

98-4226

FINAL REPORT - EL 17/93
LUINA - MPI GOLD
S CHAKU

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LUINA - MPI GOLD
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Report on Exploration
Completed on

EL 17/93 Luina

From
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SUMMARY

The Luina Exploration Licence E17/93 is located west of township of Waratah in NW Tasmania. The area has historically been an important mining centre which contains three better known historical mines besides numerous showings of base metal mineralisation. These mines are the Cleveland Mine (Sn), Mt Bishoff (Sn) and the Magnet lead / zinc / silver mine located some distance to the south of the Bishoff Mine.

Soon after the granting of the Exploration Licence MPI farmed the tenement out to Pasminco Ltd. Following unsuccessful results of their exploration programs, Pasminco withdrew from the joint venture. They invited consulting geologist Graeme B Weber to compile Final Reports on the project. Graeme Weber brought to the attention of MPI a prominent magnetic anomaly (North Magnet Mine Magnet Anomaly) located some distance between the Magnet Mine and Mt Bishoff, which had remained untested in the past exploration programs. This magnetic anomaly was interpreted to represent mineralisation similar to Mt Bishoff. It was also noted that the magnetic anomaly was adjacent to a distinctive regional structural jog.

On this basis, MPI decided to appraise the area further. A trip was made to the Department of Mines, Hobart to undertake a literature search and a field trip to the general area. An E-W ground magnetic line was read and the highest peak was selected. A N-S grid line was cut from this point and ground magnetics and soil sampling completed. The topography was quite severe both north and south of the base point, and the main anomaly was found to occur under Magnet Creek. Interpretation of the magnetic anomaly showed it to dip steeply south. After topographic and geological input, it was thought that the causative body may dip steeply north, and thus the magnetic zone could be tested with a drill hole sited north of Magnet Creek, the only accessible location without involving considerable earthworks. Soil sampling results were generally subdued with the exception of few anomalous samples close to Magnet Creek.

During March a diamond drill hole was drilled from N-S under the magnetic anomaly. The hole intersected a sequence of lithic sandstones, red brown mudstones and cherts. These when orientated showed the beds, in general dip to the south, between 60° and 80°. The veins and fault zones in general dip 60° to vertical to the north although other orientations were calculated. No significant mineralisation was recorded in the drill hole.

Down hole magnetic susceptibility readings were collected on a metre basis. A very wide zone of magnetic core commencing at 37 metres (well below the level of oxidation) was recorded with a stronger zone between 160 and 188 metres having the highest readings. Discussions with the assay laboratory revealed that the iron is often in the form of magnetite, which was suspected but rarely observed. The drill hole thus adequately tested the magnetic anomaly.

During the course of the drilling, reconnaissance was completed in the Magnet Mine area and the general region. At the Magnet Mine all old workings and dumps located were examined. The Magnet Mine produced 630,000t of ore for 37,993t of lead, and 248.2t of silver. No zinc was recovered. Run of Mine Ore is estimated at 6% Pb, 7% Zn and 394 g/t Ag Cox (1975). Records show that only four drill holes have been completed into the lode horizon south of the old workings. Recoveries were described as very poor, or old workings were intersected. It is now thought that it is more likely that drilling methods did not allow the recovery of soft sulphides as the holes were completed in the 1960's and early 1970's. It was variously reported that these holes intersected old workings and only selvages of the mineralised pipes were recovered.

It is concluded from both the data compilation and the rock chip sampling results that the Magnet Mine area is under explored by modern exploration techniques.

TABLE OF CONTENTS

	Page #
SUMMARY	
1. INTRODUCTION	1
2. TENURE	1
3. GEOLOGY & STRUCTURE	1
3.1 Geology	1
3.2 Structure	2
4. REGIONAL MINERALISATION	2
5. PRIOR EXPLORATION	3
5.1 Literature Research	3
5.1.1 EL 1/63 - Aberfoyle / EZ Ltd	3
5.1.2 EL 5/63 - Comstaff	4
5.1.3 EL 47/88 - Placer	5
5.1.4 Pasmaenco Exploration	6
6. CURRENT EXPLORATION	
6.1 Ground Magnetics	7
6.2 Soil Sampling	7
6.3 Diamond Drill Hole NMM-1	8
6.4 Magnet Mine Rock-Chip Sampling	8
6.5 Regional Rock Sampling	11
7. MAGNET MINE	
7.1 Location & Access	11
7.2 History	12
7.3 Production & Development	12
7.4 Geology & Structure	13
8. CONCLUSIONS & RECOMMENDATIONS	13
8.1 North Magnet Magnetic Anomaly	14
8.2 Magnet Mine Appraisal	14
8.3 Regional Exploration	15
RECOMMENDATIONS	15
LIST OF REFERENCES	

LIST OF FIGURES

- 1 Location Plan
- 2(a-b) Aeromagnetic Interpretation Plan
3. Sketch Plan of the Waratah District
(from Nye 1923 report)
4. 1:5,000 Geological Fact Plan by Placer (EL 47/88) showing
MPI Rock Sample Locations
Ground Magnetic Lines and Drill Hole Location
5. Ground Magnetic Profile (5000E line)
6. Ground Magnetic Profile (5100E line)
7. Drill Hole Plan & Section
8. Longitudinal Section of the Magnet Mine showing development and the position of
exploration drill holes and drill results
9. Cross Section of the Magnet Mine

LIST OF PLATES

1. Front piece - Panoramic View of the Magnet Valley.
2. Drill Hole NMM (25.5 - 29.3m)
Showing fault zone and haematized ? chert / mudstone sequence.
3. Drill Hole NMM (34.0 - 38.1m)
Showing mixed meta-sedimentary sequence showing fracturing and more competent
haematized units. The package maybe a large breccia zone as 'ghost' bedding is often
truncated by other clasts.
4. Drill Hole NMM-1 (100.5 - 105.2m)
Showing competent core with veins with high intersection angles.
5. Drill Hole NMM-1 (132.4 - 141.3m)
Shows fault zone at 136.85m with competent lithic SS to the top and haematized
silicified mudstone which contains zones of pyrite blebs (see second last row of core -
outlined by white line).
6. Drill Hole NMM-1 (149.95 - 153.5m)
Showing constant quartz - carbonate veining with thin anastomosing veinlets in
relatively competent core. Dark grey sections are due to ? chlorite infill of fine
fractures.

7. Drill Hole NMM-1 (154.5 - 159.0m)
Showing the very strong quartz - chlorite breccia zone.
8. Drill Hole NMM-1 (154.7 - 156.1m)
Close up of quartz chlorite breccia zone.
9. Drill Hole NMM-1 (163.7 - 167.7m)
Top try upside down!
Bottom tray middle line shows selective fracturing observed. Note while anastomosing fine veinlets from 165.7 - 166.1m.
10. Rock Sample from ridge between R & L H branches of Corner Creek. Shows bleached mafic rock with quartz veins to 1cm. Containing both black and white quartz. Rock sample MMA-20.
11. View of LM 70 Drill Rig and drillers tent.
12. Photo of coarse sand baffle box - empty.
13. Coarse sand baffle box in operation.
14. Settling tanks below the baffle box.
15. Magnet Mine - old open cut - gossan zone looking north. Samples MMA-104 to MMA-106 taken from walls in this area.
16. Magnet Mine - old open cut - gossan zone looking south. Samples MMA-101 - MMA-103 taken from these outcrops.

LIST OF APPENDICES

1. Rock Sampling Descriptions & Results
2. North Magnet Magnetic Anomaly Soil Sampling Descriptions & Results
3. North Magnet Magnetic Anomaly Diamond Drill Hole Log NMM-1
4. Thin Section Descriptions
5. Anglo American Report - Magnet Mine Area

1. INTRODUCTION

The Luina Exploration Licence EL 17/93 is located west of the township of Waratah in NW Tasmania (Figure 1). The Exploration Licence covers the northern margin of the Meredith Granite in the north-west sector of the Dundas Trough, which contains a sequence of metasediments, metavolcanics and mafic/ultramafic rocks.

The exploration licence has been the subject of a long history of small scale mining associated with both metasedimentary and mafic ultramafic complexes. The licence area contains two of the three large mines in this area, viz the Magnet Mine (Pb-Zn-Ag), the Cleveland Mine (Sn) and the Bischoff Mine, which is located outside the NE boundary of the Exploration Licence. The Cleveland Tin Mine is under a separate mining lease, which is currently held by Aberfoyle Ltd.

The Luina property was the subject of a joint venture between MPI Gold Pty Ltd (MPI) and Pasminco Exploration (Pasminco). Pasminco withdrew from the JV in late 1997 following the completion of detailed regional exploration over the Luina and adjacent 100% owned tenements. Much of the work completed by Pasminco is documented in their Annual Exploration Report for 1997.

This report summarises work completed in the Exploration Licence by MPI since taking over the management of the property in December 1997.

2. TENURE

The Luina Exploration Licence E17/93 covering a total of 70 Sq Km of area was granted to MPI on the 7 May 1994 for a period of two years. The licence was renewed for further two years in May 1996 and was current to 6 May 2004. However with the completion of the proposed program by MPI with no significant results, the licence was surrendered on 24 September 1998.

The required Mines Deptt. Expenditure Commitments on the licence over the period of two terms was \$242000. MPI and its Joint Venture partner Pasminco Ltd had incurred a total exploration expenditure of \$400,487 over the licence.

3. GEOLOGY & STRUCTURE

3.1 Geology

The Precambrian Oonah Formation is the oldest unit in the area, which contains in its upper successions mudstones, shales and dolomitic units with intercalated mafic volcanics. It was these dolomitic units that were replaced and mineralised at the Mount Bischoff Mine. As the overlying Crimson Creek Formation lies to the west, it is thought that the Oonah Formation may young in this direction. Mapping by Placer in the Magnet Mine shows a variety of rock types. They include ultramafics, gabbros, basalts, and bononitic lavas together with quartzites, shales and cherts with quartz veins and gossan zones. The Magnet Mine is developed adjacent to a highly altered mafic dyke and ore from the dumps appears as high carbonate banded ore. In the Comstaff Report (Rugless 1974) the alteration halo is described as being 1800 by 400 metres of prophyllitic alteration around the Magnet lode which is 900 metres long, of which but 300 feet (91 metres) was mined. The alteration zone contained quartz veining with minor pyrite and chalcopyrite veining. The mafic dykes is so altered it does not have a magnetic response.

The Cambrian Crimson Creek Formation lies approximately 500 metres to the west and is not considered important in regard to this prospect. The mapped mafic units may be part of a thrust mafic / ultramafic sequence, which occur further west. To the south-west mapping shows the presence of several serpentinite units which are probably the result of extensive shearing.

3.2 Structure

On a regional basis detailed aeromagnetics (Pasmaenco Annual Reports) show a general north-east trend of weakly magnetic units associated with the Magnet Mine sequence. The North Magnet Magnetic anomaly lies south of this trend and is situated between two northerly cross cutting structures, one of that is associated with the Magnet Mine (Figure 2). The main magnetic trend shows a distinct jog between the Magnet Mine and the North Magnet Magnetic Anomaly, which is considered a prospective zone.

On a regional basis all the better known mineralisation in the area is located on the western flank of a prominent but buried ridge of Meredith Granite which trends north-east under Mount Bischoff.

Old reports state that the mineralisation at the Magnet Mine was the junction between the main Magnet Shear and the junction of splay shears [Nye (1923), Cox (1975)]. The main ore body appears to have been a pipe like feature at one of these junctions.

4. REGIONAL MINERALISATION

The greatest source of information is Nye (1923) who spent some six months traversing, geologically mapping and examining the area in detail. This section is limited to the mafic / ultramafic dykes associated with the Magnet Mine to Mount Bischoff trend.

North-east of the Magnet Mine these ?dykes or interbedded mafic flows contain several quartz sulphide lodes. Several were located while traversing creeks in this area. They appear to be thin and have limited strike extents but this could be a product of limited outcrop on steep slopes. This mineralisation appears to be best developed just north of Mathews Creek where the grid line was cut. Here a prominent bluff of mafic material outcrops within which veins of quartz, which can be seen dipping at approximately 45° to the north. This would make these veins trend at right angles to the dip of mafic units, ie 60° south if they are conformable to the other units in this area. Samples collected from this area returned copper up to 0.77% Cu, with sample MMA-6 returning 0.58 g/t Au, which was considered very encouraging. The soil sampling on the ground magnetic line also returned up to 177 ppm Cu with no gold values over 10 ppb Au. Other areas of quartz sulphide veining were noted especially just north of the Magnet Mine, ie 200-300 metres north in Corner Creek. The gossan zone on the Comstaff line 1400W was located. It was of limited size and a sample collected MMA-1 returned 615 ppm Zn with 0.34% As with no significant gold values.

Several attempts were made to find and inspect the Mathew's Workings. These were initially thought to be located near the junction of the Magnet Creek and Mathews Creek. These workings were finally found plotted on the Placer Structural map and appear to be about 150 metres east (down stream) of the gossan sampled as MMA-1 and probably associated with the gossan zone.

Further east again occurs Fawkner's Show. It occurs 1.2 kilometres west of the Arthur River Bridge on the old Corinna Track. These workings exposed weak lead-zinc mineralisation associated with the SE contact of the mafic ?dyke sequence.

To the NW of Mount Bischoff two further lead-zinc mines occur, the Persic and Silver Cliffs Mines. Reports on the lodes in Nye suggest that they were of little value.

All these 'shows' indicate that the mafic? dykes or flows have a number of base metal prospects associated with them. The Magnet Mine is clearly the largest of these but little modern exploration has been completed over the mafic sequences. Comstaff completed the most detailed exploration in the 1970's.

To the south of the Magnet Mine, surface workings occur at the first creek and no historic workings appear to occur or are mentioned in the literature south of this point. A track (drill access track) was followed up the creek in this area but apart from some trenching little else could be found.

5. PRIOR EXPLORATION

5.1 Literature Research

Some time was spent at the Hobart Department of Mines library examining the old exploration reports covering this area. A number of reports were reviewed but many had been pilfered and data was not available. A copy of the Comstaff report on the Magnet area (missing from the Department of Mines Library) was recently acquired from Normandy Poseidon's Adelaide office. A copy of this report is enclosed as Appendix 5.

5.1.1 EL 1/63 - Aberfoyle / EZ Ltd (Glasson & Cox 1968)

These reports describe the exploration of a large grid between the Magnet Mine and the Cleveland Mine to the south. A grid was cut at 500 feet intervals which was shortened to 100 feet intervals over the 2000 feet of old workings at the Magnet Mine. Geology and geochemical soil sampling was undertaken but the results were not recorded as they commenced south of the Magnet open cut.

They estimated that the mine had produced 620,000 tons of ore for 37,395 tons of lead and 7.98 million ounces of silver. Zinc was not accounted for as there was no market. Glasson & Cox noted that the ore was very clean in that it contained little pyrite and that a clean concentrate could be made free of carbonate. An incline shaft was developed on the F/W side of the lode but below 4 level the lode flattened to 55° W and so by 16 Level a cross-cut west was 523 feet long..

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They proposed a series of drill holes W>E from high on the Magnet Range. However only two drill holes, WP-83 and WP-84 were drilled by EZ Ltd on the Magnet / Luina grid. They also completed ground magnetics and stated that this technique was of little value because the orebody contained no significant magnetic minerals. A soil geochemical survey was completed on which two holes were sited. This soil survey was completed on a hill slope of approximately 30°. The geological map shows spot geology points with no interpretation but indicates lithic sandstones to the east with cherts immediately west with a mixture of dolomite (lode horizon), basic intrusives and gossan in the mine area. The drill access tracks and drill hole sites are not shown on the plan found at the Tasmanian Mines Department. It appears that the two drill holes were drilled by EZ Ltd (? under a JV agreement with Aberfoyle) in the 1960's.

The two drill hole intercepts are shown on Figure 8 (a longitudinal section of the Magnet Mine). Drill hole WP-83 intersected the hangingwall vein and intersected 0.76m @ 0.7% Pb, 3.9% Zn and 37.2 g/t Ag and drill hole WP-84 intersected the hanging wall lode from 277.4m and returned 1.37m @ 0.85% Pb, 1.7% Zn, 34 g/t Ag and from 289.6m and 4.11m @ 0.45% Pb, 1.7% Zn and 107 g/t Ag. These appear to be uneconomic but recoveries were extremely poor in the vicinity of 30%. The most likely interpretation is that the sulphide zones were washed away leading to a significant diminution in the grades obtained. The locations of these two holes were located during the reconnaissance of the Magnet Mine, and are plotted on Figure 4.

EZ Ltd were later to obtain a Mining Licence over the tailings dam on the Magnet Creek in 1973 which were then removed to Rosebery for retreatment because of their high zinc content. The story goes that EZ cut in a new mine track from the Corinna Road and cut a new section of gossan which was sampled by Comstaff people on their EL 5/63 which returned up to 5% Zn.

5.1.2 EL 5/63 - Comstaff

In their final Report (May 1985) a summary of their exploration in the Magnet Mine area was listed. This included 1970-71 stream sediment sampling together with geological mapping of the drainages between the Magnet Mine and Mount Bischoff along the mafic dyke trend. A Turam survey was flown, which focussed exploration on several of these targets but not the North Magnet Mine anomaly. The stream sediment survey noted that Magnet Creek was anomalous in tin to 800 ppm. Sampling of mine dump material showed the source was not from the mine. Recent rock sampling MMA-101 - 106 returned up to 106 ppm Sn. No further exploration was undertaken on the source of this tin anomaly.

Some follow-up of Turam Anomalies with Chrome EM and ground magnetics was undertaken in the general area without any further significant results.

In 1975-78 a 5 kilometre long grid was cut over the mafic dyke trend as delineated by Nye (1923), which superseded the smaller preceding grids in the area. The grid was geologically mapped, -80# soil sampled (Cu, Pb, Zn, Ba, Mo, Ag & Ni) and ground magnetics and EM surveys completed on 19 lines 200 metres apart. Only one EM anomaly was located which was drilled but nothing significant was found. No results from the EM and geochemical surveys have been sighted. The interpretation of this work was that the Magnet Lode had a 900 metre strike length, which was surrounded by an arcuate propylitic alteration mineralisation over 1800 metres long by 400 metres wide. Comstaff also interpreted the mineralisation at the mine as occurring in "upwards of three pipe-like zones formed at the convergence of intersecting hanging wall and footwall shear sets within locally thickened ultramafics" (Ellis, 1989).

Two further drill holes were completed at the Magnet Mine south of WP-84 and WP-85. These two holes were to test the width and grade of the Magnet Lode at depth. MAG-1 intersected 9m @ 1.48% Pb, 3.46% Zn and 138.9 g/t Ag from 259 m with the one metre interval from 261 m returning 6.6% Pb, 13.7% Zn and 914.5 g/t Ag. Drill hole MAG-2 intersected 27.2m from 232.6m @ 0.41% Pb, 2.46% Zn and 41.9 g/t Ag with the best being 4.8m @ 0.62% Pb, 6.28% Zn and 4.41 g/t Ag from 255 m. It was variously reported that these intercepts intersected old workings and only selvedges of the old mineralised pipes were recovered and that they had poor recoveries through the mineralised horizons. The actual location of this drilling was given as 311.5 metres @ 278.45° from the No 4 level main adit. This drill pad was located on the ground and appears to be well away from the old workings although the No 8 level exploration drive passes beneath their plotted positions. Proposed drill holes MAG-3 to 6 were not completed.

In 1983-85 a Digem Survey was completed which identified numerous anomalies. Follow-up was very limited. The magnetic anomaly on Magnet Creek was identified in this survey but no follow-up work was recommended.

5.1.3 EL 47/88 - Placer

They explored the area for gold associated with mafic (boninitic) volcanics. They completed bulk leach sampling (5kg of -6mm active sediment) of the creeks draining into the lower reaches of the Magnet Creek over the intrusives mapped by Nye (1923). They obtained a series of low order results up to 13 ppb Au which was from Lunch and Missing Creeks. Placer also compiled large geological plans derived from earlier data (Aberfoyle & Comstaff) and these formed the basis for our exploration. Placer concluded that the gold might have been shed from a series of small base metal prospects stretching from the Arthur River to the Magnet Mine area. They noted a series of Pb-Zn quartz veins occurred adjacent to the Magnet Creek. Sampling showed no significant gold.

Placer also completed an air photo geological interpretation of the area, which is of interest. They interpreted the Magnet Creek where it runs approximately W to E as having a dextral shear associated with it and at the Magnet Mine the mineralisation being associated with a thrust zone.

5.1.4 Pasmaenco Exploration

Modern detailed low level aeromagnetics was flown by Pasmaenco Exploration as part of their Joint Venture undertakings with MPI on EL 19/93. Images of these magnetics were presented in earlier reports. The Oonah Formation is characterised by being extremely bland (1997 Pasmaenco Ltd JV Annual Report). The only prominent magnetic anomaly in the area appears to be the one over the Mount Bischoff Mine. While the magnetic anomaly that is the source of this report is quite obscure and lies on the contact zone of the mafic unit and the Oonah Formation. This mafic unit can be seen as a weak 'necklace' of magnetic anomalies stretching to the NNE, but becomes weaker near the Magnet Mine until the 'magnetic anomaly' is reached. In this context it is quite anomalous.

A magnetic interpretation of this data was undertaken by MPI and this shows that the mafic / ultramafic dykes of Nye (1923) have a distinctive NNE trend with a sedimentary sequence on its SE side. Several sinistral almost north bearing faults are interpreted cutting these dykes in the Magnet area. The first is interpreted to be at the Magnet Mine itself and maybe the surface expression of the fault associated with the mineralisation. The second lies 300 metres to the east and appears to have displaced the intrusive dykes.

The North Magnet Magnetic anomaly appears to be associated with this E-W contact, ie dyke - sediment contact, between the second and third faults. The third fault lies 300-400 metres east and is at the eastern end of the magnetic anomaly. The sense of rotation is interpreted to be dextral. This fault appears to be associated with the unnamed creek just east from Mathews Creek.

The regional magnetic picture shows the Magnet Mine is just south of a structural jog where the intrusive dykes change direction. This jog is also reflected in the Cambrian Crimson Creek metasediments to the west. Structurally the dykes dip west as shallow as 55° at the mine but where they trend more easterly and trend towards Mount Bischoff they dip to the south. Unfortunately this was not picked up before drilling commenced in the area.

6. CURRENT EXPLORATION

6.1 Ground Magnetics

The North Magnet Mine magnetic anomaly (Figure 2) was located by pegging and reading a ground magnetic line approximately E-W along the old track beside the Magnet Creek. The highest reading was then taken as the 5000E line around the 5000N point. A grid line was cut on magnetic north approximately 11° true north. The line was extended for 320 metres (slope corrected) to the north and 360 metres to the south. It was pegged at 20 metre intervals with magnetic readings being taken at 10 metre intervals. In general it was only the edge of the bush that any cutting was undertaken as in the mature forest the undergrowth was relatively open. The results were diurnally corrected and the magnetic anomaly occurs immediately over Magnet Creek Figure 5. This profile was interpreted by Southern Geoscience Consultants Pty Ltd and interpreted to dip south. The author argued that in all probability the beds would dip north as per the Magnet Mine and the dip maybe influenced by the steep topography. With the steep topography added a steep northerly dip was calculated and a drill hole was sited in the limited space available to test this magnetic zone from the north. Access to test the zone from the south would have involved a considerable amount of earth works.

During the drilling of hole NMM-1 a second grid line was pegged 100 metres to the east. This traverse was levelled and ground magnetic readings were taken. These results were plotted and can be found on Figure 6. Unfortunately no soil samples were collected, as the central part of the anomaly was some 60 metres north of the creek.

6.2 Soil Sampling

The 5000E-grid line was soil sampled at 20 metre intervals and the results are attached as Appendix 2. The samples in Appendix 2 are presented from south to north. Magnetic Susceptibility readings of the samples shows a strong anomaly of up to 3100×10^{-4} SI units at 4860N with a wide zone up to 1900 between 4680N to 4800N. These high readings do not correspond to the ground magnetic readings which show the magnetic anomaly occurs over 4960N. The assay results are subdued over this zone.

Over the magnetic anomaly the highest geochemical results were obtained, with values of 1030 ppm Pb, 0.49% Zn, 16 g/t Ag. These results however are thought to be due to contamination from the Magnet Mine tailings further up stream than due to the underlying magnetic anomaly. However at 4960 some 8-10 metres above creek level 219 ppm Pb, 1100 ppm Zn and 34 ppm Sn (the highest Sn reading obtained in the survey) were obtained. It is reasoned that this sample point is above flood level and gave encouragement to the anomaly containing mineralisation.

To the north a weak but significant copper anomaly maximum 177 ppm Cu occurred at 5160N which is in a zone of quartz chalcopyrite mineralisation. The rock samples from this area had also returned up to 0.58 g/t Au but the soil samples from throughout the survey failed to register any gold values above 5 ppb Au.

6.3 Diamond Drill Hole NMM-1

Almac Drilling Pty Ltd was contracted to complete at least one diamond drill hole to test this magnetic anomaly. They used a LM 70 drill rig and the hole was drilled HQ for 199.5 metres. Normal environment controls were assembled to control the return water. A series of pits and baffle boxes were positioned from which water was piped into two settling tanks. Water from the second settling tank was then pumped away from the creek to allow further time before the water-entered Magnet Creek (refer Plates 11-14).

Throughout the drilling a problem occurred with the core orientation spear, which in the majority of cases, orientated the core in a central location thus not giving definitive orientations. A detailed log is attached as Appendix 4 and a drill section can be found on Figure 7. Several photographs of the core are presented as Plates 2-9.

In summary, the beds were found to dip steeply south so intersection angles were low. Structural elements were also difficult to orientate because of a poor orientation tool, but appeared to be vertical or dip steeply north. Occasionally the vein sets had other orientations, several of which appeared to be aligned N to NE. The core consisted of a sequence of metasediments comprising silicified mudstones, cherts and distinctive lithic sandstones. A number of structural zones occurred consisting of laminated and brecciated veins and wispy tension gash infill of core with what appears to be black chlorite. Mineralisation is mainly pyrite that occurred as paint on joints and fracture fill. Little other mineralisation was noted. Several samples collected from the core were thin-sectioned, details are enclosed in Appendix 4. The most intensely deformed zone occurred over the interval 142-162.2 metres where it is thought that a fault underlying Magnet Creek. The magnetic property was examined using Exploranium KT-5 Magnetic Susceptibility meter. Each one-metre section of the core was read. In general the readings were very low to 28 metres well below the base of oxidation and then they averaged 20-30 units. A zone of higher readings occurred between 160-180 metres. These readings can be found on the detailed drill hole log in Appendix 3.

6.4 Magnet Mine Rock-Chip Sampling

Extensive use was made of Nye (1923) Bulletin 33. 'The Silver-Lead Deposits of the Waratah District'. In general all the old workings located were described in detail in this volume, and little had altered.

Several samples were collected from the prominent gossan zone (the old open cut) along the track into the Magnet Creek. Samples MMA-101 to MMA-106 were collected as channel samples across various party of the outcropping gossan. Results were particularly encouraging as zinc values averaged 1.67% and lead averaged 1.67%, ie that zinc was much higher than traditionally reported at 0.4% Zn for each 1% Pb. This was supported by fresh sulphide dump rocks which showed significantly higher zinc than lead values, eg MMA-28 and MMA-15. Of interest is the presence of significant tin in the gossan samples. These ranged from 35 to 128 ppm Sn and may indicate there is some tin potential in the Magnet Mine area and may help to explain the 800 ppm Sn anomaly reported in Magnet Creek by Shaw (1985). Plates 15 and 16 show the old open-cut gossan zone.

Two rock samples were collected from the stream just north of the gossan zone. It is very steep but several samples of a mafic - sulphide rock were collected. Samples MMA-107 and MMA-108 returned up to 0.5% Cu, which indicates that the mafic 'dyke' or volcanics also have potential for copper. Placer mapping (Figure 4) also shows an acid trachytic dyke up hill in this area. It was not located.

The No 2 South adit was located approximately 200 metres upstream from the Magnet Mine. This large adit was driven 1247 feet (380 metres) before the lode sequence was intersected. This adit is believed to be south of all drill holes and some dump material appears to be very high grade that may have come from other sections of the mine. This appears to be doubtful as it would mean double handling. The adit was inspected and was straight? 280° mag but had fallen in on what appeared to be a rise at 1270 feet (387 metres). A sample MMA-31 of lithic sandstone was collected from this fall. It appeared unmineralised and the results support this estimate.

Adits were also located north of the main Magnet Mine workings. Two adits were located near the headwaters of Corner Creek. Nye (1923) describes them quite accurately. The first or lower adit is driven in a NW direction (320° mag) for 73 metres through igneous rocks. Two drives were driven to the north, which curve have been put in at 61 metres and 73 metres from the adit entranced. Nye describes 'The one at 200 feet (61 metres) starts on five feet of gossanous materia and decomposed igneous rock. This thins out to the north and at the face hard, diabase porphyrite occurs to the west'. This appears to have been extended since Nye reported as it curves to the west and the contact dips south.

The other drive 73 metres from the entrance is described; 'starts on 2 feet of gossanous material associated with what is probably a rock with platy structure formed by one of the fine grained varieties of the diabase porphyrite. This continues for about 70 feet (21 metres) with a vertical wall to the west, when the drive turns to the north west and follows a narrow vein of ankerite. At the face the diabase porphyrite occurs to the west, and forms a wall dipping west at 50°. Thus these workings have not revealed any metallic minerals.

They were put in to test at depth an outcrop of gossan, which occurs on the north boundary of the section. The drives have come below the gossan, but whether this gossan lives down, and represents either of these bodies cut in the workings, is not certain. In any case these bodies of gossan are quite independent of the Magnet lode and are of no economic importance. They are situated to the West Side of the diabase porphyrite, close to the pyroxenite porphyrite'.

A second or higher adit has been driven about 255° mag (WSW) for about 35 metres. At the end a drive was put in at 330° mag for 8 metres on a wall that dips 60° to the west. In the floor what appears to be a shallow winze now full of water was sunk. Little in the way of lode material was seen apart from a narrow siliceous lode.

Several samples were collected of mineralised and gossaneous material from within and on the adit dumps. Two samples were collected, Sample MMA-12 returned 0.55% Pb, 4.53% Zn and 192 g/t Ag in from the bottom adit and sample MMA-13 returned 0.69% Pb, 0.25% Zn and 17 g/t Ag from the top adit. Sample MMA-12 was a gossan sample but sample MMA-13 was much more siliceous. Additional samples MMA-23 to MMA-28 were collected from lodes within the adits and from the dump material. They again returned significant base metal values to 4.23% Pb, 7.63% Zn and 197 g/t Ag, and interestingly 40 ppb Au (top adit). This shows the area appears to have some potential, as samples are yet to be collected from beneath the oxidised zone. The geological plan shows the gossan to be over 200 metres long, and there is evidence on the Placer Plan (Figure 4) that the lodes may be considerably larger than shown.

The North Magnet Companies lower adit was also located. This was originally mined to carry ore from the main Magnet Mine workings and is a substantial opening in very good condition. The adit was approximately 50 metres long at 280° mag before a collapsed rise was met. The ankerite lode zone was exposed for two metres before covered in rubble. Two samples of carbonate were collected. MMA-29 and MMA-30 returned only low values to 622 ppm Pb, 0.31% Zn and 38 g/t Ag.

Two further samples were collected from the Magnet Mine area. The first was a sample of limestone from the drill pad of WP-84 due west of the mine. This was the only place that limestone was located and it is not mapped by prior explorers. Cox (1975) noted that the mine stratigraphy had been traced by Aberfoyle Exploration from the Magnet Mine to the Cleveland Mine where equivalent dolomites hosted the tin-copper mineralisation. It is hypothesised that this limestone unit maybe the first indication observed in this area of potential replacement carbonate bodies. Sample MMA-16 of this limestone did not return any significant values. A second sample in this area was collected which was altered pyroclastic rock containing weak sulphide mineralisation. This sample MMA-17 returned very weak copper to 189 ppm Cu.

Finally a sample of manganese rich, fuchsite bearing siliceous and sulphidic waste rock used on the wall of the Magnet tramway some 70 metres north of the track into the mine, was collected. Sample MMA-15 returned 0.27% Pb, 1.73% Zn, 22 g/t Ag, 694 ppm As and 63 ppm Sn.

6.5 Regional Rock Sampling

All creeks from the Magnet Mine to 600 metres east of the drill hole were traversed, both to examine the country rocks and also to follow-up on some anomalous BLEG sampling results obtained in earlier sampling program completed by MPI. In general the country was open under a good forest cover, but soil and low vegetation masked much of the outcrop. A number of rock samples were collected. Corner Creek just north of the Magnet Mine was traversed and samples MMA-18 to MMA-22 were collected. This creek is 400 metres north of the mine workings and lies close to the structural job. The rocks collected were generally gossanous and altered mafic rocks. The results were disappointing with up to 136 ppm Cu and 400 ppm Zn being the only elevated results.

Only the lower parts of Willow Creek were traversed and no samples collected. In Lunch Creek three samples MMA-2 to MMA-4 were collected of cherts and gossanous metasediments / volcanics. No anomalous results were received.

Missing Creek was traversed but no samples were collected. On Mathews Creek a number of samples were collected along or near the ground magnetic traverse approximately 180 metres north of the base point. Here quartz - sulphide - gossan veining within a ?diorite intrusive were located. These samples MMA-5 to MMA-10 and MMA-14 mostly returned anomalous copper to 0.77% Cu, gold to 0.54 g/t Au with up to 14 g/t Ag.

Regionally the last sample collected was from a gossan noted at the bottom of a small creek 600 metres east of the drill site. This sample MMA-1 was slightly anomalous in zinc (615 ppm Zn) and had the highest arsenic value of 0.34% As, apart from the Magnet Mine gossan samples. It is now known that this gossan of what appears to be limited extent is probably 100 metres north of a pit developed on a lead-zinc show early in the Century by Mathews, a local prospector. This set of workings were not found.

7. MAGNET MINE

7.1 Location & Access

The Magnet Mine lies 7 kilometres west of Waratah or Mount Bischoff. The main access is from the Corinna Road where a dirt track turns north from just above the descent into the historic town of Luina (Whyte River) which has just been dismantled. This track of some 4 kilometres leads down to the old mine workings and Magnet Creek. The Magnet Tramway down the Magnet Creek and across the Arthur River leads to the back of the Waratah tip and can still be traversed by 4WD vehicles.

7.2 History

WR Bell first located the gossan outcrops on the eastern flank of the Magnet Range in 1877 when cutting a track up the valley. It is not clear why a track was being cut as the crest of the range contained a serviceable track. It took him a further 13 years to rediscover the gossan and in February 1981 he took up the first lease, Cottle (1952). The first Company 'The Magnet Silver Mining Company Co NL was formed in 1895 and worked the lode to 1933, when a series of separate organisations including miners syndicates tried to work the mine without success until the mine was broken up and sold in November 1940.

The main reason for closure was not the commonly held belief of 'water beat them' but that the internal decline shaft was put in at 73° west at the then known dip of the lode at No 4 level but below No 5 level the lode dipped at approximately 55° west thus the deeper the mine became the further the cross-cut was needed to be driven west to intersect the lodes. This is illustrated on the 16 and lowest level where the cross-cut was 159 metres long (Figure 9). Eventually the amount of ore obtained did not cover the costs of production and development.

7.3 Production & Development

The actual production was estimated at 620,000 tons producing 7.979 million ounces of silver and 37,396 tons of lead (Cottle 1952). Nye (1923) who wrote the definitive report on the base metal mines and prospects in the Waratah area had earlier estimated production in his report as 143,750 tons of ore producing 5.923 million ounces of silver and 25,937 tons of lead when the mine was producing between levels 12 and 13, and the mine was developed to level 14. Eventually the mine was developed to level 16 with a 70 foot winze on the footwall (richest) lode below this level before the mine closed (Cottle 1952). Production was initially by "Crudes" hand picked rich (direct smelting) galena ore, which was packed out of the mine to the Corinna Road. In 1900 the two foot tramway was commissioned between Waratah and Magnet joining the Emu Bay railway just east of the Waratah township and it was completed in 1902, which provided cheaper transport and so seconds could be treated. By 1904 the concentrator was finished which allowed the mine to expand production. The "Crudes" typically assayed 20-36% Pb, 40-66 ounces of Ag, whilst the "seconds" concentrates averaged 40-55% Pb and 90-114 ounces Ag to the ton.

The mine was developed to a depth of 1200 feet (366 metres) below the gossan outcrop, and the internal decline was developed to 290 metres from Level 4 cross-cut making each level approximately 24 metres (80 feet) apart.

Cottle (1952) estimates 520 tons of ore per vertical foot were produced containing 30 tons of leads. He estimated from old production reports (not complete) that the Company recovered 5.7% lead and 11.5 ounces of silver per ton. The tailings assayed 1.3% Pb, 7.3% Zn and 5.3 oz Ag per ton, which were dug up and taken to Rosebery for treatment in the 1960's or early 1970's.

No gold analyses were noted in this report. Cottle as well as Nye (1923) estimates that zinc grades were 0.4 percent for each 1 percent of lead. It could be argued that as zinc was not recovered by the mine that zinc was preferentially not mined and this is supported by a reference in Godfrey (1984) where it is reported that Ted Rist and his mates were working on the No 16 level the lowest level developed in the Magnet Mine, where they 'broke into what seemed to be a mass of "useless" zinc. Of course a further explanation is that the ore was becoming zinc rich with depth.

7.4 Geology & Structures

The ore body has formed between two basic intrusive bodies and has been described in detail in Nye (1923). The lode zone itself occupies the junction between a Websterite Porphyrite on the eastern side and a Diabase Porphyrite to the west. A further Websterite Porphyrite (bronzitite) occurs again to the west making the dyke complex some 354 metres thick in the Mine area. Nye reports that the dyke complex thins both to the north-east and south-west but is over 8 kilometres long, stretching from the Persic Mine, just NW of Mount Bischoff, to the Luina area (Figure 3). A number of lead-Zinc shows occur though this dyke complex and will be referred to in Section 7. Later authors believed these 'dykes' to in fact be basic volcanic flows. This report accepts that they may be dykes.

At the mine itself the lode occupies a strong fault zone between the two intrusive units which can be seen on the detailed aeromagnetic image flown by Pasmenco Exploration. To the south the hangingwall Diabase Porphyrite is separated from the lode but a wedge of Oonah metasediments. This unit dies out with depth and the two intrusives again form the hanging and footwalls. The lodes are comprised of a gänge of ankerite due to the carbonising of the intrusives. At depth the lode especially on its southern development appears to bifurcate along a number of shears. These were the footwall shear (always producing the richest ores) the south central shear and the hanging wall shear. Later at lower levels a back lode shear of massive 'dolomite' actually ankerite was developed.

8. CONCLUSIONS & RECOMMENDATIONS

These have been divided into three sections. Firstly the North Magnet Magnetic Anomaly, the Magnet Mine and Regional Exploration in the General Area.

8.1 North Magnet Magnetic Anomaly

- i) Distinct magnetic anomalies lie some 1000 metres NE and along strike from the Magnet Mine. The anomaly is centred east of the junction of Mathews and Magnet Creeks where the Magnet Mine Track and Railway crosses the Magnet Creek. Historically the old Magnet Mine workings are only 90 metres long thus do not extend to the magnetic anomaly (Figure 4). This anomaly was located in earlier exploration by Comstaff in an EM Magnetic Survey in 1983 (Trussel 1983) but no follow-up was recommended.

- ii) The anomaly is hosted by the Precambrian Oonah Formation the host to the Mt Bischoff tin deposit, which occurs some 5.5 kilometres to the east. The Bischoff Mine is conspicuous by the associated aeromagnetic anomaly probably caused by massive pyrrhotite mineralisation associated with carbonate replacement bodies and granitic dykes.
- iii) The magnetic anomaly is associated with a distinct kink, or dislocation in the mapped outcrop of the Oonah Formation and also in the regional aeromagnetics. Detailed mapping of this area by Placer in their EL 47/88 supports this structural kink by the mapping of dips and strikes in this area.
- iv) Ground Magnetic traverses located the magnetic anomaly and it was found to underlie Magnet Creek. Soil geochemical results show anomalous Pb-Zn-Ag results over the magnetic anomaly.
- v) The drill hole NMM-1 was drilled from 5017N at 173° @ -55°. The hole intersected a lithic sandstone, mudstone and chert sequence variably silicified and fractured. Several zones were structurally disrupted with extensive quartz-carbonate veining and tension gash veining, which showed structural elements to be orientated mainly vertically or steeply north, thus cross cutting bedding. Mineralisation consisted of weak pyrite and chalcopyrite mineralisation associated with the veining and ubiquitous black chlorite infill. The units are also variably haematised. The source of the magnetic anomaly is thought to be magnetite in the metasediments. Various units can be viewed in Plates 2 to 9.
- vi) It is concluded that the hole adequately tested the magnetic anomaly that failed to indicate anything of economic consequence.

8.2 Magnet Mine Appraisal

- i) The Magnet Mine occupies a fault zone between two mafic bodies. Nye (1923) believed they were mafic-ultramafic dykes, but more recent exploration Cox (1975) interprets them to be mafic volcanic flows and metasediments associated with the upper units of the Precambrian Bischoff Formation. The presence of orbicular rocks would tend to suggest that Nye maybe correct.
- ii) No exploration since the early 1970's has been completed on the Magnet Mine. Historically this mine produced approximately 630,000 tons of ore for 37,993 tons of lead and 248.2 tons of silver. Ore is estimated to have contained 6% Pb, 7% Zn and 394 g/t Ag. The Magnet lode can be traced for 900 metres but only 90 metres of this has been mined. A ~~prophylic~~ alteration zone measuring 1800 also encloses the lode by 400 metres.

(1800 m x 400 m).

propylitic

- iii) Aberfoyle completed detailed exploration between 1964 and 1968, which culminated in the completion of two exploration holes. Comstaff were later to complete two more holes in the early 1970's. Results are tabulated elsewhere, but all holes had significant core loss through the ore zone. It is concluded that these holes would be unreliable as indicators of economic ore due to primitive drill methods. The best result was 4.8 metres @ 0.62% Pb, 6.28% Zn and 44.1 g/t Ag.
- iv) Rock sampling of other workings especially NW of the Magnet Mine shows significant zinc values that were overlooked by Nye (1923).
- v) It is concluded that with the significant rock chip sampling results obtained in this program and the lack of modern geophysics and drilling along the Magnet Mine lode zone offers some potential to host economic zinc mineralisation.

8.3 Regional Exploration

- i) On the 5000E ground magnetic line at 160-200 metres north of the base point a quartz-sulphide vein system occurs within a diorite intrusive. Rock sampling of this zone has returned up to 0.77% Cu and 0.54 g/t Au. This area is worthy of further follow up.
- ii) Nye (1923) notes a number of Lead-Silver prospects through the 'dyke' belt from Magnet to Mount Bischoff. To the south this belt has been traced by Aberfoyle to the Luina Mine. Limestone was noted on the drill pad of WP-84 which had not been previously mapped, which may enhance the tin potential of the area. Historic reports indicate other base metal shows occur to the south, but they were not visited.

RECOMMENDATIONS

- i) Drill hole NMM-1 did not intersect anything of economic importance, and no further exploration on the immediate magnetic anomaly is warranted.
- ii) Reviews of the literature over the Magnet Mine area along with the results of the rock chip samples results suggest that potential exists in the Magnet Mine itself to locate economic concentrations of zinc mineralisation.

LIST OF REFERENCES

- Cottle V M 1953 Magnet Silver-Lead Mine
Geology of Australian Ore Deposits
pp 1160-1165
5th Empire Mining & Metallurgical Congress
A B Edwards (ed)
- Cox R 1975 Magnet Silver-Lead-Zinc Orebody
Economic Geology of Australia &
Papua New Guinea
Bulletin No 1 Metals pp 628-631
C L Knight (ed)
- Glasson K R 1968 Preliminary Report : Magnet Mine
Cox R Waratah District, Tasmania
Department of Mines, Tasmania
TCR No 68-498
- Godfrey M 1984 Waratah - Pioneer of the West
Advocate Printers of Burnie
- Groves I D 1965 Lead-Silver-Zinc Ore Deposit at Magnet
8th Commonwealth Mining & Metallurgical Congress
Australia & New Zealand 1965
pp 491
McAndrew & Madigan (eds)
- Nye P B 1923 The Silver-Lead Deposits of the Waratah District
Geological Survey Bulletin No 33
Tasmanian Department of Mines
- Rugless C S 1976 Interim Report on the Magnet Mine Area
Exploration Licence EL 5/63 - Comstaff
Department of Mines, Tasmania
TCR No 76-1152
- Shaw R W L 1985 Final Report on areas Surrendered (June 1985)
Everett M P EL 5/63 Comstaff Pty Ltd
Department of Mines, Tasmania
TCR No 85-2383
- Trussell D B 1983 Interpretation of Arthur River area - Digem Survey
Exploration Licence EL 5/63
Australian Anglo American Corporation
Department of Mines, Tasmania
TCR No 85-2413

FIGURES

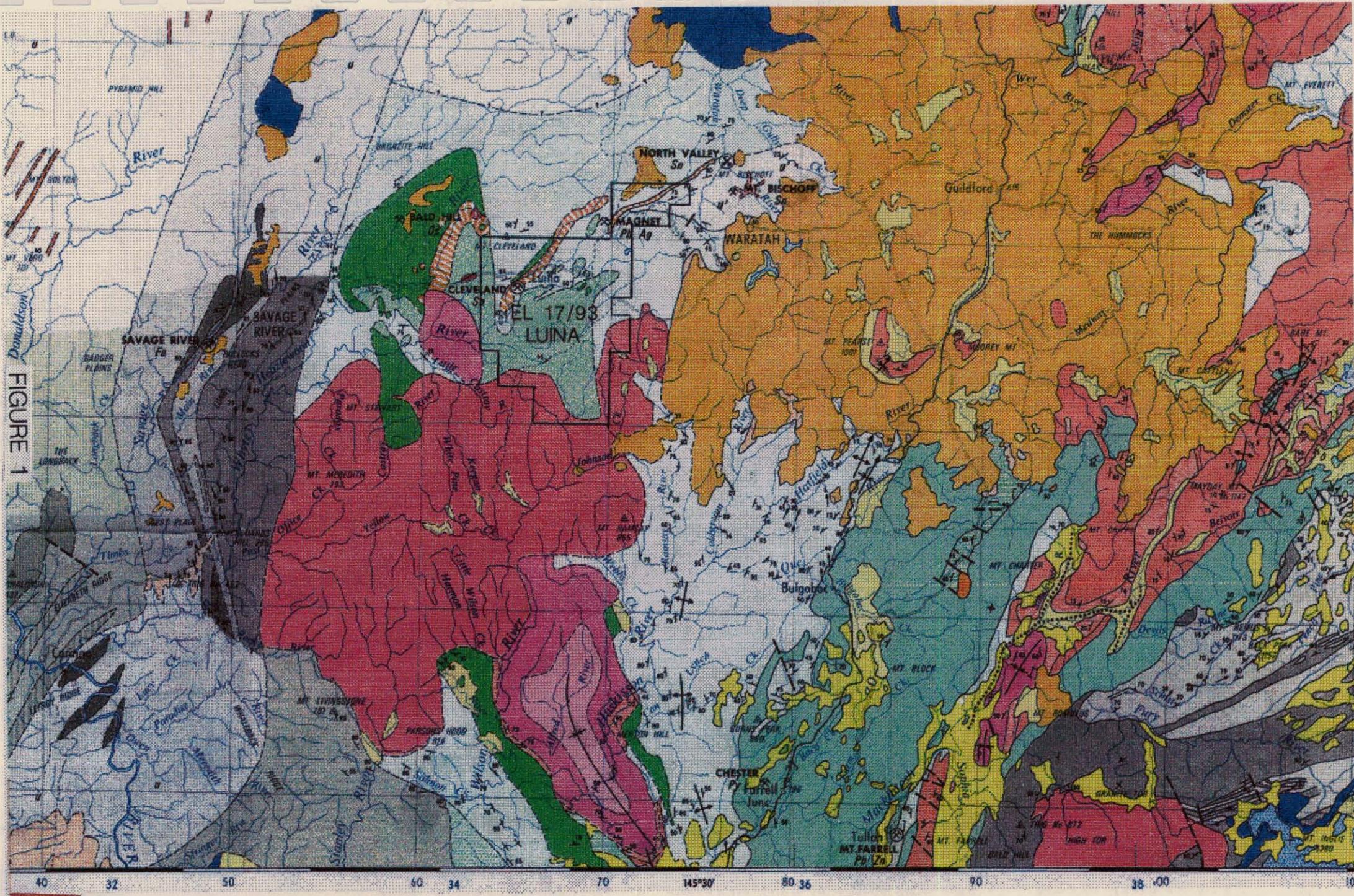
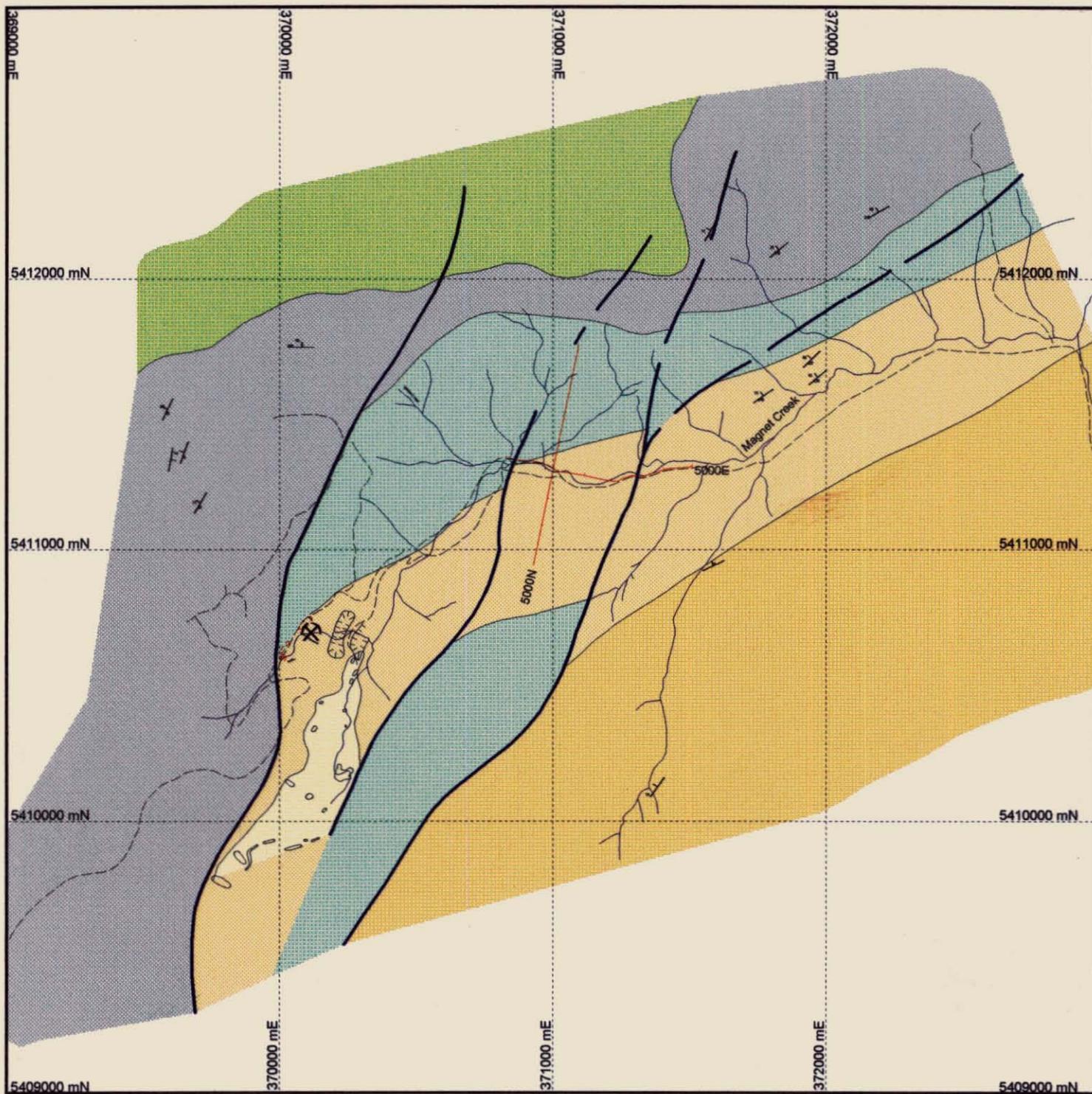


FIGURE 1

Fig 210024



LEGEND	
Package - 5	F Olivine Basalt, Dolerite Gabbro
Package - 4	E Red Fawn & Grey Chert, Red Fawn & Green Mudstone, Sandstone.
Package - 3	D Amygdoloidal Basalt / Spherulitic Basalt - Tufts Gabbro, pyroxinite and ultramafic Extensive alteration in high Mg basalts Magnet mine area.
Package - 2	C Possible Limestone ? interpreted from Anglodata
Package - 1	B Grey Quartzite, shale & chert Strongly contorted, Chevron Folds.
Package - 1	A Greywake, Mudstone, shale & chert Strongly fractured in Parts
	Gossan
	Fault
	Lithology boundaries
	Tracks
	Streams
	Grid
	Dip/strike
	Mine

MPI GOLD PTY LTD
 MAGNET EL 17/93
 Interpreted Geology

Note: Geology interpreted from Airborne magnetics and Reconnaissance fact Geology map by Anglo American.

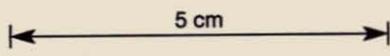
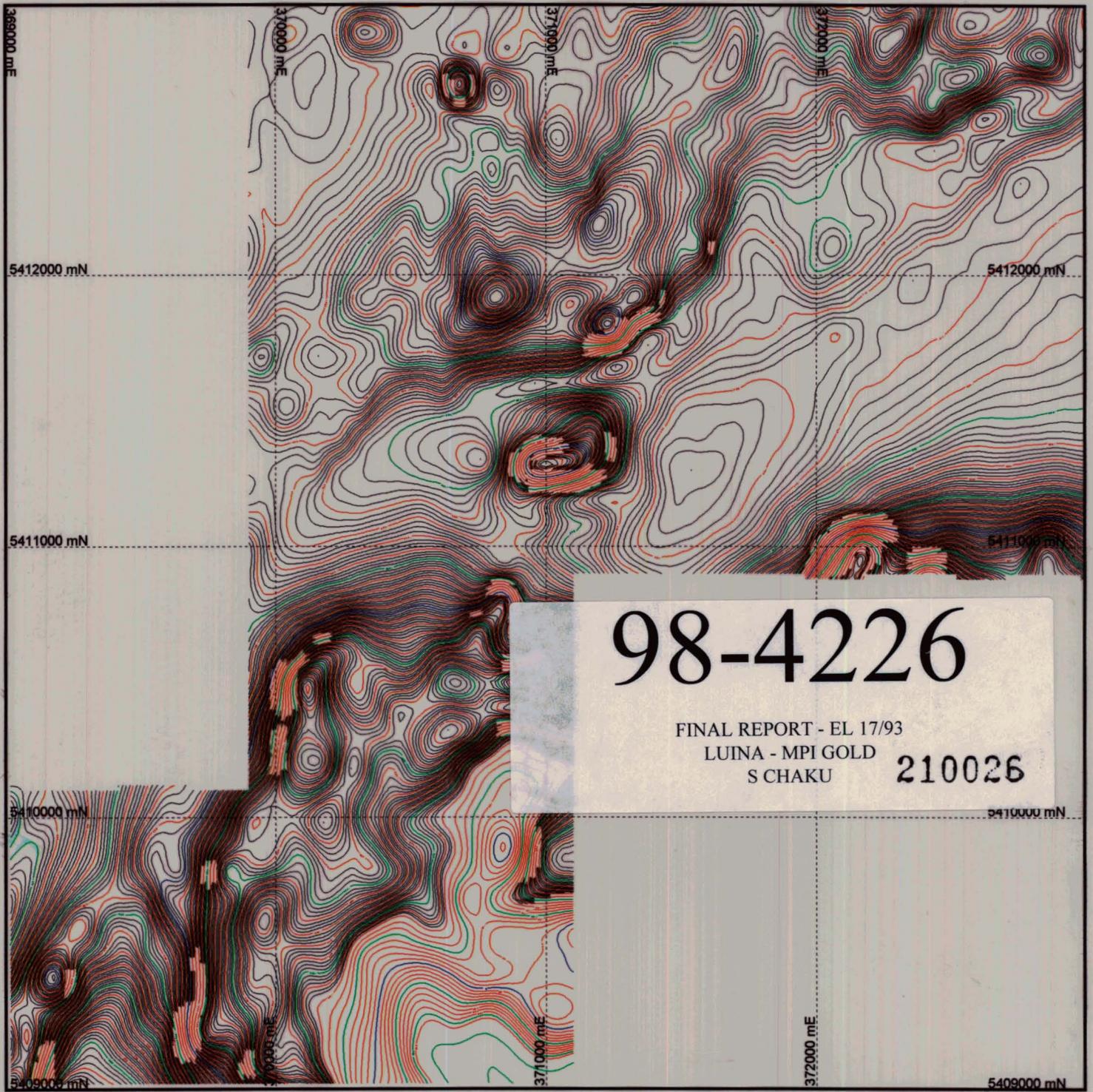


Figure 2



98-4226

FINAL REPORT - EL 17/93

LUINA - MPI GOLD

S CHAKU

210026

LEGEND

AQUISITION PARAMETERS

Flown	: UTS
Line Spacing	: 100m
Line Direction	: 90-270
Sample Interval	: 7m
Flying Height	: 60m

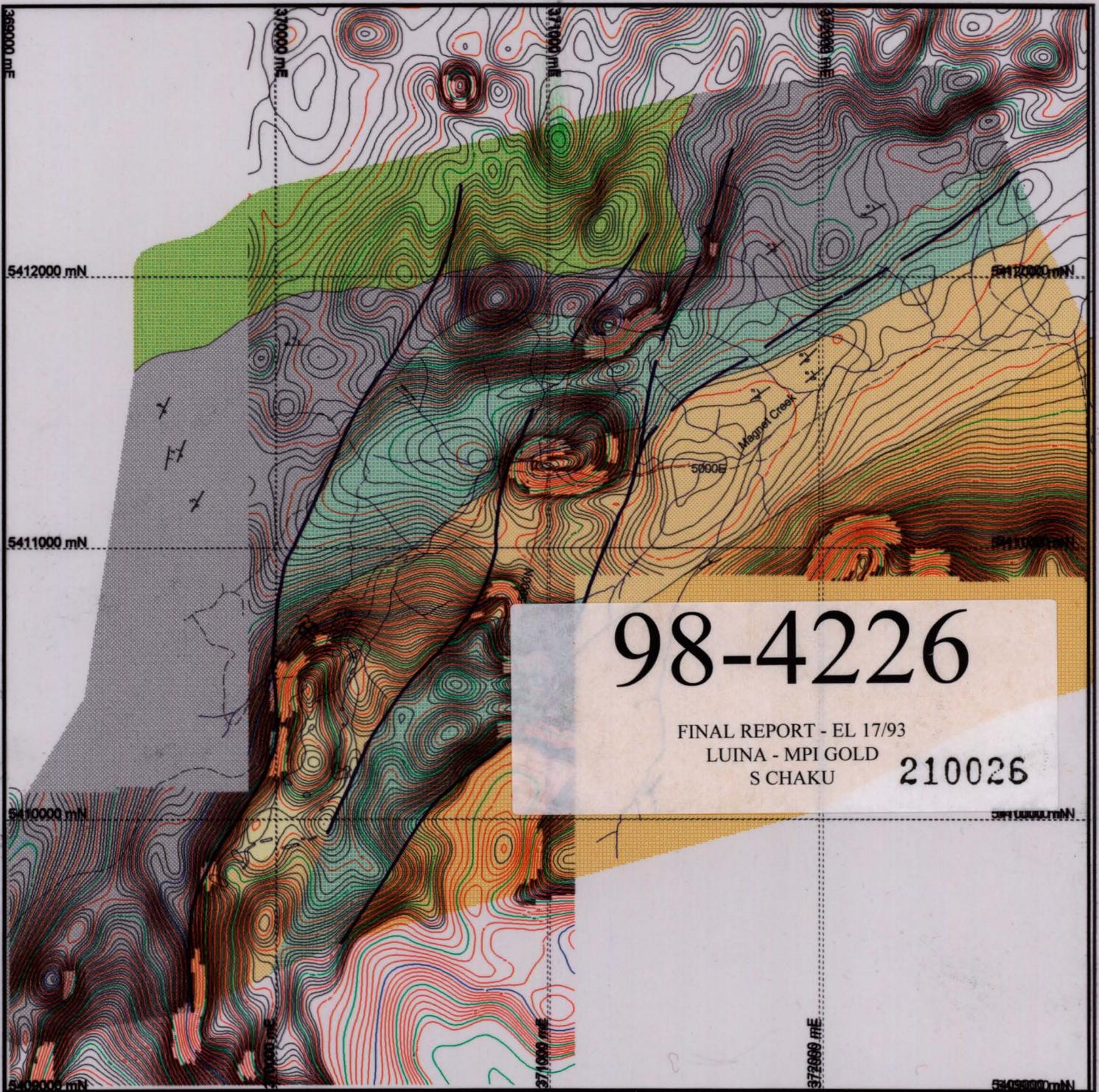
DISPLAY PARAMETERS

Contour Interval	: 5nT, 20nT, 100nT, 500nT
------------------	---------------------------

MPI GOLD PTY LTD
MAGNET EL 17/93
Contours of Total Magnetic Intensity

Figure 2B

5 cm



98-4226
 FINAL REPORT - EL 17/93
 LUINA - MPI GOLD
 S CHAKU **210026**

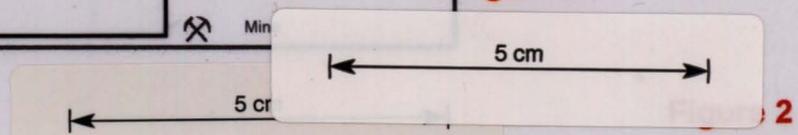
LEGEND	
Package - 5	A Olivine Basalt, Dolerite Gabbro
Package - 4	B Red Fawn & Grey Chert, Red Fawn & Green Mudstone, Sandstone
Package - 3	D Spherulitic Basalt - Tuffs C Gabbro, Proxinite and ultramafic Flying
Package - 2	C Possible Limestone ? interpreted from Anglodata
Package - 1	B Grey Quartzite, shale & chert Strongly contorted, Chevron Folds. A Contour Interval : 5nT, 20nT, 100nT, 500nT Greywacke, Mudstone, shale & chert Strongly fractured in Parts

	Gossan
	Fault
	Lithology boundary
	Tracks
	Grid
	Dip/strike
	Min

MPI GOLD PTY LTD
MAGNETIC EL 17/93
Contours of Total Magnetized Density

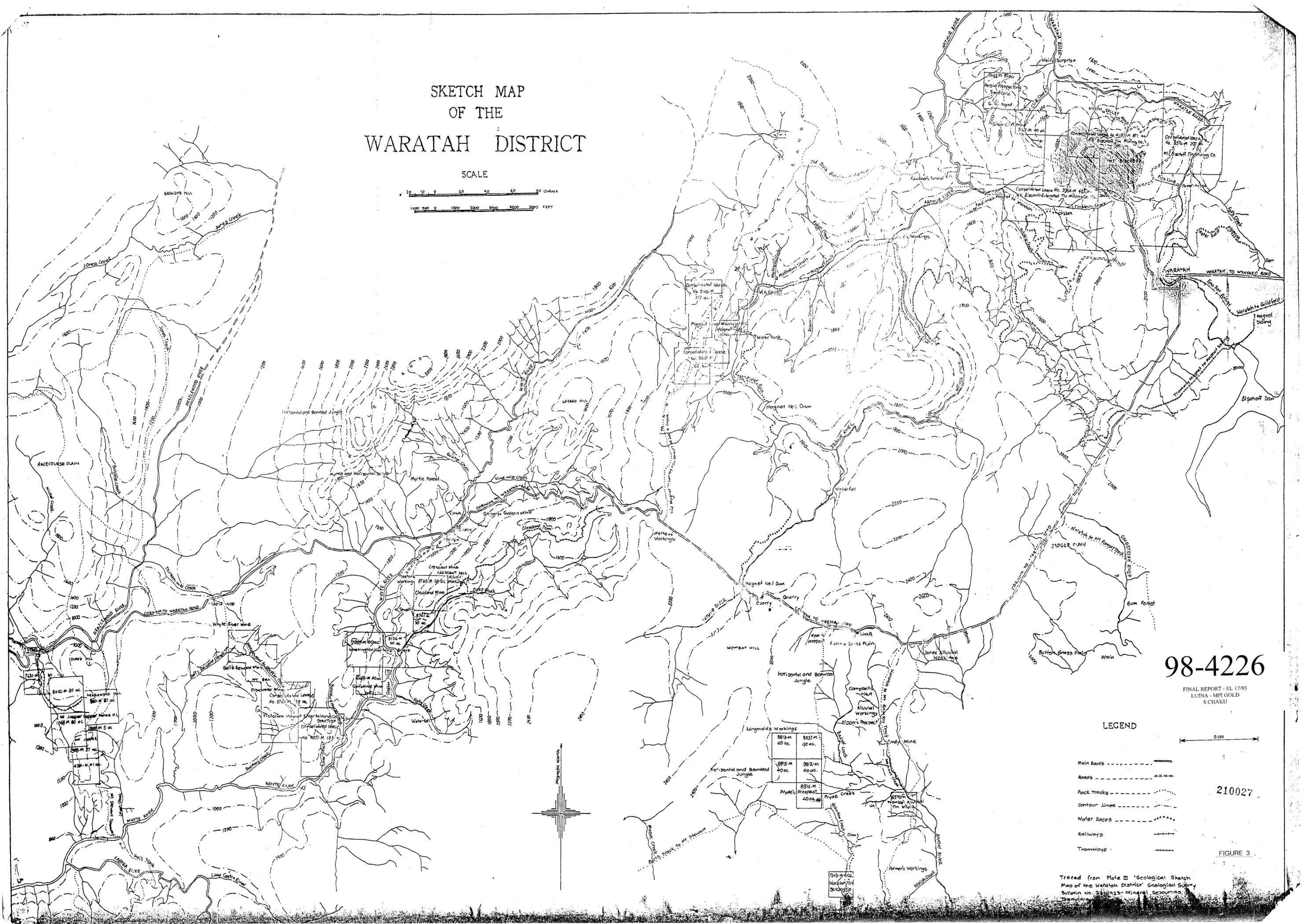
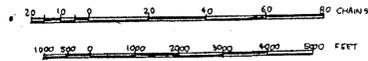
Figure 2B

Note: Geology interpreted from Airborne magnetics and Reconnaissance fact Geology map by Anglo American.



SKETCH MAP OF THE WARATAH DISTRICT

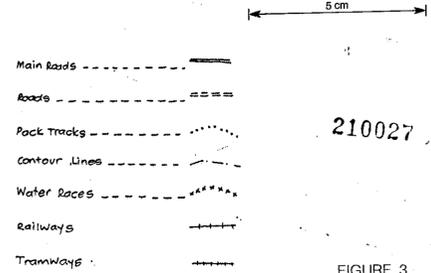
SCALE



98-4226

FINAL REPORT - EL 1793
LUNA - MPI GOLD
S CHAKU

LEGEND



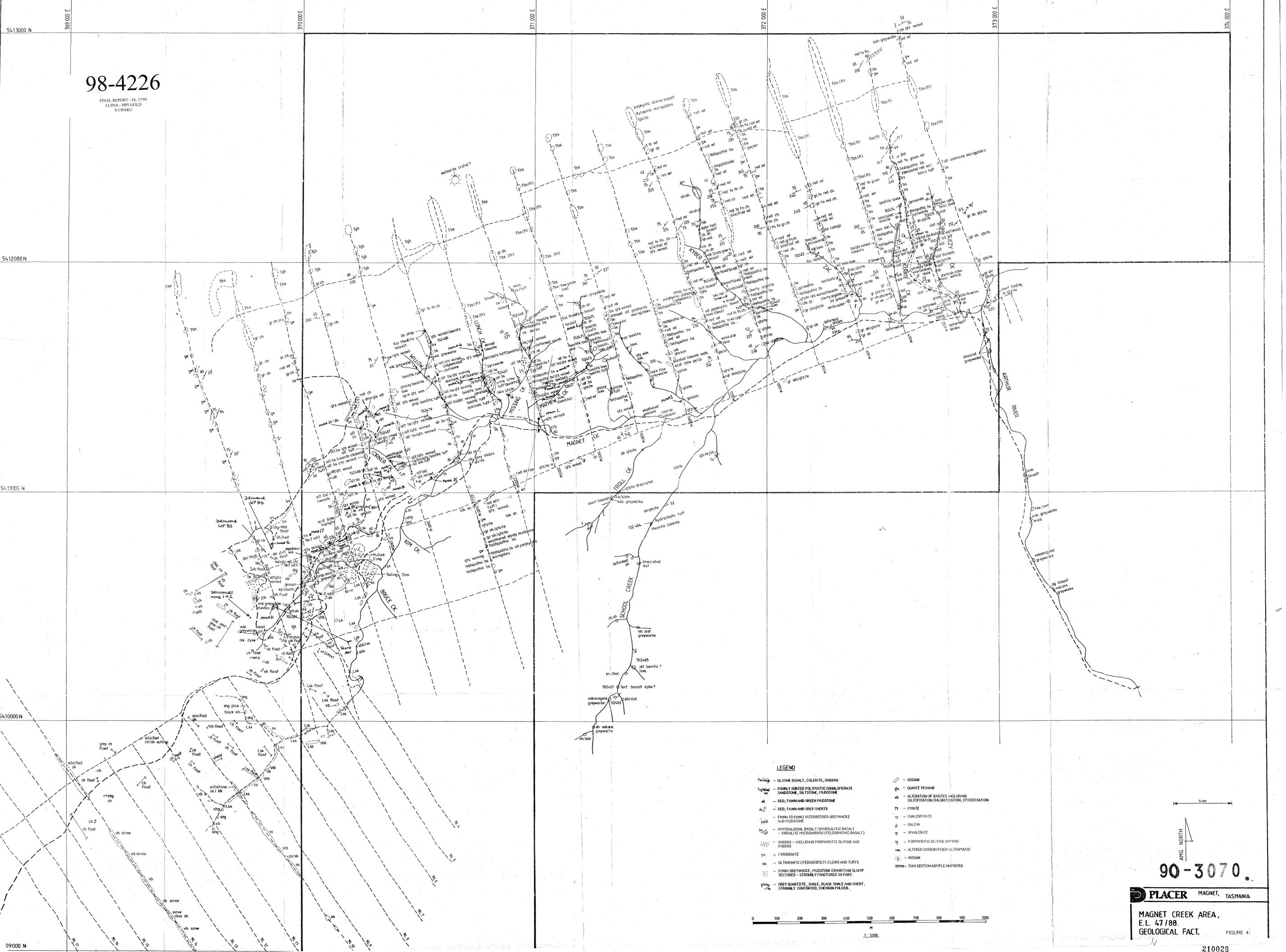
210027

FIGURE 3

Traced from Plate III 'Geological Sketch Map of the Waratah District' Geological Survey Bulletin No. 21 1923 - Mineral Resources Tasmania

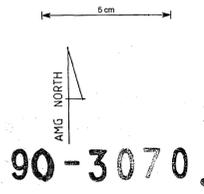
98-4226

FINAL REPORT - EL 1793
LUNA - MPI GOLD
S CHARU



LEGEND

Thick line	OLIVINE BASALT, OLERITE, OABBRO	---	GOSSAN
Thin line	POORLY SORTED POLYHYDRIC CONGLOMERATE SANDSTONE, SILTSTONE, MUDSTONE	sh	QUARTZ VEINING
mt	RED, FAWN AND GREEN MUDSTONE	sh	ALTERATION OF BASITES, INCLUDING SILICIFICATION, CHLORITIZATION, EPIDOTIZATION
ch	RED, FAWN AND GREY CHERTS	py	PYRITE
gwa	FAWN TO ESNAKI INTERBEDDED GREYWACKE AND MUDSTONE	cp	CHALCOPYRITE
vb	AMYGDALOIDAL BASALT/SPHERULITIC BASALT - VARIOLITE MICRODABBRIO (FELDSPATHIC BASALT)	g	GALENA
oabbro	OABBRO - INCLUDING PORPHYRYTIC OLIVINE AND OABBRO	sp	SPHALERITE
px	PYROXENITE	og	PORPHYRYTIC OLIVINE OABBRO
uf	ULTRAFIACIC (PERIODITIC?) FLOWS AND TUFFS	uc	ALTERED CARBONITISED ULTRAFIACIC
ka	KHAKI GREYWACKE, MUDSTONE EXHIBITING SLUMP TEXTURES - STRONGLY FRACTURED IN PART.	o	GOSSAN
gq	GREY QUARTZITE, SHALE, BLACK SHALE AND CHERT, STRONGLY CONTORTED, DISJUNCTION FLOORS.	30m	THIN SECTION ASPLE NUMBERS



90-3070
PLACER MAGNET, TASMANIA
MAGNET CREEK AREA,
E.L. 47/88.
GEOLOGICAL FACT. FIGURE 4

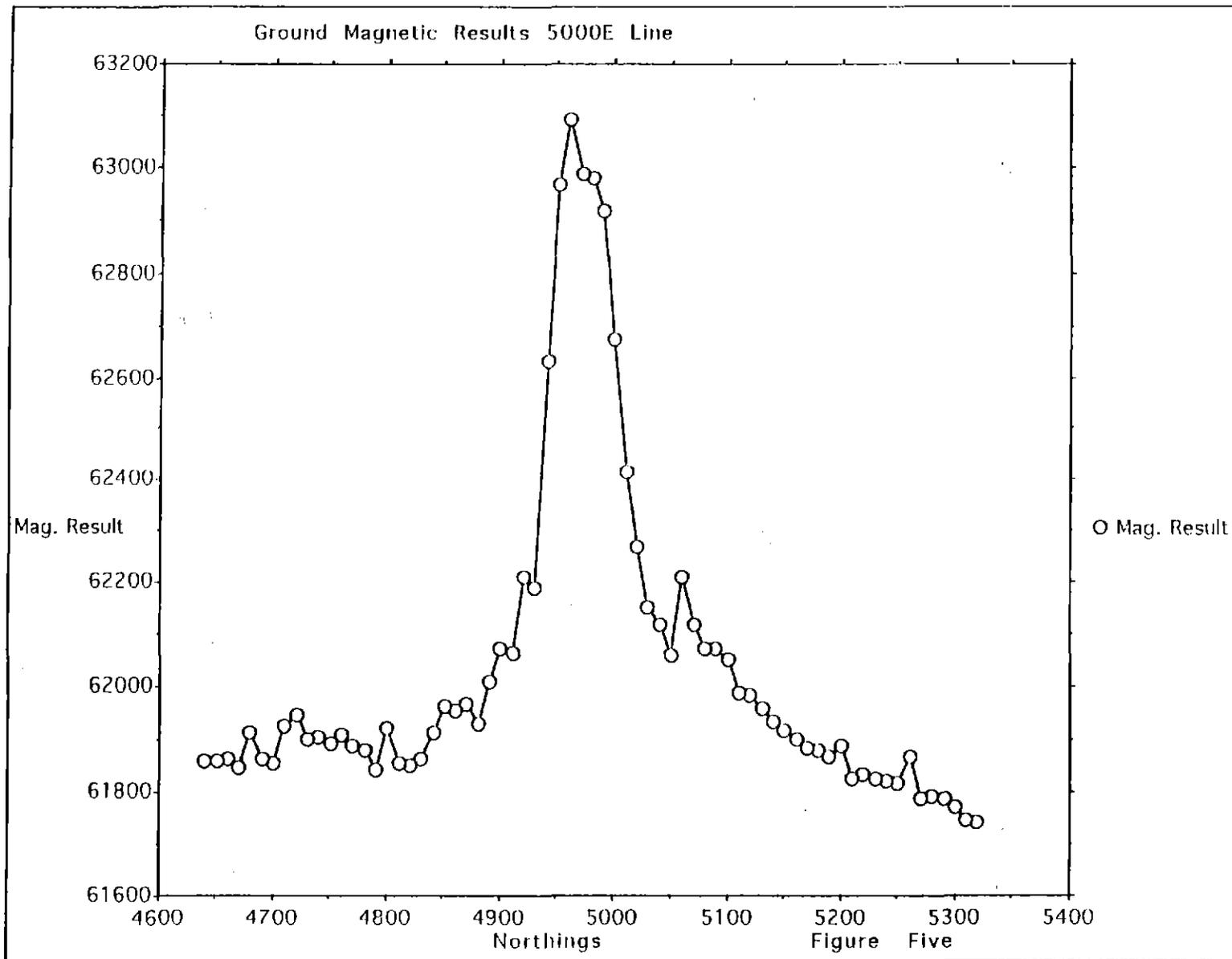


FIGURE 5

210030

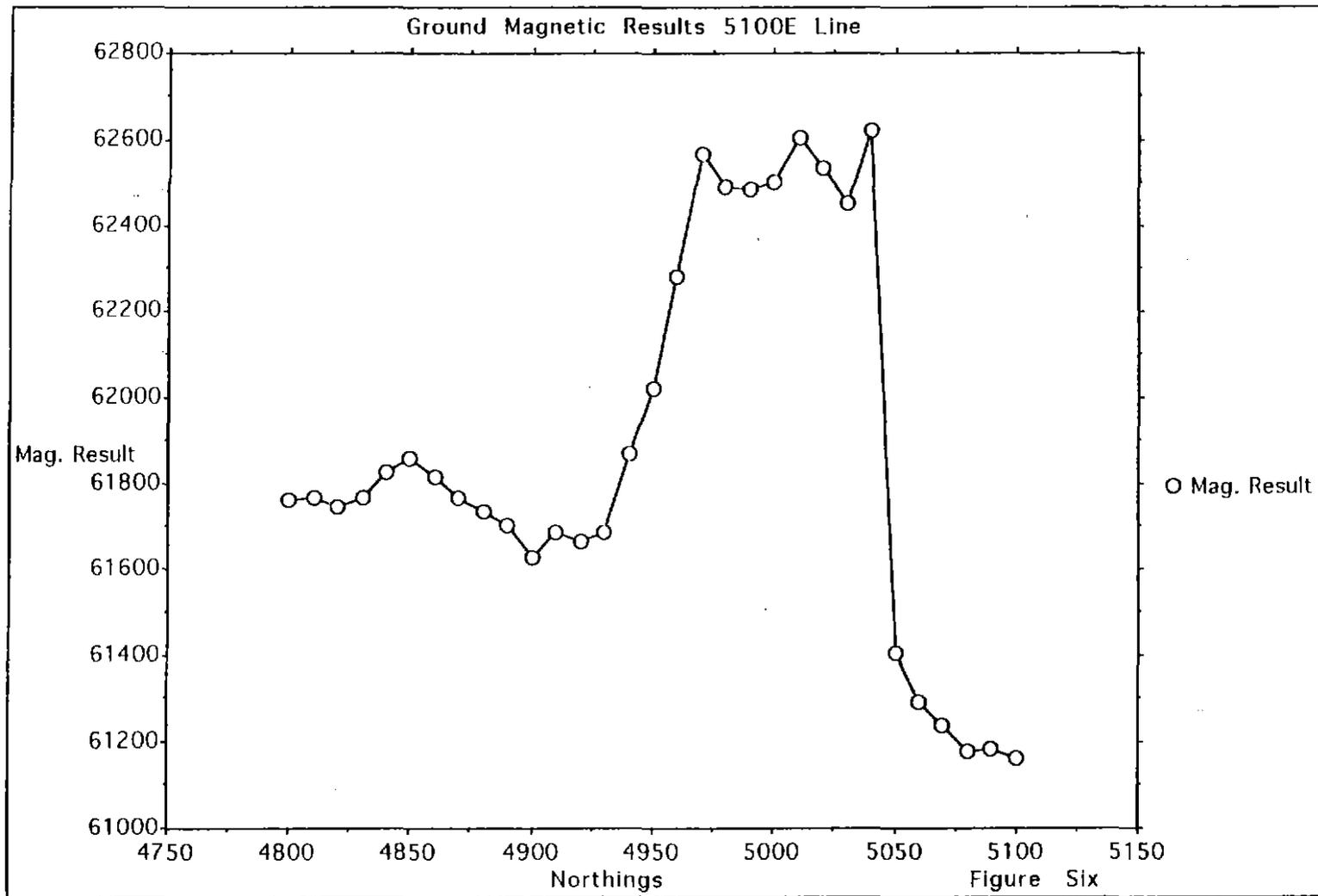
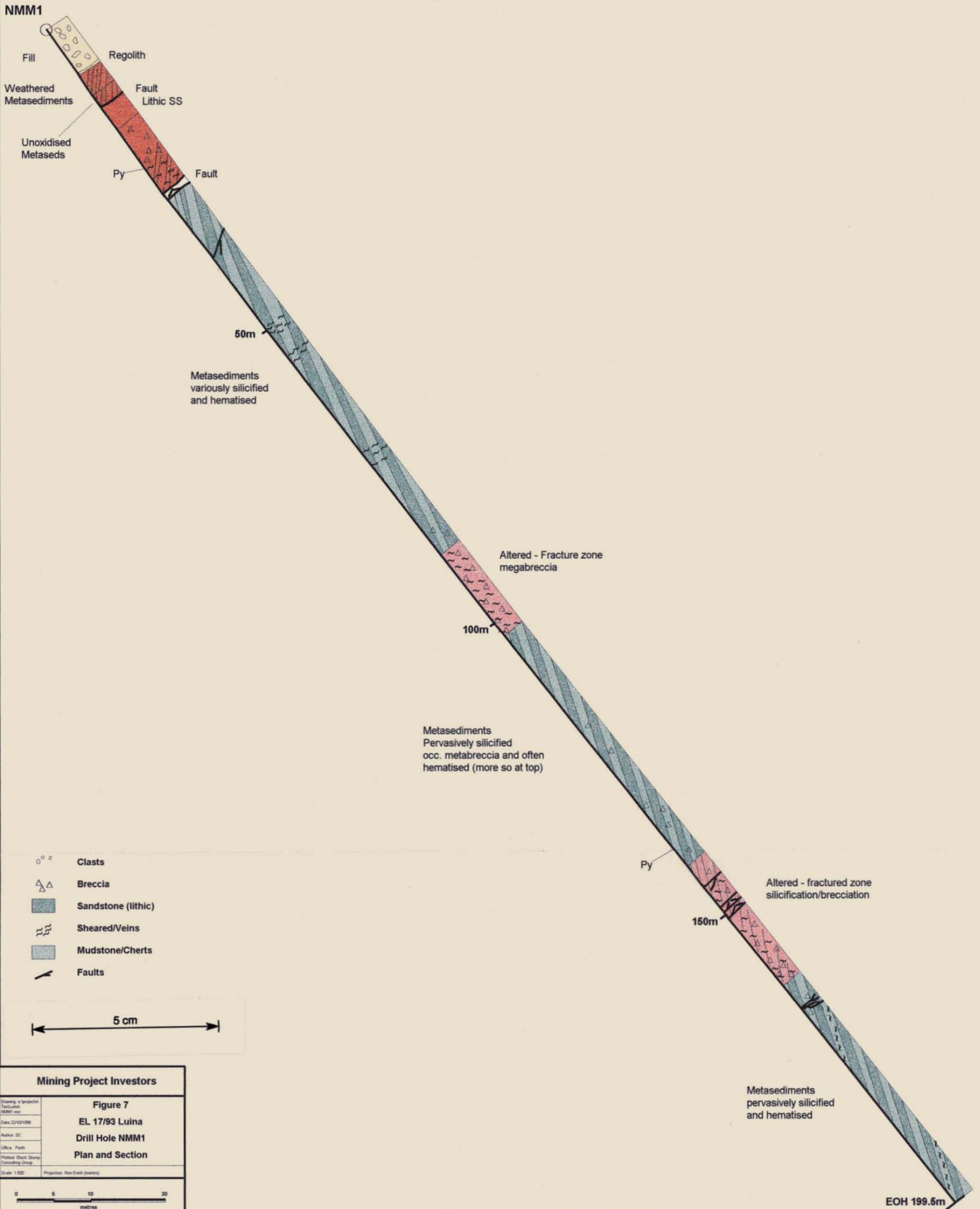


FIGURE 6

Figure Six

210031

Plan View



5 cm

Mining Project Investors	
Figure 7	
EL 17/93 Luina	
Drill Hole NMM1	
Plan and Section	
Drawing: s:\projects\1793\Luina\NMM1.dwg Date: 22/07/1998 Author: SC Office: Perth Printed: Black Stamp Controlling Group	Scale: 1:500 Projection: Non Earth (metres)

210032

0 5 10 20 metres

EOH 199.5m

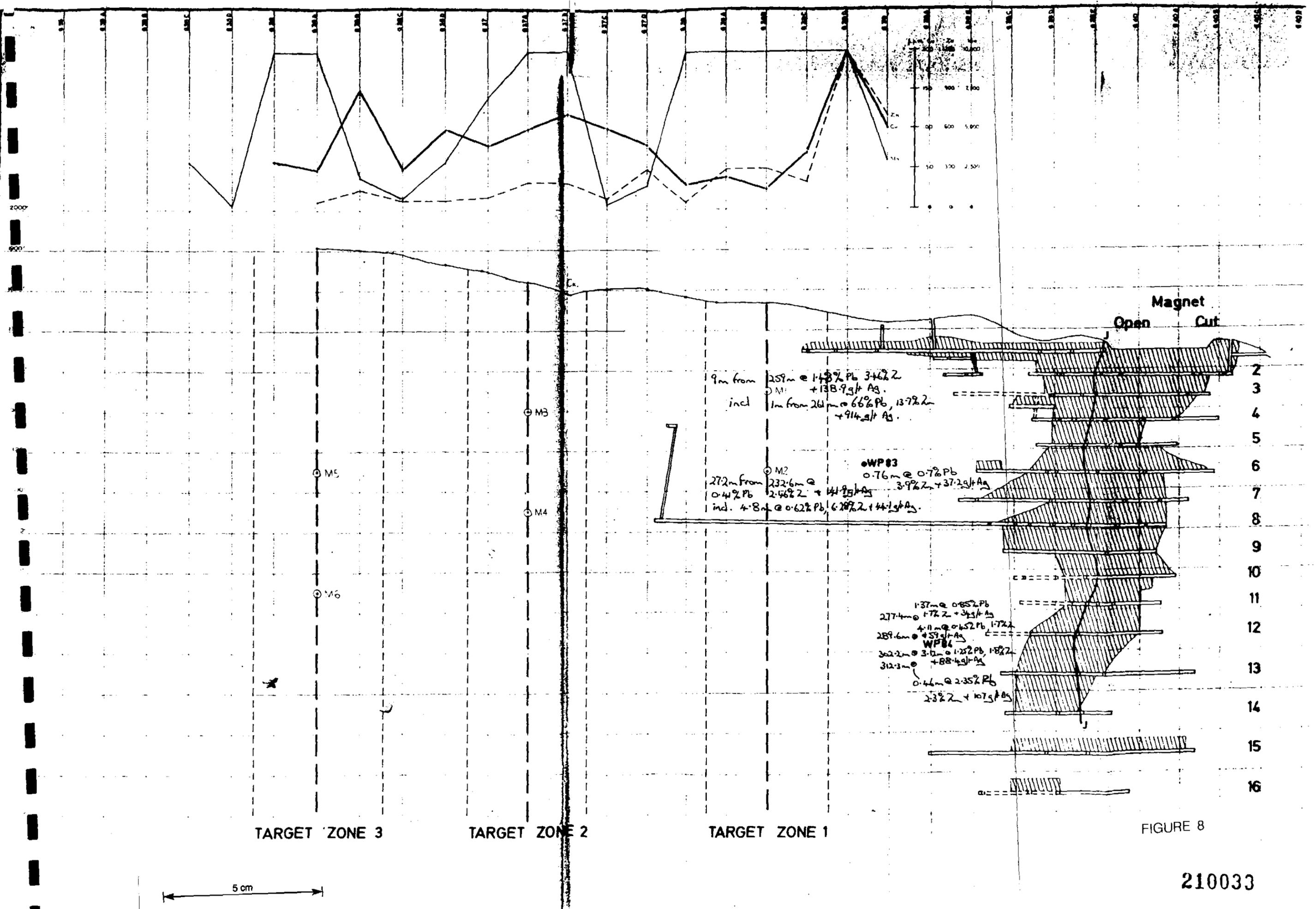
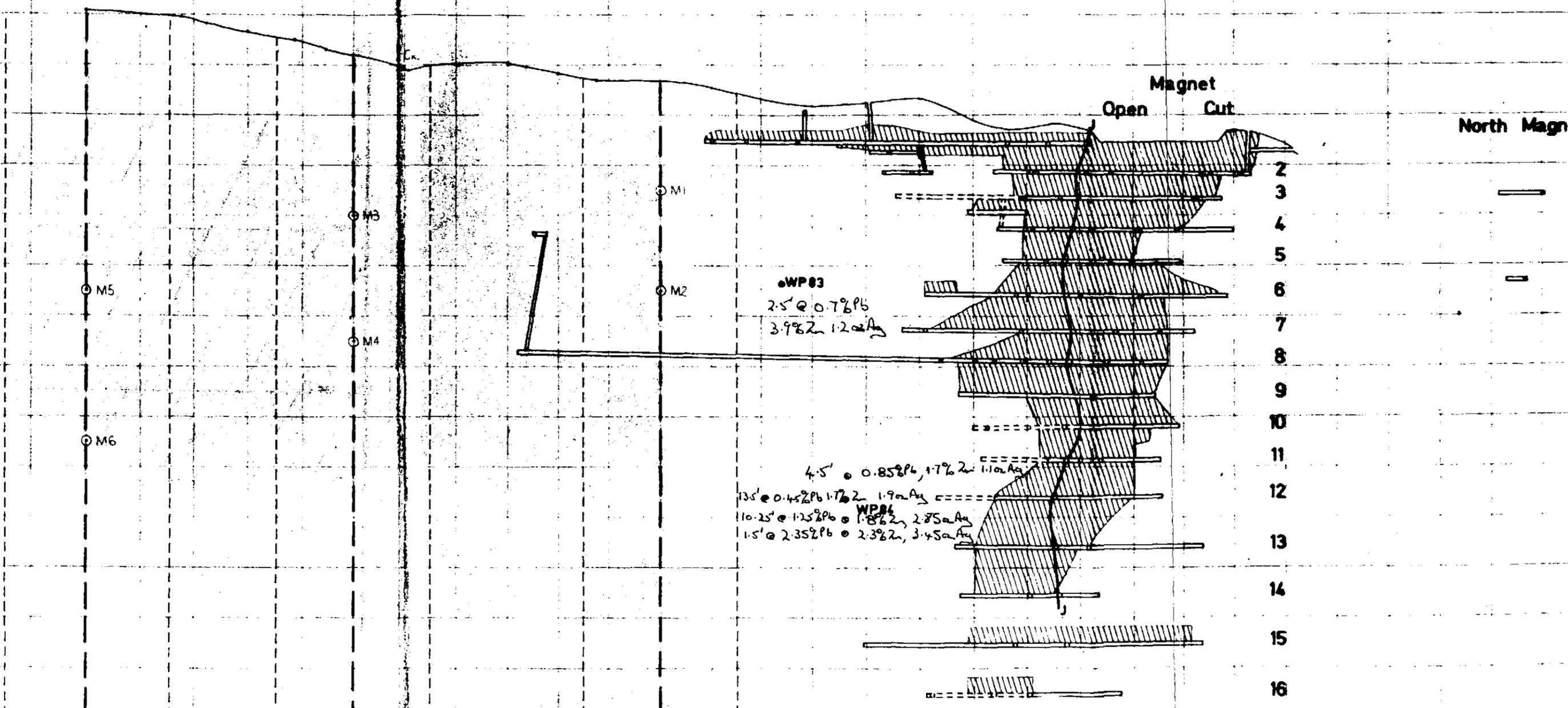
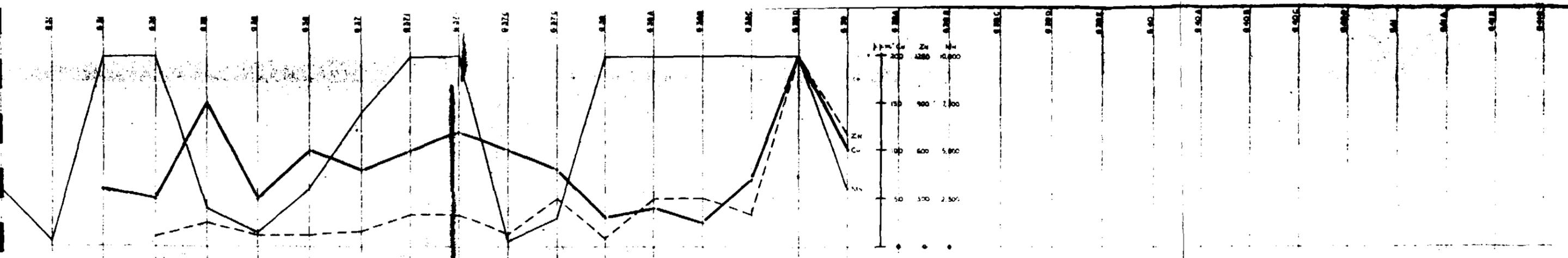


FIGURE 8



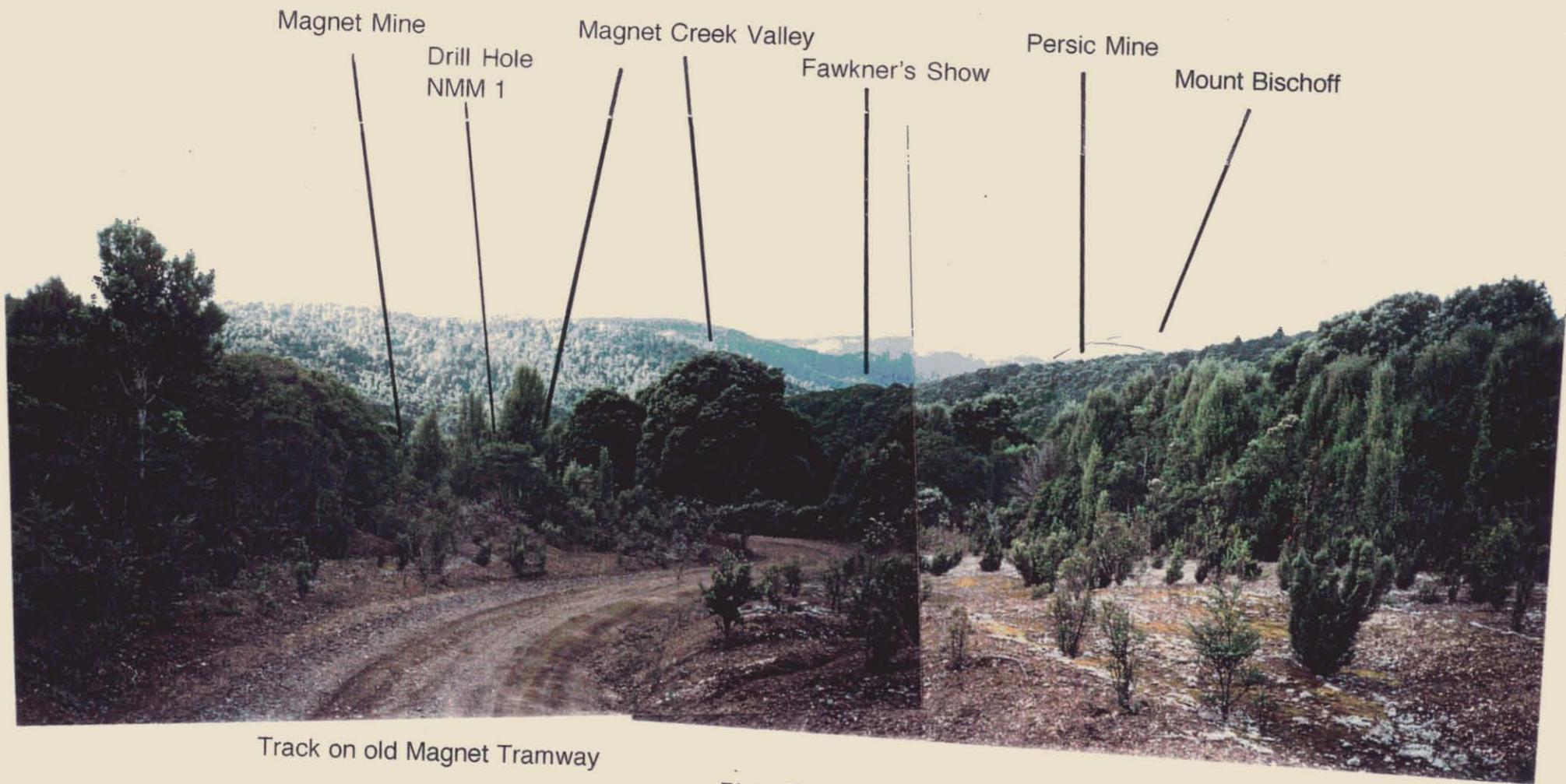
TARGET ZONE 3 TARGET ZONE 2 TARGET ZONE 1

210034

FIGURE 9
 5 cm

210033

PLATES



Track on old Magnet Tramway

Plate One

210036



Plate Two: Drill Hole NMM 1 (25.5 - 29.3 m.)
showing fault zone and haematized
chert/mudstone sequence



Plate Three: Drill Hole NMM 1 (34.0 - 38.1 m.)
Showing mixed metasedimentary sequence showing
fracturing, and more competent haematized units. The
unit may be a large mega breccia zone as 'ghost' bedding
is often truncated by other clasts.

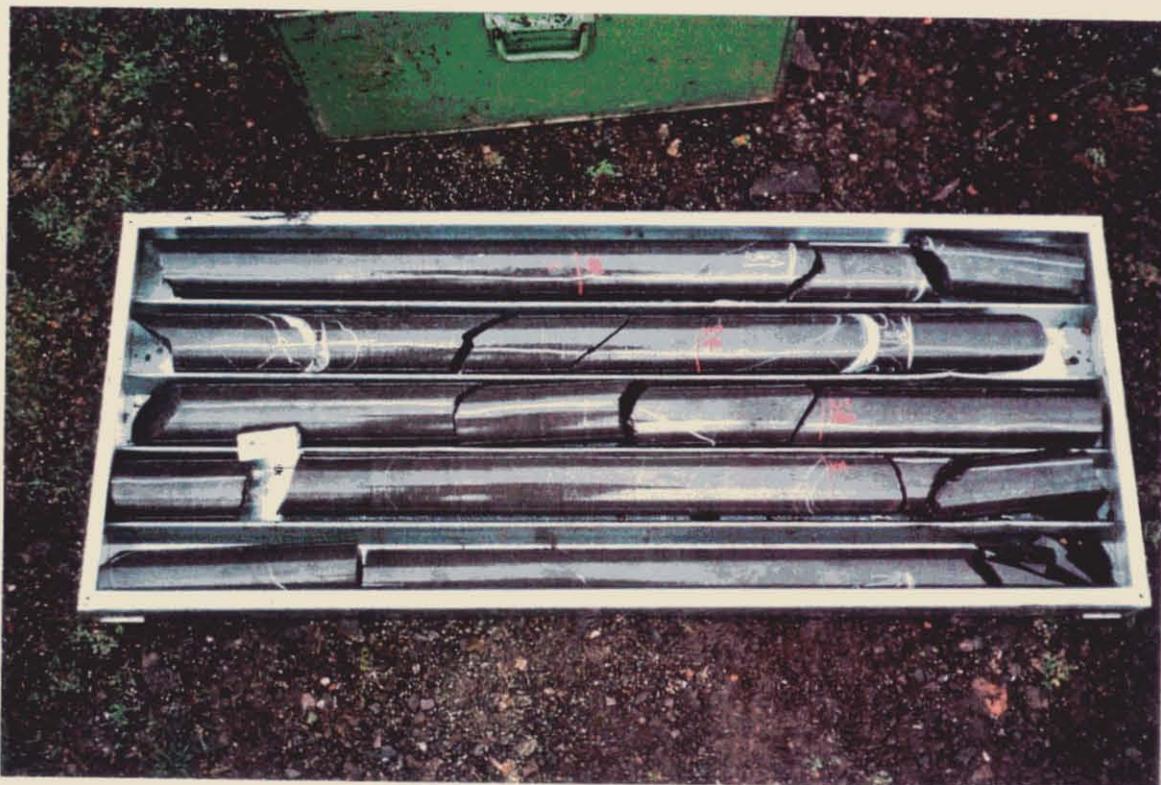


Plate Four: Drill Hole NMM 1 (100.5 - 105.2 m.)
Showing competent core with cross cutting quartz -
carbonate veins with high intersection angles.



Plate Five: Drill Hole NMM 1 (132.4 - 141.3 m.)
Showing fault zone at 136.85 metres with competent
lithic sandstone to the top and haematized silicified
mudstone which contains zones of pyrite blebs. (see
second last row of core - outlined in white.)

210039



Plate Six: Drill Hole NMM 1 (149.95 - 153.5 m.)
Showing constant quartz - carbonate veining with thin
anatomising veinlets in relatively competent core. Dark
grey sections are due to ?chlorite infill of fine fractures.



Plate Seven: Drill Hole NMM 1 (154.5 - 159.0 m.)
showing the very strong quartz - chlorite breccia zone.

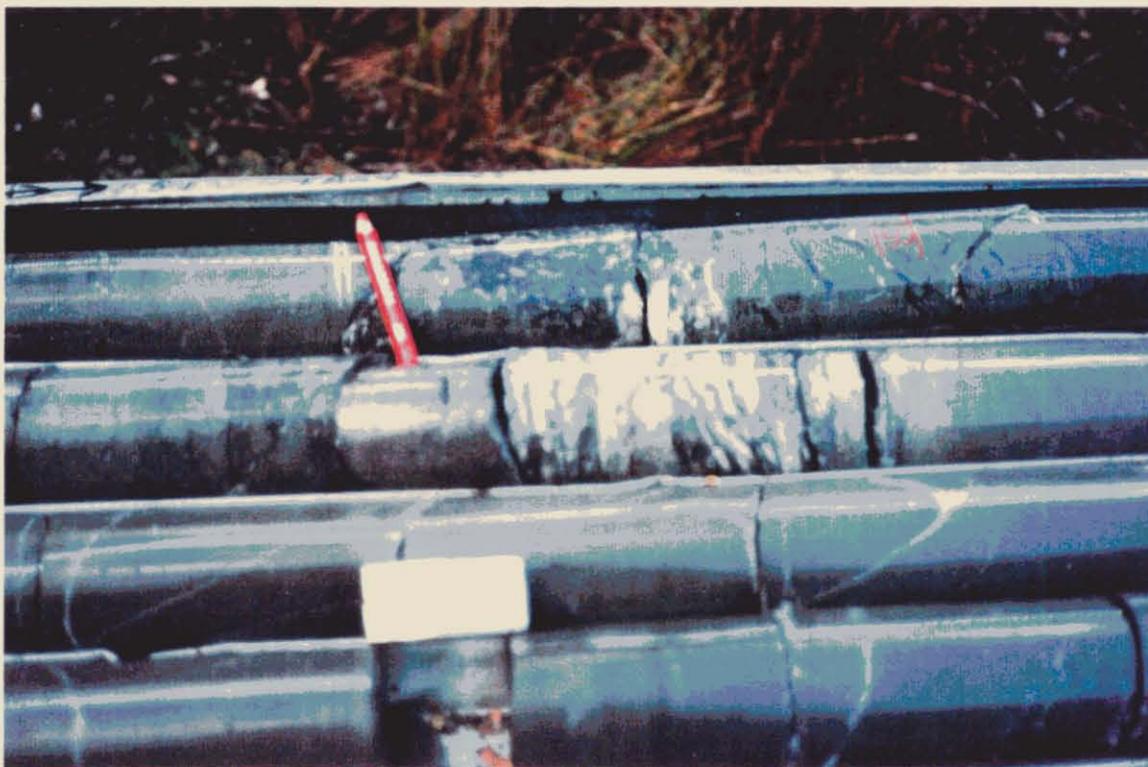


Plate Eight: Drill Hole NMM 1 (154.5 - 156.1 m.)
Close up of quartz - chlorite breccia zone.



Plate Nine: Drill Hole NMM 1 (163.7 - 167.7 m.)
Top tray is upside down!
Bottom tray middle line shows selective fracturing
observed as white anatomising veinlets 165.7-166.1 m.



Plate Ten: Rock sample collected from ridge between R & L H Branches of Corner Creek. Shows bleached mafic rock with quartz veins to 1 cm. containing both black and white quartz. Rock Sample MMA 20.



Plate Eleven: View of LM 70 Drill Rig and driller's tent.



Plate Twelve: Picture of coarse sand baffle box - empty.



Plate Thirteen: Coarse sand baffle box in operation.



Plate Fourteen: Settling tanks below the baffle box.



Plate Fifteen: Magnet Mine, old open cut, gossan zone. looking north. Samples MMA 104 - MMA 106 taken from walls in this area.

210044

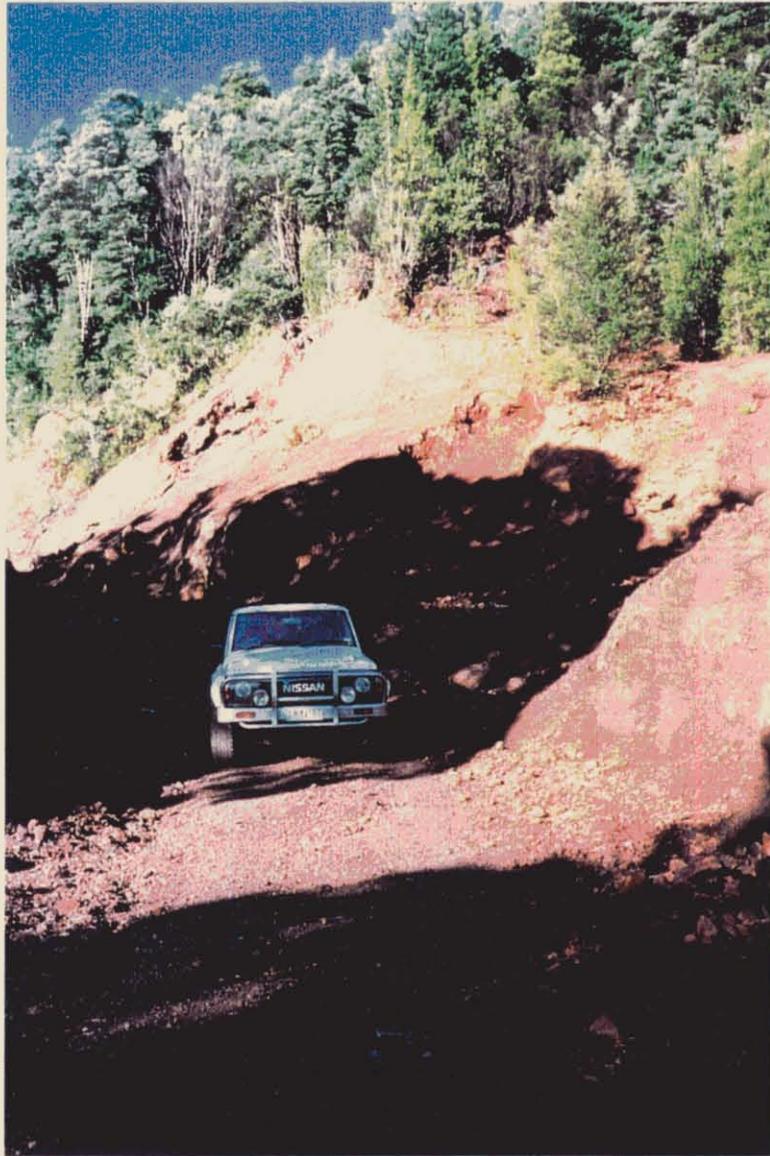


Plate Sixteen: Magnet Mine - old open cut - gossan zone looking south. Samples MMA 101 - MMA 103 taken from these outcrops.

210045

APPENDIX 1

Rock Sampling Descriptions & Results

EL 17/93 Luina, Rock Ledger

			ROCK SAMPLING LEDGER								LAB; Analabs						
CLIENT: MPI Pty. Ltd.			E.L. / PROSPECT: EL 17/93 Luina				DATE: Jan - Mar 1998										
Sampled by: G. B. Weber							ELEMENT / DETECTION LIMIT (ppm unless stated)										
Sample No.	AMG. E.	AMG. N.	DESCRIPTION	Au (10 ppb)	Cu (2)	Pb (3)	Zn (2)	Ag (1)	As (1)	Fe% (10)	Mn(3)	Sn(3)	W(10)	Sb(0.5)	Bi(1)	Ni(3)	Co (2)
MMA 1	371650	5411400	Mod yell-bn. sandy limonitic gossan. ?in situ Could be a weath. & alt. basic schist.	5	39	67	615	0.5	3375	10.07	0.43%	8	5	183	0.5		
MMA 2	370780	5411500	Lunch Creek approx. 190 m. up from junction. Seds 315°/60-70°/225°, sample 5m. wide pyritic chert, with carbonate veins, dk. gy.-bl.	5	89	5	106	0.5	29	5.62	0.28%	6	5	0.5	0.5		
MMA 3	370765	5411555	Found about 5 m. W of Creek, dk. gy. altered mod. yell. br gossanous mafic volcanic.	5	15	5	227	0.5	34	8.34	1608	3	5	0.25	0.5		
MMA 4	370780	5411620	About 300 m. upstream Lunch Creek, V. dk. red bn. ?gossan within a chert/mafic schist/qtzite sequence.	5	9	15	141	0.5	33	5.87	1775	26	5	0.5	0.5		
MMA 5	371200	5411720	Mathew Creek at 600 m. mark. lt. gy. sl. silic. rock on outside with fairly fresh dk. gn. pyroclastic rock with quartz-gossan in fract's & vuggs.	5	23	3	112	0.5	4	11.94	1711	6	5	0.25	0.5		
MMA 6	371035	5411485	From magnetic traverse, 5180N. quartz with large gossanous vuggs and mod.-dk. gn. gy. ?diorite containing blebs of aspy. or py.	580	728	17	56	1	12	6.95	509	5	5	0.9	1		
MMA 7	371035	5411485	Magnetic Traverse 5180N, same location as above. Large quartz zone in ?diorite. Sample qtz. gossan rich sample.	100	683	1.5	56	1	8	6.37	831	7	5	1.7	0.5		
MMA 8	371020	5411395	Sample collected from very large quartz boulder in Mathew Creek. where 5000N magnetic line crosses. Sample lt cream gy. vuggy quartzite with bn. vuggs ?carbonate, some secondary silicification but no generations of qtz. veining seen.	40	476	1.5	73	0.5	12	6.72	961	10	5	0.25	0.5		
MMA 9	371030	5411460	Magnetic Traverse 5160N. Very similar to MMA 6 & 7, NVSulphs. but very gossanous mod-dk. bn. ?gossan with wh. qtz. with goss. vuggs with V. dk. blue-gy. ?dyke (diorite)	10	920	61	217	1	45	5.76	488	6	5	4.2	0.5		

EL 17/93 Luina, Rock Ledger

ROCK SAMPLING LEDGER																	
CLIENT: MPI Pty. Ltd.			E.L. / PROSPECT: EL 17/93 Luina						DATE: Jan - Mar 1998					LAB; Analabs			
Sampled by: G. B. Weber			ELEMENT / DETECTION LIMIT (ppm unless stated)														
Sample No.	AMG. E.	AMG. N.	DESCRIPTION	Au (10 ppb)	Cu (2)	Pb (3)	Zn (2)	Ag (1)	As (1)	Fe% (10)	Mn(3)	Sn(3)	W(10)	Sb(0.5)	Bi(1)	Ni(3)	Co (2)
MMA 10	371250	5411460	5 m. W of MMA 9 V. large o/c of qtz.-gossan with gn.-gy. intrusive rock. Qtz. unit only 1-2 m. wide some fresh ?cp.	5	1660	5	76	3	2	5.67	635	6	5	0.25	0.5		
MMA 11	370285	5411030	Magnet Mine North Track, beside Corner Creek. V. dk. gy. v. silic. & v. lt. gy qtz. unit with boxworks after ?carb. rock collected from bottom side of track.	5	95	1.5	64	0.5	4	3.05	587	7	5	0.25	0.5		
MMA 12	370290	5411190	Bottom Adit where Corner Creek cuts the track. V. dk. bn.-red bn. & black, MnOx gossan from adit dump.	5	114	0.55%	4.53%	192	117	28.22	14.8	15	5	11	0.5		
MMA 13	370310	5411330	Top Adit on same track. 5 m. below mullock heap. Lt. gn. gy. fuchsite quartz, sulphide lode, gn, sp, py.	5	30	6900	2545	17	96	2.11	1236	6	5	4.9	0.5		
MMA 14	371100	5411525	W side of Mathews Creek approximately 50 m. N of bold outcrop of mafic diorite. Sample of quartz - chalcopyrite gossan with ?diorite.	410	0.77%	31	114	14	2	5.41	584	1.5	5	0.25	0.5	202	40
MMA 15	370560	5411065	From rock wall of Magnet Tramway 70 m. N of road. ?Ankerite ore containing fuchsite, ?chrysocolla, galena, sphalerite, calcite, pyrrhotite ?nickle.	30	88	0.27%	1.73%	22	694	15.11	7.78%	63	5	33.9	2	194	56
MMA 16	369880	5410775	Crystalline limestone found at drill pad but not mapped contains Rugose coral frags black with white secondary carbonate veins. low S, ?sl. cherty.	10	22	40	99	0.5	8	2.42	603	4	5	0.25	0.5	22	39
MMA 17	370040	5410820	Dk. gy. ?pyroclastic ?ignambritic unit contains epidote. On hill W of mine, sl. chalcopyrite & pyrite min.	10	189	18	138	2	7	4.25	1007	1.5	5	0.25	0.5	81	33
MMA 18	370390	5411070	Corner Creek LH Branch - 50 m. above junction Mafic ?volcanic with quartz veins & MnOx and weak S.	10	77	11	137	0.5	4	2.60	795	4	5	0.25	1	65	21
MMA 19	370330	5411075	50-75 m. above last sample. V. similar rock.	10	104	8	109	0.5	6	2.30	725	4	5	0.25	4	80	21

EL 17/93 Luina, Rock Ledger

ROCK SAMPLING LEDGER																	
CLIENT: MPI Pty. Ltd.			E.L. / PROSPECT: EL 17/93 Luina						DATE: Jan - Mar 1998					LAB; Analabs			
Sampled by: G. B. Weber			ELEMENT / DETECTION LIMIT (ppm unless stated)														
Sample No.	AMG. E.	AMG. N.	DESCRIPTION	Au (10 ppb)	Cu (2)	Pb (3)	Zn (2)	Ag (1)	As (1)	Fe% (10)	Mn(3)	Sn(3)	W(10)	Sb(0.5)	Bi(1)	Ni(3)	Co (2)
MMA 20	370380	5411090	Float from ridge between R & L H B of Corner Creek Mod. yell. bn. prob. altered volcanic containing 30-40% black & white quartz veins to 2 cm. wide. (photo)	5	70	14	172	0.5	6	2.98	838	1.5	5	0.25	2	78	24
MMA 21	370400	5411115	R H Branch of Corner Creek Mod. dk. gy. coarse grained epiclastic or perhaps the central portion of a volcanic flow. with vuggs after ?pyrite and gossan/ironstone.	5	136	13	137	0.5	4	2.31	756	6	5	0.25	3	44	18
MMA 22	370380	5411140	R H Branch of Corner Creek 20-30 metres higher. Similar rock, but quartz veined, vuggy with green staining after pyrite.	5	105	15	400	1	6	3.98	1136	3	5	0.25	0.5	68	34
MMA 23	370255	5411280	Adit Sampling from adits off track NNW of Magnet Mine Fine grained, mod. gn. gy. dyke rock with ?ankerite fract. fill. NVS but black MnOx on fract. From S wall	5	18	18	120	0.5	2	3.04	707	1.5	5	1	0.5	229	41
MMA 24	370255	5411280	Same adit Mod. - dk. gn. gy. v. coarse grained ?gabbro>serpentinised dk. gy. pug frags show slickensiding, lt. cream ?silicate. sample taken from dump at end of drive NVS.	5	5	26	140	0.5	1	5.99	1337	1.5	5	0.25	2	112	49
MMA 25	370255	5411280	Same adit, sample from lode on first curved drive to west which ended in orbicular Websterite. Sample mod. orange - dk. bn. fest/gossan rock. near end.	5	81	13	650	1	3	5.25	1427	3	5	0.25	4	121	41
MMA 26	370255	5411280	Same Adit sample from main drive at start of first drive Bl - bn. FeOx & MnOx gossan and crust. rock (ox. lode).	5	50	0.68%	3.76%	52	4	31.61	14.00%	4	5	10.0	6.0	86	66
MMA 27	370280	5411330	Top Adit Gn. gy. highly fract. silic. lode ?chl. or fuchsite min. galena, sphalerite, & py.	10	100	2.83%	0.64%	292	8	2.42	1932	3	5	27.9	2.0	109	30

EL 17/93 Luina, Rock Ledger

ROCK SAMPLING LEDGER																	
CLIENT: MPI Pty. Ltd.			E.L. / PROSPECT: EL 17/93 Luina						DATE: Jan - Mar 1998				LAB: Analabs				
Sampled by: G. B. Weber			ELEMENT / DETECTION LIMIT (ppm unless stated)														
Sample No.	AMG. E.	AMG. N.	DESCRIPTION	Au (10 ppb)	Cu (2)	Pb (3)	Zn (2)	Ag (1)	As (1)	Fe% (10)	Mn(3)	Sn(3)	W(10)	Sb(0.5)	Bi(1)	Ni(3)	Co (2)
MMA 28	370310	5411330	Top Adit off dump. Lt. yell. gy. altered ?ankeritic,/dolomitic rock. Bl. MnOx, & veinlets og galena often gossanous. Occ. some very dk. gn. f.g. ?dyke rock.	40	220	4.23%	7.63%	197	2	15.97	8.72%	12	5	132.6	0.5	41	38
MMA 29	370240	5410935	Lower Adit North Magnet Co. V. large 3*2 metres Sample from lode exposed at end of drive approx 50 m. then it collapsed just after lode zone. Ankerite/dolomite lode rock sl. gn. colouration in part dk. gy. ?S zones could be described as a breccia.	10	9	622	722	38	5	2.96	1.39%	1.5	5	16.1	0.5	62	33
MMA 30	370240	5410935	Same location Massive ankerite/dolomite banded bl. chlorite and ?sulphides.	10	8	319	0.31%	8	4	3.19	1.26%	1.5	5	8.5	0.5	77	34
MMA 31	369880	5410510	Magnet Mine No. 2 South Adit. Sample from fallen in rise at 1170 feet (357 metres) mod. gy. lithic sandstone sl. sheared NVS.	5	27	123	268	1	1	5.74	1379	12	5	1	2	50	32
MMA 100	369120	5409680	Large quarry 1.5 km. from Corrina Road on Magnet Track. Chip sample 8-10 m. across W. wall. haematitic red & gy. shales with siliceous chert bands.	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR	SNR
MMA 101	370055	5410720	Magnet Mine Gossan Zone - on track into mine area. Chip sample over 3-4 m. of exposed gossan outcrop.	5	44	0.43%	1.75%	67	709	27.89	13.70%	37	5	17	0.5		
MMA 102	370055	5410720	Magnet Mine Gossan Zone - on track into mine area. Chip sample over 3-4 m. of exposed gossan outcrop.	50	177	3.60%	2.25%	425	3736	33.17	7.84%	128	5	301	0.5		
MMA 103	370055	5410720	Magnet Mine Gossan Zone - on track into mine area. Chip sample over 3-4 m. of exposed gossan outcrop.	5	38	0.66%	1.70%	93	2381	43.84	11.40%	35	5	13	0.5		
MMA 104	370075	5410750	Magnet Mine Gossan Zone - on track into mine area. Chip sample over 3-4 m. of exposed gossan outcrop. This sample near the mines Dept. sign.	5	210	4.81%	2.96%	324	0.52%	31.30	12.60%	90	5	288	0.5		

EL 17/93 Luina, Rock Ledger

ROCK SAMPLING LEDGER																	
CLIENT: MPI Pty. Ltd.			E.L. / PROSPECT: EL 17/93 Luina				DATE: Jan - Mar 1998					LAB: Analabs					
Sampled by: G. B. Weber			ELEMENT / DETECTION LIMIT (ppm unless stated)														
Sample No.	AMG. E.	AMG. N.	DESCRIPTION	Au (10 ppb)	Cu (2)	Pb (3)	Zn (2)	Ag (1)	As (1)	Fe% (10)	Mn(3)	Sn(3)	W(10)	Sb(0.5)	Bi(1)	Ni(3)	Co (2)
MMA 105	370120	5410780	Magnet Mine Gossan - northern end. Continuous chip sample over 10-12 m. of altered carbonate - fuchsite mafic rock with minor visible sulphides. Sampling starts where gossan finishes.	5	15	1309	0.69%	9	579	12.16	6.18%	16	14	12	0.5		
MMA 106	370120	5410780	Magnet Mine Gossan - northern end. Continuous chip sample over 10-12 m. of altered carbonate - fuchsite mafic rock with minor visible sulphides. Sampling starts where gossan finishes.	5	32	0.41%	0.67%	45	247	6.75	1.08%	3	5	19	0.5		
MMA 107	370165	5410805	First small stream N of Gossan exposed gossan zone. Boulders of altered sulphide bearing mafic rock as above.	5	0.50%	32	62	0.5	7	2.69	390	1.5	5	0.7	0.5		
MMA 108	370165	5410805	First small stream N of Gossan exposed gossan zone. Boulders of altered sulphide bearing mafic rock as above.	5	0.28%	43	68	0.5	28	2.96	504	3	5	0.25	0.5		

210050

APPENDIX 2

Soil Sampling Descriptions & Results

EL 17/93 Luina, Soil Ledger

CLIENT: MPI Pty. Ltd.						SOIL SAMPLING LEDGER						DATE: Jan 1998					
Sampled by: G. B. Weber						E.L. / PROSPECT: EL 17/93 Luina						ELEMENT / DETECTION LIMIT (ppm unless stated)					
Sample No.	Northing	Depth	Mag. Susc	Slope	Dir.	DESCRIPTION	Au (10 ppb)	Cu (2)	Pb (5)	Zn (2)	Ag (1)	As (1)	Fe (0.1%)	Mn (10)	Sn (1)	W (10)	
			* 10 ⁻⁴ SI units	° magn.)													
S19	4640N	30 cm.	0	-15°	250°	Mod. gy. bn. clayey soil, rock frags prob. amphibolite	5	9	12	16	0.5	14	1.60	64	8	5	
S18	4660N	30 cm.	150	-15°	250°	Mod. yell. bn. ? wood frags, rock frags bl. basalt, unusual hollows ?old workings	5	16	19	26	0.5	5	4.28	67	8	5	
S17	4680N	30 cm.	1300	-10°	270°	Mod. gn. gy. feldspathic ?SS.	5	47	34	155	1	9	10.95	509	10	5	
S16	4700N	25 cm.	1700	-5°	285°	V. dk. bn. frags of ?gabbro or basic schist. No float occ. rock chips.	5	38	24	207	0.5	8	11.06	1950	12	5	
S15	4720N	30 cm.	1700	-5°	345°	Almost flat, V. dk. bn. soil ? gabbro or basic schist.	5	82	17	134	1	0.5	12.93	3200	11	5	
S14	4740N	25 cm.	1700	-15°	340°	V. dk. bn. soil float dk. gn. gy. mafic. volc	5	45	16	144	0.5	61	11.50	849	12	5	
S13	4760N	20 cm.	1700	-15°	15°	Mod.-dk. bn. soil, frags of slst. or volc.	5	37	34	200	1	4	13.59	3300	10	5	
S12	4780N	35 cm.	640	-15°	345°	Dk. bn. soil cont. mafic volc. chips. Float basic volc. or basic schist.	5	55	9	158	1	5	11.83	1937	9	5	
S11	4800N	40 cm.	1800	-10°	350°	Mod. bn. soil with some rock frags, some roots in sample, float mafic schist/volc.	5	54	15	119	1	8	12.71	1012	9	5	
S10	4820N	30 cm.	800	-10°	30°	Dk. red bn. soil occ. frags of bn. basic schist (?mafic volc.)	5	48	62	370	0.5	10	12.60	876	9	5	
S9	4840N	25 cm.	500	-10°	40°	5 m. short of peg. Dk. red bn. soil cont. basic schist (?mafic volc.) frags.	5	54	12	139	1	7	13.59	973	11	5	
S8	4860 N	40 cm.	3100	-20°	40°	Chocolate bn. soil, frags v. dk. red, one dl bn. weath. mafic schists	5	50	14	104	1	2	13.37	392	10	5	
S7	4880N	30 cm.	460	-25°	40°	V. rocky, mod. bn. soils, frags ?alt. sericite schist, lt. yell. gy.	5	69	27	261	1	14	11.39	492	15	5	

EL 17/93 Luina, Soil Ledger

SOIL SAMPLING LEDGER																
CLIENT: MPI Pty. Ltd.						E.L. / PROSPECT: EL 17/93 Luina						DATE: Jan 1998				
Sampled by: G. B. Weber						ELEMENT / DETECTION LIMIT (ppm unless stated)										
Sample No.	Northing	Depth	Mag. Susc	Slope	Dir.	DESCRIPTION	Au (10 ppb)	Cu (2)	Pb (5)	Zn (2)	Ag (1)	As (1)	Fe (0.1%)	Mn (10)	Sn (1)	W (10)
S6	4900N	30 cm.	800	-25°	20°	Mod. red bn. soil frags of basic schist some Mn. stained.	5	59	18	183	1	13	12.71	528	13	5
S5	4920N	25 cm.	460	-27°	10°	Mod. bn. soils frags weath, basic sch.	5	61	20	270	1	82	11.72	713	7	5
S4	4940N	20 cm.	415	-20°	350°	Mod.-dk. bn. soils & rock frags mod. gy. gn. slst.	5	174	26	264	1	47	12.82	994	10	5
S3	4960N	30 cm.	880	-30°	0°	Mod. red bn. soils & rock frags, slsts.	5	77	219	1100	3	51	12.82	1959	34	5
S2	4980N	50 cm.	65	-5°	160°	Essentially flat, 5 m. from Magnet Creek, north bank, prob. contaminated. Mod-dk. bn. soil & clay,	5	68	1030	4988	16	385	10.00	8200	41	13
S1	5000N	20 cm.	1100	-5°	160°	Sample taken from 5 m. N of peg as peg on old roadway, prob. contaminated. Mod. yell. bn. soils & clay.	5	65	221	1409	5	35	9.16	4900	9	5
S20	5020N	35 cm.	80	-5°	160°	Just under trees, Mod. bn. soils, occ. rock frags of basic volc.	5	66	69	445	1	19	11.39	2800	12	5
S21	5040N	30 cm.	83	-22°	205°	Mod. bn. to mod.-dk. bn. soil, rock frags felds. rich mafic schists.	5	71	86	386	1	26	9.94	405	13	5
S22	5060N	30 cm.	290	-17°	215°	Mod.-dk. yell. bn. soils.	5	70	30	210	0.5	8	11.72	653	12	5
S23	5080N	25cm.	200	-22°	330°	Top of small hill, mod.-dk. bn. soils	5	44	12	128	0.5	4	10.84	995	9	5
S24	5100N	25 cm.	150	-5°	335°	8 m. before Ck. (MMA 8) Dk. bn. soils cont. frags of v. dk. gy. ?basalt.	5	38	23	93	0.5	9	9.12	614	12	5
S25	5120N	35 cm.	30	-25°	210°	Mod. bn. soils cont. basic sch. frags. mod. coarse grained MnOx. & ?actinolite Xsts.	5	97	17	71	0.5	8	7.30	1189	9	5

EL 17/93 Luina, Soil Ledger

SOIL SAMPLING LEDGER																
CLIENT: MPI Pty. Ltd.						E.L. / PROSPECT: EL 17/93 Luina						DATE: Jan 1998				
Sampled by: G. B. Weber						ELEMENT / DETECTION LIMIT (ppm unless stated)										
Sample No.	Northing	Depth	Mag. Susc	Slope	Dir.	DESCRIPTION	Au (10 ppb)	Cu (2)	Pb (5)	Zn (2)	Ag (1)	As (1)	Fe (0.1%)	Mn (10)	Sn (1)	W (10)
S26	5140N	15 cm.	100	-25°	200°	Could not auger, dug through tree roots. V. steep, mod. bn. soils, float qtz-gossan basic schist.	5	78	4	36	0.5	10	7.29	644	6	5
S27	5160N	20 cm.	25	-30°	180°	At qtz-gossan schist outcrop. Rock sample MMA 6,7,9,&10. Mod. bn. qtz. goss. frags.	5	177	6	40	0.5	35	7.91	1192	8	5
S28	5180N	15 cm.	35	-30°	190°	Sample dug by hand into the bank. Dk. br v. carbon rich (roots). o/c Weath. mod. yell. bn. med.-coarse mafic schist.	5	56	1.50	21	0.5	1	5.85	91	7	5
S29	5200N	30 cm.	20	-25°	210°	Mod. yell. bn. rock frags med.-coarse grained mafic schist.	5	68	1.50	16	0.5	10	5.81	58	9	5
S30	5220N	30 cm.	10	-10°	200°	Dk. bn. soil, frags same as last sample.	5	24	6.00	35	0.5	5	5.05	192	8	5
S31	5240N	30 cm.	55	-10°	240°	V. dk. bn. then lt. gy. & pink ?sandy frags. ?amphibolite.	5	21	1.50	21	0.5	3	2.74	132	5	5
S32	5260N	25 cm.	10	-20°	240°	V. dk. bn. soil > mod. dk. yell. bn. frags v. dk. red weath. ?amphibolite	5	7	6	14	0.5	1.5	3.24	44	4	5
S33	5280N	20 cm.	10	-20°	280°	V. dk. bn. soil > mod. bn soil no o/c, frags coarse basic schist.	5	25	7	43	0.5	1.5	5.62	423	5	5
S34	5300N	30 cm.	75	-20°	280°	Chocolate soil mod bn. frags of coarse grained basic schist.	5	38	9	70	1	2	6.80	339	4	5

APPENDIX 3

North Magnet Magnetic Anomaly

Diamond Drill Hole Log NMM-1

DIAMOND DRILL HOLE LEDGER					Hole No: NMM 1																			
Local Grid 5000E, 5017N.		Inclination: -55°			DRILLERS: Aimec Drilling Pty.Ltd.					START DATE: 16/3/98														
Azimuth: 173° mag.		AMG: 3710205411315			E.L./PROSPECT: EL 18/93 Luina, Tasmania					DRILL RIG: LM 70		LAB: Analabs			FINISH DATE: 30/3/98									
Logged by: Graeme B. Weber					ELEMENT/DETECTION LIMIT (ppm unless stated)																			
From	To	Rec.	Mag.Susc(m)	Value	DESCRIPTION	Sample No	From	To (m)	Au(10 ppb)	Cu (2)	Pb (3)	Zn(2)	Ag(1)	As(1)	Fe%	Mn (3)	Sn (3)	W (10)	Sb (0.5)	Bi(1)	Ni(3)	Co(2)		
0.00	7.30				Surficial Fill Material																			
0.00	7.30	2.50			Geological: Broken & rounded mod. bn. & mod. gy. unOx. & Ox. sl. chl. volcs. & metaseds. 30 cm. of gravel and sand @ 5.70-6.00 ?old soil surface. occ. gossan frags. Fe rich laterite gravel sand prob. old soil surface from 7.10-7.30 m.																			
7.30	10.60				Weathered Metasediments																			
7.30	10.60	2.95			Geological: Khaki metasediments, only occ. unOx. last 30 cm. much less weathered more competent. Structural: Very broken ground, poor cor recovery, MnOx st. of fract.																			
10.60	12.60				Mudstones & Sandstones																			
10.60	12.60	2.00	10.6-11.0	0.60	Geological: Lt. gn. gy. f.g SS containing lithic frags (ie) sandy slst frags. they may have a volcanic component. Siltstones lt. gn. gy. simil. to SS in colour also dker gy. & red bn. ?haematized units. The slst. units have v.f.g. py. assoc. (eg) 11.7 m. At 11.5 m. seams of bl. ?chert cont. sig. py. form marker beds. At 11.7 m. bedding shows intricate small scale disruptions. 12.4 m. thin dk. gy. veinlets of chl. seen as struct. zone approach.																			
			11.0-12.0	0.54																				
			12.0-13.0	0.47																				
					Structural: Bedding shows constant disruptions small scale faults. 10-15 mm. Very low int. L. 3° @ 10.8 m. 9° @ 11.7 m. Facings: up @ 11.7 m. At 11.2 m. fine qtz. veins, displacing core-breccia dev. Beds have a bouma seq. look.																			
12.60	12.80				Fault Zone																			
12.60	12.80	0.20			Strong X-cutting fault zone. bedding dragged into fault. Intersection angle for fault about 60° compared with low bedding angle. Contacts have lam. qtz. & chl. with a central silic breccia.																			
12.80	16.35		13.0-14.0	0.86	Lithic Sandstone																			
12.80	16.35	3.55	14.0-15.0	0.79	Geological: Mod. gy. (sl. gn.) mod. grained lithic sandstone. sandy frags made up of slsts., cherts, mst. & ?volc. grains																			
			15.0-16.0	0.76	Structural: Core quite fract. both X cutting and parallel to core axis. qtz. infill fract @ 14.7 & 15.8 m. here it maybe a low angle breccia																			

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Azimuth: 173° mag.		AMG: 9710205411315			E.L./PROSPECT: EL 19/93 Luina, Tasmania				DRILL RIG: LM 70			LAB: Analabs			FINISH DATE: 30/3/98										
Logged by: Graeme B. Weber					ELEMENT/DETECTION LIMIT (ppm unless stated)																				
From	To	Rec.	Mag. Susc(m)	Value	DESCRIPTION	Sample No	From	To (m)	Au(10 ppb)	Cu (2)	Pb (3)	Zn(2)	Ag(1)	As(1)	Fe%	Mn (3)	Sn (3)	W (10)	Sb (0.5)	Bi(1)	Ni(3)	Co(2)			
					fault zone. Unit massive no bedding or foliation just occ. v. thin qtz. carb. veining.																				
16.35	26.80		16.0-17.0	0.64	Structural Zone																				
16.35	19.50	3.15	17.0-18.0	0.56	Geological:																				
19.50	25.50	5.80	18.0-19.0	1.11	Fairly massive lithic SS unit, but deeper becomes more																				
Core loss 25.3-25.5 m.			19.0-20.0	0.71	fine grained mudstones.																				
25.50	26.80	1.30	20.0-21.0	0.82	21.8-22.1 f.g. dk. gy. chert																				
			21.0-22.0	0.51	Structural:																				
			22.0-23.0	0.78	Similar to first zone, but more structural dislocation of bedding.																				
			23.0-24.0	0.72	Numerous thin qtz. chl. breccia shears and faults.																				
			24.0-25.0	0.44	Major fault zone @ 16.45 to 16.80, py. squirts @ 16.55 m.																				
			25.0-26.0	0.54	18.5 - 18.7 core very fractured with qtz. chl breccia veins & yell. clay/carb. on fracts one speck of cp. noted here. The finer grained units more sheared (eg) 19.6-20.9 m. fault. In lithic SS units fine chl. filled fracts giving brecc. appearance. 21.8-22.1 f.g. dk. gy. chert generally int. L's very low but very ghosted like pervasive silic. has occurred. Here chert contacts are 40° which indicated this is a large clast of chert in lithic unit Qtz. chl. breccia veinlets approx. 1 mm. occ. though core 21.2 - 22 m. almost at rt. L's to core axis Zone 23.95 - 25.6 m. zones of qtz. & yell. clay/carb. infill of fracts. Major fault ?sec. silic. zone @ 25.5 - 25.6 m. Mineralisation: Thin zone of py. to 20% 22.8 - 23.0 m.																				
26.80	28.10		26.0-27.0	0.58	Fault Zone																				
26.80	28.10	1.20	27.0-28.0	0.71-0.15	Geological:	1001	26.0	28.0		149	228	428		8	10.20	1169							73		
					Mixture of haematitic chert, mudstone, & lithic SS.																				
					Structural:																				
					Major structural dislocation zone, tension gash veining, cont. occ. cp. & py. (v. low grade). Faults infilled with qtz. & dk. gn. & bl. chl. open pore filling laminated, occ. blebs py. occ. pink qtz. ?haem.																				
					Photo (Plate 2) of core showing fault zone, and underlying haematitic mudstone/chert sequence																				
28.10	38.40				Metasediments & ?cherts.																				
28.10	31.10	3.00	28.0-29.0	23.50	Geological:																				
31.10	34.00	2.80	29.0-30.0	20.50	A mixed unit of lithic SS, and haematitic silic. mudstones/cherts																				
34.00	37.30	3.20	30.0-31.0	10.2-27.2	At the start dk red bn. units have faint white specks like clasts.	1002	28.0	30.0		72	6	114		1	9.13	791							67.		
loss in fault @ 37.1 m.			31.0-32.0	12.3-30.2	These units have 'ghost' like bedding. This ?bedding is however	1003	30.0	32.0		80	8	109		0.5	9.44	863							66		
37.30	40.30	2.90	32.0-33.0	25.1-38.1	when traced is cut off by other ?clasts indicating the zone is a	1004	32.0	34.0		116	10	139		0.5	9.89	900							76		
40.30	42.40	2.10	33.0-34.0	12.50	large breccia	1005	34.0	36.0		50	11	122		2	9.01	1049							79		

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Logged by: Graeme B. Weber										ELEMENT/DETECTION LIMIT (ppm unless stated)																			
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42.40	43.60	1.40	34.0-35.0	12.20	From 31.1 m. lt. - mod. bl. - gy. thin units of mudstones with lithic frags.	1006	36.0	38.0		105	15	105		2	8.27	834					79								
43.60	46.50	2.90	35.0-36.0	4.0-20.9		1007	38.0	40.0		55	11	119		2	8.89	791					80								
46.50	49.80	3.30	36.0-37.0	7.10	The mod. gy. essentially lithic SS units are either unaltered or product of alteration.	1008	40.0	42.0		60	1.5	111		2	9.48	1081					78								
49.80	52.50	2.70	37.0-38.0	13.4-22.6		1009	42.0	44.0		63	1.5	101		3	8.67	1164					72								
52.50	58.50	5.90	38.0-39.0	24.50	'Brain Rock' @ 36.6 m. bl. & lt. bn. v. finely banded (<0.5 mm) wavy chert sequence observed as gy. zones in Plate 3, 2nd bottom row. They are only small zones and occur elsewhere also.	1010	44.0	46.0		41	6	75		2	9.20	687					74								
58.50	64.50	6.00	39.0-40.0	16.70		1011	46.0	48.0		50	1.5	94		4	8.96	993					75								
64.50	70.50	6.00	40.0-41.0	19.2-27.1		1012	48.0	50.0		61	3	96		2	8.54	849					74								
70.50	76.50	6.00	41.0-42.0	25.90	From 61.6 m. some lt. gn. gy. & bl. cherts	1013	50.0	52.0		61	3	97		5	9.14	1208					78								
76.50	79.50	3.00	42.0-43.0	2.90	Lithic SS @ 65 m.	1014	52.0	54.0		54	8	101		3	9.13	813					81								
79.50	85.50	6.00	43.0-44.0	2.5-26.9	At 77 m. & 86 m. zones of red bn. cherts which appear to contain large clasts of lithic haem. SS. of fist size.	1015	54.0	56.0		57	9	97		3	9.02	920					85								
			44.0-45.0	6.3-68.3		1016	56.0	58.0		87	5	94		3	7.69	812					82								
			45.0-46.0	20.10	'Brain Rock' 85.5 m. just looks like a semi consolidated blob in ch.	1017	58.0	60.0		77	4	104		3	8.15	940					81								
			46.0-47.0	20.4-28.0	Structural:	1018	60.0	62.0		96	3	96		3	8.27	853					86								
			47.0-48.0	10.2-25.0	Core relatively fractured in part. (refer Plate 3)	1019	62.0	64.0		129	6	82		3	6.79	933					79								
			48.0-49.0	24.80	Int. L's 25° @ 29.7 m. : 40° @ 31.1 m. (?suspect)	1020	64.0	66.0		92	1.5	112		1	9.59	1014					87								
			49.0-50.0	10.0-22.4	At 30 m. lamin. qtz. chl. vein 15 cm. wide 80° int. L. contains some pink haematized qtz.	1021	66.0	68.0		81	1.5	98		1	9.33	1280					87								
			50.0-51.0	19.2-33.2		1022	68.0	70.0		123	1.5	101		1	9.49	952					84								
			51.0-52.0	9.9-22.9	From 33.9-34.4 mod. gy. lithic SS. containing qtz. fault zone.	1023	70.0	72.0		72	1.5	102		0.5	9.83	1202					90								
			52.0-53.0	12.90	Major fract zone @ 37.1 m. 10 cm. wide, (Plate 3)	1024	72.0	74.0		98	1.5	103		1	8.51	1198					86								
			53.0-54.0	15.90	Major alt. zone 42.5 - 43.6 m.	1025	74.0	76.0		80	3	99		2	8.87	1132					87								
			54.0-55.0	13.8-21.2	Core around 50 m. very fract & contains thin <1 mm wispy qtz. - carb. veins ?some magnetite, very minor py. & chpy. 1-5% qtz.	1026	76.0	78.0		85	1.5	101		9	9.48	985					90								
			55.0-56.0	16.5-25.9		1027	78.0	80.0		97	1.5	98		4	9.86	908					85								
			56.0-57.0	9.15-19.2	Int. L's, 24° @ 36.8 m., 10° @ 46.7 m., 16° @ 49.1 m.	1028	80.0	82.0		65	1.5	104		3	9.77	932					87								
			57.0-58.0	8.60	From 51 m. very fine tension gash qtz. infill close to bedding	1029	82.0	84.0		80	1.5	120		5	9.67	988					90								
			58.0-59.0	8.90	looks as though some beds preferentially fractured.																								
			59.0-60.0	14.3-23.6	At 55.9 m. intense qtz. - carb. tension vein subparallel to bedding																								
			60.0-61.0	16.40	Fractured 66-67.2 m. with some py. developed.																								
			61.0-62.0	4.70	From 68 m. joints & fract. chpy. & chl. slickensided. occ. py. to 71 m.																								
			62.0-63.0	0.2-21.2	70 m. on core has fine (thin) veining (<1 mm.) with dk. gy. selvage																								
			63.0-64.0	4.70	both // to bedding and cross cutting. with minor chpy. chl. & ?Sn.																								
			64.0-65.0	2.3-22.2	76.6 - 77.8 m. core more fract. thin qtz. veins to 6 mm. at top fract.																								
			65.0-66.0	0.8-22.4	at rt. L's to core axis at bottom 45° plunge west. core v. disrupted.																								
			66.0-67.0	1.90	Bedding ghosting after this but seen between beds of lithic SS																								
			67.0-68.0	0.05-10.3	and chert/sls. one of which maybe clasts within the other.																								
			68.0-69.0	15.70	Int. L's: 30° @ 53.5 m. : 25° @ 57.8 m. : 18° @ 61.6 m.																								
			69.0-70.0	3.80	10° @ 76.2 m. : 7° @ 80.5 m. : 10° @ 84.6 m. : 15° @ 85.2 m.																								
			70.0-71.0	1.42-17.4	83.2 m. units show flow charac. of frags of chert/mudst. in cherts																								
			71.0-72.0	6.10	Last 2m. bedding cannot be dist. appears to be a jumble of frags.																								
			72.0-73.0	4.50	Mineralisation/Alteration:																								
			73.0-74.0	6.1-15.5	From 28.4 m. zones become quite magnetic, esp. haematized																								
			74.0-75.0	3.20	units. prob. f.g. magnetite.																								
			75.0-76.0	8.3-21.4	49.7 - 49.9 m. two small 0.5 cm. qtz. veins with non mag. bl. Xstals																								
			76.0-77.0	10.5-19.0	At 53.9 m. thin qtz. vein with magn. & chpy. low grade.																								
			77.0-78.0	6.10	At 59.9 thin zones of lt. - mod. gy. zones which appear to																								

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			78.0-79.0	3.66-26.5	be altered ?reduced haematite units which are accomp. by py. & chl.																		
			79.0-80.0	1.10	63.0 m. thin zone of intense shearing with py. & ?Sn min.																		
			80.0-81.0	1.11-20.5	From 64 m. core much more silic. bn. cherts. still magnetic.																		
			81.0-82.0	17.50	At 75.5 m. core contains up to 10% f.g. py. over 1.5 m.																		
			82.0-83.0	18.50	Towards the bottom of this unit there maybe some Sn. min.																		
			83.0-84.0	15.60	Lam. qtz. vein 1 cm. @ 83.8 m. ?Sn in vein @ 84.9 m.																		
			84.0-85.0	30.50	Chpy. rich qtz. vein 1 cm. wide @ 86.9 m.																		
			85.0-86.0	9.50																			
88.40	102.20				Alteration/Fracture Zone ?mega breccia zone																		
88.50	91.50	6.00	88.0-89.0	0.39	Geological:	1030	88.0	90.0	46	1.5	120	5	9.04	1551									90
91.50	97.40	5.90	89.0-90.0	0.50	Sheared gy. cherts & mod. gy. lithic SS ?red bn. silic. mudstones	1031	90.0	92.0	130	1.5	139	5	9.91	1412									93
97.40	103.50	6.10	90.0-91.0	14.00	Fine chl. infill of thin fract. over 0.5 m. often min. throughout unit.	1032	92.0	94.0	61	1.5	123	3	9.82	1357									90
			91.0-92.0	15.00	Structural:	1033	94.0	96.0	43	1.5	116	7	9.63	1188									97
			92.0-93.0	24.80	At 88.5 m. oriented core, laminated vein 30 cm below has	1034	96.0	98.0	51	1.5	107	9	10.40	1188									88
			93.0-94.0	9.50	115°/85°/25°. Not all vein sets have this orientation.	1035	98.0	100.0	69	9	117	3	9.71	1186									83
			94.0-95.0	23.80	Unit very fractured, with bl. chl. infill, many qtz. veins.	1036	100.0	102.0	59	1.5	98	4	8.69	964									81
			95.0-96.0	19.40	Close examination shows clasts of different metasediments																		
			96.0-97.0	24.00	form a jumble therefore a mega breccia zone.																		
			97.0-98.0	25.00	Vein set at 101.5 m. generally int L. low approx. 15° but veins																		
			98.0-99.0	18.80	close to r/L's to bedding giving																		
			99.0-100.0	15.50	int. L's: 10° @ 96.5 m. but could be suspect.																		
			100.0-101.0	21.50	Mineralisation/Alteration:																		
			101.0-102.0	29.10	Core appears altered, some py. & chpy. specks & ankerite/siderite																		
					93.1-94.35 m. several intense fract. s. infill with qtz. ?chl. ?Sn v.																		
					occ. py.																		
					101.2 - 1.2.2 three lam. qtz. veins up to 20 mm. wide occ. vuggy																		
					with bl. min. interval finely fract. with qtz. & bl. chl. infill some py.																		
					& chpy., last vein has pink ?qtz.																		
102.20	142.50				Metasediments & ?cherts,																		
103.50	109.50	6.00	102.0-103.0	15.00	Geological:	1037	102.0	104.0	73	1.5	95	2	9.23	933									82
109.50	115.50	6.00	103.0-104.0	17.60	Unit comprised of lithic SS, mudstones and cherts, which have	1038	104.0	106.0	83	1.5	96	5	9.06	916									83
115.50	121.50	6.00	104.0-105.0	28.80	been variably silicified and haematitised.	1039	106.0	108.0	67	1.5	87	5	7.98	846									85
121.50	127.20	5.70	105.0-106.0	20.60	Thin 1 cm wide lam. qtz. veins at 156m. ?chl. or Sn. pink qtz.	1040	118.0	120.0	73	1.5	95	6	9.50	1083									83
127.20	133.40	6.20	106.0-107.0	11.50	Haematitised mudstone clast @ 108.5-110m. ?not bedded.	1041	120.0	122.0	69	1.5	86	4	9.24	912									86
133.40	139.50	6.10	107.0-108.0	25.80	122.4-123 lithic SS with thin qtz. veins to 8 mm. bl. chl. or Sn.	1042	122.0	124.0	63	1.5	97	5	8.69	885									80
139.50	145.50	6.00	108.0-109.0	15.50	From 130.2 m. massive lithic SS.	1043	124.0	126.0	57	1.5	111	6	9.68	981									86
			109.0-110.0	0.48	After 138 m. more mudstone/chert units.	1044	126.0	128.0	37	1.5	95	1	9.46	707									80
			110.0-111.0	25.80	Structural:	1045	128.0	130.0	73	1.5	103	3	10.30	997									85
			111.0-112.0	24.70	V. few bedding planes observed due to ?pervasive silicification or	1046	130.0	132.0	61	1.5	119	1	10.20	884									85
			112.0-113.0	11.10	unit also being large fragments of a megabreccia.																		
			113.0-114.0	35.10	Fairly massive unit.	1047	135.0	137.0	45	1.5	121	1	9.74	1107									86
			114.0-115.0	32.20	When bedding observed it appears to dip steeply at 80° @ 170°	1048	137.0	139.0	48	1.5	100	2	8.80	892									80
			115.0-116.0	28.30	therefore 80°/80°/170° but orient. still diff. to determine.	1049	139.0	141.0	40	1.5	101	2	7.92	835									82

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			116.0-117.0	7.30	At 105.5-107 m. v. fine fractures in core	1050	141.0	143.0			66	1.5	115		2	8.56	1245						81
			117.0-118.0	27.30	Sl. more fract. with wispy qtz. veinlets 114.2 - 115.3 m.																		
			118.0-119.0	29.20	Different frags appear to be faulted or rotated one to another.																		
			119.0-120.0	15.40	Bedding noted appears to lie close to a constant plane (ie)																		
			120.0-121.0	32.50	steeply south.																		
			121.0-122.0	6.70	Int. L's: 5° @ 112.4 m. 10° @ 112.9 m. 10° @ 117.5 m.																		
			122.0-123.0	28.00	27° @ 125.2 m. 15° @ 129.7 m. 45° @ 130.2 m																		
			123.0-124.0	6.70	The high variability of int. L's indicates a megabreccia unit.																		
			124.0-125.0	32.80	Increasing thin veins from 118.7 m. veins up to 2 cm. wide.																		
			125.0-126.0	31.50	contain small angular clasts in qtz. occ. S.																		
			126.0-127.0	27.60	Mudstone/chert units more finely fract. infill bl. chl.																		
			127.0-128.0	6.20	Fract zone 128.5-130 m. qtz. chl. chpy. veins up to 2 cm. wide.																		
			128.0-129.0	31.40	Qtz. vein @ 128.7 m. well dev. chpy. as blebs & fract. fill over 10 cm.																		
			129.0-130.0	28.80	At 136.85 m. fault/fract. core qtz. zone breccia & py.																		
			130.0-131.0	31.90	On fract. surfaces bl. silic. Xstals ?chl. @ 140.3 & 140.7 m.																		
			131.0-132.0	26.50	Mineralization/Alteration:																		
			132.0-133.0	16.60	Unit occ. fractured with occ. weak py. & chpy +/- ?Sn.																		
			133.0-134.0	27.20	Essentially at start haematized but less so with depth, but still mag																		
			134.0-135.0	14.50	Break with qtz. @ 120.85 m. with chl. or Sn.																		
			135.0-136.0	25.60	At 139.8 several small zones of py. occur.																		
			136.0-137.0	28.60																			
			137.0-138.0	21.50	Plate 4. 100.5-105.2 m. Showing competent core containing																		
			138.0-139.0	22.30	thin quartz veins at good int. L's.																		
			139.0-140.0	9.80																			
			140.0-141.0	36.40	Plate 5: Shows fault zone @ 136.85 m. with competent lithic SS																		
			141.0-142.0	36.20	at top to haematized silic. mudstone which contains zones of pyrite blebs, see second last line of core outlined in white																		
142.50	162.20		142.0-143.0	7.60	Structural/Alteration Zone	1051	143.0	145.0			86	1.5	106		3	9.71	1027						74
145.50	151.50	5.60	143.0-144.0	31.80	Geological:	1052	145.0	147.0			84	1.5	124		2	10.00	1120						75
151.50	157.50	6.00	144.0-145.0	19.80	Essentially similar to above but more fract., faulted & veined.	1053	147.0	149.0			95	1.5	123		3	9.33	1270						64
157.50	163.50	6.00	145.0-146.0	16.90	Lithic SS becomes coarse grained (coarse sand - grit size)	1054	149.0	151.0			82	1.5	169		3	9.69	1575						71
			146.0-147.0	17.80	from 162.2 m.>	1055	151.0	153.0			95	1.5	133		4	8.85	1337						61
			147.0-148.0	8.90	Structural:	1056	153.0	155.0			78	1.5	167		2	10.10	1503						69
			148.0-149.0	0.67	V. difficult to obtain int. L's due to ?secondary silicification.	1057	155.0	157.0			58	5	207		4	9.98	1640						71
			149.0-150.0	12.90	Commences as sl. more fract. than last unit containing thin qtz. veins	1058	157.0	159.0			86	3	178		2	10.40	1477						73
			150.0-151.0	20.10	Often the veins are v. thin atomising cont. qtz. carb. ?chl. +/- py.	1059	159.0	161.0			79	5	231		1	9.94	1269						77
			151.0-152.0	13.40	& occ. chpy.	1060	161.0	163.0			73	4	183		0.5	11.00	1118						77
			152.0-153.0	0.70	144.5-145.2 gy. lithic SS with qtz. veins to 2 cm. infilled qtz.																		
			153.0-154.0	0.55	chl. ?carb. and minor py. also contains floating red bn chert frags.																		
			154.0-155.0	0.66	146.0-146.4 core v. fract. > rubble here frags of bn chert swim in																		
			155.0-156.0	0.40	lithic SS unit.																		
			156.0-157.0	37.90	In general thin qtz. veins cut core axis at 70-90° and indicate with																		
			157.0-158.0	38.40	suspect orient. that structures are near vertical or dip sl. N.																		

Luina EL 17/93 Diamond Drill Hole NMM 1

DIAMOND DRILL HOLE LEDGER					Hole No: NMM 1																	
Local Grid 5000E, 5017N.			Inclination: -55°		DRILLERS: Almac Drilling Pty. Ltd.					START DATE: 16/3/98												
Azimuth: 173° mag.			AMG: 3710205411315		E.L./PROSPECT: EL 19/93 Luina, Tasmania					DRILL RIG: LM 70			LAB: Analabs			FINISH DATE: 30/3/98						
Logged by: Graeme B. Weber					ELEMENT/DETECTION LIMIT (ppm unless stated)																	
From	To	Rec.	Mag. Susc(m)	Value	DESCRIPTION	Sample No	From	To (m)	Au(10 ppb)	Cu (2)	Pb (3)	Zn(2)	Ag(1)	As(1)	Fe%	Mn (3)	Sn (3)	W (10)Sb (0.5)	Bi(1)	Ni(3)	Co(2)	
			158.0-159.0	34.70	Fract. more intense from 149.8 m. core contains extensive																	
			159.0-160.0	40.00	bl. ?chl. infill of microfractures in core.																	
			160.0-161.0	48.00	At 154.7 - 156.1 m. intense brecciation, angular mod./gy. bn. &																	
			161.0-162.0	52.00	mod. bn. cherts swimming in v. dk. bl.-purple ?chl. groundmass																	
			162.0-163.0	50.00	Thin fault @ 163.7 m. fault pug each side of 15 cm. qtz. breccia																	
					zone int/ L 80°. After this fault core much less fractured,																	
					Mineralisation/Alteration:																	
					Around 149 m. several small zones of fine grained py. occ. ?primary																	
					148.2 - 148.5 core quite gn. chl. & fract.																	
					Occ. py. & ?Sn. min. from 151.0-152.45.																	
					Dk. red bl. infill of fract @ 153.4 ?sphalerite																	
					Occ. round zones of py specks to 10% py over small int. from 164 m.																	
					 Plate 6: 149.95 - 153.5 m. Showing constant qtz. carbonate																	
					veining with fine atomising veinlets through core. Dk. gy.																	
					sections are due to ?chl. fract. fill.																	
					 Plate 7: 154.5 - 159 m. showing the most intense qtz. chl. breccia																	
					development.																	
					 Plate 8: Close up of intense brecciation.																	
					Metasediments & ?Certs																	
					Geological:																	
162.20	199.50				Generally consists of gy. bn. non haematized coarse lithic SS beds	1061	163.0	165.0	72	1.5	210		1	11.20	1426						72	
163.50	169.50	6.00	163.0-164.0	50.00	up to grit size, with interbedded mod. red bn. ?siltic	1062	165.0	167.0	65	1.5	184		1	9.97	1297						69	
169.50	175.30	5.80	164.0-165.0	48.00	mudstones or cherts	1063	167.0	169.0	73	4	174		3	10.80	1217						74	
175.30	181.50	6.20	165.0-166.0	30.00	Generally this unit has the highest Magn. Susc. readings up to 70.	1064	169.0	171.0	55	1.5	177		2	9.90	1029						71	
181.50	187.50	6.00	166.0-167.0	38.00	From 171.8 m. large lithic SS unit some fract. @ 173.1 m.	1065	171.0	173.0	62	9	187		2	9.71	117						67	
187.50	193.50	6.00	167.0-168.0	48.00	188.75 - 188.9 m. thin zone of relict haematized ?chert with 5% py	1066	173.0	175.0	70	4	184		1	10.00	1471						72	
193.50	199.50	6.00	168.0-169.0	45.00	in one vein with bl ?mag./chl. ?Sn. ?F.	1067	175.0	177.0	65	4	164		3	9.90	1732						71	
			169.0-170.0	50.00		1068	177.0	179.0	48	1.5	126		2	10.50	868						67	
			170.0-171.0	50.00																		
			171.0-172.0	30.00																		
			172.0-173.0	38.00	Structural:	1069	187.0	189.0	51	1.5	97		3	10.30	865						62	
			173.0-174.0	32.00	Unit much less fractured, but occ. zones (eg) 164 - 166 m.	1070	189.0	191.0	55	1.5	99		2	10.20	994						67	
			174.0-175.0	28.00	Less qtz. carb. veining.	1071	191.0	193.0	55	1.5	102		3	10.00	1170						65	
			175.0-176.0	0.5-46.0	First good orientation completed on bedding @ 160.5 m.; Int. L.	1072	193.0	195.0	66	1.5	111		2	9.13	1075						70	
			176.0-177.0	44.00	@ 161.9 m. 15° gives 80°/68°/170°.	1073	195.0	197.0	65	1.5	103		1	10.50	978						68	
			177.0-178.0	14.00	At 166.6 vein at right L's to core axis therefor 80°/40°/350°	1074	197.0	199.5	72	1.5	102		2	10.50	1180						74	
			178.0-179.0	46.00	This indicates a variety of fracture/shear directions.																	
			179.0-180.0	31.10	From 165.7-166.1 m. (Plate 9) shows selective micro fracturing																	
			180.0-181.0	43.60	in one particular bed																	
			181.0-182.0	44.00	Orient. @ 190.5 m. vein with chl. breccia & carb is 80°/65°/170°																	
			182.0-183.0	36.00	therefor parallel to bedding																	

Luina EL 17/93 Diamond Drill Hole NMM 1

DIAMOND DRILL HOLE LEDGER					Hole No: NMM 1																		
Local Grid 5000E, 5017N.			Inclination: -55°		DRILLERS: Almac Drilling Pty. Ltd.					START DATE: 16/3/98													
Azimuth: 173° mag.			AMG: 3710205411315		E.L./PROSPECT: EL 19/93 Luina, Tasmania					DRILL RIG: LM 70					LAB: Analabs			FINISH DATE: 30/3/98					
Logged by: Graeme B. Weber					ELEMENT/DETECTION LIMIT (ppm unless stated)																		
From	To	Rec.	Mag.Susc(m)	Value	DESCRIPTION	Sample No	From	To (m)	Au(10 ppb)	Cu (2)	Pb (3)	Zn(2)	Ag(1)	As(1)	Fe%	Mn (3)	Sn (3)	W (10)	Sb (0.5)	Bi(1)	Ni(3)	Co(2)	
			183.0-184.0	47.00	Bedding in this unit is again very hard to observe 'ghosting' probably due to secondary silicification. Veins at 191.9 - 193.0 m. all appear to strike N-S and dip west. at various angles. This is the same as a strong vein @ 164.8 m. which was orientated 360°/60°/270° which is quite unusual. Mineralisation ?Alteration: 173.1 - 175.4 a series of laminated qtz. veins with bl min. ?Sn. also v. thin tension gash veins infilled with a little silica. & bl. Xstals non - magnetic. One 10 cm. bleb of small py. blebs @ 183.8 m. Drill hole terminated at 199.5 m. after having intersected the magnetic target zone. Plate 9: Top core tray upside down! Bottom tray shows typical lithic SS core, in 163.5 - 167.7 m. interval. Note selective tension gash veining in thin unit in middle of bottom tray where thin atomising veinlets are confined to one small ?bed.																		
			184.0-185.0	24.00																			
			185.0-186.0	31.00																			
			186.0-187.0	27.00																			
			187.0-188.0	70.00																			
			188.0-189.0	32.00																			
			189.0-190.0	35.00																			
			190.0-191.0	38.00																			
			191.0-192.0	36.00																			
			192.0-193.0	48.00																			
			193.0-194.0	43.00																			
			194.0-195.0	43.00																			
			195.0-196.0	37.00																			
			196.0-197.0	48.00																			
			197.0-198.0	43.00																			
			198.0-199.0	44.00																			
			199.0-199.5	47.00																			
Bore Hole Surveys																							
					Depth																		
						Direction (mag.)																	
						Dip																	
						0.0 m.	173°																
						31 m.	172°																
						62 m.	171°																
						91 m.	171°																
						121 m.	170.5°																
						163.5 m.	171°																

210062

APPENDIX 4
Thin Section Descriptions

MINTEK SERVICES

PETROGRAPHIC DESCRIPTION

Report No. 39907
 Sample No. MMA 50 - 89.6m MPI
 Thin Section

STEREOSCOPIIC CHARACTERISTICS

Field Name: Mod - dk red bn haematitic silicified mudstone or chert.
 Nature of Sample: Small ferruginous core sample from hole MMA 50, 89.6m
 Minerals Visible: Very fine grained quartz, clay group minerals and/or sericite, and opaques.
 Texture: Crudely banded and laminated. Relic clastic.
 Colour: Dark reddish brown.
 Grain Size: Very fine grained.
 Other Comments: This crudely banded and laminated ferruginous rock appears under a binocular microscope at X100 magnification to be a ferruginous mudstone. It could have been moderately metasomatically altered by the introduction of cryptocrystalline quartz with a cherty fabric.

MICROSCOPIC CHARACTERISTICS

Constituents: (Percent visual estimate)

- 40% Clay group minerals of indeterminate composition, possibly mainly composed of goethite and/or hematite masked kaolinite and/or montmorillonite, occur as very fine interlocking matted aggregates with a banded and laminated fabric that are seen to enclose subordinate, very fine relic quartz clasts. No evidence of grading can be seen. Sericite and biotite are absent.
- 30% Quartz occurs abundantly as very fine anhedral and clusters locked in the clay mineral assemblage that closely resemble relic quartz clasts by their angular to subrounded shapes. Secondary quartz represented by either the cherty or chalcedonic variety are not exposed.
- 30% Opaques occur abundantly as very fine granular aggregates that appear to be composed of goethite and/or hematite. These secondary Fe oxide minerals stained and masked the clay mineral assemblage. Relic sulphide textures are absent.

Texture: Crudely banded, laminated and relic clastic.
 Metasomatic Alteration: None exposed.

Petrogenesis: Crudely banded and laminated, fine grained, ferruginous siltstone or shale.

Remarks: The relic clastic textures as manifest by banding and the presence of very fine quartz clasts, suggest that the protolith was a banded and laminated, ferruginous mudstone or shale. Secondary quartz is absent as chert or chalcedony.

ROCK NAME: CRUDELY BANDED AND LAMINATED, FINE GRAINED,
FERRUGINOUS SILTSTONE OR SHALE

MINTEK SERVICES

PETROGRAPHIC DESCRIPTION

Report No. 39908
 Sample No. MMA 51 - 121.4m MPI
 Thin Section

STEREOSCOPIC CHARACTERISTICS

Field Name: Mod dk red bn silicified mudstone.
 Nature of Sample: Small ferruginous core sample from hole MMA 51, 121.4m
 Minerals Visible: Fine clay group minerals, quartz, ?carbonate, ?sericite and opaques.
 Texture: Crudely banded and possibly relic clastic.
 Colour: Dark brown and reddish brown.
 Grain Size: Very fine grained and occasionally fine grained.
 Other Comments: *This crudely banded ferruginous rock appears under a binocular microscope at X100 magnification to be a fine grained, pelitic or arenopelitic sediment containing relic quartz clasts and possibly minor carbonate and sericite (white mica).*

MICROSCOPIC CHARACTERISTICS

Constituents: (Percent visual estimate)

- 34% Clay group mineral, or minerals, probably mainly composed of kaolinite, or kaolinite and montmorillonite (a smectite), occur as very fine grained, goethite and/or hematite stained and masked aggregates that exhibit crude banding, and as banded aggregates that contain relic quartz clasts and lithoclasts, and rare carbonate. The two darker coloured, ferruginous pelitic bands only contain very fine, rare quartz clasts. No evidence of hydrothermal alteration can be seen in either sedimentary lithologies, including silicification.
- 32% Quartz occurs as sparse, very fine grained relic clasts in the more ferruginous, pelitic bands and fairly abundantly as very fine and fine grained, poorly sorted, matrix supported, angular to subrounded relic clasts in the less ferruginous arenaceous pelite bands that also contain rare carbonate and sericite. The fine lithoclasts present are also of pelitic origin. Quartz pyroclasts are absent. Chert clasts are rare.
- 34% Opaques occur abundantly as very fine grained, granular aggregates that appear to be predominantly composed of goethite and/or hematite aggregates. The clast rich bands contain less ferruginous matter as hematite and/or goethite.

Texture: Crudely banded and relic clastic.
 Metasomatic Alteration: None exposed.

Petrogenesis: Crudely banded, ferruginous pelite and lithoclastic, ferruginous arenopelite.

-2-

Sample No. MMA 51 - 121.4m MPI
Thin Section

Remarks: The crudely banded, lithoclastic, ferruginous arenopelite bands contain relic quartz clasts and pelitic lithoclasts set in a less ferruginous pelitic matrix. No evidence of mineralization can be seen.

ROCK NAME: CRUDELY BANDED, FERRUGINOUS PELITE
AND LITHOCLASTIC, FERRUGINOUS ARENOPELITE

MINTEK SERVICES

PETROGRAPHIC DESCRIPTION

Report No. 39909
 Sample No. MMA 52 - 130.7m MPI
 Thin Section

STEREOSCOPIIC CHARACTERISTICS

Field Name: Dk red gy cherty rock with dk steel gy ?haematite bands through it.
 Nature of Sample: Small ferruginous core sample from hole MMA 52, 130.7m
 Minerals Visible: Very fine grained quartz, clay group mineral, or minerals, and abundant opaques.
 Texture: Finely matted, granular and mosaic textured.
 Colour: Dark reddish brown, brown and grey.
 Grain Size: Very fine grained.
 Other Comments: This ferruginous rock appears under a binocular microscope at X100 magnification to be predominantly composed of very fine grained, interlocking clay group minerals and quartz aggregates that have been stained and masked by copious goethite and/or hematite. Fine specular hematite bands could also be present. These can only be positively identified in reflected light.

MICROSCOPIC CHARACTERISTICS

Constituents: (Percent visual estimate)

- 36% Clay group minerals, probably predominantly composed of kaolinite and the smectite group clay mineral, montmorillonite, occur as very fine interlocking goethite and/or hematite stained and masked matted aggregates that in the more ferruginous pelite phase contain few relic, interstitial quartz clasts and more abundant relic quartz clasts in the less ferruginous pelitic phase present. The two distinct pelitic phases present contain no evidence of metasomatic alteration, including replacement by cherty or chalcedonic quartz. Lithoclasts, sericite (white mica), chlorite, biotite and carbonate are not exposed in interstitial or intergranular sites.
- 30% Quartz occurs as mentioned above as sparse relic clasts in the more ferruginous pelite and more abundantly in the less ferruginous pelitic phase present as distinctive clasts locked in the pelitic matrix material. Secondary quartz as represented by the cryptocrystalline cherty or chalcedonic variety is not present in either pelitic lithologies represented.
- 34% Opaques occur abundantly as very fine grained matted aggregates composed of goethite and/or hematite that masked the matrix clay mineral phases present, and as what appear to be discrete grains and clusters of specular hematite. Positive identification can, however, only be made in reflected light with the aid of a polished section.

Texture: Finely matted and relic clastic.

210068

-2-

Sample No. MMA 52 - 130.7m MPI
Thin Section

Metasomatic Alteration: None exposed.

Petrogenesis: Ferruginous, fine grained, pelitic sediment and arenopelitic sediment containing specularite mineralization.

Remarks: The specular hematite occurs as very fine, discrete, anhedral to euhedral grains and crystalline clusters locked in the matrix clay minerals. Dusty hematite and goethite are abundant and mask the clay minerals.

ROCK NAME: FERRUGINOUS, FINE GRAINED, PELITIC SEDIMENT
AND ARENOPELITIC SEDIMENT
CONTAINING SPECULARITE MINERALIZATION

MINTEK SERVICES

PETROGRAPHIC DESCRIPTION

Report No. 39910
 Sample No. MMA 53 - 144.1m MPI
 Thin Section

STEREOSCOPIIC CHARACTERISTICS

Field Name: Two distinct units red bn chert & gy ?chert with quartz sulphide veins parallel to bedding.
 Nature of Sample: Mineralized core sample from hole MMA 53, 144.1m
 Minerals Visible: Fine quartz; clay minerals, carbonate, ?chlorite, ?biotite and opaques.
 Texture: Probably relic clastic, matted and granular.
 Colour: Brown and dark brown with minor white.
 Grain Size: *Very fine and fine grained.*
 Other Comments: This rock appears under a binocular microscope at X100 magnification to be a weakly mineralized and carbonate veined, ferruginous lithoclastic sediment containing quartz clasts and little or no cryptocrystalline cherty or chalcedonic quartz. The sulphide opaque phases present will not be described here.

MICROSCOPIC CHARACTERISTICS

Constituents: (Percent visual estimate)

- 30% Clay group minerals, presumably mainly composed of kaolinite and the smectite group mineral, montmorillonite, occur as very fine goethite and/or hematite masked, matted aggregates in the matrix, and as fine angular and subangular lithoclasts composed of clay minerals and chert that show little staining and masking by Fe-oxide minerals. The quartz clasts and lithoclasts are clast supported. None of the lithoclasts present exhibit relic igneous textures, including pyroclastic textures. Evidence of weak microfracturing can be seen in places.
- 20% Calcite occurs as several fine, parallel disposed fracture fillings and as grains and clusters locked in the matrix. It could be of late CO₂ metasomatic origin.
- 20% Chlorite, as ferrochlorite, occurs in the ferruginous matrix as fine patchy aggregates that exhibit no relic textures.
- 30% Opaques occur as very fine granular aggregates that appear to be predominantly composed of goethite and/or hematite. The sulphide minerals cannot be identified in transmitted light. Pyrite could be dominant.

Texture: Relic clastic, matted and granular.
 Metasomatic Alteration: Possibly weak CO₂ metasomatism.

Petrogenesis: Weakly carbonate veined and mineralized, fine grained, ferruginous, poly-mictic lithoclastic sediment.

210070

-2-

Sample No. MMA 53 - 144.1m MPI
Thin Section

Remarks: The relic clastic textures suggest that the precursor was a ferruginous, polymictic lithoclastic sediment. Chalcedonic and cherty quartz replacement did not occur

ROCK NAME: WEAKLY CARBONATE VEINED AND MINERALIZED,
FINE GRAINED, FERRUGINOUS,
POLYMIC TIC LITHOCLASTIC SEDIMENT

210071

MINTEK SERVICES

PETROGRAPHIC DESCRIPTION

Report No. 39911
Sample No. MMA 54 - 148.5m MPI
Thin Section

STEREOSCOPIC CHARACTERISTICS

Field Name: Mod dk gy silicified metasediment with considerable fine pyrite.
Nature of Sample: Small core sample from hole MMA 54, 148.5m
Minerals Visible: Fine quartz, clay group mineral, or minerals, ?chlorite, ?carbonate and opaques.
Texture: Crudely banded and possibly relic clastic.
Colour: Dark brown and reddish brown.
Grain Size: Very fine and fine grained.
Other Comments: This crudely banded rock appears under a binocular microscope at X100 magnification to be a fine grained, carbonaceous pelitic sediment or metasediment. Rare quartz clasts could be present in places. The opaque mineral phases present cannot be positively identified in transmitted light. A reflected light study would be required.

MICROSCOPIC CHARACTERISTICS

Constituents: (Percent visual estimate)

- 70% Clay group minerals of indeterminate composition occur as very fine grained, carbonaceous matter dusted and masked matted aggregates that could be predominantly composed of kaolinite and montmorillonite. Rare quartz clasts are occasionally enclosed by the pelitic matrix material. A fine calcite filled microfracture traverses this carbonaceous pelite. No evidence of shearing or recrystallization, silicification, sericitization or chloritization can be seen in interstitial or intergranular sites.
- 2% Calcite occurs as a fine irregular microfracture filling. It could be of late CO₂ metasomatic origin.
- 28% Opaques occur as very fine granular aggregates that appear to be predominantly composed of carbonaceous matter and probably minor dusty pyrite as euhedral grains and clusters.

Texture: Crudely banded and relic clastic.
Metasomatic Alteration: Weak carbonatization.

Petrogenesis: Weakly microfractured, carbonatized and pyritized, crudely banded, carbonaceous pelite.

Remarks: The relic clastic textures suggest that the protolith was a crudely banded, carbonaceous pelite. Relic quartz clasts are rare.

ROCK NAME: WEAKLY MICROFRACTURED, CARBONATIZED AND PYRITIZED, CRUDELY BANDED, CARBONACEOUS PELITE

MINTEK SERVICES

PETROGRAPHIC DESCRIPTION

Report No. 39912
 Sample No. MMA 55 - 155.1m MPI
 Thin Section

STEREOSCOPIC CHARACTERISTICS

Field Name: Mod gn gy ?silicified metasediment. Very strongly fractured with chlorite or sphalerite infill minor dolomite or siderite veining.
 Nature of Sample: Small core sample from hole MMA 55, 155.1m
 Minerals Visible: Fine quartz, clay group minerals, chlorite, sericite and opaques.
 Texture: Probably relic clastic and brecciated.
 Colour: Grey, dark grey and greenish grey.
 Grain Size: Very fine and fine grained.
 Other Comments: This rock appears under a binocular microscope to be a silicified and chloritized, carbonaceous pelite or black shale in which all relic clastic textures have been destroyed. It was brecciated.

MICROSCOPIC CHARACTERISTICS

Constituents: (Percent visual estimate)

72% Quartz and chlorite, possibly of metasomatic origin, occur in about equal abundance as fine interlocking cryptocrystalline mosaic textured aggregates that have been dusted by carbonaceous matter. Diagnostic relic clastic textures are absent from interstitial and intergranular sites. Carbonate is rare.

28% Opaques occur as very fine granular aggregates composed of carbonaceous matter and as scattered, discrete, anhedral to euhedral grains that can only be positively identified in reflected light.

Texture: Probably relic clastic and brecciated.
 Metasomatic Alteration: Silicification and chloritization.

Petrogenesis: Strongly brecciated, silicified and chloritized, fine grained, carbonaceous pelite.

Remarks: No evidence of metamorphic recrystallization can be seen. The protolith could have been a carbonaceous pelite or black shale with rare quartz and feldspar clasts. It could grade into an arenaceous pelite (sandy shale) or pelitic arenite.

ROCK NAME: STRONGLY BRECCIATED, SILICIFIED AND CHLORITIZED,
FINE GRAINED, CARBONACEOUS PELITE

210073

MINTEK SERVICES

PETROGRAPHIC DESCRIPTION

Report No. 39913
Sample No. MMA 56 - 163m MPI
Thin Section

STEREOSCOPIC CHARACTERISTICS

Field Name: Lithic haematized, fine grained sandstone, strongly magnetic, ?silicified.
Nature of Sample: Small core sample from hole MMA 56, 163m
Minerals Visible: Fine quartz, feldspar, chlorite, sericite and opaques.
Texture: Relic clastic and granular.
Colour: Dark grey and grey.
Grain Size: Very fine and fine grained.
Other Comments: This rock appears under a binocular microscope to be a fine grained lithic arenite dusted by opaques that contains abundant quartz clasts and lithoclasts. The opaque phases present cannot be identified in transmitted light. The lithoclasts could be polymictic. Abundant magnetite could be present.

MICROSCOPIC CHARACTERISTICS

Constituents: (Percent visual estimate)

70% Quartz occurs as very fine and fine grained, loosely packed, matrix supported, relic angular to subrounded clasts and as lithoclasts of sedimentary and igneous origin set in a matrix composed of opaques dusted and masked cherty quartz.

30% Opaques occur abundantly as very fine granular aggregates that could be predominantly composed of carbonaceous matter and hematite and as discrete, interstitial and intergranular, anhedral to euhedral grains and clusters that could be predominantly composed of magnetite.

Texture: Relic clastic and granular.
Metasomatic Alteration: ?Silicification.

Petrogenesis: Hematite and carbonaceous matter dusted, fine grained lithic arenite containing abundant fine particulate magnetite.

Remarks: The relic clastic textures suggest that the protolith was a lithic arenite or sandstone.

ROCK NAME: HEMATITE AND CARBONACEOUS MATTER DUSTED,
FINE GRAINED, LITHIC ARENITE

210071

MINTEK SERVICES

PETROGRAPHIC DESCRIPTION

Report No. 39914
Sample No. MMA 57 - 165.6m MPI
Thin Section

STEREOSCOPIIC CHARACTERISTICS

Field Name: Mod dk gy quite fractured silicified metasediment.
Nature of Sample: Small core sample from hole MMA 57, 165.6m
Minerals Visible: Fine quartz, feldspar, chlorite, ?carbonate and opaques.
Texture: Relic clastic and granular.
Colour: Grey and dark grey.
Grain Size: Very fine and fine grained.
Other Comments: This strongly fractured rock appears under a binocular microscope to be lithologically similar to the preceding sample and hence probably a fine grained lithic arenite or sandstone. Quartz and carbonate filled parallel disposed fractures. A tuffaceous component could be present.

MICROSCOPIC CHARACTERISTICS

Constituents: (Percent visual estimate)

72% Quartz occurs as very fine and fine grained, poorly sorted, loosely packed, matrix supported, angular to subrounded relic clasts and lithoclasts of volcanic (igneous) and sedimentary origin set in a matrix composed of opaques dusted and masked cryptocrystalline quartz and rare chlorite. Quartz and calcite filled irregular, parallel disposed fractures. Feldspar clasts are rare.

28% Opaques occur as very fine granular aggregates that could be mainly composed of carbonaceous matter and hematite and as scattered, discrete grains and clusters that can only be positively identified in reflected light.

Texture: Relic clastic and granular.
Metasomatic Alteration: Possibly silicification.

Petrogenesis: Strongly fractured, silicified, fine grained, carbonaceous, lithoclastic arenite (sandstone).

Remarks: The relic quartz and rare feldspar clasts and polymictic lithoclasts suggest that the protolith was a lithoclastic, arenaceous sediment.

ROCK NAME: STRONGLY FRACTURED, SILICIFIED, FINE GRAINED, CARBONACEOUS, LITHOCLASTIC ARENITE (SANDSTONE)

APPENDIX 5

Anglo American Report - Magnet Mine Area

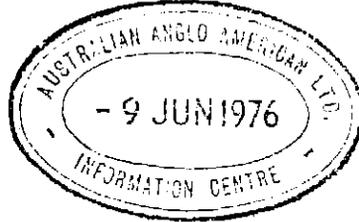
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210076



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6614



COMSTAFF PROPRIETARY LIMITED

INTERIM REPORT ON THE MAGNET MINE AREA

EXPLORATION LICENCE 5/63, PART 1

Magnet, Burnie Sheet SK 55-3
Origin of Grid 373100m E, 5411900m N

LEAD, SILVER AND ZINC

16

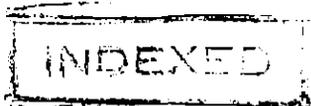
16

2

2

C.S. RUGLESS

30th May 1976



210077

MAGNET MINE LOOKING NORTH

MAGNET MINE LOOKING WEST

Approximate boundaries of main rock units are outlined (gw/mt - greywacke/mudstone, alt um - altered ultramafic host rock), as well as mineralised vein convergent zones or Pipes 1, 2 and 3.

LIST OF PLANS

1. Regional Geology
2. Magnet Mine Area - Fact Geology
3. Magnet Mine Area - Geological Interpretation
4. Stereographic Projection of Joint Measurements
5. Level Plan of Pipes 1, 2 and 3
6. Magnet Grid - Fact Geology
7. Magnet Grid - Geological Interpretation
8. Magnet Grid - Magnetics
9. Magnet Grid - Copper Content of Soils
10. Magnet Grid - Lead Content of Soils
11. Magnet Grid - Zinc Content of Soils
12. Magnet Grid - Molybdenum Content of Soils
13. Magnet Grid - Mercury Content of Soils
14. Magnet Grid - Tin Content of Soils
15. Magnet Grid - Barium Content of Soils
16. Magnet Grid - Factor Scores for Soils

CONTENTS

1. SUMMARY	Page 1
2. INTRODUCTION	Page 2
3. WORK DONE	Page 3
4. REGIONAL GEOLOGY	Page 3
5. MAGNET MINE	Page 4
5.1. Geology	Page 4
5.2. Gossan Geochemistry	Page 5
5.3. Production History	Page 6
5.4. Previous Exploration	Page 7
6. MAGNET GRID	Page 8
6.1. Geology	Page 8
6.2. Magnetism	Page 10
6.3. Geochemistry	Page 10
6.3.1. Tin	
6.3.2. Copper	
6.3.3. Lead-Zinc	
6.3.4. Barium	
6.3.5. Nickel	
6.3.6. Molybdenum	
6.3.7. Mercury	
6.3.8. Summary	
7. DISCUSSION	Page 14
8. CONCLUSIONS	Page 14
9. RECOMMENDATIONS	Page 15
9.1. Magnet Mine	Page 15
9.2. Magnet Grid	Page 15
REFERENCES	
APPENDIX 1 GOSSAN VALUES	
APPENDIX 2 PETROGRAPHIC DESCRIPTIONS	

INTERIM REPORT ON MAGNET MINE AREAMAGNET GRID (BAB)1. SUMMARY

The Magnet Mine, 6.7km south-west of Mt. Bischoff, was a moderate lead-silver producer in the first half of the century (1891 - 1940). Cottle (1953) estimated a total production of 37,993 tonnes of lead and 248,190kg silver from 629,949 tonnes of ore. Although there is no record of zinc production, he estimated the grade to be 5.7% lead, 7.3% zinc and 394 grammes per tonne of silver.

Strong evidence for a granitoid association for the hydrothermal lead-zinc-silver mineralisation at Magnet and smaller lodes to the north, prompted the construction of a reconnaissance grid to cover a prospective area extending 3.8km north-east from the Magnet Mine. Exploration of the grid by geological mapping, ground magnetometer surveying and geochemical soil sampling indicates that the Magnet Lode has a 900m strike length and is open to the south. The Magnet Lode is encompassed by a north-westerly flanking 1800m by 400m arcuate propylitic alteration zone containing pervasive quartz veining with minor chalcopyrite/pyrite mineralisation. The presence of the alteration zone is also outlined by a zone of low magnetic response within normally magnetic basic rocks.

Detailed mapping of the Magnet Mine area has been helped by exposures in a recent road cutting through surface mine workings. The existence of at least three mineralised pipe-like zones has been revealed at the convergence of intersecting hanging wall and footwall shear sets within a locally thickened ultramafic unit, at the base of a basic volcanic pile.

Previous exploration of the mine area by Electrolytic Zinc Co. Ltd. and Cleveland Tin N.L. proved unsuccessful. Their boreholes were not correctly sited to intersect the discrete steep westerly plunging ore pipes. Encouraging zinc grades within the dump and tailings material (* 10% zinc) and the footwall zone of the

newly exposed gossan (\pm 5% zinc) has prompted reappraisal of the old mine workings. Since the mine was worked selectively for high grade lead-silver ore, it is considered that the zinc rich footwall may still be present.

It is proposed to probe the main workings at depth by two boreholes sited to intersect the Magnet Lode at 200m below surface.

The grid may be extended 600m to the south to facilitate exploration of the possible southern strike extension of the mineralised Magnet ultramafic unit. Electrical geophysical methods (S.P., I.P. and Crone E.M.) will be considered as exploration techniques over the grid to test possible strike extensions of the Magnet Lode and associated alteration zone.

2. INTRODUCTION

Mineralisation in the Waratah district appears to be genetically and spacially related to the Devonian period of granite intrusion. The granitoid genetic relationship of the Mt. Bischoff tin deposit and satellite tungsten, zinc and antimony deposits is generally accepted (Solomon and Groves). Lead-zinc-silver deposits south-west of Mt. Bischoff (Plan 1) show a spacial relationship with the Devonian granite trend in North-west Tasmania, which extends from the Heemskirk Granite west of Zeehan, through the Meredith Granite under the Mt. Bischoff quartz porphyry dykes to the Hampshire Hill Granite, south of Burnie.

The probable granitoid relationship of lead-zinc-silver mineralisation at the Magnet Mine and lesser deposits to the north prompted construction of a reconnaissance 3800m by 1400m grid to test the possibility of northerly strike extensions of the Magnet ore horizon and/or other favourable ore settings in the area.

Detailed mapping of the Magnet Mine area was possible due to recent exposures of the old mine workings in the new road constructed by Electrolytic Zinc Co. Ltd. for transporting the Magnet Mine tailings to the Waratah/Luina road. Established controls for mineralisation differ from the model presented by Nye (1923) only in the petrography and regional setting of the host rock, and the intensity and regional importance of the shearing which controls the hydrothermally generated mineralisation.

3. WORK DONE

Most of the Magnet Grid was cut in 1975. It comprises nineteen lines, each 1400m long (3400W to 400E) and 200m apart, along a baseline bearing 238° (magnetic). It extends from the Magnet Mine to the junction of the Magnet Creek with the Arthur River. Extensions to the grid, cut during the 1975/76 summer season, include an additional two 1400m lines (200E and 400E) to the north-east, and southerly extensions of lines 3400W (0 to 360S), 3200W (0 to 260S), 2400W (0 to 300S) and 2200W (0 to 200S).

The A⁰ soil horizon was sampled and a Proton Magnetometer survey, with readings every 20m, completed. Soil samples have been sieved to -80# and analysed for copper, lead, zinc, barium, molybdenum, tin, silver and nickel. Geological mapping at 1:5000 scale has been completed over lines 3400W to 000W inclusive.

Detailed 1:2000 scale mapping of the Magnet Mine area was controlled by a tape and compass survey of all important features including tracks, creeks and tie lines to pits, shafts, adits and rock outcrops.

4. REGIONAL GEOLOGY (See Plan 1)

The Cambrian succession in the Luina-Waratah-Tullah area comprises rock types identifiable with present day petrotectonic assemblages at colliding plate margins, where subduction of an oceanic plate beneath a cratonic plate gives rise to a volcanic island arc assemblage and oceanic trench sediments. The Bald Hill and Huskisson ophiolites are remnants of an oceanic plate which was subducted beneath the Tyennan craton giving rise to the arcuate acid to intermediate volcanics in the Chester/Upper Que River area (Mt. Read Volcanics). Contemporaneously deposited turbidite sediments occur west of these acid volcanic rocks in the Coldstream/Lower Que River area.

The Magnet Grid overlies rocks at the interpreted oceanic plate-trench margin, where ultramafic/mafic extrusive and intrusive rocks, presumably generated at an oceanic rift centre, are sandwiched between conformable turbidite sediments.

A later phase of granite intrusion associated with the Devonian Tabberabberan Orogeny gave rise to the observed hydrothermal tin, tungsten, antimony, silver, lead and zinc mineralisation in the Waratah-Luina area.

5. MAGNET MINE

5.1. Geology (see Plans 2 and 3)

The most significant account of the geology of the Magnet Mine was that of Nye (1923) who considered the Magnet Lode occurred within a "websterite porphyrite" dyke which was intrusive into Dundas Series sediments. He argued the presence of sediments within the dyke were further proof of its intrusive nature. The present study has indicated that the "websterite porphyrite" host to mineralisation at Magnet is in fact a basal ultramafic unit comprising serpentinised ultramafic flows (thin sections TD 403, TD 404 and TD 417) and tuffs (thin section TD 487) which conformably overly greywackes and mudstones of the Dundas Series. The presence of sediment bodies within the unit are indicative of hiatus during ultramafic volcanic activity. The sediments appear to be conformable with the ultramafites and comprise greywacke flanked by foliated black shale.

The host ultramafic unit locally thickens to a width of 50m in the mine area and has been identified along 900m strike length. It is overlain conformably by basic extrusive and intrusive rocks which were classified by Nye as "diabase porphyrite". Petrographic studies have shown that the basic extrusives include spherulitic basalt (variolite, thin section TD 468) and comagmatic(?) intrusives including porphyritic megagabbro (thin section TD 483 and TD 491) and porphyritic microgabbro (thin section TD 496).

Nye felt that the "dyke" intrusion was controlled by major faults and the mineralisation was also controlled by the fault pattern. The presence of large scale faults or lineaments in the area can not be substantiated by the present study. It is felt that the serpentinised ultramafic unit acted incompetently during later phases of tectonism in the area, resulting in the development of a foliation parallel to the country rocks (220°) interpreted by Nye as the Hangingwall Shear.

The Footwall Shear set (170°) recognised by Nye, possibly developed just prior to the mineralising episode, and is best developed within the less competent ultramafic unit.

The two "shear" sets formed the channel ways and loci for influxing hydrothermal solutions which preferentially deposited lead-zinc-manganosiderite mineralisation at their convergent zones. A later period of hydrothermal activity introduced base metal poor ankerite which Nye felt replaced the lead-zinc-manganosiderite ore.

At least three mineralised convergent zones or pipes have been recognised during the present study and have been nominated Pipe 1, Pipe 2 and Pipe 3. Pipes 1 and 2 comprise the Magnet Mine and have been worked to 280m and 160m respectively. Pipe 3 has only been explored on the upper levels.

A stereographic analysis of all mineralised veins found along the Magnet road cutting has indicated three main directions:

- (i) Strike 214° , dip 73° NW (hangingwall shear),
- (ii) Strike 170° , dip 66° W (footwall shear),
- (iii) Strike 168° , dip 75° E (footwall shear).

The last direction is confined to Pipe 2. The reversal of dip of the footwall shear is regarded as a localised phenomenon. The two former trends are regarded as the most important. Their intersection gives rise to a 67° plunge towards 258° for the ore pipes (Plan 4). This is confirmed by the indicated direction of the mine workings (Nye, 1923).

By using the above information and the fact that a thrust may have displaced the ore pipes approximately 50m further west as evidenced in Pipe 3 (Electrolytic Zinc Co. borehole information - Plan 2, cross section A-B), it is possible to construct a level plan of the Magnet ore pipes (Plan 5) which has been used as the basis for drill hole planning.

5.2. Gossan Geochemistry

The recently constructed road cutting has exposed spectacular gossans over each of the three recognised vein convergent zones or pipes. The intervening altered ultramafic unit is also ferruginised in places. Reference to Plan 2 and Table 1 indicates the positions and trace element values of grab and channel samples taken over the gossans.

Pipe 1 exhibits the best developed gossan, and values indicate metal zonation from a zinc rich

footwall (samples TD411 - TD416) to a lead rich hangingwall lode (samples TD418 - TD419).

Gossans over Pipes 2 and 3 are predominantly zinc rich. Borehole information indicates zinc dominance over lead continues into the primary zone. (Cross sections AB, CD, Plan 2).

5.3. Production History

Total production over the working life of the Magnet Mine (1891 - 1940) was estimated by Cottle at about 37,993 tonnes of lead and 248,190kg of silver from 629,949 tonnes of ore.

Nye indicates that during the early years of the mine (1891 - 1900), "considerable quantities of first class ore (29% lead and 45oz/ton silver) and gossan were sent away from the mine", evidently from the levels above the 90m deep zone of oxidation. Second class ore (4% lead and 6oz/ton silver) was treated later when a concentrating plant was erected in 1904.

Twelvetrees mentions "in 1903 the upper four levels were being mined within the oxidised zone. At that time the mine was averaging 8% to 9% lead and 40oz/ton silver and was being worked over 575 feet strike length in the upper levels and 300 feet length in the lowest level. The width averaged 5 feet to 8 feet and was often considerably wider." The mine was barely profitable during the years 1908 to 1923 and "just paid for itself" because of low lead and silver prices and the cost of building expanding plant facilities. Records indicate that only higher grade ores were mined from the middle levels (8 to 12) during this period.

Records from the later periods of mining are sketchy. Very little development work was undertaken and mining was concentrated on the levels developed in the period up to 1922 (down to level 16). Cottle calculated from production figures between 1916 and 1933, that the recovery grade of the mine was 5.7% lead and 394gm per tonne silver. Tailings losses are not known but Cottle estimated the dump material to contain 1.3% lead, 7.3% zinc and 185gm per tonne silver. This is supported by grades within the tailings material (being currently mined by Electrolytic Zinc Co. Ltd.) which average 8% to 10% zinc. Throughout Nye's account of the mine, only passing comment is made about the

presence of sphalerite, although he does mention that "galena and sphalerite are not intimately associated in the ore." Sphalerite ore was regarded as mullock as evidenced by the zinc rich dump and tailings material. Grab samples taken from the deeper level mine stopes are obviously biased towards galena content in their selection but they still contain interesting values, viz:

Grab samples taken by Nye (1923)

<u>Location</u>	<u>Assay</u>		
	Lead	Zinc	Silver
No. 11 stope (1.5m channel sample)	10.10%	4.46%	12.75oz/ton
No. 13 stope (footwall ore)	29.70%	12.88%	45.73oz/ton

5.4. Previous Exploration

Limited exploration of the Magnet Lode has been carried out by Electrolytic Zinc Co. Ltd. and Cleveland Tin N.L. in the early 1950's and 1968 respectively.

Electrolytic Zinc Co. Ltd. failed to intersect economic mineralisation in their two opposed boreholes (Plan 2, cross section A-B). Their holes indicate that a low angle fault or thrust observed at surface has displaced the mineralised zone 50m to the west. By extrapolating the positions of the ore pipes and drill hole intersections at depth (Plan 5) it is evident that Electrolytic Zinc Co. Ltd. have intersected the southern portion of the footwall lode of Pipe 3 in hole WP 83, and have clipped the northern end of Pipe 2 in hole WP 84.

Cleveland Tin N.L. drilled three boreholes which tested two sections south of ore Pipe 3, with little success (Plan 5). Borehole M3 tested the southern ultramafic unit where no ore pipes (convergent zones) have been recognised, and failed to intersect mineralisation. Boreholes M1 and M2 tested the section closer to Pipe 3 (Cross section C-D, Plan 2). M1 intersected only a trace of lead-zinc mineralisation and is interpreted to have been well south of Pipe 3. M2 intersected stronger mineralisation

and is interpreted to have clipped the southern edge of Pipe 3.

Drilling programmes implemented by both companies were designed to explore mineralisation below the strongly gossanous convergent zone of Pipe 3 but failed to compensate for the structural controls on the lode.

6. MAGNET GRID

6.1. Geology (see Plans 6 and 7)

The stratigraphic sequence originally adopted as a regional extension of the stratigraphy at Cleveland Mine to the north-east by Glasson and Cox has been adopted for the present study, with modifications, viz:

<u>Tertiary</u>	<u>Basalts and Gravels</u>
Dundas Series (Cambrian)	a) Crescent Spur Formation (Top) (felspathic greywackes and inter-bedded mudstones)
	b) Hall's Formation (grey, fawn and red cherts and mudstones)
	c) Deep Creek Basic Volcanic Formation (basal ultramafic volcanics, variolites, basalts with comagmatic intrusive gabbros and pyroxenites)
	d) Magnet Creek Formation (lithic micaceous greywackes and mudstones with minor basic volcanics)
Bischoff Series (Precambrian)	Bischoff Slates (Grey quartzites, shales and siltstones with minor black shales and cherts)

The Magnet Lode occurs in a locally thickened portion of a basal ultramafic volcanic unit in the Deep Creek Basic Volcanic Formation which is thought to be conformable with underlying greywackes and mudstones of the Magnet Creek Formation, and overlying cherts, greywackes and mudstones of the Halls and Crescent Spur Formations.

The north-westerly dipping succession is thought to young to the north-west, as indicated by rare sediment facings (graded bedding) and compositional ultramafic to basic grading in the basic volcanic pile. The Cambrian succession overlies the Bischoff Series grey quartzites and foliated shales unconformably. The main evidence for this being the change of sedimentary provenance from the quiet shelf deposited sediments of the Bischoff Series to the trench deposited sequence of the Dundas Series. Lack of shearing rules out a fault contact for the two rock series. The Bischoff Series rocks have been exposed within the core of a gently south-easterly plunging anticline. Refolding of the Cambrian rocks to the north of the anticlinal axis is not evident.

Faulting has disturbed the Precambrian-Cambrian succession. Several faults normal to bedding occur in the northern half of the grid and similar faults are postulated to occur in the southern half. Thrust faults oblique to bedding have been recognised in the mine sequence. One fault exhibits a 50m south block north displacement.

A 1800m long by 400m wide arcuate alteration zone encompasses the Magnet Lode and basic rocks to the north-east. Alteration consists of albitisation, chloritisation, silicification, carbonatisation and less commonly epidotisation which is consistent with the propylitic alteration type (thin section TD 483, TD 492, TD 496, TD 404, TD 417 and TD 437). This alteration is commonly found at the outermost alteration zones of porphyry copper deposits. Hydrothermal quartz veining is pervasive and has apparently healed a fracture set within host rocks. Minor chalcopyrite, pyrite mineralisation is associated with the larger quartz veins. (Table 1 - Gossan samples TD 495, TD 497, TD 499, TD 925 and TD 940).

The alteration zone is thought to be the surface expression of a buried acid intrusive body or bodies related to the Devonian granite suite. Flat lying tertiary basalts, dolerites, gabbro and underlying fluviatile gravels and lacustrine sandy sediments cap all topographic highs in the area and mask the underlying Cambrian geology.

6.2. Magnetics (see Plan 8)

The significant feature of the magnetics of the grid area are the areas of low magnetic response. The host Magnet ultramafic gives rise to a poor but definable magnetic low which extends 500m north of the last known outcrop of the ultramafite.

The contact between the non magnetic Bischoff Series and magnetically responsive Dundas Series is defined by the magnetics.

The arcuate alteration zone defined by mapping gives rise to a coincident area of low magnetic response in normally magnetic basic rocks. This phenomenon can be attributed to the process involved during alteration which has effectively reduced magnetite to non magnetic iron oxides. (Refer to thin section TD 483).

The area of low magnetic response over the northern half of the grid is attributable to a thickening of non magnetic sediments including cherts and mudstones.

Capping Tertiary basics have given rise to a variable magnetic picture. In part they are strongly magnetic.

6.3. Geochemistry

Grid soil geochemical data has been treated statistically. High background and anomalous populations have been outlined by logarithmic cumulative frequency plots (see Table 2). The elemental characteristics or associations of the area are indicated by correlation coefficients and factor analysis (Table 2). The most important association is a lead/zinc/weak mercury relationship.

It is important to note that the floodplane of Magnet Creek carries anomalous amounts of all elements. This has to be considered when studying the geochemical data.

The trends of each element in relation to the interpreted grid geology is discussed below:

6.3.1. Tin

Northerly trending high background values

occur north of the Magnet Mine, within the alteration zone, and may be caused by a leakage anomaly from tin mineralisation at depth. The origin of anomalous tin values at grid 000W, 850N is unknown but may be attributable to alluvial tin in Tertiary gravels.

6.3.2. Copper

No definable pattern exists. The Tertiary basalt cap has low contained copper. The Magnet Lode and the quartz-chalcopyrite mineralisation within the alteration zone give rise to adjacent anomalous copper values, although no major extensions of the mineralised veins are outlined by the soil values. Anomalous copper values outside the alteration zone can not be explained although Cambrian basics are known to have high contained copper values.

6.3.3. Lead-Zinc

The two elements have been dealt with together because of their strong statistical relationship in the Magnet grid. Strong lead-zinc anomalies and an enveloping halo of anomalous lead values coincide with the Magnet Lode, and interpreted northern extensions of the Magnet ultramafic host. Anomalous lead-zinc values occur elsewhere in the alteration zone and are attributable to observed minor mineralised showings. A gossan (gossan sample TD 955) at grid 1400W, 60N has a coincident lead-zinc anomaly. The extension of this gossan may explain the anomalous values at grid 600W, 280N.

Anomalous lead-zinc values on the western sections of lines 3400W, 3200W, 3000W, 2800W and 1200W can not be explained except possibly by high contained values in the Cambrian basalt.

Anomalous zinc values over the Tertiary basalt cap can be explained by a high zinc content in the basalts.

Anomalous lead-zinc values occur at the southern boundary of the Tertiary basalt cap on lines 600W and 400W and may be due to lateral cation migration from an anomaly beneath the basalt.

6.3.4. Barium

No meaningful trends can be gleaned from the data. The distribution of values is unusual and may be suspect; geochemical trends follow the grid lines rather than the geology.

6.3.5. Nickel

No definable pattern exists. The host Magnet ultramafite is not delineated by the nickel values. Nickel values appear to have dispersed downhill from their probable basic/ultrabasic origin in the north-eastern portion of the grid.

6.3.6. Molybdenum

No anomalous values coincide with either the Magnet Lode or alteration zone. High background values appear to follow a strata-bound chert associated with a pyrite gossan within the Bischoff Series rocks. The north-eastern portion of the Tertiary basalt has coincident high background values.

6.3.7. Mercury

Strong mercury trends occur over the Magnet grid and correspond with geological features.

Anomalous mercury values coincide with Magnet Lode and neatly outline the flanking alteration zone. A linear mercury anomaly coincides with Cambrian basic/ultrabasic intrusives in the north-east portion of the grid.

The gossan at grid 1400W, 60N exhibits a corresponding mercury anomaly.

Anomalous mercury values outline the Tertiary

basalt cap. These values overlap onto underlying Cambrian rocks in the north-eastern portion of the grid (lines 400W, 200W and 000W).

6.3.8. Summary

- a. Elements which have effectively outlined mineralisation or rock units over the Magnet grid include copper, lead, zinc, mercury and tin.
- b. Geochemistry has outlined the Magnet Lode and substantiated the possibility of the mineralised ultramafite extending 500m to the north.
- c. The Magnet alteration zone has been effectively outlined by a mercury halo.
- d. A gossan found by mapping at grid 1400W, 60N has coincident lead, zinc and mercury anomalies.
- e. Copper anomalies within the alteration zone correspond with known copper mineralisation. It follows that all copper anomalies within this zone are worth investigation.
- f. Tin anomalies occur within the alteration zone and possibly reflect tin mineralisation at depth.
- g. Strong lead-zinc and coincident mercury trends occur at the Tertiary basalt/Cambrian contact in the north-east portion of the grid and may represent lateral cation migration from an anomaly beneath the basalt. This possibility is supported by the presence of INPUT and Crone E.M. anomalies at grid 000W, 920N to 960N and grid 200W, 940N respectively.

7. DISCUSSION

Metal zonation of mineral deposits in the Magnet/Mt. Bischoff area is similar to that associated with granite/granodiorite intrusive elsewhere. Stanton cites the case of mineral zoning in the Cornish vein system where tin and tungsten have been deposited closest to the mineralising intrusive, and with a progressive lowering in temperature away from the intrusion, copper, tungsten, zinc and lead are deposited. The gangue minerals follow the same trend with quartz and tourmaline occurring closest to the intrusive, with carbonates and barites away from it.

Mt. Bischoff provides an analogous model where zonation away from the Devonian quartz porphyry system includes tin, tungsten, antimony, zinc and lead. The lead-zinc-carbonate mineralisation is interpreted to lie peripherally to a buried acid intrusive body manifested at surface by quartz veins containing minor chalcopyrite mineralisation within the propylitic alteration zone. It follows that the alteration zone could house granitoid associated metals including copper, antimony, bismuth, tungsten and tin at depth.

8. CONCLUSIONS

- 8.1. Lead-zinc mineralisation at the Magnet Mine is structurally controlled and occurs within three vein convergent zones or pipes within a locally thickened basal ultramafic unit. The general trend of the pipes is a plunge of 67° towards 258° (T).
- 8.2. Mining at Magnet concentrated on the northernmost pipe which was worked to the 14 level at 280m depth. Sphalerite rich ore was treated as mullock and was either dumped or used to fill the stopes. There is a distinct possibility that the mine was worked on a selective basis and sphalerite rich zones left.
- 8.3. The mineralised ultramafic host has been mapped over 900m and is open to the south. Magnetic and geochemical information indicate that it may extend 500m to the north.
- 8.4. The alteration zone encompassing the Magnet Lode and the basic rocks to the north-east may relate to a buried acid intrusive. Minor copper mineralisation occurs within this zone which must be also prospective for the other granitoid associated metals at depth.

- 8.5. Rocks similar to those found in the Magnet Mine area occur in the northern half of the grid although ultramafic tuffs and flows have not been recognised.
- 8.6. A lead and zinc anomalous gossan found within Bischoff Serões rocks on a grid 400W, 60N appears to be stratabound, and should be investigated further.
- 8.7. The origin for INFUT and Crone E.M. anomalies over Tertiary basalts in the northern portion of the grid could not be found, although lead, zinc and mercury anomalies in the area may represent leakage anomalies from a source beneath the basalt.

9. RECOMMENDATIONS

9.1. Magnet Mine

Two diamond drill holes, MAG 1 and MAG 2, are recommended to test the width and grade of the Magnet Lode. If the above holes intersect viable ore additional drilling will be required.

9.2. Magnet Grid

It is proposed that Magnet Grid be widened and extended.

Extension lines should be cut 200m to the south of lines 3000W, 2800W, 2600W, 2000W, 1800W, 1600W and 1400W, to facilitate implementation of electrical geophysical methods over the interpreted extension of the Magnet host ultramafite, and over the gossan found at grid 1400W, 60N.

The grid should be continued at least 600m to the south to cover the extension of the Magnet host ultramafite to the south. The same grid pattern should be adopted including extension of the baseline bearing 238° with 1400m lines extending from 200S to 1200N.

The grid should be continued to the north as previously proposed to include the lead-zinc occurrences at Persic and Silver Cliffs. Magnetometer surveying and geochemical A^o soil sampling should be carried out over the grid extensions.

Electrical geophysical methods including Self Potential (S.P.) and Crone E.M. should be implemented over the entire grid.

The possibility of disseminated mineralisation within the recognised propylitic alteration zone should be investigated by initially implementing an Induced Polarisation (I.P.) programme to cover the alteration zone between lines 3400W and 1400W.

The gossan at grid 1400W, 60N should be investigated using the above geophysical methods. The gossan could be further exposed by costeaning.

The E.M. anomalies at grid 200W, 940N and grid 000W, 940N may have coincident geochemical anomalies which is shown as leakage below the basalt. Since costeaning of the Tertiary basalt is not a feasible proposition, the E.M. anomaly should be examined by diamond drilling.

C.S. Rugless

REFERENCES

- Groves P.I. and Solomon M. 1964 The Geology of the
Mt. Bischoff District.
Pap. Proc. R Soc., Tasm.
98: 1-22.
- Nye P.B. 1923 The Silver-Lead Deposits
of the Waratah District.
Bulletin 33, Geol. Survey,
Tasmania.
- Cottle V.M. 1953 Magnet Silver-Lead Mine.
Geology of Australian Ore
Deposits, vol.1, 1160-1165.
(5th Empire Min. Met. Congress.
- Glasson K.R. and Cox R. 1968 Preliminary Report Magnet
Mine, Waratah District,
Tasmania.
Cleveland Tin N.L. Report.
- Twelvetrees W.H. 1903 Report on the Mineral Fields
between Waratah and Long
Plains. Economic Geology,
Volume Tasmania 1905.
- Stanton R.L. 1972 Ore Petrology.
McGraw-Hill.

APPENDIX 1TABLE 1GOSSAN VALUES FROM THE MAGNET MINE AREA AND THE MAGNET GRID

In parts per million unless otherwise shown

Sample No.	Cu	Pb	Zn	Mo	Sn	Ag
TD 402	50	50	620	3	30	2
TD 406	50	3.4%	8500	<3	50	100
TD 408	30	6000	9000	3	50	5
TD 409	50	600	6200	10	30	5
TD 410	20	2000	1.0%	10	100	65
TD 411	30	1900	3.7%	10	100	130
TD 412	20	1.70%	3.4%	10	100	250
TD 413	10	1800	8500	3	50	40
TD 414	20	1800	2.6%	10	100	80
TD 415	30	2000	4.9%	10	50	40
TD 416	30	8500	4.9%	10	50	90
✓TD 418	200	6.80%	3.7%	10	50	350
✓TD 419	100	3.90%	6.6%	10	200	250
✓TD 420	100	1.96%	1.0%	10	100	90
✓TD 421	100	1.30%	>1.0%	10	50	100
✓TD 422	100	1.26%	1.01%	10	200	200
✓TD 423	30	620	>1.0%	10	50	30
✓TD 424	200	2.10%	6.0%	5	300	250
✓TD 425	200	3.20%	6.2%	10	200	400
TD 426	200	1.90%	3.0%	10	200	270
TD 427	100	900	1.02%	5	50	20
TD 428	50	1900	>1.0%	3	50	35
TD 429	50	1300	8800	10	50	25
TD 430	50	1600	8600	10	50	20
TD 431	50	1300	>1.0%	10	50	20
TD 432	100	1800	8800	20	50	45
TD 433	50	2000	3.5%	20	50	90
TD 434	100	2000	8000	10	50	50
✓TD 435	100	1600	9300	10	50	100
✓TD 436	100	1.36%	4.1%	5	100	120
✓TD 439	100	2200	8200	10	50	120
TD 440	20	2000	9500	5	50	30
TD 442	200	8500	6.8%	10	200	130
TD 443	100	2000	5.3%	5	50	60
TD 445	20	3000	1.0%	5	50	15
TD 446	30	1600	9400	10	50	15

210098

Sample No.	Cu	Pb	Zn	Mo	Sn	Ag
TD 447	100	5800	>1.0%	10	200	190
TD 448	30	1400	9500	10	50	40
TD 449	50	620	4600	10	30	20
✓TD 451	100	2.11%	1.02%	20	300	330
✓TD 452	30	1400	6600	20	50	10
✓TD 453	30	1.38%	9500	5	100	100
TD 455	50	320	1500	5	30	<2
TD 456	50	830	3800	10	30	10
TD 457	300	100	90	7	20	0.5
TD 463	500	1000	120	5	30	1
TD 482	52	510	1400	x	x	2.0
✓TD 495	>1%	290	78	4	x	14
✓TD 497	1550	42	140	1	x	1
TD 499	3300	42	220	0.5	x	1.4
TD 902	28	26	1600	1	x	1.4
TD 910	8	140	520	0.5	x	1.2
✓TD 911	140	>2000	9500	0.5	40	6.0
✓TD 912	200	210	1600	0.5	x	4.4
✓TD 913	66	>2000	1%	0.5	20	10
✓TD 917	54	3100	2%	-	-	1.9oz/ton
✓TD 918	40	1000	2800	-	-	4.4
✓TD 919	18	1700	9000	x	-	29
✓TD 920	170	220	1500	x	-	4.4
✓TD 921	30	4200	8200	x	-	20
✓TD 922	96	2.80%	3.40%	x	-	8.8oz/ton
✓TD 923	370	8.30%	4.25%	x	-	20.8oz/ton
✓TD 924	390	4.70%	1.40%	x	-	4.5oz/ton
TD 925	2600	150	92	30	x	4.0
✓TD 928	10	430	640	-	-	5.4
✓TD 929	10	1250	6200	-	-	9.2
TD 930	68	96	500	1	20	2.2
TD 936	24	280	540	2	x	1.0
✓TD 937	20	500	1200	1	x	1.2
TD 938	16	950	3400	2	20	5.4
✓TD 939	250	56	340	x	x	1.0
✓TD 940	1450	40	104	1	x	0.4
✓TD 944	110	320	6000	0.5	20	4.8
✓TD 945	130	6700	1.30%	1	40	4.5oz/ton
✓TD 946	230	330	2900	0.5	20	6.8
✓TD 947	330	2.05%	7.1%	0.5	140	13.1oz/ton
✓TD 948	62	1700	2.15%	1	40	1.1oz/ton
TD 955	28	700	1600	3.0	x	7.6

APPENDIX 1TABLE 2STATISTICAL DATA FROM A° SOIL GEOCHEMISTRY - MAGNET GRID1. Range of Values

Cu	0 - 650ppm
Ni	6ppm - >1.00%
Pb	0 - >1.00%
Zn	0 - >1.00%
Ba	10 - 1500ppm
Hg	0 - 5100ppb
Sn	0 - 580ppm
Mo	0 - 5ppm

2. Populations from Cumulative Frequency Plots

<u>Element</u>	<u>Population 1</u>	<u>Population 2</u>	<u>Population 3</u>
Cu	75 - 90ppm	90 - 108ppm	>108ppm
Ni	180 - 330ppm		>330ppm
Pb	45 - 80ppm	80 - 115ppm	>115ppm
Zn	104 - 150ppm	150 - 220ppm	>220ppm
Ba	120 - 280ppm		>280ppm
Hg	80 - 100ppb	100 - 280ppb	>280ppb
Sn	9 - 30ppm	30 - 42ppm	>42ppm
Mo	1.5.- 2.1ppm		>2.1ppm

Correlation Coefficients

Pb/Zn (strong) Pb/Hg (weak)

3. Factor Analysis

	<u>1st Factor</u>	<u>2nd Factor</u>	<u>3rd Factor</u>
Factor Matrix	Pb/Zn/weak Hg	Ni	Mo
Rotated Factor Matrix	Pb/Zn/weak Hg	Ni	Mo

PETROGRAPHIC DESCRIPTIONS

by H.W. Fander, M.Sc. and D. Cowan, B.Sc.

TD 403 Peridotite Lava.

Hand Specimen: Dark green ? fragmental rock.

Microscopic: This is a strongly flow banded ultramafic lava which must have consisted mainly of glass and is now completely serpentinitised. Its original composition was probably more or less that of a peridotite; the glass would have been equivalent to olivine.

The present rock consists of serpentine pseudomorphs after olivine phenocrysts and subordinate pyroxine, with flow alignment of their long axes. They are set in a strongly flow banded serpentinous groundmass. This has a finely scoriaceous fabric in places, and is micro-vesicular throughout. There are numerous minute chalcedony filled vesicles and occasional larger ones (which appear like quartz grains in hand specimens). Small goethite patches represent altered primary opaques.

The fabric and textures strongly indicate an extrusive origin; it may well have been a submarine extrusion, and there may be field evidence of pillow structures.

TD 404 Severely altered ? ultramafic lava

Hand Specimen: Grey green, microcrystalline sheared rock.

Microscopic: This rock is very severely altered, and the present composition gives little indication of its original nature. Because of the secondary minerals, its colour is much lighter than that of the fresh rock.

Textures indicate that the rock was extrusive; scoriaceous/microvesicular textures and perlitic cracks are common. There are indications of the former presence of phenocrysts, some of them with olivine morphology. The only surviving primary mineral is picrochromite (an Mg-Cr spinel in the spinel series); its presence is one of the main pieces of evidence for an ultramafic origin of the rock.

The present minerals are chalcedonic quartz, pale green serpentinous chlorite and abundant carbonate.

The rock is extensively fractured; the network of microfractures is dark coloured, probably due to ultrafine MnO₂, accompanied by minor quartz.

Thus the rock may well be genetically related to TD 403, but severe alteration precludes definite correlation on petrographic grounds.

TD 417 - Severely altered ultramafic extrusive

Hand Specimen: Dark green brecciated or fragmental rock

Microscopic: The rock is very strongly altered and extensively silicified, as well as being brecciated. Relict textures suggest that the original rock was largely glassy, with some microphenocrysts, perhaps in the nature of a peridotite-lava.

The rock consists of greenish fragments of serpentinous, semi-isotropic material representing altered and devitrified ultramafic glass. These fragments contain microphenocrysts, now completely pseudomorphed by mosaic quartz; their morphology suggests slender prisms of olivine.

The rock fragments are set in a matrix of fine quartz which clearly replaces them and shows numerous pseudomorphous features indicating its origin.

In view of a complex alteration history involving devitrification, serpentinitisation, replacement of phenocrysts, brecciation and extensive replacement by quartz, the interpretation regarding the nature and composition of the primary rock must necessarily be tentative; it is perhaps best summarised as a porphyritic, ultramafic extrusive.

TD 437 - Metasomatic quartz-albite rock

Hand Specimen: Grey green, medium grained rock with traces of pyrite.

Microscopic: This is believed to be a metasomatic rock, rather than a normal igneous type, because of its composition and fabric.

The rock consists of rather confused masses of intergrown quartz and albite, in which relatively coarse quartz contains partly embedded albite laths. There are also numerous interstitial patches of finer albite laths intergrown with pale green chlorite. Irregular patches of carbonate (? dolomite) occur throughout.

It appears that relatively coarse quartz and albite formed first, followed by fine albite/chlorite patches. Igneous textures are absent, and the fabric is much more typical of a metasomatic rock.

Quartz veins cut the rock, and are fractured and displaced or disrupted by later carbonate veins. Small aggregates of leucoxenic rutile are present sporadically.

The rock is related to igneous activity, and may occur as a dyke, apophysis or irregular veinlike mass or lens.

TD 468 - Spherulitic glassy ? basalt

Hand Specimen: Dark rock with ? spherulites

Microscopic: This is a spectacular rock and must be very nearly unique in both fabric and composition.

The original rock was largely glassy, consisting of greenish brown "basaltic" (or ultramafic) glass with occasional small phenocrysts and crystallites of unknown composition but probably feldspar. There was a conspicuous development of spherulites, apparently whilst the rock was still soft or molten, because these spherulites enclose orientated, regular blebs of glass; spherulites formed by devitrification would not have this texture. The spherulites were probably composed of radiating feldspar (plagioclase fibres, but they now consist of stilbite).

Parts of the rock are vesicular or scoriaceous; there are rare pseudomorphs after pyroxene (or olivine). The glass itself is thoroughly devitrified, and altered to serpentine chlorite.

The likely composition of this rock was that of an olivine basalt, with plagioclase spherulites.

TD 483 - Altered Porphyritic Olivine Melagabbro

Hand Specimen: Dark grey-green chloritic porphyritic ultrabasic rock.

Microscopic: This is a fairly thoroughly altered porphyritic olivine melagabbro, medium grained and a minor or marginal intrusive phase.

Primary mineralogy is only identified on the basis of pseudomorphic textures, the rock consisting entirely of pennine chlorite and anhedral quartz with a little sericite and minor traces of (relict primary) magnetite. Frequent bastite-like pseudomorphs of subacicular pyroxene phenocrysts (mean 300-350 μ) are accompanied by thinly dispersed

but variably sized quartz-sericite pseudomorphs after olivine (max. 1cm), sometimes with chlorite selvages suggestive of altered reaction rims. These features are enclosed in a weakly dolerite-textured altered ground-mass of anhedral quartz and chlorite pseudomorphs after plagioclase laths, and lath-like to weakly ophitic pyroxene respectively.

The rock is not unlike the pyroxenic picrites previously described for E. Reid, but relatively feldspathic initially (hence melagabbro). Magnetite is weakly chromiferous. Much of the phenocrysts-pseudomorphous chlorite is stained with Fe-oxide which appears to represent degraded secondary fibrous magnetite "exsolved" during alteration. No sulphide detected.

TD 487 - Altered Ultramafic Lithic Tuff

Hand Specimen: Grey-green ultramafic fragmental, K stain negative.

Microscopic: This is an altered ultramafic lithic tuff and as such clearly an extrusive phase.

The rock consists of essentially altered angular, poorly sorted (200u-1cm), fairly closely packed lava clasts with a replacive interfragment matrix of cherty-microcrystalline to chalcedonic quartz and chlorite. The rock is incipiently bedded as reflected in a weak dimensional orientation of the more elongate particles.

The lava clasts are altered to the extent that they now consist almost entirely of fine-grained Mg-chlorite with subordinate cherty quartz. Relict fabrics range from porphyritic (olivine, pyroxene phenocrysts, now chlorite), through microlitic to flow-banded vitric types with a variety of scoriaceous and vesicular textures in places. Perilitic devitrification textures are seen. One or two clasts include silicified plagioclase laths, but overall the inferred primary composition is peridotitic.

The rock is somewhat Fe-stained in irregular patches and along late discontinuous microfractures. This reflects degradation of accessory opaques (primary) and probable traces of Fe-carbonate (secondary).

TD 491 - Altered Porphyritic Olivine Melagabbro

Hand Specimen: Fe-stained, altered porphyritic ? melagabbro.

Microscopic: Apervasively altered porphyritic olivine melagabbro, rather similar and evidently closely related to TD 483

Frequent chlorite-montmorillonite pseudomorphs after ferromagnesian phenocrysts and microphenocrysts (200u-2mm) are seen and in this case olivine and (? orthopyroxene) pyroxene were present in roughly equal proportions.

The groundmass trends towards slaggy textures and consisting originally of felted to semi-radiating feldspar laths (mean 50 x 500u, up to 3.5mm long) with interstitial microgranular ? pyroxene and feldspar (probably at least in part devitrified glass) and disseminated skeletal opaques. This fabric is now outlined in Fe-stained chlorite-montmorillonite aggregates.

Coarser grained chromiferous magnetite is an accessory phase as sub- to euhedral particles disseminated throughout the rock. Occasional discontinuous veins (to 500u) of anhedral ? pyrite (no positive limonite pseudomorphs) were present. Late limonitic microfractures are common.

TD 492 - Fractured, altered basic ? lithic tuff.

Hand Specimen: Grey-green fractured, altered basic-ultramafic ? fragmental, K stain negative.

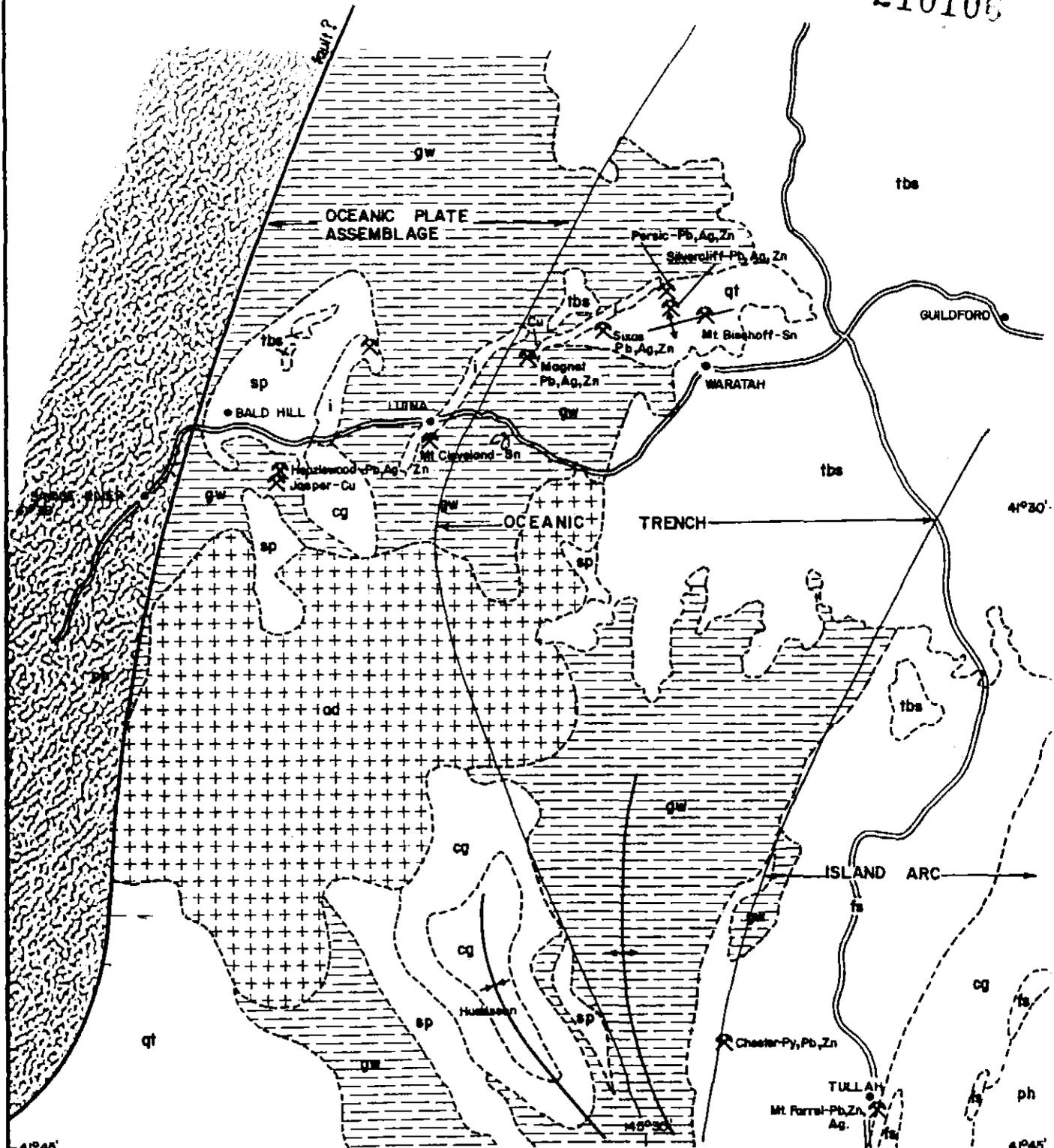
Microscopic: This is a fractured and thoroughly altered fragmental basite either a tuff lava or lithic tuff; the distinction is tenuous and academic at this stage of alteration.

The rock has an incipient brecciation fabric, overprinted on the primary fragmental texture, reflected mainly in a network of irregular microfractures which are, at least largely, post-alteration. Mineralogically it consists virtually entirely of chlorite and micro-anhedral quartz, with a little admixed montmorillonite and traces of degraded (chloritised) tremolite.

Frequent angular-subangular altered lava clasts (<500u-5mm) are visible and these features exhibit a range of relict fabrics from feldspar- and pyroxene-porphyritic to micro-vesicular and glassy. Dolerite-textured fragments occur

sporadically. Interfragment/matrix portions of the rock consists of cherty quartz with disseminated altered crystal fragments and angular to splintery altered lava fragments.

Alteration features are virtually identical with those in the underlying melagabbroic and ultramafic rocks and apart from its markedly stronger initial feldspathic nature, this rock is not unlike TD 487.



41°45'

41°30'

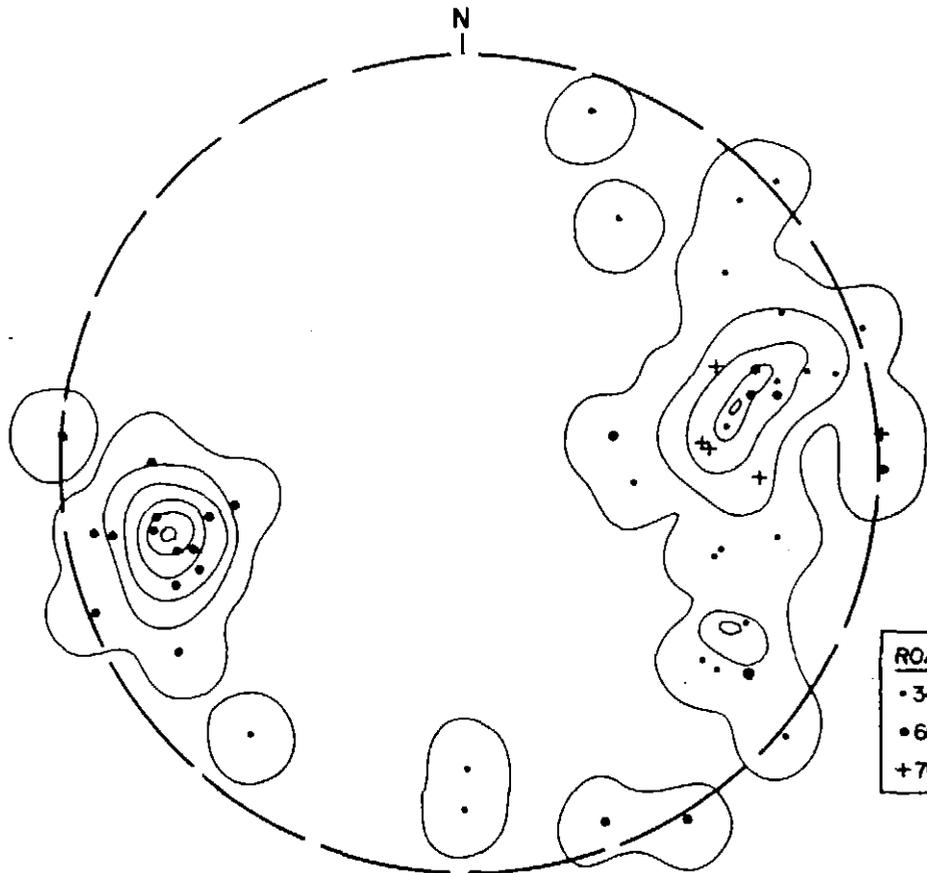
41°45'

- tbs Basalt, Dolomite, Gabbro
- ad Adamellite
- cg Undivided conglomerate, quartzwacke, Siltstone, shale, limestone
- fs Felsic to intermediate volcanics, volcanoclastics & related intrusives
- gw Greywacke, mudstone
- sp Serpentinite, peridotite & associated rocks
- i Basic intrusive and extrusive rocks
- qt Unmetamorphosed quartzite, siltstone, shale, dolomite
- ph Metamorphosed laminated quartzite, phyllites

5 cm

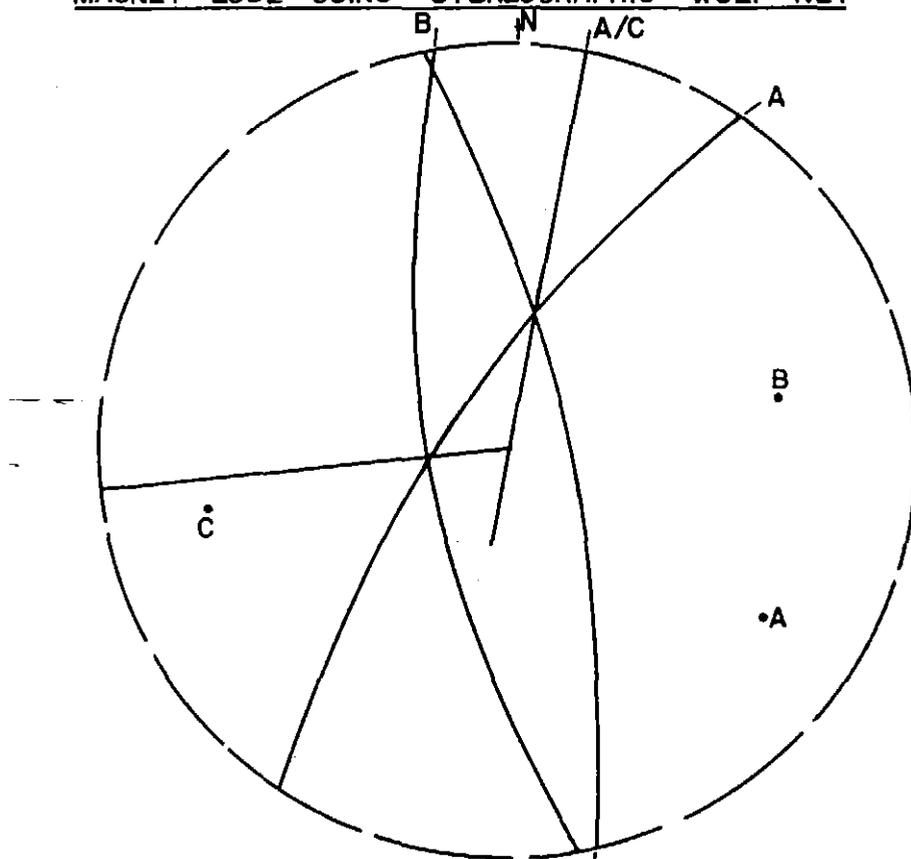
COMSTAFF PROPRIETARY LIMITED			
WARATAH - LUINA AREA			
INTERPRETED REGIONAL GEOLOGY			
BASED ON BURNIE 1:250 000			
GEOLOGY SERIES			
DRAWN J.M.H. 22/3/76	COMPILED C.S.R. MARCH 76	SCALE 1:250 000	TAS/2/871

210107



ROAD METERAGE
• 340-600m pipe 1
• 600-700m pipe 2
+ 700-800m pipe 3

FREQUENCY CONTOUR PLOT OF POLES TO MAIN ORE VEINS ON THE
MAGNET LODGE USING STEREOGRAPHIC WULF NET

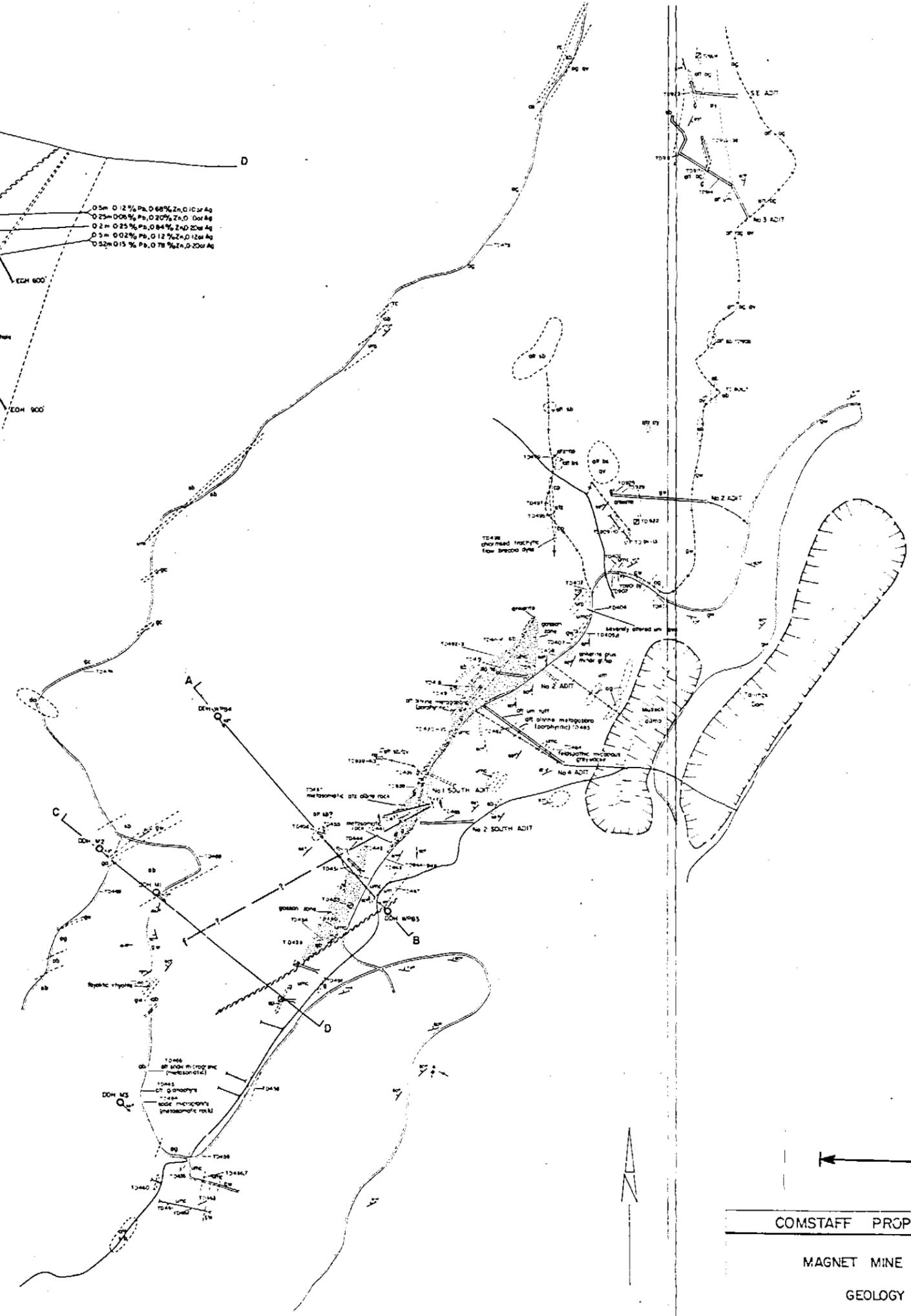
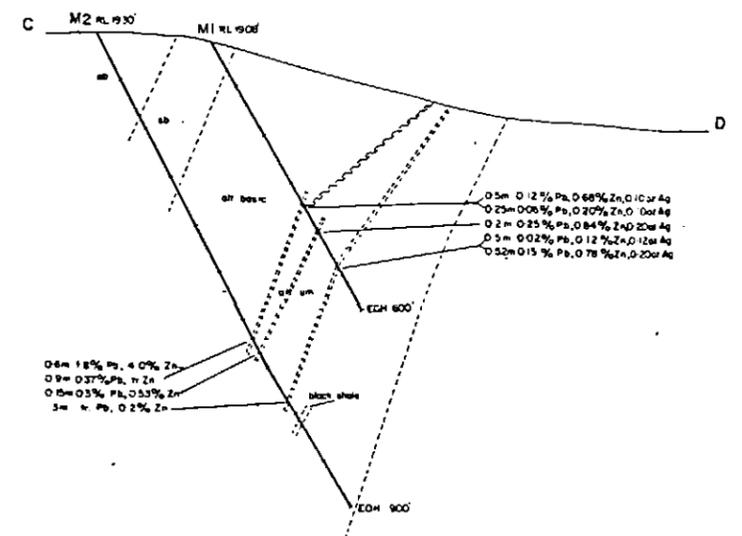
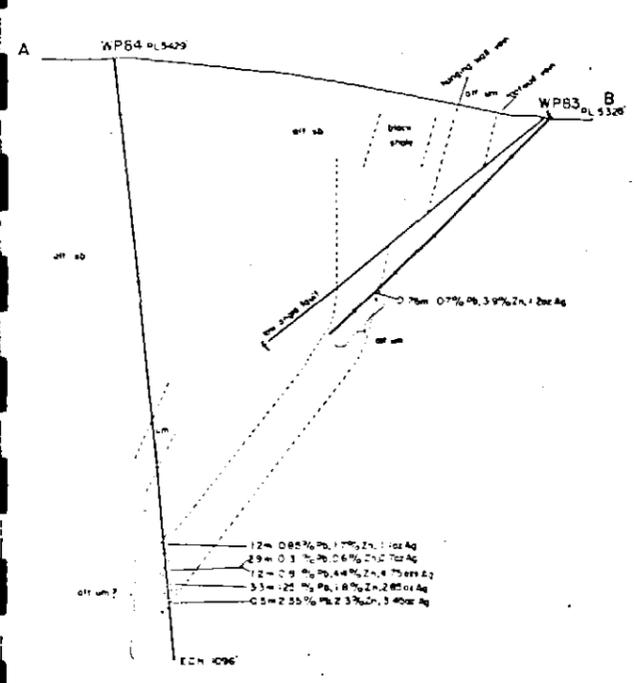


DIRECTION AND PLUNGE ANGLES OF PLANE INTERSECTIONS A/B AND A/C WHERE A REPRESENTS THE HANGING WALL SHEAR DIRECTION AND B AND C REPRESENT FOOTWALL SHEAR DIRECTIONS
STEREOGRAPHIC WULF NET

COMSTAFF PROPRIETARY LIMITED

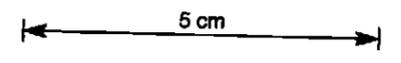
**MAGNET MINE AREA
JOINT MEASUREMENTS**

DRAWN J.M.H. 23/3/76	COMPILED C.S.R. MARCH 76	SCALE Not To Scale	TAS/2/872
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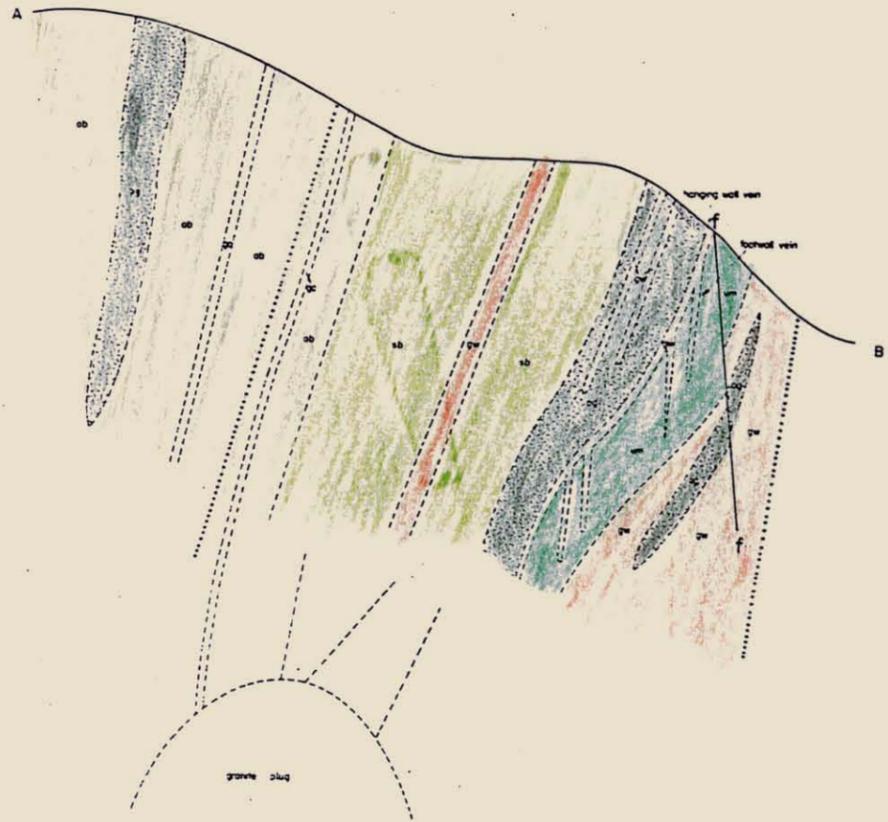


LEGEND

TERTIARY		Geological boundary	
CAMBRIAN		Fault	
PRECAMBRIAN		Fault - highly reflective	
DEFORMATION		Shear zone	
DEFORMATION		Strike and dip of bedding	
DEFORMATION		Strike and dip of foliation	
DEFORMATION		Strike and dip of cleavage	
DEFORMATION		Diamond drillhole with direction and inclination	
DEFORMATION		Cave	
DEFORMATION		Adit	
DEFORMATION		Adit closed	
DEFORMATION		Shaft	
DEFORMATION		Drainage	
DEFORMATION		Road or track	
DEFORMATION		Default roadway	
DEFORMATION		1 - zone	
DEFORMATION		2 - zone	
DEFORMATION		3 - zone	
DEFORMATION		4 - zone	
DEFORMATION		5 - zone	
DEFORMATION		6 - zone	



210109

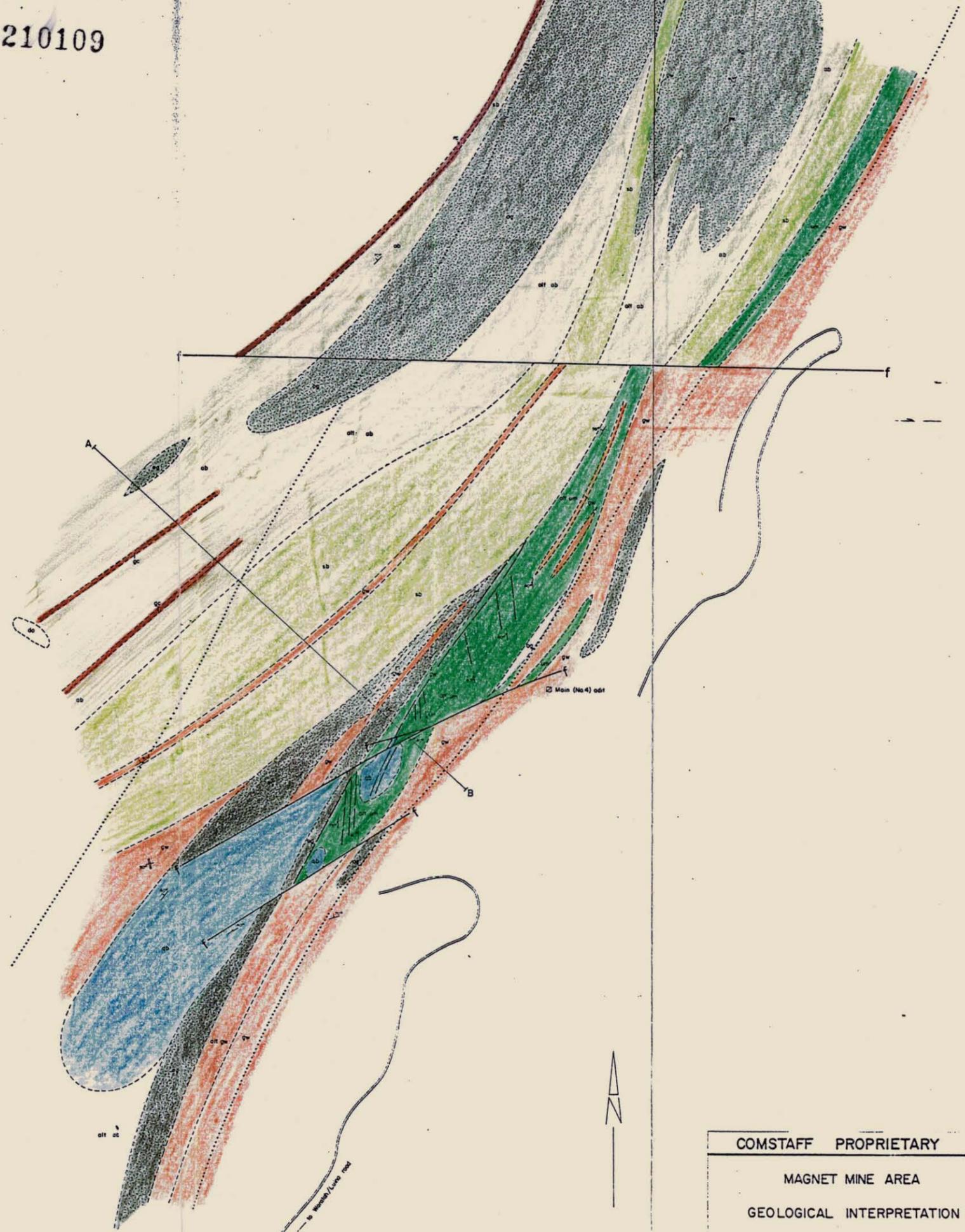


SECTION A-B

5 cm

LEGEND

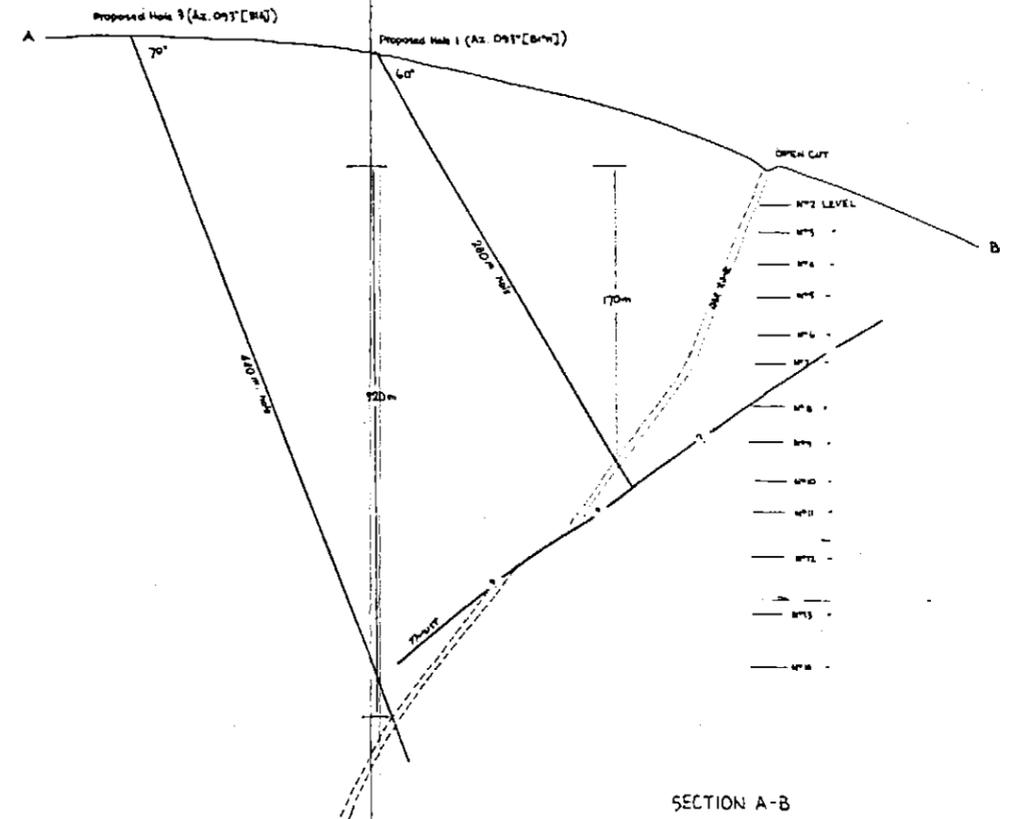
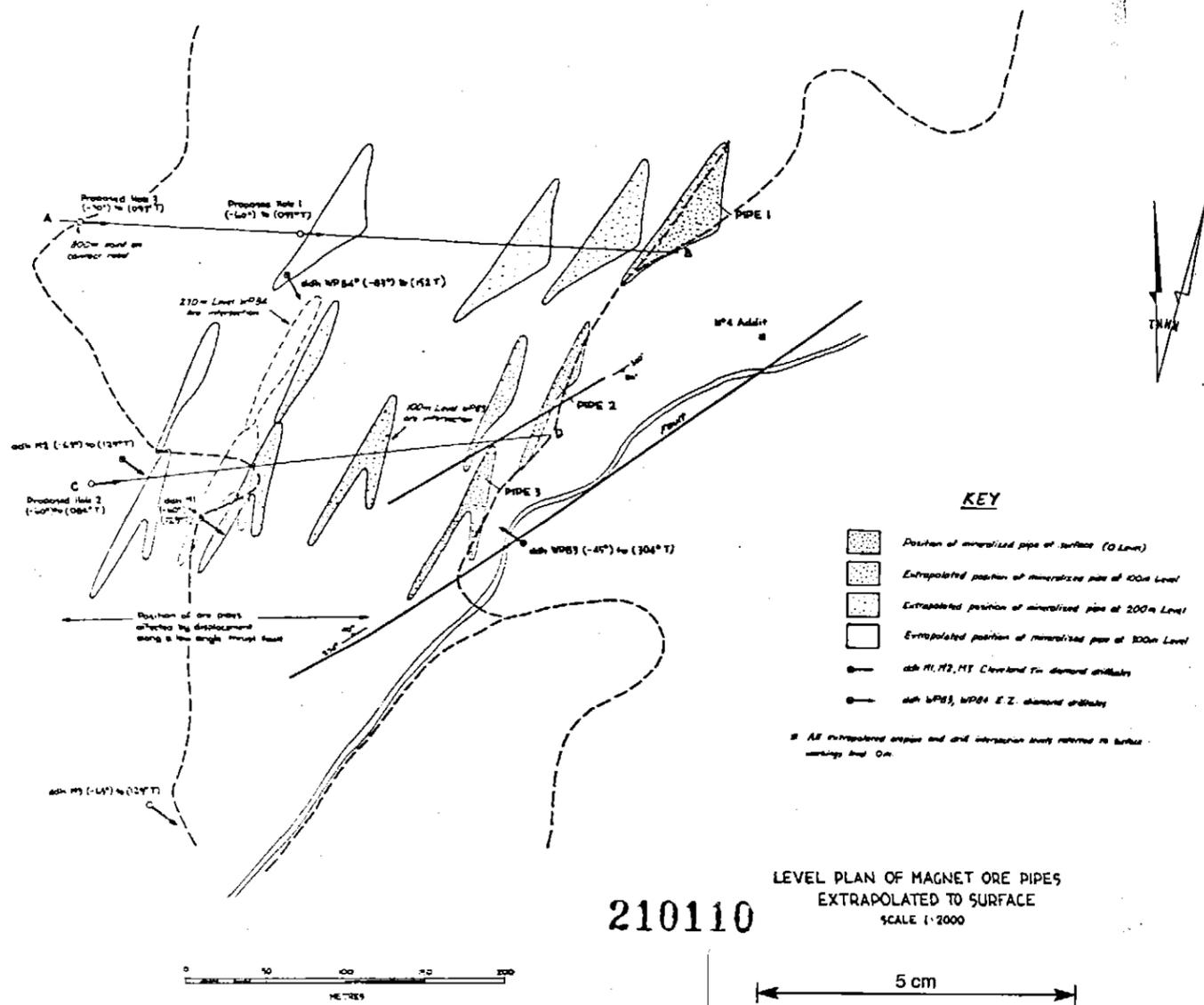
CAMBRIAN (Dundas series - present sp. group)	DEEP CREEK FORMATION	ab	Olivine, basalt, gabbro, dolerite	Geological boundary
		ab	Red chert, grey to tan chert	
MILLS FORMATION	HILLS FORMATION	ab	Quartz siltite metamorphic rock probably ex basite/gabbro, basalt	Fault
		ab	Amphibolite basalt/sphenulitic basalt variolite	Trend lines
AGATE CREEK FORMATION	DEEP CREEK FORMATION	ab	Paraphyric olivine gabbro	Zone of quartz veining and propylitic alteration
		ab	Altered carbonised ultramafic	Strike and dip of bedding
AGATE CREEK FORMATION	DEEP CREEK FORMATION	ab	Ultramafic (ferroanitic) volcanics and tuffs	Strike and dip of foliation
		ab	Khaki to tan coloured greywacke, mudstone minor interbedded basalt lenses tan to cream mudstone/siltstone	Strike and dip of cleavage
		ab	Alteration including silicification, chloritization	Road/railway
				Major mine shaft



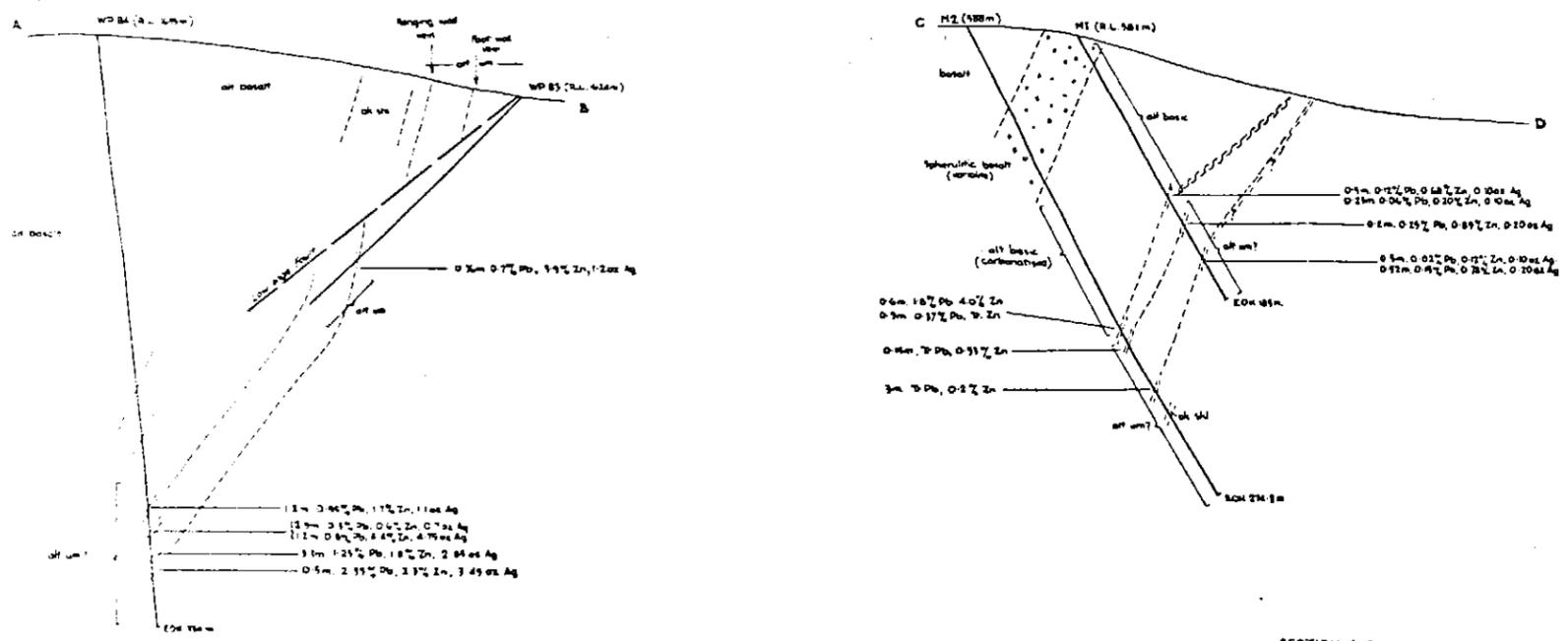
COMSTAFF PROPRIETARY LIMITED

MAGNET MINE AREA
GEOLOGICAL INTERPRETATION

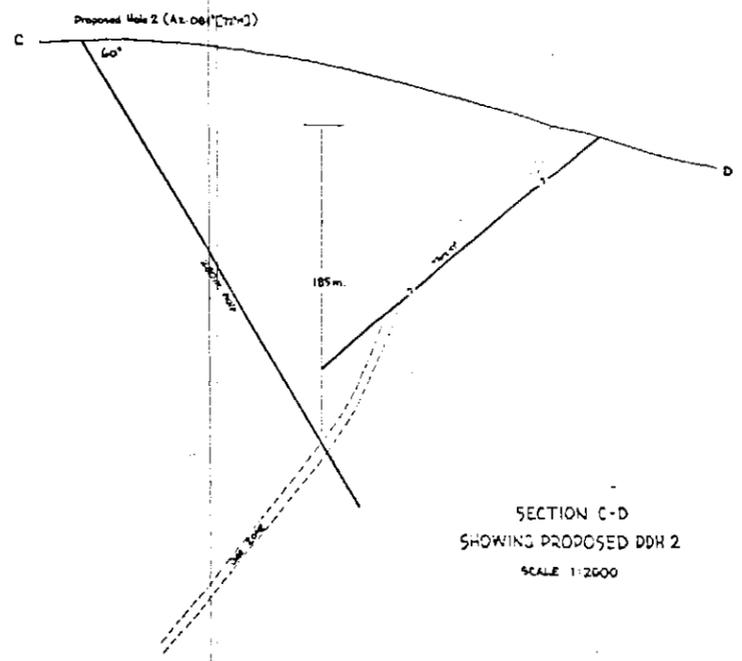
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DATE MARCH 1976
DRAWN BY CSR 4/3/76
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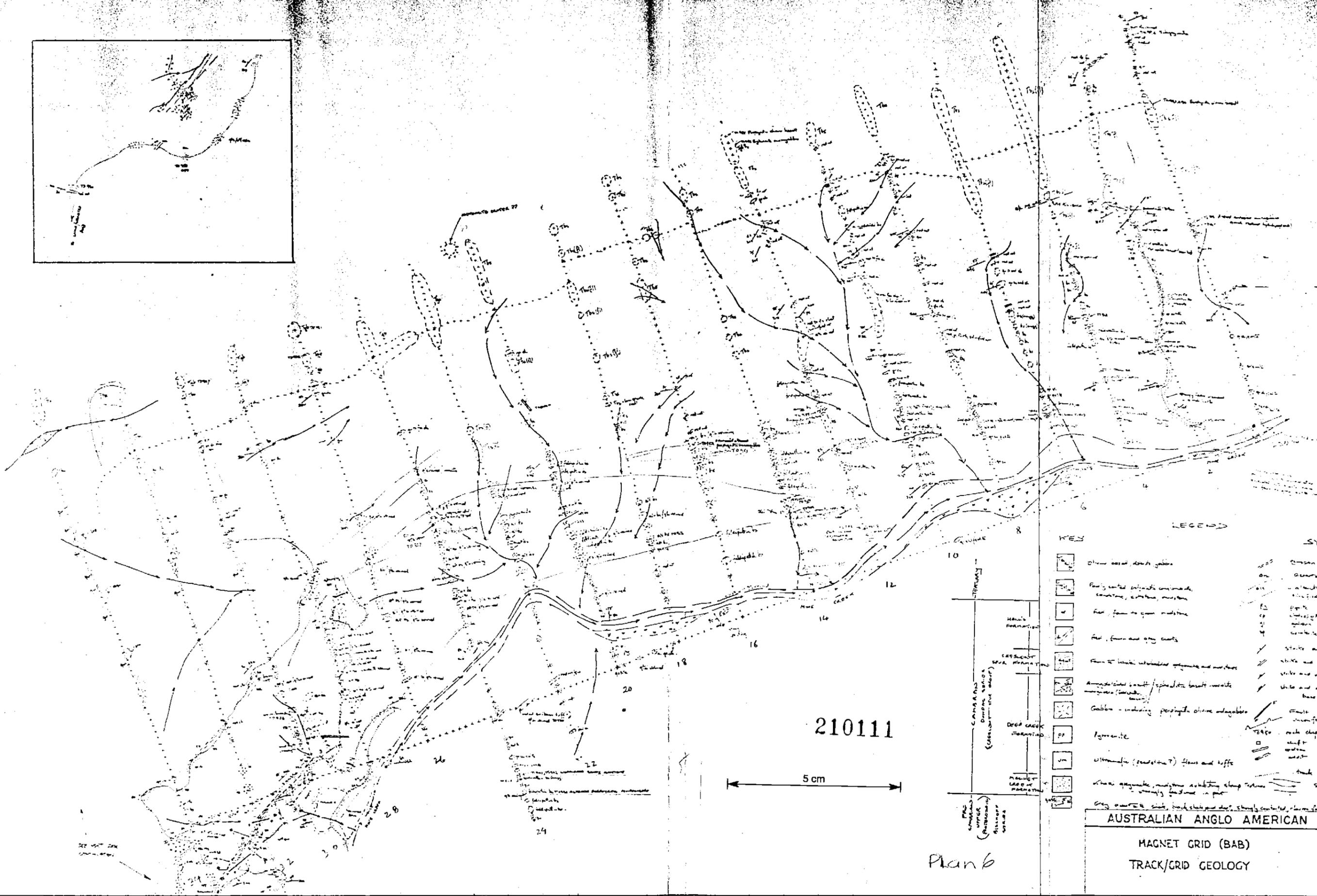
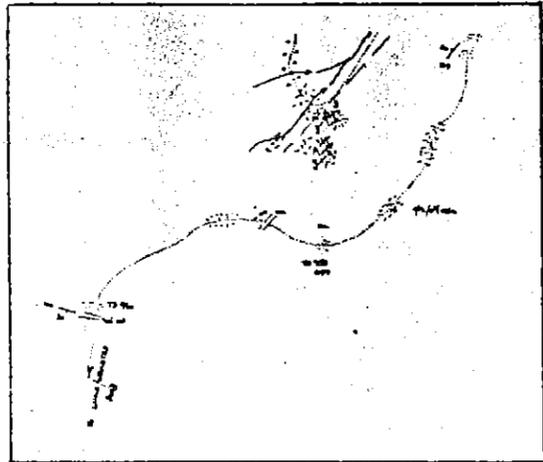
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SCALE 1:2000



SECTION C-D
SHOWING DDH M1 & M2
DRILLED BY CLEVELAND TM
SCALE 1:2000



SECTION C-D
SHOWING PROPOSED DDH 2
SCALE 1:2000



LEGEND

SYMBOLS	SYMBOLS

210111

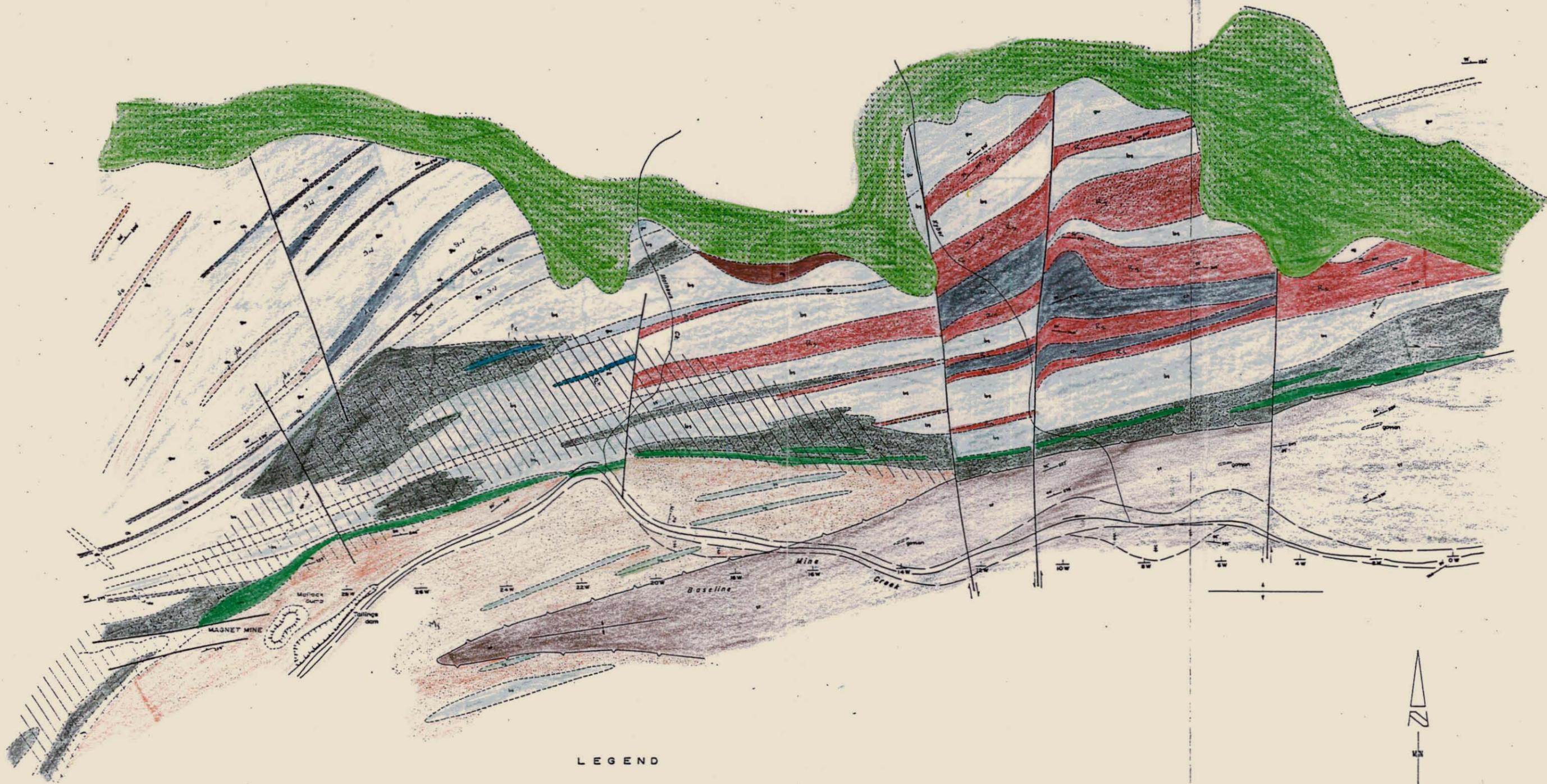
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Plan 6

AUSTRALIAN ANGLO AMERICAN LIMITED

MAGNET GRID (BAB)
TRACK/GRID GEOLOGY

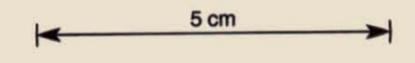
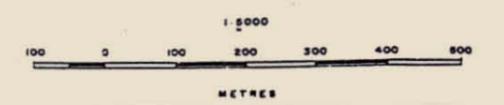
TAS-2-705



LEGEND

TERTIARY					
			Olivine basalt, dolerite, gabbro Dolerite		Alteration of basites including silicification, chloritization, hydrothermal
			Poorly sorted polymictic conglomerate, sandstone, siltstone, mudstone		Fault
HALLS FORMATION	R ₅		Red, fawn to green mudstone		Fault (inferred)
			Red, fawn to green chert		Unconformity
CRESCENT SPUR FORMATION	C ₅		Fawn to khaki interbedded graywacke and mudstone		Strike and dip of bedding
			Amygdaled basalt, microgabbro (feldspathic basalt) Spherulitic basalt, variolite		Strike and dip of carbonate/quartz/ basemental sulphide veins
DEEP CREEK FORMATION	D ₅		Gabbro including porphyritic melagabbro		Strike and dip of foliation shearing
			Pyroxenite		Stream showing extent of floodplains
			Ultramafic (peridotite?) flows and tuffs		
MAGNET CREEK FORMATION	M ₅		Khaki greywacke, mudstone exhibiting slump features strongly fractured in part		
PRE-CAMBRIAN (BASIC SERIES)			Grey quartzite, shale, black shale and chert, strongly cemented, sheared folded		

210112

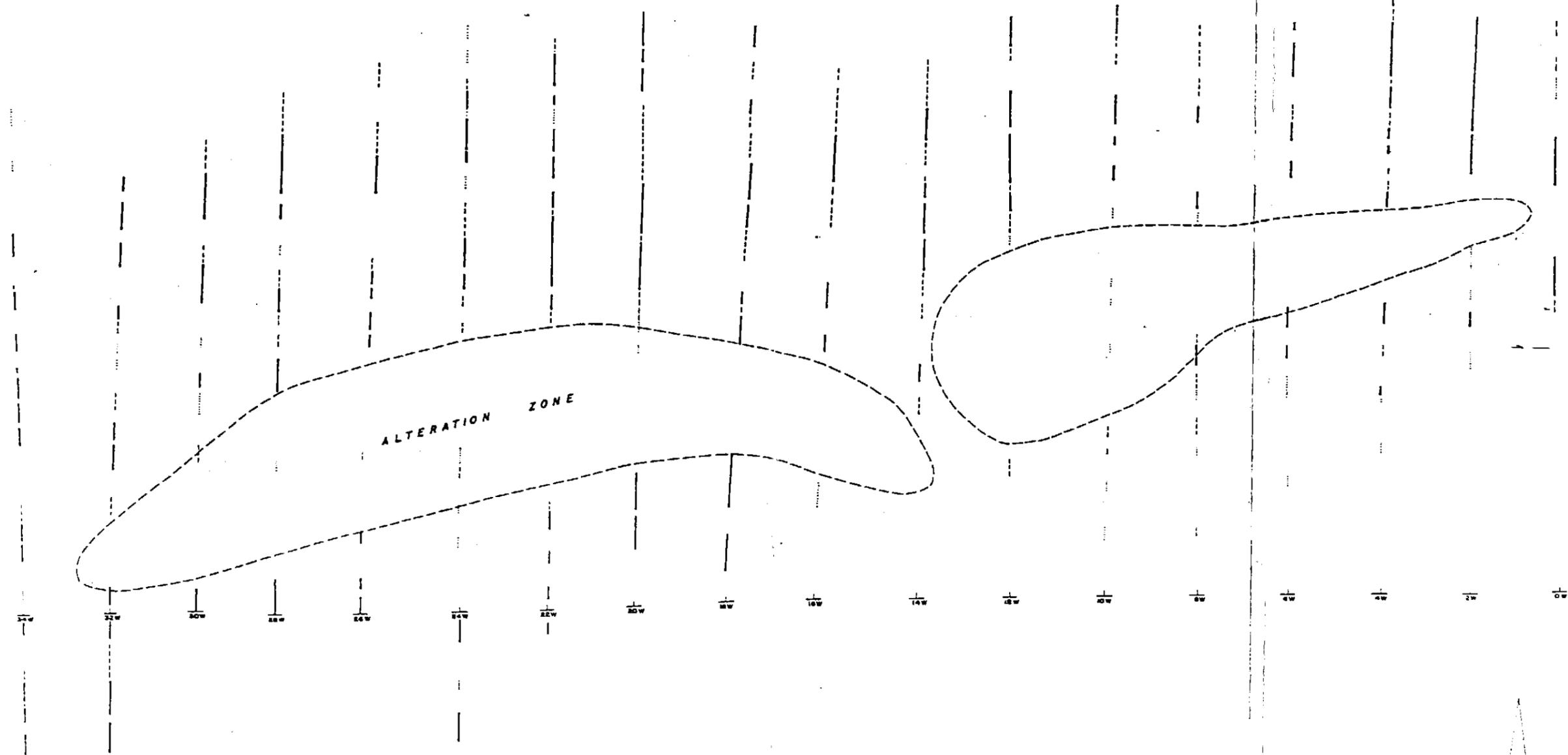


AUSTRALIAN ANGLO AMERICAN LIMITED

MAGNET GRID

GEOLOGICAL INTERPETATION

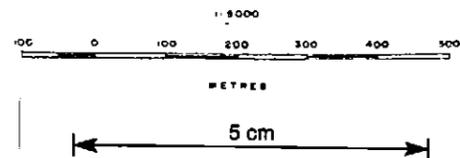
DATE	MAY '76
COMPILED	CSR
SCALE	1:5000



KEY

- Strong intensity profile peaks
- Medium intensity profile peaks
- - - Peaks in generally low intensity profiles

210113



AUSTRALIAN ANGLO AMERICAN LIMITED	
MAGNET GRID	DATE <i>John Smith</i> JUNE '76
GROUND MAGNETICS	COMPILED CSR
	SCALE 1:5000
	TAG/2/773

210114

1.

COMSTAFF PROPRIETARY LIMITED.

REPORT ON THE BISCHOFF SOUTH PROJECT - a reconnaissance
of the Arthur River and its tributaries. 7AP/AM, EL.5/63.

Winter, 1970.

1. INTRODUCTION:

The area covered by this project lies to the west and south-west of Mt. Bischoff, and within a five mile radius thereof. (Map No 1). The project took the form of a stream sediment sampling and regional geological mapping programme covering the Arthur River drainage.

One of the main objectives was to delimit any possible extensions of the Mt. Bischoff mineralisation, whilst another was to see whether determination of the structure in this area might lead to a greater understanding of that of Mount Bischoff and its relationship, if any to the Cleveland (Sn., Cu.) and, now abandoned, Magnet (Pb., Ag.) Mines to the south-west. In addition to these specific aims, the programme also forms part of the regional approach to the entire lease areas.

In topography, climate and vegetation the area is typical of the north-western part of Tasmania, namely well-dissected and drained, very wet, cool and thickly forested. Access to most of the tributaries is fairly good, largely due to the existence of the old Magnet Mine Tramway, now a good four wheel drive track known as the Magnet Line, but access to the Arthur River itself is more difficult and involves more lengthy traverses.

/2. The project.

2.

The project was begun in mid April, and by mid-June by far the greater part of the programme had been carried out. However, geological mapping was continued after this time, and the project was not finalised until almost the end of July, when results were received, plotted and evaluated.

The staff involved in this programme comprised one geologist and from two to six field-assistants.

2. PREVIOUS WORK.

The area is described in Geol. Survey Bulletin 34 "The Mount Bischoff Tin Field" by A. McIntosh Reid, published in 1923, and various other papers dealing with the area in part or in full are also in existence. Most of these publications are more or less contemporaneous with Bulletin 34. Old workings are in existence at Mt. Bischoff, on Tinstone Creek, and at Magnet Mine, and it seems likely that most of the area has been well "fossicked".

Prior to this programme work by Comstaff Pty. Ltd. was restricted to the geological mapping of Tinstone Creek and the geochemical sampling of part of Ritchie Creek. Since neither of these activities has previously been reported, they are incorporated in this report.

3. WORK CARRIED OUT.3.1. Geochemical sampling (Map No 2)

The Arthur River and its major tributaries were cut out and sampled at 500 ft. intervals, whilst minor tributaries encountered were sampled at their confluence with the major drainage and at 200 ft or 500 ft upstream of the confluence according to size. Most of the tributaries were surveyed by

/3. tape and compass.

3.

tape and compass since no suitable base map was available, but on the Arthur River and three tributaries sample intervals were estimated and only rough bearings taken.

Statistical summary:

Drainage channels cut, pegged, surveyed and sampled	13.3 mls.
Drainage channels cut, roughly surveyed and sampled	11.7 mls
TOTAL drainage sampled	<u>25</u> mls.
Samples collected:	322.

3.2. Geological mapping (Map No 3)

As will be seen from the map, this is incomplete, with the greater part of the Arthur River and two tributaries yet to be mapped. At this time of the year the Arthur, which is a large river (c. 50ft wide) is swollen by melted snow and heavy rain, with the result that much of the bedrock "exposed" in its bed and banks is under water, it was therefore decided to leave this mapping until summer, when a far greater proportion of the outcrop will be accessible.

In addition to the drainages mapped, the Magnet Line was also traversed.

Statistical summary:

Road traverses	7.8mls.
Creek traverses	14.1mls.
	<u>21.9mls.</u>

E.L.5/63 & 7AP/AMTHE BISCHOFF SOUTH PROJECT

A reconnaissance of the Arthur River and its tributaries.

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In addition to the drainages mapped, the Magnet Line was also traversed.

3.3. Drafting.

In the absence of a suitable alternative, the geologist involved, in conjunction with the draftsman, prepared a 1:10,000 scale base map, on which all geological and geo-

3.

chemical data were originally recorded. This map was compiled from field surveys and checked by air photo interpretation. Wherever possible the end points of field surveys were fixed from aerial photography, and although some adjustment was necessary, it is felt that the base map thus produced is more accurate than any available alternative.

4. GEOLOGY.4.1. Field Observations (Map No. 4)

By far the greater part of the rocks seen to date are mixed sediments of (presumed) late Pre-Cambrian/early Cambrian age, which show a marked and rapid lithological variation. Almost any short traverse across strike will reveal a number of lithological changes, and it is apparent that the sediments are (relatively) thinly bedded. Almost without exception the sediments exhibit some signs of metamorphism, generally of very low grade. Argillaceous rocks often appear to be slightly baked and indurated, and many exposures show the effects of low-grade dynamo-thermal metamorphism, with the development of jointing, cleavage, possible weak preferred orientation within the petrofabric, and the growth and/or recrystallisation of micas and feldspar.

Well developed cleavage and jointing is so prevalent that bedding is often almost totally obscured, except at the junction of differing lithologies. Fortunately a unit of one lithological type often contains a thin band or bands of another type, thus enabling the orientation of bedding to be determined.

Sediments of the following lithological types are represented within the area, with the observed variation within type being as described:

(a) Sandstone - Generally fine-medium grained, grey, grey-brown, grey-green, orange, orange-brown, dark brown, buff and khaki in colour, the rocks are often micaceous and/or feldspathic and/or tuffaceous, sometimes quartzitic or argillaceous. Most commonly present is a dark brown feldspathic and tuffaceous type, in which some of the feldspar appears secondary (i.e. recrystalline), or as a grey micaceous and feldspathic type.

(b) Quartzite - Usually grey and fine-grained, sometimes argillaceous. It is present throughout the area but is not

4.

common. Occasionally it occurs as small boudin within shaley beds.

(c) Greywacke - rare, grey or green, sometimes^{re} crystallized.

(d) Siltstone - common throughout. Grey, grey-green, dark green, orange, orange-brown, brown, chocolate and khaki, these rocks are sometimes shaly, laminated, fissile, flaggy or banded, less commonly phyllitic or hornfelsic, rarely recrystalline, often argillaceous and micaceous, sometimes felspathic and tuffaceous.

(e) Mudstone - common. Usually khaki or chocolate, also grey, orange-brown and red-brown in colour the rocks are often shaley or massive and well jointed, sometimes phyllitic with secondary (recrystalline) mica.

(f) Shale - true shales are uncommon. When present they are black and carbonaceous, or grey and sometimes phyllitic and/or micaceous.

(g) Slate - rare, grey.

(h) Phyllite - grey, micaceous and restricted in occurrence.

Other rock types seen within the area are quartz-porphyry, serpentine, dolerite and basalt. The porphyry is seen at the eastern end of Tinstone Creek, and is part of the dyke swarm intruding Mount Bischoff whilst the basalt is Tertiary in age and is seen in the south of the area. Exposures of serpentine and dolerite are few in number and scattered in occurrence; The serpentine appears to be restricted to the western part of the area, being exposed only in AR 8250 Creek, MC 132 Creek and MC 4050 Creek.

The most common strike direction is approximately north-east - south-west, with dips being both to the north-west and south-east and varying from 25° to 90° (vertical beds), although predominantly steep. In addition to the north-east - south-west strikes, others trending more nearly north-south and east-west were recorded, suggesting structural breaks of some kind.

Some small-scale (drag) folding was recorded in the field. In all cases the fold axes were approximately north-east -

5.

south-west. A very tight almost parallel-sided isoclinal antiform in which both axial plane and limbs almost correspond to bedding was recorded near the southern end of the Magnet Line. This axis also trended north-east - south-west, and the fold was slightly overturned to the north-west.

Such faulting as was observed appears to be of minor magnitude and consequence.

No significant mineralisation was recorded. Whilst not common, minor quartz veining is seen throughout the area, but such veins appeared barren in all instances. The recrystallised siltstones seen on AR 8250 Creek are pyritised, with pyrite occurring as pods and veinlets, and also disseminated along joint planes. Also on this creek, close to Butler's Road, are two occurrences of gossanous material, one developed along minor fault planes in recrystallized siltstone and carrying pyrite and pyrrhotite, the other occurring on a joint (?) plane in siltstone and containing haematite and minor marcasite.

4.2. Structure and Stratigraphy.

In view of the profusion of lithological types observed in the area, and the rapid changes from one to another, it is difficult to arrive at any correlation between beds, or any stratigraphic sequence, for the area as a whole. However, when lithology is considered in terms of structure, some degree of correlation is possible within each structural unit. Thus before discussing correlation and stratigraphy, it is necessary to describe the structure of the area.

4.2.(a) Structure (Map No. 5)

The dominant feature of the area's structure is the north-east - south-west "grain" imparted by the many strike trends in this direction. The grain is seen in a broad band extending across the north of the area from MC4050 creek in the west to the junction of Tinstone and Ritchie Creeks in the east, and also intermittently along the Magnet Line between this major band and the Waratah-Savage River Road.

Within the major NE-SW band, one major and several minor structures are in evidence. The drag folds mentioned in Section 4.1. lie within this zone, and it is thought that those in Mine Creek, lie close to or on the axis of a

major antiform, the presence of which is indicated by opposing dips on the northern and southern side of the zone. The approximate trace of the antiformal axis is indicated on the map, and conforms approximately to the general NE-SW trend, although appearing to be flexured. Strikes on MC 4050 Creek indicate that the outcrop of the axial zone is closing, and it therefore seems likely that the structure is plunging to the south-west. Since the Arthur River is still to be mapped, it is not possible to trace the antiform beyond the Mine Creek-Arthur River confluence at this time. However, since the zone of NE-SW trending beds extends at least across to the Ritchie Creek-Arthur River junction, it seems likely that the anticline will also extend this far. The postulated extension is indicated on the map, but it is possible that the actual axial trace may lie north or south of the line shown.

In addition to the dominant NE-SW trending block, minor but nevertheless definite trends in other directions are also observed, and there must obviously be some kind of discontinuity between the various structural units.

Although transverse structural trends are apparently indicated by the strikes recorded on the two southernmost Arthur River Tributaries (A3155 and ARB250 Creeks), data within the south western part of the area is very limited, and this will not be discussed further. In the east, however, more information is available, and here at least three cross-cutting trends are present.

At the southern end of the Magnet Line and Ritchie Creek, close to the Waratah-Savage River Road, some strikes trend north-south, cutting across others close to the dominant NE-SW trend. These N-S trending beds are themselves "truncated" to the north by a series of beds trending approximately east-west, as indicated by strikes recorded in Ritchie Creek and on the Magnet Line. To the north of this lineament the beds as seen in Ritchie Creek adopt a north-north-west - south-south-east orientation, until they come up against the major NE-SW block in the north, whilst on the Magnet Line strikes appear disorientated at first, and then as one progresses northwards gradually swing round to conform to the dominant NE-SW trend.

The N-S orientation as observed at the southern end of Ritchie Creek is also seen at the eastern end of Tinstone Creek, and another E-W lineation may occur on the Magnet

Line just east of MLC ⁶⁵⁵⁰ 650 Creek.

The relationship between the various structural units described here is, at this time, rather obscure, but will be discussed briefly in section 6 of this report.

4.2. (b) Stratigraphy. (Map No. 4)

As was noted above, any correlation or stratigraphic succession derived from information currently available can be applied only within that discrete structural unit from which it is derived. It is therefore necessary to consider each of these units in turn.

In the case of the 'minor' units (i.e. those with a grain other than NE-SW), the available data is rather too restricted to draw many conclusions. However the following suggestions are tentatively advanced:-

- (i) The southernmost area of N-S trending rocks comprises a dominantly argillaceous sequence, whilst the northern area with this trend has a sequence of argillites and fine-grained arenites.
- (ii) The E-W trending unit is a succession of thinly-bedded mudstones and sandstones below, and laminated mudstones with minor siltstone above.
- (iii) The NNE-SSW unit is apparently dominantly arenaceous below and becomes more argillaceous above.

Within the major NE-SW block more information is available, and this, together with its structural configuration, allows a more detailed analysis to be made. No evidence of "younging" was seen, but, assuming these beds to be right way up, the succession here is:-

- | | |
|----------------|--|
| <u>Younger</u> | (iii) Felspathic and tuffaceous sandstones and siltstones; mudstones; minor shales. |
| | (ii) Dominant felspathic and tuffaceous sandstones; minor mudstones. |
| <u>Older</u> | (i) Grey shales; phyllites; semi-phyllitic sediments; subordinate quartzites; very minor slates. |

8.

In the southern limb of the antiform, group (i) and (iii) may be seen extending across MC 132 Creek, the Magnet Line, the Arthur River and (in part) MLC 6550 Creek. Because of the plunge of the structure, only group (iii) is seen on MC 4050 Creek, whilst group (ii) is only observed on the Magnet Line and may represent a facies variation within group (iii).

5. GEOCHEMISTRY.

The samples collected were analysed for Ag, Cu, Pb, Sn and Zn, and on receipt of these results selected samples were subsequently analysed for Au, Bi, Co and Sb. Selected samples were also analysed for Mo, Nb, Ta and W.

The analytical results received were plotted as histograms. In the first instance massive "anomalies" in all analysed elements in Mine Creek and Arthur River, which result from the old Magnet Mine tailings, swamped any other anomalies. Histograms were therefore replotted, excluding the results of samples on the drainages (and in the case of Sn also excluding results from Tinstone Creek, which drains Mt. Bischoff), and thresholds are calculated from them.

Thresholds were as follows:-

<u>Ag</u>	7 ppm
<u>Cu</u>	110 ppm
<u>Pb</u>	360 ppm
<u>Zn</u>	240 ppm
<u>Sn</u>	100 ppm

and samples with results in excess of these values are shown as anomalous (Maps No. 6 and 7).

In the case of the selected samples analysed for additional elements, the numbers involved were too small for histogram-derived thresholds to be statistically acceptable, and in these instances arbitrary levels have been selected to distinguish between anomalous and non-anomalous values. Gold was not detected in any of the samples, and no antimony values (maximum 300 ppm) were considered to be anomalous. One bismuth value (300 ppm)

was considered anomalous, as were all cobalt values in excess of 60 ppm (5 samples). No anomalies were recorded in Mo, Nb and Ta, but certain results in W may approach threshold.

Anomalous drainages are indicated on Maps 6 and 7, and are:-

(i) Mine Creek and the Arthur River Downstream of Mine Creek.

These are anomalous for Ag, Cu, Pb, Zn and Sn, presumably as a direct result of tailings from the Magnet Mine. Maxima are extremely high, being:-

Ag	810 ppm
Cu	1,200 ppm
Pb	1.7%
Zn	16.0%
Sn	1.94%

It is, of course, quite possible that these massive "anomalies" derived from tailings mask true anomalies within these drainages.

One point to be noted concerning these anomalies is that tin mineralisation has not been reported from the Magnet Mine, so that the tin values here may indicate a substantial anomaly. However, if this is the case the anomaly is open-ended and appears to originate outside the lease boundary.

(ii) A 32 Creek

Anomalies in Ag, Cu, Pb, Zn and Sn are also recorded on this tributary of the Arthur River. They are restricted to the lower reaches, within a low-lying swampy area adjacent to the Arthur, and are considered to result from contamination by the Arthur.

(iii) MLC 6550 Creek

Anomalies in Ag, Cu, Pb and Zn are considered to result from contamination from the Magnet Line.

10.

(iv) MC 4050 Creek

Low level anomalies in Zn and one anomalous sample in copper near the head of this creek may be basalt-derived.

(v) MC 132 Creek

The lower reaches of this creek show low level anomalies in Zn. These are restricted in occurrence to an area that is in all probability an old flood plain of Mine Creek, and can therefore be disregarded.

(vi) The Arthur River Upstream of the Mine Creek Confluence.

Between Mine Creek and the Magnet Line anomalies in Ag, Pb, Zn and Sn were recorded, whilst upstream of the Magnet Line are anomalies in Zn, Sn and Co. Those in the latter element may be of interest as they appear to occur on a NE-SW trend reflecting the grain of the major structural block. However it is possible that they may only indicate a raised background over a particular rock type.

It may be noted that the Zn anomalies on the Arthur River just south of the Mine Creek confluence, on lower MC 132 Creek and on upper MC 4050 Creek also follow the NE-SW structural trend.

(vii) AR 8250 Creek

This creek shows anomalies both in Zn and Sn. In the case of the former, the anomaly is low level, and probably relates to the Tertiary Basalt seen near the head of the creek. The anomaly in tin is open-ended, and probably originates outside the lease boundary just to the south of the Waratah-Savage River Road, where there is an area with several small alluvial tin workings on Devonian granite.

(viii) Ritchie Creek upstream of Tinstone Creek.

Two tributaries show minor anomalies in Zn, possibly dolerite - or basalt-derived, whilst a third has a low - level anomaly in Sn.

(1X) Tinstone Creek and Ritchie Creek downstream of its confluence.

These are anomalous for Sn throughout and for Zn in their lower reaches. Some of the tin values may result from Mount Bischoff, but values fall coming downstream from there and then rise sharply to 1% along a zone extending for about 1,000 ft. on either side of the Tinstone Creek-Ritchie Creek confluence (Map No. 8). This zone corresponds with the anomaly in zinc, and one or two samples here may also be anomalous for tungsten.

Samples taken on a right-hand tributary of Tinstone Creek, almost due south of Mt. Bischoff showed anomalies in Ag, Cu, Pb, Zn, Sn and Bi which may be related to the Mount Bischoff ore-bodies.

6. CONCLUSIONS.

It was seen in section 4 that the majority of the rocks within this area are of sedimentary origin, that their lithologies are very mixed and varied, and that many of the sediments are felspathic and/or tuffaceous. It would therefore appear that the sediments were derived from a nearby landmass that was undergoing rapid erosion, that they were transported rapidly, and that they were deposited in an environment of fluctuating sea-level. It also appears that the period of deposition was one in which volcanic activity was occurring, and since deep water sediments are almost entirely lacking that the depositional environment was relatively near shore.

The presence of three or four cross-cutting structural trends indicates some measure of structural complexity, and some form of structural and/or depositional discontinuity must be postulated between each of the structural units. Unfortunately, there is no evidence to indicate the relationship between these units, but the fact that the NNW-SSE block appears to be cut off by the main NE-SW block could be explained by the former overlying the latter unconformably. This, however, is an extremely tentative hypothesis. Completion of geological mapping within the area and that of Mount Bischoff itself may enable a more comprehensive structural interpretation to be made.

12.

From the evidence currently available, it seems that there is no direct structural link between the Mt. Bischoff Mine Area and the Magnet Mine. The latter lies to the north of the antiformal axis, whilst this axis passes to the north of the Bischoff Mine Area.

It is significant that the dolomite which is host rock to the Mount Bischoff mineralisation has not been observed within the area mapped. This would suggest that the dolomite at Mount Bischoff is structurally or depositionally a discrete body.

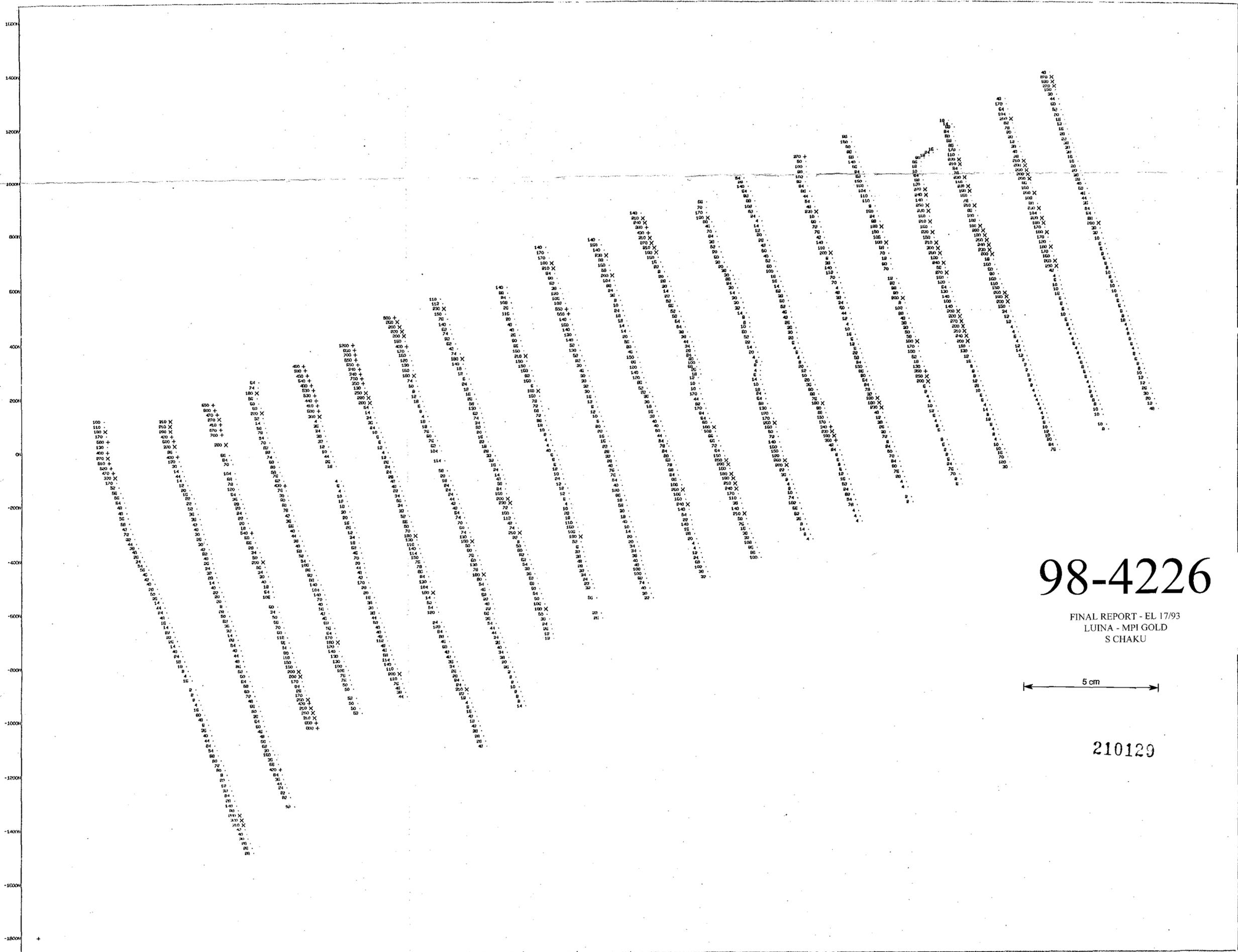
The geochemical data obtained from this project indicates that an extension of the Bischoff mineralisation may possibly occur near to the junction of Tinstone and Ritchie Creeks.

7. PLANS

<u>Plan No.</u>	<u>Title</u>	<u>Scale</u>
1	Mt. Bischoff Area Regional Locality Plan	1:500,000
2	Mt. Bischoff South Geochemistry	
3	Mt. Bischoff South Geology (Extent of Mapping)	
4	Mt. Bischoff South Geology	1:20,000
5	Bischoff South Geology - Structural Interpretation	1:20,000
6	Mt. Bischoff South Anomalies Stream Sediment Samples - Ag, Pb, Zn, Bi.	
7	Mt. Bischoff South Anomalies Stream Sediment Samples - Co, Cu, Sn, W.	

H. R. Robison

JANUARY, 1971



98-4226

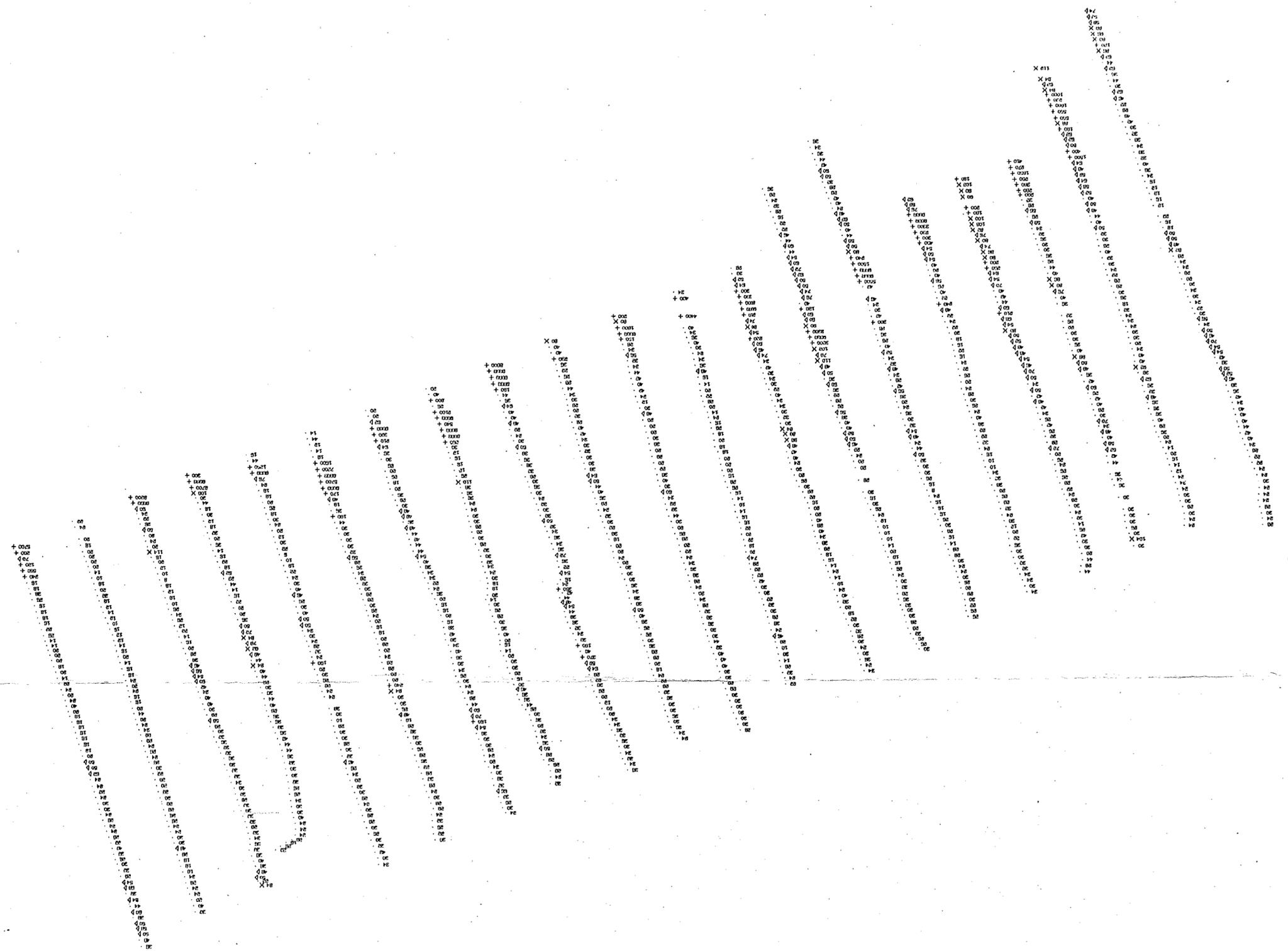
FINAL REPORT - EL 17/93
 LUINA - MPI GOLD
 S CHAKU

5 cm

210129

41 h
 Ni
 330 +
 180 - 333
 - 178

- 41 -
- 45 - 79 ○
- 80 - 114 ○
- 115 + ○



98-4226

FINAL REPORT - EL 17/93
LUINA - MPI GOLD
S CHAKU

5 cm

210130

9d
17

100

104 - 149

150 - 212

220



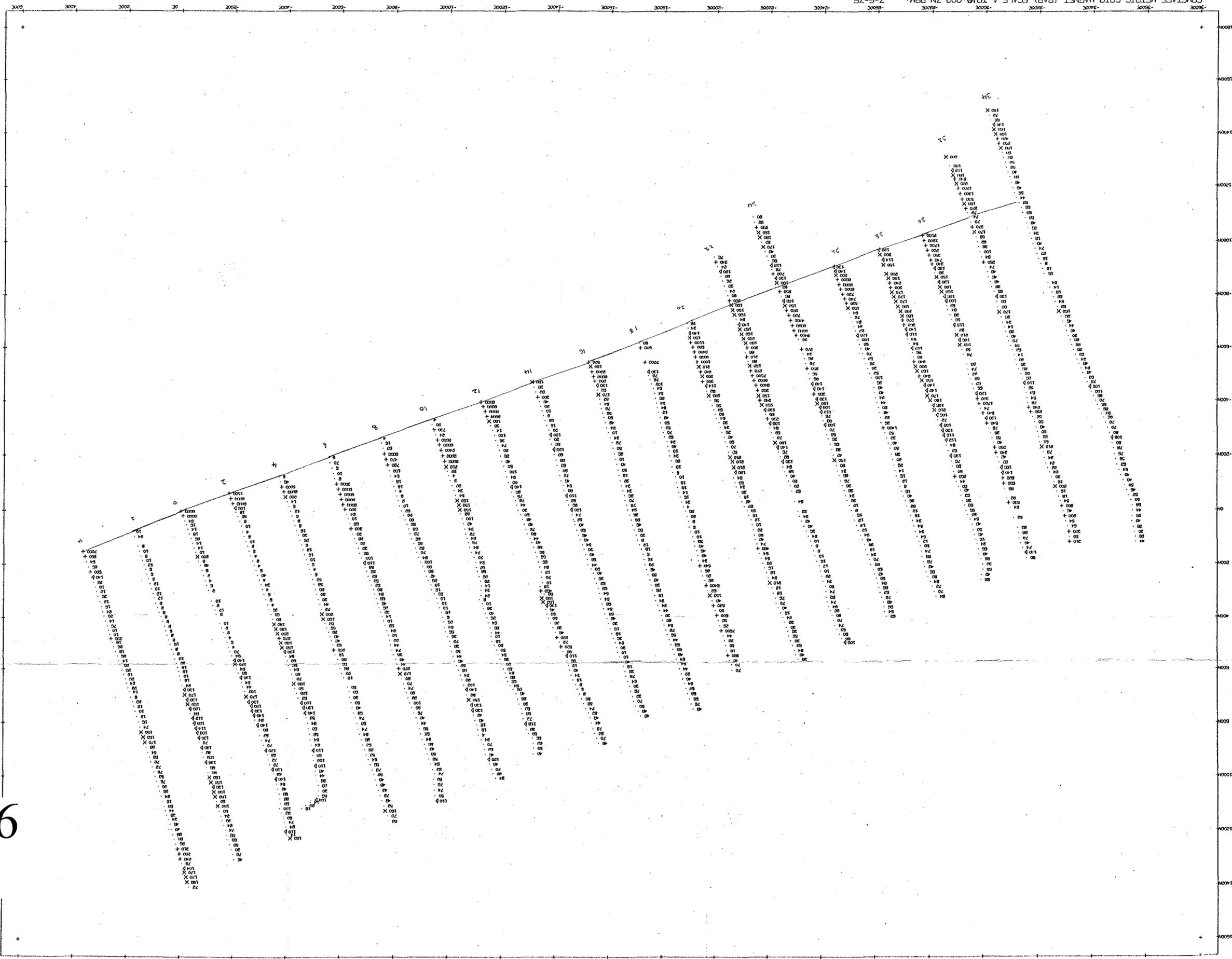
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Z
5

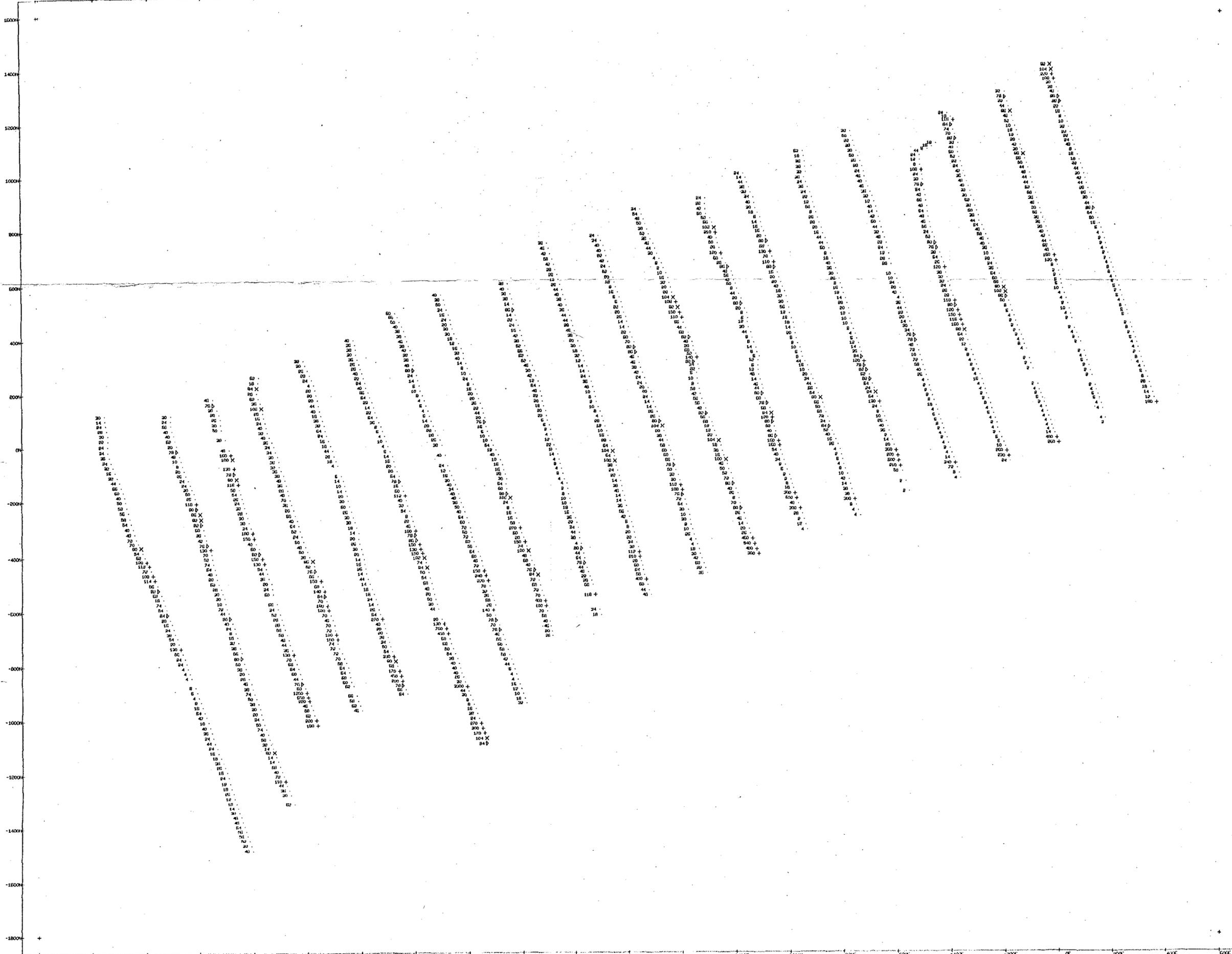
210131

98-4226

FINAL REPORT - EL 17/93
LUINA - MPI GOLD
S CHAKU

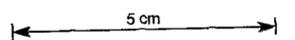
5 cm





98-4226

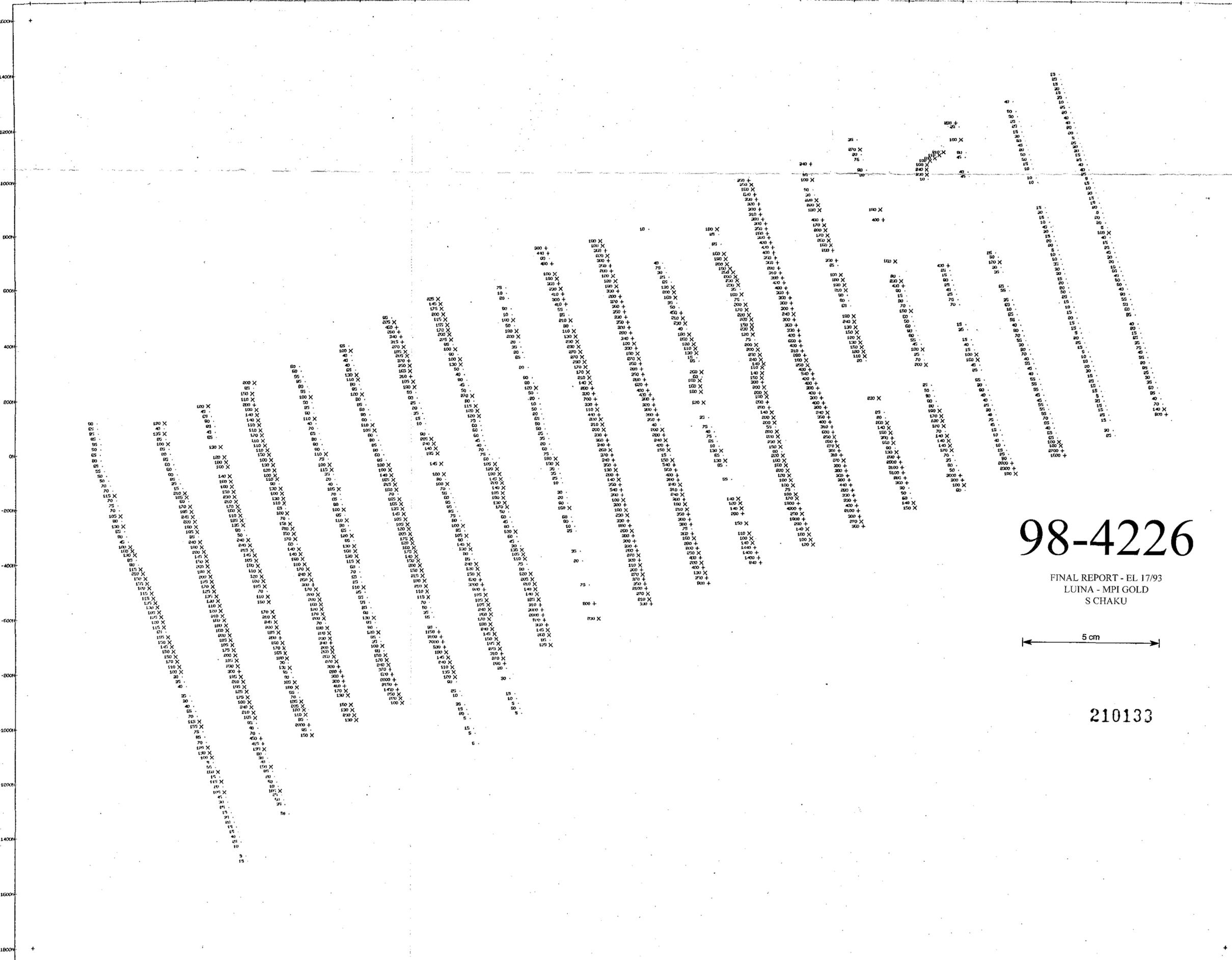
FINAL REPORT - EL 17/93
 LUINA - MPI GOLD
 S CHAKU



210132

- ⊕ 108 +
- ⊗ 90 - 107
- ⊖ 75 - 89
- 74

CU



"Ag" - PPB
Hg

98-4226

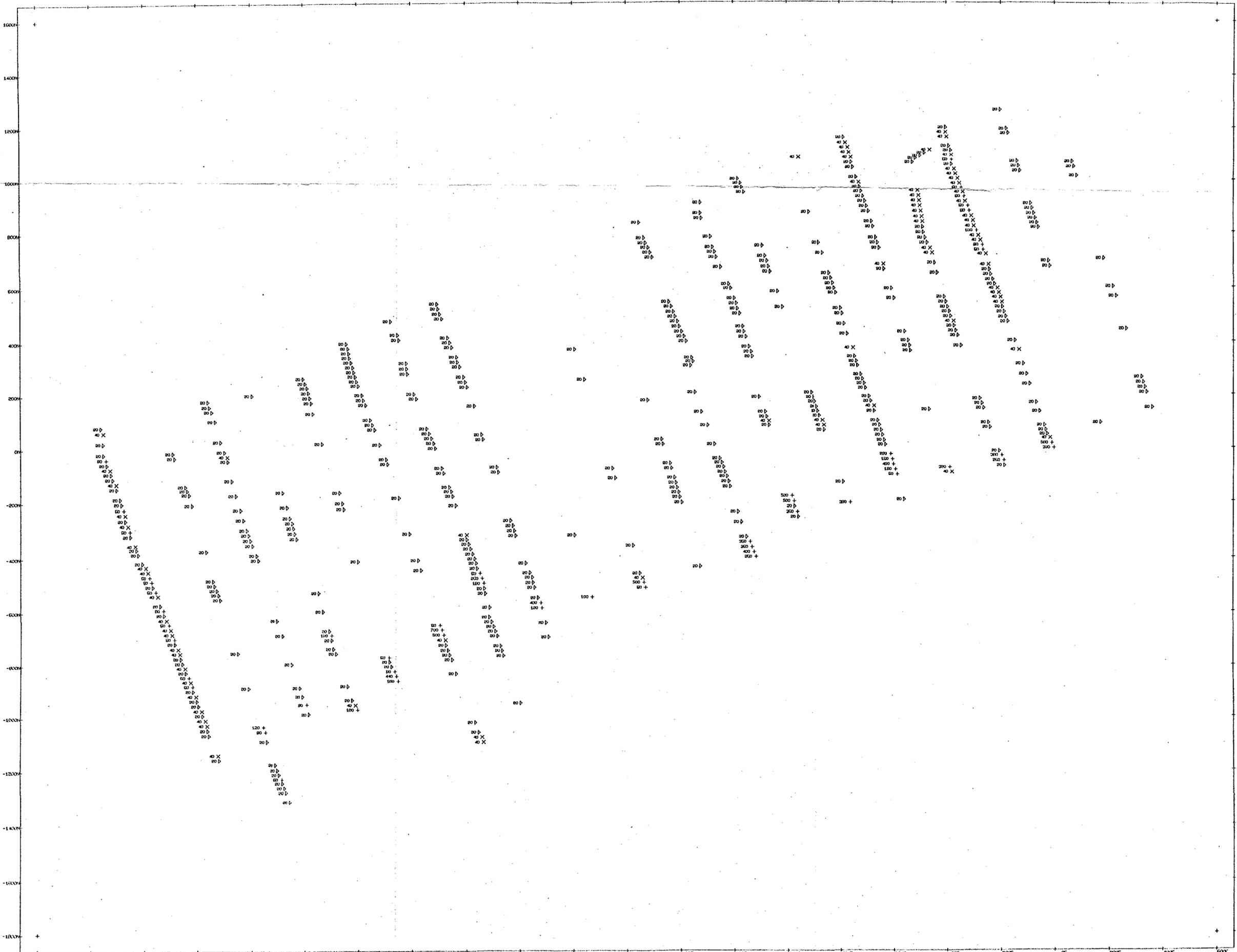
FINAL REPORT - EL 17/93
LUINA - MPI GOLD
S CHAKU

5 cm

210133

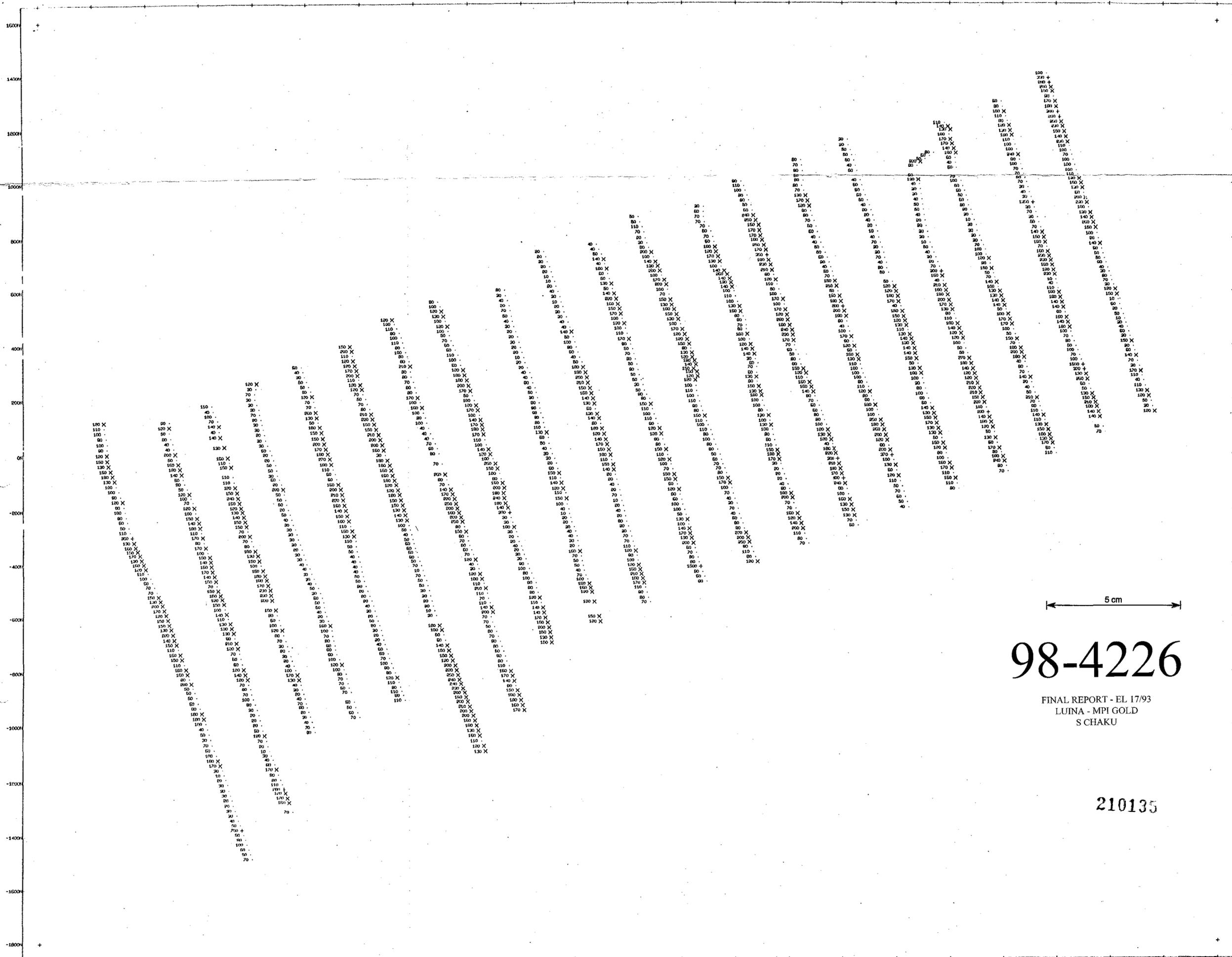
○ + 200 +
○ x 100 - 275
○ - 50
○ - 75

98-4226



- ⊕ 42 +
- ⊗ 30 - 41
- △ 6 - 23

SN



98-4226

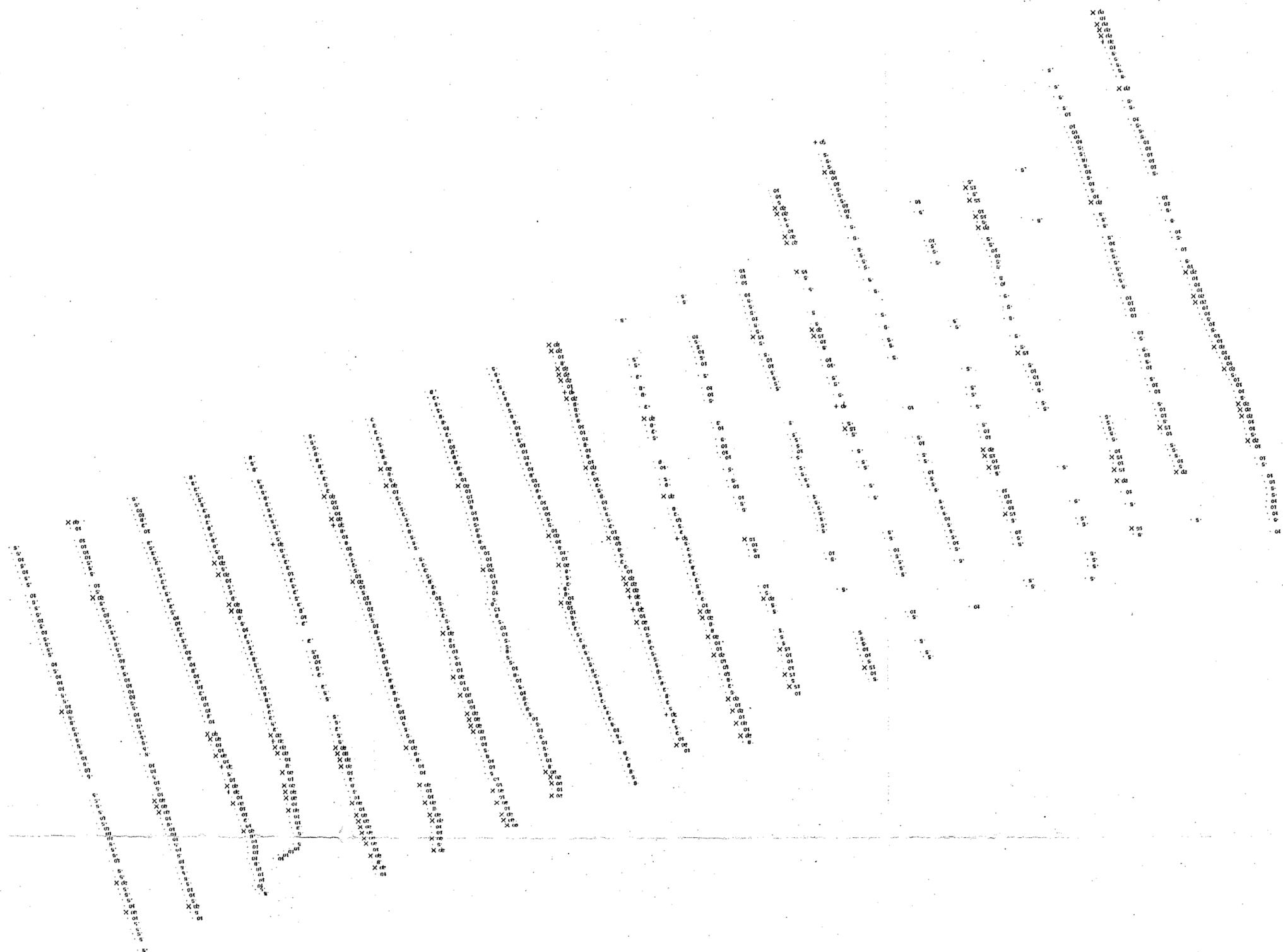
FINAL REPORT - EL 17/93
 LUINA - MPI GOLD
 S CHAKU

210135

⊕ E80 +
 ⊗ 120 - 279
 - 119

Ba

1.4
0.2 - 5+
1.4



50

210136

98-4226

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LUINA - MPI GOLD
S CHAKU

