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GEOPHYSICAL REPORT

TO

LYELL - E.Z. EXPLORATIONS

No. 3

ADASTRA HUNTING GEOPHYSICS PTY. LTD.

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Mascot, N.S.W.

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INTRODUCTION.

In association with Dr. B. Scott, Chief Geologist and J. Bonniwell, Geophysicist, of L.E.E. in Queenstown, Tasmania, during the period of the 16th. - 20th., February, 1959, further consideration was accorded to the aerogeophysical results of the South West Tasmanian region.

The main purpose of the visit by the author was to continue the review of the data on the Arthur Area, Job No. AH125 (which had been commenced on the previous visit and preliminarily discussed in Report No. 2) with special reference to the examination of charts (or tapes). This investigation correspondingly constitutes the major part of this report.

Discussions were also held on the geophysical ground follow-up program and results available from it at the time; Some brief remarks are included as a consequence of these.

SOME ADDITIONAL COMMENTS ON JOB NO. AH.125, ARTHUR AREA.

A5/1.

E.M. Anomaly.

A chart examination of this anomaly on Lines 34 and 35 reveals that the higher frequency response is negligible on both lines whilst the lower frequency response is 0.5 degree above background on Line 35 and 0.4 degree above background on Line 34.

This provokes the following observations:

(a) It should be remembered that the full scale deflection is 4° on the lower and 5° on the higher frequency channel i.e. the sensitivity is greater on the lower frequency.

(b) The altimeter record shows the aircraft-ground clearance to be of the order of 650 ft. in the vicinity of this anomaly. Hence it could be expected that the higher frequency response would have decreased relatively more than the low frequency.

(c) As the E.M. response is a function of a parameter which is the product of conductivity and size of the body and frequency employed and as this function rises to a maximum and then decreases as this parameter continues to increase, it is quite conceivable that this response is being obtained from a body with a high conductivity-size factor such that the region beyond the maximum is the relevant operative portion of the curve. Under these circumstances a lower response would be obtained on the higher frequency.

45/1 Contd.

(d) It is suggested that a combination of the above three effects could be contributing to the observed responses.

There are negligible responses to the north and south.

Magnetic Data.

Superimposed on a regional more or less N-S magnetic gradient which is increasing to the east, there is a small, plateau-like, area. The western edge of this plateau region is associated with the Owen Conglomerate/Carbine Group (?) contact. It is along this junction that the E.M. anomaly falls, near the vicinity of Tertiary and Recent cover which extends further to the west. As far as can be judged on magnetic evidence available, the "plateau-like" effect dies out to the south.

The following are suggested as possible origins:-

(i) There is some magnetic mineral content within the Ordovician Owen formation in this locality which is raising its susceptibility value.

(ii) There may be preserved under the Ordovician Owen, which is thinning, say, in this area, a stratum of a more magnetic material in the Carbine Group. This is unlikely to be the case geologically, i.e. basic lavas etc. are unlikely to occur.

(iii) The effect could be explained by postulating a more or less vertical, weakly magnetic body elongated along the direction of and occurring near the junction of the Carbine and Ordovician Owen and petering out to the south whilst possibly being faulted out to the north. This is assuming that the plateau-like effect could be arising from a minor high superimposed on the main regional gradient. Such a body would not only account for the magnetic observations but also if it were assumed to be conductive, at least in part, it would account for the E.M. response. The model of this third postulate obviously conforms with what might be anticipated from a possible ore body.

In summary, although it would have been additional confirmation to have obtained distinctive responses on the higher frequency channel as well as the low, this is an interesting and in many respects unique anomaly, which therefore warrants high order priority in ground checking to establish its economic or other significance.

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A5/2.

On the chart profiles, this E.M. anomaly trend is composed of small and broad anomaly peaks with possible topographic and/or drainage correlation. These factors, when linked with the close proximity of the Tertiary cover, render this anomaly of very doubtful importance.

A5/3 and 4:

Like A5/2 the chart examination of these anomalies on several lines suggests that they are small and broad with possible altimeter correlation. They cannot be regarded as impressive.

A5/5.

This possesses a large sharp peak on two lines (5 and 6) although some drainage correlation is possible. The closeness to the Tertiary junction is unfavourable. Line 7 was probably flown too high for a response to be recorded. Although not particularly promising, this is a more interesting anomaly than A5/2 3 and 4.

A6/1 and 2.

In general, these E.M. anomalies are very large and broad on profile as is indicated also from the contours. Comments on these anomaly trends and on other E.M. anomalies associated with the ultrabasic belts of AH117 in Report No. are still applicable as to their possible origin.

A12/1.

This E.M. anomaly has a very unfavourable appearance on chart both with regard to its nature and possible topographic correlation and is no longer recommended for ground checking.

A12/2.

This is a fresh anomaly selected for ground checking. It occurs mainly on one Line, No. 114 at Frame No. 1031, with a 1.0 degree peak between a northerly pitching syncline and anticline. Although there is probable altimeter correlation, it would appear to be a definitely conductive region.

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Assessment of Anomalies.

Remarks made previously in Report No. 1 with regard to the significance of a priority listing apply equally here.

Because of the greater accessibility of these localities as contrasted against those of AH117, it is probable that some form of ground checking could be carried out on most if not all whilst the higher priority anomalies could be given more thorough treatment.

- 1st. Order Priority. A5/1.
- 2nd. Order Priority. A6/1, A6/2, A5/5, A12/2.
- 3rd. Order Priority. A5/3, A5/4.
- Structural. A5/2, A12/1.

Some Remarks on Results of AH117 Ground Checking.

So far, one anomaly, viz 20/4, has not been satisfactorily located on the ground. It is understood that it is normal for some "leakage" of anomalies in ground follow-up. It is suggested that one explanation of this loss may be due to a conductor being broad in nature and containing a gradual or continuous variation in conductivity rather than a sharp, discrete type. Perhaps in these circumstances, the airborne equipment may obtain a more "integrated" effect from the whole zone, whereas ground equipment is not particularly effected by a portion only.

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