COMMONWEALTH OF AUSTRALIA

DEPARTMENT OF NATIONAL DEVELOPMENT

BUREAU OF MINERAL RESOURCES, GEOLOGY AND GEOPHYSICS.

RECORDS

1959, NO.54

PRELIMINARY REPORT ON A GEOPHYSICAL SURVEY AT THE REWARD LEASE McARTHUR RIVER, N.T.

by

J. HORVATH

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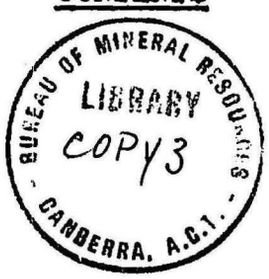

ILLUSTRATIONS

ABSTRACT

A geophysical survey of the Reward silver-lead lease, near the McArthur River Station, Northern Territory, carried out in June and July 1958, revealed several electromagnetic anomalies. Most of the anomalies are extensive but weak, and could be due to shear zones. However, two of the anomalies are well defined and fairly strong and are considered likely to be associated with mineralisation. Testing of these two anomalies is recommended.

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1. INTRODUCTION

During June and July, 1958, a field party of the Bureau of Mineral Resources carried out a geophysical survey of the Reward silver-lead lease near the McArthur River Station, Northern Territory. The survey was performed at the request of Mt.Isa Mines Ltd. to investigate the orebody, which occurs in an area largely covered by alluvium.

The orebody was discovered in 1955 by prospectors of Mt.Isa Mines Ltd. and has been investigated by several costeans each several hundred feet long, by five diamond drill holes and by two shafts with crosscuts. This testing was confined to a relatively small area around a low ridge consisting mainly of dark siliceous dolomite. According to the Company the results of the drill holes were not very satisfactory because of poor core recovery in the oxidised zone which extends to a vertical depth of about 200 feet. The host beds and the lode dip at about 30° to the west. The section through traverse 00 (Plate 2) shows the available information on the orebody as revealed by the shaft, crosscut and diamond drill holes No.1 and No.5.

2. RESULTS

Magnetic, self-potential and electromagnetic methods were used in the survey but only the electromagnetic method gave results of real interest. The results of the electromagnetic survey are shown in the attached plans, which comprise Plates 2 to 6 of the final report now in preparation.

The electromagnetic survey was carried out using the Turam method with coil separation of 100 feet and frequency of 880 cycles per second. A rectangular loop was used for the primary cable in the initial lay-out, but in extending the survey a grounded primary cable was used. Higher Turam ratios were recorded with the grounded cable in the area between traverses 8N and 14S (see Plate 5), but otherwise the results were practically the same as with the inductive coupling, i.e. using closed loop.

Several Turam anomalies, designated by letters A to D, indicating fairly extensive conducting zones were observed. The extent and positions of these zones are shown most clearly by the phase contours in Plate 3.

In general, conducting zones of this kind may be due to the presence of sulphides or graphite or to rocks containing water with a high electrolytic conductivity resulting from high salinity or high content of sulphates etc. Shears and fault zones may act as good conductors because of their higher

permeability, particularly in areas of weathered sulphide orebodies, where the water circulating in the shear zones contains electrolytes originating from the oxidation of the sulphides.

Information concerning the conductivity of the bodies causing the electromagnetic anomalies can be deduced from the survey results. An approximate indication of the conductivity is given by the relative size of the observed in-phase and out-of-phase components of the electromagnetic field or in the Turam method, the relative size of the ratios and phase readings.

The anomalies shown in Plate 3 have two prevailing strike directions. Anomalies B and C strike north and anomalies A,E,D and F mainly north-west. As shown by the phase contours the anomalies with north-west strike are fairly extensive, but the associated Turam ratios (Plate 4) are relatively weak and indicate only moderate conductivity.

Anomaly B, which appears as a strong indication in the results with grounded cable (Plate 5), extends from 1S to 8N and is probably associated with the known mineralisation. The anomaly does not coincide with the weathered outcrop of the lode but is situated down-dip in a position as would be expected taking into account the dip of the lode and the fact that the current concentration will occur mainly in the sulphide zone. The ratio contours (Plate 5) show that the good conductor is mainly developed to the north-west of the existing shafts. A northerly pitch is suggested and cross-faulting may occur near traverse 2N.

Anomalies B and C are considered to be more important than the other anomalies recorded because they are stronger and better defined and are due to bodies of higher conductivity. They are relatively short and appear to terminate abruptly. It is considered likely that B and C are associated with mineralisation and are the only anomalies which warrant testing at present. The other anomalies with the prevalent north-west strike are weak and not well defined and could be caused by shear zones without any appreciable mineralisation.

3. RECOMMENDATIONS FOR TESTING

Five drill holes are recommended. These should be of sufficient diameter to obtain good core recovery in the mineralised zone. The positions of the holes are shown in Plate 6. Details of the holes are as follows:-

Anomaly B.

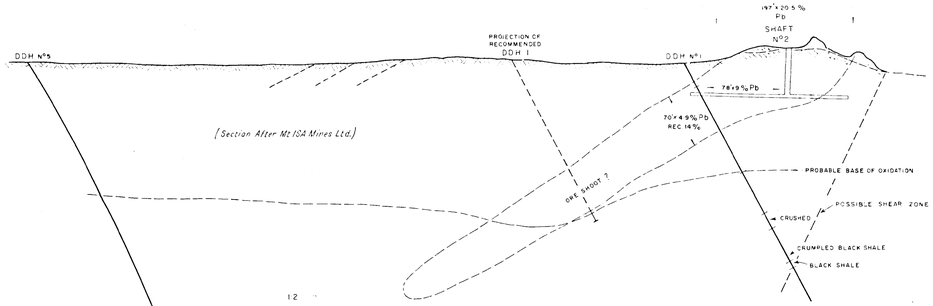
Drill hole 1, Collar 1N/1000W, bearing 54° magnetic, depressed 60°
" " 2, " 6N/ 880W, " 54° " " 60°
" " 3, " 3N/1000W, " 54° " " 60°

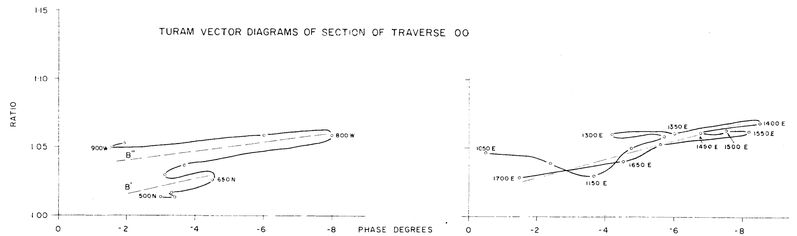
Anomaly C.

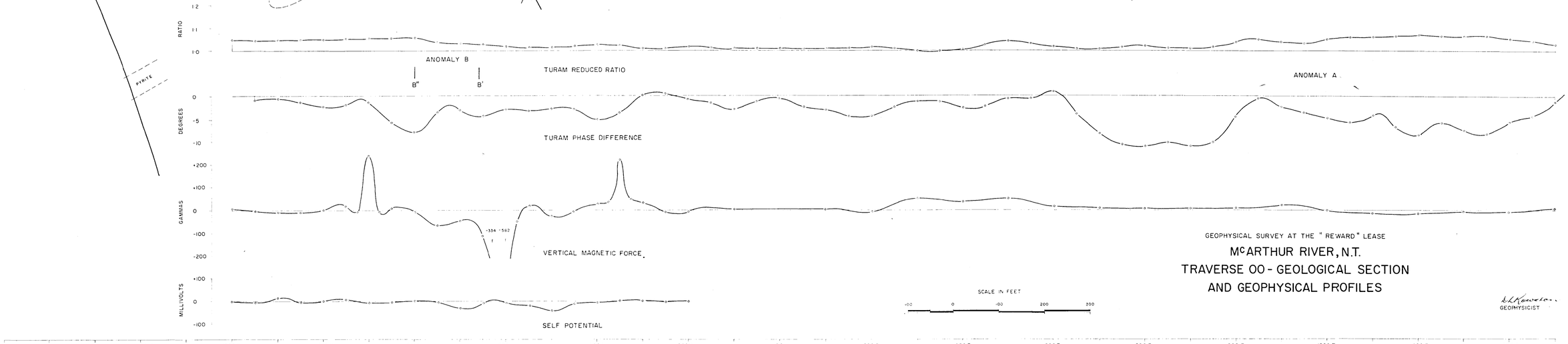
Drill hole 4, Collar 1225S/75E, bearing 90° magnetic, depressed 60°
" " 5, " 24S/250W, " 54° " " 60°

It is doubtful whether costeans will be of much value in determining the cause of the electromagnetic anomalies. However, if it is intended to carry out further costeaning in the area, the suggested locations for the costeans are shown in Plate 6; these are on alluvium.

The drilling recommended is sufficient for the initial testing of the electromagnetic anomalies of interest. After these holes have been completed, it will be desirable to review the interpretation and testing requirements in the light of the drilling results obtained.







SCALE IN FEET

-100 0 -00 200 300

GEOPHYSICAL SURVEY AT THE "REWARD" LEASE

McARTHUR RIVER, N.T.

TRAVERSE 00 - GEOLOGICAL SECTION AND GEOPHYSICAL PROFILES

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Geophysical Section Bureau of Mineral Resources, Geology and Geophysics.
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PLATE 3

GEOPHYSICAL SURVEY AT THE "REWARD" LEASE,

McARTHUR RIVER, N.T.

TURAM PHASE CONTOURS

GEOPHYSICIST

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PLATE 4

GEOPHYSICAL SURVEY AT THE "REWARD" LEASE

McARTHUR RIVER, N.T.

TURAM RATIO CONTOURS

LEGEND

OUTCROP

SHAFT

DDH 4 EXISTING DRILL HOLE

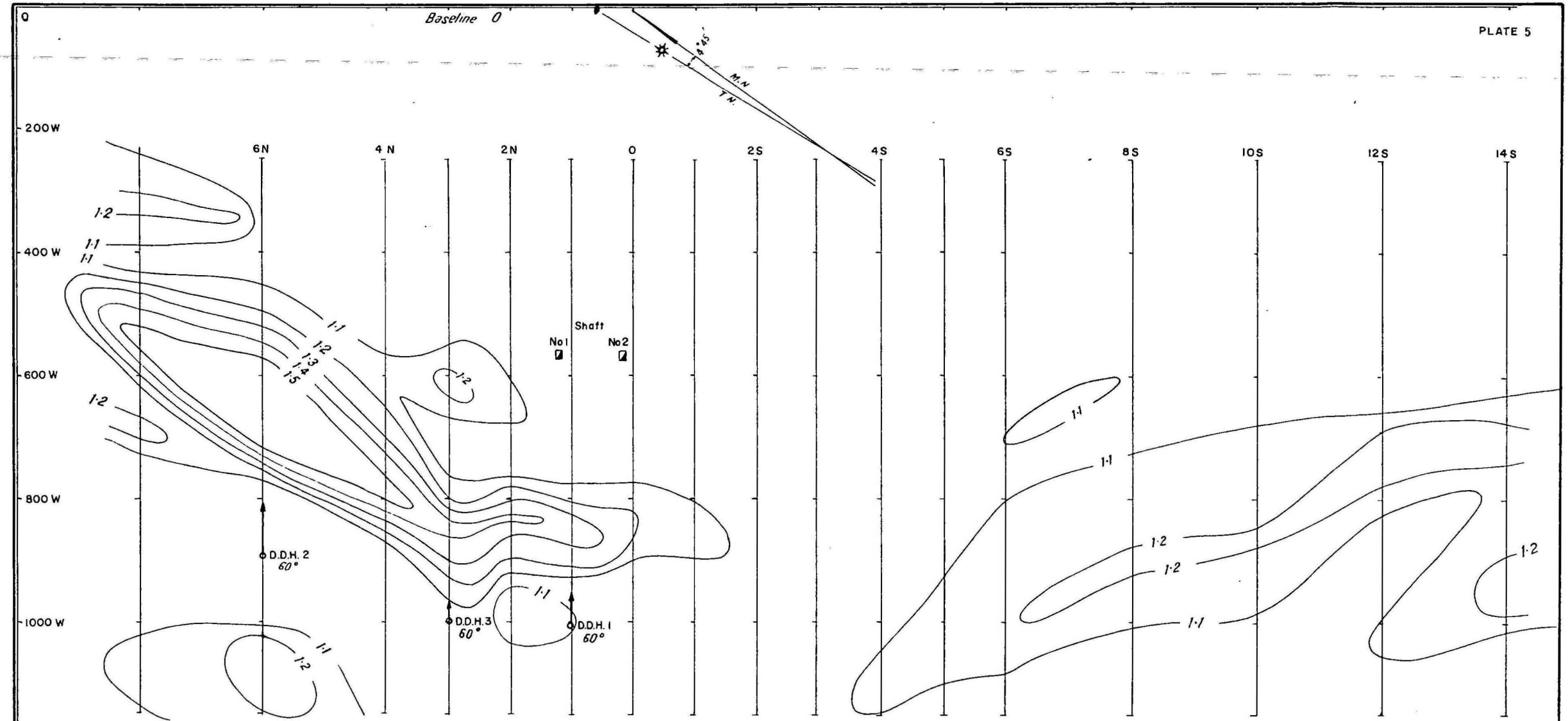
SCALE IN FEET

200 0 200 400 600

CONTOUR INTERVAL .02

E.L. Lawson
GEOPHYSICIST

PLATE 5



SCALE IN FEET

200 0 200 400

CONTOUR INTERVAL 0·1

J. Isbister

GEOPHYSICIST

GEOPHYSICAL SURVEY AT THE "REWARD" LEASE, Mc ARTHUR RIVER, N.T.

TURAM RATIO CONTOURS

WITH GROUNDED CABLE BASELINE 0

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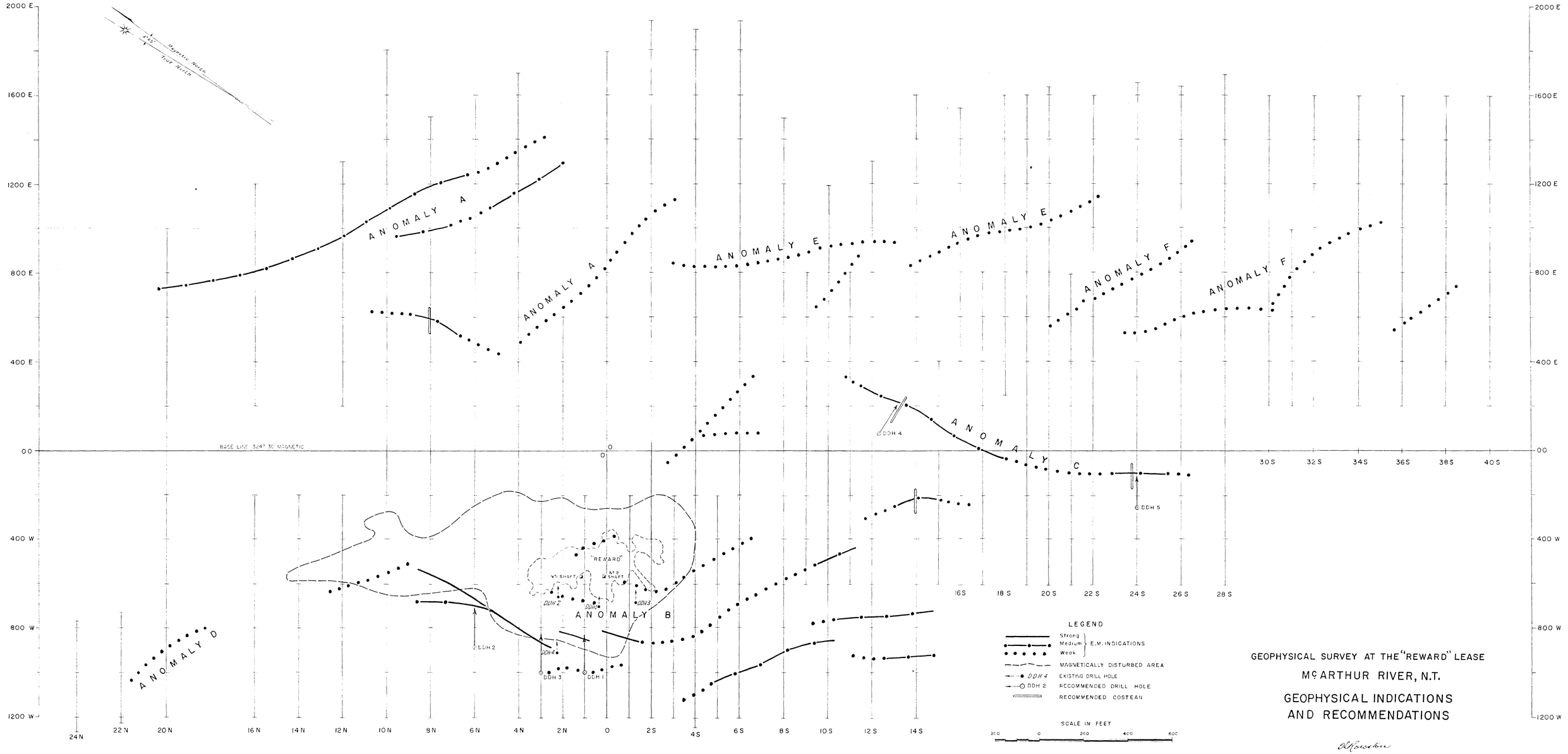
PLATE 6



GEOPHYSICAL SURVEY AT THE "REWARD" LEASE

McARTHUR RIVER, N.T.

GEOPHYSICAL INDICATIONS AND RECOMMENDATIONS

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