

Mineral Leases:-

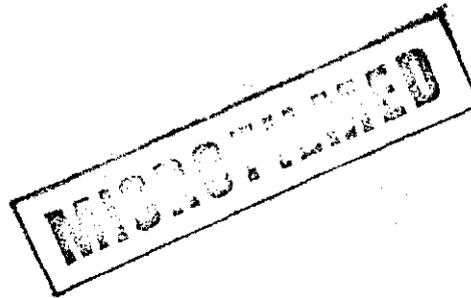
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- 10002/M ✓
- SL9075/M ✓
- SL9300/M ✓
- SL9749/M ✓
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ELECTROLYTIC ZINC COMPANY OF AUSTRALASIA LIMITED

West Coast Mines



READ-ROSEBERRY LEASES

Report for Year Ended 26th June, 1984.

E.Z. Report No. T196

T.C. Lees,
August, 1984



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1. INTRODUCTION

This report summarises exploration carried out on the Read-Rosebery Mine Leases during the 12 month period to 26th June, 1984. It supplements the previous report on the Mine Leases, to September, 1983 (E.Z. Report 170).

Exploration has concentrated on mapping the southern part of the Mine Lease, from 5,370,000N south to White Spur and Mt. Read.

Drilling has commenced on the program aimed at testing prospective zones on the northern part of the Mine Lease. The first successful hole (DP 259) intersected 0.20m of semi-massive pyrite-sphalerite together with oolitic carbonate, in a sediment sequence comparable to the Rosebery host rocks. Siliceous alteration occurs both structurally above and below the mineralisation, while chlorite-biotite-magnetite-tourmaline-minor Au alteration occurs below the mineralisation.

Exploration on the southern part of the Mine Lease has recently been concentrated on the Au-Ag potential of South and West Hercules, where some significant Au-Ag intersections are known from existing drill holes.

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2. WORK CARRIED OUT, 1983-84

2.1. Gridding

The only gridding carried out during the year was by Getty Oil & Development Corp. (Getty) on the northern part of the Mine Lease and Mt. Black for the Rosebery East Joint Venture; some of these lines entered or crossed the Mine Lease.

2.2. Previous Exploration

Previous exploration on the southern part of the Mine Leases has been concentrated around the Hercules Mine, with smaller drilling programs in the Jupiter Mine area, the Dallwitz Prospect, and one drill hole south of Koonya.

Throop (1974, 1975) did good work south of Hercules, with a program of short drill holes which intersected some high grade Pb-Zn, and high Ag and Au values with low grade Pb-Zn. Follow-up deeper drilling apparently failed to intersect similar mineralisation.

At West Hercules, two drill holes to test the Pb-Zn soil anomaly, in effect drilled the Western Sequence contact.

Two short holes at North Hercules tested the thin Pb-Zn-barite lode at Ring P.A. A deeper test was completed by H955. No mineralisation was intersected.

Several deep surface drill holes have tested the Hercules-South Hercules mineralisation at depth with apparently poor results. Unfortunately, core from H710 was "skeletonised" and left on site - what remains is virtually useless.

Several holes of the H950's series apparently intersected host rocks but with "no significant mineralisation". Effort should be made to relog and sample these holes, especially in the light of recent Au-Ag investigation. At present, core is inaccessible behind other core stacks.

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Detailed mapping and geophysics was followed by drilling of several drill holes on White Spur; these intersected shales and pelitic ash amongst lithic tuffs of the Western Sequence.

I.P. programs have been undertaken at Hercules and South Hercules, and successfully located high grade mineralisation in L-M lode and Dunn's shaft area. Disseminated mineralisation was drilled in the follow-up programs west of Hercules and is fairly widespread at South Hercules.

Gradient I.P. was also used at South Dallwitz, North Hercules and White Spur.

Early dipole-dipole I.P. by McPhar Geophysics in 1960-62 covered substantial areas of the Mine Lease; it was also used on White Spur, Koonya, and the Natone Grid.

Turair and follow-up Turam were used on the Dallwitz, South Hercules and White Spur grids. Aeromagnetic data was obtained as Turair was flown, but poor location of flight lines and lack of control led to poor quality results - the area was re flown for magnetics.

No ground magnetics have been carried out on the southern part of the Mine Lease.

2.3. Geological

Mapping was largely confined to the southern part of the Mine Lease. Various grids cover the area - the Hercules Grid on the western side of the Mt. Read Rd., and the Stitt and Dallwitz Grids to the east. Good outcrop on the Mt. Read-Mt. Hamilton plateau, together with easier access, enabled more detailed mapping of that area. A considerable area outside the Mine Lease, on E.L. 1/62, was mapped to enable better interpretation of the geology (see Fig. 1). 1:5,000 scale geological plans are included as Plans 1, 2, 3 and 4.

Additional lines cut on and adjacent to the northern part of the Mine Lease by Getty for the Rosebery East J.V., were mapped.

Petrological examination of selected samples has been used as an adjunct to mapping.

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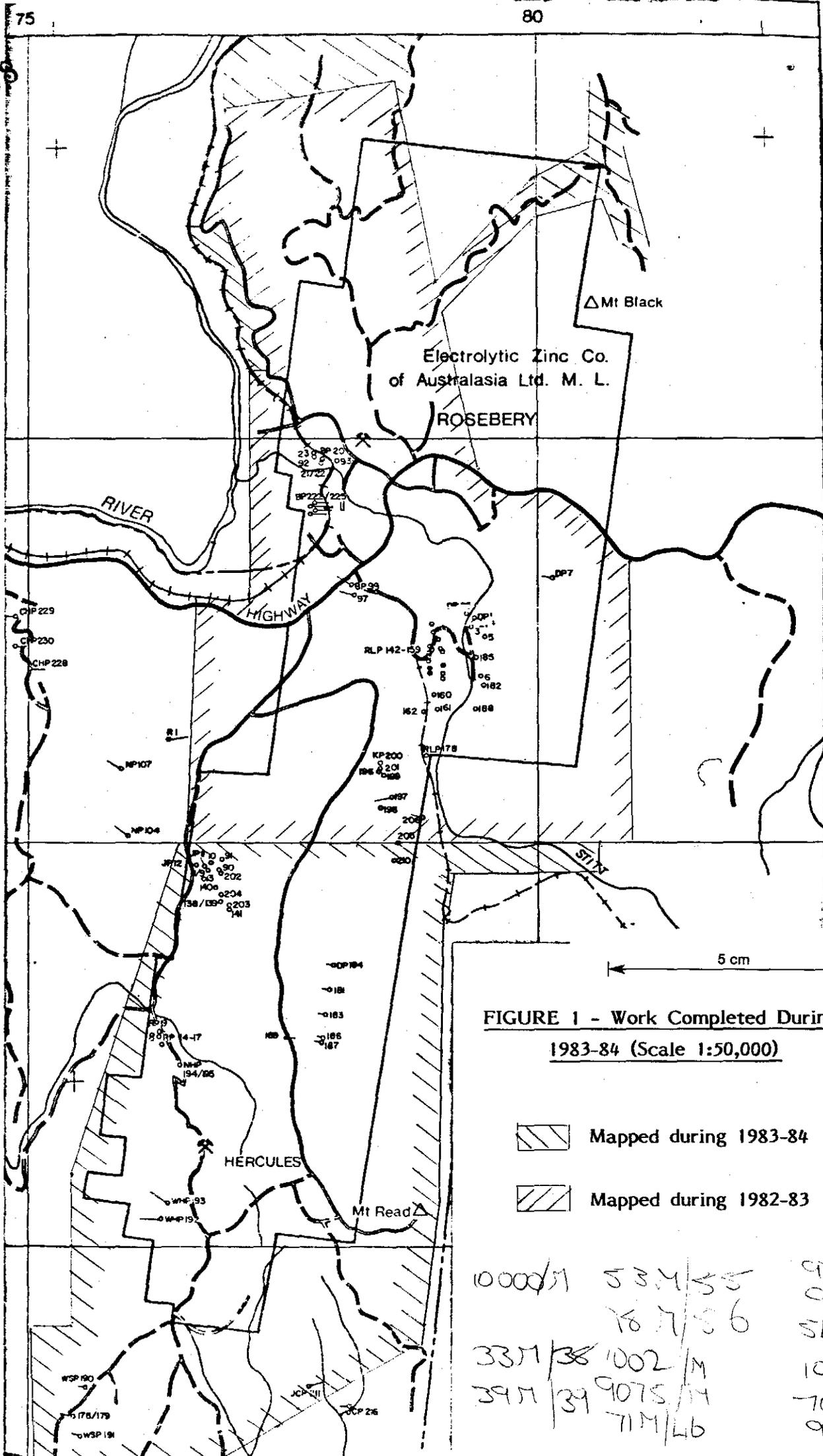


FIGURE 1 - Work Completed During 1983-84 (Scale 1:50,000)

-  Mapped during 1983-84
-  Mapped during 1982-83

10000/31	53M/55	9769/M
	787/56	9300/M
33M/38	1002/M	54M/55
39M/39	9075/M	10635/M
	71M/46	70M/46
		99M/56

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Limited rock geochemistry has been obtained. Several samples from widely spaced, isolated outcrops of the sediment horizon on Mt. Read have low base metal values. Whole rock analyses of selected rocks in the Hercules area have outlined broad geochemical characteristics of altered and unaltered footwall, host and hangingwall rocks.

Several drill holes on and adjacent to the Mine Lease have been relogged; these include BD1 and CS1, drilled by Getty adjacent to the Mine Lease at Bobadil and Cutty Sark; KP 197 and KP 210 (Koonya area); JP 202, JP 203, JP 204 (Jupiter area), NHP 194 (North Hercules); H 603, H 953 (West Hercules); and WSP 190, WSP 191 (White Spur). Summary logs are included as Appendix 2.

Drilling of the Mine Lease program commenced late in the year. In the Dalmeny area, the first drill hole, DP 257 flattened excessively and was redrilled as DP 259, which intersected 0.20m of semi-massive sphalerite-pyrite in a sediment sequence.

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3. GEOLOGY OF THE MINE LEASE AREA

3.1. Stratigraphic Setting

The geology of the northern part of the Mine Lease has been described by Lees (1983) (E.Z. Report 170); also Green (1983) and Brathwaite (1969).

The main geological elements of the Mine Lease and adjacent area, are:

- Rosebery Group sediments, conglomerate and tuffs.
- Western Sequence quartz-phyric tuffs and sediments.
- Central Sequence feldspar-phyric tuff and minor sediments.
- Massive rhyolitic, dacitic, and andesitic lavas.

Several distinctive units - the Salisbury Conglomerate, Natone Volcanics and Stitt Quartzite, together with Chamberlain Shale, comprise the Rosebery Group as seen west of Rosebery and in the Moores Pimple area. Western Sequence rocks occur as a thin slice between the Rosebery Group and Central Sequence near the Dalmeny Estate, and outcrop extensively from Williamsford onto White Spur, again between the Rosebery Group near Moores Pimple and the Central Sequence Volcanics.

Central Sequence Volcanics occupy a belt extending from north of Rosebery southwards on to White Spur and beyond.

Massive rhyolite-rhyodacite lavas and intrusives occur extensively on the slopes of Mt. Black, and from Dalmeny to Mt. Read. Andesitic/trachytic flows and minor basalts occur with rhyolites in the Stitt River Valley and on the Murchison Highway.

3.2. Rosebery Group

West of Rosebery and adjoining the Mt. Read Volcanics is a series of unfossiliferous quartzites, shales, slates with felsic volcanic and conglomerate horizons.

The sequence is apparently faulted out in the vicinity of the Jupiter Mine, but reappears several kilometers to the south-south-west on the flanks of Moores Pimple.

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Stratigraphic interpretations of the Rosebery Group have been many and varied, with some authors favouring a west-facing sequence (Loftus-Hills, et.al., (1967), Brathwaite (1969)) and others an east-facing sequence (Hall et.al. (1953), Campana & King (1963)). Green (1983) explains apparently contradictory facings of different units in the Rosebery Group by a series of tectonic slides between some of them.

The major units of the Rosebery Group, as occurring in outcrop from west to east, are described below.

3.2.1. MUNRO CREEK SLATE

Slates and quartzites from the Munro Creek Slate have been included by previous authors as belonging to the Rosebery Group, but outcrop to the west of the area mapped.

They consist of thinbedded and slumped quartz-wacke, feldspar-wacke and shales and slates; often pyritic.

3.2.2. WESTCOTT ARGILLITE

The Westcott Argillite only outcrops in the mapped area on the Williamsford Road, but is known from DDH MD1 (Natone area), the Natone track, and the Pieman River.

It consists largely of dolomitic siltstone, sandstone and shale, with minor conglomerate bands, and grades into the Salisbury Conglomerate.

Some fuchsite bearing carbonate rocks have been mapped in the Natone Creek area by I. Mathison (E.Z. maps) but these may well be carbonated ultramafics by analogy with similar rocks from Moores Pimple which Fander (1984) (C.M.S. Report 84/3/36) describes as ultramafic rocks with intense silicification complexed by sideritic carbonation.

3.2.3. SALISBURY CONGLOMERATE

The Salisbury Conglomerate outcrops extensively on Moores Pimple, on the Williamsford Road, in Natone Creek and the Pieman River.

Thickness is variable, from 5m to 100m, of open, matrix-supported fuchsitic conglomerate. Clasts are predominantly chert, quartzite and black slate, and less commonly carbonate, phyllite, fuchsite and mafic

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volcanics. Matrix may be composed of fragmental chert or dolomite (Campana & King, 1963).

The fuchsite composition of the green muscovite, originally reported by Finucane (1932) has been confirmed by analysis carried out by the Tas. Mines Department, and contain $>1\%$ Cr_2O_3 (K. Corbett, pers. comm. 1984).

In the Natone area, the conglomerate dips steeply but variably east to west, and has consistent east facings in DD MD 1 (G. Green's log). On Moores Pimple east-dipping sand-supported volcanomict conglomerate contains clasts of felsitic pitchstone, vitric tuff, sericitic pelite and quartz grains (Fander, C.M.S. Report 84/3/36) and is associated with silicified, carbonated ultramafics and quartz-phyric tuffs and lavas similar to the Natone Volcanics.

In the Pieman River Gorge north of Rosebery, Campana & King (1963) noted a 60 foot-thick fuchsitic breccia-conglomerate of argillaceous pebbles and dolomitic bands, but that the Natone Volcanics are apparently absent. They note a pyritic quartz fissure lode about 10 feet wide which may well be a quartz-filled fault, at the upper (eastern?) contact of the conglomerate.

Conglomerate and pebble bands occur within tuffs of the Natone Volcanics on the Williamsford Road and indicates the processes forming the conglomerate continued, as ash flows of the Natone Volcanics were deposited.

The conglomerate is interpreted to be a braided stream deposit.

3.2.4. NATONE VOLCANICS

The Natone Volcanics outcrop on the Williamsford Road and Murchison Highway, and typically consist of white, cleaved and sericitised fiamme-bearing ashflow tuffs, locally with pebble bands, black slate fragments, and occasional quartz phenocrysts. Minor pyrite is present locally. Possible correlates occur in the Moores Pimple area, with quartz-phyric tuff, volcanic breccia, and quartz-feldspar rhyolitic pitchstone described from the area by Fander (C.M.S. Report 84/3/36). The volcanics are apparently absent in the Pieman River Gorge.

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On the Williamsford Road, the Salisbury Conglomerate occurs as a band within the Natone Volcanics, which dips sub-vertically and faces east. The contact between east-facing volcanics and west facing Stitt Quartzite is not exposed, although Campana & King's (1963) 'quartz-fissure lode' may well represent the fault contact.

The Natone Volcanics are interpreted as subaerial, welded (in part), ashflow tuffs which were deposited as valley flows. Stream deposits (conglomerate and pebble bands) are intercalated with the volcanics in places.

3.2.5. STITT QUARTZITE

Stitt Quartzite outcrops extensively due to its resistance to erosion, and extends in a belt from the Pieman River near Bastyan Dam to the Jupiter Mine, where it is truncated by a major fault. It is present again south of Williamsford and is exposed on the east ridge of Moores Pimple.

Two main facies are present - thick-bedded, massive resistant well sorted micaceous quartz arenite to quartzite with thin shaley or slaty bands, and thinly bedded sandstone-siltstone-shale, often showing graded bedding.

The quartzite consistently faces westwards and is bound to the west by the fault contact with Natone Volcanics or Salisbury Conglomerate. A conformable contact with the older Chamberlain Shale to the east is known from drill holes north of Rosebery.

Dips in the quartzite vary widely but are consistent within each of several structural domains. These domains are bound by major structural features - the fault contact between Stitt Quartzite-Chamberlain Shale and Mt. Read Volcanics; the "Rosebery Axis" - a faulted, post-cleavage anticlinal structure; the Jupiter Fault which truncates the Rosebery Group at the Jupiter Mine; the Concliffe Creek Fault and Bather Creek Faults (extensions of the Jupiter Fault) which control the distribution of the Rosebery Group south of Williamsford.

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i) Bobadil - Pieman Gorge Area

Stitt Quartzite and Chamberlain Shale consistently dip east and face west. The contact with Mt. Read Volcanics dips at 40°E and has been confirmed by drill holes BD1 and BD269 south of Bastyan Dam. Fifty to sixty metres of shale-dominated sequence was intersected in both holes before graded sandstone-siltstone, and then later quartzite, which indicates the Stitt Quartzite also dips underneath the volcanics at approximately 40°E.

ii) Bobadil to Jupiter

The trace of the "Rosebery Axis" separates east from west dipping quartzite and shale. The west-dipping and facing sequence extends southward to the Jupiter Mine, where the Rosebery Group is truncated by the Jupiter Fault.

iii) Williamsford Area.

Quartzites, sandstones, shales and slates correlated with the Stitt Quartzite and Chamberlain Shale, outcrop south of Williamsford.

Apparent interfingering with the Western Sequence going south may be a result of folding.

iv) Moores Pimple Area

Micaceous sandstone, siltstone and greywacke east of Moores Pimple dip steeply but facings are again to the west.

A syncline is inferred near the western margin of the Stitt Quartzite by easterly facings in the Salisbury Conglomerate and the predominance of westerly facings in the quartzite, but a faulted syncline is more probable, as there is no known area where lithologies can be correlated across a synform.

Of the two lithofacies represented, the thin, graded sandstone-siltstone-shale sequence are turbidites, while the clean, well-sorted sand and minor shale are possibly channel-turbidites. The Chamberlain Shale-Stitt Quartzite may be regarded as a coarsening-upward sequence, which may have been produced by a prograding delta or barrier beach deposit.

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3.2.6. CHAMBERLAIN SHALE

The Chamberlain Shale outcrops along the Flume Road and in the Stitt River, where it consists of laminated shales and siltstone. In the Pieman River gorge, a tectonic breccia of rolled, contorted sandstone balls in a crumpled slaty matrix is the deformed Chamberlain Shale in fault contact with the Mt. Read Volcanics. A similar faulted contact occurs in drill hole BD1 but the shales and slates are less deformed in BD269 further south.

In the Bobadil area, the shale is 50-60m thick, and dips under the Mt. Read Volcanics at about 40°. It consists of laminated shale-siltstone with minor thin sandstone beds, is locally graphitic and has very fine grained semi-massive pyrite in thin bands over several metres. Limited facing data is to the west. The formation change to Stitt Quartzite occurs suddenly but conformably when graded sandstone-siltstone beds dominate over siltstone-shale.

A thin shale is commonly present between the Mt. Read Volcanics and Stitt Quartzite north of Jupiter Mine and south of Williamsford, and is probably the Chamberlain Shale.

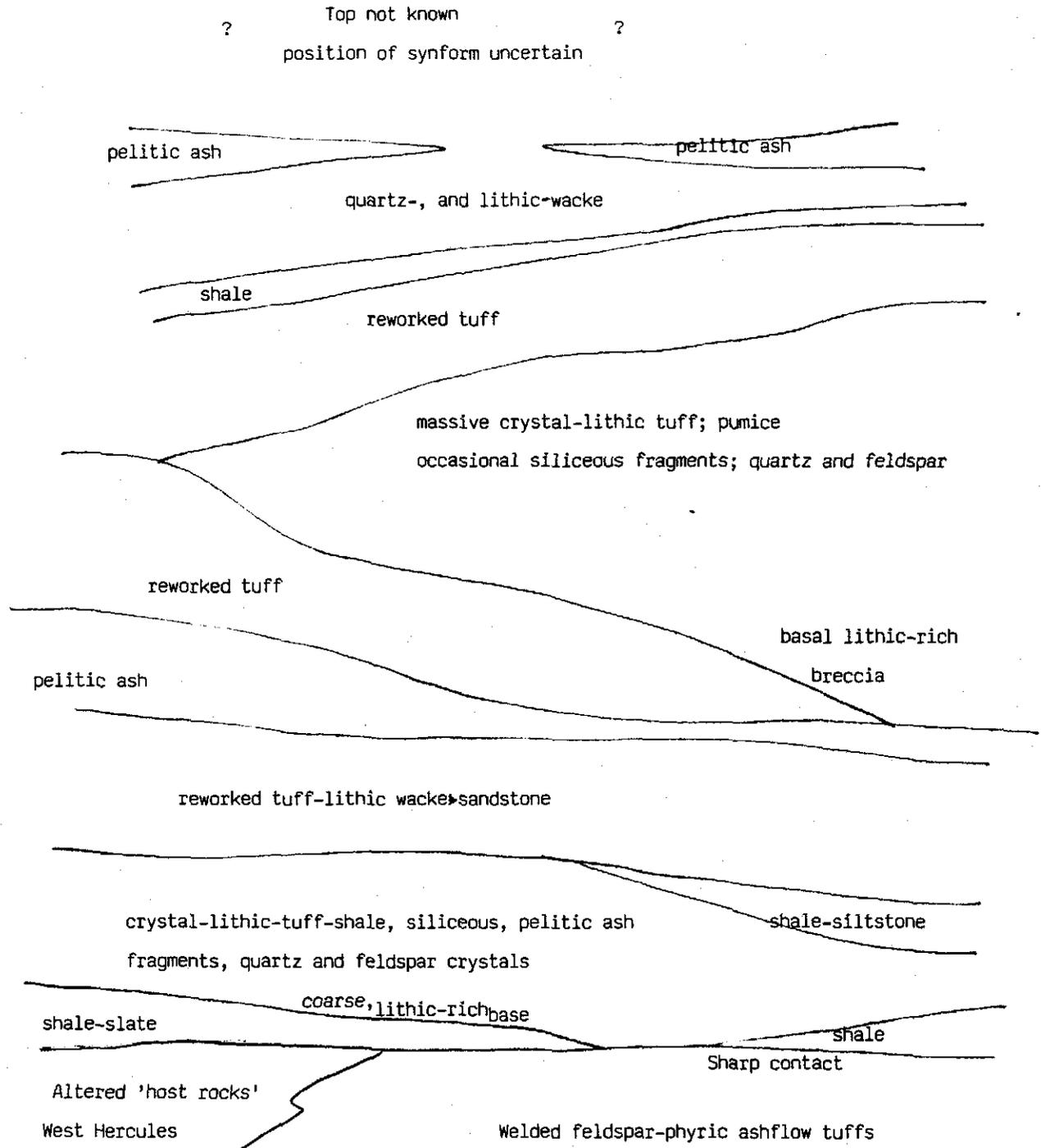
The shales are interpreted as having been deposited below wave base in either marine or lacustrine conditions.

3.3. Western Sequence

The Western Sequence of Corbett (1979) consists of a thick sequence of greywacke, turbidites, siltstone, mudstone and intercalated volcanics, which, apart from initial tholeiitic volcanism, are quartz-phyric. Corbett (op.cit.) regarded the Western Sequence as an older, pre-rift sequence but recently (pers. comm. 1984) conceded that it is younger than the Central Sequence. It is well exposed on White Spur, from South Hercules to near Moores Pimple, northwards to near Williamsford.

3.3.1. STRATIGRAPHY

Fig. 2 shows the stratigraphic sequence exposed on White Spur.



**FIGURE 2 - Diagrammatic Stratigraphic Chart of the
Western Sequence on White Spur.**

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The shale at the contact of Central and Western Sequences dips west at 40 to 80°. Limited facing data indicates the sequence here is right-way-up.

Overlying is a coarse volcanic breccia or crystal-lithic tuff, of various fragments including shale/slate, siliceous, pelitic ash, lava, felsic, massive pyrite, & sphalerite-bearing siliceous fragments, and quartz and feldspar crystals, in felsic groundmass. The unit has either eroded, or has been derived from a variety of lithologies including various sediments and mineralisation. No evidence of welding has been seen, in fact pumice fragments are usually oblate. The occurrence of sediments above and below, infer the unit was deposited subaqueously, and is a non-welded ashflow or massflow.

Reworked tuffs, lithic wackes and sandstones, commonly with detrital quartz, feldspar and rounded shale, slate and siliceous lithic clasts, follow.

A pelitic ash horizon is widespread and is about 100m thick in DDH WSP191.

A massive resistant felsic tuff occurs as a large, lens-shaped body on White Spur. A coarse, lithic-rich margin occurs on its eastern side, and is probably a lithic-rich basal layer - an interpretation which would agree with the overall west facing of the Western Sequence.

The basal lithic-rich section consists of abundant, coarse shale, slate, pelitic ash, siliceous, felsic, quartzite and pumice fragments and quartz feldspar crystals, in a felsic groundmass. The bulk of the unit has fewer lithics, feldspar and minor quartz crystals, and apparently non-welded pumice fragments in a felsic groundmass.

Further west, and poorly outcropping on the northern slope of White Spur, are laminated shales with reworked tuff, lithic wacke and sandstone bands with rounded quartz fragments/crystals.

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Between the Mt. Read Volcanics and Chamberlain Shale in the Black P.A. - Primrose area, is a wedge of probable Western Sequence correlates, consisting of volcanogenic lithic wackes, reworked tuffs, shales, & a mineralised carbonate horizon. Pyritic carbonate actually outcrops in three places in the Stitt River - probably repetition of one horizon by folding.

3.3.2. WESTERN SEQUENCE CONTACT

Corbett (pers. comm. 1984) regarded the contact between Western Sequence and Central Sequence as a major fault, but after recent mapping he envisages the Western Sequence unconformably overlying the Central Sequence; the contact is not appreciably faulted.

In DDH WHP193, a sharp contact separates altered felsic tuffs from reworked tuffs and wackes of the Western Sequence.

The clast and crystal components of the Western Sequence readily distinguishes it from the Central Sequence volcanics. The proportion of epiclastic and sedimentary components in the former is also much higher. Clasts and fragments of shale, slate, pelitic ash, QFP, siliceous and felsic tuff or lava, and massive pyrite and rarely sphalerite, together with quartz crystals, are only rarely developed in the Central Sequence (see following section) which usually has felsic fragments and feldspar crystals. These differences indicate several significant changes occur at the contact:

- Either major change in provenance, or, units which were deposited in the interim (shale, slate, pelitic ash) were subsequently eroded and incorporated in later lithic tuffs.
- A change in nature of volcanism; from feldspar-phyric to quartz-plus feldspar-phyric tuffs.
- A sudden increase in proportion of subaqueously deposited tuffs and shales was initiated by widespread subsidence.
- A mineralising event preceded deposition of the Western Sequence.

3.3.3 CORRELATION OF WESTERN SEQUENCE WITH CENTRAL SEQUENCE

Similarities in the successions at Rosebery and Hercules and other parts of the Mine Lease, led Green (1983), to conclude that one main phase of mineralisation occurs associated with intravolcanic sediments, together

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with a change in the nature of volcanism from feldspar-phyric to quartz-feldspar phyric.

The hangingwall tuffs of Rosebery and Hercules, in addition to quartz phenocrysts, have a variety of lithic components including shale, black slate, siliceous, felsic, and massive sulphide (both pyrite and sphalerite) which are lacking in footwall ashflow tuffs. These xenotuffs are interpreted as subaqueously deposited mass flows, which in places fill erosional valleys cut in the underlying slate, host rocks and ore.

Overlying the quartz-phyric rocks on the Mine Lease are feldspar-phyric ashflows, and massive andesitic to rhyolitic lavas.

A comparison of the lower part of the Western Sequence to the successions at Rosebery and Hercules shows them to be analogous, at least on a broad scale. The main differences are in the overlying rocks, which are volcanic overlying Rosebery, and sedimentary in the Western Sequence; and the lack of mineralisation, which so far has not been found close to the Western Sequence/Central Sequence contact.

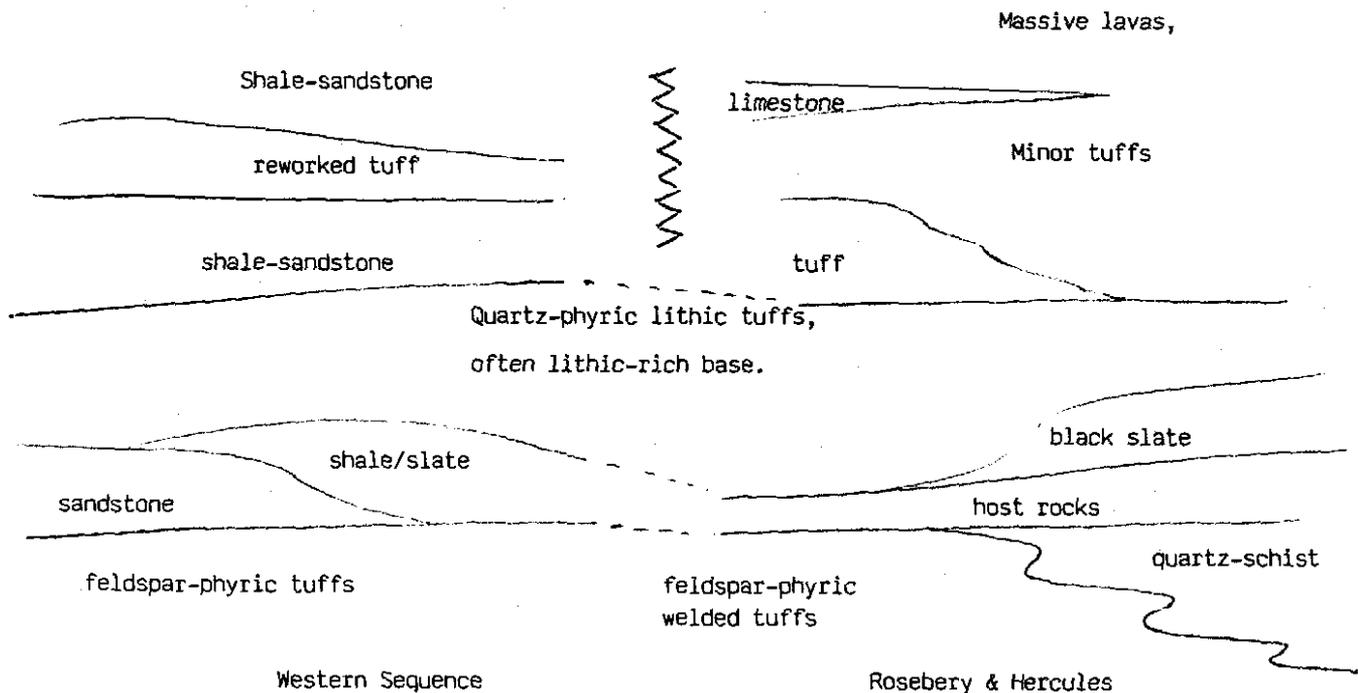


FIGURE 3 - Possible correlation of Rosebery/Hercules Sequence and Western Sequence Stratigraphy.

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It is therefore inferred that the Western Sequence is, at least in part, coeval with the Central Sequence (Fig. 3). Continued sedimentation with shales, sandstones and reworked tuffs and volcanic wacke occurred in the western area in submarine conditions, while massive tuffs and lavas (with minor sediments including limestone) were deposited in the main volcanic belt bordering the marine basin, in dominantly subaerial conditions but with local shallow water deposits.

3.4. Central Sequence

The Central Sequence of Corbett (1979) consists of feldspar-phyric rhyolite-dacite ashflows, lavas, agglomerates, tuffs and intrusives.

Within the Central Sequence, several distinct associations occur through the Mine Lease:

- feldspar-phyric ashflow tuffs.
- intravolcanic sediments and epiclastics.
- massive rhyolite to dacite lavas and intrusives.
- massive andesitic lavas and tuffs.

3.4.1. FELDSPAR-PHYRIC ASHFLOW TUFFS

A variety of feldspar-phyric vitric-crystal-lithic tuffs occur in the foot-wall of the Rosebery and Hercules orebodies, and are at least 300 metres thick. No underlying rocks are known, although Green (1983) considers that late Precambrian dolomite (c.f. Jane Dolomite, Smithton Dolomite) may underlie the volcanics.

The tuffs occur in a belt extending from north of Rosebery to South Hercules, and are composed of both welded and non-welded tuffs having load-flattened pumice fragments or fiamme; felsic lithics and feldspar crystals, in devitrified groundmass. Fiamme, indicating welding of tuffs deposited subaerially, are present directly beneath both Rosebery and Hercules.

A thin, discontinuous sedimentary/epiclastic horizon within the feldspar-phyric tuffs occurs at Koonya on the Mt. Read Road near Bald Hill. Mineralisation at Koonya has been tested by several drill holes, & consists of

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quartz-sphalerite-galena-pyrite veins, and disseminated pyrite-chalcopyrite, associated with silicification and chloritisation. The Koonya mineralisation definitely occurs within "footwall-style" alteration stratigraphically below the Rosebery Lodes prospect.

The top of the feldspar-phyric sequence is marked by intravolcanic sediments at Rosebery, Rosebery Lodes, Barkers and Hercules, which separate these from the overlying quartz-phyric tuffs. Where the intravolcanic sediments are not present, the distinction is naturally based on the presence of quartz phenocrysts, but several other important changes occur at the contact - the tuffs become primarily epiclastic, showing evidence of reworking; and pumice fragments, although load-flattened, are not welded; and coarse lithic-rich basal breccia often shows an abrupt or disconformable contact with the feldspar-phyric rocks.

North of Rosebery, the mapped boundary between feldspar-phyric and quartz+feldspar-phyric tuffs trends west of north, and is not present further north due either to faulting or the closure of an anticlinal fold.

Quartz phenocrysts(?) have been logged in drill holes that have penetrated well into the footwall, but it has not yet been established whether the quartz is present as primary phenocrysts. If primary quartz does occur in the footwall, this will pose problems for the interpretations of geology offered herein.

Siliceous alteration zones associated with mineralisation are superimposed of feldspar-phyric tuffs at Rosebery, Hercules, Jupiter and Rosebery Lodes.

3.4.2. INTRAVOLCANIC SEDIMENTS AND EPICLASTICS

The most obvious and widespread sediments are those of Rosebery-Rosebery Lodes and their equivalent sediments and epiclastics at Barkers Prospect. A similar sequence, of shales and reworked tuffs overlying "host rocks", occurs at Hercules.

Limited facing data, inferred from tuff with slate fragments overlying a slate horizon indicate these sequences are right-way-up; dipping and facing east.

022

Rosebery-Rosebery Lodes-Dalmeny

The Rosebery host rocks and black slate have been discussed in detail by Brathwaite (1969), Eastoe (1973) and Gee (1970); see also Section 5.1.

Of relevance are the extremities of the host rocks - what happens to them in terms of facies variation, removal from the sequence by erosion, and possible equivalents that may host mineralisation.

North of Rosebery the host rocks and slate have locally been eroded and slate fragments are abundant in the overlying lithic tuff units. Within the host rock a reworked quartz-phyric tuff thickens northwards and with depth, but in DD65R immediately overlies mineralisation and is overlain by black slate. The occurrence of quartz-bearing rocks in the host rocks is relevant stratigraphic placement of quartz-phyric rocks and shale horizons north of Rosebery - these may constitute an expanded sequence with "host rocks" and "hangingwall" losing their identities. The persistent shale/slate horizons therein were obviously deposited in quiet periods. The quartz-phyric rocks north of Rosebery that trace the antiform closure of the Rosebery Axis may be, as Green's (1983) map shows, truncated by the faulted contact of volcanics and Rosebery Group.

South of Rosebery, the host rocks are poorly defined, possible equivalents being tourmaline-bearing quartzite, and reworked (bedded) tuff, overlain by slate-bearing lithic tuffs, in the Stitt River. Several drill holes are scheduled to drill the host rock position from the Stitt River south to Rosebery Lodes.

The sequence at Rosebery Lodes, and its relationship to a similar sedimentary sequence at Dalmeny, is outlined by Lees (1983). Recent drilling of DP259 intersected the Dalmeny sediments with carbonates and thin semi-massive sulphides, and further drilling is planned.

Dallwitz-Jones Creek Sediment Horizon

From Dallwitz, across Mt. Read, to Jones Creek a thick belt (to 400m) of lithic tuffs with shale, siliceous and QFP fragments, reworked chloritic tuffs, tuffaceous sediments, and shale and siltstone, appears to be a continuous sequence.

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Dips are from 70°W at Dallwitz to near vertical; flow banded, flow brecciated and intrusive rhyolite lava and intrusives, and granophyre intrusives occur on both sides of the horizon, disrupting it in places. One facing known from JCP211 (Jones Creek) is to the west.

Disseminated mineralisation (pyrite, chalcopyrite, sphalerite) and weak vein mineralisation usually with shale horizons, is known from drill holes at Dallwitz and Jones Creek. Best assays are 5' @ 1.4% Zn (sphalerite-bearing carbonate veins) in DP186, and 10m @ 0.2% Pb, 0.6% Zn in JCP216.

The relationship of this horizon to those of Hercules, Rosebery Lodes (and hence Rosebery) and Dalmeny, is poorly known largely because of poor outcrop between Rosebery Lodes and Dallwitz. Further confusion is caused by west dips at Dallwitz (c.f. east at Rosebery Lodes and Dalmeny) and the close association of flow-brecciated felsic lavas with the Dallwitz horizon.

KP210 (Koonya) drilled in the poor outcrop area, planned to intersect pyritic, siliceous rocks exposed in a creek, that were thought to be host rocks. They are, in fact, pyritic, silicified ashflow tuffs typical of the footwall, and KP210 passed through these and into unaltered footwall. The host rock position was not intersected.

Bobadil-Cutty Sark Epiclastics and Shales

Recent mapping and drilling by both E.Z. and Getty, has outlined several shale-epiclastic horizons within the quartz-phyric lithic tuff sequences north of Rosebery.

At least two persistent shale/slate horizons are present; associated rocks includes thin poorly bedded volcanogenic sandstone to reworked tuffs, mass flow breccias of felsic lithics in deformed shale matrix, and lithic tuff with shale fragments.

The quartz-phyric tuffs are interpreted as mass and debris flows, largely deposited subaqueously, as evidenced by:

- significant proportion of shales ;
- pumice fragments where present, are apparently flattened but not welded.

024

Limestones

Several limestones are known from drilling in the hangingwall of Rosebery (Lees, 1983), at Black P.A., and more recently from Dalmeny drill holes DP5 and DP259.

At Dalmeny, the limestone may be in a similar stratigraphic position to those in the hangingwall of Rosebery. The basal 3m of limestone is strongly haematitic, with minor Au, and is underlain (at least structurally) by a significant width of siliceous sphalerite-bearing alteration in tuffs.

3.4.3. MASSIVE LAVAS (MT. BLACK VOLCANICS)

Massive andesitic lavas occur from above the north end of Rosebery to the Cutty Sark area. They consist of andesitic to basaltic lavas and minor tuffs composed of chloritised amphibole and feldspar in felsic groundmass with minor magnetite.

Toward the southern end, the andesite has a strongly altered rim, where silicification causes the andesite to appear as rhyolite in hand specimen.

Local pyritic zones are present in the Cutty Sark area and are associated with hydrothermal vent breccias (S. Joyce in report to Getty).

Massive magnetite-pyrite veins with siliceous alteration rims, were intersected in the sequence in 71R, and are presumably concentrated products of remobilisation of magnetite from the andesites, and co-precipitation of pyrite.

Massive felsic (rhyolite, rhyodacite) lavas occur extensively on Mt. Read and northwards on either side of the Dallwitz-Jones Creek sediment/epiclastic horizon, to Koonya and possibly to the Dalmeny area.

On the flanks of Mt. Read, excellent examples of flowbanding and autobrecciation occur. Associated with the massive lavas are granophyric intrusives. Minor doleritic/basaltic dykes are common.

Some of these autobrecciated lavas have in the past been erroneously mapped as tuffs, presumably because of the breccia textures and streaks of glassy, flowbanded lava which look like fiamme when weathered.

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Felsic lavas also occur extensively on Mt. Black, eventually giving way to massive andesites that forms the shoulder of Mt. Black.

Getty is currently exploring the Mt. Black area in the Rosebery East J.V. Minor pyrite has been recorded, apparently concentrated in distinct zones which are the subject of current investigation. Pyrite has only rarely been noted from the massive lavas on Mt. Read.

4. REGIONAL STRUCTURE

4.1. Deformation Within The Volcanics

Sediment bands, such as host rocks, ore, and black slate, that occur within the volcanic belt, are tightly folded with generally strong axialplane cleavage (S_1). A second generation of folding is recognised where S_1 is folded by open folds, and local examples crenulate cleavage on S_1 occur.

Bedding-cleavage relationships in the host rocks and black slate in the Rosebery Mine area are consistent, with cleavage steeper than bedding except in local examples of overturned bedding.

Joint orientations in the mine area have been analysed, and show the hangingwall "massive pyroclastics" have undergone the same deformation(s) as the host rock (J. Howarth, pers. comm. 1983) but cleavage is seldom observed. This indicates strain developed during deformation may be relieved by brittle failure (fracturing and faulting) of the massive volcanics, and concentrated in the sediment bands where failure is ductile and folds develop. The unconfined compressive strength of "massive pyroclastics" is significantly higher than that of "host rocks" (R. Hampson, E.Z. Rock Mechanics Program - Progress Report).

What this means, in effect, is that deformation D1 has produced tight folding in the relatively plastic sediment horizons while imposing a cleavage on susceptible rocks (including alteration zones), and only brittle fracture systems in massive unaltered tuffs and lavas.

Post-cleavage F2 folding has produced the major "Rosebery Axis" faulted antiform, and is seen regionally as kinked cleavage.

027

4.2. Distribution of Marker Horizons

Intravolcanic sediment horizons are the most reliable markers, but the feldspar-phyric/quartz-phyric contact may be regarded as the trace of "host rocks" and equivalents with varying degrees of certainty, depending on the proximity of the sediments.

BOBADIL-CUTTY SARK

Shale-epiclastic horizons compose a significant proportion of the quartz-phyric sequence. Some individual shale/slate horizons are continuous over a kilometer or more.

ROSEBERY

East dipping and facing sediments and epiclastics on an east limb of major anti-form, (axial-plane 60°E, right-way-up). Sandstone and reworked tuff between Rosebery and Rosebery Lodes are probably coarser-grained equivalents of the host rocks.

DALMENY

Sediments and mineralisation are similar to Rosebery, but the relationship is uncertain.

ROSEBERY LODES

Shales, schists and epiclastics, capped by black slate are apparently the strike extension of Rosebery, and dips and faces east. Sediments are known to continue south of Rosebery Lodes (east of Koonya).

KOONYA

Sediments and epiclastics within the footwall felsic flow tuffs, are of limited strike extent.

BARKERS AREA

A thick sequence (>100m) of folded and faulted epiclastics, sandstones, shales and black slates dips west, and is probably equivalent to the Rosebery Mine sequence. Gossanous outcrops discovered in the Barkers area, although possibly "bog iron" precipitates, will be tested by drilling, as part of the existing program.

028

JUPITER

Quartz-phyric tuffs outcrop on the Williamsford Road, west of, and abutting, strongly silicified tuffs. Several outcrops of shaly pelitic ash on the eastern side of the Jupiter alteration zone are of unknown affinity.

DALLWITZ-JONES CREEK

A sequence of west-dipping shales and pelitic ash at Dallwitz can be traced southwards on to Mt. Read. The relationship between this horizon and the east-dipping Rosebery Lodes to the north is unclear.

At Jones Creek, drill holes JCP211 and JCP216 show a thick shale/epiclastic horizon surrounded by rhyolite lavas. Between Dallwitz and Jones Creek, the stratigraphy is disturbed by (intrusive?) rhyolite and only sparse shale outcrops are seen.

HERCULES

Within massive tuffs on the northern side of Mt. Hamilton the sudden appearance of quartz on a horizon which also contains pelitic ash and volcanic wacke, and psammo-pelitic quartz-feldspar ash in the Ring River, marks the trace of the Hercules host rock horizon.

A synform may lie between Hercules and the west-dipping Jones Creek to Dallwitz horizon.

An antiform is well defined at West Hercules, and extends down Copper Ridge to Williamsford.

4.3. Major StructuresROSEBERY AXIS

The "Rosebery Axis" is an arcuate structure extending from near Bobadil in the north, to the mill area, then through the Salisbury and Chamberlain Mines. The structure may also extend through the Jupiter Mine area, where the "Jupiter Fault" of Campana & King (1963) terminates the Rosebery Group.

029

In outcrop, a quartz-tourmaline-pyrite vein breccia dips east at 60-70°, and separates east from west dipping bedding and cleavage; and is thus a post-cleavage faulted antiform.

Several drill holes have (accidentally) passed through the fault, notably R1121 from the footwall of 8 Level. This hole passed through feldspar-phyric ashflows with variable "quartz schist" alteration, the tourmaline-filled fault (very poor core recovery), then altered (silicified, sericitised) quartz-phyric tuff, epiclastics and lithic tuffs with black slate fragments.

Sampling of the tourmaline-quartz vein and surrounding altered rocks has been recently carried out. Drill hole BP97 at Barkers Prospect intersected the tourmaline-quartz vein.

Rocks on the western side of the "Rosebery Axis" consist of massive tuffs and rhyolite lavas as well as the Barkers Prospect epiclastics and sediments.

Alteration in this belt is distinctive and confined to this area, consists of strong silicification and sericitisation, giving waxy yellow-green appearance to the rocks. Quartz±carbonate veining is profuse, and thin bluish tourmaline veinlets are common.

JUPITER FAULT

Campana & King (1963) interpreted a major fault with approx. 3km lateral displacement, to dislocate the Rosebery Group from its abrupt termination just north of the Jupiter Mine, to its re-appearance near Moores Pimple.

E.Z. Co. maps show two faults - the Bather Creek Fault (equivalent to Jupiter Fault south of Williamsford) and Conliffe Fault which together would take up the large displacement. Diagnostic rocks of the Rosebery Group (e.g. Salisbury Conglomerate, Natone Volcanics, and, to a lesser extent Stitt Quartzite) are not present in a complete sequence between Jupiter and Moores Pimple, although sandstones and slates south of Williamsford may be the Stitt Quartzite, and glacial moraine covers a large part of this area.

PIEMAN RIVER-BOBADIL FAULT

A strongly brecciated fault contact between Mt. Read Volcanics and Chamberlain Shale/Stitt Quartzite is exposed in the Pieman River gorge downstream from Bastyan Dam. A similar contact is seen in drill hole BD1 (Getty) but deformation near the shale/volcanic contact is much less in drill hole BD269.

The fault contact between volcanics and shale dips east at about 40° and is parallel with the gross stratigraphy of the sediments.

"COPPER RIDGE ANTIFORM"

An antiform within the Hercules host rock horizon is well exposed on the ridge west of Hercules, defined by bedding in reworked tuffs, and the west-dipping Western Sequence overlying(?) host rocks at West Hercules.

The trace of the antiform extends northwards along Copper Ridge, but with no bedding, and fiamme or pumice fragments having been crumpled during deformation so that no reliable "bedding" of tuffs is available, the position of the fold nose is defined by cleavage only. Measured cleavage on Copper Ridge is remarkably consistent, and varies from steep west through vertical to moderately steeply east as shown in Fig. 4. The position of the fold axis can be defined if its dip is known - i.e. if vertical, the axis would lie at 376,200E, if inclined at about 70°E, the axial plane would lie further east.

The fold can be traced to South Hercules, where it is lost when embroiled in complex structure near where the Hercules host rocks terminate.

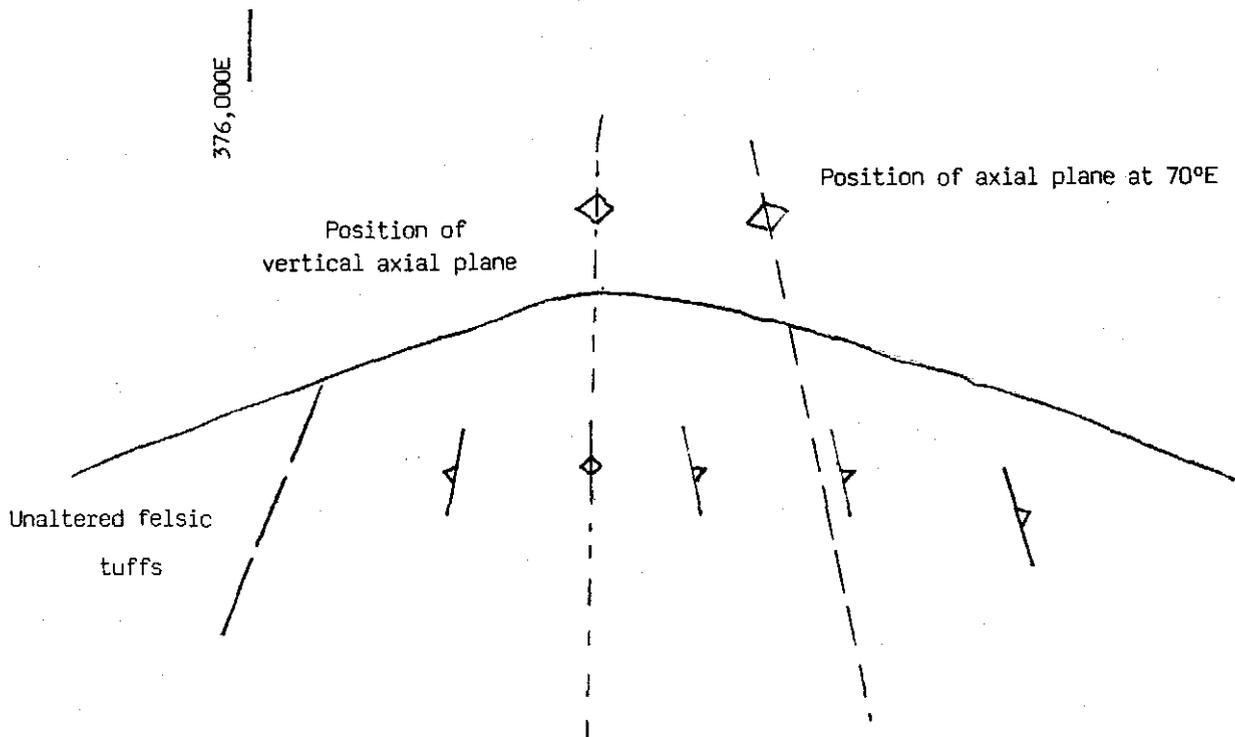


FIGURE 4 - Cleavage Across Copper Ridge (5,368,000N) with Possible Position of Axial Plane.

(Scale 1:2,500)

5 cm

WHITE SPUR SYNFORM

A synformal structure on White Spur exists within Western Sequence rocks but cannot be accurately located due to poor outcrop. Limited facing data indicates the synform in right-way-up. Further north, east dipping sediments of Western Sequence in Bakers Creek are overturned, thus the position of a synform this far north is uncertain.

BOBADIL ANTIFORM

The distribution of quartz-phyric rocks north of Rosebery suggests a fold closure of an anticline and is similar to the interpretation of Green (1983) that the anticlinal closure is truncated against the major Rosebery Fault. Poor outcrop in the area hampers detailed assessment.

5. MINERALISATION

5.1. Rosebery

The stratigraphy and mineralisation has been described by Brathwaite (1969) and Green (1983). A summary of Green's thesis is included as Appendix 1.

Fig. 5 shows some of the features and relationships of ore and host rocks.

5.2. Hercules

Footwall Ashflow Tuffs

Underlying the Hercules 'host rocks' are welded, feldspar-phyric felsic ashflow tuffs, which are strongly altered, (mainly silicified) in a zone beneath the ore lenses. The altered rock is well exposed on Copper Ridge and various workings and openings at the Hercules Mine. Here it typically consists of green chloritic fiammè (to 20cm) in finely crystalline silicified groundmass with 1-2% disseminated pyrite and sphalerite. In less intensely altered areas, feldspar is present, becoming less smeared and less sericitised away from alteration.

Relatively fresh, unaltered footwall rocks are present between Williamsford and Bakers Creek, and are usually crystal-lithic tuffs with pumice or fiammè, and albite crystals, in felsic groundmass.

No definite footwall tuffs are known south of Bakers Creek, probably due to a combination of structure and topography. The anticlinal closure west of Hercules (the "Copper Ridge Anticline"), together with a rapid rise in elevation up Bakers Creek, effectively produces a closure. In "layer-cake" stratigraphy, host rock equivalents would be expected on the western side of the "Copper Ridge Anticline", but the contact of Western and Central Sequence rocks may mark their position.

Massive pink, albitised tuffs occur on the northern slope of Mt. Hamilton and in the Ring River, and are interpreted as footwall rocks as they are

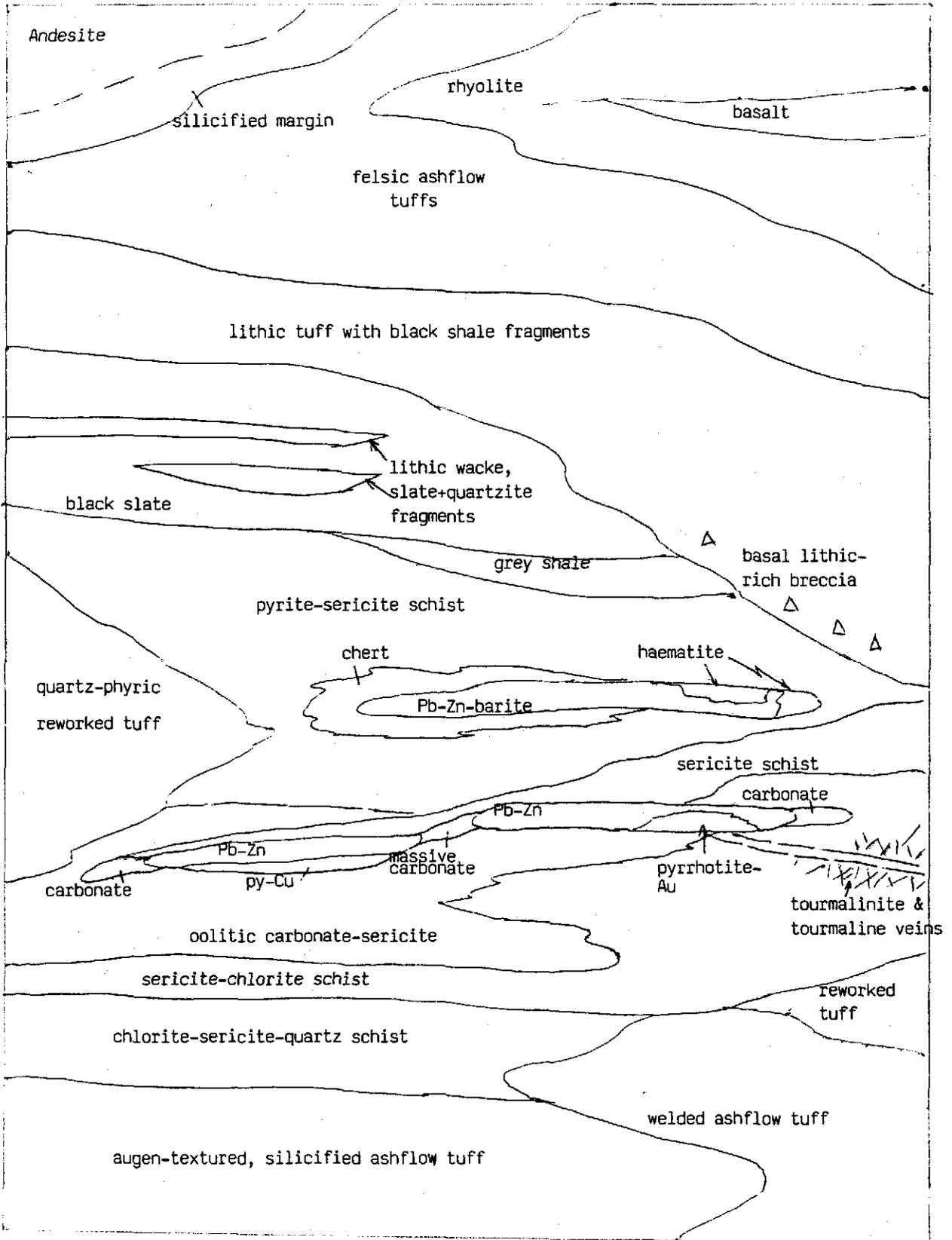


FIGURE 5 - Diagrammatic Rosebery Host Rock Sequence (not to scale)

(Modified from Lees, 1983)

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feldspar-phyric, with felsic fragments and numerous fiammè.

The zone of footwall alteration can be traced north from Hercules along Copper Ridge to the Ring River and Ring P.A. workings. From this point northwards to the Jupiter Mine area outcrop is very poor due to glacial cover. The rocks exposed, however, consist of weakly altered feldspar-phyric pumiceous tuffs, typical of the footwall ashflows.

Host Rocks

The Hercules 'host rocks' encompass a diverse suite of tuffs, reworked tuffs, cherty pelitic ash, chlorite sericite schists, variable nodular carbonate rocks, and the Hercules ore lenses. They extend from a siliceous shear zone beneath the haulage on 4 level (1,600N H.G.) to South Hercules (about 4,300S H.G.) where the host rocks apparently terminate in an area of complex geology. An antiform is present over the strike extent of host rocks, with the main Hercules ore lenses occurring on a large parasitic fold on the east limb of the structure, the southern closure of the structure is coincident with the disappearance of host rocks.

On the west side of Copper Ridge and south to South Hercules a discontinuous shale marks a change from either feldspar-phyric, welded footwall ashflows, or reworked tuffaceous 'host rocks', to quartz-phyric lithic tuffs and ensuing sediments and tuffaceous sediments of Corbett's Western Sequence. The host rocks are not present north of Bakers Creek, but the Western Sequence contact may mark their trace.

The ore lenses are steeply dipping, having been transposed into the cleavage, and are associated with strongly deformed zones of strong cleavage and development of schists; abundant carbonate; and large-scale boudinage structures. Between the strongly deformed zones, the host rocks consist of altered lithic tuff with felsitic, pumice and chert fragments in microcrystalline quartz and calcite matrix (55277), lithic sandstone of quartz and feldspar grains, and lithic clasts; strongly carbonated (55464); and pelitic ash of shards and angular clastic quartz grains (55449) (C.M.S. Report 83/11/25, 84/3/8).

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At West Hercules and extending to South Hercules, several zones of strongly deformed and silicified 'host rocks' have been outlined by mapping. Similar textures to the 'quartz schist' are common in narrow linear zones parallel to gross cleavage. It is possible that the Au-Ag mineralisation present is associated with these zones.

A distinctive cherty siltstone or pelitic ash occurs at the top of the host rock sequence from A Lode to South Hercules.

Carbonates

Carbonates are a common component of the host rocks, and is described as replacive, possibly diagenetic, and postdating silicification/argillisation (C.M.S. Report 83/11/25). Several forms of carbonate have been noted by Fitzgerald (1974) and the close association of oolitic carbonate to ore is striking.

Carbonate textures include "cannonballs" on the 4 level road, of quartz-carbonate spheroids from 1-2mm to 10cm diameter, often with vague relict bedding still visible passing through the cannonballs; "fire works" textures (or hergledergledites) of curved carbonate needles "exploding" from a point source; and zoned oolites to pisolites (1 to 5mm) often with distinct cores and often in close proximity to ore. "Cannonball" textures may either be diagenetic or may be true pisolites, similar to those forming in Bolivian lakes in shallow, hot-spring fed stagnant pools that are super-saturated with respect to calcite because of CO₂ loss by algal photosynthesis and by degassing (Risacher and Eugster, 1979). "Fireworks" textures are more likely to be of diagenetic origin, while the oolites have several possible origins.

Recent oolites form in either shallow, agitated conditions in bars just below water level in either lakes or the sea, or in quiet, deep marine conditions. Oolites *sensu stricto* have been described from Rosebery (C.M.S. 83/5/39) and so probably also occur at Hercules. Sainstreet et.al. (1981) describes carbonate accretionary spheroids from the Barberton Greenstone Belt (S. Africa) which are similar in many ways to those at Hercules. The authors interpret them as accretionary lapilli

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which were emplaced by turbidity currents. Another possible mode of origin which would explain the association of 'oolites' to ore, is that phreatic explosions associated with boiling of ore solutions at or just below the water/sediment interface, formed accretionary lapilli from carbonate-rich mud and co-precipitating carbonate.

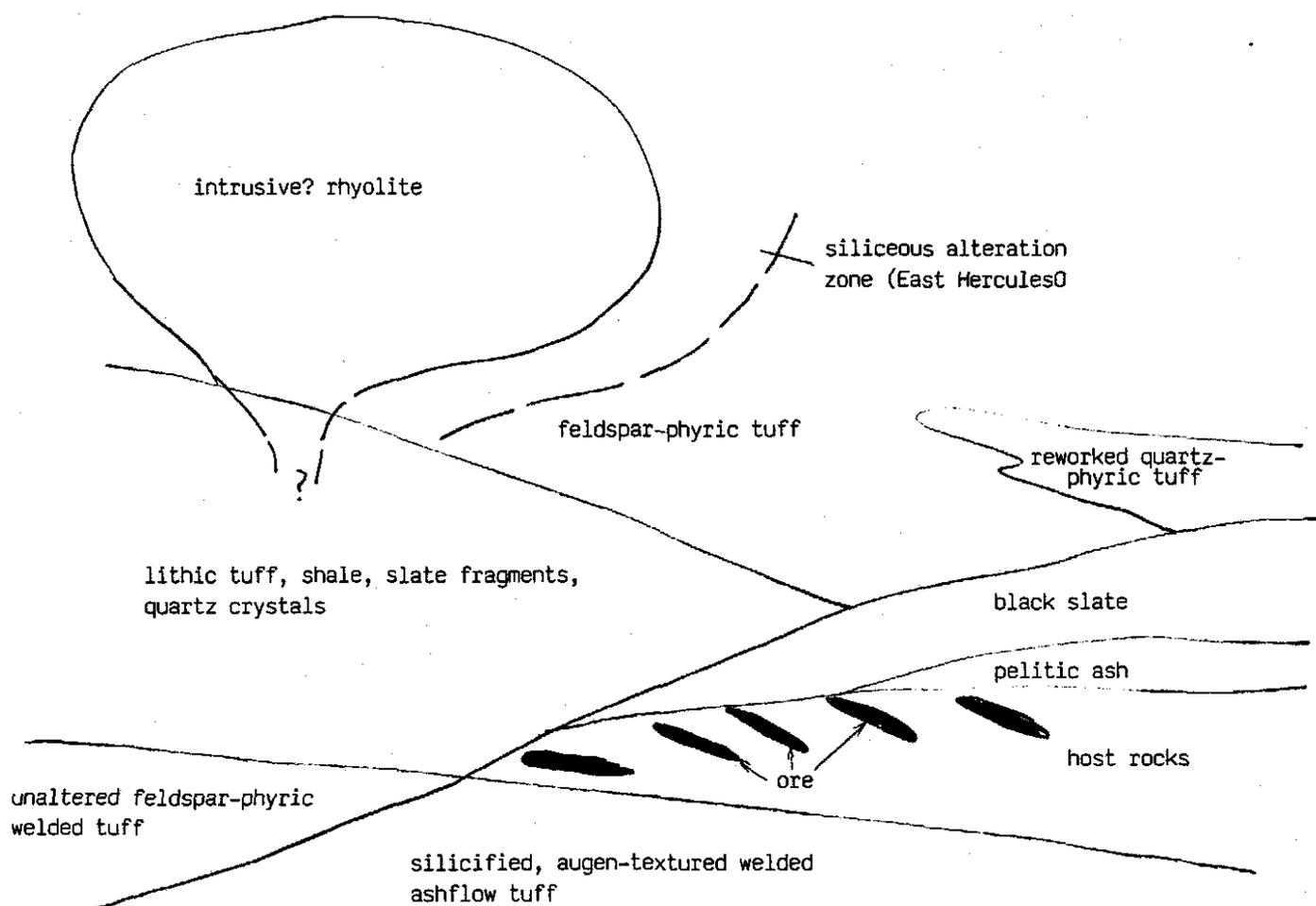


FIGURE 3 - Diagrammatic Hercules Host Rock Sequence

Mixed Sediments

Overlying the host rock at Hercules are grey to black shales and slates, often pyritic, with numerous lithic-rich and crystal-rich bands from a few millimetres to several metres thick. These horizons represent periods of higher-energy reworking of underlying tuffs, or distal phases of volcanic activity, during a mainly quiet, subaqueous phase that the shale/slate was deposited.

A quartzite unit occurs at the top of shale/slate sequence, and varies from quartz-feldspar sandstone to lithic wacke and reworked tuff, and locally shows a lithic-rich erosional base.

Hangingwall Rocks

Overlying the shale/slates (where present) are usually quartz-phyric lithic-crystal tuffs; at the northern end of the mine they are lithic-rich with shale and slate fragments, elsewhere they contain occasional lithics.

At East Hercules pumiceous (welded?) altered felsic tuffs occur possibly surrounding an altered rhyolitic lava or intrusive.

Stone (1975) distinguishes several types of massive pyroclastics based on deep drill holes along and below the Hercules orebody.

Hercules Orebody

The Hercules orebody consists of numerous ore lenses, usually within strongly cleaved and deformed zones within the host rocks. The ore lenses consistently dip at 70°E, but are of irregular shape and size, in an overall en echelon pattern, and they sometimes coalesce.

Total tonnage mined to 1984 is 2.16mt at 5.7% Pb, 17.8% Zn, 0.42% Cu, 180 g/t Ag, 2.94 g/t Au, 11.1% Fe. Current reserves (June, 1984) are 0.383mt at 3.0% Pb, 11.7% Zn, 0.45% Cu, 52 g/t Ag, 1.1 g/t Au, 7.5% Fe. The distribution of ore lenses is shown in Fig's 7 and 8.

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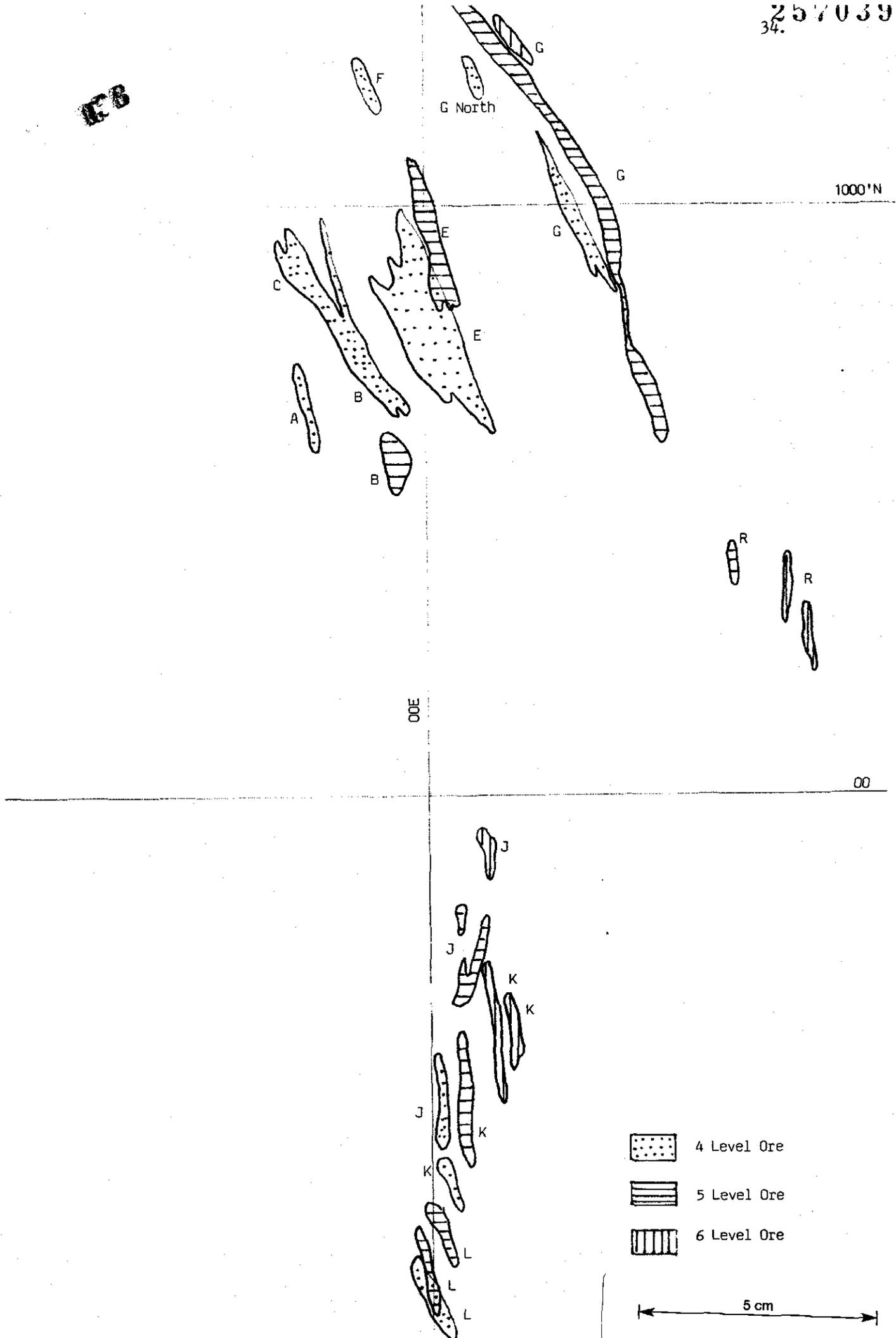


FIGURE 7 - Distribution of Hercules Ore Lenses in Plan
(Scale 1:2,500)

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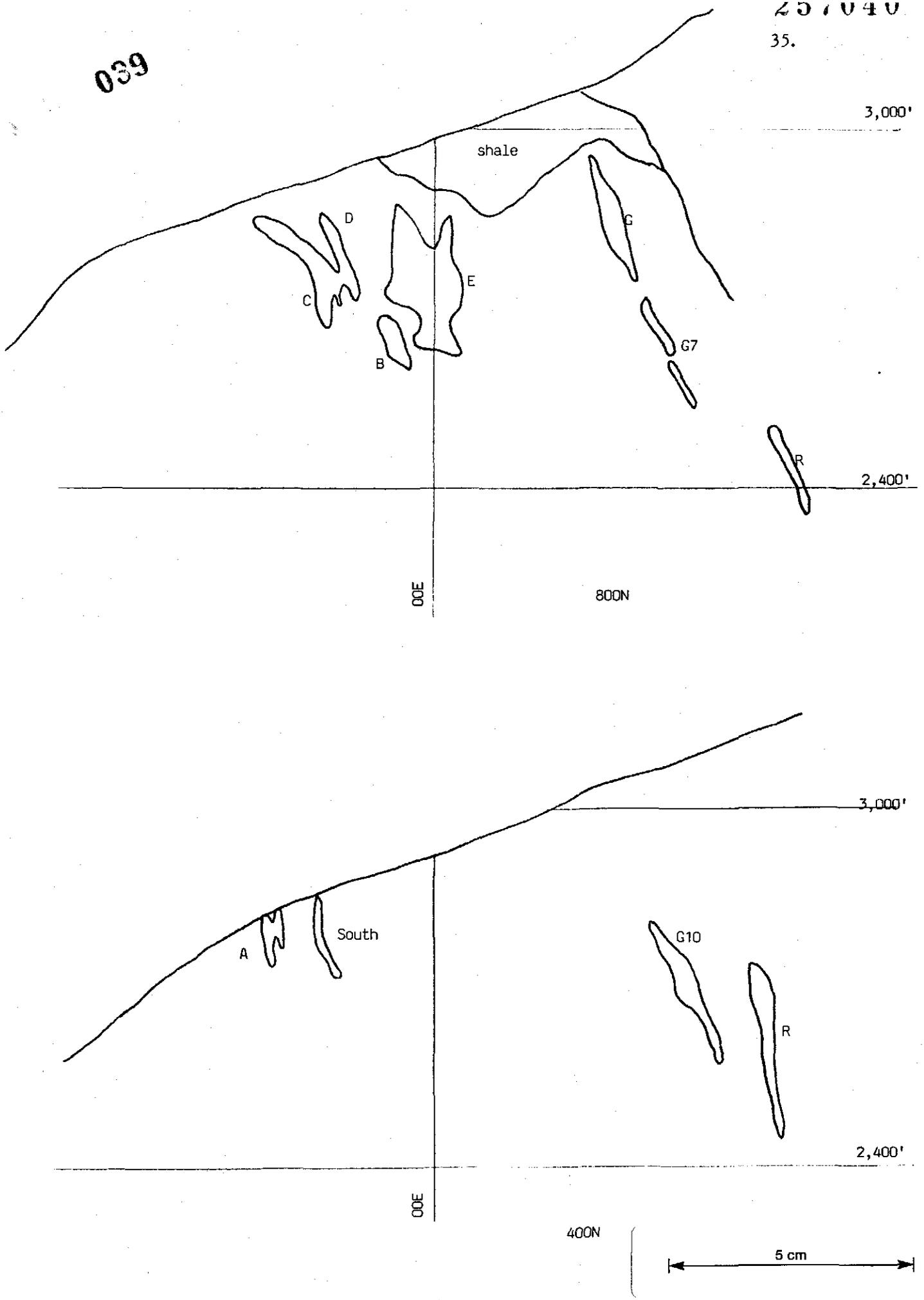


FIGURE 8 - Distribution of Hercules Ore Lenses in Section.
(Scale 1:2,500)

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Several distinct ore types are distinguishable on the basis of texture and mineralogy:

- Massive, high grade ore - poorly banded, of blebby coarse sphalerite amongst minor galena and gangue, and thin pyrite-chalcopyrite layers.
- "Spotty ore" is widespread, and consists of flow-structured and flow-brecciated lithic vitric tuff, apparently welded, with silica-replaced spherulites, sericite-replaced lithics, and minor carbonate alteration. "Blebs" of sphalerite to 5mm, are "clearly vug-fillings" (C.M.S. 83/5/39).
- "Schistose ore" as commonly found in R Lode, consists of ubiquitous pale brown sphalerite through cleaved sericite schist.
- Barite ore is uncommon and known from drill logs, usually in the hangingwall of G Lens.
- Ag-Au ore was mined from "Ruby Silvers Lodes" in some worked out sections of the mine, and perhaps extends to South Hercules where high Ag-Au occurs associated with low orders of Pb-Zn.
- No finely banded sulphide ore typical of Rosebery is known.

Several faults are known in the mine area. The Bakers Creek Fault (strike 120° dip 50°N) has a breccia up to 2m developed along it, but no appreciable movement in the mine area (J. Howarth, pers. comm. 1984) but has a right lateral displacement of approximately 200 ft on the surface (Throop, 1974). Intermediate Fault (141/45°N) has a displacement of about 50' horizontally; while Fellows Fault (106/30N) has no appreciable movement. The Mt. Hamilton Fault is thought to lie along the hanging-wall contact of host rocks, and truncate them below 7 level. Although shearing and brecciation occur locally at this contact, it is in places sharp and concordant. A strong 'quartz schist' zone that terminates black slates at 1,500N H.G., and fault breccia in G north Glory Hole, are probably expressions of the Mt. Hamilton Fault.

5.3. Dalmeny

At Dalmeny, mineralisation was located by early prospectors in the Stitt River valley south of Rosebery, and early drilling (pre-1915) intersected 16 feet of ore, of which 3 feet assayed 31% Pb, 17% Zn, 15 oz (466 g/t) Ag, 1.18 g/t Au in No. 2 bore. No. 1 bore was proved to have been stopped before reaching the target.

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Subsequent drilling (DP 1, 2, 3, 4, and DP 85) intersected interbedded shales, sandstones and reworked tuffs, often carbonated and with disseminated pyrite or pyrrhotite, which are probable host rock equivalents although grain size is generally coarser.

The Dalmeny mineralisation from the Stitt River (S/N 55155) is a stockwork of galena-sphalerite veins in silicified tuff or lava, and is of limited extent.

The east-dipping sediment sequence, and coincident I.P. anomaly, was drilled by DP 259, which intersected 0.20m of semi-massive sphalerite-pyrite in a sedimentary sequence very similar to that of Rosebery, especially as 3m of oolitic carbonate occurs immediately below the sulphide. A section of DP 259 is included (Plan 5), and a summary log is appended (Appendix 2). Follow-up drilling is envisaged.

5.4. Jupiter

At Jupiter, a strong "quartz schist" alteration zone extends southeastwards from the Jupiter Pb-Zn workings. The No. 1 and No. 2 adits were driven into the "quartz schist" chasing Cu-pyrite mineralisation. A sketch of the geology of the area is shown in Fig. 8.

Pelitic ash with minor pyrite outcrops east of the No. 1 adit and extends northwards, with massive, unaltered felsic tuff and lava abutting these sediments further east. The occurrence of sorted shaly pelitic ash adjacent to Jupiter alteration zone warrants further work - initially more detailed mapping and surface sampling.

The Jupiter Pb-Zn workings are located within the quartz-schist alteration zone, but pyritic bedded chert is present on the Williamsford Road between quartz schist and massive quartz-pyritic tuff and agglomerate which may represent the equivalents of the Rosebery hangingwall. The mineralisation is confined to a 1-3' wide strongly cleaved sericite schist zone.

Faulting influences the distribution of lithologies north of Jupiter, where the Natone Volcanics and Stitt Quartzite wedge out. The "Jupiter Fault" of Campana & King (1963) may consist of a major fault with several parallel and divergent subsidiary faults.

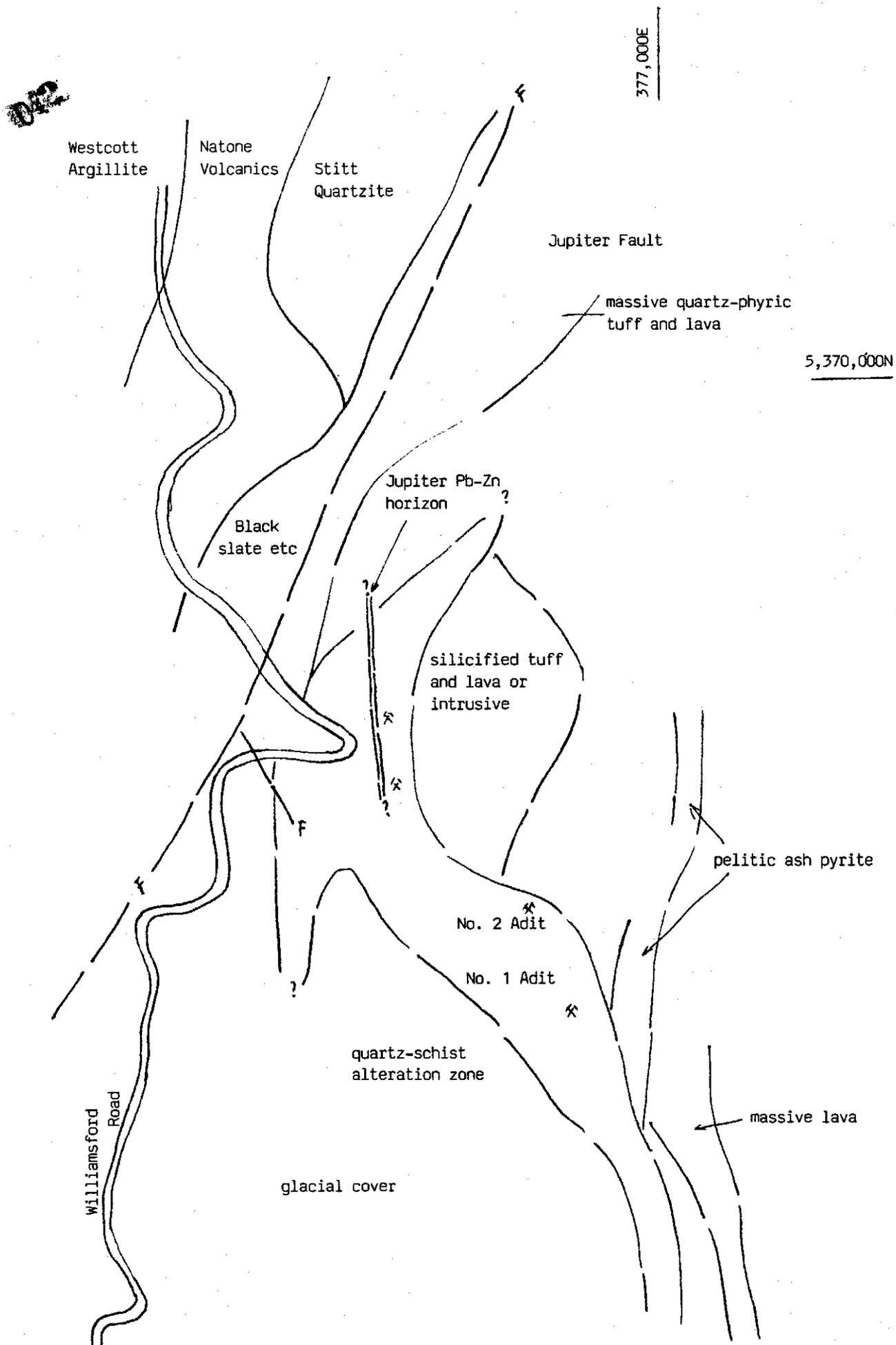


FIGURE 9 - Geological Sketch Map, Jupiter Area (1:5,000 scale)

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Weak 'quartz schist' alteration is seen in a poor outcrop area well south of Jupiter; another isolated occurrence of strongly chloritised and silicified tuff is known about 1km northeast of Jupiter, giving a total possible strike length of approx. 2km of alteration, most of which is untested.

5.5. Ring P.A.

The Ring P.A. workings (also called North Hercules) followed a 4" band of Pb-Zn-barite which is exposed on the Williamsford-Hercules Road. A quartz-tourmaline-pyrite-gold? vein is a few feet further east. Although no host rocks are known in the area, the mineralisation may be significant (in its presence, not magnitude) if viewed in its association with alteration.

The mineralisation is apparently stratiform as it dips east at about 60° compared with cleavage at 80°E, and is composed of layered sphalerite-galena-barite, and is not the usual vein remobilisation assemblage of quartz-carbonate-sulphide. The occurrence of stratiform Pb-Zn mineralisation in the footwall would also explain a "clast" of massive sulphide in the Hercules footwall (7 level drive, 1,100N, 300W H.G.) which would be inexplicable otherwise.

Drill holes NHP 194, NHP 195 were aimed at the Pb-Zn horizon but did not intersect it, and H 955, tested the North Hercules area at depth.

5.6. Tourmaline-Associated Mineralisation

The "Rosebery Axis", (Sect. 4.3.) a tourmaline-quartz filled faulted antiform, is known from several locations from the Salisbury Mine on the Mt. Read Road, through the Chamberlain Mine, and Milton's Shaft, to the Stitt River. It has been sampled in several places, as follows:

Salisbury Mine (from records)

4'6" lode av. 1.4 g/t Au, 3.2 g/t Ag, 0.45% Cu, dump 0.93 g/t Au.

Chamberlain Mine (from records)

17' quartz lode 3.25 g/t Au, 9.3 g/t Ag.

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Barkers Prospect (BP 97)

233-250' 17' av. 1.0 g/t Au, 3.5 g/t Ag.

Further, more extensive sampling, is planned for next financial year. Pyrrhotite-(tourmaline) replacement of high grade ore between 15 and 17/L, F lens at Rosebery, contains 74,000 'proven' tons at 8.2 g/t Au.

Numerous other quartz-tourmaline veins with "Mt. Black-style" mineralisation (i.e. pyrite±gold ±bismuth, antimony sulphosalts) occur through the volcanics especially related to tourmalinites, as at the south end of Rosebery in DDH's 45R, 70R, 72R and Dalmeny; and with fracture zones such as the "Rosebery Axis" and a smaller, parallel structure extending from the Magazine Road to South Rosebery.

Dr. Ian Plimer on a recent visit to Rosebery, collected tourmaline samples from the following locations:

- 15 level V-4S ("bedded" tourmaline);
- DDH's 72R, 70R, 48R, R2223;
- the "Rosebery Axis"/Fault Zone, at Salisbury and South Rosebery.

The tourmalines are clustered in the schorl (Fe-rich) field, which indicates (according to Plimer):

- common origin for tourmalines,
- tourmaline veins and faults are remobilised of originally stratiform tourmaline,
- Mg/Fe ratios of tourmaline are no use as a guide to ore at Rosebery.

5.7. Koonya-Dallwitz

Outcrops in creeks south of Koonya, near DDH KP 210, showed (going east) felsic ashflow tuffs, becoming progressively more altered and pyritic, followed after a few metres with not outcrop, by felsic lavas with little or no alteration.

KP 210 was relogged and is summarised as follows:

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0	-	42.2m	Glacial till.
42.2	-	57.6	Weathered felsic ashflow tuffs, possibly chloritic.
57.6	-	63.6	Fault breccia.
63.6	-	133.0	Silicified chloritised ashflow with minor pyrite.
133.0	-	213.1	Ashflow tuffs.
213.1	-	360.5	Rhyodacitic/dacitic lavas.

Following the creek mapping, it is concluded that KP 210 is drilled entirely in the footwall sequence, initially in Footwall-style alteration. The host rocks or their position were not intersected.

The Dallwitz Prospect area has been mapped, but no other work has been carried out as the six drill holes have tested an 800m strike length of inter-bedded siltstone, shale and pelitic ash.

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6. GEOPHYSICS

The geophysics of the northern part of the Mine Lease has been covered in the previous report (E.Z 170), and, more specifically, the I.P. was reviewed by Bishop (1983).

Somewhat less geophysics has been undertaken on the southern part of the Lease. Several gradient array I.P. surveys were undertaken in several areas and successfully located thin, discontinuous zones of mineralisation at South Hercules.

Airborne E.M. - Turair - and follow-up ground Turam were largely unsuccessful, and did not even locate the mineralisation at South Hercules.

6.1. Turair

Turair - airborne E.M. - was flown over areas north of Rosebery, and from Rosebery Lodes to Hercules in 1972 (see Linford, 1972).

A combination of poor ground control and generally low order anomalies with respect to noise levels, meant that even these anomalies were of low priority.

6.2. Turam

Ground pulse E.M. - Turam, was used to better locate and enhance anomalies found by Turair.

On the Dallwitz Grid, weak anomalies were located at D60N, 3.50E and D44N, 7.80E. A single point anomaly is located on White Spur line L5, 7.50.

At South Hercules, responses on the western ends of all lines follow geological strike and topography, and may be coincident with a change to a shale dominated sequence. In the host rocks from L45 to L185, there were no strong anomalies.

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6.3. Gradient Array I.P.

Several gradient array I.P. surveys have been carried out on the southern part of the Mine Lease (refer Howland-Rose, 1973 a,b).

The first, at South Hercules lines 00 to 10S (Report TAS 009C) showed two broadly anomalous zones with a number of significant anomalies in each, from 4E to 5E and 8E to 12E over most lines. The best anomalies were subsequently drilled, and contained disseminated mineralisation with thin zones of massive mineralisation. At the same time, lines 32S and 40S on White Spur were surveyed, and showed weak anomalies which are coincident with pelitic ash and shale-slate horizons.

Follow-up gradient array I.P. over South and West Hercules defined anomalous zones as follows:

- Zone A:
At West Hercules, coincident with shale at the Western Sequence contact, drilled by WHP192 and WHP193.
- Zone B:
On lines 8N, 10N from 1.5W to 2.0W, near the collar of WHP193 where altered, silicified tuffs with disseminated pyrite, sphalerite, are known.
- Zone C:
Best seen at 16N, 12.0W, which is probably coincident with shale in the Western Sequence.
- Zones D; E:
At the western ends of lines, and probably associated with more shales.

Further gradient array I.P. at White Spur, North Hercules and South Dallwitz was reported on by Howland-Rose (1979)(Report TAS 065). On White Spur, a strong, shallow anomaly is coincident with a shale horizon at 5,600S/875E, 6,400S/1,080E; other anomalies are also associated with shale/slate horizons.

At North Hercules, a number of discrete, near-surface responses occur with shales, (Chamberlain Shale equivalent?) due to either sulphide or graphite, with significant responses at 14,200N, 125W; 14,800N, 250W; 14,600N, 025E and 175E; 14,200N, 025E and 275E; and 14,000N, 025W and 075E.

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Anomalous zones at South Dallwitz are "formational" in having high chargeabilities but with still high resistivities, that are correlatable from line to line, as follows:

2,000 S	300 E
2,400 S	350 E
2,800 S	400 E and 650E.

6.4. Magnetics

Aeromagnetics were flown concurrently with Turair, but poor control of the survey caused it to be re flown by Georex Pty. Ltd. Contoured aeromagnetics at 1:10,000 scale, show the following broad features:

- complex magnetic pattern in sediments west of the volcanic belt;
- generally flat and featureless magnetics over the volcanics, except for a broad zone of higher magnetism extending from Dallwitz to Jones Creek, where some stronger anomalies occur.

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7. GEOCHEMISTRY AND ALTERATION

7.1. Rock Chip Analyses

Only a few selected rocks were assayed solely for base and precious metals during the year, these include sediments from the Mt. Read area, and some sulphidic or gossanous rocks from East Hercules. Chip samples of the sediments on Mt. Read showed only low order values, while gossan and sulphides from East Hercules contain copper (to 1%) with minor Ag (18 ppm) and Au (0.10 ppm).

7.2. Whole Rock Geochemistry

Ten samples from the Hercules area were submitted for whole rock analysis. Results are shown in Table 1.

The samples submitted for whole rock analyses comprise several geologically and chemically distinct groups. S/No's 47173, 47174, 47175 and 55525 are from silicified, variably chloritic footwall pumiceous felsic tuffs. This group is characterised by strongly depleted Na_2O (0.05-0.09%), low Al_2O_3 , variable MnO and CaO ; similar TiO_2 and K_2O and high H_2O (total) and MgO (0.65 - 1.70%) compared with relatively unaltered feldspar-phyrlic fiammè bearing tuffs from 4 level hangingwall (55281) and Bakers Creek (55457).

Two samples of tuffs hosting the Hercules orebody (55320 and 55349) are high in Al_2O_3 , TiO_2 , CaO and MgO (the latter due to dolomitised carbonate spheroids). SiO_2 is low, as is Na_2O , but the latter is not depleted to the extent of the footwall alteration.

Sample 55368, from Mt. Hamilton, is of altered (chloritic, siliceous) pumiceous tuffs in strongly depleted in Na_2O comparably to the footwall alteration but has unusually high FeO (as Fe-chlorite?).

Sheared, sericitised and carbonated fiammè tuffs are possibly effected by the Mt. Hamilton Fault (S.N. 55285) has higher CaO and CO_2 than the unaltered tuffs, with lower SiO_2 and Na_2O , which probably reflects the alteration.

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Sample No.	47173	47174	47175	55281	55285	55320	55349	55368	55457	55525
Al ₂ O ₃	12.9	11.2	10.5	13.9	12.9	15.5	16.4	11.2	13.4	12.4
SiO ₂	74.0	76.9	74.3	73.5	71.4	66.0	58.0	72.5	74.0	71.9
TiO ₂	0.31	0.25	0.28	0.35	0.33	0.50	0.56	0.27	0.31	0.33
FeO	1.11	0.90	2.78	1.26	0.92	1.02	1.57	4.85	1.95	3.53
Fe ₂ O ₃	0.65	2.00	2.85	1.15	1.00	1.75	0.50	1.65	0.70	1.75
MnO	0.44	0.07	0.20	0.05	0.10	0.27	0.17	0.19	0.18	0.27
CaO	0.74	0.02	0.01	0.28	2.85	1.45	4.80	0.01	0.35	0.05
K ₂ O	4.30	4.00	3.05	2.40	3.60	4.00	3.80	2.85	3.25	3.55
MgO	1.40	0.65	1.20	0.85	1.25	3.00	5.40	1.70	0.55	1.70
Na ₂ O	0.09	0.05	0.05	3.74	0.67	0.22	0.49	0.05	3.37	0.06
P ₂ O ₅	0.030	0.025	0.035	0.035	0.050	0.090	0.135	0.030	0.060	0.035
SO ₃	0.30	2.20	3.10	0.030	0.030	2.60	0.090	0.60	0.050	0.65
CO ₂	1.10	0.25	0.25	0.15	2.30	1.60	4.20	0.15	0.70	0.20
HgO-	0.20	0.11	0.07	0.09	0.07	0.11	0.13	0.17	0.16	0.18
H ₂ Ot	2.15	2.40	2.80	1.65	2.10	3.55	3.85	3.00	1.25	3.00
Oxide Total	99.7	101.0	101.5	99.4	99.6	101.6	100.1	99.3	100.2	99.61
Zn	1000	160	960	55	1700	90	65	80	65	140
Pb	475	50	35	5	5	30	10	5	X	10
Cu	55	25	110	10	5	15	10	10	10	120
Rb(ppm)	230	220	160	120	170	190	180	140	140	210
Sr "	30	15	7	190	90	55	140	7	200	8
Ba "	1150	1500	810	670	1150	4250	2400	580	840	940
Na ₂ O/K ₂ O	.021	.0125	.016	1.56	0.186	0.055	0.129	0.0175	1.037	0.017
Sr/Rb	0.13	0.07	0.04	1.58	0.53	0.30	0.78	0.05	1.43	0.04

TABLE 1 - Whole Rock Analyses of Rocks from the Hercules Area.

	Average FW	Average FW (Fitzgerald 1974)	Average HR	Average HR (Fitzgerald 1974)	Hanging- wall	Average HW (Fitzgerald, 1974)
	(47173, 47174, 47175, 55525)	HR 49,68, 74,88,180	(55320, 55349)	HR 8,15,26, 32,55,60, 91,114,128 132,150,153	(55281)	HR 71,73,105, 141.
Al ₂ O ₃	11.5	12.9	15.95	15.4	13.9	13.5
SiO ₂	74.3	76.9	62.0	55.7	73.5	73.9
TiO ₂	0.29	0.24	0.53	0.56	0.35	0.29
FeO	2.08	2.08	1.31	3.84	1.26	2.00
Fe ₂ O ₃	1.81		1.13		1.15	
MnO	0.25	0.25	0.22	2.04	0.05	0.11
CaO	0.20	0.65	3.12	5.46	0.28	1.13
K ₂ O	3.70	2.75	3.90	3.95	2.40	2.20
MgO	1.24	0.63	4.20	3.50	0.85	1.29
Na ₂ O	0.06	0.15	0.36	0.62	3.74	2.40
P ₂ O ₅	0.03	0.04	0.12	0.20	0.035	0.05
Cr ₂ O ₃		0.36		0.08		
SO ₃	1.56		1.35		0.03	
CO ₂	0.45		2.90		0.15	
H ₂ O -	0.14		0.12		0.09	
H ₂ Ot	2.59		3.70		1.65	
LOI		4.10		9.46		3.86
Pb+Zn+Cu	0.08	0.36	0.01	0.48	0.01	0.01
Rb (ppm)	210		185		120	
Sr "	15		100		190	
Ba (ppm)	1100		3325		670	
Na ₂ O/K ₂ O	0.045	0.05	0.09	0.16	1.56	1.09
Sr/Rb	0.07		0.54		1.58	
MnO+CaO+MgO	1.69	1.53	7.54	11.0	1.10	2.53

TABLE 2 - Averaged Whole Rock Analyses of Footwall, Host and Hangingwall Rocks, Hercules Area.

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Table 2 shows whole rock analyses for footwall, host and hangingwall rocks, compiled from results in Table 1, and Fitzgerald (1974). The three groups of rocks are chemically distinct having several characteristics that distinguish each from the others, as outlined below:

Footwall	Low Na_2O , and low $\text{Na}_2\text{O}/\text{K}_2\text{O}$, Sr/Rb ratio; high SiO_2 .
Host Rocks	High $\text{MnO}+\text{CaO}+\text{MgO}$ and CO_2 (due to carbonate species); also high BaO; low SiO_2 .
Hangingwall	High Na_2O and $\text{Na}_2\text{O}/\text{K}_2\text{O}$, Sr/Rb ratios.

7.3. Alteration

Several alteration styles have been recognised in the area mapped; these are shown in Fig. 10. Brief descriptions of alteration styles follow:

i) **Quartz Schist**, or footwall alteration, occurs extensively below the Rosebery and Hercules orebodies; also at Rosebery Lodes, Jupiter and East Hercules. "Quartz Schist" consists of siliceous augen defined by chlorite-sericite foliae. With decreasing intensity of alteration, smeared, sericitised feldspar appears and gradually becomes fresher; silicification decreases until the rock is dominantly felsic; and chlorite-sericite foliae become recognisable as fiammè. The alteration is characterised by low Na_2O values and low $\text{Na}_2\text{O}/\text{K}_2\text{O}$ and Sr/Rb ratios.

Associated with "quartz schist" development are subsidiary alteration features; such as progressive sericitisation and carbonatisation with eventual destruction of feldspar; and formation of sericitic schist zones within and adjacent to quartz schist proper. This may reflect a difference in the original lithology and its susceptibility to alteration, or lack of silica during the alteration phase. Chlorite is a common component of quartz schist alteration, occurring in a variety of forms; ultrafine chlorite imparting a greenish tinge to the rock; strong chloritisation of pumice and fiammè; and chlorite schist zones of massive chlorite usually close to the host rock contact.

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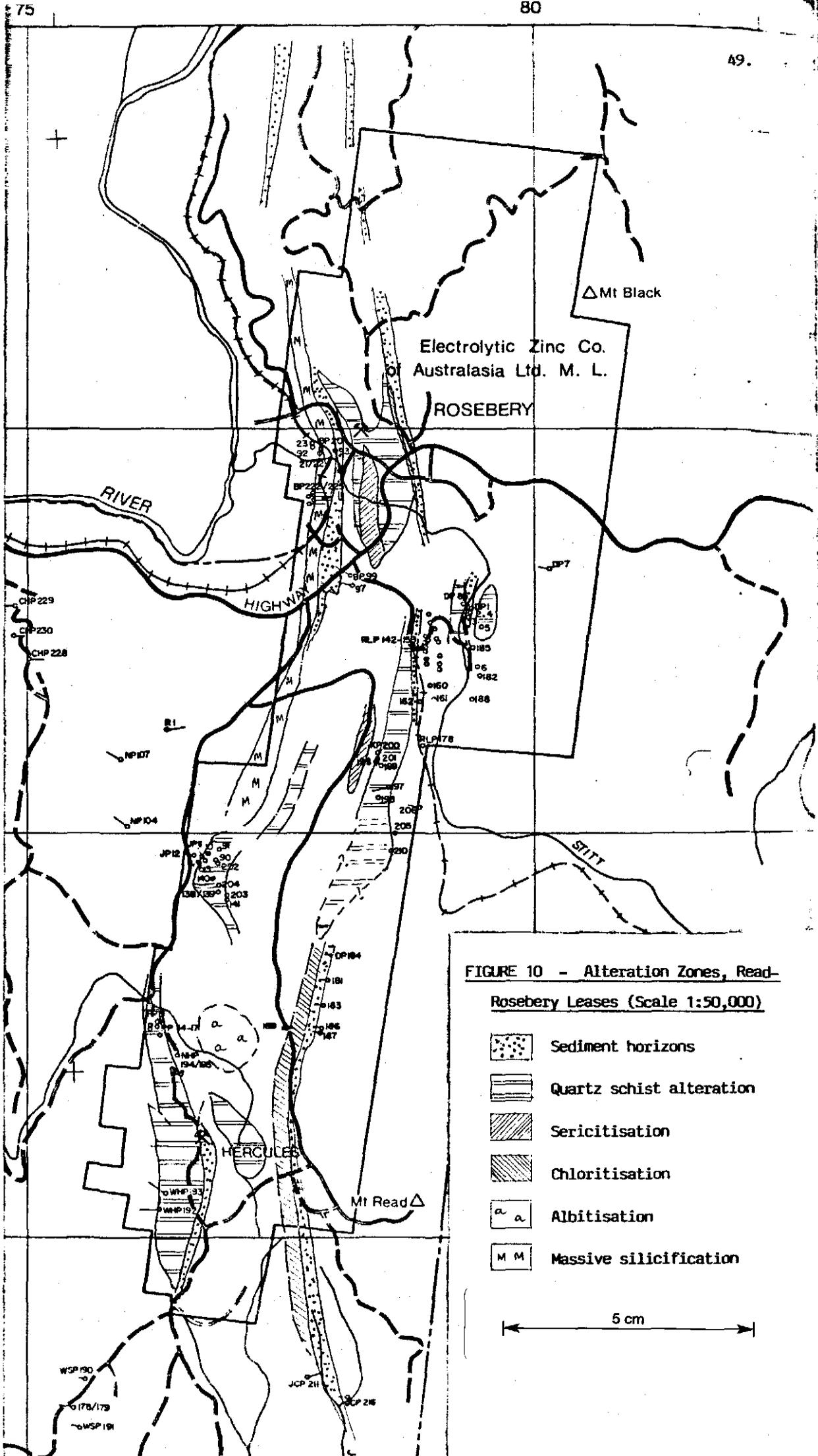


FIGURE 10 - Alteration Zones, Read-Rosebery Leases (Scale 1:50,000)

-  Sediment horizons
-  Quartz schist alteration
-  Sericitisation
-  Chloritisation
-  Albitisation
-  Massive silicification

5 cm

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ii) **Massive silicification** is characterised by massive green to yellow silicified and sericitised tuff and lava, with extensive quartz±carbonate veins and tourmaline veinlets. It is confined to the belt of volcanics between the "Rosebery Axis" and Rosebery Group sediments.

A different form of massive silicification was recently encountered in drill holes BD1 and BD 269 at Bobadil. Pink quartz-phyric lithic tuffs with siliceous fragments are "flooded" with white chalcedonic silica.

iii) **Kaolinisation** associated with persistent deep weathering occurs in a specific area at the northern end of the footwall "quartz schist" alteration zone. It may be a reflection of a weak sericite/kaolinite alteration phase.

iv) **Epidotisation** was occasionally noted in massive, acid to intermediate lavas and intrusives of the Mt. Black Volcanics.

v) **Complex chlorite-biotite-tourmaline alteration** occurs directly below mineralised sediments in DP259. Similar alteration is known locally within the Rosebery Mine - for example core from F lens footwall 17 level WIN.

vi) **Fuchsite** is present in the Salisbury Conglomerate on the Williamsford Road. K. Corbett (pers. comm.) analysed the supposed fuchsite from Moores Pimple and found it to contain >1% Cr₂O₃.

vii) **Albitisation** occurs in patches within massive pink welded ashflow tuffs.

viii) **Chloritisation** of felsic tuffs is common along the Dallwitz-Jones Creek sediment horizon; this is at present only an observation and is not supported by petrology or geochemistry.

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8. PROPOSED WORK

The following work is proposed for 1984/85.

8.1. Geological

Further geological mapping is needed in the Dallwitz, Jupiter and West Hercules areas to accurately define prospective host rock lithologies. Routine petrology and geochemistry of rock chip samples will accompany mapping.

An extensive rock-chip sample program is to be undertaken specifically to delineate gold targets. Emphasis will be placed on altered rocks and sedimentary horizons.

8.2. Geophysical

Down hole E.M. should be used to locate a drilling target to follow-up the intersection of 0.20m of semi-massive sulphide in DP259. Surveys of other recent holes would be conducted concurrently.

8.3. Au Sampling Program - Drill Core

Following discussions with consultant, G. Purvis (Report in preparation), a program involving splitting and assaying existing core from various areas in the Mine Lease, is to be undertaken, with the objective of locating reserves of Au or Au-Ag that may have already been drilled.

Areas of immediate interest are South and West Hercules and deep drill holes below Hercules, and the northern and southern extensions of the Rosebery orebody. Details of core for spitting and assay, are included as Appendix 3.

Depending on the results of this sampling program, diamond drilling may be warranted.

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8.4. Diamond Drilling

A further drill hole to test the host rock position that KP210 failed to test, should be considered, but at this stage the two planned holes south of Rosebery Lodes on Howard's Tram, will suffice.

Follow-up of the small (0.20m) sulphide intersection in DP 259, will follow down hole E.M.

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APPENDIX 1.

"The Geological Setting and Formation of the Rosebery Volcanic-Hosted Massive Sulphide Orebody, Tasmania", by G.R. Green, 1983 -
Summary by T.C. Lees.

"THE GEOLOGICAL SETTING & FORMATION OF THE ROSEBERY VOLCANIC-HOSTEDMASSIVE SULPHIDE OREBODY, TASMANIA", by G.R. GREEN, 1983.SUMMARY BY T.C. LEES1. INTRODUCTION

Production (1981) 10.9mt @ 18.0% Zn, 5.5% Pb, 0.8% Cu, 14.9% Fe, 187 g/t Ag, 2.8 g/t Au.

Reserves (proven + probable) 7.64 mt @ 16.4% Zn, 5.2% Pb, 0.59% Cu, 175 g/t Ag, 3.6 g/t Au.

Ore "Rosebery-type" - high tonnage, high Zn+Pb/Cu, finely banded, well zoned, sheet-like.

2. REGIONAL GEOLOGY

Precambrian Dundas Trough, indicated with rifting of Tyennan-Rocky Cape Quartzites, etc., contains ultramic complexes, and later felsic volcanoclastics within a mudstone-shale-lithic wacke-conglomerate sequence.

Mt. Read Volcanics consists of (from Corbett, 1981) Central sequence of acid lavas, ignimbrites and tuffs, with minor sediments (and known orebodies); Western sequence mainly of clastic sediments, quartz-phyric tuffs, and intrusive QFP; and the Tyndall Group of basal limestone, quartz-phyric tuff, lava, agglomerate, volcanoclastic sandstone, and Jukes Formation conglomerate.

Terrestrial Owen Conglomerate followed by Gordon Limestone and Eldon Group; then Devonian deformation and Dev-Carb granite intrusion with po-Sn mineralisation.

3. GEOLOGY OF THE ROSEBERY AREAFootwall Pyroclastics:

1,000mt+ of uniform, flame-bearing vitric-crystal-lapilli tuff with albite and/or K-feldspar phenocrysts; both welded and unwelded tuffs deposited subaerially.

Host Rocks, Black Slate:

Cleaved siltstone, slate and crystal tuff. Black slate with turbidite beds containing Precambrian quartzite grains.

Massive Pyroclastics:

A lower unit contains quartz phenocrysts (no K-feldspar), horizons with shale clasts.

The upper unit is composed of green pumice tuff and agglomerate with sparse albite phenocrysts.

062

Mt. Black Volcanics

Lower monotonous rhyolitic to dacitic flow banded to autobrecciated lava, and upper dacitic to andesitic, and minor basaltic tuff and lava.

Cauldron subsidence estimated at 1,700m-1,000m of footwall pyroclastics, 700m water depth.

Rosebery Group:Chamberlain Shale, Stitt Quartzite, Westcott Argillite:

Chamberlain Shale consists of slate, mudstone and volcanoclastic sandstone; grading into 350m of quartzwackes, quartzarenite, siltstone and slate. The Stitt Quartzite grades into 200m of siltstone, calcic sandstone and minor conglomerate bands.

Sediments, Natone Volcanics, Salisbury Conglomerate:

An east-facing mudstone sequence with dolomite is succeeded by the Salisbury Conglomerate.

The Salisbury Conglomerate faces east with clasts of chert, quartzwacke, carbonate, siltstone, shale, phyllite, fuchsite, and vein quartz.

The Natone Volcanics consist of cleaved quartz±sericite±chlorite±carbonate with quartz and sericitised plagioclase crystals, and abundant black shale clasts. A fault probably separates Stitt Quartzite from vitric-crystal-lithic tuffs of Natone Volcanics.

The Munro Creek Formation consists of 250m+ of sandstone, slate, minor conglomerate and dolomite.

Crimson Creek Formation

Monotonous mudstone with occasional lithicwacke and sandstone bands which contain mafic lava fragments, abuts the Munro Crk Fm to the west.

Structure:

A footwall anticline separates east- from west-dipping cleavage, and is thus post-cleavage.

A major fault extends from the Pieman Gorge to Williamsford, truncating both Primrose Pyroclastics and Rosebery Group. Quartz, galena, and cb- to q- fl veins with Pb-Zn-Ai-Sn-Cu mineralisation, with silicification, abuts the fault and Black P.A., Salisbury and Chamberlain.

The contact between Rosebery Group and Volcanics in the Pieman R is fault dipping 40°E with zone of tectonic breccia extending 80m into Sediments.

Tectonic shales may explain stragaphic problems within Rosebery Group-contact of Natone Volcanics and Stitt Quartzite; a 5m breccia zone at the top of the Salisbury Conglomerate; between the Westcott Argillite and Munro Ck. Fm., and Munro Ck. Fm. and Crimson Ck. Fm.

063

Environment of Deposition:

Chamberlain Shale sandstones are mass flows.

Thick-bedded Stitt Quartzite in submarine fan; thin bedded facies in lower fan region.

Stitt and Westcott Argillite compared with Pesaguero Fan, Spain, with Westcott equivalent deposited from low density turbidites. Spanish sequence interpreted in terms of fan progradation and avulsion; conglomerates, sandstones, and mudstone sequences emanating from single feeder channel.

Spherulitic chert in Westcott Argillite and Salibury Conglomerate may be replacement of evaporite, derived from dolomite.

Extent of Rosebery Group:

Greywacke-mudstone-minor limestone sequence in Coldstream R, faulted against conglomerate in Westcott Argillite.

At Moores Pimple, q-f-crystal tuff, shale, greywacke, fuchsite conglomerates may be correlates.

A mineralised boulder in the western sequence south of Mt. Read suggests younger than central sequence.

Corbett (1981) interprets black slate rafts in q-f-tuff at Bastyan Dam as collapse breccia in volcanic rift. Rafts a result of cauldron subsidence related to footwall ignimbrites.

Tectonic History:

Dundas Trough bounded by deformed quartzite sequences which were originally joined. Success Creek Group conglomerate-sandstone-carbonate-siltstone typical of early rifting stage. Olivine tholeiite volcanism accompanies Crimson Creek Formation, and ultramafics intrude.

Molasse-type deposition of conglomerate in fault bound troughs initiated in mid-late Cambrian.

Initial rifting with shallow siliceous sediments and carbonates (Success Creek Gp). Ocean crust appears with further rifting, also subduction with mafic volcanism and trough sedimentation of Crimson Creek Fm.

East dipping subductive phase initiated calc-alkaline volcanism and accretionary prisms - Rosebery Gp and Dundas Gp.

4. ROSEBERY OREBODY

Distribution of ore partly result of deformation. Py-cp-rich basal section below banded Pb-Zn; barite ore overlies.

Four main orebody (C-D-E-F and G (inverted)), 3rd order trends show Pb, Zn maxima at ends; Ag similar; Au max at south end, with ridge near Cu max below 15/L. High Fe coincident with low Zn/Fe in central north of orebody.

064

Fe content of sp decreases stratigraphically up.

Chlorites comparable with Mt. Lyell but richer in Fe and Al than those from Woodlawn and Mattagami Lake.

5. HYDROTHERMAL ALTERATION

Footwall rocks grade laterally from albite vitroclastic tuff, through semischists with sericitised feldspar, to schists with sericite flecks and chlorite streaks after fiamme.

Silicified schist underlies orebody, most primary textures destroyed.

Tourmaline usually in veins. Tourmaline-chlorite-biotite is apparently post-cleavage, but some may be Cambrian.

Post cleavage silicification and sericitization with q-cb veins and vein-type deposits of Sn-Bi-Cu-Pb-Zn in q-to \pm f \pm cl occurs from Black P.A. to Jupiter.

Assuming TiO₂ and Zr immobile during alteration, alteration below Rosebery shows Al, Nb, Zr static, Mg, Mn, Rb, K, H₂O, non-sulphide Fe enriched, Na, Sr and usually Ca strongly depleted; Ba erratic.

Co content and Co/Ni ratio in footwall pyrite under ore with highest Fe and Cu.

6. SULPHUR ISOTOPES

δ s³⁴ py of D lens + 8.9 \rightarrow +9.4%

δ s³⁴ py from py-po replacement +16.1%

δ s py, sp from barite +14.5 to +19.8%

δ s barite + 34.6% \rightarrow 41.2%

Isotope temperatures range from 100°C to 500°C, concentrated 300-350°C.

Reheating during metamorphism has not imprinted isotope equilibrium, equilibrium was attained during either deposition or diagenesis.

7. METAMORPHISM AND METASOMATISM

Py-po mineralisation of post-folding metasomatic origin.

Post deformation spessatine garnet in q-C-gar-cb-b- to -mv-py-sp-cp assemblage from altered host rock (R1840, 1767) co-existing asp-py indicates temperature range 370-455°C. Equilibrium asp-py-c at 250°C set at below peak metamorphism (retrograde?).

8. CONDITIONS OF ORE FORMATION

Minimum water depth to prevent boiling of 3m NaCl solution at 300°C is 765m.

Minimum solution temp. 230°C-260°C set by ba-cp stability.

Initial asp-py saturated solution at 300°C modelled during mixing with seawater; passing through sp-py field. Relative amount of seawater-derived S over source rock S increases with time explaining s³⁴ values.

Distribution of ore explained by py-cp mound forming around vent; whereas gn, sp rained down from either ascending plume or plume stagnated at water/air interface. Diachronous nature of ore not explained. Possible explanations

are strongly saline solutions (Type II of Sato) which initially rise, then sink and flow downslope; a plume initially depositing py-cp, then particulate sulphides from bottom-hugging dense solutions in pods. Lack of veining in footwall and low ore zone over hydrothermal vent (defined by high Co in py) may be by venting at margins of mound. Venting may have been along south plunging fracture system, as defined by $Co/Ni > 10$ and low $\delta^{34}S$.

Rosebery-type orebodies (Solomon, 1981), overlie felsic tuff and/or sediments have discordant sericite/chlorite alteration zones sheet-like massive ores; contain aspidostannite±po; sulphur isotopes (usually 6 → 10‰) reflect mixed volcanic-seawater sulphur source. (Hercules + 11.2 → 13.2‰)

Permeable zones within the footwall (unwelded parts of the sequence) may have enabled several areas of discharge.

9. CONCLUSIONS

Rosebery of exhalative origin, from H_2S -rich solutions. Ore diachrous, from +8.5 to +12‰ in Fe-Cu rich basal to +15 to +17‰ in Pb-Zn ore. Ore formed largely by lateral accretion.

Fe-Cu ore overlies high Co in footwall, deposited at up to 300°C from buoyant plume. First vent sealed; Pb-Zn ore from reversing buoyancy plume exhaled from F lens.

Barite ore deposited at 250°C, sulphur from volcanic and seawater source.

E. & O.E.

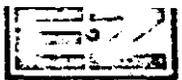
T.L. / A.M.D.

APPENDIX 2.

Summary Drill Logs - Drill Holes BD 1, CS 1, KP 197, 210, J.P. 202,
203, 204, NHP 194, WSP 190, 191, H 603, 953 and
DP 259

Prepared by **069** Date **1/11/83**

DRILL HOLE SUMMARY



Report Number
Section Number **520-**
Pit Number

Project **Red-Roseberg**
Prospect **Keary**

Longitudinal Number Full Length **767'** Hole No. **< P 197**

Latitude Longitude AMG

Grid co-ordinates

Core elevation Altitude

Final length Final depth

Date commenced **20-4-74** Date completed **2-5-74**

Hole length m	HOLE ORIENTATION			Hole length m	HOLE ORIENTATION			Wedges used
	dip	direction			dip	direction		
		true N	mag N			true N	mag N	

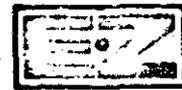
Intersection (m)			estimated true width (m)	SUMMARY GEOLOGY Rock units, mineralisation and structure	rock density g/cm ³
From	to	actual length			
0	37'			Glacial till	
37'	109'			Angular textured, silicified lithic tuff.	
109'	117'			Fault breccia	
117'	171'			Silicified, chloritic ash flow tuff	
171'	197'			Pyritic sericitic siltstone	
197'	240'			Angular textured silicified tuff	
240'	270'			Silicified Lithic Tuff	
270'	470'			Volcanogenic sediments	
470'	524'			Altered Tuffaceous sandstone	
524'	600'			Silicified Volcanogenic sediments	
600'	687'			Rhyolitic ash flow tuff	
687'	691'			Massive pyrite	
691'	720'			Brecciated Rhyolitic Ash Tuff or lava	
720'	767'			Rhyolitic Ash flow tuff.	

Intersections (m)			estimated true width (m)	SUMMARY ASSAYS weighted average					
From	to	actual length							

Prepared by *OTL*

Date *1/11/33*

DRILL HOLE SUMMARY



Report Number
Section Number
Plan Number

Project *Cand - Rosebery*
Prospect *Jupiter*

Longitudinal Number

Full Length *958'* Hole No. *JP 202*

Latitude

Longitude *AMG 5 369 680 N 376 865 E*

Grid co-ordinates

Collar elevation

Altitude

Final length

Final depth

Date commenced

Date completed

Hole length m	HOLE ORIENTATION			Hole length m	HOLE ORIENTATION			Hole length m	Wedges used
	dip	direction			dip	direction			
		true N	mag N			true N	mag N		

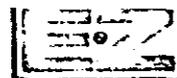
Intersection (m)			estimated true width (m)	SUMMARY GEOLOGY Rock units, mineralisation and structure	rock density g/cm ³
From	to	actual length			
10'	133'			<i>Sericitized tuff</i>	
133'	189'			<i>Angular-textured altered tuff</i>	
189'	338'			<i>Felsic lithic tuff.</i>	
338'	344'			<i>Fault.</i>	
344'	556'			<i>Rhyolitic Agglomerate</i>	
556'	660'			<i>Angular-textured quartz-sericite schist</i>	
660'	663'			<i>Fault.</i>	
663'	720'			<i>Silicified, sericitized tuff</i>	
720'	874'			<i>Quartz-phyric rhyolite tuff</i>	
874'	905'			<i>Black slate</i>	
905'	918'			<i>Angular Slump Breccia</i>	
918'	958'			<i>Lithic Sandstone.</i>	

Intersections (m)			estimated true width m	SUMMARY ASSAYS weighted average				
From	to	actual length		Pb	Zn	Cu %	Ag g/t	Fe %
629	631	2'		0.3	3.5	0.04	25	2.9

Prepared 073

Date

DRILL HOLE SUMMARY



Report Number
Section Number
Plan Number

Project Road - Rosser
Prospect Tumbler

Longitudinal Number

Full Length 1004' Hole No. TP 204

Latitude Longitude AMG 5 369 486 N 376 895 E

Grid co-ordinates

Collar elevation

Altitude

Final length

Final depth

Date commenced

Date completed

Hole length m	HOLE ORIENTATION			Hole length m	HOLE ORIENTATION			Hole length m	Wedges used
	dip	direction			dip	direction			
		true N	mag N			true N	mag N		

Intersection (m)			estimated true width (m)	SUMMARY GEOLOGY Rock units, mineralisation and structure	rock density g/cm ³
From	to	actual length			
0	90'			Angen textured quartz-sericite-chlorite schist	
90'	226'			Altered tuff or lava	
226'	246'			silicified Felhic Tuff	
246'	526'			Rhyolitic Ash Flow tuff	
526'	612'			Rhyolitic Agglomerate	
612'	620'			Fault	
620'	700'			Altered lithic tuff	
700'	835'			Angen textured silicified tuff	
835'	900'			sericitized Tuff or lava	
900'	904'			Fault	
904'	973'			silicified, sericitized tuff or lava	
973'	1009'			Quartz-phyric tuff or lava	

Intersections (m)			estimated true width m	SUMMARY ASSAYS weighted average			
From	to	actual length		Pb %	Zn %	Cu %	Ag g/t
747	753	6'		0.4	3.0	0.05	15
767	773	6'		0.65	2.8	0.12	15

257074

Prepared by **T.C. Lees** Date **23.5.84**
 Report Number
 Section Number
 Plan Number
 Longitudinal Number

DRILL HOLE SUMMARY
 Project **Read-Rosebery**
 Prospect **Dalmeny**
 Full Length **444.3m** Hole No. **DP 259**

Latitude Longitude **AMG 5,372,190.2N 379,667.6E**
 Grid co-ordinates
 Collar elevation **151.6** Altitude
 Final length Final depth
 Date commenced **14th April, 1984** Date completed **14th May, 1984**

Hole length m	HOLE ORIENTATION			Hole length m	HOLE ORIENTATION			Hole length m	Wedges used	
	dip	direction			dip	direction			Dip	True N
		true N	mag N			true N	mag N			
0	-80	270		220	-68	-		385	-55.5	268
90	-75	-		280	-63	268		419	-48.5	288.5
174	-71	264.5		335	-56.5	268				

Intersection (m)			estimated true width (m)	SUMMARY GEOLOGY Rock units, mineralisation and structure	rock density g/cm ³
From	to	actual length			
0	34.5			Glacial till	
34.5	137.9			Rhyodacite lava	
107.9	131.2			Lithic-crystal tuff (or hyaloclastite)	
131.2	145.4			Rhyodacite lava	
145.4	182.2			Limestone; haematite-altered at base.	
182.2	204.9			Rhyodacite lava and tuff (or hyaloclastite)	
204.9	324.8			Silicified Felsic Tuffs, minor sp	
324.8	334.2			Augen-textured, silicified tuff, minor sp	
334.2	363.9			Bedded reworked tuff, sandstone, siltstone, shale	
363.9	365.6			Mineralised sediments	
365.6	365.8			Massive sulphides - sphalerite, pyrite	
365.8	370.1			Oolitic carbonate (rhodochrosite)	
370.1	391.3			Massive chlorite-magnetite-pyrite- tourmaline	
391.3	415.1			Felsic lithic-crystal-vitric tuffs	
415.1	436.5			Felsic lithic-vitric tuff	
436.5	444.3			Silicified (altered) tuff, dis sphalerite.	

Intersections (m)			estimated true width m	SUMMARY ASSAYS weighted average				
From	to	actual length		Cu%	Pb%	Zn%	Ag g/t	Au g/t
333.6	333.0	34.6		0.01	0.01	0.50	1.0	≤0.01
333.0	344.0	11.0		0.03	0.31	0.76	26.7	0.05
344.0	363.9	19.9		0.01	0.20	0.40	27.3	0.135
363.9	365.8	1.9		0.08	1.55	2.6	180.4	0.69
365.8	369.1	3.3		0.00	0.06	0.06	54.5	0.16
369.1	382.0	12.9		0.02	0.02	0.03	5.9	0.36

APPENDIX 3.

Au Sample Program - Core Splits and Re-Assays, Rosebery and Hercules.

APPENDIX 3.Au Sample Program - Core Splits and Re-Assays,
Rosebery and HerculesROSEBERY - NORTH END

	Depth	Sample No.	Assay For	Comments
49R	930-937			
	937-945			
	945-952			
	952-960		Pb,Zn,Cu,Ag,Au	
	960-970			
	970-980			
	980-990			
	990-1000			
56R	1565½-1571		Pb,Zn,Cu,Ag,Au	
	1571 -1585½			
71R	1709½-1720	D4495-5600	Au	
	2079 -2089½	D5610-5613		

ROSEBERY - SOUTH END

45R	1436-1438		Ag,Au	
	1478-1489			
47R	685-700			
	700-715			
	715-730			
	730-745		Pb,Zn,Cu,Ag,Au	
	745-760			
	760-768½			
	795-805			
	805-814			

082

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	Depth	Sample No.	Assay For	Comments	
48R	620-635				
	635-650				
	650-665				
	665-680				
	680-695				
	695-706				
	706-715				
	715-725				
	725-735				
	735-745				
	745-755				
	755-765				Carbonate-
	765-775		Pb,Zn,Cu,Ag,Au	bearing	
	775-785			throughout	
	785-795				
	795-804				
	804-820				
820-830					
830-843					
843-855					
855-870					
	950-965				
	965-980				
	980-995				
50R	176 $\frac{1}{2}$ -208	47104-47108	Au	Carbonate	
54R	620-635				
	635-650				
	650-660				
	660-670				
	670-685		Pb,Zn,Cu,Ag,Au	Carbonate	
	685-700				
	700-715				
	715-730				
	730-745				
	745-755				

083

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4.

	Depth	Sample No.	Assay For	Comments	
H 880	217-249	2683-2690	Au	Carbonate	
H 884	117-129	1894-1895	Au		
	129-140				
	140-150		Pb,Zn,Cu,Ag,Au		
	150-160				
	160-175				
H 885	99-144	1907-1917	Au		11
H 887	67- 85	2003-2006	Au		4
	128-142	2007-2009	Au		3
	156-174.5	2010-2013	Au		4
	174.5-191	2042-2044	Au		3
H 889	106-116	2045-2047	Au		3
	201-226	2162-2166	Ag,Au		5
H 900	173-238	2167-2176	Au		10
		2247-2249	Au		3
H 901	208-230	2250	Au	Carbonate	
		3001-3004	Au		5
H 903	198-238	3043-3051	Au	Carbonate	9
H 905	89-112	3065-3069	Au	Carbonate	(5)
	87-100		Pb,Zn,Cu,Ag,Au	Carbonate	2
H 906	100-116				
	238.5-248	3116-3123	Au	Carbonate	(8)
H 907	85 - 97	3124-3126	Au	Carbonate	3
	226½ -244½	3127-3130	Au	Carbonate	4
	244½-254		Pb,Zn,Cu,Ag,Au	Carbonate	2
	254 -263				

084

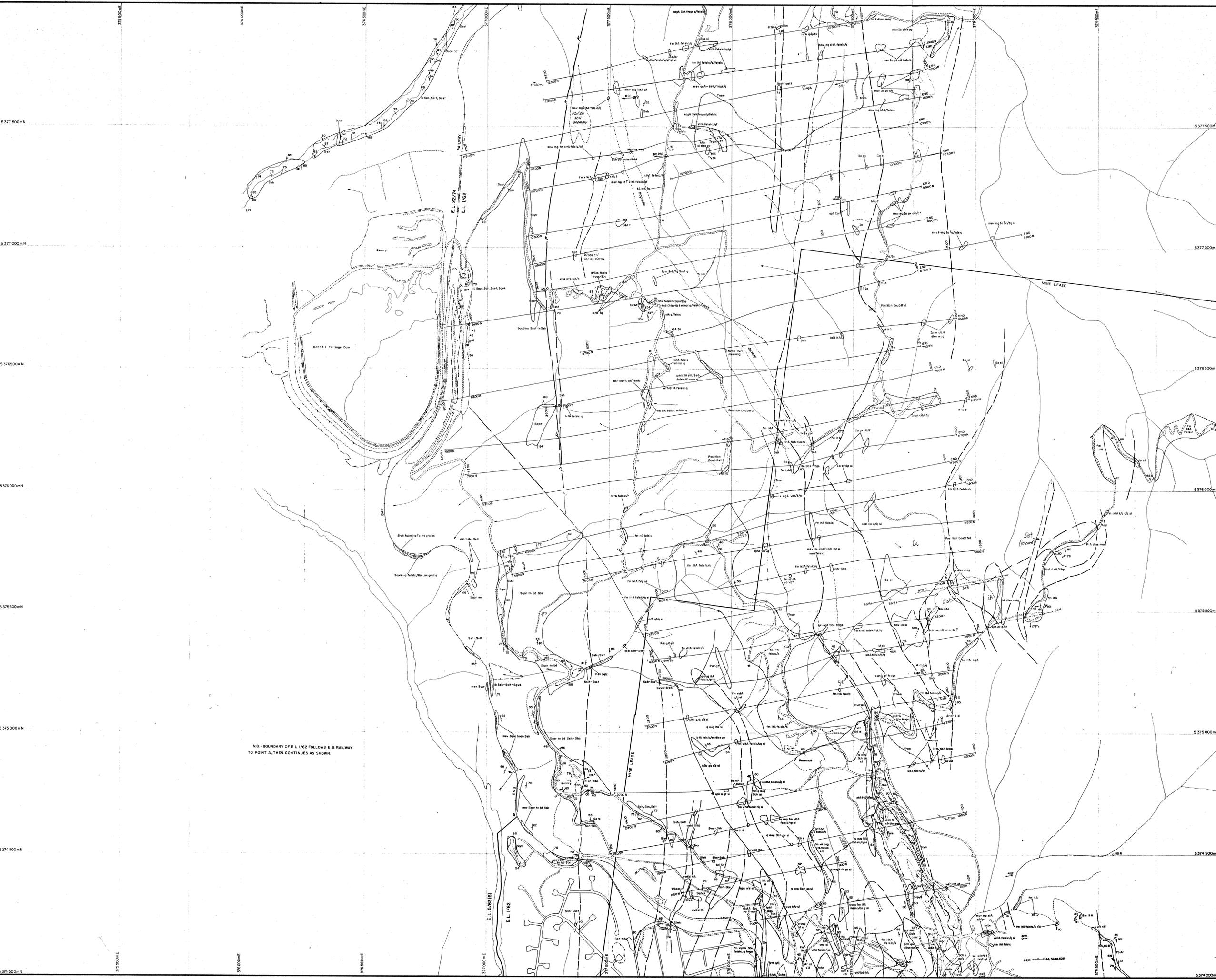
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	Depth	Sample No.	Assay For	Comments	
H 933 (AQ Core)	0- 10				
	10- 20				
	20- 30				
	30- 40				
	40- 50				
	50- 60				
	60- 70				
	70- 80				
	80- 90				
	90-100				
	100-110		Pb,Zn,Cu,Ag,Au	Carbonate	20
	110-120				
	120-130				
	130-140				
	140-154				
	154-170				
	170-180				
	180-190				
	190-200				
200-210					
H 940	0- 10				
	10- 20				
	20- 30		All Pb,Zn,Cu,Ag,Au		
	30- 40				
	40- 50				
	50- 60				
	60- 70				
	70- 80				
	80- 88				
88-125	D5038-5043	Au		6	
H 951	700-713				
	713-723				
	723-733				
	733-746				
	746-756				
	756-793	D5052-5057	Au		6

085

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6.

	Depth	Sample No.	Assay For	Comments
H 952	523.5-562.8	D5072-5077	Au	6
H 953	731-740 740-750 750-760 760-773		Pb,Zn,Cu,Ag,Au	4
H 954	194-205 205-215 215-225 225-235 235-242.5		Pb,Zn,Cu,Ag,Au	
H 632	150-160 160-170 170-180 180-190 190-200 300-310 310-320 320-330 330-340 340-350 350-360		Au,Pb,Zn,Cu,Ag, Au 309 Carbonate Au,Pb,Zn,Cu,Ag Au 309	



N.B. - BOUNDARY OF E.L. 1/62 FOLLOWS E.B. RAILWAY TO POINT A, THEN CONTINUES AS SHOWN.

LEGEND

1 Colour	2 Cleavages
ple pale	m.v. m.v.
dk dark	w.cvd w.cvd
pk pink	clvd clvd
rd red	str.cvd str.cvd
brn brown	
or orange	3. Igneous Grain Size
yel yellow	lg > 1mm
ol olive	mg 1-5mm
gn green	wh 5-50mm
bk black	cg > 50mm
wh white	
cm cream	
pl purple	
clr clear	

4. Sediment Grain Size

argillites < 0.06mm	rudites > 2.0mm
arenites 0.06 - 0.20 mm	gr granule 2 - 4 mm
vlg 0.06 - 0.12 mm	pb pebble 4 - 64 mm
lg 0.12 - 0.25mm	cb cobble 64 - 256mm
mg 0.25 - 0.5 mm	bd boulder > 256mm
cg 0.5 - 1.0 mm	
vsg 1.0 - 2.0 mm	

5. Igneous Rock Classification

LA Acid tuff	ryh rhyolite
A Acid Lava	ryd rhyodacite
LA Minor Acid Intrusives	da dacite
MA Major Acid Intrusives	P pegmatite
	GR granite
	QF quartz feldspar
	PP porphyry

6. Sedimentary Rock Classification

VS Volcaniclastic Sediments	
Sv Volcanogenic Sediments	
Srd Rudites	Scon Conglomerate
	Sbr Breccia (sedimentary)
	Sst Sandstones
	Sar arenites
	Sst quartz arenite
	Sst lithic arenite
	Sst volcanic arenite
	Sst quartz wacke
	Sst feldspathic wacke
	Sst lithic wacke
	Sst volcanic wacke

7. Silicates

q quartz	bkw boxwork	cb carbonate
k K-feldspar	sub sulphides	cid siderite
ab albite	gos gossan	cl calcite
p plagioclase	hm haematite	dol dolomite
a amphibole	mag magnetite	rh rhodochrosite
px pyroxene	lim limonite	ba barite
bc biotite	bn bornite	fl fluoreite
c chlorite	co chalcopyrite	sh scheelite
s sericite	py pyrite	Au gold
ep epidote	sp sphalerite	Leu leucosine
to tourmaline	gn galena	
f feldspar	py pyrite	
nb norrbornite	py pyrite	
l talc	py pyrite	

8. Sulphides

asp arsenopyrite	Fe Fe-oxides
Mn Mn-oxides	Fe Fe-oxides
Fe Fe-oxides	tet tetrahedrite
cas cassiterite	

9. Carbonates

cb carbonate	cid siderite
cl calcite	dol dolomite
rh rhodochrosite	ba barite
fl fluoreite	sh scheelite
Au gold	Leu leucosine

10. Textures

lava	dm bombs	1A flow brecciated
lithic tuff	pm pumice	vns veins
crystal tuff	fm(f) flame	abd cross-bedded
vt vitric tuff	l (length cm)	tkbd thick-bedded
lpt lapilli tuff	P porphyritic	amb amygdaled
ag agglomerate	a vesicular	ib inter-bedded
af ash flow	sph spherulitic	tbnd thin-bedded
ashfl ash fall	wld welded	ab inter-bedded
bx breccia	nw/d reworked	lam laminated
qe/aug quartz	fr fragments	cl clasts
eyes augen	cl clasts	brd brecciated
bedded	bnd banded	stg staining
schistose	fb flow banded	

11. Alteration

alb albitized	12. Structure
cb carbonated	Fault
cd chloritized	Bedding
cs sericitized	Cleavage
Kd kaolinized	Joint
ep idiositized	Flunge
sc scalded	Facing & Class

12. Structure

- Fault
- Bedding
- Cleavage
- Joint
- Flunge
- Facing & Class
- Unconformity
- Outcrop
- Interpreted boundary

13. Mineralisation

- dis (i) disseminated (%)
- str stringer
- mas massive

14. Topographical Features

- Track, vehicle, foot
- Railway, tramway
- River, creek
- Waterfall
- Drill Hole
- Old mine, pit
- Sample Location
- Trig. spot height
- Dump or scree

SCHEMATIC SHEET LAYOUT

N.B. - CORRESPONDING SHEET, MT. BLACK - AO-504-0020

ELECTROLYTIC ZINC CO. OF ASIA LTD
PROJECT: READ-ROSEBERRY LEASE, T.A.S.

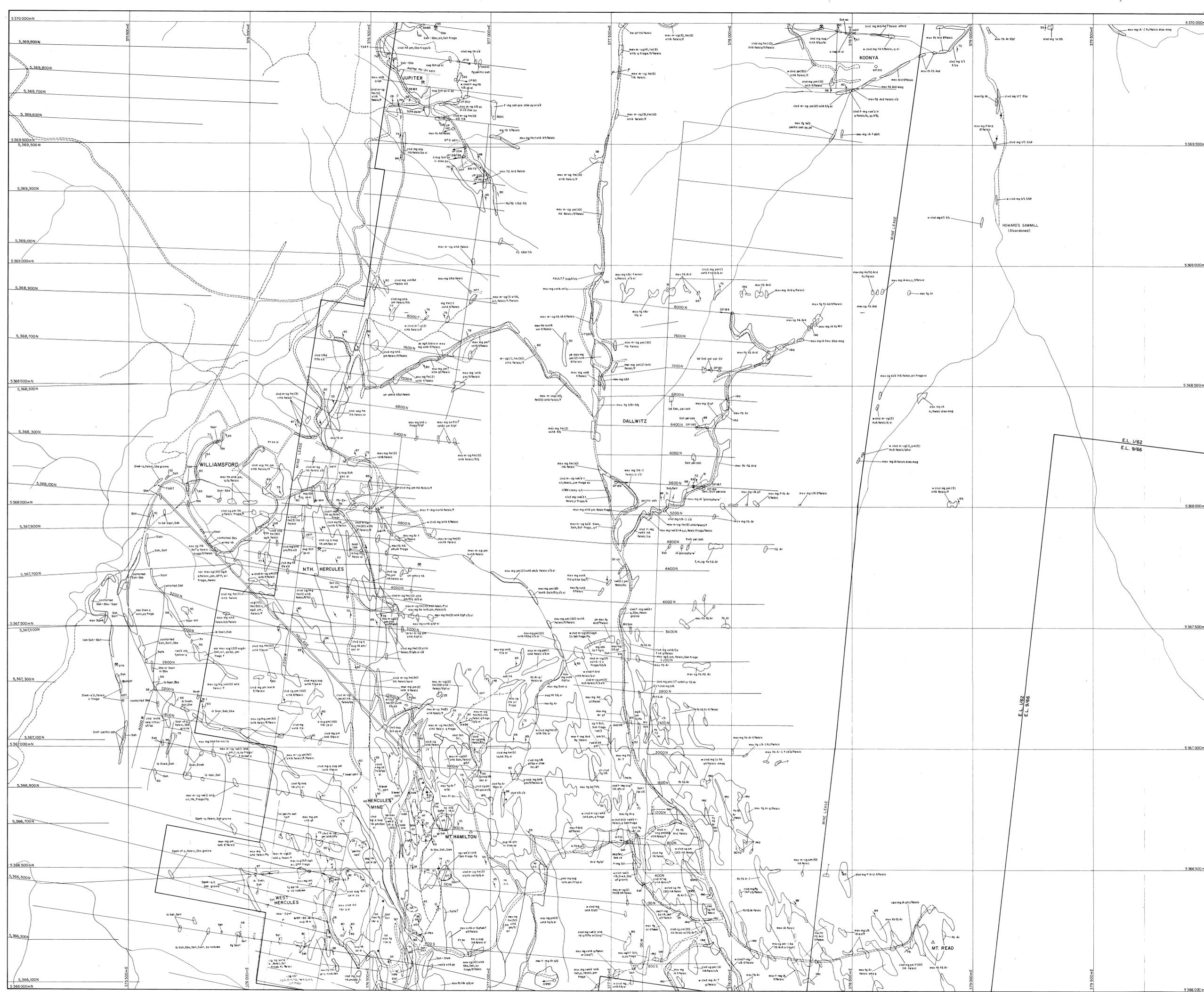
257087

GEOLOGY
INTERPRETATION

SHEET 7A 6486

SCALE: 1:5000 Survey: T.L. Revised: 3-9-84
Reference: Date: 25-10-83 Ref. No.
Drawn: R.J.R. Checked: AO-520-0109

6488



LEGEND

1 Colour	2 Cleavages	3 Igneous Grain Size
pk pale dk dark pk pink rd red brn brown or orange yel yellow ol olive gn green blk black wht white crm cream ppl purple clr clear	mvs w clvd cld str clvd	fg > 1mm mg 1 - 5mm cg 5-50mm vg > 50mm

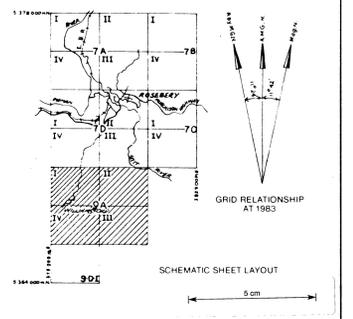
4 Sediment Grain Size	5 Igneous Rock Classification
argillites < 0.06mm arenites 0.06 - 2.0mm vfg 0.06 - 0.2mm fg 0.12 - 0.25mm mg 0.25 - 0.5mm cg 0.5 - 1.0mm vg 1.0 - 2.0mm	rudites > 2.0mm gr granule 2 - 4mm ps pebble 4 - 64mm cob cobble 64 - 256mm tbl boulder > 256mm

6 Sedimentary Rock Classification	7 Metamorphic Rock Classification
Vs Volcaniclastic Sediments Sv Volcanogenic Sediments	Sch Undifferentiated Metamorphic Rocks

8 Quartzes	9 Carbonates
q quartz al albite p plagioclase a amphibole px pyroxene bi biotite ch chlorite ser sericite ep epidote rn hornblende t talc	cb carbonate srd sodic cl calcite dol dolomite rh rhodochrosite ba barite fl fluorite sh scheelite Au gold Lx Leucosene

10 Textures	11 Alteration	12 Structure
lava lithic tuff crystal tuff vitic tuff lpt lapilli tuff agg agglomerate at ash flow ash fall asph asphalt bw breccia qu/arg quartz eyes augen bd bedded sch schistose	ab altered cb carbonated c chloritized s sericitized sp silicified ep epidotized sl sulfidated	Fault Bedding Cleavage Joint Plunge Facing & Glass Unconformity Outcrop Interpreted boundary

13 Mineralisation	14 Topographical Features
dis disseminated (%) str stringer mvs massive	Track, vehicle foot Railway, tramway River, creek Waterfall Drill Hole Old mine pit Sample Location River trap, spoil height Dump or scree

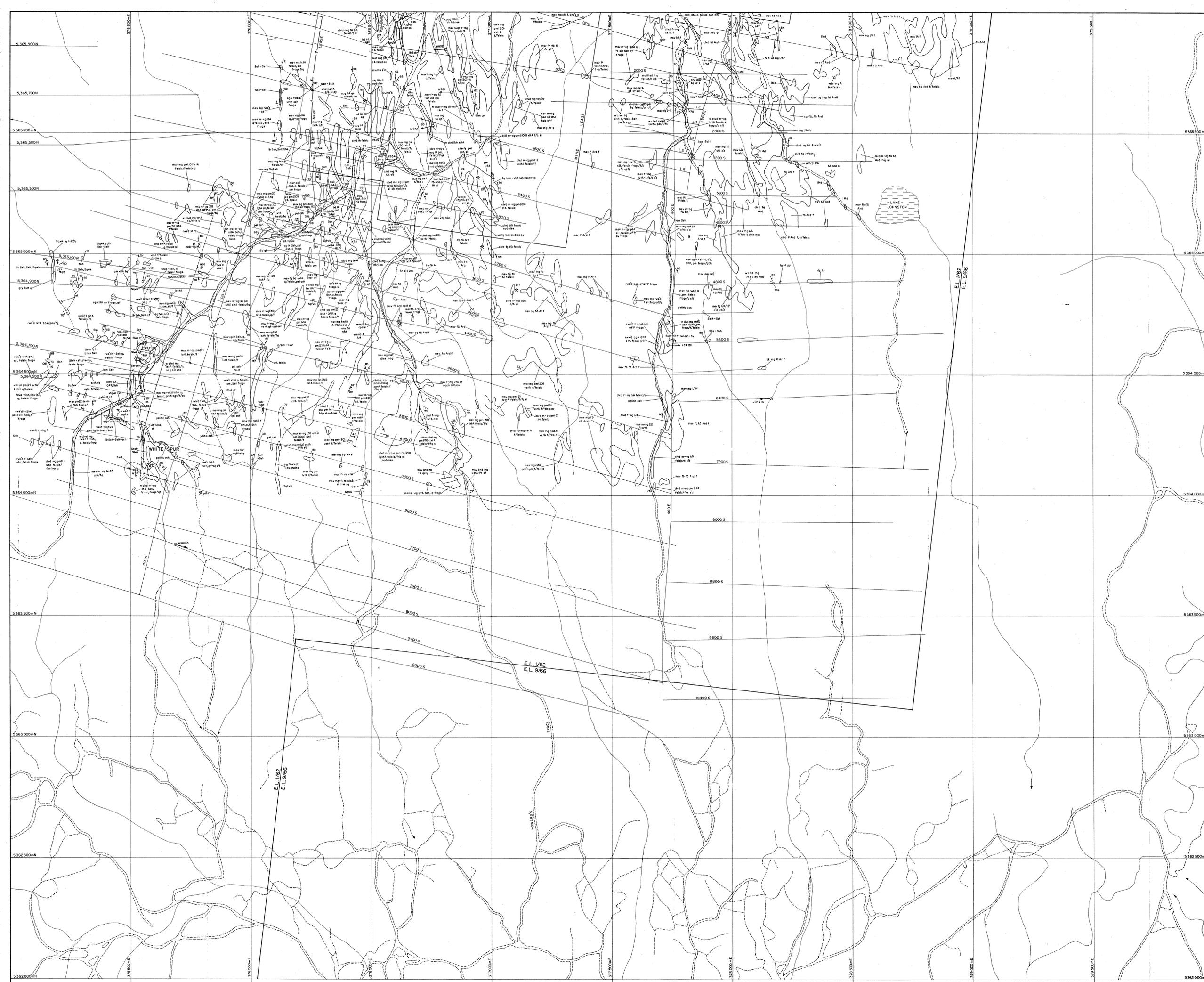


ELECTROLYTIC ZINC CO. OF ASIA LTD.
PROJECT: READ-ROSEBERY LEASE, T.S.

257089
GEOLOGY
INTERPRETATION

SHEET 9A
 257089
 6488

Scale: 1:5000	Survey: T.L.	Revised:
Reference:	Date: 11-9-84	Ref. No.:
Drawn: R.J.R.	Checked:	AO-520-O138

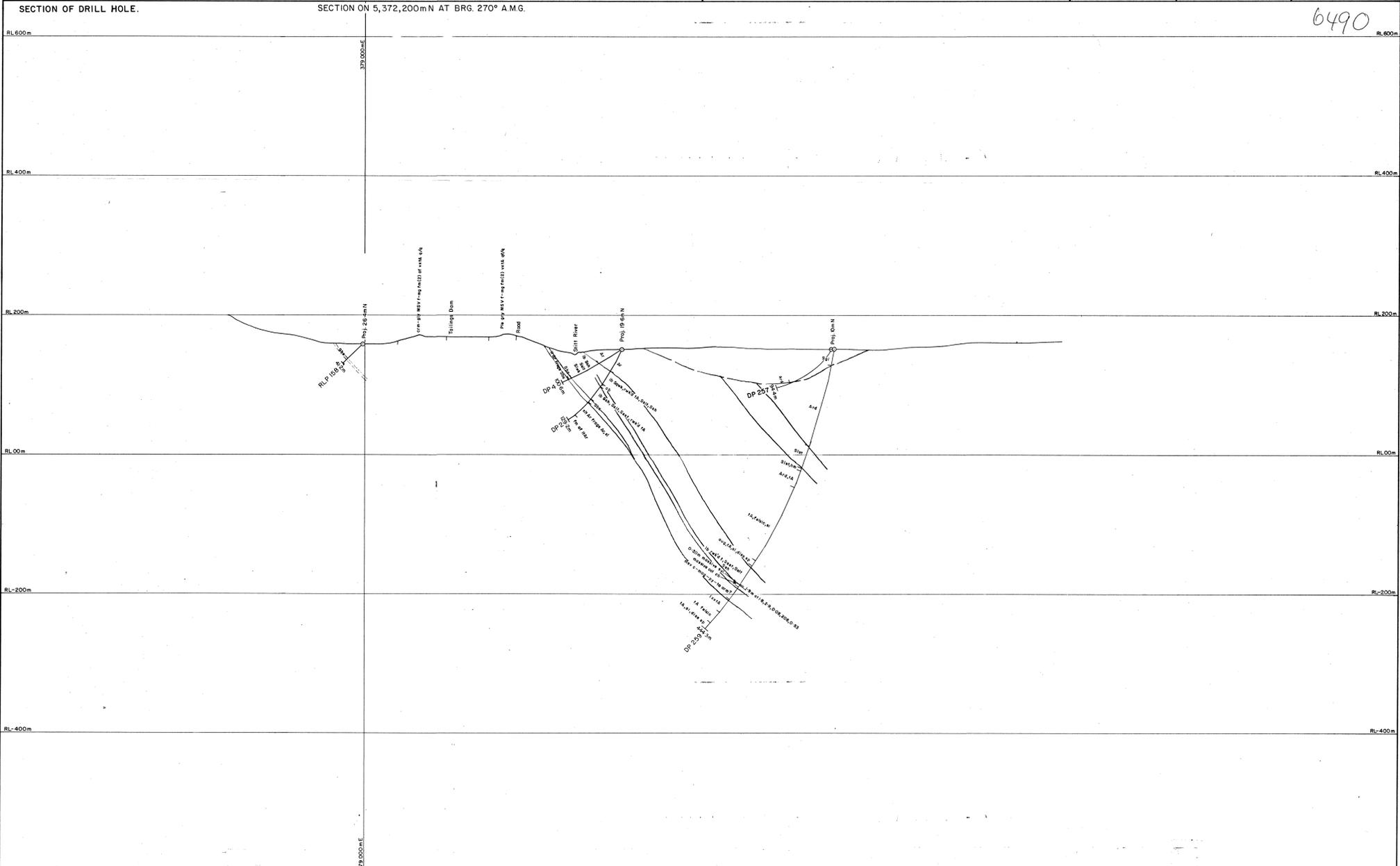
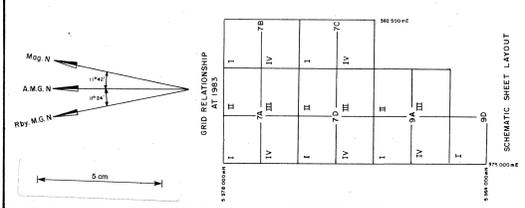


6489

LEGEND

1 Colour	2 Cleavages	3 Igneous Grain Size									
pte pale dk dark pk pink rd red brn brown or orange ye yellow cl olive grn green bk black wht white crm cream ppl purple clr clear	mv mv w cld cld str cld brwn or ye grn bk wht crm ppl clr	Size lg > 1mm mg 1-5mm cg 5-50mm vcg > 50mm									
4 Sediment Grain Size											
argillites < 0.06mm arenites 0.06-2.0mm vfg 0.06-0.12mm fg 0.12-0.25mm mg 0.25-0.5mm cg 0.5-1.0mm vcg 1.0-2.0mm	ruddies > 2.0mm gr granules 2-4mm pb pebbles 4-64mm cob cobble 64-256mm bld boulder > 256mm										
5 Igneous Rock Classification											
IA Acid tuff A Acid Lava IA Minor Acid Intrusives MA Major Acid Intrusives MI Intermediate tuffs IL Intermediate lava I Minor Intermediate Intrusives DI Major Intermediate Intrusives MV Mafic Volcanics IM Minor Mafic Intrusives - dolerite d U Ultramafic Rocks	rhyolite rhyodacite r d dacite d P pegmatite granite GR quartz feldspar GPP porphyry										
6 Sedimentary Rock Classification											
VS Volcaniclastic Sediments Sv Volcanogenic Sediments Srd Rudites Scon Conglomerate Sbr Breccia (sedimentary) Sst Tuffite Sst Sandstones Sst Argillites Sst Limestone Sst Dolomite Sst Chert Sst Iron formation Sst Evaporite Sst Undifferentiated Metamorphic Rocks	Sst orthoquartzite Sst quartz arenite Sst feldspathic arenite Sst arkose Sst lithic arenite Sst volcanic arenite Sst quartz wacke Sst feldspathic wacke Sst lithic wacke Sst volcanic wacke										
7 Silicates	8 Sulphides	9 Carbonates									
q quartz k K-feldspar ab albite p plagioclase a amphibole px pyroxene b biotite c chlorite s sericite e epidote t tourmaline f feldspar hb hornblende l talc	bwk boxwork sul sulphides gos goethite hm haematite mag magnetite lim limonite bn bornite co chalcopyrite sp sphalerite gn galena py pyrite po pyrrhotite asp arsenopyrite Me Mercurous Fe Fe-oxides tet tetrahedrite cas cassiterite	cb carbonate sid siderite cal calcite dol dolomite rh rhodochrosite ba barite flu fluorite shi scheelite Au gold Leu leucosene									
10 Textures											
pm pumice str striae vt vitric tuff vlt vitric tuff apt apatite ag agglomerate af ash flow ashll ash fall bx breccia qe/aug quartz eyes augen bd bedded sch schistose	bm bombs flm flame P porphyritic a amygdaloidal ves vesicular sph spherulitic wld welded rwd reworked fr fragments cl clasts bnd banded fb flow banded										
11 Alteration											
ab albited cb carbonated cg chloritized sd sericitized ka kaolinized ep epithermal si silicified											
12 Structure											
	Fault Bedding Cleavage Joint Plunge Facing & Class Unconformity Outcrop Interpreted boundary										
13 Mineralisation											
dss (i) disseminated (%) str stringer msv massive											
14 Topographical Features											
Road Track, vehicle, foot Railway, tramway River, creek Waterfall	Drill Hole Old mine, pit Sample Location Trig. spot height Dump or scree										
<p style="text-align: center;">N.B. - CORRESPONDING SHEET, MT. BLACK-AO-504-0124</p> <p style="text-align: center;">ELECTROLYTIC ZINC CO. OF ASIA LTD.</p> <p style="text-align: center;">PROJECT: READ-ROSEBERY LEASE, T.A.S.</p> <p style="text-align: center;">257090</p> <p style="text-align: center;">GEOLOGY</p> <p style="text-align: center;">INTERPRETATION</p> <p style="text-align: center;">SHEET 9D</p> <p style="text-align: center;">6489</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td>Scale: 1:5000</td> <td>Survey: T.L.</td> <td>Revised:</td> </tr> <tr> <td>Reference:</td> <td>Date: 18-9-'84</td> <td>Ref. No.</td> </tr> <tr> <td>Drawn: R.J.R.</td> <td>Checked:</td> <td>AO-520-0139</td> </tr> </table>			Scale: 1:5000	Survey: T.L.	Revised:	Reference:	Date: 18-9-'84	Ref. No.	Drawn: R.J.R.	Checked:	AO-520-0139
Scale: 1:5000	Survey: T.L.	Revised:									
Reference:	Date: 18-9-'84	Ref. No.									
Drawn: R.J.R.	Checked:	AO-520-0139									

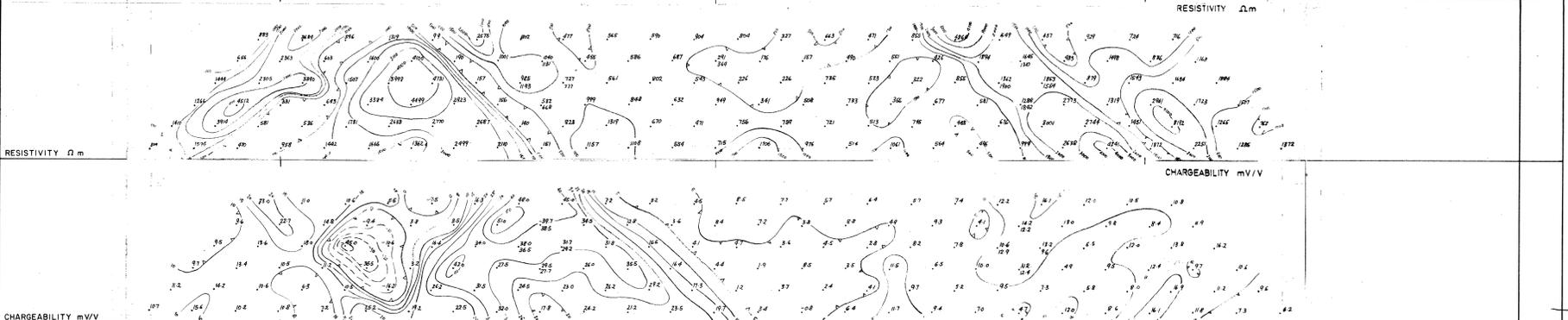
ROSEBERY MINE GRID ORIGIN IS 5 374 181-69mN 378 870-55mE A.M.G.
 BEARING OF HOLE No DP2 = 258.5° A.M.G.
 DP4 = 258.5° A.M.G.
 RLP158 = 273.5° A.M.G.
 DP 257 = 270° A.M.G.
 DP 259 = 270° A.M.G.



6490

DIPOLE - DIPOLE
I.P.

Survey by : SCINTREX(Tas-107)
 Date : 22-5-83
 Receiver : RX508185
 Pulse : 2 sec
 Spacing : 50 metres



GROUND
MAGNETICS

