ANVIL MINING CORPORATION LIMITED

002861

MEMORANDUM

TO: W. Krats FROM: P. M. Pettigrew

SUBJECT: Pb and Zn Zonation in Faro 1 and 3 DATE: May 8, 1973

Introduction:

For some time there has been a consistent error in the DDH-predicted Pb/Zn ratio of the ore mined relative to the Pb/Zn ratio experienced in mining (i.e. milling and stockpiling). This has been commented on by the writer in reports dated February 10 and September 13, 1972 and in a memorandum dated April 16, 1973.

The error appears, in a sense, to be self-compensatory: the (Pb + Zn)% appears to be reliably predicted but the Pb % is underestimated and the Zn % over-estimated in any DDH-based mining plan.

Summary:

DDH data for zones 1 and 3 were examined in terms of 5' diamond drill core increments with Pb $\geq$ 6% and Zn $\geq$ 7%. Isopach maps were compiled on the basis of cumulative thicknesses of these values per hole. These maps indicate localized highs in particular for Zn and that these have possibly been given too much weight in bench plans and, therefore, in mining plans. Despite this, Zn does seem to be much more homogeneously distributed than Pb, which is much more zonal in distribution.

Some more detail has been worked into the sub-zonation suggested in the writer's report on the massive pyrite (September 26, 1972). There now seems to be considerable significance in the remobilization phenomenon and through a study of this some recommendations will be made for correcting the Pb/Zn ratio problem.

It is suggested that a causal approach is better than a simple, mathematical one.

The sub-zonation suggests areas which must be examined more closely (i.e. drilled) to help decide on alternative mining programmes.

1. Distribution of Pb and Zn in Zones 1 and 3:

All the DDH logs were examined for Pb and Zn values per 5 ft. increment in terms of values ≥ 6% Pb and ≥ 7% Zn. Isopach maps were compiled based on cumulative thicknesses of these incremental values.

High assay values were used on the assumption that high Pb-Zn tonnage blocks are relied on to provide a high proportion of the metal content in any mining plan. They also appear to give a reasonable "marker horizon" for grade continuity and, by inference, reliability.

a. Pb Distribution:

Figure 1 is the Pb isopach map mentioned above. (i.e. a map containing equal thicknesses of Pb ≥ 6%).

It shows the thickest portion of high Pb to be located to the west of section 22. This is in the thinner portion of the sulphide mass (cf. figure 3).

There is an extreme localized high at DDH 66-44 and the reverse is observable at 70-2.

Zone 3 and much of the ore to the east of section 22 is quite lead-deficient in the present context.

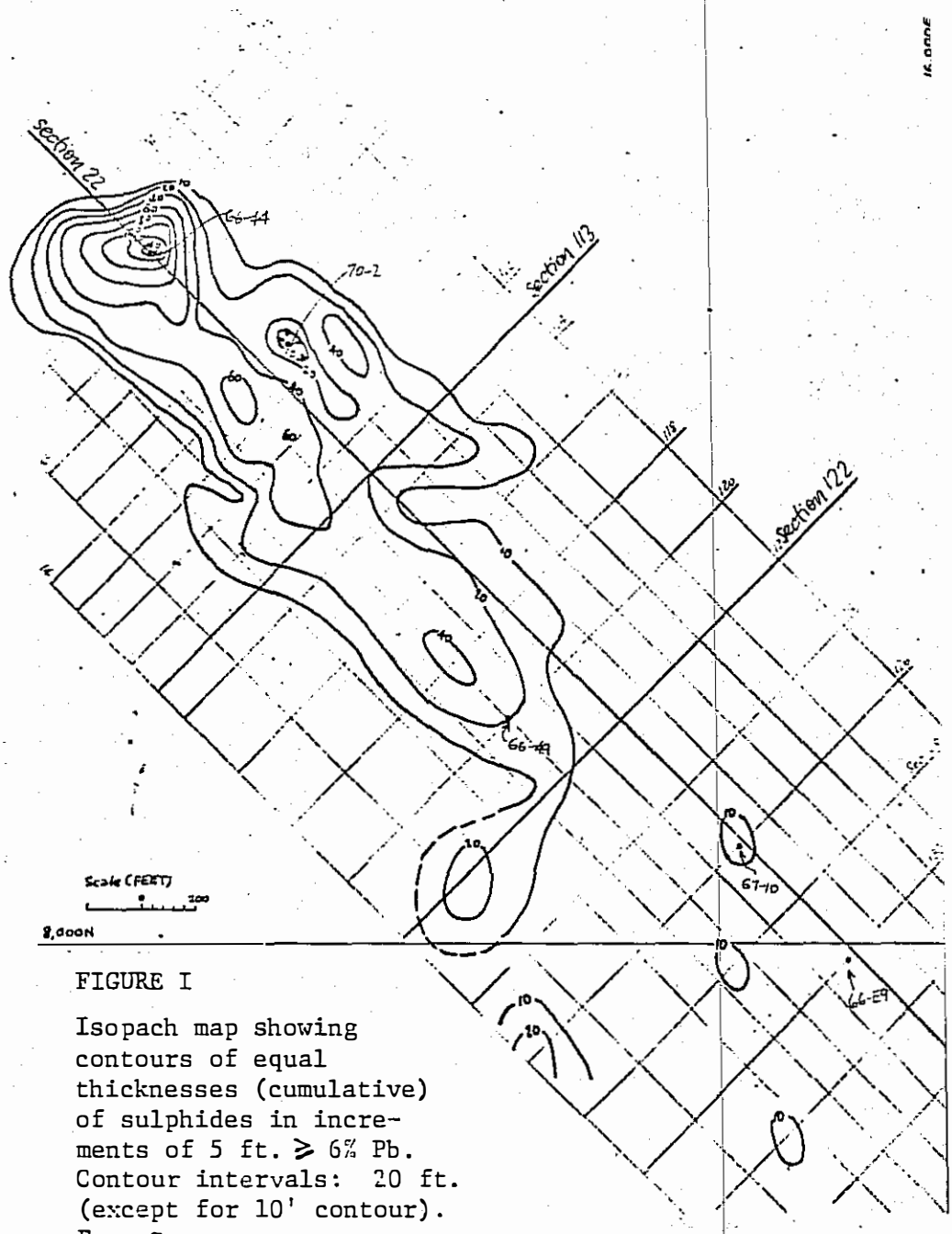

FIGURE I

Isopach map showing contours of equal thicknesses (cumulative) of sulphides in increments of 5 ft. ≥ 6% Pb. Contour intervals: 20 ft. (except for 10' contour). Faro Zones 1 and 3.

b. Zn Distribution:

Figure 2 is the Zn isopach map mentioned above (i.e. a map contouring equal thicknesses of Zn ≥ 7%).

Contrary to the Pb distribution, there is here a symmetrical spread of Zn vlaues about section 22. In fact, the Zn seems to coincide with the total sulphide outline (Figure 3).

It must be noted that there are three intensely localized highs in the area to the east of section 22 and north of section 113. Again, DDH 66-44 is a localized high as was the case with the Pb isopach.

There are two localized lows: 70-4 and 66-10.

Again, contrary to the Pb distribution, there is a strong Zn-rich zone within Zone 3. This is located to the south of section 122 and in the vicinity of holes 67-10 and 66-E9. This approximately corresponds to a Cu-rich zone discussed in the writer's report of April 11, 1973 ("Copper in Faro Zones 1 - 3", pp. 2 and 4).

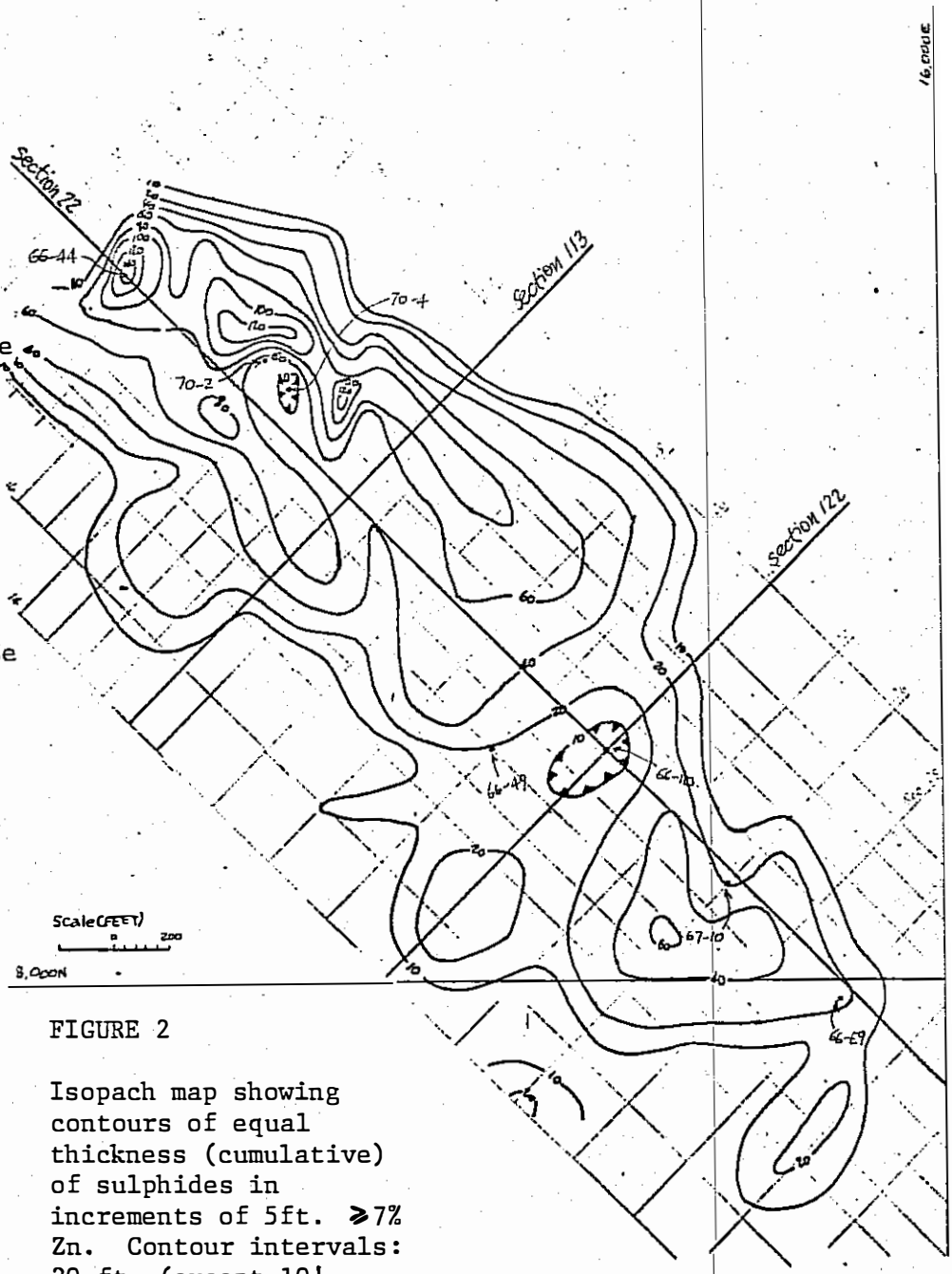

FIGURE 2

Isopach map showing contours of equal thickness (cumulative) of sulphides in increments of 5ft. ≥7% Zn. Contour intervals: 20 ft. (except 10' contour). Faro Zones 1 and 3

Below is an isopach map of the total sulphide thickness. It is included to give a framework within which to consider the data incorporated in Figures 1 and 2 above.

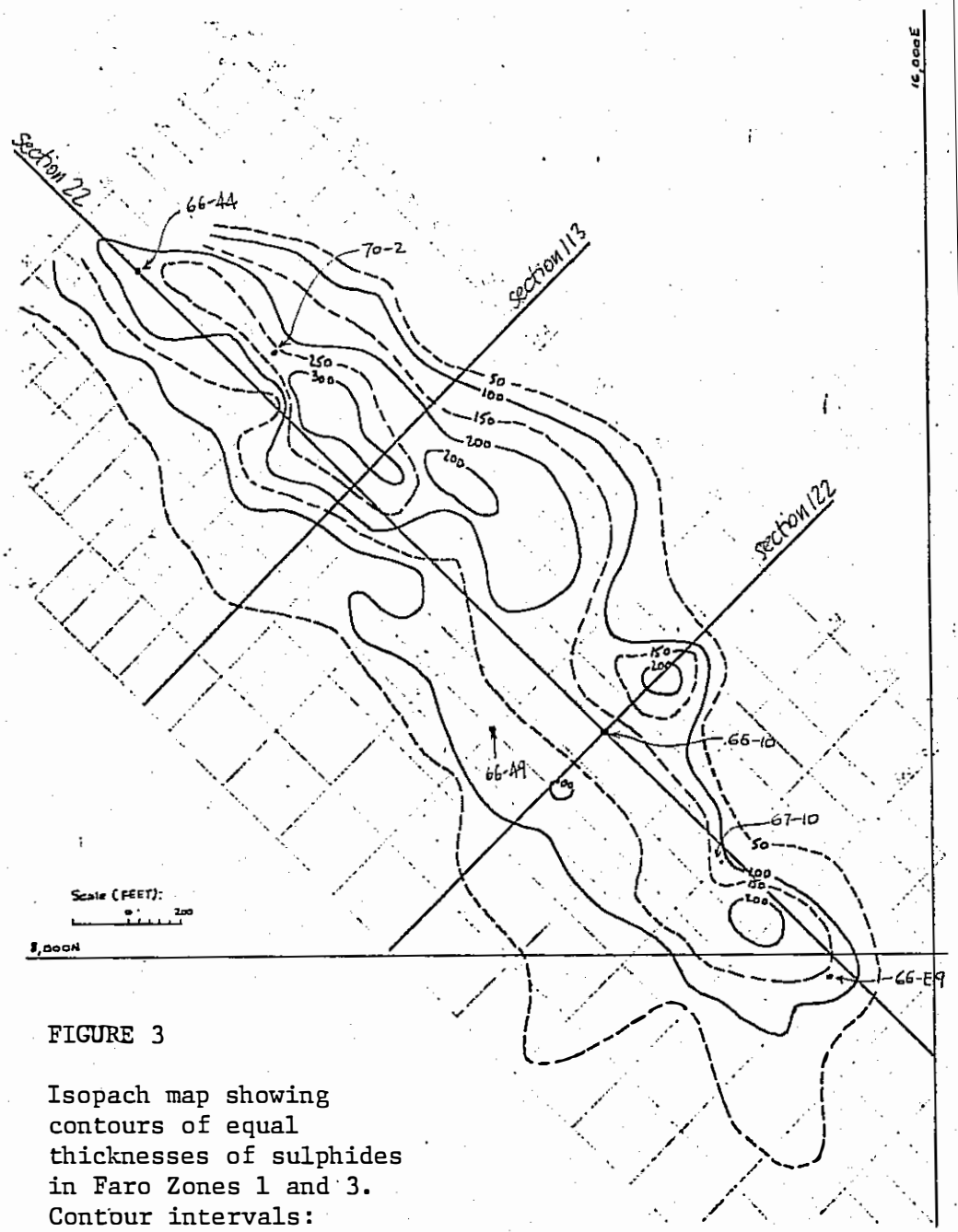

FIGURE 3

Isopach map showing contours of equal thicknesses of sulphides in Faro Zones 1 and 3. Contour intervals: 50 ft.

2. Sub-Zonation of Zones 1 and 3:

In the writer's report on the massive pyrite zone (September 26, 1972, pp. 5 and 6) an attempt was made at a sub-zonation based on general observations from bench plans and pit mapping. The isopach maps above seem to support the post-ulated scheme with some modifications. Furthermore, the Cu-isopach included with the writer's report of April 11, 1973 (page 2) also lends support to this sub-zonation.

Figure 4 shows the revised sub-zonation of Zones 1 and 3 in terms of sub-zones A to E inclusive. They are characterized as follows:

(i) A. Sulphides are high in Pb, Zn and Cu. There is a fairly strongly developed pyrrhotite facies in these sulphides with a characteristic Pb/Zn ratio approaching 1.

(ii) B. The pyrite zone. This has been discussed in the report quoted above.

(iii) C. and D. These are somewhat Pb-deficient areas. The Zn and Cu, however, are both quite high. Here the Pb/Zn ratio tends towards 0.5.

(iv) E. This sub-zone is largely Pb, Zn and Cu deficient relative to sub-zones A, C and D. It may prove to be of extremely marginal economic significance both due to its total metal content and its considerable depth of burial relative to all other sub-zones.

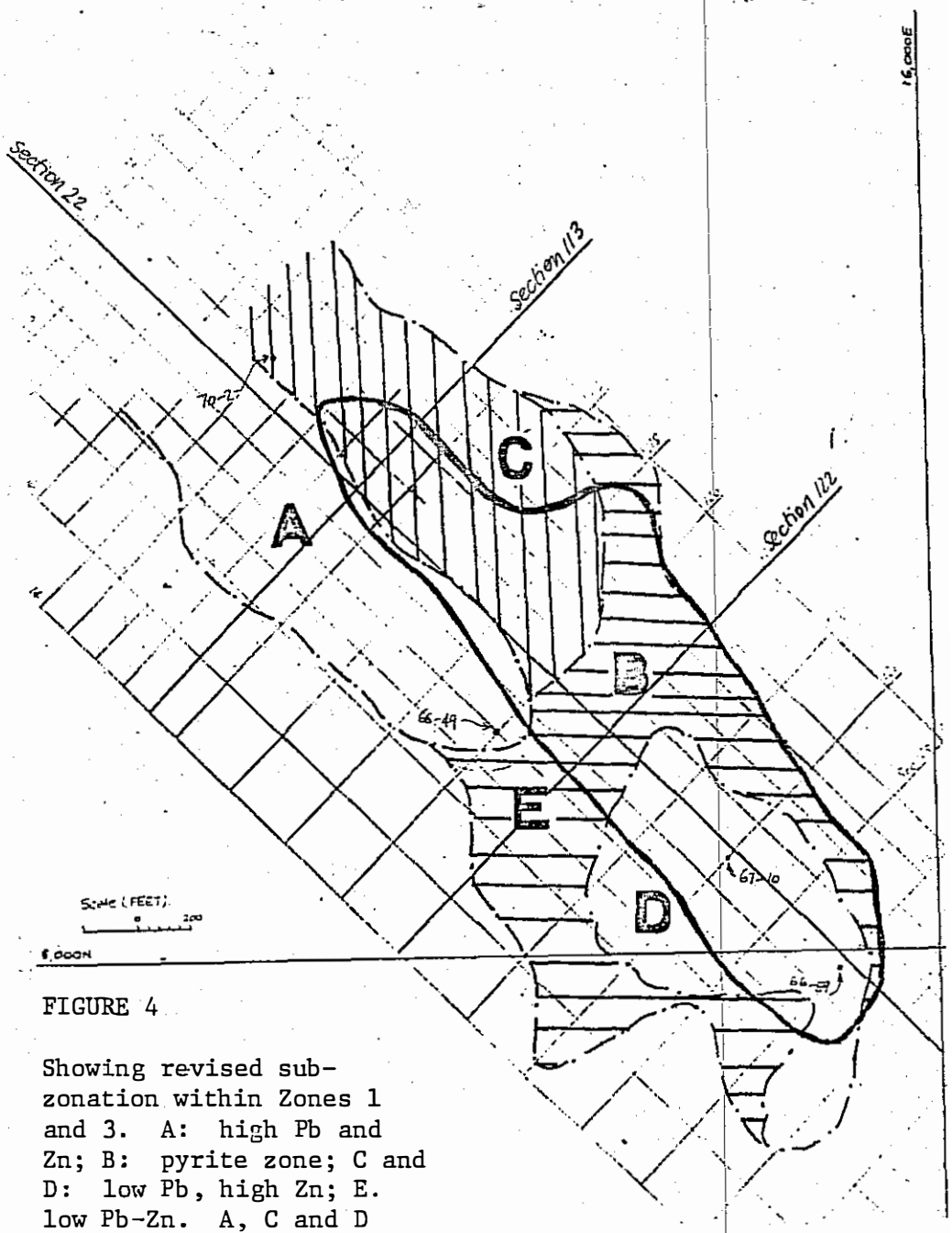

FIGURE 4

Showing revised sub-zonation within Zones 1 and 3. A: high Pb and Zn; B: pyrite zone; C and D: low Pb, high Zn; E. low Pb-Zn. A, C and D are sub-zones of high Cu.

3. Reliability of Prediction of Pb/Zn Ratio:

While the present report is not the last word on this subject, the writer would suggest that any ore removed from sub-zone C to the north of section 113 is very much subject to intensely localized Zn-highs which may, in fact, not persist over the area of a tonnage block. Some preliminary work on 3910 and 3870 blast hole Zn assays suggest this to be a fact. Thus, mining plans involving high Zn values within this area are very suspect.

Within sub-zone A, the predicted Zn values are not as inaccurate, but they may still require some trimming. There seems to be some sort of relationship to pyrrhotite content. This needs further investigation.

Pb distribution on the basis of blast hole assays seems to be about as reliably predicted as (Pb + Zn) and Cu distribution (see report April 11, 1973, pp. 4 and 5).

The problem outlined in the introduction seems, at present, to be due to some or all of the following:

(a) incorrect Zn assays in 1965 - 1970 (see report September 13, 1972, p. 5).

(b) intense localization of high Zn values.

(c) underestimation of Pb values as reflected by slight gains in sub-zone A analagous to (and possibly genetically related to) similar gains observed in Cu values.

The cause of these problems is not yet clear, but it seems to be somehow related to remobilization of the sulphides by the Anvil Batholith. A mineragraphic study has been initiated on a rather small scale and this is to be integrated with some work to be carried out by the Metallurgical Department.

Conclusions:

(a) There is a definite, broad mineralogical sub-zonation within Zones 1 and 3.

(b) This sub-zonation is not properly understood genetically, but it has a bearing on Pb/Zn ratio predictions.

(c) A purely mathematical approach to the Pb/Zn ratio problem will NEVER solve it or counteract it. An understanding must first be obtained of the cause(s) and nature of the sub-zonal patterns observed.

(d) If it is desired that a more realistic Pb/Zn ratio be predicted for short-term planning, there is adequate data available to set up criteria for modifying e.g. 4-month estimates. The writer intends outlining some of these criteria once more is known about remobilization and pyrrhotite distribution.

Recommendations:

The writer has designed a development drilling programme to test out the extreme limits of sub-zone A (presently below the west wall of the pit and discussed in J. McLachlan's report of February 22, 1973) and to obtain a much better picture than we presently have of sub-zone D.

This programme consists of four holes in sub-zone A totalling 900' of drilling and seven holes in sub-zone D totalling 3500' of drilling.

Thus, an additional 4400' of drilling would give a much needed collection of data together with the current drilling programme to make some basic decisions relating to stripping. It cannot be too strongly emphasized that our knowledge of sub-zone D is rather slight, but that some of its characteristics may well be worth its being treated in a separate mining programme.

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