


Division of Mines and Mineral Resources — Report 1990/03
The application of soil humic substances to soil geochemical exploration.
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INTRODUCTION

Where leaching processes are highly active in the development of soil profiles, as is the case in western Tasmania, the "B" horizon tends to be strongly depleted of heavy metals. This problem has long been recognised by mineral explorers and their solution to it has been to make use of the "C" horizon, which is less affected by leaching processes, for soil geochemical exploration.

Studies in the Department of Resources and Energy found the humic substances to be extremely aggressive in the degradation of economic minerals (Baker, 1986) and it follows that these substances are the most likely cause of the excessive leaching recorded for western Tasmania soils. If this interpretation is correct then metals removed by weathering of bedrock will move through the soil profile as complexes with the humic substances. It is thus possible that investigations of the humic substances-metal associations are capable of indicating the substrate distribution of metals of economic interest.

Conventional "A" horizon sampling and analysis has generally been rejected because of erratic response to substrate mineralisation. This is thought to be due to the analytical method, which involves total extraction of samples containing variable proportions of inorganic and organic components. If some means could be found of making use of "A" horizon sampling, the resulting method would fulfill the need for mineral explorers to conduct their investigations with little impact on the environment. To test the idea of a new system of "A" horizon soil geochemical exploration several field areas were selected for study.

FIELD STUDIES

An area south-west of Waratah was selected as the main trial site for the "A" horizon sampling. Previous studies of the area indicated a Dighem anomaly and "C" horizon geochemical anomalies (Collins, 1985). No mineralisation has been recorded in the area, which is underlain by Cambrian volcanic rocks. These rocks host a small Pb-Zn orebody at the old Magnet Mine, 4 kilometres to the north.

The "A" horizon sampling was carried out at 20 m intervals on a traverse spacing of 100 m, and a 2-man party collected 320 samples in 5 days. The humic substances were extracted from these samples and the associated metals determined. The contoured results for Pb are shown in Figure 1 and those for Ag, As, Au, Cu, Pb and Zn along Traverse 100 S are given in Figure 2.

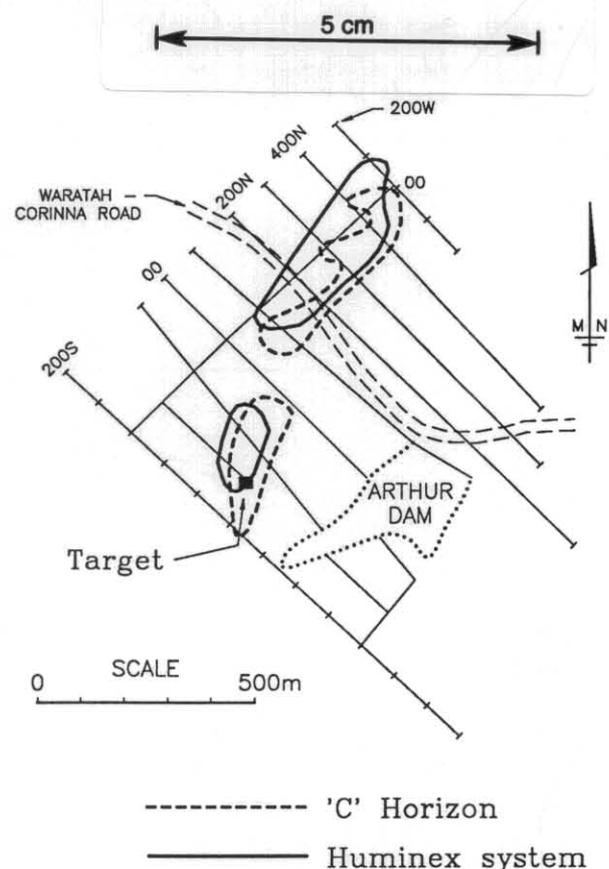


Figure 1. Comparison of "C" Horizon and Huminex anomaly definition near Waratah.

The results clearly indicate that analysis of humic substances from the "A" horizon has detected the anomalies previously discovered only by augering to the "C" horizon. Subsequent drilling along Traverse 100 S to test the "high" of the "A" horizon results located vein style mineralisation at a depth of 90 m. A zone some 25 m in width was found to contain veins varying in width from 0.1 to 1.0 m, with values of up to 23% Zn, 19% Pb, 460 g/t Ag and 5 g/t Au.

Less intensive studies were undertaken near Zeehan, north of the Henty gold prospect, and near Narrawa. The Zeehan study was undertaken at the site of the old Oceana Mine, and samples were collected along existing traverses 3 700 N and 3 300 N. This area was extensively disturbed by large scale dozer blade sampling and was the site of former mining. The

TRAVERSE RESULTS

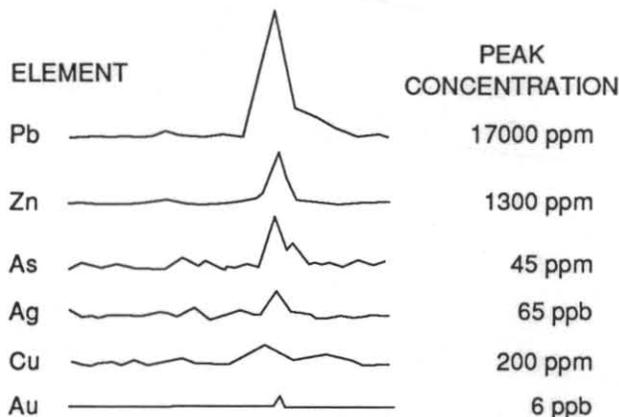


Figure 2. Huminex traverse profile across target position (100S/160E) near Waratah showing element peak values.

Oceana samples were analysed for Cu, Pb and Zn; the traverse results are given in Figure 3. Once again it can be seen that the results given by the humic substances reflect those from previous "C" horizon sampling. It is also of interest that contamination, which is often a problem around old mine sites, is not in evidence for the humic samples.

Samples were taken from north of the Henty gold prospect and near Narrawa to test the ability of the humic samples to indicate Au distribution. The results given in Figures 4 and 5 indicate that the use of these samples yields results which reflect gold distribution in the substrate.

CONCLUSIONS

To date all test applications of the use of soil humic substances in soil exploration geochemistry have been successful in detecting anomalous metal distributions. Studies have been undertaken in drier regions of Tasmania and these have confirmed that the method is widely applicable.

This new procedure for use of "A" horizon samples has been patented by the Department of Resources and Energy as the Huminex System of exploration geochemistry, and its application to soils is now commercially available. It offers low sampling costs, clear anomaly definition, and can be undertaken with no impact on the environment. Research into other applications of the method is continuing, and it is anticipated that it will be applicable to the organics present in drainage waters where the rainfall is such that mobile soil humic substances are leached from the soils.

REFERENCES

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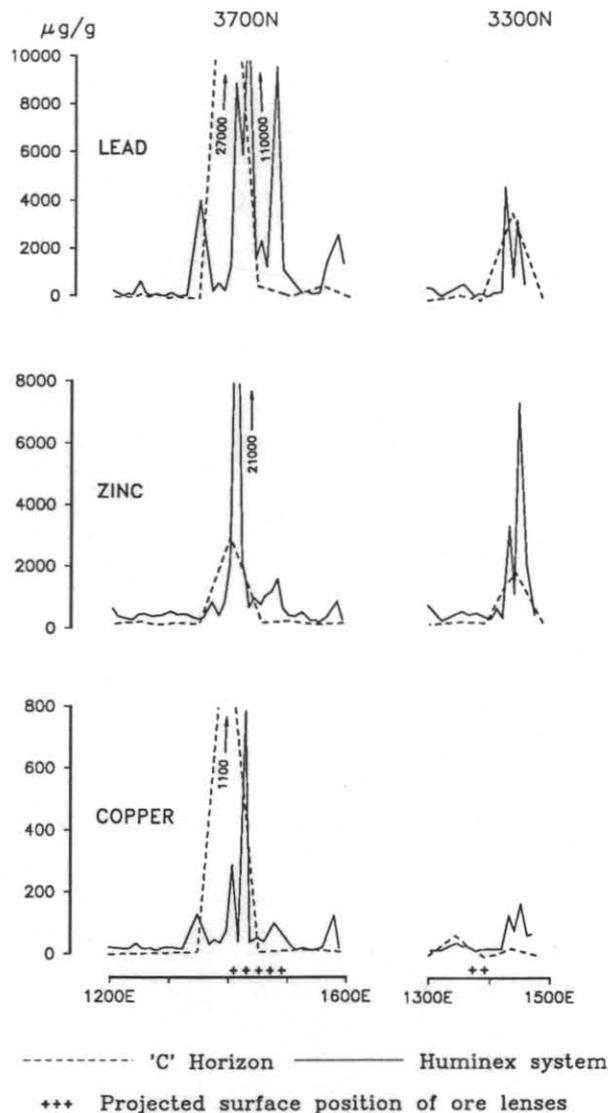
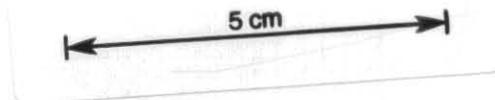


Figure 3. Comparison of "C" Horizon and Huminex results in the vicinity of the Oceana Mine, Zeehan.



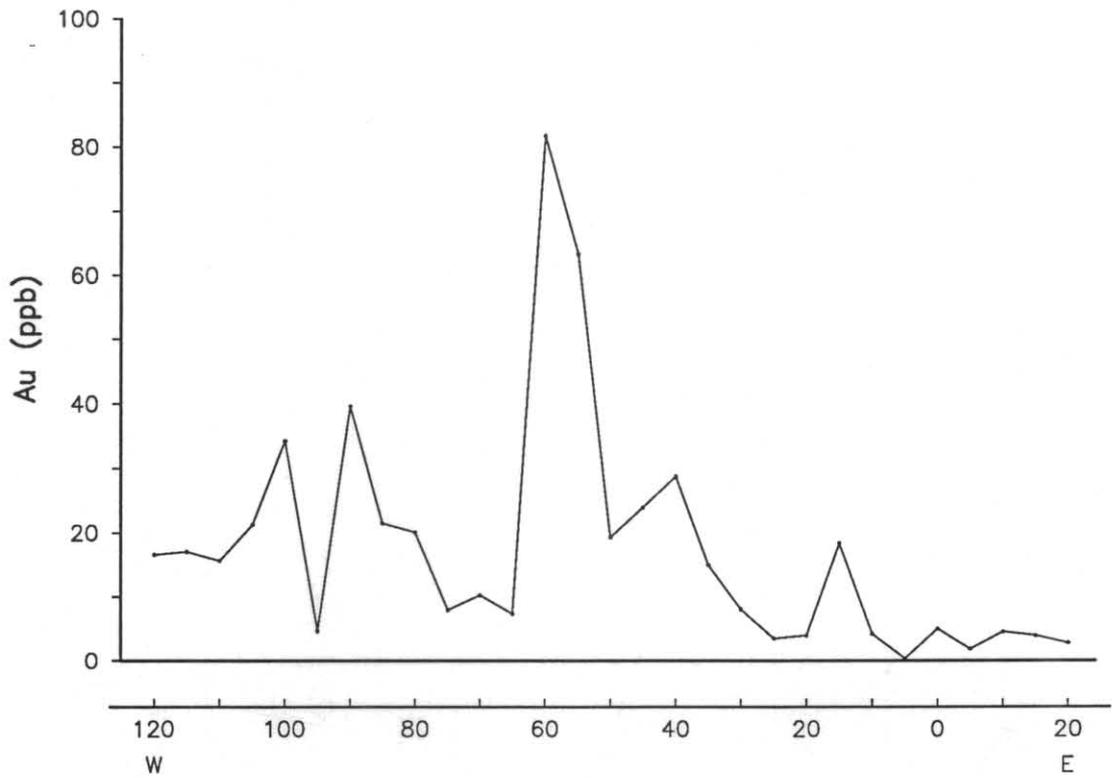


Figure 4. Huminex traverse profile (65N) across Henty Fault Zone north of Henty gold prospect.

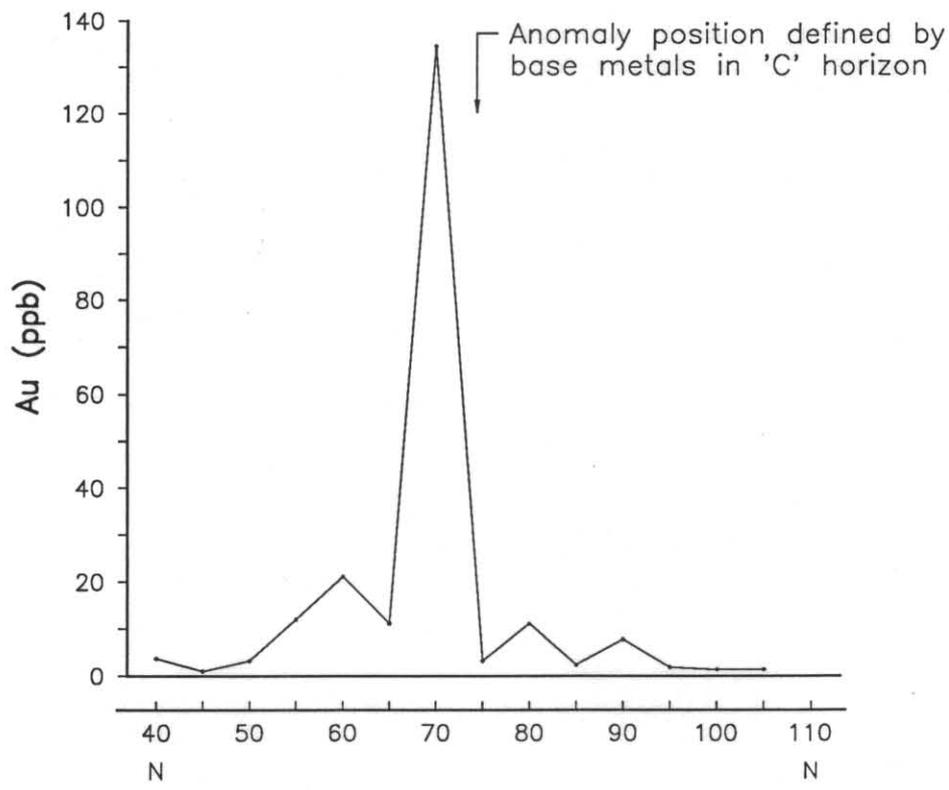


Figure 5. Huminex traverse profile (5810E) across Narrawa anomaly.

