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ELECTROLYTIC ZINC COMPANY OF AUSTRALASIA LIMITED
MINERAL RESOURCES DIVISION

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EXPLORATION LICENCE NO. 4/73 - STERLING VALLEY

PROGRESS REPORT ON EXPLORATION ACTIVITY

16TH NOVEMBER, 1983 TO 1ST MAY, 1984.

OPEN FILE

REPORT No. T181

I.R. McDONALD,
MAY, 1984.

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1. INTRODUCTION

This report covers work undertaken on E.L. 4/73 by Electrolytic Zinc Company of Australasia Limited on behalf of a Joint Venture consisting of E.Z., Aberfoyle Exploration Pty. Ltd. and Getty Oil Development Company Ltd.

No new field work was undertaken during this reporting period. This was in part due to uncertainties about ground tenure which were created by the Tasmanian Hydro Electric Commission's move to have a large area of E.L. 4/73 vested under their control, and hence removed from the jurisdiction of the Mines Act. The H.E.C. have subsequently agreed to modify their demands, but negotiations on the matter are still continuing.

This report is, therefore, concerned with assessment of previous work.

2. PREVIOUS EXPLORATION

Previous exploration on E.L. 4/73 is detailed in E.Z. Report No's 133 (1980), 143 (1981), 146 (1981), 150 (1982), 154 (1982), 161 (1983) and 167 (1983).

3. EXPLORATION ACTIVITY 16TH NOVEMBER, 1983 TO 1ST MAY, 1984

3.1. Work Undertaken

The results of an assessment of the exploration for tin mineralisation in the Sterling Valley area were presented in E.Z. Report No. 167. It was concluded that the intersections of tin mineralisation seen to date were consistently too low grade and too narrow to represent a viable mining proposition. The general opinion within the mining and metals industry is that Tin Quotas are unlikely to be lifted in the foreseeable future. These two factors when taken together suggested strongly that further exploration for tin within Sterling Valley was not warranted. The potential of the Sterling Valley area to host viable mineralisation of alternative commodities was examined.

Within generally depressed metal market prices, two commodities seemed worthy of attention. Arsenic has maintained a strong market price, showing steady increases over the past five years. There is a world undersupply situation which could accentuate as the major supplier Boliden, in Sweden, runs out of ore. Samples from the mineralised drill hole intersections were sent to C.M.S. for thin and polished section examination. Comments on the metallurgical properties of the mineral assemblage

with special reference to the arsenic mineralogy, were requested. Gold also was judged worthy of follow-up because of the association with arsenopyrite veins seen in the line 3,260N costean. Grab samples of quartz-arsenopyrite veins returned maximum assays of 26.6 g/tonne ^{As?} Au and 8 g/tonnes Au. (E.Z. Report No. 161.)

Details of the regional and local setting of the known mineralisation, and the history of the exploration have been presented in previous reports and this is summarised in plan No. AO-526-0033.

3.2. Arsenic Mineralisation

All the significant mineralisation in the area is associated with the Henty Fault Zone which is a major NNE trending fault zone which separates the andesitic lavas and pyroclastics of the Mt. Black Volcanics on the west from the cleaved mudstones and volcanic greywackes of the Farrell Slates on the east. The zone of potential mineralisation extends northwards into E.L. 1/62 but is now largely covered by the waters of Lake Rosebery (plan -0033) which will make further testing of that area very difficult. This report is concerned only with the zone inside E.L. 4/73. All the significant arsenic assay intersections are presented in Table 1. The intersections were calculated using a 1% As cut-off on the drill hole assay intervals. Plan A2-526-0034 shows the interpreted geology, the arsenic intersections, and all the mineralisation zones projected on to the 100m R.L. level in the vicinity of drill holes STP 217, 221, 231 and 234. The ore zones are recognised and defined by their spatial relationship to the fault contact between the Farrell Slates and the Mt. Black Volcanics.

Zone A is the main mineralisation zone seen to date. It comprises six intersections in four holes and lies about 70m west of the Henty Fault Contact. Two intersections in STP 217 have been assigned to Zone A because of their proximity. Similarly two narrow intersections in STP 231 have been assigned to Zone A as they lie about 70m west of the contact.

Zone B comprises three intersections lying just west of the Henty Fault contact in the Mt. Black Volcanics. In STP 221 the zone lies almost on the contact. In STP 234 it lies about 5m west, and in STP 217 lies about 15m west of the contact.

Zone C occurs only in STP 231 as a +1% As intersection. It lies about 80-90m west of the Henty Fault contact. It can be recognised in STP 217 as a 0.2% As zone. It is possibly also present in STP 234 as a zone of above background values of As (690 ppm) and Sn (280 ppm) at about 140m down hole.

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Zone D comprises two intersections, in holes STP 234 and 221, lying in the Farrell Slates about 40m east of the Henty Fault contact. They may be unrelated but both are narrow and are characterised by elevated Ag and Cu.

In all cases the arsenic is present as arsenopyrite (see Appendix 1).

3.3. Arsenic Ore Reserves

An informal ore-reserve calculation has been carried out on the above mineralisation Zones A-D, and is presented in Table 2. The estimated true width intersections were used with no attempt to bulk these out to a minimum mining width. In most cases this would be a straight dilution with essentially barren rock. A nominal density of 2.8 was used throughout as this approximates to an average value for felsic volcanics and mudstones. (It is probably too low a figure for high sulphide intersections such as STP 221 Zone A, which was essentially massive pyrrhotite.) Nominal areas of influence were given to each intersection, and a 50m up dip and 50m down dip extension. These areas are shown in long section projection in plan A2-526-0035.

As shown in Table 2, the holes drilled in the Sterling River area indicate about 480,000 Tonnes at just over 5.0% As.

3.4. Arsenic Ore Potential

Plans 526-0033; -0034 and -0035 show that the mineralisation zones all remain open. DDH STP 232A1 failed to test the Henty Fault Zone contact area because of an unexpectedly thick cover of glacial till at that point. It is possible that Zones A and B could extend a significant distance northwards towards, or even past, the E.L. boundary. (The drill holes MRP 219, 212, 233, which lie in E.L. 1/62 from 200 to 500m north of the E.L. boundary, also intersected +1% Arsenic mineralisation. A similar 'ore reserve' exercise on these holes indicates approximately 675,000 Tonnes at 2.4% As.) South of STP 231 there are essentially no tests of the fault zone. DDH STP 101, drilled in 1961, tested the contact 1.5Km south of STP 231 by drilling from the Farrell Slates into the Mt. Black Volcanics. The hole traverses approximately 30m of Mt. Black Volcanics. Assay sampling of the hole stopped in the Farrell Slates about 15m short of the contact zone. Arsenic was not determined. From about 550m to about 1,300m south of STP 231 the Fault Zone is occupied by a basaltic intrusive which appears to predate the mineralisation as it is in turn intruded by granitic dykes which have associated quartz-arsenopyrite veins. These are exposed in a costean on line S,260N which is 1,150m south of STP 231. Rock samples from the costean gave arsenic values up to 23% As (EZ reports 154 and 161).

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The drill holes which define mineralisation zones A, B, C, D cover a strike length of 300m. There is a further 450m of untested strike northwards to the E.L. boundary (and more into E.L. 1/62) and 1,500m of essentially untested strike to the south. A reasonable estimate of potential within this zone might be a tripling of the 480,000 Tonnes indicated so far to about 1.5 million tonnes. All zones are also open at depth. Only STP 234 has tested below 150m depth (plan -0035). Below this the entire contact zone is essentially untested.

The market value of arsenic metal in 1983 was approximately \$4,800 per tonne. At 5.02% As a tonne of Sterling River ore has an in-ground value of \$241, and the total of Zones A, B, C, D an in-ground value in excess of \$155 million. There is a potential to increase this to over \$300 million above the 00m R.L. The gross value of a tonne of Sterling River ore would in fact be higher than the figure used because the ore contains a variable tin content and occasional elevated copper values (Table 1). The ore also has, an as yet unquantified, gold content (see section 3.5 below) which might considerably upgrade its value.

For comparison purposes the following figures were taken from the 1983 E.Z. Annual Report.

"Average grade of ore mined at Rosebery	12.3% Zn
	5.3% Pb
	0.6% Cu

Average metal prices received	Zn	\$840/tonne
	Pb	\$460/tonne
	Cu	\$1530/tonne

A tonne of Rosebery ore therefore has an in-ground value of

$$$.123 \times 840 + .053 \times 460 + .006 \times 1530 = \$137 "$$

The above figures present a very optimistic view of the potential of the area. In practical terms the ore would prove very difficult to mine. The intersections are narrow. They all lie in faults and shears so ground conditions would be very poor. Because the mineralisation is fault controlled it probably occurs as numerous short strike length lodes which would severely limit the size of stoping blocks.

The saleable arsenic product on the world market is arsenic trioxide. Production of this product is not possible in any existing West Coast Tasmanian plant. A custom built plant would be required to treat any arsenic ore produced. The conclusions reached by C.M.S. (see Appendix 1) from their mineralographic work suggest that recovery of the arsenopyrite should be quite feasible.

3.5. Gold Mineralisation

The potential for gold mineralisation has not received a great deal of attention in the Sterling Valley area up to the present. Significant gold values of 26.6 g/tonne and 8 g/tonne Au were returned from two samples of quartz-arsenopyrite veins from the line 3,260N costean (E.Z. Report No. 161). Prior to this the gold content of the Sterling Valley mineralisation had been regarded as very low. The highest gold value from the arsenic intersections of Zones A, B, C, D was 0.4 g/tonne Au, although STP 221 did report 1.0m @ 2.08 g/tonne Au from a sample outside the calculated arsenic intersections.

The first hole drilled in the area (STP 217) was not analysed for gold. Subsequently analysis of all split core samples for gold was established as a routine. The technique used for these routine analyses, however, was an aqua regia/A.A.S. geochemical technique which may not have detected all the gold locked up in sulphides. By the time that the last hole was drilled (STP 234) gold had been dropped as a routine element because of the apparent lack of significant gold in the previous sampling. It seems inevitable therefore that the three samples in which gold was identified by C.M.S. polished section examination (Appendix 1) should come from drill holes STP 217 and 234, which were not analysed for gold. Gold was identified in the Zone A intersections in STP 217 (Sample No. 43895) and STP 234 (Sample No. 61151) and the Zone D intersection in STP 234 (Sample No. 61153).

4. CONCLUSIONS

The preoccupation with tin as a target metal in the Henty Fault Zone area of E.L. 4/73 resulted in a lack of consideration of other possibly economic commodities. There is a potentially economic arsenic resource in the area. There are also good indications of gold mineralisation which is possibly associated with the arsenic. A lack of sufficient quality gold analyses prevents any positive correlation of gold with arsenic.

TABLE 1 - SIGNIFICANT DRILL-HOLE INTERSECTION

Hole Number	Drilled Intersection		Mineral ⁿ Zone	Estimated True Width (m)	Assay						R.L. (m)	A.M.G. Co-ordinates	
	Hole Depth (m)	Length			As%	Ag g/t	Sn ppm	Cu ppm	Pb ppm	Zn ppm		North	East
STP 234	189.00 - 191.50	2.50	A	2.30	3.94	22.5	X	5640	215	645	4	5,374,479	384,208
STP 217	92.35 - 93.35	1.00	A	0.80	1.80	3.5	4950	1550	535	440	95	5,374,375	384,230
	98.65 - 102.55	3.90	A	3.10	6.45	3.5	1800	1600	60	345	88	5,374,373	384,236
STP 221	32.60 - 39.50	6.90	A	4.90	6.15	20.5	885	2130	150	610	142	5,374,405	384,290
STP 231	85.20 - 85.50	0.30	A	0.25	9.00	5.5	6	170	140	155	104	5,374,251	384,260
	78.30 - 78.80	0.50	A	0.40	9.80	5.5	5600	1150	60	70	110	5,374,253	384,256
STP 234	261.00 - 263.00	2.00	B	1.90	4.35	2.0	575	2250	40	165	-49	5,374,472	384,255
STP 217	154.60 - 157.60	3.00	B	2.60	2.80	2.5	X	775	20	140	42	5,374,365	384,269
STP 221	118.50 - 119.50	1.00	B	0.80	1.30	3.0	38	90	30	160	75	5,374,415	384,333
STP 217	75.00 - 79.00	4.00	C	3.60	0.20	1.0	545	110	30	150	107	5,374,379	384,223
STP 231	53.80 - 58.30	4.50	C	3.70	5.91	8.5	120	2160	95	340	128	5,374,257	384,245
STP 234	313.25 - 313.85	0.60	D	0.60	9.00	29.5	X	1.15%	50	505	-84	5,374,468	384,293
STP 221	166.80 - 167.80	1.00	D	0.90	1.00	23.5	34	2200	930	1050	40	5,374,422	384,366

TABLE 2 "ORE RESERVE" CALCULATIONS STERLING RIVER AREA								
Zone	Hole No.	Intersection		Area of Influence (m ²)	Volume (m ³)	Tonnes Ore	Tonnes As	Average Grade % As
		Width (m)	As %					
A	STP 234	2.30	3.94	8,000	18,400	51,520	2,030	
	STP 221	4.90	6.15	5,000	24,500	68,600	4,219	
	STP 217	0.80	1.80	5,000	4,000	11,200	202	
		3.10	6.45	10,000	31,000	86,800	5,599	
	STP 231	0.25	9.00	8,000	2,000	5,600	504	
		0.40	9.80	8,000	3,200	8,960	878	
Sub Total Zone A						232,680	13,432	5.77%
B	STP 234	1.90	4.35	6,000	11,400	31,920	1,389	
	STP 221	0.80	1.30	8,000	6,400	17,920	233	
	STP 217	2.60	2.80	10,000	26,000	72,800	2,038	
Sub Total Zone B						122,640	3,660	2.98%
C	STP 231	3.70	5.91	10,000	37,000	103,600	6,123	
Sub Total Zone C						103,600	6,123	5.91%
D	STP 234	0.60	9.00	5,000	3,000	8,400	756	
	STP 221	0.90	1.00	5,000	4,500	12,600	126	
Sub Total Zone D						21,000	882	4.20%
<u>TOTAL ALL ZONES</u>						472,920	24,097	5.02%

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APPENDIX 1 - C.M.S. Petrology-Mineragraphy Report No. 84/3/33

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Central Mineralogical Services



The Supervising Geologist
 Mineral Resources Division
 Electrolytic Zinc Co. of
 Australasia Ltd.
 West Coast Mines
 P.O. Box 21
 ROSEBERY / TAS. 7470

DATE	14 MAY 1984	TIME		BY		14 Meulah Road Newryd, S.A. 5067 Telephone 42 5659
RECEIVED						
DEPT		ENG	GEOL	/		

11th May, 1984

REPORT CMS 84/3/33

YOUR REFERENCE: Order No. 900521
 DATE RECEIVED: 21st March, 1984
 SAMPLE NOS.: 17 Samples
 SUBMITTED BY: I. McDonald
 WORK REQUESTED: Petrology/Mineralgy

Sample No.	Wala No.	Depth.
43893	MRP 212	189.9 - 190.0
94	STP 217	93.0 - 93.1
95	"	100.1 - 100.25
96	"	155.65 - 155.75
97	MRP 219	113.0 - 113.25
98	STP 221	36.25 - 36.4
99	"	39.0 - 39.1
43900	"	118.9 - 119.0
61145	STP 221	56.25 - 56.35
46	"	57.3 - 57.4
47	"	78.4 - 78.5
48	MRP 233	143.5 - 143.9
49	"	150.35 - 150.45
50	"	159.2 - 159.3
51	STP 234	190.3 - 190.4
52	"	261.0 - 261.1
61153	"	313.25 - 313.35

H.W. Fandor for
H.W. Fandor, M. Sc.

REPORT CMS 84/3/33

Seventeen samples of variably mineralised drill core were received for petrological and mineragraphic examination. Representative thin- and polished sections were prepared and microscopic data is summarised in the attached brief tabulated petrological descriptions and mineragraphic notes.

Summary

This suite comprises variously altered, mineralised and brecciated psammopelitic sediments with associated veins and a single example of veined and mineralised intermediate volcanic. General features are consistent with a granitic contact-related fault or fracture-controlled lode-type situation. Alteration assemblages are broadly pneumatolytic ("greisening"). Textural relationships are complexed by variable, but essentially pervasive post-mineralisation stress and brittle deformational effects, such that temporal relationships are largely obscure.

Host rocks, with the exception of the single leucocratic volcanic (sample 43898) may be summarised as quartzose psammopelitic sediments. These rocks are variably carbonaceous and, where unaltered, reflect simple primary assemblages of detrital silt- to sand-sized quartz and semi-sericitic white mica in varying proportions. Altered variants typically exhibit tourmalinisation of the "clay" fraction, with development of ultrafine green schorl of distinctly contact-metasomatic character. This may be supplemented by silicification. Chloritisation of the argillaceous components is locally marked and probably represents a marginal alteration facies.

Associated veins typically exhibit quartz-schorl assemblages supplemented by vugs and films of fluorite. The associated (vein, metasomatic) sulphide assemblage comprises arsenopyrite with varying proportions of pyrrhotite, subordinate to minor chalcopyrite, locally conspicuous sphalerite and accessory to trace amounts of bismuth, galena, cassiterite, bismuthinite and tetrahedrite. Temporally late impregnations, veinlets and films of sideritic carbonate, chalcopyrite, stannite and locally fluorite are of erratic distribution and exhibit variable late stress effects.

Analogies may be drawn with complex multistage fracture-related situations in granitic contact haloes represented for example by the "Federal Lode" at Renison. There is some evidence of an overprinting of broadly Zeehan-type on contact-pneumatolytic assemblages represented by the siderite-chalcopyrite-stannite and schorl-quartz-arsenopyrite-pyrrhotite-pyrite-cassiterite associations respectively, but as noted, finer details are confused by the markedly variable subsequent stress effects.

A few examples of siliceous semi-massive sulphide mineralisation are poorly diagnostic in terms of vein- or metasomatic-type paragenesis. In the absence of specific details of the host rock sequence, there would appear to be some potential for development of metasomatic mineralisation analogous to the Renison "sill-type" ores, but dependant on suitably reactive host rocks (for example intercalated calc-pelites, limestone or dolomite).

Potentially economic aspects of the mineralisation relate to the generally conspicuous arsenopyrite, accessory base metal sulphides, cassiterite, stannite, bismuth-bismuthinite and traces of gold. In this context, the assemblage is complex, with probable implications in terms of metallurgical characteristics. Specific characteristics, as they may pertain to metallurgical aspects, may be summarised:

1. Arsenopyrite exhibits a wide variation in sizing and is typically intergrown with fine-grained silicates, alternately medium-grained pyrrhotite, or pyrite. Whilst grainsizings are consistent with flotation milling criteria, and intergrowths are typically simple, in-situ granulation may be problematical in terms of deleterious sliming characteristics.
2. Tin is present in at least two phases (cassiterite and stannite). Again, sizings are compatible with flotation and gravity concentration as practised for example at Renison and Cleveland.

The more or less pervasive late stress effects may be deleterious in respect of cassiterite recovery. This phase is prone to "autogranulation" during milling/liberation when stressed, with potential related losses as slimes.

The differential tin mineralogy implies a certain proportion of total Sn will report to sulphide flotation concentrates. Comparative total and acid-soluble Sn analyses would provide a guide to the relative proportions of cassiterite and stannite.

Isolated micro-inclusions of cassiterite in arsenopyrite are consistent with minor losses of Sn to arsenopyrite concentrates.

3. Bismuth, bismuthinite and the rare tetrahedrite occur typically as fine single and composite blebs intergranular to pyrrhotite, as microscopic films (+ chalcopyrite) on fractures in arsenopyrite, and as relatively coarse intergrowths with chalcopyrite. The main locus of concentration will thus be sulphide concentrates with potential losses to sulphide tailings (pyrrhotite-pyrite concentrates) and arsenopyrite concentrates.
4. Gold, as detected to date, is fine to micron-sized, with a very specific distribution in sporadic massive sulphide-hosted blebs of chalcopyrite. This complexed by particles associated with microscopic films of chalcopyrite on fractures in arsenopyrite. Response to flotation will thus be analogous to that of bismuth and bismuthinite.

The presence of optically detectable (particulate) gold in individual samples appears to conflict with the low (< 1 ppm) assays previously recorded from this area (I. McDonald's pers. comm.). Confirmatory assays would thus appear warranted. Tellurium determinations may give a lead to possible interference with the fire assay method.

5. Base metal sulphides appear amenable to flotation concentration. Although of doubtful significance in economic terms, this component, and particularly chalcopyrite, is significant as a host to gold and, to a certain degree, bismuth.

D. Cowan, B. Sc.

Sample No.	Classification - Composition	Fabric	Accessories	Comments
43893 (T.S. 49305)	Breccia. Clasts, zones of tourmalinised pelite, silicified/tourmalinised sandy pelite/argillaceous siltstone-sandstone, vein-type quartz-schorsl rock with interspersed films, spongy semi-massive zones of pyrite + arsenopyrite.	Banded, semi- to mylonitic breccia with frequent discontinuous films of green schorsl.	Minor clots of cloudy sideritic carbonate. Thinly disseminated <50-150 μ cassiterite in tourmaline, carbonate	Tourmalinised/silicified, quartz-schorsl-veined, carbonaceous, quartzose psammopelite with disseminated to semi-massive sulphides, traces of cassiterite. Semi-mylonitically brecciated.
43894	Breccia. Clasts of thoroughly tourmalinised, variably carbonaceous, massive to quartzose silty/fine sandy pelite, subordinate clasts of vein-quartz + fluorite. Mylonitic schorsl matrix. Sporadic late fluorite veinlets.	Analogous to 43893, but only incipiently banded and relatively mylonitic.	Disseminated clots, spongy films, clots of granulated arsenopyrite, traces chalcopyrite, granulated cassiterite	Close affinities with brecciated 43893. Exhibits relatively abundant clasts of vein-type quartz with associated clots of fluorite, rare fine-grained cassiterite.
43895	Semi-massive Sulphide Rock. Arsenopyrite, pyrrhotite and quartz in varying proportions with disseminated quartz-intergranular clots of sideritic carbonate, fine-grained green schorsl, minor fluorite.	Medium-grained, semi-banded, with sub- to euhedral quartz. Mildly stressed.	Thinly disseminated single to loosely clustered 50-200 μ , mean 75 μ cassiterite. Traces of chalcopyrite	Poorly diagnostic as to vein-type or metasomatised impure carbonate paragenesis. Cassiterite is intergranular to quartz and sulphides, locally included in carbonate.
43896	Arsenopyrite-Quartz-Sericite Rock. Disseminated to near-massive arsenopyrite with varying proportions of vein-type quartz and semi-sericitic white mica, sporadic patches of chlorite; minor pyrrhotite.	Fine- to medium-grained, crudely banded, moderately stressed to sheared.	Disseminated millimetric-scale, stressed to sheared clasts of silicified/sericitised psammopelitic sediment	Interpreted as an intraclastic, strongly arsenopyrite-mineralised siliceous vein-type paragenesis, grading into quartz-arsenopyrite-healed breccia. Mildly restressed,
43897	Breccia. Clasts, zones of variably cherty-silicified to chloritic/tourmaline-stained pelite interspersed with semi- to near-massive fine-grained arsenopyrite-pyrite aggregates with disseminated cloudy cassiterite.	Semi-mylonitic breccia-like, crudely banded.	Relics of carbonaceous matter in altered pelitic zones, traces of sideritic carbonate.	Affinities with 43893, 43894; composite of mineralised vein-type and altered pelitic host rock components. Cassiterite as single grains, clusters in sulphide-quartz zones.
43898	Veined Leuco-andesite. Andesine-porphyrific plagioclase-microclathic "lava" with frequent veins, veinlets of quartz, arsenopyrite and pyrrhotite with discontinuous albitic selvages; films, clots of semi-sericitic white mica.	Glomeroporphyritic, weakly flow-structured host rock, irregular medium-grained, incipiently stressed veins.	Traces pale Mg-chlorite in veins, veinlets.	Extensively veined leucocratic intermediate lava or, conceivably, a minor intrusive. Vein-related sulphides grade into near-massive pyrrhotite-rich aggregates.
43899	Breccia. Ultrafine green schorsl with varying proportions of granulated vein-type quartz, clasts of tourmalinised, variably carbonaceous pelite, disseminated arsenopyrite, pyrite, fluorite.	Mylonitic, crudely banded.	Traces chalcopyrite (in fluorite) and granulated sideritic carbonate.	Composite of tourmalinised pelite and vein-quartz components, with granulated sulphide, sporadic late vugs, films of fluorite.
43900	Veined Psammopelite. Host rock of relict detrital quartz, sericite and cherty microcrystalline quartz. Irregular veinlets of quartz, pyrrhotite, arsenopyrite. Minor films of granulated sulphide, ultrafine schorsl.	Contorted to semi-mylonitically brecciated argillaceous sandstone/sandy pelite. Stressed veinlets.	Minor films, clots of chlorite, sericite in veinlets. Traces carbonaceous matter.	Quartz-sulphide-veined, subsequently stressed to brecciated silty fine to medium sandstone/sandy pelite. Weakly tourmalinised.

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Sample No.	Classification - Composition	Fabric	Accessories	CENTRAL MINERALOGICAL SERVICES Comments
61145	<u>Veined Psammopelite</u> . Semi-sericitic white mica and microcrystalline quartz with minor chlorite, relict detrital quartz grains. Discontinuous veins, veinlets of quartz with disseminated to near-massive arsenopyrite, subordinate pyrite.	Analogous to 43900; relatively sheared.	Minor late clots, crosscutting films of Fe-Mg chlorite.	Alteration/deformation pattern closely analogous to 43900; relatively pelitic (sericitic), relatively sheared. Vein-hosted sulphide disseminations grade into "massive" aggregates.
61146	<u>Pyrite-Quartz Rock</u> . Pyrite and fine to microcrystalline quartz in varying proportions with minor arsenopyrite, sideritic carbonate, pyrrhotite. Sporadic vugs, veinlets of coarser-grained quartz.	Semi-banded on fine millimetric scale; moderately stressed.	More or less pervasive traces of fine-grained green schorl.	Affinities with 43895, although relatively pyritic. Similarly poorly diagnostic as to vein-type or metasomatic paragenesis.
61147	<u>Tourmalinised/Veined Pelite</u> . Clasts, zones of extensively tourmalinised/locally silicified pelite interspersed with veins, veinlets of quartz with frequent films, vugs of fluorite, varying proportions of fine green schorl.	Essentially a quartz-fluorite-schorl-healed breccia with early stressed quartz veinlets.	Disseminated to locally semi-massive arsenopyrite in clasts. Traces pyrrhotite, cassiterite, carbonate	Thoroughly altered, brecciated and veined pelite. Clasts are mildly sheared to semi-mylonitised, as are the early quartz veinlets. Matrix is unstressed.
61148	<u>Semi-Massive Sulphides</u> . Semi- to near-massive arsenopyrite-pyrite aggregates with intergranular fine-grained quartz. Interspersed zones, clasts of chloritic quartzose psammopelite.	Crudely banded; stressed to microfractured, locally granulated.	Minor clots, in veins. Films of cloudy siderite, rare cassiterite in "massive" sulphide aggregates.	Detail obscured by late stress/deformation effects, but interpreted as a veined, mineralised, chloritised-silicified quartzose sandy pelite.
61149	<u>Altered Psammite</u> . Framework of subangular quartz grains, minor chert clasts; weakly carbonaceous chlorite matrix. Pervasive disseminations spongy to near-massive aggregates of pyrite, arsenopyrite. Sporadic ill-defined quartz veinlets.	Relict poorly sorted sandy clastic. Stressed to locally brecciated; contorted, partly recrystallized quartz veinlets.	Minor late clots, films of sideritic carbonate, sideritic quartz veinlets. Traces of metasomatic schorl.	Chloritised/pyrite-arsenopyrite-mineralised impure (argillaceous) orthoquartzite "grading" into sandy pelite. Early (stressed) quartz veinlets are pyrite-arsenopyrite-mineralised.
61150	<u>Altered Psammopelite</u> . Relict detrital quartz grains and ultrafine green schorl in varying proportions with disseminated pyrite, arsenopyrite, sporadic mineralised quartz veinlets.	Analogous to 61149, but carbonaceous shale-parted. Relatively stressed to fractured and brecciated.	Irregular zones of strongly silicified host rock.	Tourmalinised/variably silicified, quartz-veined, arsenopyrite-pyrite-mineralised, subsequently fractured to semi-mylonitised quartzose psammopelite.
61151	<u>Breccia</u> . Clasts, zones of variably chloritised sericitic quartzose pelite, sandy pelite, semi-massive pyrrhotite(-quartz-arsenopyrite) aggregates, vein-type quartz.	Crudely lenticularly banded, semi-mylonitic breccia.	Minor relics of carbonaceous matter in pelite clasts. Sporadic blebs, discontinuous films of chalcopyrite.	Altered, veined, mineralised and relatively "sheared" quartzose, sericitic pelite. Main contrast with 61150 is presence of chlorite rather than fine schorl.
61152	<u>Mineralised Vein</u> . Quartz with intergranular clots, minor bands of fine green schorl, sporadic vugs of fluorite, disseminated to semi-massive arsenopyrite (+ pyrrhotite, chalcopyrite), disseminated cassiterite.	Medium-grained, semi-banded, variably stressed, with irregular zones of recrystallized quartz.	Marginal zone of sheared chloritic/partially silicified sericitic pelite host rock. Traces siderite	Distinctly vein-type characteristics. Vein assemblage is analogous to that in 61147. Cassiterite variously disseminated throughout quartz, sulphide aggregates.

In vein.

375016

STO

Sample No.	Classification - Composition	Fabric	Accessories	Comments
G1153 (T.S. 49321)	Veined Pelite. Contorted sericitic carbonaceous slate with veins, veinlets of quartz with disseminated to semi-massive arsenopyrite, subordinate pyrrhotite, relatively conspicuous chalcopyrite.	Contorted to brecciated quartz-sulphide-healed host rock. Variably stressed to locally recrystallized vein.	Minor arsenopyrite-intergranular blebs, films of ?bismuth.	Relatively unaltered, but intensely veined and mineralised carbonaceous shale. Veining grades into healed breccia zones. Restressed.

REPORT CMS 84/3/33Mineragraphic Notes43893

(P.S. 49305)

Exhibits more or less continuous spongy, semi-massive aggregates of arsenopyrite and pyrite with both phases appearing as microfractured relict sub- to euhedral grains (mean 150 μ , to 500 μ) and granular aggregates in a matrix of fine granulated particles (sized < 1 μ to about 50 μ , mode 10-25 μ). Interspersed silicate aggregates carry rare 20-150 μ diameter anhedral (granulated in part) cassiterite particles. A crosscutting film of fine-grained carbonate (?siderite) is accompanied by discontinuous spongy selvages of fine-grained (mean 20 μ , range 2-75 μ) stannite. Isolated blebs of chalcopyrite (to 200 μ) occur interspersed with the extensively granulated pyrite and arsenopyrite.

43894

(P.S. 49306)

Exhibits more or less pervasively disseminated single and composite blebs of pyrrhotite, chalcopyrite, subordinate stannite and associated traces of sphalerite sized from < 20 μ to 500 μ , with a mode about 50-100 μ . These are supplemented by similarly sized angular particles of arsenopyrite, and the sulphides in general represent segmented vein- and altered host rock-related disseminations.

In contrast to the thin-section, there is no detectable cassiterite.

43895

(P.S. 49307)

Exhibits semi-continuous, polygonal, mosaic-textured, medium-grained (mean 75 μ) pyrrhotite aggregates studded throughout with variably microfractured sub- to euhedral arsenopyrite (< 100 μ to 500 μ), which is locally granulated in contrast to the recrystallized pyrrhotite. Thinly disseminated pyrite euhedra supplement the arsenopyrite. Sporadic irregular blebs of chalcopyrite are interspersed with pyrrhotite, and this phase also locally heals fractures in arsenopyrite. Microscopic blebs of bismuth (max. 30 μ) are pyrrhotite-intergranular, locally conspicuous, and may form composite films with pyrrhotite and chalcopyrite on fractures in arsenopyrite. Rare microscopic blebs of galena and stannite occur on pyrrhotite- and pyrrhotite-arsenopyrite grain-boundaries, and minor traces of bismuthinite are present as a partial replacement of bismuth.

One relatively coarse (3.2 mm x 1.6 mm) patch of chalcopyrite, with abundant "included" fractured arsenopyrite, includes thinly disseminated < 5-25 μ , mean 15 μ particles of gold associated with films of chalcopyrite healing fractures in arsenopyrite.

Rare < 30 μ cassiterite particles are variously intergranular to pyrrhotite or to irregular patches of quartz with a little associated siderite.

43896

(P.S. 49308)

Exhibits near-massive, millimetric to centimetric scale aggregates of medium-grained, weakly but variably microfractured arsenopyrite grading into silicate-hosted disseminated euhedra. Thinly disseminated pyrite euhedra and irregular sub- to fine millimetric scale patches of pyrrhotite occur randomly throughout the arsenopyrite aggregates, along with minor intergranular films and blebs of chalcopyrite. Pyrrhotite locally hosts coarse (to 160 μ) blebs of bismuth, incipiently marginally replaced by bismuthinite, and rarely microscopic blebs of sphalerite.

Interspersed silicate aggregates host thinly disseminated particles of rutile. In contrast to 43893 etc., there is no detectable cassiterite.

43897

(P.S. 49309)

Exhibits semi-banded aggregates of fine- to medium-grained (< 50-500 μ , mean 75 μ) near-massive arsenopyrite and pyrite, with both phases exhibiting an- to euhedral grainshapes, dependant on their relative abundance. These sulphides are variously microfractured to granulated (particularly arsenopyrite) or partly recrystallized (pyrite) in response to the semi-mylonitic deformation.

Minor fine clots of chalcopyrite are disseminated throughout and grade into intergranular and fracture-healing discontinuous microscopic films. Minor traces of galena appear as < 20 μ micro-inclusions in pyrite and arsenopyrite. Rare 20-200 μ , mean 75 μ cassiterite particles are of intergranular habit, with grainshapes reflecting partial granulation. This phase is relatively inconspicuous in comparison with the area thin-sectioned.

Rare late crosscutting veinlets consist of silicate (?quartz) with a little carbonate, relatively conspicuous chalcopyrite and subordinate to minor galena.

43898

(P.S. 49310)

This section represents a zone of relatively massive vein-related sulphide. The main phase is relatively coarse granular to subprismatic pyrrhotite. Sub- to euhedral arsenopyrite is more or less evenly disseminated throughout, along with single grains and small clusters of quartz. Thinly disseminated microscopic (mean 25 μ , to 40 μ) pyrrhotite intergranular blebs of bismuth are marginally replaced by bismuthinite with rare associated tetrahedrite, and these composite aggregates grade into discontinuous films on fractures in arsenopyrite. Rare blebs of chalcopyrite of pyrrhotite-intergranular habit complete the opaque assemblage.

43899

(P.S. 49311)

Exhibits more or less pervasively disseminated single grains and simple composite aggregates of arsenopyrite, pyrite and pyrrhotite, ranging from microscopic to fine millimetric proportions. Arsenopyrite is variably fractured to granulated, as is similarly pyrite, and pyrrhotite is extensively replaced by secondary microcrystalline pyrite with a little associated marcasite.

019

Accessory chalcopryrite occurs as fine intergranular blebs and discontinuous microfilms throughout the composite sulphide aggregates. Traces of chalcopryrite also occur in late crosscutting films with minor associated microscopic blebs (< 25 µ) of stannite. Extremely rare < 20 µ cassiterite particles were observed as inclusions in arsenopyrite.

43900

(P.S. 49312)

Exhibits an irregular vein-hosted aggregate of pyrrhotite and arsenopyrite ranging from 2 mm to 5 mm in width. This aggregate is texturally similar to the 43898 sulphides, but is relatively fractured and marginally granulated. Fracture-healing films of chalcopryrite are relatively common in the disseminated to semi-massive arsenopyrite, and these features are accompanied by rare < 20 µ blebs of bismuthinite.

61145

(P.S. 49313)

This section consists of near-massive sulphides with medium-grained (mean 350 µ) sub- to euhedral arsenopyrite and subordinate closely intergrown pyrite forming semi-banded composite aggregates. Interstices consist of films of silicate often supplemented by blebs and films of sphalerite with minor ultrafine exsolution chalcopryrite.

Sulphides (pyrite, arsenopyrite) are variably microfractured with arsenopyrite locally granulated and pyrite partly recrystallized to lenticular, finely granular masses. Close inspection revealed no detectable bismuth, cassiterite or stannite.

61146

(P.S. 49314)

Exhibits almost monomineralic spongy, weakly banded aggregates of medium, even-grained (mean 250 µ) granular to euhedral pyrite. The pyrite is supplemented only by minor traces of pyrrhotite and chalcopryrite as irregular intergranular blebs and isolated spongy composite aggregates ranging to about 1 mm diameter. There is no detectable cassiterite, stannite or bismuth. In contrast to the associated samples the pyrite exhibits only incipient stress effects.

61147

(P.S. 49315)

Exhibits disseminated to locally near-massive, fine- to medium-grained arsenopyrite accompanied by extremely rare microscopic blebs of chalcopryrite. The "massive" zones are of millimetric proportions, crudely banded, and are invariably granulated. Marginal areas of tourmalinised pelite include thinly disseminated to locally conspicuous fine-grained (max. 50 µ, mean 25 µ) cassiterite.

61148

(P.S. 49316)

Exhibits variably fractured to granulated, near-massive, medium-grained arsenopyrite with varying proportions of closely intergrown pyrite. Traces of cassiterite occur as arsenopyrite-intergranular clusters of < 5-75 µ, mean 25 µ particles, loose clusters of relatively fine (mean 10 µ) angular (granulated) grains and rare arsenopyrite-hosted micro-inclusions.

61149

(P.S. 49317)

Exhibits crudely banded, spongy, semi-massive aggregates of medium-grained, granular to euhedral pyrite with minor closely intergrown arsenopyrite. Accessory traces of chalcopyrite occur as pyrite-intergranular blebs and in late discontinuous films with, locally, a little intergrown fine-grained stannite. Rare cassiterite occurs as $< 20-75 \mu$ particles, typically intergranular to pyrite, but also thinly disseminated throughout the silicate aggregates.

61150

(P.S. 49318)

Exhibits millimetric-scale, crudely lenticular masses of extensively granulated arsenopyrite and pyrite supplemented by angular (granulated fine-grained disseminations. Relict textures reflect "massive" medium-grained composite (i.e. pyrite-arsenopyrite) aggregates analogous to those in 61148 for example. Rare discrete microscopic blebs of chalcopyrite represent the only detectable accessory opaque.

61151

(P.S. 49319)

Exhibits a semi-massive pyrrhotite aggregate studded throughout with single grains and clusters of quartz and strongly microfractured arsenopyrite. Sporadic pyrrhotite-intergranular blebs of chalcopyrite grade into arsenopyrite-fracture-healing films. Accessory traces of sphalerite are of similar distribution to chalcopyrite and the two phases may be intergrown.

Trace constituents comprise extremely rare pyrrhotite-intergranular blebs (to 25μ) of bismuth and chalcopyrite-hosted particles of gold. Gold particles range from $< 5 \mu$ to $8 \times 55 \mu$ and appear entirely restricted to chalcopyrite films healing fractures in arsenopyrite.

61152

(P.S. 49320)

Exhibits semi-massive medium-grained arsenopyrite with subordinate to minor intergrown pyrite and partly pyritised pyrrhotite. Minor intergranular blebs of chalcopyrite are present and isolated microscopic blebs ($< 20 \mu$) of bismuth are hosted by the variably pyritised pyrrhotite. Cassiterite is absent in contrast to the area thin-sectioned, where single grains ($25-500 \mu$, mean 150μ) and loose clusters are associated with quartz and quartz-schorn rather than sulphide aggregates.

61153

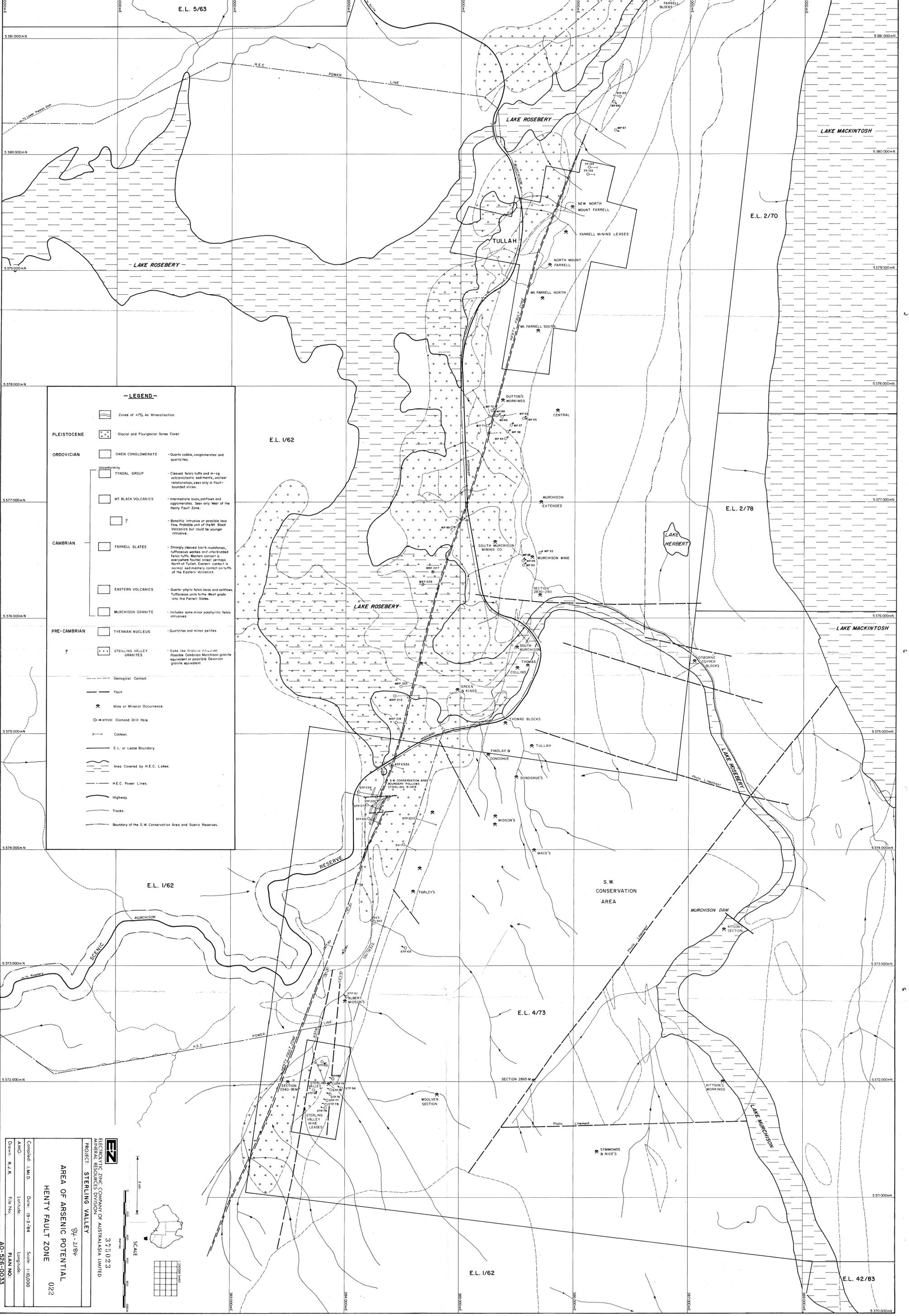
(P.S. 49321)

Exhibits coarse-grained, extensively microfractured arsenopyrite as semi- to near-massive zones interspersed with vein-quartz and millimetric-scale patches of pyrrhotite.

Intergranular blebs and fracture-healing films of chalcopyrite are more or less pervasive throughout the arsenopyrite aggregates. Chalcopyrite hosts locally conspicuous films and irregular blebs (to $200 \times 500 \mu$) of bismuth and extremely rare microscopic (max. 5μ) particles of gold. Sporadic small (max. 200μ , typically $< 100 \mu$) blebs of sphalerite occur variously intergranular to pyrrhotite or arsenopyrite, or marginal to chalcopyrite. There is no detectable cassiterite.

SAMPLE LOCATIONS

Sample No.	Hole No.	Depth	Mineralisation Zone
43893	MRP 212		
43894	STP 217	93.0 - 93.1	A
43895	STP 217	100.1 - 100.25	A
43896	STP 217	155.65 - 155.75	B
43897	MRP 219		
43898	STP 221	34.25 - 34.4	A
43899	STP 221	39.0 - 39.1	A
43900	STP 221	118.9 - 119.0	B
61145	STP 231	56.25 - 56.35	C
61146	STP 231	57.3 - 57.4	C
61147	STP 231	78.4 - 78.5	A
61148	MRP 233		
61149	MRP 233		
61150	MRP 233		
61151	STP 234	190.3 - 190.4	A
61152	STP 234	261.0 - 261.1	B
61153	STP 234	313.25 - 313.35	D



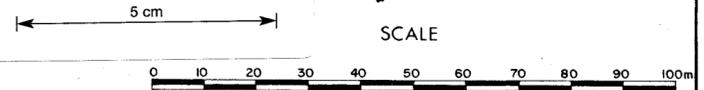
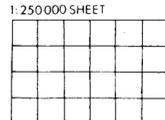
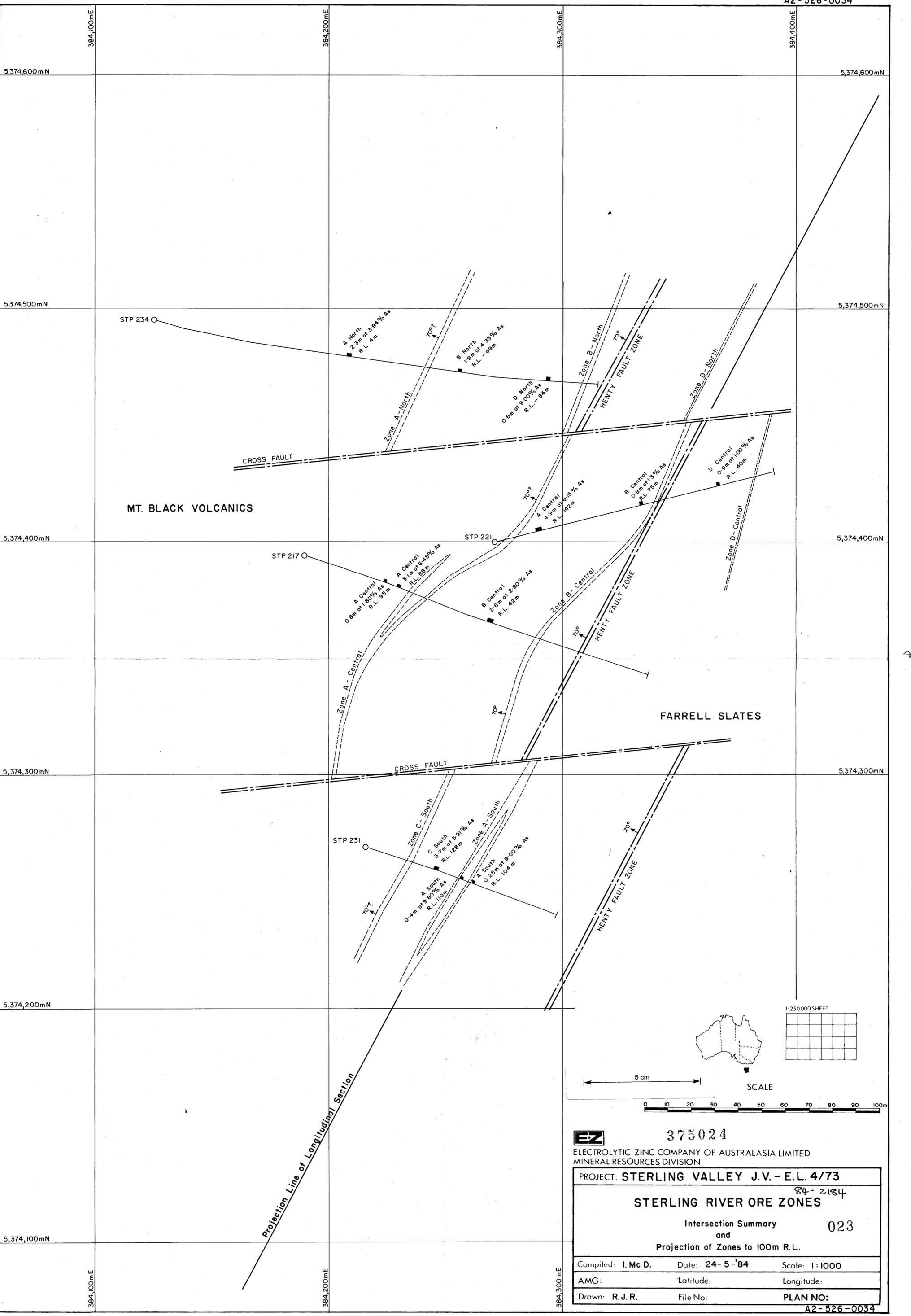
-LEGEND-

- Zones of >1% As Mineralisation.
- Glacial and Fluvio-glacial Scree Cover.
- PLEISTOCENE**
- ORDOVICIAN**
- OWEN CONGLOMERATE - Quartz cobble, conglomerates and quartzites.
- TYNDAL GROUP - Cleaved felsic tuffs and m-eg volcaniclastic sediments, unclear relationships; seen only in fault-bounded slices.
- MT BLACK VOLCANICS - Intermediate lavas, ashflows and agglomerates. Seen only West of the Henty Fault Zone.
- ? - Basaltic intrusive or possible lava flow. Probable unit of the Mt Black Volcanics but could be younger intrusive.
- CAMBRIAN**
- FARRELL SLATES - Strongly cleaved block mudstones, tuffaceous wackes and interbedded felsic tuffs. Western contact is everywhere faulted; seen only North of Tullah. Eastern contact is normal sedimentary contact on tuffs of the Eastern Volcanics.
- EASTERN VOLCANICS - Quartz-phyric felsic lavas and ashflows. Tuffaceous units to the West grade into the Farrell Slates.
- MURCHISON GRANITE - Includes some minor porphyritic felsic intrusives.
- PRE-CAMBRIAN**
- TYENNAN NUCLEUS - Quartzites and minor psilites.
- STERLING VALLEY GRANITES - Dyke like Granitic intrusives. Possible Cambrian Murchison granite equivalent or possible Devonian granite equivalent.
- Geological Contact.
- Fault.
- Mine or Mineral Occurrence.
- STP231 Diamond Drill Hole.
- Costean.
- E.L. or Lease Boundary.
- Area Covered by H.E.C. Lakes.
- H.E.C. Power Lines.
- Highway.
- Tracks.
- Boundary of the S.W. Conservation Area and Scenic Reserves.

EN
 EXPLORATION ZINC COMPANY OF AUSTRALASIA LIMITED
 EXPLORATION RESOURCES DIVISION
 PROJECT: STERLING VALLEY
 AREA OF ARSENIC POTENTIAL
 HENTY FAULT ZONE
 022

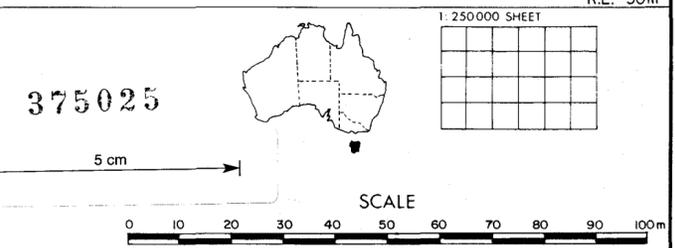
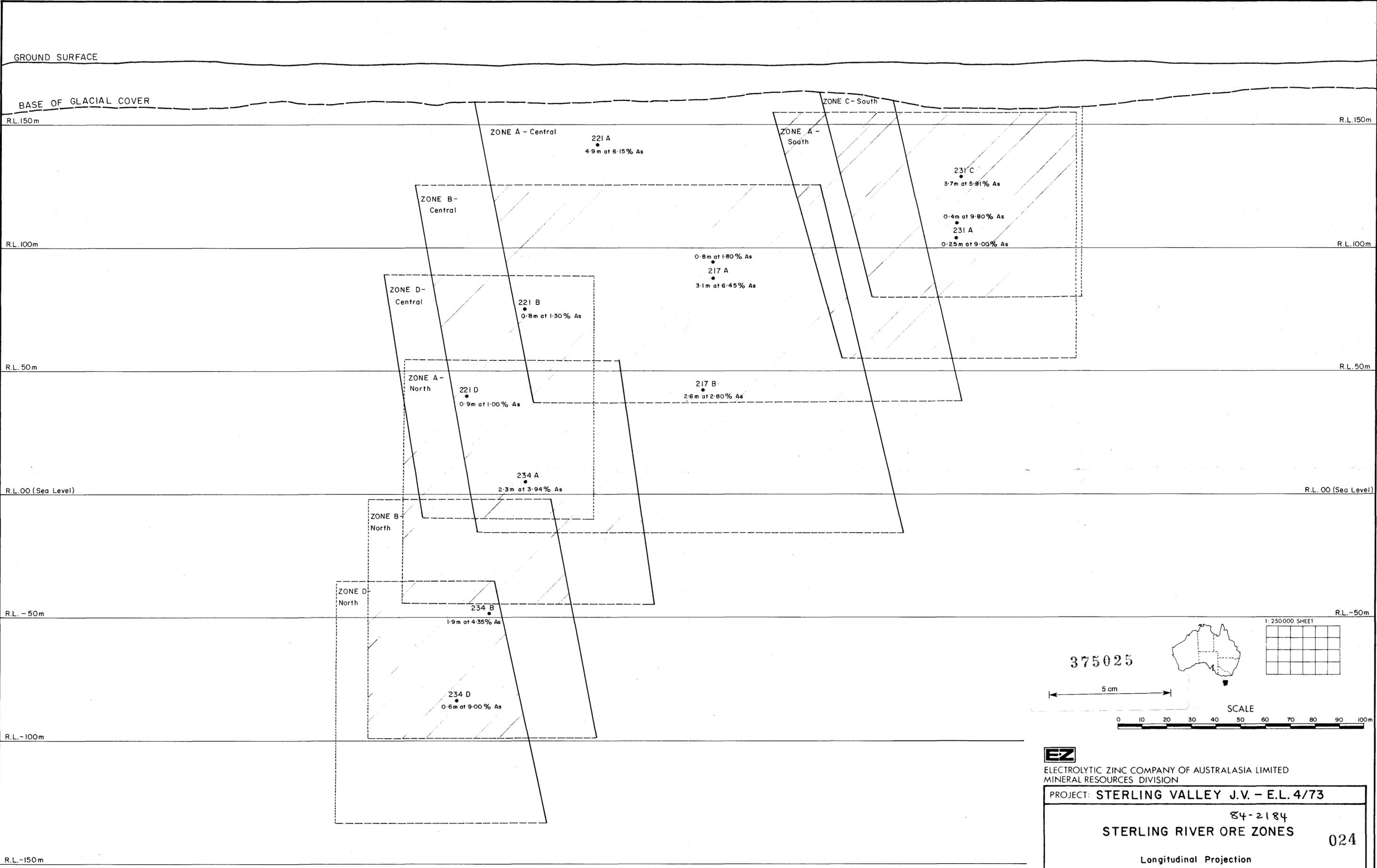
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ELECTROLYTIC ZINC COMPANY OF AUSTRALASIA LIMITED MINERAL RESOURCES DIVISION		
PROJECT: STERLING VALLEY J.V. - E.L. 4/73		
STERLING RIVER ORE ZONES		
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STERLING RIVER ORE ZONES		024
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