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Exploration Licence 1/68
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Regional Exploration
Heazlewood and Arthur River
1972/1973 Summer Field Season Report

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AUSTRALIAN ANGLO AMERICAN LIMITED

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REGIONAL EXPLORATION

1972/1973 SUMMER FIELD SEASON

1. INTRODUCTION

1.1. Location and Access

1.1.1. Heazlewood Area

The Upper Heazlewood River drainage system covered this season lies about nine miles NW of Waratah in the NE sector of Exploration Licence 1/68. (See TAS 2-440).

Two helicopter landing pads were established on the Heazlewood River and access during the field season was provided by a Hughes 500 helicopter.

Access to the lower sections of the Heazlewood area can also be gained by a walking track which extends northwards from the Mt. Cleveland track and ends approximately one mile south of the lower Heazlewood helipad (see TAS 2-441).

Other parts of the area are accessible only on foot.

1.1.2. Arthur Area

The section of the Arthur River drainage system covered in the 1972/1973 season lies about four miles north of Waratah in the north central sector of Exploration Licence 5/63. The northern part of the area mapped and sampled lies without (i.e. north of) the northern boundary of Exploration Licence 5/63 (see TAS 2-440).

Access during the season was provided mainly by helicopter which was able to utilise a helipad prepared near the junction of Deep Gully Creek and the Arthur River, and on the road near the Wandle River bridge.

This road, established by Associated Forest Holdings, joins the Waratah Highway near Parrawe and runs along the Arthur River extending almost to Deep Gully Creek and providing good motor vehicle access to the Arthur area (see TAS 2-441).

1.2. Physiography

Both areas are typically thickly forested with deeply incised drainage systems. Despite the steep nature of the country; soil cover is almost ubiquitous and geological outcrop away from the creeks is poor.

1.3. Previous Work

No systematic regional exploration has been previously undertaken in the specific areas covered by this report.

1.4. Exploration Methods

Exploration methods combined systematic collection of stream sediment samples from active streams and regional geological mapping which was restricted largely to exposures in streams.

All active streams were surveyed by tape and compass and marked at 100' intervals. Stream sediment samples were taken 100' upstream of confluences and at 500' intervals along the streams. At Waratah, the sediment samples were dried and sieved to obtain -80 mesh fractions which were then despatched to the Australian Mineral Development Laboratories in Adelaide, for analysis as detailed below:

Atomic absorption spectrometry for Cu, Zn, Ni, Ag.
X-ray fluorescence for Sn.

Samples found to be anomalous in any of the above elements were re-analysed by spectrographic scan according to the following systems:

<u>Samples anomalous in</u>	<u>Spectrographic scan for</u>
Cu/Zn	Co, Mo, V, W, Au, Pb, Sb, Bi, Cd, As.
Ni	Co, Pt, Pd, Os, Ir.
Sn	V, W, Nb, Ta.

Heavy concentrate samples of stream sediments were taken at approximately half mile intervals in some of the major streams of the Arthur River area. (see TAS 2-441). These samples were submitted to AMDEL for spectrographic scan for the elements Cr, V, W, Mo, Ta, Nb, Sn, Cd, Au, Pb, Pt, and Os.

2. GEOLOGY

The sedimentary rocks forming the greater portion of outcrop in the Heazlewood and Arthur areas are represented by two lithologically distinct sequences of suspected Lower Cambrian(?) and Cambrian(?) ages, which (for the purpose of this report) are termed the Quartzite/Shale Group and the Mudstone/Greywacke Group. These are complexly folded and intruded by various ultrabasic and basic igneous rocks.

In the NE of the Arthur area these older sedimentary rocks are unconformably overlain by flat lying sediments which are possibly of Permian(?) age.

A dissected basalt plateau of Tertiary age unconformably overlies older rocks in the areas of high ground lying between the Heazlewood and Arthur areas and east of the Arthur River (see TAS 2-442).

2.1. The Quartzite/Shale Group

This is believed to be the oldest group outcropping in the area and is a "miogeosynclinal" sequence of quartzites, siliceous metasiltstones and shales. It appears to be lithologically similar to, and is tentatively equated with, the Lower Cambrian(?) rocks of the Mt. Bischoff Series (Groves & Solomon, 1964., Proc. Royal Society of Tasmania - Geology of the Mt. Bischoff District.). It is probably also equivalent to the arenaceous sequence exposed in the core of the Just-In-Time anticline, south of Waratah (refer D. Wallis, 1971, Comstaff Pty. Ltd. 1970/1971 Summer Field Season Report, and M.P. Everett, 1972, Comstaff Pty. Ltd. 1971/1972 Summer Field Season Report.).

The quartzites are commonly rather massive and thickly bedded, pale to dark gray in colour and consisting principally of fine to medium sand sized grains of quartz; often with minor amounts of muscovite.

Shales are rather well laminated, varying from pale grey to black in colour. In places they are distinctly graphitic and somewhat pyritic. Tiny micaceous flakes are sometimes developed parallel to bedding planes, probably indicative of low grade metamorphism.

The "meta-siltstones" are highly siliceous, generally interbedded with shales and commonly showing "boudin" structures and may be regarded as ultrafine somewhat argillaceous quartzites.

The sediments generally appear to be well sorted and do not exhibit visible graded bedding or gradational changes in lithology.

The group is regarded as a succession deposited under fairly stable conditions as may be expected during the early phases of deposition within a geosynclinal trough. The thickness of the succession is not estimated.

2.2. The Mudstone/Greywacke Group

This unit overlies the Quartzite/Shale Group and is regarded as being of Cambrian age. It appears to be lithologically similar to the Hatfield Greywacke sequence south of Waratah (M.P. Everett, 1972 Comstaff Pty. Ltd. 1971/1972 Summer Field Season Report), and the sediments of the Magnet and Cleveland Mine areas (Cox & Glasson, 1967 Symposium: Geol. of Western Tasmania. The Geology and Mineralisation of Cleveland Mine), which are tentatively correlated with part of the Cambrian system, on a lithological basis.

The group consists primarily of massive mudstones, fine greywackes and lesser amounts of tuffaceous greywackes or water laid tuffs.

The mudstones are dark reddish brown (chocolate) or pale olive grey colour and are often thickly bedded and massive; and nearly always either highly jointed, cleaved or sheared.

4/ The greywackes are

The greywackes are commonly of olive brown to dark grey colour and vary in grain size from silty to medium sand size. In places they show indistinctly graded bedding, which in exposures along the Wandle Road (Arthur area) indicate that the sediments in that locality are facing "up". Considerable amounts of detrital mica are sometimes seen in the greywackes of which the more feldspathic types exhibit (megascopic) textures, reminiscent of tuffs, and they possibly represent a re-worked or water laid pyroclastic sediment.

In the Upper Heazlewood locality there outcrops a "lithic vitric Xenotuff" (thin section TB 923) containing detrital fragments of siltstone, shale and chert, indicating subaqueous deposition (petrographic description by Central Mineralogical Services, Adelaide).

In the Heazlewood area there are a number of exposures of dolomitic limestones (thin section TB 930 - petrographic description by C.M.S.) commonly associated or interbedded with slightly carbonaceous shales. They consist almost entirely of finely crystalline dolomite with very fine silty lamellae of detrital quartz and illitic clays, stained with ultra fine carbonaceous and pyritic material. The silty lamellae give the rock a megascopic layered appearance.

On the far SE of the Heazlewood area, a dolomitic limestone interbedded with shales immediately overlies an oolitic chert (thin section TB 924 - petrological description by C.M.S.) which is slightly carbonaceous and pyritic also.

It is believed that these "chemical sediments" lie near the base of the Mudstone/Greywacke Group, possibly representing an interlude between the deposition of the Quartzite/Shale Group and the overlying Mudstone/Greywacke Group.

However, the dolomites are not always present in exposure near the contacts between the two groups, and it is likely that the dolomitic limestone association is a laterally discontinuous horizon.

Cherts and argillaceous cherts are seen elsewhere in the Mudstone/Greywacke Group, and one is especially well exposed in a small quarry on the Wandle Road (Arthur area), where they are flanked by fine mudstones (see TAS 2-442). These are rather well bedded and do not appear to have dolomite or oolitic chert affiliations.

The thickness of the Mudstone/Greywacke Group is not estimated.

The exact relationship between the Quartzite/Shale Group and the Mudstone/Greywacke Group is not understood, but large scale structures indicate that the two sequences are regionally conformable.

The sedimentary break between the two periods of deposition is probably of the nature of a disconformity, possibly with local unconformities due to minor warping of the Quartzite/Shale sediments prior to the deposition of the Mudstone/Greywacke Group.

2.3. Permian(?) Sediments

In the far NE of the Arthur area, steeply dipping sediments of the Mudstone/Greywacke Group intruded by basaltic sills are overlain unconformably by a sequence of conglomeratic sandstone, fine sandstones and silty shales. These overlying sediments have a shallow dip (10° or less) to the east and although they have not been extensively mapped, the same lithologies, with similar shallow dips, are seen in extensive outcrop along the Wandle Road to the NE of the Arthur area covered by this report (see TAS 2-442). These sediments are possibly of Permian(?) age but field evidence to support this assumption is lacking.

2.4. Igneous Activity

Basic and ultrabasic rocks intrude the older sediments in both the Heazlewood and Arthur areas.

Basaltic extrusives overlies much of the country east of the Arthur River and the higher ground separating the tributaries of the Upper Heazlewood from those flowing eastward to the Arthur River (see TAS 2-442).

2.4.1. Palaeozoic Intrusives

Possibly, the earliest emplaced igneous rocks are the "Serpentinities", which in the areas mapped are exposed only in the lower sections of the Heazlewood River and Friday Creek and at the southern end of the Wandle Road. These ultrabasic rocks are generally rather sheared and so completely serpentinitised that it is difficult to estimate the original mineralogy of the intrusives.

A sample of serpentinite from the SW corner of the Heazlewood area was submitted to C.M.S. for micro-petrographic examination and was reported by them to be a serpentinitised "Titaniferous Mica Peridotite of possible kimberlite affinities" (TB 929).

The serpentinite at the southern end of the Wandle Road is associated with a serpentinitised granular rock which may originally have been a gabbro. The serpentinite in this locality contains narrow veinlets of fibrous "asbestos" (or chrysotile?) and at one place appears to flank an outcrop of crystalline limestone. This is notable only because at Friday Creek (Heazlewood area) a dolomitic limestone outcrops immediately adjacent to serpentinite.

It is not known whether this is merely coincidental or whether the presence of the carbonate bears some relation to the emplacement of the ultrabasics.

In the central east section of the Heazlewood area there outcrops, over a distance of at least 1000', a relatively coarse grained and apparently differentiated intrusive of (basically) gabbroic composition. This is probably related to a number of smaller "micro-gabbro" intrusions exposed in the eastern tributaries of the Upper Heazlewood and to the doleritic and basaltic intrusives which are widely distributed in both the Heazlewood and Arthur areas.

These latter intrusives are more commonly found intruded into the Mudstone/Greywacke Group and, in general, appear to be fairly concordant with the sediments. For this reason it was originally thought that the basic rocks might represent "spilitic" lavas.

However, a number of specimens were submitted for petrographical examination and it was reported by Central Mineralogical Services of Adelaide, that although the rocks were compositionally similar to "spilites" the textures were indicative of intrusive origins.

These mafic intrusives (as reported by C.M.S.), typically are composed of abundant albite and pyroxene with interstitial magnetite and chlorite in a chloritised mesostasis.

Olivine may have been present in some cases but is completely masked by chloritization of the mesostasis. Albite is commonly of primary origin. These rocks have been variously termed (C.M.S.) as Augite Basalt, Albite Dolerite, Albite Basalt, and Microgabbro; the divisions between basalt, dolerite, and microgabbro are apparently made on a textural (grainsize) basis.

The intrusives are fairly small; rarely outcropping over distances greater than a few hundred feet, and the contacts with the enclosing sediments, where exposed, appear to be roughly concordant and it would seem that the intrusives are sill-like bodies.

The intrusive "Dolerites" (used in a general sense to include all the fine grained mafic intrusives mentioned) are nearly always closely jointed with sub-regular joint patterns. In

thin section (C.M.S.) they often exhibit micro-brecciation into sub-angular grains (1 - 5 mm dia.) and chloritisation and/or tremolitization of the mafic minerals. This brecciation and chloritization is unrelated to the late stage deuteritic alteration of calcic plagioclases (to albite) and chloritization of the mesostasis.

The intrusives are commonly rather weathered in outcrop showing "onion peel weathering" of joint fragments.

It is believed that the "dolerites" were intruded into relatively undeformed strata and then folded along with the enclosing sediments.

The micro-brecciation and attendant secondary chloritization would appear to support this notion.

2.4.2. Cainozoic Extrusives

The higher country separating the Upper Heazlewood drainage system from the Arthur River valley is capped with a sheet of Tertiary basalt (Groves & Solomon, 1964. Proc. Royal Society of Tasmania, Geology of the Mt. Bischoff District), which is an outlier of the dissected basalt plateau which covers an extensive area south of Waratah and east of the Arthur River.

This basalt sheet, apparently having a thickness of between 20' and 150' (Groves & Solomon, 1964), was used as a limit to exploration in the Arthur area; it being considered worthless to take geochemical stream sediment samples over an area which is underlain by up to 150' of basalt which (presumably) has no economic possibilities.

2.5. Metamorphism

Metamorphism in the areas mapped is generally of a low order. Development of fine mica flakes in the quartzites, metasiltsstones and shales of the Quartzite/Shale Group probably indicates slight load metamorphism during burial and diagenesis.

The rocks of the Mudstone/Greywacke Group appear to be unaffected by metamorphism except for narrow (less than 3' wide) aureoles of slightly baked sediments at some of the mudstone - intrusive dolerite contacts.

Ultrabasic rocks it seems are rather susceptible to alteration and the severe serpentinitisation of the ultrabasics in the areas mapped does not indicate any considerable degree of metamorphism.

A chlorite schist has been sampled from an outcrop in Lina Creek in the central Heazlewood area and was submitted to C.M.S. for petrographic examination (TB 927). As reported, the rock "possibly represents a completely sheared and chloritised mafic". Considering the generally low grade of metamorphism of the other rocks in the area this would seem quite acceptable, i.e., the "schist" is formed by cataclastic metamorphism.

2.6. Structure

The dominant structural feature of the Heazlewood area is a large anticlinal fold which runs obliquely through the central section of the Heazlewood area (see TAS 2-442). The anticline, which has a wavelength of several thousand feet, plunges at approximately 25° on a bearing of about 235° SW.

Minor drag folding has occurred on its limbs and the syncline running parallel to and immediately NW of the anticlinal axis may also be a fairly important structure. Observed dips indicate that the axial plane surface would have a near vertical dip to the SE.

The core of this anticline in the Heazlewood River exposes sediments of the Quartzite/Shale Group which to the east and SE dip under overlying sediments of the Mudstone/Greywacke Group. These latter sediments maintain moderate to steep dips to the SE probably indicating that the folding of the Mudstone/Greywacke Group in this sector is not severe.

However, to the NW of the major anticlinal structure, good exposures of the Quartzite/Shale Group in Cowan Creek show that the sediments (in that locality) are tightly folded into numerous small anticlines and synclines; generally with moderate to shallow plunges to the ENE and having wavelengths of the order of a few hundred feet.

In the SW of the Heazlewood area structures are less clear, but it appears that the overlying Mudstone/Greywacke Group is somewhat more folded than in the eastern sector but in general dips away to the SE.

The presence of Dolomitic Limestones near the interface between the Quartzite/Shale Group and the Mudstone/Greywacke Group may indicate deposition in shallow water. There is a possibility that the older Quartzite/Shale sediments were already somewhat deformed prior to the deposition of the Mudstone/Greywacke Group and that the dolomites were deposited on the flank of early formed anticlinal ridges. Alternatively, the dolomites may have been deposited as a fairly persistent horizon in a shallow basin.

In the Heazlewood area a number of small exposures of rocks, which would lithologically be classified as part of the Quartzite/Shale Group, outcrop adjacent to rocks of the Mudstone/Greywacke Group and their presence cannot be explained by simple folds. It is possible that these sections may have been relatively uplifted by normal faulting but the geological data is insufficient to conclusively support this notion.

In the Arthur area, folding of the Quartzite/Shale Group is rather more complex. In the NW sector, minor folds have trends varying between NNW and NE, with plunges both to the north and to the south. These attitudes are not clearly understood and possibly represent structures from an earlier stage of folding, deformed by later folding.

In the south and east the trends are ENE to east and plunge to the east. The Mudstone/Greywacke Group in the exposures of the Wandle Road also follow these trends and the sediments appear to be moderately closely folded.

In general, it would seem that the older sediments of the Quartzite/Shale Group are exposed by "structural highs" such as erosion to anticlinal cores or relative uplift by minor faulting.

It is not unlikely that some deformation of the Quartzite/Shale sequence occurred prior to deposition of the Mudstone/Greywacke Group but, almost certainly, the two groups have been concurrently folded during a later period of tectonism.

Minor structural features, such as severe contortion and intraformational folding of shales and development of tension gashes and boudin structures in quartzites, are common in folded rocks of the Quartzite/Shale Group. Many of the rocks, notably massive mudstones and dolerites, are closely cleaved and/or jointed.

2.7. Mineralisation

Regrettably no exposures indicative of possible economic mineralisation have been observed.

Finely divided pyrite is not uncommon, especially in the carbonaceous shales and to a lesser extent in dolomitic limestones and chert, but it is considered to be of sedimentary origin and unlikely to be associated with economic mineralisation.

Tiny specks of sulphide minerals, probably pyrite and chalcopyrite, have been observed occurring as disseminations in some of the intrusive dolerites and in fine quartz(?) veinlets within the dolerites. They are regarded as magmatic accessories.

3. GEOCHEMISTRY

Most of the assay results for stream sediments of the Heazlewood and Arthur areas have been received. With respect to geochemistry the two areas are treated separately. Heavy concentrate sample analyses are not yet available. Results of spectrographic scanning of anomalous stream sediment samples are awaited also.

3.1. Heazlewood area

Upon inspection of results of analyses of stream sediments it was immediately apparent that metal values of sediments taken from areas of outcrop in the Quartzite/Shale Group were of a lower order than values in sediments taken from areas of other rocks. Consequently, the samples were divided into two statistical populations according to the geological association in the areas from which they were taken. The approximate boundary used for the splitting into two groups is shown on TAS 2-443.

3.1.1. Statistical Analysis

Friday Creek and its tributaries were surveyed and stream sediment sampled during the 1971/1972 season and although the metal values from these streams were not included in the statistical analysis, the threshold values found for the "B" population of the Upper Heazlewood have been applied to them - the geological environments being similar.

Histograms and percentage cumulative frequency distributions were plotted for Cu, Zn, and Ni values to determine threshold values for geochemical anomalies. A summary is given below (all values in parts per million):

	<u>Element</u>	<u>Range</u>	<u>Popul- ation Peak</u>	<u>Thres- hold</u>
Population "A" 274 samples "Quartzite/ Shale Group"	Cu	5-120	0-10	≈ 30
	Zn	5-140	10-20	75
	Ni	5-150*	0-10	55
	Ag	< 1	< 1	1
	Sn	5-15	< 5	N.A.
Population "B" 226 samples "Other Rocks"	Cu	5-160	10-20	45
	Zn	5-310	40-50	120
	Ni	5-400	20-30	75
	Ag	< 1	< 1	1
	Sn	0-15	5-10	N.A.

* one isolated Ni value of 900 ppm was recorded.
N.A. = not applicable.

Due to the rather important role played by mechanical concentration factors in localisation of tin (as cassiterite) in stream sediments, no attempt has been made to statistically determine a threshold for tin. However, any Sn values over 20 ppm would be regarded as possibly anomalous.

All Ag values were recorded as less than 1 ppm. Any Ag value over 1 ppm is therefore regarded as anomalous.

3.1.2. Geochemical Anomalies

Stream sediment sampling has located one major geochemical anomaly and several minor anomalies in the Heazlewood area (see TAS 2-443).

The major anomaly lies in the SW portion of the area and is reflected in two small tributaries draining into the Heazlewood near the Lower Heazlewood helipad and in several small tributaries of Friday Creek; notably Tea Creek and Monday Creek - Cu, Zn, Ni, Ag, and Sn.

It is recommended, for initial follow up of the anomalies, that small grids be cut and soil sampled over the areas surrounding Monday and Tea creeks. A square grid of 3000' by 3000' over each of the two creeks could be quickly cut and sampled (the country is covered by fairly open myrtle forest) and the soil sample results would provide a basis for future investigation.

It may be discovered that the geochemical anomalies are attributable to the presence of accessory amounts of sulphides which have been observed in narrow veinlets within "dolerites" which are rather abundant in this area.

At the eastern sector of the Heazlewood area occur a number of tributaries in which sediments are anomalous in Cu, Zn, and Ni. The actual values are generally lower than in the sediments of the anomalous streams detailed above and are rather scattered and less consistent. However, they are certainly anomalous and further work in these areas should be based on results of spectrographic scanning of sediments and on the outcome of the recommended soil sampling of the Friday Creek anomalies.

A number of small anomalies of various combinations of Cu, Zn, and Ni are scattered rather sporadically in the central and north eastern areas of the Heazlewood. A small area in the NE gives anomalous Ni values also.

However, these anomalies are of secondary importance to the groups of anomalies discussed above and should take a low priority. They would be best appraised following further investigation into the more important anomalous areas in the vicinity of Friday Creek.

Reasonable access to the confluence of Friday Creek and the Heazlewood river is provided by the "walking" track which turns off the Mt. Cleveland road and ends about one mile south of the lower Heazlewood helipad (see TAS 2-441). This track would provide adequate access for the initial party of grid cutters and samplers. However, as additional investigations may prove to be warranted, it may be advisable to establish a vehicle track to the area. Such a track, which would not need to exceed four miles in length, could be constructed before the 1973 winter becomes too advanced and by next summer the track surface would have been fairly well consolidated (?) by the season's rain.

3.2. Arthur River Area

Stream sediments in the Arthur river have been found to contain very high metal values (up to 4000 ppm Sn for example) due, no doubt, to contamination from mine workings up stream (notably Mt. Magnet, Mt. Bischoff and Ringarooma). Consequently, all samples taken from the Arthur river and from tributaries likely to be below the flood level of the river (and thus likely to be affected by contamination) have been excluded from the statistical analysis of metal values. Obviously, any genuine geochemical anomalies which may have existed in the Arthur river are now masked by the contamination.

3.2.1. Statistical Analysis

Histograms and percentage cumulative frequency distributions were plotted to determine threshold values for the geochemical anomalies.

The cumulative percentage curves for Cu, Ni, and Zn, all showed "kinks"; indicating the presence of at least two principal statistical populations. This is attributable to the presence of the Tertiary basalt which outcrops amongst the upper reaches of most of the creeks sampled - the basalt having relatively high background metal values. Consequently, thresholds for Cu, Zn, and Ni, were purposely kept fairly high to "weed out" spurious "basalt anomalies".

The statistical findings are summarised as follows: (all values in parts per million). (A total of 284 "uncontaminated" samples were included in the statistical analysis).

	<u>Range</u>	<u>Popul- ation Peak</u>	<u>Threshold</u>	<u>Number of Anomalous Values</u>
Cu	5-240	20-30	90	15
Zn	5-700	120-130	270	10
Ni	5-800	90-100	270	17
Ag	<1	<1	1	0
Sn	0-150	0-5	17	58

3.2.2. Geochemical Anomalies

The stream sediment sampling programme revealed a number of interesting geochemical anomalies in the Arthur River area (see TAS 2-443).

Perhaps the most significant are the promising Sn values recorded from Deep Gully Creek and the adjacent Rollins and Dalco's Creeks which drain into the Arthur River in the southern half of the sampled area. Values up to 150 ppm Sn are recorded in Deep Gully Creek; and Dalco's Creek combines a couple of minor Cu and Zn anomalies with the Sn anomalies.

The Sn anomalies in Deep Gully Creek are of particular interest since this stream drains a large area about two miles NE of Mt. Bischoff and the Sn values may reflect additional Sn mineralisation in the area. Unfortunately, results of spectrographic scans are not yet to hand.

As an initial follow-up procedure close spaced sampling of heavy concentrates is suggested (at say 1000' intervals along streams) of Deep Gully Creek and all its tributaries.

The southern half of the Arthur area has not yet been geologically mapped - this must be done so that more accurate appraisal of geochemical anomalies can be made.

Heavy concentrate sampling of the tributaries of the anomalous creeks should help to delineate the areas from which the Sn has been liberated.

In the SW of the Arthur area, Robinson's Creek and the small stream immediately north of the latter, have returned anomalous Ni values. The latter creek especially, has very high values, averaging 700 ppm Ni. These anomalies could reflect drainage of an area of ultrabasic rocks. However, the creeks should be geologically mapped and close spaced heavy concentrate sampling carried out.

A promising Cu-Zn anomaly exists in the upper part of Happy Day Creek in the central west of the Arthur area. Results of spectrographic

analysis should help in planning further investigations. Gridding and soil sampling may be warranted.

In the Wandle river (in the vicinity of Wandle Bridge) exists a fairly strong Cu-Zn anomaly. Downstream of it occurs an Sn anomaly (see TAS 2-443). At the Wandle bridge there is a small quarry from which "road metal" has been quarried. A good deal of rubble and soil has been bulldozed into the Wandle river during the excavations. The rock in the quarry is an intrusive albite basalt (petrographic description by C.M.S. - TB 933) "there are abundant discontinuous, opaque mineral-bearing veinlets of quartz, calcite, and minor tremolite with scattered grains of barite. The major opaque constituent is carbonaceous material".

"A heating test indicated this mineral to be coaly (anthracite?). It is accompanied by sparse aggregates of chalcopyrite and traces of pyrite and sphalerite. The mineralisation is apparently derived from coal bearing country rocks by remobilisation."

The above described "mineralised" veinlets in the intrusive basalt may be responsible for the stream sediment anomalies. However, the anomalies warrant closer examination and close spaced heavy concentrate sampling may be applicable. Analysis of some of the rocks in the area may determine whether or not the intrusive basalt has metal values of sufficiently high order to cause anomalous stream sediments.

Several other isolated anomalies exist in the Arthur area. They are of Sn, Zn, or Ni and in each case exist as anomalous values of only one of the elements (see TAS 2-443). These anomalies are of secondary importance compared with the anomalous areas discussed above and they may be better appraised after the major anomalies have been further investigated.

It is anticipated that the results of spectrographic scans of anomalous samples will help to "sort out" the picked anomalies. Anomalies in Cu, Zn, and Ni may in some cases be due to the presence of the Tertiary basalts or Palaeozoic intrusives which have relatively high background metal values. It is suspected that some of the other elements, notably Pb, may not reflect the presence of the mafic rocks and may help to "expose" the spurious anomalies. The same would apply to anomalies in the Heazlewood area.

4. CONCLUSION

4.1. Geology

The geological situation in the Heazlewood and Arthur areas covered in this report is (briefly) one of a miogeosynclinal sedimentary sequence of possible Lower Cambrian (?) age, disconformably overlain by a eugeosynclinal sequence of possible Cambrian (?) age.

Both of these units have been fairly closely folded by at least (it would seem) two periods of tectonism. The sediments have been intruded by ultrabasic and basic igneous rocks of typical orogenic association which appear to have been intruded largely as sills which have been folded along with the sediments.

To the NE of the Arthur area the older rocks are unconformably overlain by a flat lying sequence of clastic sediments which may be of Permian (?) age.

The country east of the Arthur river and the dividing ridge between the drainage systems of the Heazlewood and Arthur rivers is capped by a sheet of Tertiary basalt lava.

4.2. Geochemical Anomalies

A number of "interesting" geochemical anomalies have been revealed by the regional stream sediment sampling programme.

The most significant anomalies are the Cu-Zn-Ni-Ag-Sn anomalies in the vicinity of Friday creek in the SW sector of the Heazlewood area; and the extensive Sn anomalies in Deep Gully creek in the SE Arthur area.

4.3. Recommendations for Follow-up Investigations

The following work is recommended as initial follow up procedure to investigate the existing stream sediment anomalies:

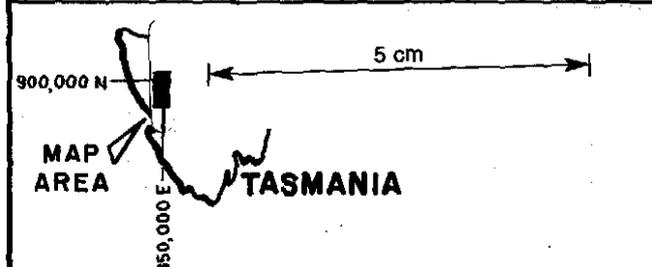
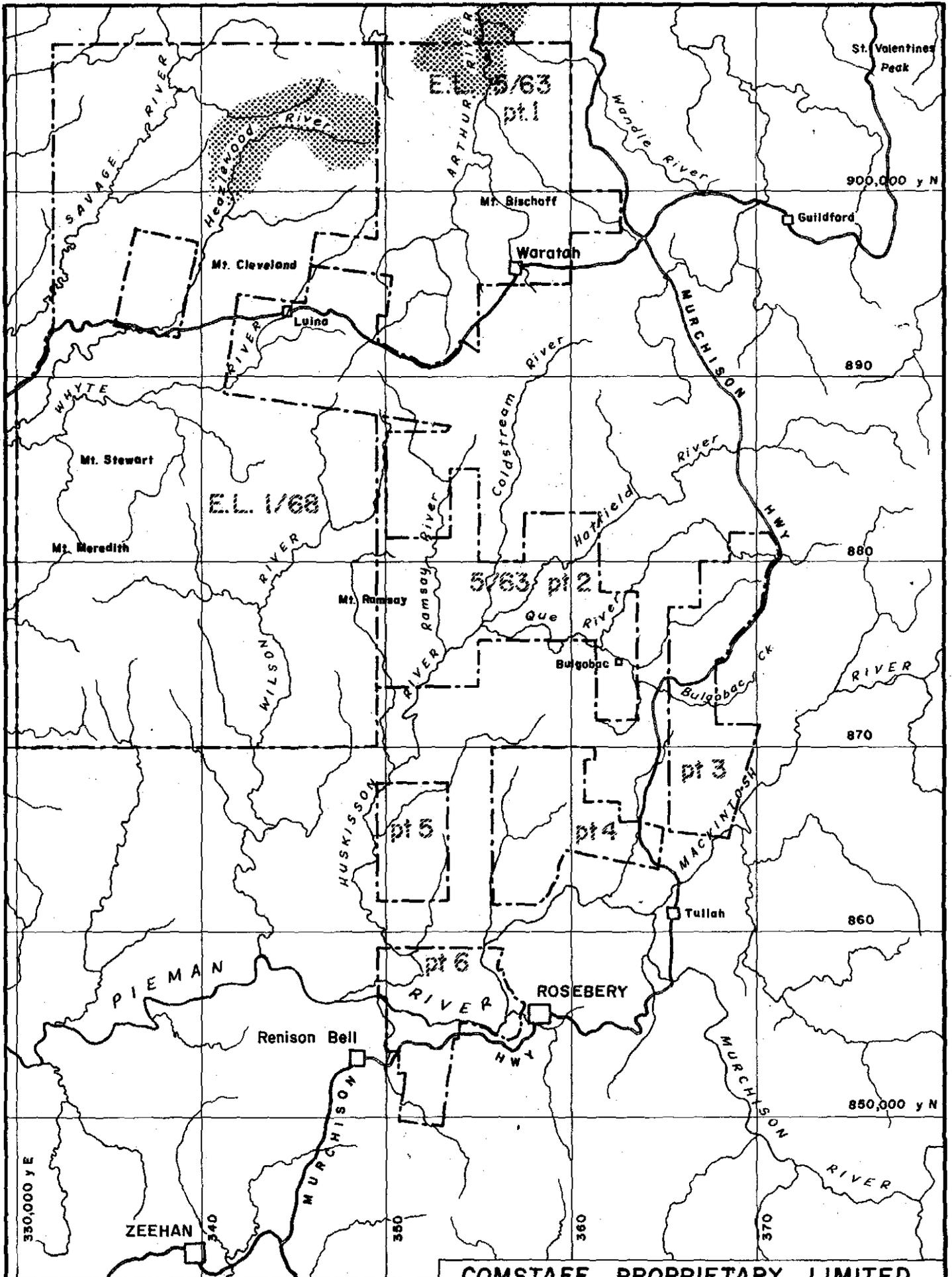
- 1) Gridding and soil sampling of the Friday creek anomalies as outlined in the text (3.1.2.).
- 2) Close spaced heavy concentrate sampling of streams in the Deep Gully area (3.2.2.).
- 3) Close spaced heavy concentrate sampling of other anomalous streams in the Arthur area as detailed in the text (3.2.2.).
- 4) Completion of geological reconnaissance mapping of the southern portion of the Arthur area.
- 5) Investigation into other geochemical anomalies of lower priority should be based on the results of the work recommended above.

Compiled by:
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Approved by:
R.J.Kernick,
Chief Geologist.

pp. B. Mc Bride

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 HEAZLEWOOD R. & ARTHUR R. AREAS
 1972/73 SUMMER SEASON REPORT
LOCATION MAP

DRAWN MAY 73 R. Bittanby	COMPILED	SCALE 1:250,000	DWG. TAS-2-440
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910,000 y N

900,000 y N

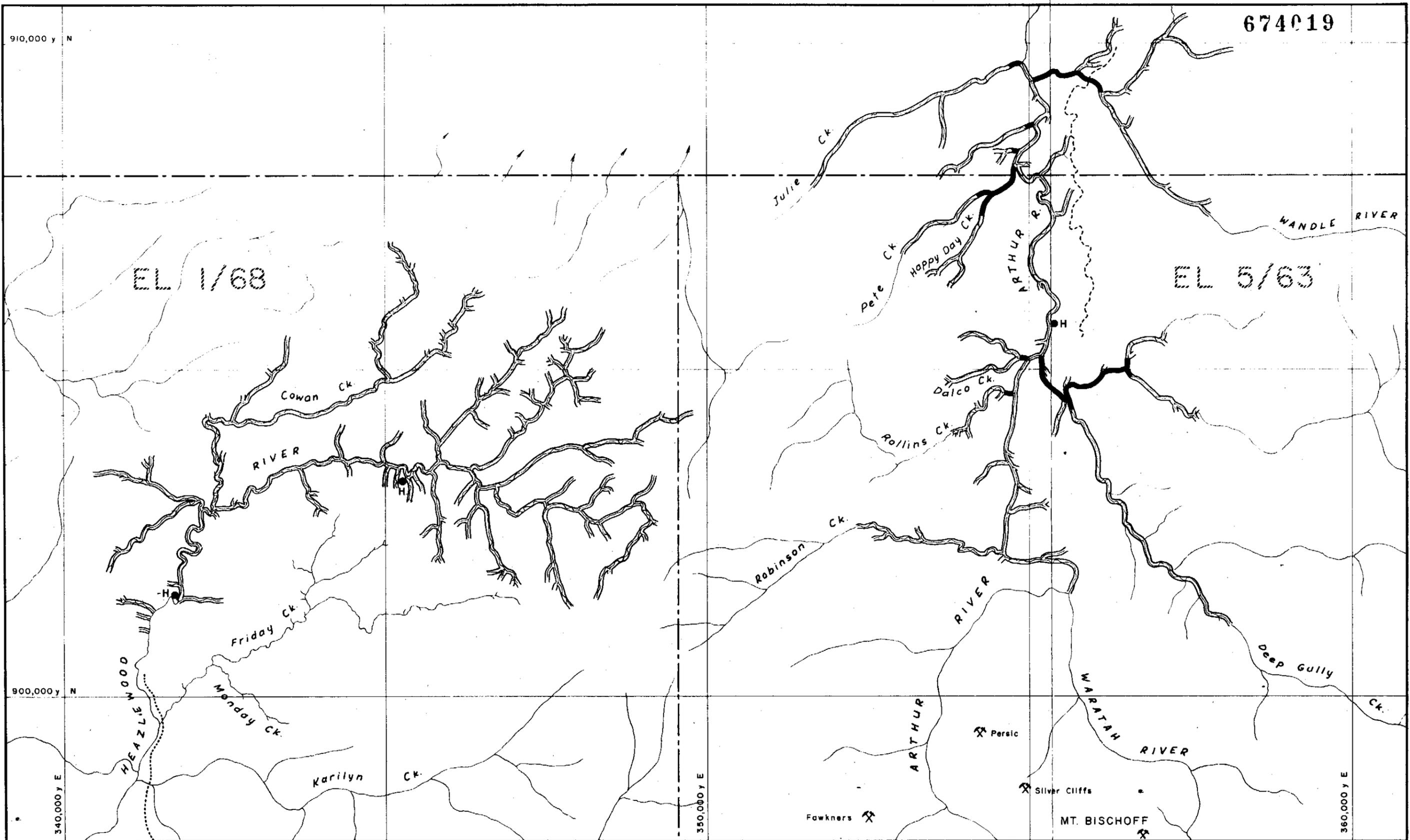
340,000 y E

350,000 y E

360,000 y E

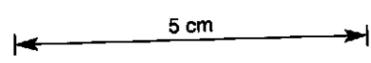
EL 1/68

EL 5/63

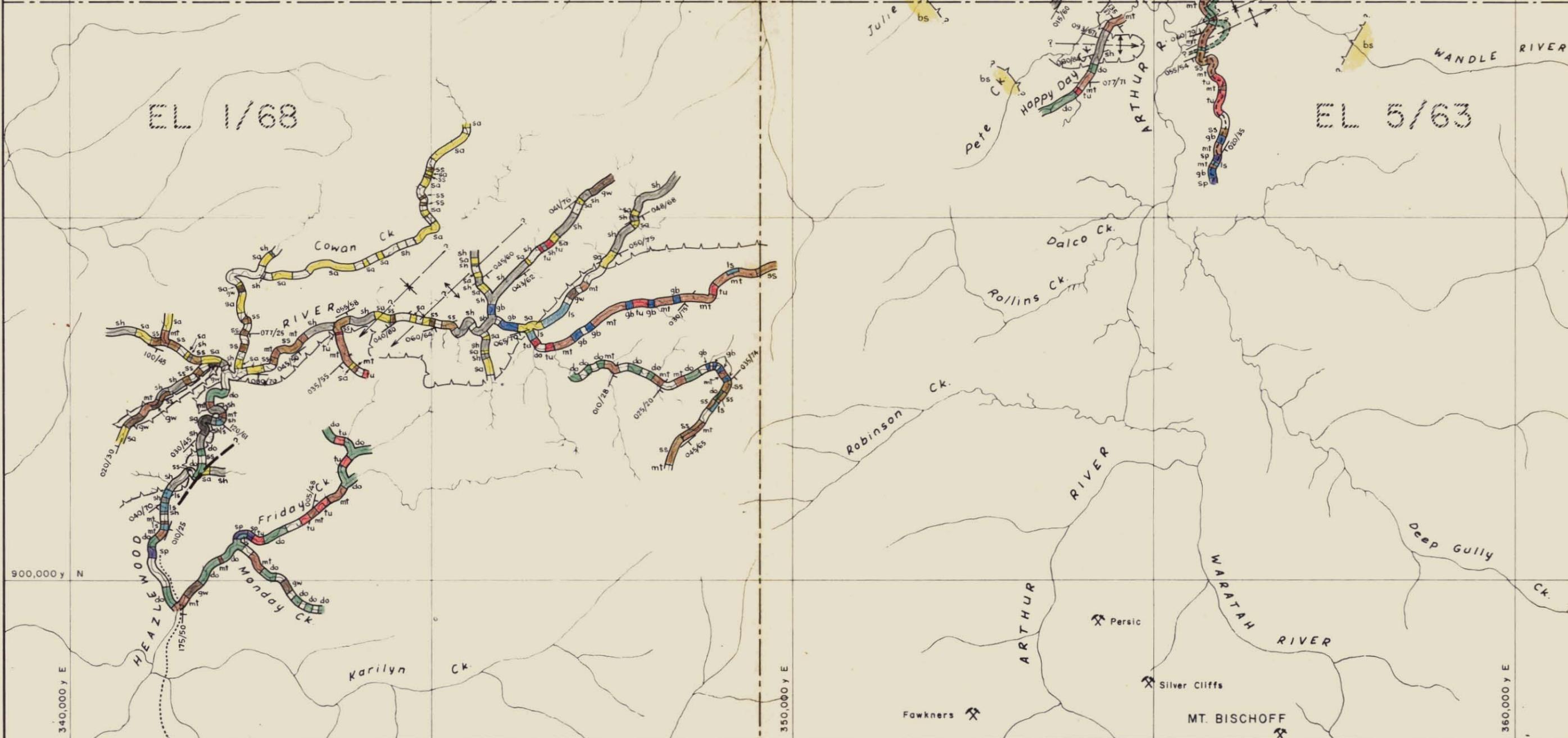


LEGEND

- E.L. boundary
- Road or track
- Foot track
- Mine or workings
- Creek sampled 1972/73
- Creek sampled, including heavy concentrates
- Helicopter landing pad



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AREAS COVERED



LEGEND

- sa Sandstone, quartzite
- cg Conglomerate
- ss Siltstone, chert
- mt Mudstone
- sh Shale
- sg Graphitic shale
- qw Greywacke

- ls Dolomitic limestone
- tu Tuff
- bs Basalt
- do Dolerite
- gb Gabbro
- sp Serpentinite

- - - ? Unconformity / disconformity, inferred
- - - - - ? Outcrop boundary, inferred
- - - - - ? Fault, inferred
- ↕ ? Anticline, inferred
- ↔ ? Syncline, inferred
- 160/75 Strike and dip of bedding
- sa qw sh mt Stream and track, rock outcrops

5 cm

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GEOLOGY

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 SCALE 1:50,000
 DWG No. TAS-2-442

910,000 y N

900,000 y N

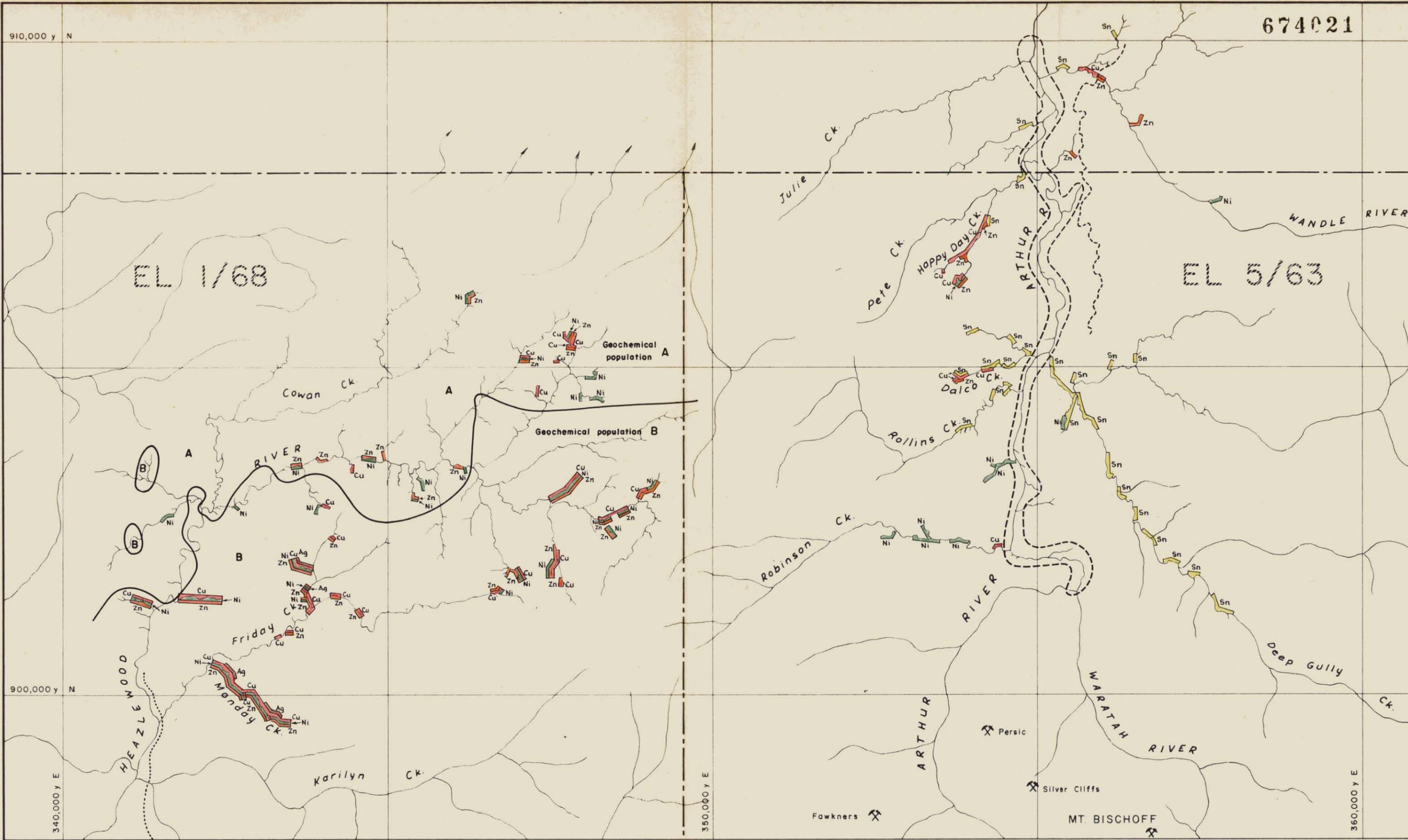
340,000 y E

350,000 y E

360,000 y E

EL 1/68

EL 5/63



LEGEND

GEOCHEMICAL ANOMALIES

- Copper
- Zinc
- Nickel
- Tin
- Silver

- Theoretical limit of contamination.
- Approximate boundary between geochemical populations A and B in the Heazlewood area.

5 cm

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1972/73 SUMMER SEASON REPORT

STREAM SED. GEOCHEMICAL ANOMALIES

DRAWN May 73 <i>R. Batten</i>	COMPILED W. H.	SCALE 1:50,000	DWG No. TAS-2-443
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