 feet long, and seven traverses offset from it in a north and south direction bearing $4\frac{1}{2}^{\circ}$ W of magnetic north.

The surveying was carried out with compass and tape (generally).

Magnetometer readings were taken along the traverses at fifty foot intervals, and in areas where more detail was required an interval of 25 feet was adopted.

The readings were corrected for diurnal variations, temperature changes and an isogam plan prepared showing the variations in the vertical intensity of the earth's magnetic field in the area mapped.

RESULTS

A regional magnetic anomaly of about 500 gammas is evident in the southern portion of the map, with an average gradient of 16 gammas per 100 feet.

A magnetic disturbance occurs along the line marked AB on the plan. The writer suggests that this may represent an epidote hornfels horizon or possibly a structural geological break.

INTERPRETATION

The regional magnetic anomaly appears to be due to the emplacement of the granite mass and possibly results from its slight magnetite content. As the granite cooled (after being emplaced in the archaean sediments) below the Curie point then accessory magnetite and iron bearing minerals would tend to become polarized in the earth's magnetic field; the thicker the granite mass the longer the geological time it would have taken to cool beneath the Curie point and the higher the probability of the accessory magnetite being polarized in the earth's field; consequently, the stronger the magnetic field

associated with it.

A magnetic disturbance occurring along the line AB may represent an epidote hornfels horizon or possibly a structural break along the margin of the granite mass.

As mineralization in this area often occurs adjacent to the epidote hornfels horizon and in structural traps, the writer recommends that geochemical gridding be carried out across this anomalous zone and microchemical tests for nickel, cobalt, zinc, lead and copper be applied. As these elements are readily soluble in the secondary mineral state then by capillary movement they would be carried up through the soil to produce a mineral "halo" above a shallow seated mineral deposit.

RECOMMENDATIONS & CONCLUSIONS

A slight magnetic discontinuity was located marked AB on the plan which may be related to shallow seated mineralization.

The writer recommends that geochemical gridding be carried out across this zone and the soil tested for the following metals - nickel, cobalt, zinc, lead and copper.

These would tend to accumulate in the soil above a weathered shallow seated mineral lode in the form of secondary minerals dispersed in the soil.



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IAH:AGK
23/8/55



—LEGEND—

- Intusive Pegmatite Granite,
grading to Felspar Quartz Pegmatite.....
- Hard Wall Quartzite with Secondary Copper Lodes.....
- Banded Tremolite Diopside formation with
disseminated Primary Copper and Cobalt Mineral.....
- Laminated Micaceous Sandstone and Quartzite
w/ interbedded Massive Quartzite.....
- Magnetic Anomaly..... A ——— B

—SCALE—



To accompany report by I. Mumme, Assistant Geophysicist

S.A. DEPT. OF MINES				ETHIUDNA COBALT-COPPER PROSPECT				Approved			
Geological & Vertical Force Magnetometer Contour Plan				Geological & Vertical Force Magnetometer Contour Plan				Dated			
By J. H. D. A. L.				By J. H. D. A. L.				Dated			
Checked by				Checked by				Dated			
Drawn by				Drawn by				Dated			
Scale 200 Feet to 1 inch.				Scale 200 Feet to 1 inch.				Scale 200 Feet to 1 inch.			
55-286				55-286				55-286			
Fig.				Fig.				Fig.			
Date 24-8-55				Date 24-8-55				Date 24-8-55			