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1948/43

SECOND PROGRESS REPORT ON GEOPHYSICAL SURVEY OF COBAR MINING FIELD, N.S.W.

by

L.A. RICHARDSON

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COMMONWEALTH OF AUSTRALIA

DEPARTMENT OF SUPPLY AND DEVELOPMENT

BUREAU OF MINERAL RESOURCES, GEOLOGY AND GEOPHYSICS

REPORT NO. 1948/43

(GEOPHYSICAL REPORT NO. 1948/5)

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SECOND  
PROGRESS REPORT

ON

GEOPHYSICAL SURVEY  
OF COBAR MINING FIELD, N.S.W.

BY

L. A. RICHARDSON  
SUPERINTENDING GEOPHYSICIST

BUREAU OF MINERAL RESOURCES, GEOLOGY AND GEOPHYSICS

COBAR GEOPHYSICAL SURVEY

2ND PROGRESS REPORT

I. INTRODUCTION AND HISTORY OF OPERATIONS

This progress report briefly describes the developments of chief interest in the Cobar geophysical survey up to 4th June, 1948.

Discussions between officers of the Geological and Geophysical Sections of the Bureau late in 1946, led to the commencement of geophysical survey operations by the Bureau at Cobar in March, 1947. A magnetic survey of the New Cobar, Chesney, Dapville and Gladstone areas was conducted by L.A. Richardson and W.D. Keating. The results of these operations are given in Report No. 1947/60 dated November, 1947.

The magnetic survey was resumed in November, 1947, under the Bureau's supervision and in association with the Zinc Corporation Ltd., field geophysical operations being conducted by W.D. Keating of the Bureau as Party Leader and J.J. Oosthuizen of the Zinc Corporation Ltd. The pegging of traverses and other surveying operations were conducted by the Company.. Geological surveys were commenced by the Company's geological staff and the results of these were available for the geophysicists to supplement the previous and current geological work of the Bureau and the N.S.W. Mines Department.

The first objectives of the geophysical operations were to extend the earlier surveys northerly to include the Great Cobar and Tharsis areas, to round off and extend the area covered by the earlier surveys and to then extend northerly to the C.S.A. and southerly to the Peak Area.

In December, 1947, the Company commenced diamond drilling on the Dapville area to test the Dapville No. 1 magnetic anomaly described in the report of November, 1947.

In January, 1948, the area was visited by the writer and the results were examined. Test surveys were made on the Peak area which gave interesting results, and plans were made for this area to receive immediate attention. C.J. Sullivan Superintending Geologist of the Bureau had previously expressed special interest in the Peak area due to the existence of a bend in the sandstone - slate contact which was believed to be of importance in connection with mineralisation control.

The magnetic survey of this area, completed by W.D. Keating, showed the existence of a pronounced magnetic anomaly and a self potential survey of the area of the anomaly showed features of interest. Later a gravity survey was made over the anomaly area by J.C. Dooley of the Bureau and the S.P. survey was extended by G.F. Schaeffer of the Bureau.

The field was again visited by the writer in April, 1948, when Mr. Haddon King and Mr. Sullivan were also present. The No. 1 D.D. hole had just previously intersected a pyrrhotite - Chalcopyrite body of thickness about 3'6" at a vertical depth of 840 feet below the centre of the Dapville No. 1 magnetic anomaly. Further particulars are given later in this report.

The survey at that time had extended well to the north towards the C.S.A., this part, from the vicinity of Fort Bourke area, having been completed by J.J. Oosthuizen. An anomaly of

interest was present north of the Spotted Leopard shaft and other features of possible interest were apparent.

On completion of the gravity survey of the Peak area two gravity test traverses were surveyed on the Great Cobar north area. It was then necessary for Mr. Dooley to return to Melbourne with the Gravimeter to prepare for a continuation of gravity surveys elsewhere. Messrs Dooley and Schaefer returned to Melbourne on 15th April, having spent four weeks on the field. Mr. Keating returned to Cobar on 14th April, and W.A.L. Forsyth of the Zinc Corporation Ltd., joined the Cobar party on the same day.

During the April visit to Cobar general aspects of the survey and drilling results were discussed with Messrs. King and Sullivan. Some details of the drilling results are given later in this report. Following these discussions arrangements were made for -

1. Additional S.P. surveys at the Peak area.
2. More detailed magnetic and S.P. surveys on the Great Cobar north area.
3. Detailed magnetic and S.P. surveys on the C.S.A. mine area.
4. Continuation of the C.S.A. - Spotted Leopard survey.
5. Detailed magnetic survey of the Dapville No. 2 anomaly area.

A second drilling plant was sent to the field by the Zinc Corporation Ltd. early in May and the Company asked for details of a site for drilling to test the Peak survey results. Arrangements were made for this question to be discussed at Cobar with the geologists concerned, before making a decision. This was done on 2nd and 3rd June with Mr. King, Mr. Sullivan not being available. Particulars are given later in this report.

During this visit to Cobar, plans were made for the survey to be extended in due course, to the area immediately south of the New Occidental and to the "Leslie" occurrence.

## II. SUMMARY OF RESULTS

### 1. Dapville Area.

Some details of the drilling results in No. 1 Hole are given below:-

<u>Depth</u>	<u>Copper</u>	<u>Gold</u>
988-992'6"	0.13%	Nil
1032-1035	0.90	Trace
1035-1040	0.10	0.02 oz
1040-1045	0.45	Trace
1045-1050	0.75	0.02 oz
1050-1055	0.15	Trace
1055-1060	1.30	0.02 oz
1060-1063	4.5	0.10 oz
1063-1065	4.6	0.02 oz

The material at 1060'-1065' was massive pyrrhotite, (of true width 3'6") at a vertical depth of 840 feet below the centre of the Dapville No. 1 magnetic anomaly. These drilling results were interpreted as of considerable importance because they tend to confirm the belief that magnetic anomalies on the

Cobar field are likely to be well worth drilling. Furthermore it is important to recognise that the nature of the Dapville No. 1 anomaly body, where known, is massive pyrrhotite and produced an anomaly of about 30 gammas only at the surface. An ore-body of similar dimensions and depth, but with less pyrrhotite, would produce an anomaly correspondingly smaller and it can therefore be concluded that magnetic anomalies of even small intensity than that of Dapville No. 1 anomaly may be regarded as important. The speculation can be carried further to support the view expressed in the report of November, 1947, that the absence of magnetic anomalies need not be regarded as adversely affecting prospecting of localities which may be considered favourable on geological or other grounds.

The geophysical aspects were mentioned during discussions at Cobar and in connection with the selection of a site for No. 2 drill hole, Mr. King expressed interest in the Dapville No. 2 anomaly area as a target for that hole. This was not favourably considered by the writer for the reasons given below, it being understood that Mr. King had special reasons from the mining operational side influencing his views on the matter.

- a. The form of the Dapville No. 2 anomaly as it stood was very irregular and needed further examination before a decision could be satisfactorily made concerning testing by drilling.
- b. The area of this anomaly was covered by overburden so that we had no evidence of the existence of any favourable surface manifestations of mineralisation as was the case with the Dapville No. 1 anomaly.
- c. For general requirements in connection with future deliberations concerning the interpretation of our magnetic results at Cobar, an intersection of the Dapville No. 1 anomaly body, in its centre, and at a shallower depth than 840' would be useful.

These points were discussed at the time and to take care of the aspect (b) above, Mr. King put forward the proposal to undertake trenching of the anomaly area to search for any mineralisation signs in the solid bedrock. Mr. Keating was thereupon asked to give the location necessary for such trenching. Further decisions on the matter were deferred because Mr. King desired to discuss the question with others concerned.

Subsequent cogitation on the subject by the writer led to the memo dated 23rd April and addressed to Mr. Keating. In this memo it was indicated that in view of the interest being shown in the Dapville No. 2 anomaly it was desirable that we have the opportunity of giving that area some further attention before being asked to select a site for a drill hole to test this anomaly. In the event of the final decision being in favour of placing No. 2 drill on No. 1 anomaly a site was recommended as below.

At 1400N/ 2770W depressed 60° in the direction 260° (true) to intersect the anomaly axis at a depth of about 450 feet.

In due course further attention was given to the area of No. 2 anomaly and the results are to hand. This work consists of a detailed magnetic survey of a number of traverses by Mr. Keating and some S.P. traverses by Mr. Forsyth. The magnetic profiles show the existence of very disturbed conditions of shallow seated origin and the possible presence of an anomaly of about 30 gammas which is more or less similar in type to the Dapville No. 1 anomaly. It is centred at about 2900N/3000W. The definition is very uncertain. The S.P. Survey gave no anomaly.

No. 2 drill hole was eventually placed by the Company on the Dapville No. 2 anomaly at 1250N/2780W, depressed 66° in the direction 275° (true). This will test, at a position about 200 feet southerly from the anomaly centre, at a depth of about 450 feet.

## 2. The Peak Area.

The magnetic survey of the Peak area, by Mr. Keating, revealed the presence of a magnetic anomaly of intensity 450 gammas, of deep-seated origin and centred at 200N/1200E. The form of the anomaly is shown by means of isodynamic lines on plan No. G28-1.

It will be noticed that the anomaly is centred on the southerly continuation of the Blue Lode Shear line and is close to the bend in the sandstone-slate contact as determined by C.J. Sullivan. This bend is believed by Mr. Sullivan to be a geological feature of significance in connection with mineralisation.

There is room for speculation concerning the type of body responsible for this anomaly and to seek further evidence concerning its nature, arrangements were made for self-potential and gravity surveys to be made over the anomaly area. The S.P. survey was commenced by Mr. Keating and showed anomalies of interest. During Mr. Keating's subsequent absence from the field on recreation leave, a gravity survey of the area was made by J.C. Dooley of the Bureau while the S.P. survey was continued by G.F. Schaeffer of the Bureau and later by W.A.L. Forsyth of the Zinc Corporation Ltd. The result of these gravity and S.P. surveys are shown on plans numbered G28-3 and G28-2 respectively.

It will be seen that each method of survey shows an anomaly but they do not coincide in position. Consequently there is no mutual confirmation and each anomaly has to be considered separately and on its own merits.

The magnetic anomaly is considered to be well situated from the geological viewpoint in view of its relation to the Blue Lode Shear and the bend in the sandstone-slate contact. It is no doubt due to a magnetic body of substantial dimensions with an elongation parallel to the Blue Lode Shear Line. A clue as to its nature may be provided by the results of tests made on the drill core from the Peak Drill Holes 2 and 3. These show that the bottom 45' of No. 3 and the bottom 275' of No. 2 drill hole intersected lightly mineralised slate with appreciable magnetisation. Mineragraphic examination of specimens from these sections by Dr. Stillwell shows that the magnetisation is due to pyrrhotite, mostly along cleavage planes. Within these sections heaviest mineralisation of useful kind is found in shear zones, or the like, of width about 5 feet or less. The whole or most of the pyrrhotite zone is lightly mineralised with copper and lead.

The body intersected by the Nos. 2 and 3 drill holes gave no appreciable magnetic anomaly at the surface and if similar material is responsible for the Peak magnetic anomaly it is likely that the magnetic mineralisation of this body will be more intense than that of the body intersected by No. 2 and No. 3 drill holes, with the probability of magnetite also being present. Furthermore if the most useful mineralisation is to be found in shear zones within this body, attention is drawn to the Blue Lode Shear as the feature likely to be concerned with this aspect. The shoots of ore connected with this shear in the Blue Lode workings showed a steep easterly dip. The form of the anomaly suggests that the anomaly body has a steep westerly dip. In testing this anomaly it is therefore not clear whether it would be best to drill from the east side or the west. From the straightout geophysical point of view it would be satisfactory to drill vertically at the centre of the anomaly body to prove its depth and determine its nature in the centre of its mass distribution.

The foregoing remarks apply as interpretation aspects if the anomaly is due to a mineralised body of the Cobar type. It should be recognised that the anomaly could be due to a basement or other geological feature. However, we know nothing about the depth to or nature of the basement in this area, or of the existence of any other unmineralised geological feature which could cause this anomaly.

The S.P. anomaly axis lies along or close to the position of the Blue Lode Shear with one pronounced negative centre at the southern end and less definite ones to the north. The form of the southern negative centre is such that the source of potential responsible could be a sulphide body undergoing oxidation at a depth of 200-300 feet which is the depth of oxidation on the Peak area.

It is also a fact that the anomaly is confined to the hill feature, though the correlation with this feature is not consistent in detail.. There have been instances when S.P. anomalies have been measured and attributed to special earth-current distributions related to hill features. This could be the case with this anomaly but its form and coincidence in position with the Blue Lode Shear are strong factors in favour of it being regarded as a feature related to mineralisation distribution.

The gravity anomaly is a broad feature, measured only in part to date, but its centre does not correlate well with known geological features of interest. Furthermore its dimensions are such that a mineralised body of the type likely to occur at the Peak area would have to exhibit unusually large dimensions to produce the anomaly measured.

Reviewing the anomalies obtained from the three methods the writer favours testing of the magnetic anomaly first and then the S.P. anomaly, leaving the gravity one for later consideration.

Some aspects of interest in connection with the magnetic anomaly are set out below -

- a. The absence of S.P. anomaly over the central area of the magnetic anomaly may be judged as evidence unfavourable for the existence of heavy sulphide mineralisation in the magnetic anomaly body. This absence would be accounted for if any such sulphide body present does not extend upwards into the oxidation zone.
- b. The absence of obvious mineralisation indications at the surface over the central area of the magnetic anomaly was not regarded as unfavourable evidence because the anomaly body may not extend sufficiently close to the surface to provide such obvious indications. It was believed that the Blue Lode mineralisation may be one surface manifestation which would extend down its southerly pitch to the vicinity of the anomaly body and thus be related to the latter.
- c. In this connection it is understood that recently officers of the Bureau's Geological Section have made a detailed examination of the area and have found pseudomorphs of sulphide in the surface rocks over the central area of the anomaly. Further details are awaited.
- d. It is believed that in spite of any unusual or odd aspects which might apply to this anomaly body we have ample justification for assuming at this stage that the magnetic anomaly alone provides a worth while target for drilling.

Early in May the Zinc Corporation Ltd., notified that another drilling plant would reach the field on 26th May for drilling the Peak area and sought particulars of a drill site. Due to the existence of the various factors mentioned above, arrangements were made for this question to be investigated at Cobar with the geologists concerned before making a decision. This investigation took place on June 2nd, and it was agreed that the first hole should be drilled from the east side at 180N/1510E depressed 65° in the direction of traverse 180N, westerly, to intersect the anomaly centre at a depth of about 500 feet.

When the time arrives for testing the S.P. anomaly we may be in possession of sub-surface data obtained from the testing of the magnetic anomaly which will influence the decision concerning the S.P. anomaly. In the absence of any such additional information it is recommended that the initial testing of this anomaly be by drilling designed to intersect the anomaly axis at a vertical depth of about 350 feet at the point 1000N/1000E.

### 3. The Great Cobar Area.

The operating Company is interested in an early determination of the possibilities on the Great Cobar group of leases.

To date a detailed magnetic survey by Mr. Keating and a S.P. survey by Mr. Forsyth has been made over the area extending northerly from the Great Cobar lease to the part just north of the railway line.

In addition, gravity measurements have been made by Mr. Dooley along two traverses on the Great Cobar north area. Geophysical operations over this ground are seriously hampered by the presence of slag, iron debris and houses, which of course mostly effect the magnetic surveys. Plan G28-4 shows the results of the magnetic survey in the form of isodynamic lines which are based on smoothed profiles.

There is a strong magnetic anomaly associated with the Great Cobar occurrence which cannot be completely measured due to the existence of the slag dump. The material responsible is no doubt related to the Great Cobar core-body occurrence and probably does not extend far if at all into the Great Cobar North lease. However, it is possible that material of lesser magnetisation extends into the latter lease producing a small anomaly which cannot be satisfactorily separated from the anomaly due to the Great Cobar occurrence. The position is made worse by the fact that the magnetic profiles concerned are very disturbed by the effects of houses and debris. It is considered therefore that the magnetic results on this area are inconclusive.

The results of the S.P. survey to date show no anomalies of interest on traverses 6400N to 7800N. Additional S.P. work is being carried out. However, the prospects of obtaining useful results from this method on the Great Cobar North area are not promising and will probably be inconclusive also.

The gravity test survey by Mr. Dooley was made on traverses 7500N and 8200N. In each case anomalies of low intensity are present, centred at about 4000W, which could be due to mineralised zones.

On the basis of results to date on this area it is considered that the geophysical survey results are not conclusive enough for the purposes of making a satisfactory drilling recommendation.

If practicable we would appreciate some notice of the intention to drill this area, to give time for a close examination



of the results when they are all to hand, so that whatever we can get out of them will be available for the guidance of testing. This examination would be facilitated if at the time, a copy was available of the Company's recent compilation from old records showing sub-surface mineralisation distribution in the Great Cobar and Great Cobar North workings.

It is believed that there is scope for further gravity work on this area and the use of electromagnetic methods which may detect the position of shear zones of interest.

#### 4. C.S.A. -Spotted Leopard Area.

Plan No. G28-5 shows smoothed vertical force isodynamic lines based on part of the field observations made by J.J. Oosthuizen of the Zinc Corporation Ltd. It is clear from these results that an anomaly (Spotted Leopard No. 1) of intensity 70 gammas and deep-seated origin is centred at A 12000N/2000W. This position is about 2 miles southerly from the C.S.A. Mine and is on or near the extension of the C.S.A. Tinto mineralisation line.

As in the case of the Peak anomaly this anomaly could be due to a geological feature other than a mineralised body. If a mineralised body is responsible, its dimensions will probably be substantial but its main mass may not extend upwards far, if at all, into the oxidation zone.

It was recommended that initial testing by drilling be designed to intersect the anomaly axis at a depth of 800 feet. Accordingly a drill site was fixed at A 11860N/1560W for a hole depressed 65° in the direction of A 12000N/2000W.

Other anomaly features of interest are present in Mr. Oosthuizen's work south of the Spotted Leopard shaft. These will be described when the results of recent field work have been examined.

On the C.S.A. Mine area the detailed magnetic survey by Mr. Keating has revealed an anomaly of interest centred near the known occurrence. A self-potential survey is to be made over this area and results from both surveys will be described later.

### III. CONCLUSIONS

Results to date from Cobar Geophysical Survey show promise of making a useful contribution to the knowledge of the mineralisation distribution on that field.

Seven magnetic anomalies of definite interest have been located. These are, New Cobar, Chesney, Dapville No. 1, Peak, Great Cobar, Spotted Leopard No. 1 and the C.S.A. Mine. The discovery of massive pyrrhotite in the mineralisation responsible for the Dapville No. 1 anomaly has an important bearing on geophysical interpretation procedure because a number of other magnetic anomalies of low intensity become of interest. These will be selected from the results in due course and are additional to the ones mentioned above.

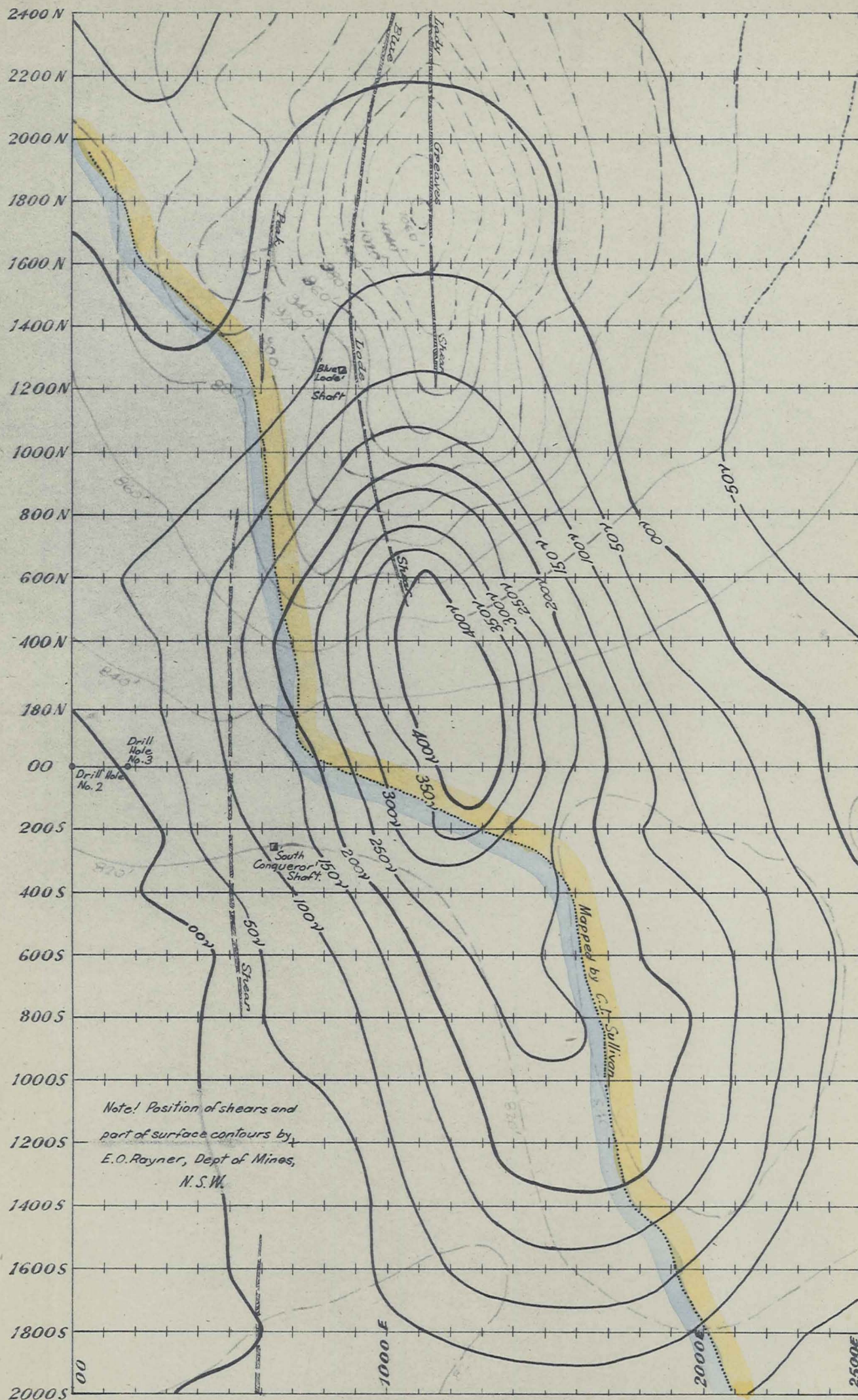
Plotting of the results by Mr. Schaefer, to suit geophysical requirements, is proceeding in this office and is well advanced. It is recommended that gravimeter surveys be commenced at an early date on the area of the Spotted Leopard No. 1 anomaly and the Great Cobar Area.

*L.A.R.*

Melbourne,  
July 9th, 1948.

(L. A. RICHARDSON)  
Superintending Geophysicist.

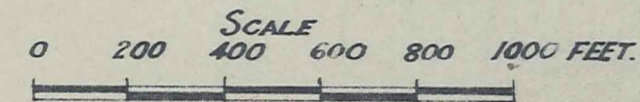




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COBAR GEOPHYSICAL SURVEY

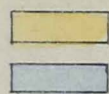
. PEAK AREA .



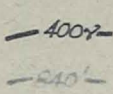
Observer: W.D. Keating.

Magnetic Vertical Force Isodynamic Lines.

22A.  
9 JUL '48



Sandstone.  
Slate.



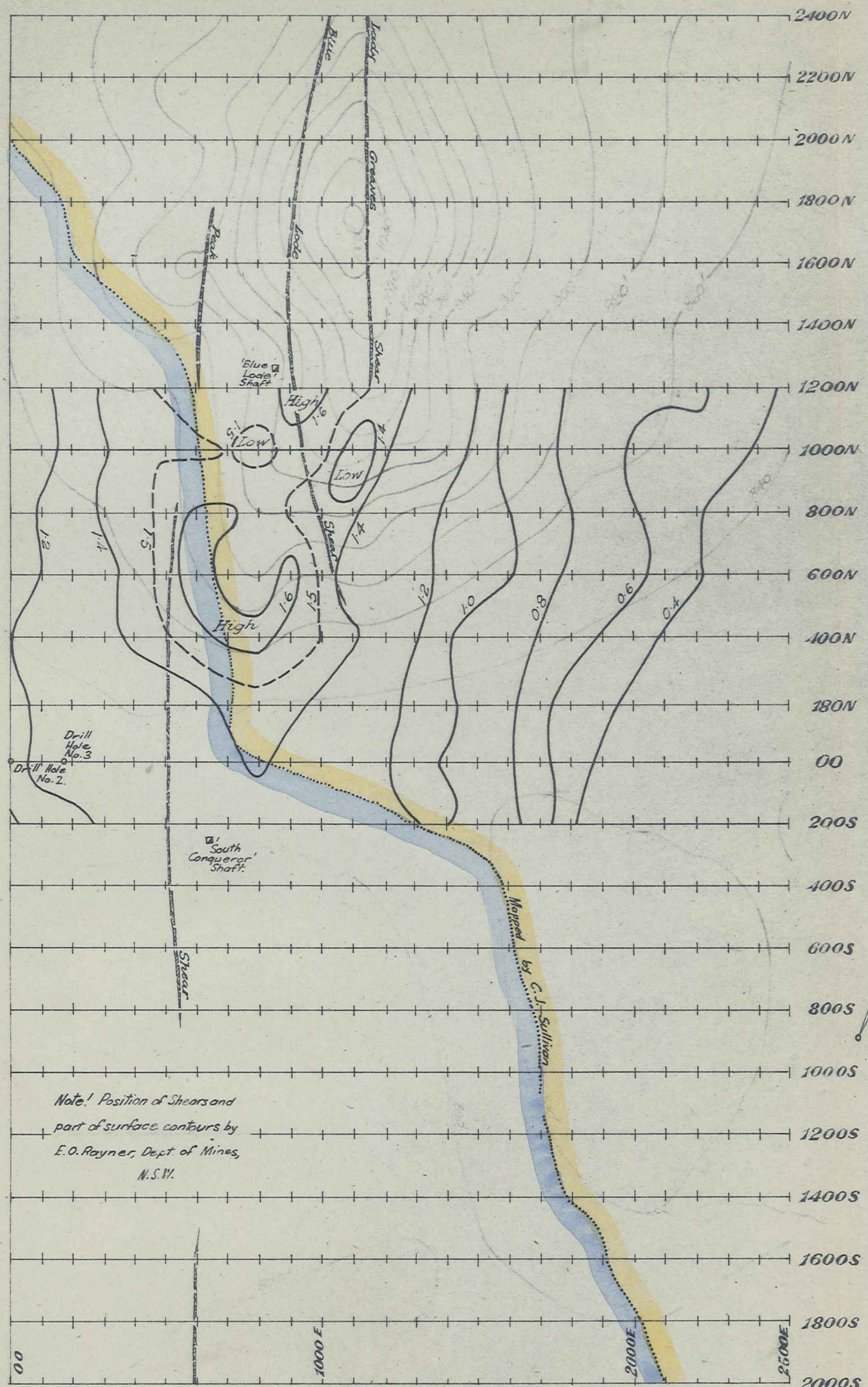
Isodynamic Lines.  
Surface Contours.

G28-1





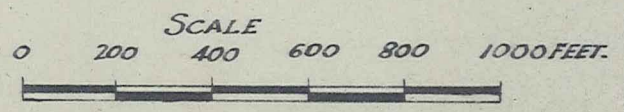




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# COBAR GEOPHYSICAL SURVEY PEAK AREA

Gravity Contour Lines  
Contour Interval: 0.2 milligals.



Observer: J. C. Dooley.

<p>2400N</p> <p>2200N</p> <p>2000N</p> <p>1800N</p> <p>1600N</p> <p>1400N</p> <p>1200N</p> <p>1000N</p> <p>800N</p> <p>600N</p> <p>400N</p> <p>180N</p> <p>00</p> <p>200S</p> <p>400S</p> <p>600S</p> <p>800S</p> <p>1000S</p> <p>1200S</p> <p>1400S</p> <p>1600S</p> <p>1800S</p> <p>2000S</p>	<p>00</p> <p>1000E</p> <p>2000E</p> <p>2500E</p>	<p>Sandstone.</p>	<p>1/2</p>	<p>Gravity Contours.</p>	<p>G28-3.</p>
		<p>Slate.</p>	<p>1/2</p>	<p>Surface Contours.</p>	

2400N

2200N

2000N

1800N

1600N

1400N

1200N

1000N

800N

600N

400N

180N

00

200S

400S

600S

800S

1000S

1200S

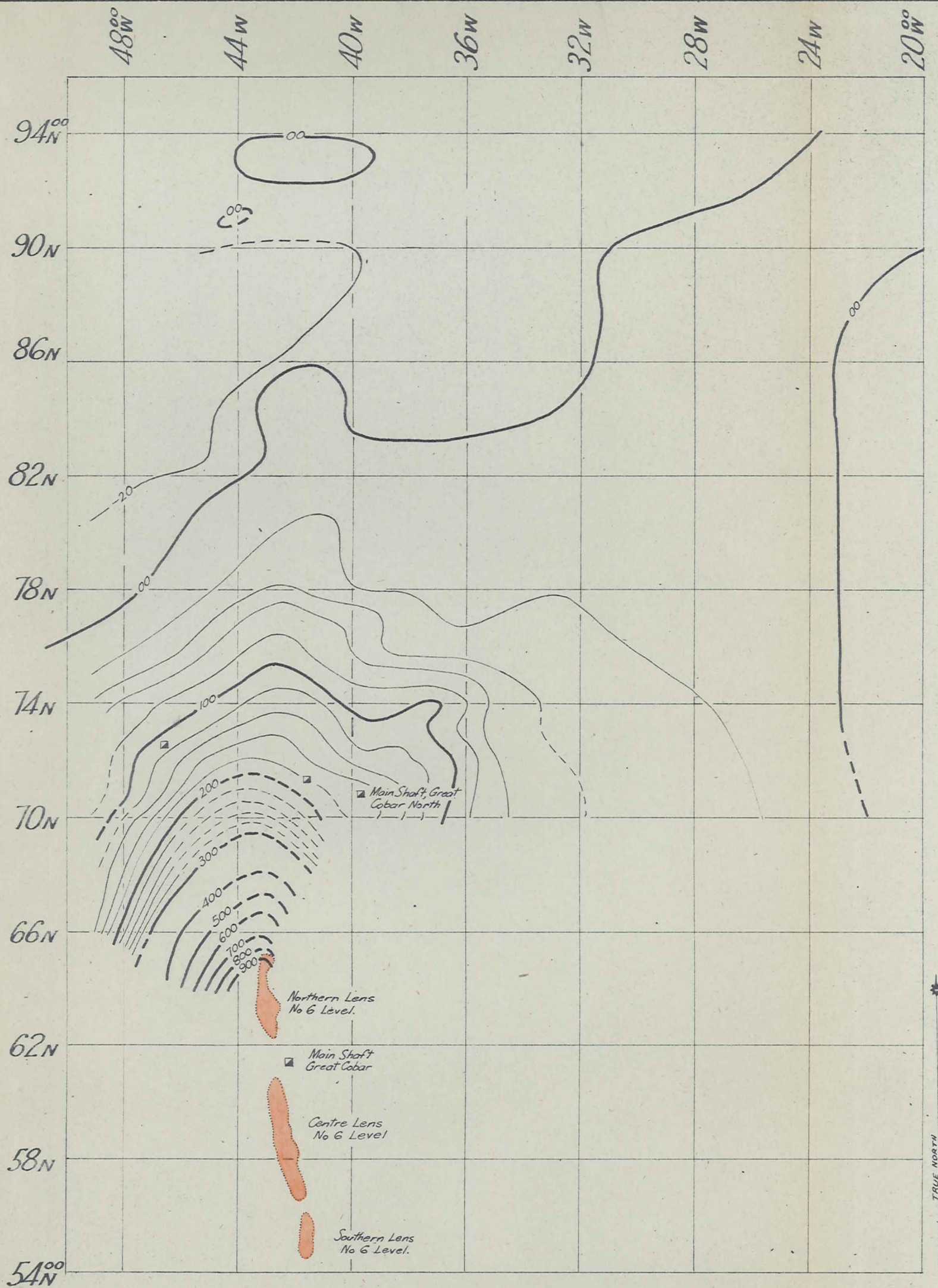
1400S

1600S

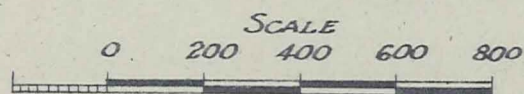
1800S

2000S





Bureau of Mineral Resources, Geology & Geophysics.



Observer: W.D. Keating.

Lak.  
9 JUL '48.

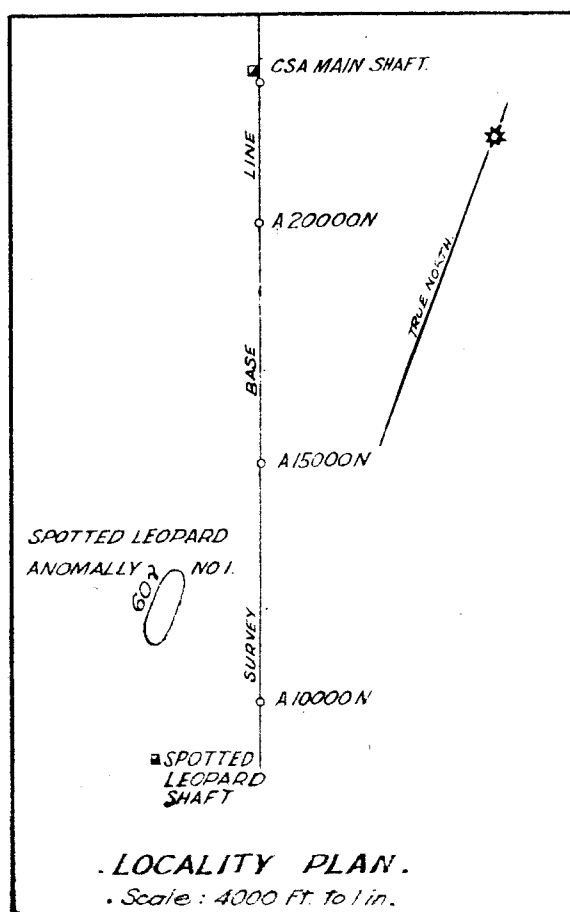
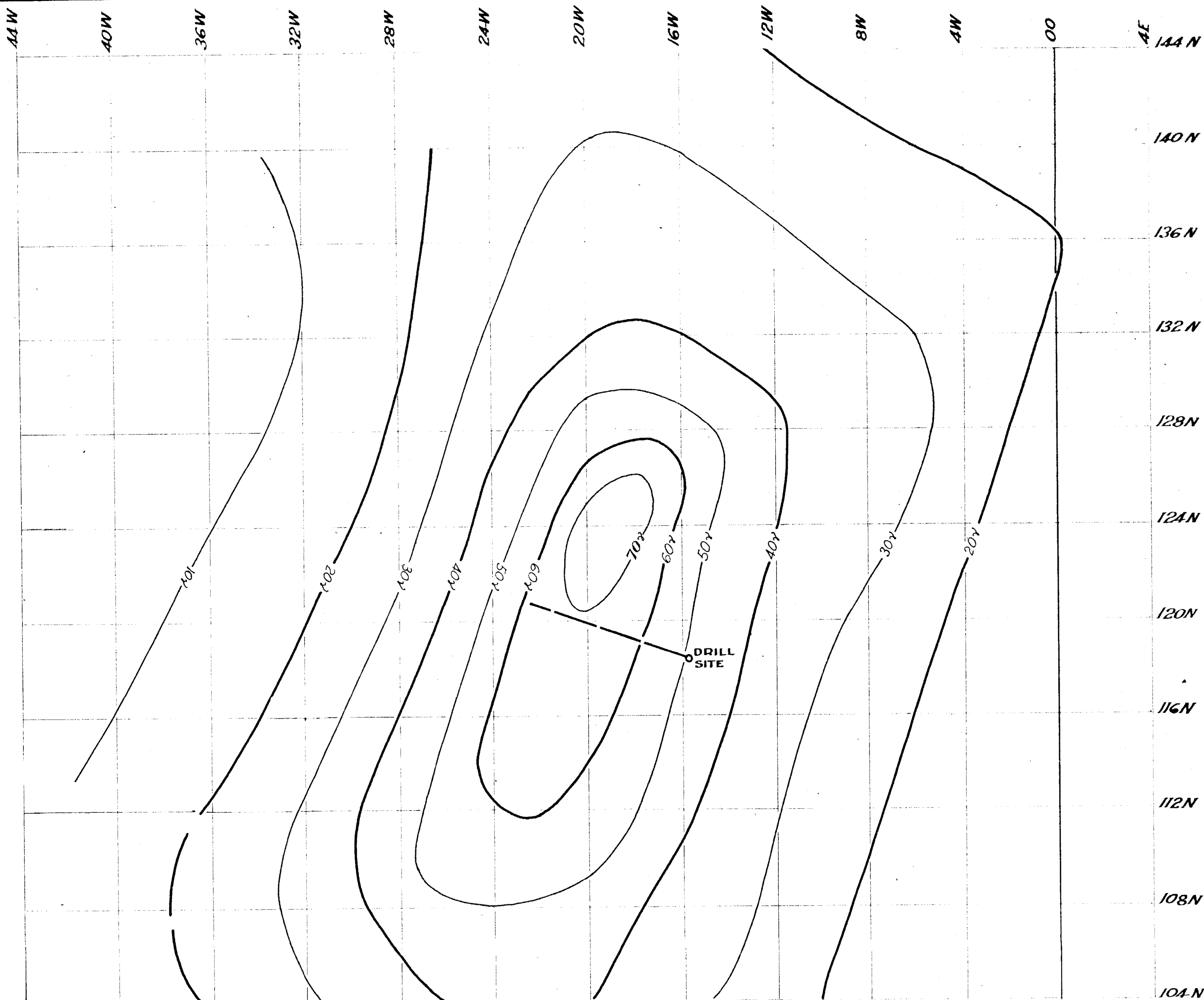
# COBAR GEOPHYSICAL SURVEY GREAT COBAR AREA

Magnetic Vertical Force Isodynamic Lines:

Note: Isodynamic lines taken from smoothed profiles.

G28-4.

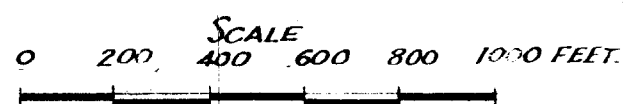




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COBAR GEOPHYSICAL SURVEY  
C.S.A - SPOTTED LEOPARD AREA.

Magnetic Vertical Force Isodynamic Lines.



Observer: J. J. Oosthuizen,  
(Zinc Corp.)

*L.A.A.*  
9 JUL '48.

G28-5.