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GEOPEKO

A DIVISION OF PEKO-WALLSEND OPERATIONS LTD.

PROGRESS REPORT ON MACKINTOSH EAST

PART OF E.L. 2/70

TASMANIA.

DECEMBER 1978 TO DECEMBER 1979.

W. HERRMANN
DEVONPORT.

JUNE, 1980.

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1. INTRODUCTION

Exploration Licence No. 2/70 is held in two parts, designated Mackintosh West and Mackintosh East, by Aberfoyle Limited.

The Mackintosh West portion surrounds the Que River base metal deposit in north western Tasmania. The Mackintosh East part, of approximately 58sq. km. abuts the north - western boundary of the Cradle Mt.-Lake St. Clair National Park.

Geopeko entered a joint venture agreement with Aberfoyle Ltd. in September 1979, whereby Geopeko would undertake to finance and manage the ensuing phases of exploration within the Mackintosh East part of E.L. 2/70.

This report summarizes the details and results of exploration carried out by Geopeko since September 1979 and outlines plans for the further evaluation of the area.

This report also contains a summary of previous exploration carried out in the area, since 1969, by several companies within the Aberfoyle groups.

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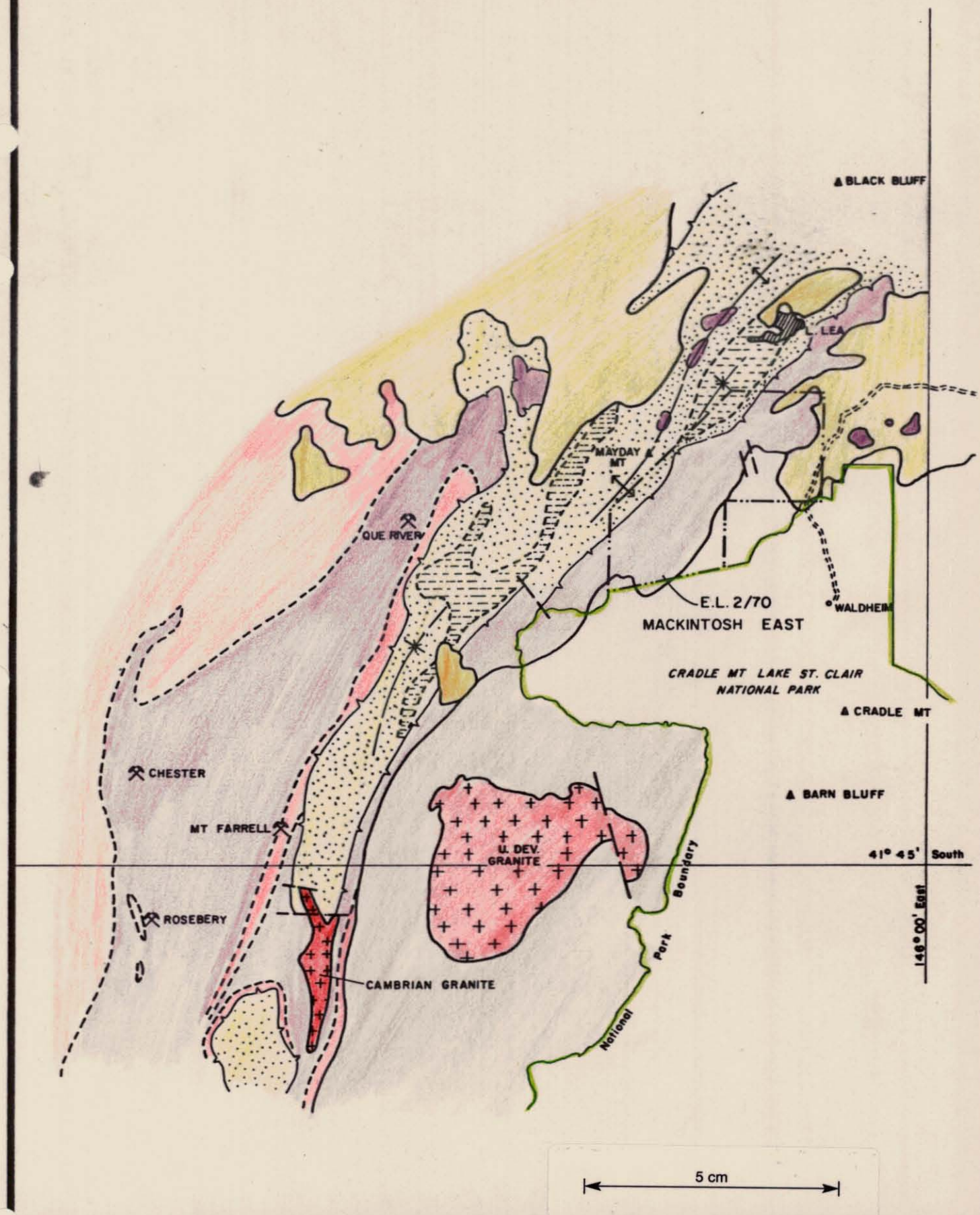

LEGEND:

TERTIARY:	Basalt
ORDOVICIAN:	Siliceous conglomerate, sandstone, siltstone/limestone
CAMBRIAN:	Felsic to intermediate volcs. volcaniclastics, intrusives. /greywacke turbidite sequences.
PRECAMBRIAN:	Metamorhosed quartzites, pelitic schists

DATE: JUNE'80
GEOL: W. H.
DWN: J. P. M.
CHKD:

GEOPEKO
A DIVISION OF PEKO WALLSEND OPERATIONS LTD

Scale: 1: 2 500 000

FIG. 1

E.L. 2/70 MACKINTOSH EAST

LOCALITY PLAN

with

REGIONAL GEOLOGICAL SETTING

2. SUMMARY

The Mackintosh East licence area covers a portion of the north western margin of the metasedimentary Pre Cambrian 'Tyennan nucleus', the flanking Cambrian, island arc volcanic-intrusive assemblage known as the Mt. Reid volcanics, and the consecutively overlying conglomeratic sandstone and limestone of Ordovician age.

Regional stream sediment geochem, soil geochem and rock chip geochem data indicate that a one kilometre wide strip of volcanic tuffs, lavas and volcaniclastic sediments which form the basal unit of the Mt. Reid volcanics in this area, are anomalous in lead and zinc on a semi-regional basis. Furthermore, there are indications that lead and zinc is preferentially concentrated within finely layered, sub aqueously deposited, pyritic volcaniclastic sediments and that the metals are of syngenetic deposition.

The geological environment appears highly favourable as a host for massive base metal sulphide deposits.

The three most prominent stream sediment/soil geochem anomalies have been selected for detailed evaluation and are designated Provers 1,2 and 3. Recommendations for gridding, C-Horizon soil sampling and Induced Polarization are given.

Two areas of anomalous tin in stream sediments, one on the Pre Cambrian metasediments and the other apparently underlain by Ordovician sandstone, are worthy of follow up investigations.

3. RECOMMENDATIONS

1. Establish metric grids in the Prover 1 and Prover 3 areas.

2. Conduct C-Horizon soil sampling with power auger where practicable, over the Prover 1 and Prover 3 grids.
   Priority should be given to Prover 3 area.
   Prover 1 sampling designed to verify earlier B-Horizon geochem data.

3. Conduct systematic I.P. survey and detailed geological mapping over any significant geochem anomalies.

4. Test confident I.P./geochem targets by diamond drilling. I.P. should outweigh geochem data when selecting drilling targets.

5. Carry out detailed geological mapping of the volcanic-volcaniclastic sediment group to determine the source of geochem anomalies and to establish if mineralization is stratiform or related to particular lithologies.

6. Conduct geological reconnaissance and panned concentrate sampling to determine the extent and source of the stream sediment tin anomalies.

4 ACTION SHEET

5. LOCATION, ACCESS, GEOGRAPHY.

The Mackintosh East area is located in the central north-west of Tasmania and in part adjoins the north western boundary of the famed Cradle Mt.-Lake St. Clair National Park. (Ref. Fig 1)

Extensive, poorly drained button grass plains, of about 800 to 1100m. elevation, cover approximately half of the Mackintosh East area. The button grass vegetation appears to particularly favour the south-eastern area underlain by Pre-Cambrian metasediments (Fury Plains) and the karst topography overlying Ordovician limestone in the Vale of Belvoir.
Areas of dense Richea scoparia vegetation, upto a couple of meters tall, exist in the semi open country south west of Back Peak.

The basaltic soils of the north eastern portion support a mixture of open eucalypt and myrtle forest. The south western part of the area is characterized by dense myrtle forest in the lower valley of the Vale River and its tributaries.

The formed, gravel road to Waldheim passes through the eastern part of Mackintosh East and allows near to all-weather access to Pencil Pine Lodge which provided accomodation for the exploration crew during October-November, 1979.

Access to the northern part of the licence is facilitated by a bulldozed road from Leary's corner to Lake Lea. From a point about 3km. west of Leary's corner over the Lake Lea road, a rough track leads

south-west to meet the cleared baseline of the extensive survey grid established during the early seventies. These tracks are navigable by four wheel drive vehicles in fair weather.

Marked walking tracks from the grid baseline provide foot access to the junction of the Vale River and Fleece Creek. (known as 'Fourways') and to Reynold's Falls.

6. PREVIOUS WORK

In November 1969, Paringa Mining and Exploration Co. Ltd., on behalf of the Aberfoyle Group, commenced exploration in the environs of a small occurrence of galena-sphalerite mineralization variously referred to as Carter's Prospect, Back Peak Prospect or Fury Plains Prospect.

B-Horizon soil geochemical survey established the existence of several lead anomalies, over 600m. in strike length, in soils overlying the narrow belt of 'greenish volcanic rocks, cherts and slates of Cambrian age adjacent to the north western margin of the PreCambrian Tyennan massif'. There appeared to be a particular association between high lead values and soils overlying black slates and suggested an overall stratigraphic influence on the source of the lead anomalies. Minor galena-sphalerite mineralization was observed in NW trending fault fissures and also localized within breccia zones at the intersection of the latter faults and NE trending shears. It was considered that this mineralization represented re-mobilization of Pb-Zn from the anomalous slates and volcancis. (G. Krummei,1970)

During the following summer season, November, 1970-March, 1971, Paringa extended the soil geochem survey grid to the north-east and south-west of Carter's prospect and found that Pb-Zn anomalies extended for a combined strike length of about 5.5km, in soils overlying the narrow, Cambrian volcanic belt.

It was found that the Pre Cambrian metasediments to the south-east and the Cambrian porphyries to the north-west were not anomalous.

During this season a wide spaced stream sediment geochem survey was carried out over most of the northern part of E.L. 2/70, which at that time extended from Tullah and Que River in the west to the Forth River in the east and embraced the northern part of the Cradle Mt. National Park.

The stream sediments were analysed for Cu, Pb and Zn and supported the inference, derived from the soil survey, that the Cambrian volcanic suite was the most geochemically favourable rock group and was worthy of further investigation. (Varley, 1971)

In February 1972, a helicopter-borne electromagnetic and magnetometer survey was carried out over the northern parts of E.L. 2/70 by McPhar Geophysics P/L.

E.L. 2/70 was subsequently renewed, in December 1972, in two parts designated Mackintosh West and Mackintosh East.

At Mackintosh East, exploration over the next two seasons (January-February 1973 and summer of 1973/74) consisted mainly of ground E.M. follow up of four A.E.M. anomalies within the E.L. and of two A.E.M. anomalies adjacent to the southern boundary of the E.L. but within the Gradle Mountain National Park.

- A.E.M. anomalies No. 9, 10 and 12 in the northern part of Mackintosh East were found to be due to flat lying conductors related to Tertiary basalt or ground water accumulations and were subsequently dismissed.

- A.E.M. anomaly No. 11 was found to be a strong continous conductor within the PreCambrian metasediments and was attributed to a stratigraphic unit, probably a pryitic, graphitic slate horizon. Soil geochemical sampling failed to give encouragement and no further work was recommended.

- A.E.M. anomaly 14, within the national park was found to be continous with A.E.M. 11 and of no further interest.

- A.E.M. anomaly 13, also within the national park, coincides with a weak magnetic anomaly and weakly anomalous copper and lead values were recorded in several A horizon soil samples. The geological setting is obscure, apparently close to the PreCambrian boundary; no further work was carried out due to the location within the national park.

- Ground E.M. reconnaissance was also carried out on part of the extensive Paringa soil geochem grid. The E.M. survey on all lines (except 2100N) showed horizontal effects only, no massive conductors were indicated and there were no features related to geology or geochemistry. However, the progress report of June, 1974 recommended an Induced Polarization survey and testing of the soil geochemical anomalies by drilling. (E.H. Skey, 1973 &1974)

During February 1975, Geoquest Pty. Ltd. on behalf of Cominco Exploration Pty. Ltd., carried out induced polarization surveys on lines 8100N, 7300N, 2900N and 2100N over the Pb soil geochemical anomalies established by Paringa in 1970/71. Weak frequency effect anomalies (within the Cambrian volcanic suite marginal to the Pre Cambrian metasediments) were found to occur beneath the soil anomalies on lines 7300N and 2100N. (E.H. Skey, 1975)

Testing of the anomalies by drilling was recommended.

Further investigation of the co-incident I.P.-geochemical anomalies was delayed until 1978 when four bulldozer trenches were excavated on grid lines which had been covered by the I.P. survey.

Mapping of the trenches revealed that the underlying rocks are weakly sheared barren rhyolites with minor late stage intersecting quartz-chlorite 'veinlets with disseminated sulphides'. It was concluded that the soil anomalies were derived from the latter veinlet mineralization but were not due to stratiform sulphide mineralization. (C.H. Young 1978)

7. EXPLORATION BY GEOPEKO - PHASE 1

Geopeko, in 1979, entered a joint venture agreement with Aberfoyle, to undertake exploration at Mackintosh East with the objectives in the first phase of exploration being:

i) to carry out geological reconnaissance and systematic, more closely spaced, stream sediment sampling in the area of Cambrian acid volcanic/ intrusive lithologies between the PreCambrian metasediments in the east and the Ordovician sediments in the west.

ii) to re-assess the geological, geochemical and geophysical results of the work carried out over the extensive Back Peak grid by the previous explorers.

7.1 GEOLOGY

The Mackintosh East area covers a portion of the north-western margin of the Pre-Cambrian "Tyennan" cratonic nucleus, the flanking Cambrian island arc volcanic assemblage known as the Mt. Reid Volcanics, and the consecutively overlying conglomeratic sandstone and limestone of Ordovician age. Remnants of Tertiary basaltic flows cover part of the north-eastern area.

Geological mapping was carried out with the aid of 1:10,000 scale airphoto enlargements and the data was plotted on 1:10,000 topographic maps provided by the Tasmanian Lands Department.

(Refer to Plan No's TS 2/70 A-2, B-2 enclosed.)

Pre-Cambrian metasediments:

The Pre-Cambrian rocks have not been mapped in detail but appear to consist principally of laminated and massive quartzites, psammo-pelitic and minor carbonaceous mica schists which show evidence of multiple deformation and regional metamorphism in the'greenschist' facies. They occur in the south-eastern part of Mackintosh East and form part of the 'Tyennan nucleus' which is believed to have existed as a fairly stable cratonic 'high' since about late Pre-Cambrian time.

Mount Read Volcanics:

The metasedimentary basement is unconformably overlain by a volcanic sequence consisting principally of fairly massive fine grained quartz crystal tuffs with interbedded massive or finely laminated vitric tuffs, tuffaceous siltstones and fine grained porphyritic lavas. Their overall composition is rhyolitic. Whilst some of the tuffs are quite massive and could be equivocally interpreted as of sub aerial or subaqueous depositon, there also occur finely layered varieties with, for example, alternations between beds of fine cherty/vitric tuff and quartz crystal tuff on a scale of layering down to a couple of millimetres thick. The occasionally observed soft sediment - loading structures in these rocks further suggest subaqueous deposition and a degree of particle size sorting, probably in an undisturbed environment some distance from centres of vulcanism.

These rocks are confined to a narrow, (100-1500m) north-easterly to easterly striking belt, paralleling the margin of the metasedimentary block, and dipping moderately to steeply to the north-west and north.

The unconformability of the contact is evident from:

- the marked contrast in deformation and metamorphic style across the contact
- the strike parallelism of gross layering in the volcanics and the volcanic-metasedimentary contact which appear to be folded in a broad northerly plunging antiform in the eastern part of the area.
- the local presence of rounded quartzite pebbles in crystal lithic tuffs adjacent to the contact. (The pebbles representing erosional clasts of [illegible] Cambrian derivation.)

The various lithologies within the volcanic group are locally finely layered and interbedded but in most cases it is difficult to map contacts for any distance due to poor outcrop. It seems that many of the lithologies are laterally discontinuous or lensoidal and therefore the lithological boundaries shown on the accompanying map should be regarded with caution in areas where few outcrops are shown.

The volcanics are structurally overlain by a broadly conformable massive body of coarse grained quartz-feldspar-biotite porphyry. This 'unit' is at least 2km. wide in the central region and appears to extend the length of the E.L. with great textural and compositional uniformity. The rock typically consists of large phenocrysts (upto 6mm) of embayed quartz, sericitized albite and minor orthoclase with chloritized flakes of biotite in a crystalline ground mass (grain size 0.1mm) of quartz and pinkish orthoclase.

The porphyry is regarded as a large synvolcanic intrusive, probably chemically and genetically related to the volcanics it intrudes.

Points of evidence in favour of an intrusive origin for the porphyry include:

- recrystallized xenolithic fragments are present in porphyry outcrops on the Reynold's falls track in a small tributary about 300 metres east of Tumbling Creek.
- granoblastic quartz (recrystallized crystal tuff?) adjacent to the porphyry-volcanic contact exposed in Speeler Creek.
- occasional occurrence of small isolated bodies of porphyry within the volcanics (as at 408,900mE, 5,396,800mN).
- local discordance of porphyry contact (e.g. 200m. west of Carter's Prospect at Fleece Creek.

In the valley of the Fleece Creek and north-east of Speeler Creek, the porphyry extends north westward as far as the contact with the overlying Ordovician sediments and this is probably also the case in the south western part of the licence although it has not been mapped.

Ordovician Sediments:

In the valley of the Fleece Creek and the unnamed creek north of Speeler Creek, siliceous sandstone and conglomeratic sandstone is well exposed in sharp unconformable contact with the massive Cambrian porphyry. At the base, the sediments are clean, fine to medium grained quartz sandstone, generally massive but with minor pebbly conglomeratic bands and lenses. Disseminated blebs of pyrite are a minor constituent in some of the sandstone and pebbly bands with dark hematitic matrix are locally prominent. The rocks are clearly equivalent to the Ordovician Owen Conglomerate. They dip gently to the north-west at 20-30^{o}, forming the eastern limb of an open, synclinal fold which has a gently north-easterly plunging axis running approximately along the Vale River.

The sandstones appear to have a thickness of about 150 metres and pass upwards into poorly exposed fine grained silty sediments and impure limestones which occupy the Vale of Belvoir.

Tertiary Basalt:

Some of the north and eastern parts of the Mackintosh East area are covered by remnants of flat lying Tertiary basaltic flows. The basalt occurs mainly on broad valley floors and was presumably extruded onto a topography not greatly different from the present.

Coarse grained hornblende gabbro outcrops south of the Iris River near the eastern boundary suggest the prescence of volcanic vents in that area.

Mineralization:

The strongest show of mineralization occurs at Carter's Prospect which is situated just outside the Mackintosh East licence. The prospect has been described by Krummei, 1970 and Rugless, 1976. Galena, with minor pyrite, sphalerite and chalcopyrite occurs in small discontinous quartz veins, small stockworks and breccia zones within PreCambrian laminated quartzites and schists close to the contact with the volcanics. The mineralization is poddy and partly localized at the intersection of NW trending faults and NE trending minor shears.

The former faults displace the metasediment-volcanic boundary, giving a blocky character to the volcanic belt, and are therefore no older than late or post Cambrian age. Similar trends also offset the basal Ordovician sediment contact suggesting that some movement (of the opposite sense) occurred during the Tabberabberan deformation.

Similar galena-quartz mineralization has been observed, on a much smaller scale, as occasional fine quartz-chlorite-sulphide veinlets within rhyolitic quartz crystal tuffs exposed in the trenches excavated by Abminco. (Young, 1978.)

Minor galena was also noted in fine veinlets in quartz crystal tuff and as fine disseminations in sheared chloritized rock close to the porphyry contact exposed in the southern tributary of Fleece Creek, west of Marsden Creek.

This style of mineralization has little economic potential. However it is likely that it has been derived by remobilization of metals from the Cambrian volcanic sequence which has been shown, by soil geochemistry, (Varley, 1971) to be anomalous in lead and zinc for most of it's length within Mackintosh East.

During the latest phase of mapping, minor disseminated sulphides, notably pyrite and pyrrhotite, have been observed in fresh rocks at several, widespread, localities within the volcanic suite. Fine specks or crystals of sulphides occur in most of the volcanic lithologies but are more prominent in the finer grained, layered tuff-sediment types. On a megascopic scale they often appear to be concentrated within particular layers strongly suggesting a syngenetic stratiform origin.

A few rock chip samples of various volcanic lithologies have been analysed for comparison of background metal values. The finely layered (commonly pyritic) tuffaceous sediments contain lead values about an order of magnitude higher than the more massive glassy-crystal tuffs and lavas as shown in the following table:

TABLE 1

Field Location No.	Sample No.	Rock type	Cu	Pb	Zn	Ag	(ppm)
M54	KR 5596	Bedded pyritic tuff-siltstone	110	300	65	3	
	5660	Finely layered tuff-siltsone	20	740	190	3	
	5661	Finely layered pyritic tuff/ siltstone	320	5800	5000	11	

Field Location No.	Sample No.	Rock type	Cu	Pb	Zn	Ag	(ppm)
M55A	KR 5663	Finely layered pyritic siltstone	15	370	130	1	
M61	5666	Layered dark tuff-siltstone	15	290	180	1	
M64	5668	Layered pyritic tuff-siltstone	20	840	280	2	
M54A	5670	Layered pyritic tuff-silstone	110	210	320	3	
	KR 5594	Fig. rhyolitic quartz xtal tuff	20	50	110	(1	
M52	5662	Dark chloritic tuff	60	35	85	2	
M55	5664	Rhyolitic vitric tuff	2	40	50	1	
M59	5665	Rhyolitic quartz-feldspar xtal tuff	5	15	65	1	
M62	5667	Rhyolitic quartz xtal tuff	25	35	95	1	
M67	5669	Rhyolitic quartz-feldspar porphyry lava	10	85	50	1	

Since none of the above samples show any epigenetic veining or replacement mineralization it is probable that the anomalous lead, zinc and silver were syngenetically deposited. This is supported by the contrasting Pb, Zn, Ag values of the two litholgical groups. One can nowadays quite readily visualize the chemical deposition of base metal sulphides in quiet, sub-aqueous, low oxygen environments, especially in association with acid vulcanism.

These anomalous tuffaceous sediments are a likely metal source for the structurally controlled (Carter's type) veinlet mineralization; the remobilization was probably effected by solution transport during late Cambrian or Tabberabberan deformation.

7.2 GEOCHEMISTRY

Stream sediment samples were collected from all reasonably accessible stream systems draining the area of Cambrian Volcanics and porphyry. Normal sampling interval was 200 metres; locations were roughly measured out by survey chain, flagged and marked by aluminium perma-tags.

Plans numbered: TS 2/70-A-3, B-3 show the sample localities. (Plans not enclosed with this report.)

The -80 mesh fractions of all samples were analysed for Cu, Pb, Zn, Fe, Sn and W. Every fourth sample only, of sediments from the Fleece, Tumbling and Marsden Creek systems, was analysed for Au.

Analyses were carried out by Australian Laboratory Services, Woolloongabba; using the following methods:

Cu, Pb, Zn, Fe	A.A.S.
Sn, W	X-ray Flourescence
Au	Carbon Rod - A.A.S.

Copper, lead, zinc and gold values are represented on plans: TS 2/70-A-4, B-4. These plans also show the extent of the 1970-71 Paringa soil geochem survey and the locations of the major lead-zinc soil anomalies.

Iron, tin and tungsten values are shown on accompanying plans: TS 2/70-A-5, B-5.

Anomaly thresholds have been somewhat arbitrarily, by the eyeball technique, set at the following levels.

Cu	25ppm
Pb	110ppm
Zn	250ppm
Au	25ppb
Fe	5%
Sn	30 ppm
W	30ppm

The dominant geochemical response is for lead, with a peak value of 3200ppm Pb. In several instances there is correlation between anomalous lead and zinc values but with the zinc generally of a lower order and contrast; maximum 450ppm Zn.

There are three principal zones of anomalous lead. Two of these occur in tributaries of Fleece Creek and are respectively located about 1km. south west of and just north-east of Carter's Prospect. These drainage anomalies are clearly related to the two principal soil geochem anomalies and have been designated Prover 1 and Prover 2 respectively.

However, the strongest drainage anomaly, coincident in lead, zinc and iron, occurs in the next major tributary (of the Vale River) north of Speeler Creek and for purposes of Geopeko follow-up this area has been designated Prover 3.

With the exception of the Prover 3 area there is generally not close correlation between lead-zinc and iron values. Copper is only weakly anomalous in a few samples and similarly shows no particular correlation to lead and zinc.

Gold values range from 25-135ppb but are not strongly correlated to Cu, Pb and Zn and the small number of available analyses causes problems in assessing the significance of these results.

Tungsten values range from less than 10 to 60ppm W but the few values over 30ppm are considered to have no special significance.

Anomalous tin values upto 425ppm occur in the Fleece Creek and it's southern tributary which drain an area of Pre Cambrian rocks south of Carter's Prospect. Rugless, 1976 reported the occurrence of a banded quartz-tourmaline rock from the Fleece Creek about 200m upstream from Carter's Prospect. A petrographic report of the rock (by H.W. Fander) describes a tourmalinized sediment containing arsenopyrite which has been folded and contorted and finally brecciated with introduction of chalcopyrite and galena.

Though this is little enough to base comment on, it seems probable that the latter sulphide mineralization is related to the Carter's style galena-quartz veining but the tourmalinization-arsenopyrite mineralization may relate to an earlier phase of tin-sulphide mineralization.

Several anomalous tin values, upto 165ppm, also occur in the lower reaches of Tumbling Creek in an area which (from airphoto interpretation) appears to be underlain by Ordovician sandstone.

7.3 GEOPHYSICAL SURVEYS

Part of the Mackintosh East area was surveyed by a new helicopter borne electromagnetic-magnetic method known as Dighem. The survey was conducted in April 1980 and the data is currently being processed by the contractors. No results have been received to date.

7.4 DISCUSSION OF RESULTS

It is apparent that the most significant stream sediment geochemical anomalies occur in streams draining off the Cambrian volcanic strip. In fact the results show that almost every stream draining the volcanics is at least weakly anomalous and thus support the Paringa soil geochem data which shows that the volcanic group has a high lead and zinc background on a semi regional scale. Rock chip geochemical data indicates that the tuffaceous sediment lithologies contain anomalous levels of Pb and Zn an order of magnitude or so higher than the background levels in the more massive, vitric and crystal tuffs and lavas.

Taken together the geological and geochemical indications are that the acid volcanic-volcaniclastic group at Mackintosh East is a highly prospective host for possible massive sulphide mineralization of the Rosebery type.

In the Prover 3 area the stream sediment geochem values peak at 2200ppm Pb and 430ppm Zn. These are highly significant in comparison to the initial anomalous drainage sample, containing 300ppm Pb and

340ppm Zn, which lead to the discovery of the Que River deposit. (Webster & Skey, 1979.)

At the Prover 1 area, B-Horizon soil geochem by Paringa has defined an elongate lead-zinc anomaly with greater than 300ppm Pb over about 1200m. strike length. Isolated values peak at upto 2500ppm Pb and these also appear quite significant in comparison to C-Horizon soil values over the Que River deposit. However, as a cautionary note, the conclusions from the Que River study were that the soil geochem anomalies did not show close correlation to the projected ore lenses but did provide a useful method of outlining areas for systematic geophysical surveys which could be used for definition of drilling targets.

The 1975 I.P. survey on four lines over the main soil geochemical anomalies (now Prover 1,2, see Plan Nos: 2/70 A-3, B-3)indicated weak frequency effect anomalies on lines 2100N and 7300N. Subsequent testing by trenching in 1978 failed to adequately account for the I.P. anomalies but it was concluded that the soil anomalies were not due to stratiform sulphide mineralization.

This conflicts directly with the regional geochemical indications and I recommend that a more systematic evaluation of the Prover 1 and Prover 2 anomalies should be carried out.

The Prover 3 area was not covered by the Paringa soil geochem survey but since the approach so far has been geochemical, this should be carried out as the first stage in assessment.

Recommendations for assessment of the lead-zinc anomalies are briefly listed as follows:

1. Establishment of metric grids over the Prover 1 and Prover 3 areas. Grids with base line length of 1200 metres, with 800 metres cross lines at 100 metres spacings, and placed approximately as shown on plans: TS 2/70, A-2, B-2 should be sufficient for initial follow-up.

2. C-Horizon soil sampling on Prover 1 and Prover 3 grids; to be sampled with power auger where possible. Prover 3 should be given some priority at this stage as it is a new anomaly as yet untested.
   Sampling at Prover 1 may proceed tentatively at first, perhaps on a reconnaissance basis to verify the Paringa results.

3. Detailed geological mapping of both grids in order to relate goechemistry to rock types.

4. If geochemical and/or geological data are favourable, systematic Induced Polarization sureys should be carried out to define drilling targets.

5. Confident I.P. anomalies should be tested by diamond drilling.

The anomalous tin values in streams south of Carter's Prospect are especially interesting in the light of the report by Rugless, 1976 of a sulphide bearing tourmalinized sediment from an outcrop in Fleece Creek (see page 26 this report).

The tin anomalies may relate to vein mineralization associated with an (unknown) granitic intrusion in this area or perhaps to exhalative tin-sulphide mineralization of Cambrian or even PreCambrian age.

Careful reconnaissance mapping and panned concentrate sampling of sediments is recommended in both of the anomalous tin areas.

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W. HERRMANN.
Geologist.

APPENDIX A — Rock Chip Geochem Results

Sample Number	Description	Cu ppm	Pb ppm	Zn ppm	Ag ppm	Ba ppm	Sn ppm	W ppm	Mn ppm	Fe %	Au ppb
KR 5569	Pyritic gossanous Qtz vein in PreCambrian schist	120	70	370		240	30	(10			170
5573	QFBi porphyry c̄ narrow quartz-chlorite veinlets	25	40	195	1		(5	(10			
5574	As for KR 5573	20	20	110	(1		(5	(10			
5575	Shd. chl. tuff. c̄ pyrite galena adjacent to QFBi porphyry contact	5	4800	170	3		(5	(10			
5576	Rhyolitic xtal tuff c̄ disseminated pyrite galena in quartz veinlets	10	2800	50	20		(5	(10			
5588	Pyritic shd. acid volc	30	150	20	2		5	(10			
5589	Pyritic PreCambrian quartzite	100	40	35	1		(5	(10			
5590	Quartz-chlorite vein in xtal tuff	10	135	115	1		10	(10			
5591	Pyritic sandstone	2	15	20	1		10	(10			
5592	QFBi porphyry c̄ Quartz-chlorite veins	10	45	280	(1		(5	(10			
5593	Silicified limestone	5	25	40	(1		(5	(10			
5594	Rhyolitic xtal tuff, alt. nodules	20	50	110	(1		(5	(10			
5595	White vein quartz	2	10	2	(1		(5	(10			
5596	Bedded pyritic siltstone	110	300	65	3		(5	(10			

Sample Number	Description	Cu ppm	Pb ppm	Zn ppm	Ag ppm	Ba ppm	Sn ppm	W ppm	Mn ppm	Fe %	Au ppb
KR 5597	Ox. acid xtal tuff c 10% ox. sulphides	210	175	20	3		20	(10			
5598	Fault Breccia	20	210	30	2		5	(10			
5599	Quartz-chlorite vein from costean 2900N	10	200	150	2		(5	(10			
5600	Carter's ore	45	6.8%	230	21		5	(10			
5601	Carter's ore	220	19.2%	2000	47		15	(10			
5602	Carter's ore	85	3.68%	560	14		(5	(10			
5603	Carter's ore	270	12.6%	2800	38		(5	(10			
5660	Layered tuff-siltstone	20	740	190	3				1800	3.20	
5661	Layered tuff-siltstone	320	5800	5000	11				3600	6.20	
5662	Chloritic tuff	60	35	85	2				95	1.60	
5663	Layered pyritic siltstone	15	370	130	1				75	1.40	
5664	Rhyolitic vitric tuff	2	40	50	1				240	2.00	
5665	Rhyolitic quartz-feldspar xtal tuff	5	15	65	1				160	1.16	
5666	Layered dark tuff-siltstone	15	290	180	1				200	1.84	
5667	Rhyolitic quartz xtal tuff	25	35	95	1				410	1.68	
5668	Layered pyritic tuff-siltstone	20	840	280	2				5400	3.40	
5669	Rhyolitic quartz-feldspar porphyry lava	10	85	50	1				460	2.00	
5670	Layered pyritic tuff-siltstone	110	210	320	3				3000	8.40	

8. REFERENCES

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401 000 mE
402 000 mE
403 000 mE
404 000 mE
405 000 mE
406 000 mE
407 000 mE
5 399 000 m N
5 398 000 m N
5 397 000 m N
5 396 000 m N
5 395 000 m N
5 394 000 m N
5 393 000 m N
5 392 000 m N
5 391 000 m N
MT. MAYDAY
Trig 460
3747
E.L. 2/70 BOUNDARY
VALE RIVER
SPEELER CREEK
"FOURWAYS"
TUMBLING CREEK
FOOT TRACK
cld lst
impure sil fe jasper lst
KR 5593
lst bedded
impure lst
sst scree
sst, cgl sst
sst c fossil burrows
(M46) sst congl beds; hm layers near base
some py sst float
(M43) sst c congl sst beds
bleached shd Qfbp (M44)
congl qtzt
qtzt (M11)
(M10) py qtzt
minor q chl veinlets KR 5573
(M9)
(M8)
KR 5574
(M3)
partly chloritized
(M2)
local chloritic alteration adjacent to qchl veins
qfbp
(M13)
(M79)
(M80)
(M81)
(M76)
(M77)
(M78)
galena vein
CARTER'S PROSPECT
KR 5600-5603
FLEECE CREEK
KR 5598
(M75) fault bx
fg axt
(M74)
gns
Quartzite
PROVER I
PROPOSED GRID AREA
(M14)
costean
KR5599
(M71)
(M15)
KR 5660 5661
(M16)
minor diss py
(M17)
(M18)
KR 5575 somewhat chloritised adj (2-3m) to contact
KR 5576 axt minor py gal near contact
massive fg at
(M19)
pel schist
THE HEAP OF ROCKS
3400
(M49)
(M50) fg axt or lava?
minor py diss
minor diss py (M53A)
(M51) KR 5594
nodular axt
(M52A)
massive axt
(layered) acid tuff-vt
fg dark avt
(M54A)
fg layered atsl
(M55A)
fg axt
av-xt
(M48)
massived fg avt strongly clvd
BACK PEAK
sch//to bed?
finely layered a f sed.
(M62)
dark tuff siltstone
(M61)
(M64)
(M65)
(M66)
layered avt/minor avxt
tuffaceous siltstone (M63)
(M60) mg qfbl
qfbpl
(M67)
avt
dark atsl
BOMBARDIER TRACK
2800
3000
3800
3400
LEGEND:
Geological Boundary
mapped
inferred
unconformity
unconformity inferred
boundary tertiary basalt
outcrop boundary
float boundary
Faults
mapped
inferred
fault breccia (bx)
strike/dip of lithological layering/bedding
strike/dip of flow layering in volcanic rocks
strike/dip of schistosity (Metamorphic foliation)
strike/dip of schistosity parallel to bedding / lithological layering
strike/dip of cleavage
cleavage vertical
strike/dip of prominent joints
strike/dip of vertical joints
minor fold axis (in folded foliation) with plunge
lineation (crenulation of metamorphic foliation)
Miscellaneous
KR 5600 Rock sample location and number for geochemical analysis
(M66) Rock speciman location and number
Foot track and bombardier track
GEOLOGICAL INTERPRETATION
Pencil No.
19-58 TERT. Basalt
19-5 ORDO. Limestone, impure limy siltstone
19-7 ORDO. Sandstone, conglomeratic sandstone
19-21 Є Quartz-feldspar-biotite porphyry-intrusive
19-19 Є Rhyolitic quartz-feldspar-biotite porphyry-extrusives
19-28 Є Rhyolitic quartz crystal tuff, minor crystal lithic tuff
19-24 Є Rhyolitic fine grained massive or laminated vitric tuffs
19-17 Є Fine grained volcaniclastic sediments
19-70 PRE Є Psammo-pelitic schist and quartzite
GEOPEKO
DEVONPORT BASE, TASMANIA
053035
SCALE 1:10 000
No TS 2/70-A 2
MACKINTOSH EAST E.L. 2/70
GEOLOGICAL PLAN
DATE JUNE '80
GEOLOGIST W. H.
DRAWN J. P. M.
CHECKED
A
B
5 cm
80-1473

PROVER 3
PROPOSED GRID AREA
LAKE LEA TRACK
SUNSHINE CREEK
IRIS RIVER
BLACK BOG CREEK
Old Mill
PENCIL PINE LODGE
PENCIL PINE CREEK
NATIONAL PARK BOUNDARY
E.L. 2/70 BOUNDARY
Hut
408 000 mE
409 000 mE
410 000 mE
411 000 mE
412 000 mE
413 000 mE
5 401 000 mN
5 400 000 mN
5 399 000 mN
5 398 000 mN
5 397 000 mN
5 396 000 mN
5 395 000 mN
5 394 000 mN
5 393 000 mN
5 392 000 mN
2800
2900
2925
3000
3200
Tb
qtz vein 4m thick KR 5595
(M40)
(M41)
py congl sst
fg congl sst
congl sst
congl sst flt
M42
qfbp
KR 5592 (M39)
fg axt
axt & thin avt interbeds
KR 5590
scattered axt outcrop
axt minor avt interbeds
sst float
clvd axt
massive axt (M53)
massive axt
KR5596 (M54) thin interbedded dark py sl
(M55)
(M56)
ax-vt layered
layered ax-vt (M60)
fg clvd avt
fg avt
(M57) fg layered axt (minor diss. py/po?)
KR5597
ox sulphides up to 5%
cg hbl gabbro (M 58)
fg axt minor diss py/po
(M59)
axt (qtzt pebbles)
(M37)
(M38)
dark chloritic at (M52)
fault bx
shd axt
py qtzt KR 5591
laminated qtzt
laminated qtzt & minor Ps Pe schist layers
Ps Pe sch
KR 5587
Qtzt
(M36) axt & qtzt pebbles
(M33)
M34
(M35) qfbp
Ps Pe gneiss
KR 3569
Ps Pe schist
(M31)
granoblastic quartzite (contact metamorph ?) (M23)
(M24)
fg q.b.pl (M22)
(M26)
axt (M21)
laminated vt (M20)
(M29)
minor folds 015°/00
shd py at KR 5588
Ps gns & minor Pe layers
fg xt (M28)
fault bx (M27)
(M25)
(M30)
Ps Pe gneiss
Pe sch
crenulated 230/10
crenulated 240/5
lam qtzt
Ps Pe gns
(M1)
Ps Pe sch
Ps schist
Pe schist
LEGEND:
Geological Boundary
mapped
inferred
unconformity
unconformity inferred
boundary tertiary basalt
outcrop boundary
float boundary
Faults
mapped
inferred
fault breccia (bx)
strike/dip of lithological layering/bedding
strike/dip of flow layering in volcanic rocks
strike/dip of schistosity (Metamorphic foliation)
strike/dip of schistosity parallel to bedding/lithological layering
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strike/dip of prominent joints
strike/dip of vertical joints
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19-28 Є Rhyolitic quartz crystal tuff, minor crystal lithic tuff
19-24 Є Rhyolitic fine grained massive or laminated vitric tuffs
19-17 Є Fine grained volcaniclastic sediments
19-70 PRE Є Psammo-pelitic schist and quartzite
053036
GEOPEKO
DEVONPORT BASE, TASMANIA
SCALE 1:10 000
No. TS 2/70-B2
MACKINTOSH EAST E.L. 2/70
GEOLOGICAL PLAN
DATE JUNE '80
GEOLOGIST W.H.
DRAWN J.P.M.
CHECKED
A
B
5 cm
80-1473

401 000 mE
402 000 mE
403 000 mE
404 000 mE
405 000 mE
406 000 mE
407 000 mE

5 399 000 m N
5 398 000 m N
5 397 000 m N
5 396 000 m N
5 394 000 m N
5 393 000 m N
5 392 000 mN
5 391 000 mN

MT. MAYDAY
Trig. 460
3747'

E.L. 2770 BOUNDARY

LEGEND:

15 — Cu ppm
110 — Pb ppm
250 — Zn ppm
(151) — Au ppb

Original sample assay

Duplicate sample assay

ANALYTICAL METHODS

Cu, Pb, Zn, — AAS (method 1)
Au — AAS CARBON ROD (method 120a)

AUSTRALIAN LABORATORY SERVICES, Brisbane QLD.

ANOMALOUS VALUES – DRAINAGE SAMPLES:
(colour marked from sample location upstream to next location)

Copper ≥ 25 ppm
Lead ≥ 110 ppm
Zinc ≥ 250 ppm
Gold ≥ 25 ppb

5 cm

B – HORIZON SOIL GEOCHEMISTRY
(Paringa 1970 – 71)

Pb > 300 ppm
Zn > 150 ppm

INDUCED POLARIZATION GEOPHYSICS
(Cominco 1975)

frequency effect anomaly

Paringa grid

GEOPEKO
DEVONPORT BASE, TASMANIA

GIS 32417 – 32551
32596 – 602

SCALE 1:10 000

No TS 2/70 – A 4

DATE JUNE 1980
GEOLOGIST W.H.
DRAWN J.P.M.
CHECKED

MACKINTOSH EAST E.L. 2/70

DRAINAGE GEOCHEMICAL RESULTS
COPPER, LEAD, ZINC and GOLD

A B

80-1473

053037

LEGEND

15 — Cu ppm
110 — Pb ppm
250 — Zn ppm
(15) — Au ppb

15 — Original sample assay
200
260

10* — Duplicate sample assay
180
260

ANALYTICAL METHODS

Cu, Pb, Zn, — AAS (method 1)
Au — AAS CARBON ROD (method 120a)

AUSTRALIAN LABORATORY SERVICES, Brisbane QLD.

ANOMALOUS VALUES - DRAINAGE SAMPLES
(colour marked from sample location upstream to next location)

Copper ≥ 25 ppm
Lead ≥ 110 ppm
Zinc ≥ 250 ppm
Gold ≥ 25 ppb

B - HORIZON SOIL GEOCHEMISTRY
(Paringa 1970 - 71)

Pb > 300 ppm
Zn > 150 ppm

Paringa grid

5 cm

GEOPEKO
DEVONPORT BASE, TASMANIA GIS 32552 - 32595

SCALE 1:10 000

No. TS 2/70 - B4

DATE JUNE 1980
GEOLOGIST W.H.
DRAWN J.P.M.
CHECKED W.H.

MACKINTOSH EAST E.L. 2/70
DRAINAGE GEOCHEMICAL RESULTS
COPPER, LEAD, ZINC and GOLD

A B

80-1473

053038

MT. MAYDAY
Trig. 480
3747'

E.L. 2/70 BOUNDARY

401 000 mE | 402 000 mE | 403 000 mE | 404 000 mE | 405 000 mE | 406 000 mE | 407 000 mE

5 399 000 m N | 5 398 000 m N | 5 397 000 m N | 5 396 000 m N | 5 395 000 mN | 5 394 000 mN | 5 393 000 mN | 5 392 000 mN | 5 391 000 mN

LEGEND:

Fe %
Sn ppm
W ppm

Original sample assay
Duplicate sample assay

ANALYTICAL METHODS:

Fe — AAS (method 1)
Sn, W — XRF (method 9A)

AUSTRALIAN LABORATORY SERVICES, Brisbane Qld.

ANOMALOUS VALUES — DRAINAGE SAMPLES:
(colour marked from sample location upstream to next location)

Iron ≥ 5%
Tin ≥ 30 ppm
Tungsten ≥ 30 ppm

GEOPEKO
DEVONPORT BASE, TASMANIA
053039

SCALE 1:10 000

No. TS 2/70-A5

MACKINTOSH EAST E.L. 2/70
DRAINAGE GEOCHEMICAL RESULTS
IRON, TIN and TUNGSTEN

DATE: JUNE
GEOLOGIST W.H.
DRAWN J.P.M.
CHECKED

A | B

5 cm

80-1473

LEGEND:

1·84 — Fe %
20 — Sn ppm
40 — W ppm

10·2 12·4* — Original sample assay / Duplicate sample assay
<5 <5
<10 <10

ANALYTICAL METHODS:

Fe — AAS (method 1)
Sn,W — XRF (method 9A)

AUSTRALIAN LABORATORY SERVICES, Brisbane QLD.

ANOMALOUS VALUES – DRAINAGE SAMPLES:
(colour marked from sample location upstream to next location)

Iron	≥ 5 %	(orange)
Tin	≥ 30 ppm	
Tungsten	≥ 30 ppm	

GEOPEKO
DEVONPORT BASE, TASMANIA

053040

No. TS 2/70-B 5

SCALE 1:10 000

MACKINTOSH EAST E.L. 2/70

DRAINAGE GEOCHEMICAL RESULTS

IRON, TIN and TUNGSTEN

A B

DATE	JUNE 1980
GEOLOGIST	W.H.
DRAWN	J.P.M.
CHECKED	[signature]

80-1473

5 cm