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COMMONWEALTH OF AUSTRALIA

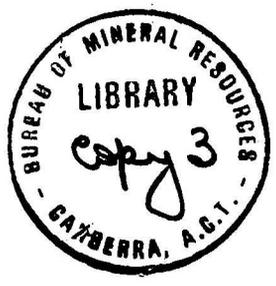
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DEPARTMENT OF NATIONAL DEVELOPMENT

BUREAU OF MINERAL RESOURCES,  
GEOLOGY AND GEOPHYSICS.

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RECORDS  
1959 NO.111



NOTES ON GROUND MAGNETIC SURVEY AT  
NEW HOPE AREA,  
TENNANT CREEK, N.T.

by

J. DALY.

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## ABSTRACT.

At the request of Mr. K. Shirley, applicant for a mining tenement over an area adjacent to the New Hope mining lease, the results of ground magnetometer surveys performed by National Lead Ltd. over the area have been examined, and recommendations made for four drill holes to test anomalies.

\* \* \* \* \*

### 1. INTRODUCTION.

During 1957, National Lead Ltd. carried out a programme of geological investigation on the Tennant Creek Gold Field. In the course of this investigation, ground magnetometer surveys were performed by the Company over several areas, including an area proceeding east from the New Hope Mining lease, about 18 miles ESE of Tennant Creek township. Information on the results of the geophysical work was made available to the Bureau by courtesy of the company. The company retired from the field at the end of 1957. Recently, the area covered by the company's survey in the New Hope area has been applied for under mining tenement by Mr. K. Shirley, who has had access to the results of the geophysical surveys and has requested that the Bureau investigate the results and make any recommendations for exploration that appear justified.

### 2. RESULTS OF THE SURVEY.

The information supplied consists of profiles of vertical component of the earth's magnetic field. On the basis of these profiles, contours of vertical component have been prepared by the Bureau and are shown on the attached plan (Plate 1). The profiles have been smoothed by eye. Over a small area shown on the plan, the profiles are too disturbed for contouring.

Information was supplied by Mr. Shirley on a diamond drill hole put down by National Lead Ltd., the position of which is shown on the plan. The result of this drill hole is discussed later.

### 3. INTERPRETATION.

The method found suitable for interpretation of the results of magnetic surveys at Tennant Creek is described by Daly (1957). The information available in the present case is not as complete as is desirable for precise interpretation for the following reasons,-

(a) No measurements of horizontal component have been made. The use of horizontal component profiles is of great service in increasing the precision of the interpretation, particularly in cases such as the present one, in which the vertical component profiles over anomalies are of unusual shape.

(b) The spacing of traverses is generally 300 feet. Traverses at closer spacing over anomalous areas would be desirable.

The contour plan shows two main magnetic effects.

(i) A general rise in magnetic intensity to the north.

(ii) Two anomalous areas, each showing the effects of several bodies, which may be pipelike bodies of ironstone of the type generally found at Tennant Creek.

One anomalous area extends from 2200E to 3600E, and appears to contain three separate bodies at fairly shallow depth.

The calculated centres of the bodies are as follows:-

2400E/120N, depth 400 feet

2700E/80S, depth 300 feet

3200E/100N, depth 500 feet.

The shape of the profiles is unusual, but would be accounted for by the combination of the regional rise to the north, referred to earlier, and the effects of pipelike bodies dipping to the south.

The second anomalous area extends from 5400E to 7800E, and contains two anomalies, due to bodies centred as follows:-

5700E/1500S, depth 500 feet

7500E/2100S, depth 500 feet

The profiles have the same character, suggesting a combination of a regional increase in vertical component to the north, and magnetic bodies dipping to the south.

The unusual shape of the profiles may cause some doubt as to whether or not the bodies causing the anomalies are in fact composed of massive ironstone. Attention has been drawn previously to the possibility of this being the case in the Wheal Dorea area (Daly 1957). However, as far as can be determined from the vertical component alone, the profiles in the New Hope area are quite different in character from those over the Wheal Dorea, and are considerably larger in amplitude. It seems probable that the New Hope anomalies are in fact due to ironstone bodies at depth.

If the irregular nature of the results between 2100E and 2300E is due to the presence of near surface ironstone it seems very likely that at least the anomalies between 2200E and 3600E are due to ironstone.

#### 4. RESULTS OF PREVIOUS DRILLING.

The drill hole put down by National Lead Ltd., details of which were supplied by Mr. Shirley, failed to intersect either ironstone or mineralisation. A section through this drill hole is shown (Plate 2).

It would appear from the plan (fig. 1) that the drill hole was directed at the centre of the anomaly, rather than the centre of the body causing it. However, this discrepancy may be more apparent than real, since there is no direct evidence for the shape of the contours between 7200E and 7500E. In any case, the ironstone bodies at Tennant Creek are generally extended in an east-west direction, and the general shape of the contours suggests that the body causing this particular anomaly is not exceptional in this regard. It appears, therefore, that the drill hole is reasonably well placed, provided that the body actually dips to the south. The failure to strike ironstone may be due to one or more of the following causes.-

(a) If the evidence for southerly dip is illusory, and the body actually dips to the north, the direction of the hole is unfavourable.

(b) On any assumption regarding dip, the hole has obviously been stopped too soon.

(c) Holes at Tennant Creek generally deviate. The experience of Peko Mines N.L. (personal communication) is that the holes usually flatten, provided the depression does not exceed a certain critical value, above which they steepen. In the area around the Peko Mine, this value is slightly less than  $70^{\circ}$ . If the hole has actually steepened, its chances of intersecting the body would be lessened.

## 5. DRILLING RECOMMENDATIONS.

The most satisfactory method of testing the anomalies would be to drill holes from the south, aimed to intersect the centres of the various anomalies as stated above, at depressions of about  $60^{\circ}$ . However, the lessee has stated that he proposes to drill holes to depth of 300 feet only. Holes of this length would be generally too short to reach the centres of the bodies, and the only means of giving a reasonable chance of intersecting the bodies will be to drill vertical holes above the calculated positions of the centres.

The sites recommended are shown below.

- (1) 2700E/80S
- (2) 7500E/2100S
- (3) 5700E/1500S
- (4) 3200E/80N

The order of the holes given is governed by the fact that the bodies are not very large, and it is not certain that the tops of the bodies causing the anomalies of smaller amplitude will be within reach of a 300 foot hole. It is considered that hole No. 1 will probably intersect ironstone and hole No. 2 has a reasonable chance. Holes 3 and 4 are less favourable, and should not be drilled unless a successful result is obtained in hole 2.

## 6. REFERENCE.

- DALY, J. 1957 - Magnetic Prospecting at Tennant Creek.  
Bur.Min.Resou.Aust., Bull. 44.



LEGEND

⊗ RECOMMENDED SITE FOR VERTICAL DRILL HOLE

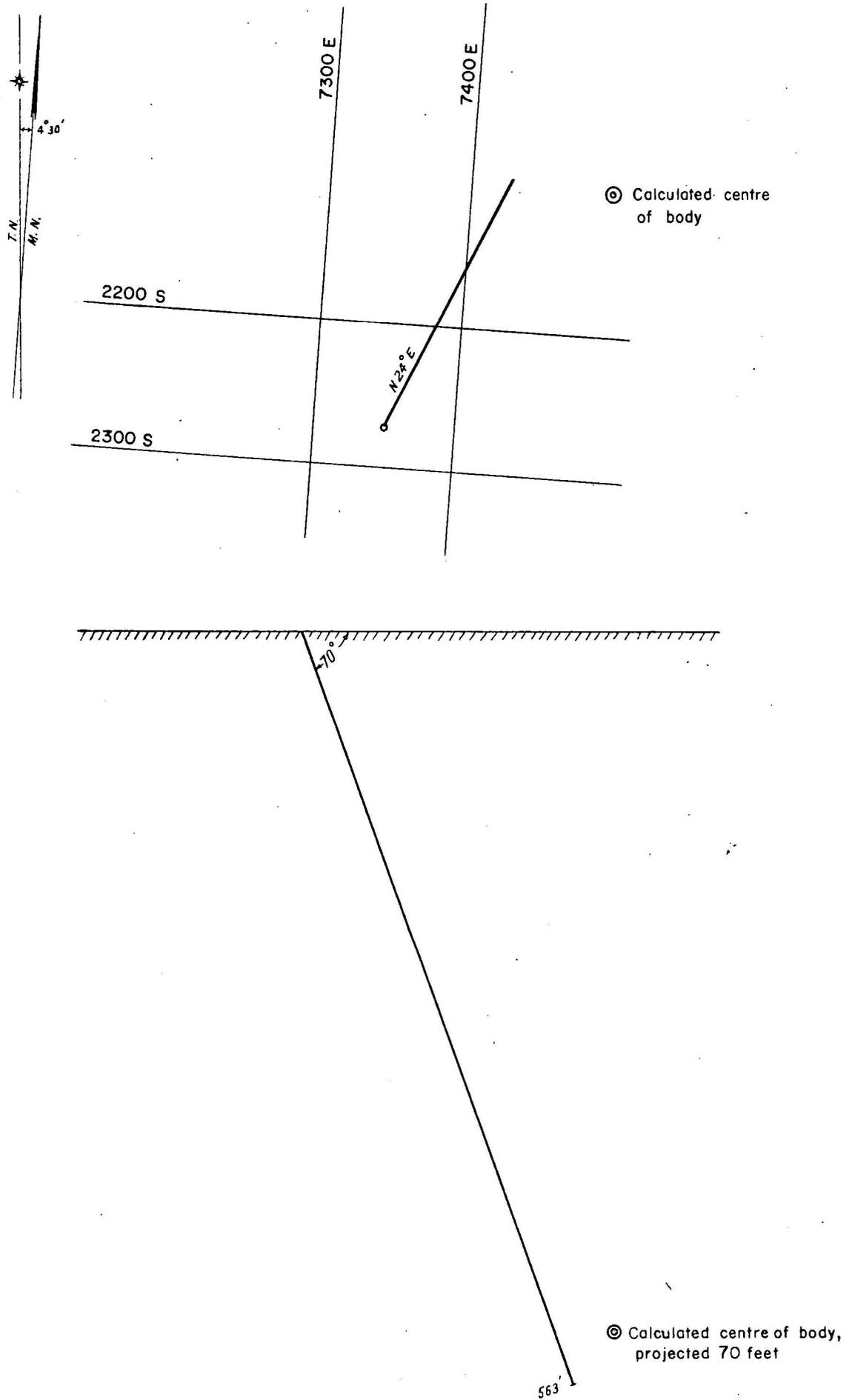
▨ RESULTS UNSUITABLE FOR CONTOURING DUE TO EFFECTS OF NEAR SURFACE MAGNETIC MATERIAL

SCALE IN FEET

0 400 800 1200

CONTOUR INTERVAL 100E

MAGNETIC SURVEY, TENNANT CREEK,  
 NEW HOPE AREA  
**CONTOURS OF VERTICAL MAGNETIC INTENSITY**  
 BASED ON RESULTS OF MAGNETOMETER SURVEY  
 BY NATIONAL LEAD LTD.  
 (INFORMATION ON AREA APPLIED FOR, AND LOCATION OF DRILL HOLE,  
 SUPPLIED BY MR. K. SHIRLEY)



NEW HOPE AREA, TENNANT CREEK, N.T.  
PLAN AND SECTION THROUGH DRILL HOLE  
BY NATIONAL LEAD LTD.

