AUSTRALIA AND NEW ZEALAND EXPLORATION COMPANY

SUMMARY REPORT

ON

EXPLORATION LICENCE 17/68

FOR THE PERIOD

JANUARY - SEPTEMBER, 1973

R.T. Brandt

November 6, 1973.

INTRODUCTION

During the period under review, regional exploration activities in E.L. 17/68 were carried on with the aim of completing a preliminary examination of all areas of potential interest for tungsten. By the end of September 1973, this had been largely accomplished. The greater part of the E.L., with the exception of the basalt-covered plateau areas in the far west and south-west, was covered by geochemical sampling at close intervals and detailed geological mapping, though not yet completed, is in an advanced stage. All geochemical samples were analysed for tungsten and most of the samples taken in the eastern part of the E.L. were also analysed for tin, copper, lead, zinc and gold.

Exploration work to date has resulted in the discovery of seventeen discrete tungsten anomalies in E.L. 17/68 and the adjoining Permit to Enter and Search area of the McClarm Syndicate. These are exclusive of the Kara No.1, Kara North and Kara South prospects, which have been dealt with in detail in a previous report. All but one of the new discoveries are situated within four miles of the Kara prospects. Four have been adequately explored by surface methods and are considered to warrant trenching or drilling. The remainder still require detailed geological and geophysical mapping and some confirmatory sampling before any sub-surface work is contemplated.

In addition to the regional exploration work, four drillholes were completed at the Kara No.1 prospect for the specific purpose of obtaining complete core samples for metallurgical test work.

The average numbers of personnel directly engaged in the above work during the period under review were as follows :

Months	Geologists	Field Assistants	Contract Drillers
January 1973	1	1	-
February-May	2	2	2
June	2	3	2
July	1	3	-
August-September	1	4	-

GEOLOGY OF E.L. 17/68

a) Stratigraphy

A geological study of the area covered by E.L. 17/68 was undertaken in 1964 by G.P. Pike as part of his university honours thesis, and his report and maps have proved very valuable. Apart from Pike's work, very little previous geological information was available. The terrain in general is difficult for detailed geological mapping due to the thick vegetation and soil cover, but careful examination of incised stream courses has in many cases proved rewarding and has yielded enough information for a stratigraphic and structural picture to be developed. It has been found, for example, that Tertiary basalt flows are not everywhere as deep and extensive as previously supposed, and exposures of the underlying rocks can be found where streams have been sufficiently incised to have cut through the basalt cover.

Because of innumerable lateral facies variations, some difficulties were encountered in the correlation of various stratigraphic units and the tie-in of the local geology with the adjoining Government geological maps, but on the basis of cumulative experience the stratigraphic-lithological column shown in Table 1 was established and has been found applicable to the areas mapped. The regional geology is shown on the two accompanying maps of the eastern and western halves of the E.L. Mapping of the western half has not been completed and the map is provisional, compiled largely from other sources, and will be revised when more information has been gathered.

Particular attention was given to the distribution of the Gordon Limestone, as this formation was believed to be the host for tungsten mineralization at Kara. Field observations in the eastern half of the E.L. have shown the areas of limestone to be smaller than expected and the calcareous horizons to be somewhat limited in thickness. The conclusion was reached that the dominantly arenaceous Lower Ordovician Moina Sandstone grades into the overlying Gordon Limestone through transitional beds consisting of sandstones with thin calcareous horizons. These beds have been included in Table 1 as a separate stratigraphic unit under the name "Transition Series".

The discovery of carbonate horizons in the Ordovician at a lower stratigraphic level than the Gordon Limestone is considered of possible importance. It indicates that mineralized skarns, which were previously thought to occur only in the Gordon Limestone, may exist in the older rocks as well; in fact many of the known skarns, including those at the Kara prospects, are now believed to occur in the Transition Series rather than the Gordon Limestone proper.

b) Structure and Geological History

The present structural interpretation of the area differs only in detail from that of G.P. Pike. Rocks designated as Cambrian in age are most extensively developed in the eastern part of the E.L., where they form a complex anticlinal inlier (the Loongana anticlinorium) bordered by outward-dipping Ordovician sediments. Cambrian rocks are also conspicuous as anticlinal inliers

TABLE 1

STRATIGRAPHIC SUCCESSION IN E.L. 17/68

System	Sequence	Lithological Types
Tertiary		Basalt flows
Devonian		Granite intrusives
Silurian	Eldon Group	Sandstones, quartzites
Ordovician	Gordon Limestone	Essentially limestones, with minor calcareous sandstones
	Transition Series	Calcareous sandstones, sandstones, siltstones, minor limestones
	Moina Sandstone	Essentially sandstones, with quartzites, siltstones, shales, slates and minor conglomerate bands
	Owen/Roland Conglomerate	Essentially conglomerates and quartz sandstones
Unconformity		
Cambrian	Undifferentiated	Greywackes, slates, quartzites, cherts, acidic lavas, keratophyres, mudstones, siltstones

along the southern boundary of the E.L., and in the west they form the core of an anticlinal structure (the St. Valentine's Peak anticlinorium) extending from St. Valentine's Peak in a N.N.E. direction towards Hampshire.

Cambrian sedimentation was terminated by a period of intense folding, faulting and uplift, resulting in the deposition of the coarse molasse-type, terrestrial Owen/Roland conglomerates which form the base of the Ordovician System. These were succeeded by 3000-5000 feet of marine sediments, ranging in composition from the dominantly arenaceous Moina Sandstone to the dominantly calcareous Gordon Limestone. Sedimentation continued at least into the Silurian and was brought to a close by the Devonian Tabberabberan orogeny and accompanying acidic intrusions represented by the Blythe River (or Hampshire Hills) granite pluton and various smaller bodies.

The present structural features can be ascribed essentially to the Tabberabberan orogeny and various major structural units can be recognised as follows :

(i) The Loongana anticlinorium, a broad arch aligned east-west. No attempt has been made to decipher the complex pre-Ordovician structures in the Cambrian rocks.

(ii) The Leven syncline in the S.E. of the E.L.; a gently eastward-plunging syncline of Ordovician rocks, with subsidiary folds and faults complicating the structure on the southern flank.

(iii) The Gunn's Plains basin, mostly outside the eastern boundary of the E.L.; a broad basin structure in Ordovician and Silurian rocks.

(iv) The Redwater syncline, of Lower Ordovician rocks, plunging towards the Blythe River granite. A major fault separates this structure from the Gunn's Plains basin.

(v) The Mount Everett synclinorium. The Lower Ordovician beds here form a complex N.E.-plunging synclinal structure, fault-bounded on the western side, where the Moina Sandstone has been thrust upwards at Mount Everett.

(vi) The Limestone Creek synclinorium; a broad synclinal structure striking just east of north. The beds on the eastern limb have a uniform westerly dip and include the bulk of the Ordovician succession, from the Moina Sandstone at Mount Everett, through the Transition Series to the Gordon Limestone at Limestone Creek. In contrast, the western limb is far more complex, being characterised by subsidiary folds, overturned limbs and granite intrusions.

(vii) The St. Valentine's Peak anticlinorium. In broad outline, the core of this structure consists of closely folded Cambrian rocks intruded in the northern part by a small Devonian granite pluton, which has been named the Ringwood granite. The steep anticlinal limbs are marked by thick developments of Ordovician conglomerate and sandstone, which form the twin ranges of St. Valentine's Peak on the east and the Companion Hills on the west. The eastern limb, which can also be regarded as the western limb of the Limestone Creek synclinorium, has in its northern part many structural complexities and contains granite intrusions with which tungsten mineralization is associated. This important structural zone, in which the Kara tungsten prospects are situated, is described below.

(viii) The Kara structural zone. Situated on the common limb of two major structures (vi and vii), this zone appears to consist of minor asymmetrical northerly-plunging synclinal folds largely engulfed by granite. The sediments involved are sandstones with intercalcated skarns whose original pre-metamorphic composition is uncertain. Formerly thought of as part of the Gordon Limestone sequence, these beds are now regarded as of the Transition Series, with the calcareous members metamorphosed to skarns. The zone has a possible length of about three miles in a north-south direction, but little is known about its continuity and detailed structure owing to the prevalence of Tertiary basalt, which conceals the older rocks.

The Devonian orogenic and plutonic phases were followed by a long period of deep erosion during which the granites and associated metamorphic rocks were exposed at the surface. Outpourings of basalt and related volcanic rocks occurred in the Tertiary, on an irregular land surface. The thickness of the basalt is very variable, with the deepest parts coinciding in a rough way with the present major drainage lines, suggesting superimposition from pre-basalt times. Since the basaltic phase there have been epeirogenic uplifts and broad warpings, and much of the original basalt cover has been removed by erosion.

c) Intrusion and Metamorphism

The Cambrian and Ordovician beds were intruded by the Devonian Blythe River (or Hampshire Hills) granite pluton and its smaller offshoots. The granite is evidently post-orogenic and, where its intrusive contact is not concealed under Tertiary basalt, it has generally discordant, cross-cutting relations with the adjacent sediments. There are practically no pegmatites, aplites or other minor intrusives associated with the granite, but some internal phases of the main pluton have a coarse pegmatitic texture. This feature suggests that aqueous magmatic differentiates were retained within the granite until a late stage in its consolidation history, and may then have been released into the surrounding rocks in the form of hydrothermal solutions. The marginal parts of the granite are generally medium-grained, equigranular, leucocratic and quartz-rich. Fine-grained chilled margins are not in evidence.

Contact metamorphism by the granite is highly variable in width and intensity. The sediments observed in contact are mostly sandstones, which have been recrystallized and feldspathized in the near vicinity of the granite but are otherwise unaffected. At one point in Limestone Creek there is local development of wollastonite in the Gordon Limestone, associated with a small stock of granite. Skarn rocks are best developed at the Kara tungsten prospects and elsewhere in the Kara structural zone. These are mostly garnet-diopside-amphibole rocks with considerable magnetite, believed to have been formed by metasomatism of calcareous layers in the Ordovician Transition Series. They are described in greater detail in a previous report dealing with the Kara prospects.

A few skarn occurrences outside the Kara structural zone have been located at points on the granite margin where calcareous sediments are in contact, but they appear to be rather local and sporadically distributed. The conclusion has been reached that skarn development and accompanying tungsten mineralization occurred preferentially in tightly folded beds engulfed in granite. For this reason, apart from any possible compositional factors, the thinly bedded and closely folded rocks of the Transitional Series, and even those of the Cambrian Sequence in the St. Valentine's Peak anticlinorium, may have been better potential hosts for tungsten than the more massive and less disturbed Gordon Limestones.

d) Tungsten Mineralization

The skarn-type tungsten mineralization at the Kara prospects has been described in a previous report on the exploration of E.L. 17/68 up to January 1973. Petrographic studies of the mineral paragenesis of the skarn have shown that scheelite is a late-stage introduction and in many cases is associated with intense micro-fracturing of closely folded host rocks. This tends to confirm the field observation that close folding and fracturing favour skarn development and mineralization.

Intensive sampling of large areas of the Blythe River granite pluton (mostly in E.L. 1/69, north of the area described in this report) has shown numerous tungsten anomalies in the granite. These anomalies are associated with small hydrothermal veins and disseminations containing abundant titano-hematite, with tungsten present in an unidentified form. The pattern of the veins suggests a system of conjugate shear zones in the granite, which acted as channelways by which iron and tungsten-bearing hydrothermal solutions arose from a deeper source. Where the solutions encountered hospitable carbonate-bearing host rocks on the granite margin or in roof pendants, the iron was precipitated as magnetite and the tungsten as scheelite.

The abundance of iron in the late-stage emanations from an otherwise iron-poor granite poses a problem, but could possibly be due to the assimilation by the granite magma of large volumes of iron-rich Precambrian sediments. Precambrian sediments are present to the north of the batholith and include banded iron formations, which trend directly towards the granite.

From the exploration point of view the implications of the above, confirmed in part by field observations, are as follows :

(i) Tungsten mineralisation is frequently associated with iron, but the presence of iron does not necessarily prove the existence of tungsten, nor has it been established that scheelite occurs only with magnetite in this environment.

(ii) Scheelite, magnetite and probably other skarn materials as well, are not products of true contact metasomatism by the intruding granite magma, but were formed at a later stage by hydrothermal solutions, possibly after consolidation of most of the granite. These solutions required channels of access into the host rocks, consequently the state of fracturing of the host rocks and granite is a controlling factor in mineralization as important as the presence of replaceable carbonate horizons.

(iii) Small tungsten-bearing veins in granite, which are not of economic importance, can yield stream sediment samples as high in tungsten as those yielded by mineralized skarns. Consequently, before any evaluation of the sampling results can be made, the source from which the tungsten came must be definitely established. This is not always easy.

GEOCHEMICAL EXPLORATION

a) Stream Sediment Sampling

Before this year's exploration programme was started, a large part of E.L. 17/68 had been covered in 1972 by stream sediment sampling of a reconnaissance nature, at widely separated points, with largely negative results. Some additional intensive sampling was then carried out in the Kara region which picked up several anomalies previously missed, demonstrating the unreliability of sampling on too broad a scale. Evidently the dispersal train of tungsten in stream sediments can be relatively short and a close pattern of sampling, especially of the smaller creeks, is a necessity in order to delineate individual anomalous zones of limited extent.

The guiding principle in the present programme was to sample every creek and tributary at intervals of not more than ¼ mile until it became apparent, from the lack of values or obviously unfavourable geology, that further sampling was not justified. Where significantly anomalous values were obtained, check samples were taken wherever possible. It was found that high values were not always reproducible by re-sampling at the same location, and confirmation by additional sampling in the vicinity was always desirable.

All stream sediment samples were panned and the concentrates were examined for scheelite before being sent for tungsten analysis. Many of the samples from the eastern part of the E.L. were analysed for other metals as well, since they were collected from streams draining the Cambrian volcanic terrain. As a rough guide, based on a statistical study of the 1972 work, values less than 85 ppm W were not regarded as anomalous. Values higher than 85 ppm W were regarded as possibly significant, provided they were consistent and reproducible.

From January to September 1973, a total of 593 panned stream-sediment and rock samples were collected and analysed for tungsten. Of these, 157 were analysed in addition for tin, copper, lead, zinc and gold. The sample sites are shown on five Geological Sampling Maps, on which the tungsten values, in ppm W, are marked in red. The analytical results for the other metals are listed in Appendix A to this report.

b) Soil Sampling

Systematic soil sampling was undertaken at one locality approximately ½ mile south of Hampshire siding (Target T3 on plan no. 7/9). An occurrence of magnetite associated with skarn was surveyed magnetically and a strong magnetic anomaly 900 feet long was delineated. Soil samples were then taken by hand augur from a depth of 6 feet, at 50-foot intervals on lines 200 feet apart. Ninety-seven soil samples were analysed for tungsten and most yielded very low values, but one sample on the southernmost line ran 1000 ppm W and gave encouragement to the belief that tungsten-bearing skarns are present under a basalt cover to the south. More work at this locality is intended.

AIR-BORNE MAGNETOMETER SURVEY

In March 1973, an aeromagnetic survey was flown over a 45-square mile strip of country extending from St. Valentine's Peak through the Kara prospects and the Hampshire area to Ridgley in E.L. 1/69. The main objective was the delineation of local anomalies which might be attributable to bodies of magnetite concealed under soil or basalt. The results of the survey have not yet been fully interpreted, but this work is being done in conjunction with field geological mapping and the continuing development of geological knowledge of the area.

SUMMARY OF EXPLORATION RESULTS

Since the beginning of 1973, 17 tungsten anomalies have been discovered in E.L. 17/68 and the McClarm Syndicate's Permit to Enter and Search area. All anomalies but one are situated within 4 miles of the Kara prospects. These are shown on the accompanying map of prospects and locations in the Kara region (plan no. 7/9), which also presents a brief description of the work completed at each locality and the additional work recommended. Five localities (including one in E.L. 1/69) are classified as "Targets", in which surface sampling and geological examinations have been completed and further investigation by trenching or drilling is warranted. The remainder are classified as "Locations", where the detailed geology and nature of the mineralization are inadequately known and further surface investigations are required.

DRILLING AT THE KARA NO.1 PROSPECT

Four drillholes were put down at the Kara No.1 prospect, not for exploratory purposes but in order to obtain complete and representative core samples of the weathered tungsten-bearing material already outlined by previous drilling in 1971 and 1972. To maximise core recovery in weathered friable ground that had proven difficult or impossible to core by standard drilling methods, a specially constructed split-tube drive pipe was employed, which was hammered into the ground without rotation or water-flush. This method was successful in achieving a far better recovery than had previously been obtained in the same ground by ordinary diamond drilling. The depths drilled and recoveries obtained in the four holes were as follows :

Hole No.	133	134	135	136
Total Depth	120.5'	148.1'	84.5'	116.8'
Core Recovery %	91.5	89.8	97.1	99.1

The overall tonnage and grade position has not been materially changed by this latest drilling.

Metallurgical test work on the core samples is still in progress and the results are awaited.

R.T. Brandt

Regional Geologist

Maps Accompanying Report

1) Provisional Geological Map of the Western Half of E.L. 17/68, scale 1" = 1 mile
2) Regional Geology of the Eastern Half of E.L. 17/68, scale 1" = 4290' (No.1/7)
3) Plan showing Prospects and Locations in the Kara Region, scale 1" = 600' (No.7/9)
4) Geochemical Sampling Maps, scale 1" = 20 chains (based on Forestry Commission 20-chain Series) :-
   - a) Hampshire Sheet
   - b) St. Valentine's Sheet
   - c) Laurel Creek Sheet
   - d) Alstergrens Sheet
   - e) Leven Sheet

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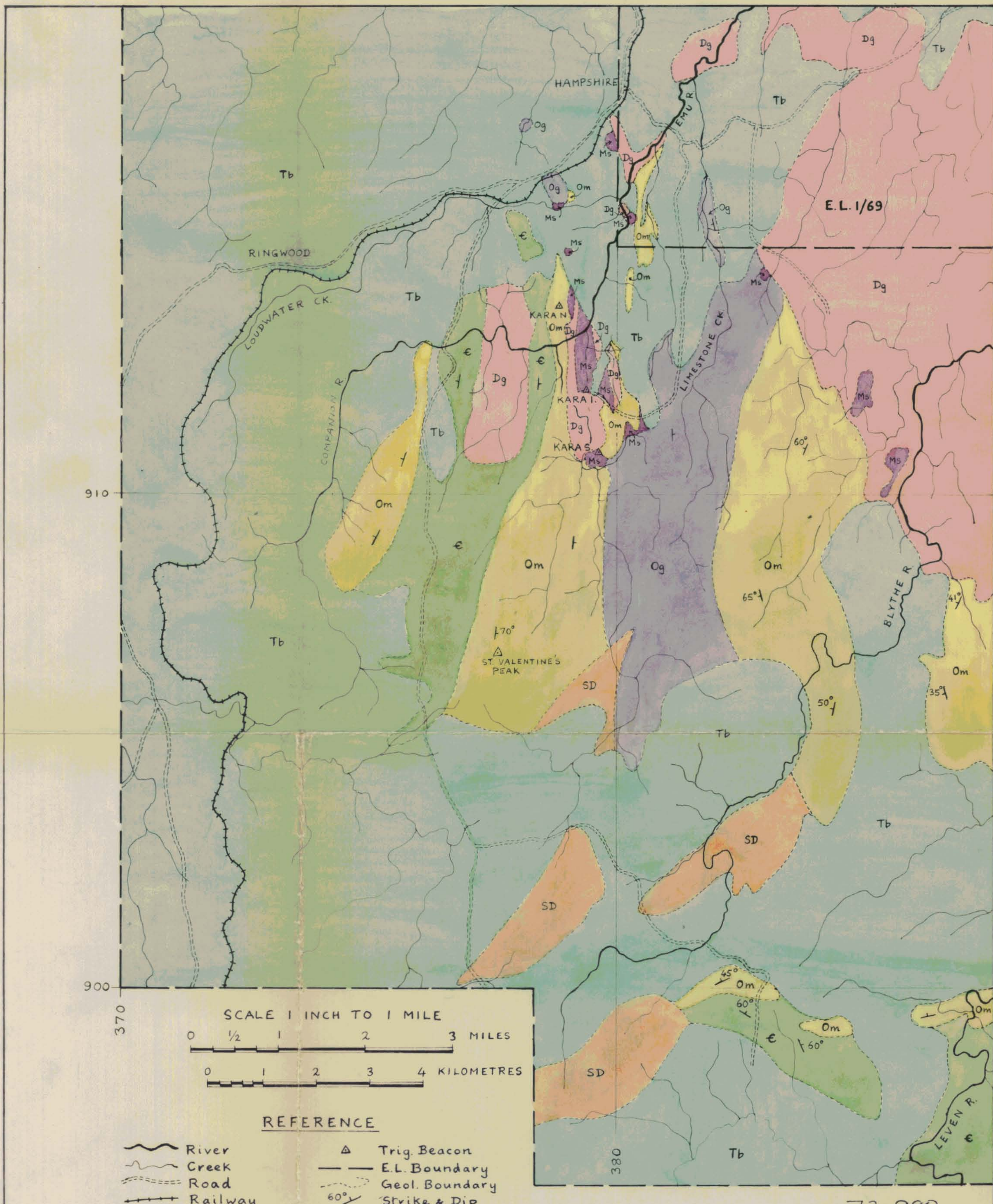
APPENDIX A

ANALYTICAL RESULTS FOR SAMPLES ANALYSED FOR OTHER METALS IN ADDITION TO TUNGSTEN

Sample Description	Sn, ppm	Cu, ppm	Pb, ppm	Zn, ppm	Au, ppb	W, ppm
AL - 14	30	100	150	470	<20	10
5	20	20	20	40	<20	10
6	10	20	80	210	<20	10
7	30	10	190	85	<20	30
8	20	10	520	50	<20	20
9	20	15	20	140	<20	5
20	5	10	40	50	<20	10
1	30	10	20	170	<20	2
2	20	10	120	110	<20	5
3	20	20	80	160	<20	10
4	5	30	260	710	<20	10
5	10	10	340	130	<20	30
6	20	10	160	60	<20	15
7	10	10	880	60	<20	30
30	200	10	180	110	<20	5
1	20	10	40	60	<20	15
2	10	10	120	60	<20	5
3	3	15	90	140	<20	15
4	20	5	20	60	<20	15
5	5	15	<20	2000	<20	50
6	1	10	<20	520	<20	40
7	10	10	80	70	<20	5
8	20	10	140	160	<20	15
39	20	10	<20	1100	<20	30
41	10	25	110	95	<20	15
2	10	10	40	80	<20	20
3	20	10	35	50	<20	20
4	5	5	75	30	<20	5
5	3	5	30	50	<20	15
7	5	10	<20	120	<20	15
8	5	10	120	95	<20	10
49	5	5	580	80	<20	5
50	5	5	130	95	<20	5
1	20	2	110	170	<20	20
2	5	10	130	780	<20	20
3	10	15	40	120	<20	10
4	5	5	25	50	<20	2
5	5	15	<20	95	<20	<2
6	100	5	<20	50	20	<2
7	20	5	100	150	<20	20
8	5	5	<20	25	<20	<2
9	5	5	<20	50	<20	5
60	10	90	100	110	<20	10

Sample Description	Sn, ppm	Cu, ppm	Pb, ppm	Zn, ppm	Au, ppb	W, ppm
AL - 61	5	35	20	40	< 20	2
2	5	5	< 20	480	< 20	2
3	5	2	< 20	20	< 20	2
4	5	20	85	110	< 20	5
5	10	5	130	35	< 20	10
6	20	5	130	60	< 20	5
67	20	20	95	110	< 20	5
8	10	15	80	90	< 20	5
9	20	10	60	150	< 20	< 2
70	5	10	40	120	< 20	2
1	10	5	85	150	700	5
2	5	10	600	190	< 20	5
3	5	5	530	150	< 20	5
4	5	10	110	100	< 20	5
5	3	10	140	140	< 20	5
6	30	10	160	160	< 20	5
7	20	5	130	140	< 20	5
8	20	10	180	280	< 20	2
9	50	15	95	240	< 20	5
80	30	15	90	370	< 20	2
1	5	10	1000	60	< 20	10
2	10	10	100	120	< 20	10
3	5	5	180	100	< 20	5
4	30	20	130	270	< 20	15
5	10	15	410	110	< 20	15
6	5	15	310	180	28	20
7	5	10	270	65	< 20	5
8	20	10	70	80	< 20	10
9	20	10	60	80	< 20	10
90	30	10	80	90	< 20	15
92	5	5	150	120	< 20	10
3	10	10	120	95	< 20	2
4	3	10	60	95	< 20	5
5	20	5	70	55	< 20	2
6	20	10	120	60	< 20	10
7	10	10	110	70	< 20	10
8	10	10	140	190	< 20	10
9	20	15	140	80	< 20	10
100	3	15	35	110	< 20	15
1	1	15	< 20	230	22	< 2
2	3	20	55	490	< 20	< 2
3	5	10	< 20	940	< 20	5
4	10	15	70	220	< 20	5
5	1	5	< 20	45	< 20	2
6	5	5	< 20	30	< 20	< 2
7	3	10	< 20	230	< 20	2
8	5	15	55	130	< 20	2
9	10	15	< 20	680	< 20	10
10	10	10	< 20	540	< 20	2
1	5	10	45	400	40	2
2	3	15	50	300	< 20	15
AL -113	5	15	35	120	< 20	2
CW -300	3	10	20	220	< 20	20

Sample Description	Sn, ppm	Cu, ppm	Pb, ppm	Zn, ppm	Au, ppb	W, ppm	W, ppm by XRF
CW -301	10	10	20	440	<20	20	
2	5	10	<20	110	<20	2	
3	5	10	<20	90	<20	5	
4	10	10	<20	150	23	5	
5	5	10	50	55	23	10	
6	10	5	<20	30	<20	5	
7	3	5	<20	5	<20	50	
8	1	5	55	55	<20	5	
9	10	35	35	35	1300	>200	
10	500	5	110	25	<20	80	
1	5	30	35	110	<20	15	
2	10	35	45	75	<20	10	
3	5	15	25	140	<20	15	
4	10	10	45	360	<20	20	
5	3	15	<20	180	<20	15	
6	20	20	45	420	<20	20	
7	3	10	<20	130	<20	20	
8	1	10	<20	580	<20	40	
9	1	15	<20	15	<20	<2	
20	3	35	<20	45	<20	<2	
1	<1	10	20	60	<20	5	
2	<1	5	55	75	<20	10	
3	5	10	20	320	<20	10	
4	3	10	25	260	<20	10	
5	5	10	35	120	<20	10	
6	20	15	100	180	<20	5	
7	10	10	65	75	<20	5	
8	<1	10	90	95	<20	5	
9	1	20	120	420	<20	10	
30	10	10	90	190	<20	5	
1	20	10	95	100	<20	5	
2	5	5	50	85	<20	2	
3	300	80	70	240	<20	90	
4	200	75	90	200	<20	30	
5	50	5	30	100	<20	60	
6	<1	10	45	20	<20	<2	
337(B)	5	10	150	80	<20	2	
8	<1	5	110	25	<20	2	
339	10	10	90	75	<20	2	
341	3	10	50	710	<20	30	
2	-	10	70	65	<20	>200	2300
3	50	5	130	20	<20	20	
4	10	10	40	15	<20	30	
5	20	5	85	40	<20	40	
6	30	10	60	210	<20	<2	
7	20	20	55	280	<20	2	
8	20	15	60	250	<20	<2	
9	1	10	20	25	<20	2	
50	5	5	<20	55	<20	10	
1	5	5	<20	20	<20	<2	
2	1	5	<20	10	<20	<2	
3	<1	5	<20	15	<20	<2	
4	10	5	<20	15	<20	5	
5	50	<2	65	35	<20	20	
356	20	5	<20	10	<20	<2	



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GEOLOGY

TERTIARY	Tb	Basalt
DEVONIAN	Dg	Granite
SILURIAN-DEVONIAN	SD	Sediments, undifferentiated
ORDOVICIAN	Ms	Magnetite-skarn
	Og	Gordon Limestone, Transition Series } Undifferentiated
	Om	Moina Sandstone, Owen Conglomerate } Undifferentiated
CAMBRIAN	€	Undifferentiated

AUST. & N.Z. EXPLORATION CO.

GEOLOGICAL MAP OF THE WESTERN HALF OF E.L. 17/68

(PROVISIONAL ONLY, SUBJECT TO REVISION)

Date: 22nd Oct. 1973.

MAP. 1.

654014 1842

73-980 654015

MAP. 2.

AUSTRALIA AND NEW ZEALAND.
EXPLORATION COMPANY. 1843

REGIONAL GEOLOGY.

EASTERN HALF OF EXPLORATION LICENCE 17/68 AND SURROUNDING AREAS.

PREPARED BY :-	C.H.W.	DRAWN BY :-	C.H.W.
SCALE :-	1" = 4290'	REPORT :-	P.R. JULY 1973.
DATE :-	25.7.73.	PLAN N° 1/7	

5 cm

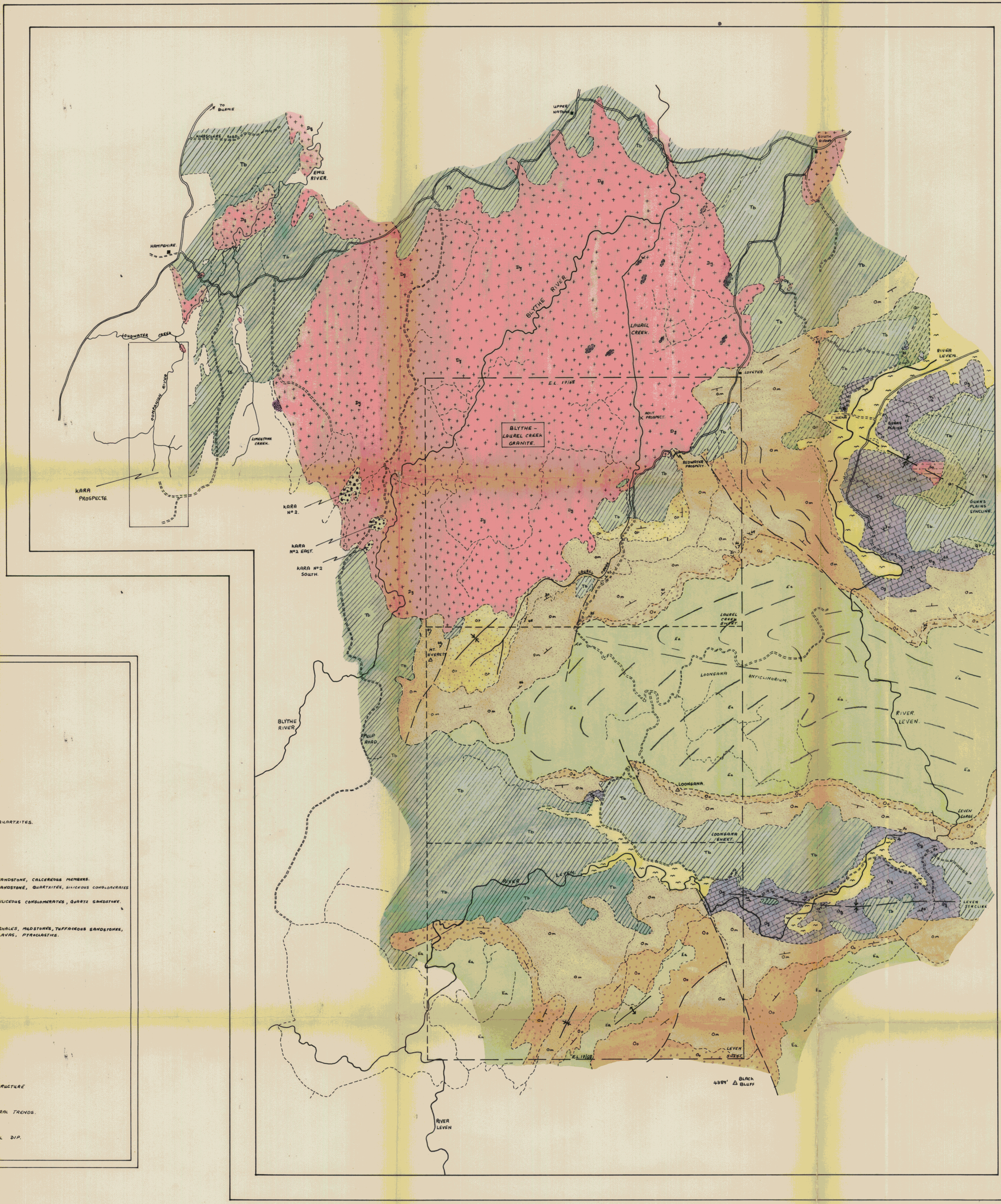
SCALE 1" = 4290 FT.

MILES 1 3/4 1/2 1/4 0 1 2 3 MILES.

BASE PLAN PREPARED FROM AERIAL PHOTOS.
BALFOUR - VALENTINE - PROJECT 1457.

SCALE	DATE.	ALTITUDE
65 CHNS.	20.2.64.	20,000 FT.

= ROAD.
= TRACK.
= UNCLEARED FORESTRY TRACK.
= RIVER.
= CREEK.
HAMPSHIRE = VILLAGE.
= BOUNDARY - E.L. 17/68
= E.L. SHEET DIVISION.



GEOLOGICAL REFERENCE.

QUATERNARY.	Q	Qa	=	ALLUVIUM + SWAMP DEPOSITS.	
		Qt	=	BASALT TALUS.	
TERTIARY.	T	Tb	=	TERTIARY BASALT.	
SILURIAN.	S	So	=	ELDON GROUP	— QUARTZITES.
ORDOVICIAN.	O	Og	=	SKARN TYPE ROCKS.	
		Og	=	GORDON LIMESTONE.	
		Ot	=	TRANSITION ZONE.	— SANDSTONE, CALCEREOUS MEMBERS.
		Om	=	MOINA SANDSTONE.	— SANDSTONE, QUARTZITES, SILICEOUS CONGLOMERATES
		Oo	=	CONGLOMERATE ZONE (OWEN, ROWLAND)	— SILICEOUS CONGLOMERATES, QUARTZ SANDSTONE.
UNCONFORMITY.					
CAMBRIAN.	E	Ea	=	CAMBRIAN (UNASSIGNED)	— SHALES, MUDSTONES, TUFFACEOUS SANDSTONES, LAVAS, PYROCLASTICS.

IGNEOUS ROCKS.

DEVONIAN.	D	Dg	=	DEVONIAN GRANITE
		Dgs	=	DEVONIAN SPECULARITE ZONES.
		Dgm	=	MAGNETITE SKARN ZONES.

= GEOLOGICAL BOUNDARY.
= GEOLOGICAL BOUNDARY - INFERRED.
= DIP + STRIKE MEASUREMENT.
= HORIZONTAL + VERTICAL DIPS.
= FAULT.
= FOLD STRUCTURE
= STRUCTURAL TRENDS.
= REGIONAL DIP.

73-980

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MAP. 3.

AUSTRALIA AND NEW ZEALAND EXPLORATION COMPANY.

NORTH-WEST TASMANIA.

PLAN SHOWING PROSPECTS AND LOCATIONS. REQUIRING FURTHER EXPLORATION IN KARA REGION.

E. L. 17/68

PLAN Nº 7/9. 1844

SCALE 1" = 600 FT (APPROX) DATE SEPT. 1973.

KARA GEOLOGY.

B = TERTIARY BASALT.
Gr = DEVONIAN GRANITE.
Q = QTS, SSTS, CONGS
L = LIMESTONE
T = TACTITE
Tm = TACTITE WITH MAG.

LEGEND.

AL 234 × = STREAM SEDIMENT SAMPLE.
40 = TUNGSTEN VALUES PPM W.
= RIVER.
= CREEK
= ROAD.
= TRACK.
= RAILWAY.
= BULLDOZED LINES.

100 0 100 200 300 400 500 METRES.

500 0 500 1000 1500 FEET.

SCALE 1" = 600FT (APPROX).

TARGETS.

(EXCLUDING THE KARA Nº 1 AND KARA NORTH PROSPECTS)

MAP SYMBOL.	TARGET TERMINOLOGY.	WORK COMPLETED TO DATE.	RESULTS.	RECOMMENDED WORK.
T.1.	EAST KARA PROSPECT.	DETAILED SURFACE GEOLOGICAL MAPPING CLOSE SPACED STREAM SEDIMENT SAMPLING. INITIAL BULLDOZING.	ANOMALOUS TUNGSTEN VALUES RANGING UP TO 1·71 % W. FAVOURABLE GEOLOGY.	TRENCHING SOIL SAMPLING POSSIBLE DRILLING.
T.2.	KARA NORTH – EASTERN PROSPECT.	(NOT INTIMATELY ASSOCIATED WITH PREVIOUS WORK)	ANOMALOUS MAGNETICS FAVOURABLE GEOLOGY.	AUGER DRILLING TRENCHING.
T.3.	HAMPSHIRE MAGNETITE PROSPECT.	SURFACE GEOL. MAPPED. GRID MAGNETIC SURVEY HAND-AUGER SAMPLING.	FAVOURABLE GEOLOGY ANOMALOUS AUGER SAMPLE (1000 ppm W) ON SOUTHERN TRAVERSE NEAR CONTACT WITH OVERLYING BASALT.	SYSTEMATIC AUGER DRILLING.
T.4.	EMU - PINE PROSPECT.	STREAM SEDIMENT SAMPLING. SURFACE GEOLOGICAL MAPPING.	MODERATLY ANOMALOUS. FAVOURABLE GEOLOGICAL SETTING. NEAR GRANITIC INTRUSIVE.	PROSPECT NOT TOO ENCOURAGING, BUT 3 AUGER HOLES REQUIRED. FURTHER SURFACE OBSERVATIONS LIMITED.
T.5.	SOUTH-WEST – KARA Nº 1 PROSPECT.	SURFACE GEOLOGICAL MAPPING SURFACE SAMPLING OF LOCATED MAGNETITE OCCURRENCES.	EXTREMELY FAVOURABLE GEOLOGICALLY. MAGNETITE OCCURRENCES ARE SCHEELITE BEARING. ASSAYS ENCOURAGING.	TRENCHING. POSSIBLE DRILLING.

PRIORITY OF WORK – T.5, T1, T3, T2, T4.

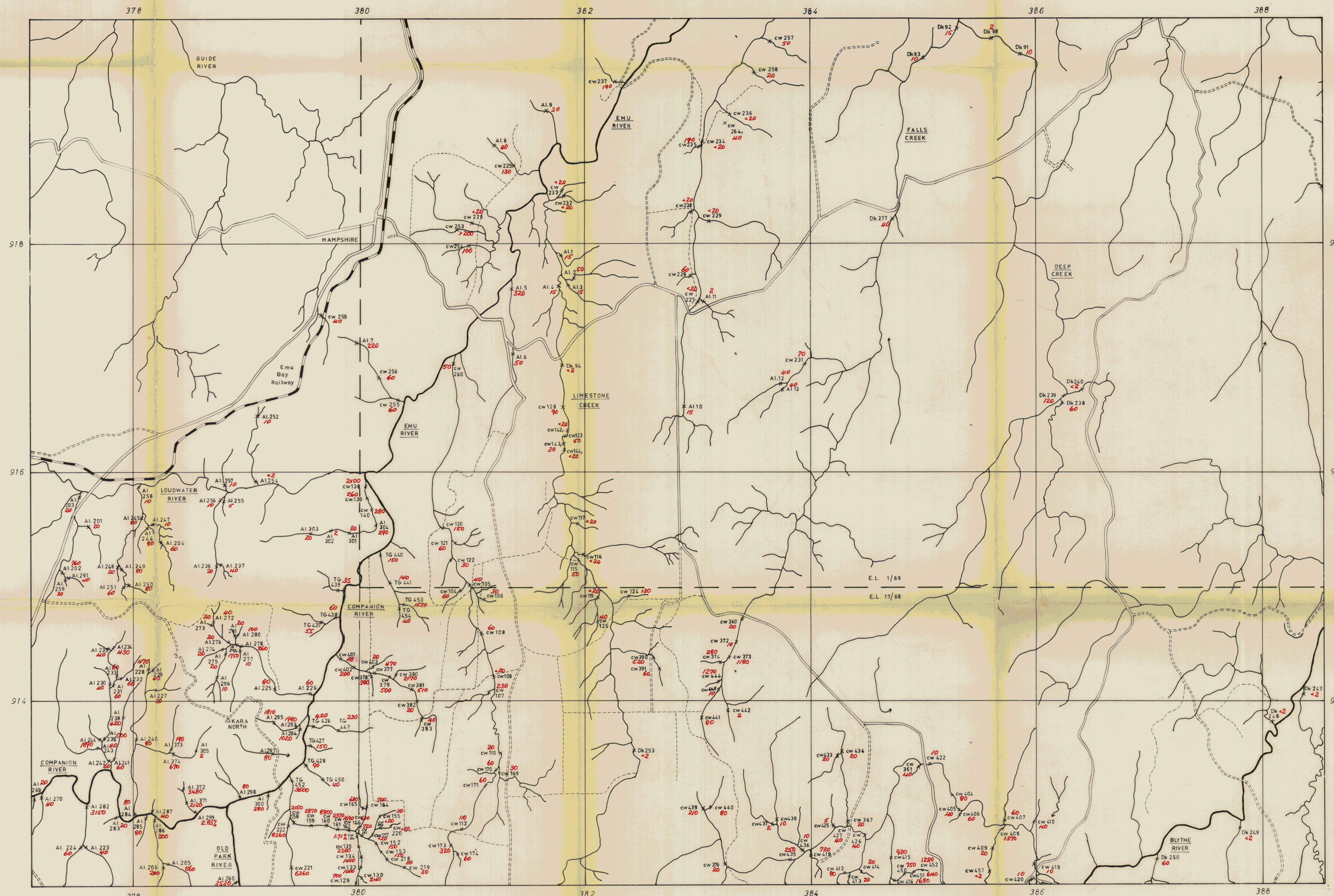
LOCATIONS.

MAP SYMBOL.	LOCATION TERMINOLOGY.	WORK COMPLETED TO DATE.	RESULTS TO DATE.	RECOMMENDED. ADDITIONAL WORK.
L.1.	LIMESTONE CREEK LOCATION.	RECONNAISSANCE GEOLOGY STREAM SEDIMENT SAMPLING.	NEW OCCURRENCE OF GRANITE IN CONTACT WITH LOWER ORDOVICIAN 'TRANSITIONAL SERIES' NO SIGNIFICANT ASSAY RESULTS FROM SAMPLES.	DETAILED GEOLOGICAL MAPPING AND SURFACE SAMPLING POSSIBLE DRILLING SITE.
L.2.	SUTTONS SKARN LOCATION.	RECONNAISSANCE GEOLOGY STREAM SEDIMENT AND SURFACE EXPOSURE SAMPLING.	FAVOURABLE GEOLOGICAL SETTING, SKARN-TYPE ROCKS IN CONTACT WITH GRANITE ANOMALOUS TUNGSTEN ASSAY RESULTS.	DETAILED SURFACE MAPPING MAGNETOMETER SURVEY. SOIL SAMPLING POSSIBLE AUGER DRILLING.
L.3.	LODDWATER JUNCTION LOCATION.	STREAM SEDIMENT SAMPLING.	ANOMALOUS TUNGSTEN VALUES RANGING UP TO 2100 ppm W.	DETAILED GEOLOGICAL MAPPING. PLUS TIGHT STREAM SEDIMENT SAMPLING.
L.4	SILVER MINE LOCATION.	RECONNAISSANCE GEOLOGICAL MAPPING.	FAVOURABLE GEOLOGICAL SETTING ALONG NORTHERLY STRIKE EXTENSION OF KARA Nº1 GEOLOGY KNOWN MAGNETITE SKARN.	DETAILED GEOLOGICAL MAPPING POSSIBLE SOIL SAMPLING AND GROUND MAGNETOMETER SURVEY.
L.5.	EAST COMPANION LOCATION.	STREAM SEDIMENT SAMPLING.	ERRATIC, BUT ANOMALOUS ASSAY RESULTS - UP TO 2170 ppm W.	DETAILED STREAM SEDIMENT SAMPLING OWING TO BASALT COVER, SURFACE GEOL' OBSERVATIONS ARE PROBABLY LIMITED, BUT SHOULD BE ATTEMPTED.
L.6.	EAST KARA CREEK- NORTH LOCATION.	LIMITED TO BRIEF STREAM SEDIMENT SAMPLING.	LOCATION LIES IMMEDIATELY TO NORTH OF KARA Nº1 PROSPECT. ORIGINAL VIEWS ARE THAT BASALT COVER MASKS PRE-TERTIARY GEOLOGY.	DETAILED SURFACE MAPPING. STREAM SEDIMENT SAMPLING ATTEMPTED WHERE POSSIBLE.
L.7.	EMU MAGNETITE LOCATION.	RECONNAISSANCE GEOLOGY.	GOVERNMENT GEOLOGICAL SURVEY RECORD KNOWN MAGNETITE OCCURRENCE IN IMMEDIATE VICINITY.	DETAILED SURFACE GEOLOGICAL OBSERVATIONS.
L.8.	LAUREL CREEK ADIT LOCATION. (OFF AREA SHOWN ON PLAN)	GEOLOGICAL MAPPING STREAM SEDIMENT SAMPLING.	SKARN LOCATION. FAVOURABLE GEOLOGICAL SETTING. NO HIGHLY ANOMALOUS ASSAYS TO DATE.	DETAILED SURFACE GEOLOGICAL MAPPING MAGNETOMETER SURVEY. SOIL SAMPLING.
L.9.	COMPANION RIVER LOCATION.	STREAM SEDIMENT SAMPLING IN AREA.	ANOMALOUS TUNGSTEN VALUE AL.299ss = 2·83% W. COULD BE FAVOURABLE GEOLOGIC POSITION.	DETAILED SURFACE GEOLOGICAL MAPPING. CLOSE SPACED STREAM SEDIMENT SAMPLING.
L.10	WEST KARA LOCATION.	STREAM SEDIMENT SAMPLING IN AREA.	ANOMALOUS TUNGSTEN VALUES RANGING UP TO 1·28% W. GEOLOGICAL SETTING NOT KNOWN.	DETAILED SURFACE GEOLOGICAL MAPPING. ADDITIONAL STREAM SEDIMENT SAMPLING NORTH + SOUTH OF LOCATION.
L.11.	CRITTER CREEK LOCATION.	STREAM SEDIMENT SAMPLING IN AREA.	ANOMALOUS TUNGSTEN VALUES RANGING UP TO 6900 ppm W. GEOLOGICAL SETTING NOT KNOWN.	DETAILED SURFACE GEOLOGIC MAPPING STREAM SEDIMENT SAMPLING.
L.12.	OLD PARK LOCATION.	STREAM SEDIMENT SAMPLING IN AREA.	ANOMALOUS TUNGSTEN VALUES. EXPECTED (ASSAY RESULTS NOT AS YET RECEIVED) GEOLOGY NOT KNOWN.	DETAILED SURFACE GEOLOGICAL MAPPING. STREAM SEDIMENT SAMPLING.
L.13.	BASE-LINE LOCATION.	STREAM SEDIMENT SAMPLING IN AREA.	MAGNETITE SKARN OBSERVED - SAMPLE ASSAYED 1750 ppm W. FAVOURABLE GEOLOGY - LIES. N.W OF KARA. N.	DETAILED SURFACE GEOLOGICAL MAPPING STREAM SEDIMENT SAMPLING.

1. PRIORITY OF RECOMMENDED WORK. – LOCATIONS, L9, L10, L11, L12, L13, L2, L6, L3, L4, L1, L9, L7, L5.
2. SURFACE GEOLOGICAL MAPPING REQUIRED AT LOCATIONS. – LOCATIONS, L1, L3, L4, L6, L7, L8, L9, L10, L11, L12, L13.
3. FURTHER CLOSE SPACED STREAM SEDIMENT SAMPLING REQUIRED AT LOCATIONS. – LOCATIONS, L6, L9, L10, L11, L12, L13.
4. MAGNETOMETER SURVEYS REQUIRED AT LOCATIONS. – LOCATIONS L2, L4, L8.
5. SOIL SAMPLING REQUIRED AT LOCATIONS. – LOCATIONS L2, L4, L8.

1844

PLAN ACCOMPANIES C.H.W. PROGRESS REPORT - SEPTEMBER 1973.



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N

GEOCHEMICAL SAMPLING

x = SAMPLE LOCATION

cw 123 x = STREAM SEDIMENT SAMPLE AND SAMPLE NUMBER

cw 234r x = ROCK SAMPLE AND SAMPLE NUMBER

150 x = ASSAY VALUE - ppm W

REFERENCE

= ALL WEATHER ROAD

= CLEARED TRACK

= UNCLEARED FOREST TRACK

= RAILWAY

= RIVER

= CREEK

= E.L. BOUNDARY

= TRIG. BEACON

SCALE

SCALE 1:15840 OR 1"=1/4 MILE

1000 0 1000 2000 3000 4000 5000 ft.

250 0 250 500 750 1000 1250 1500 m.

MAP GRID: TASMANIA STATE GRID IN YARDS

5 cm

AUSTRALIA AND NEW ZEALAND EXPLORATION COMPANY

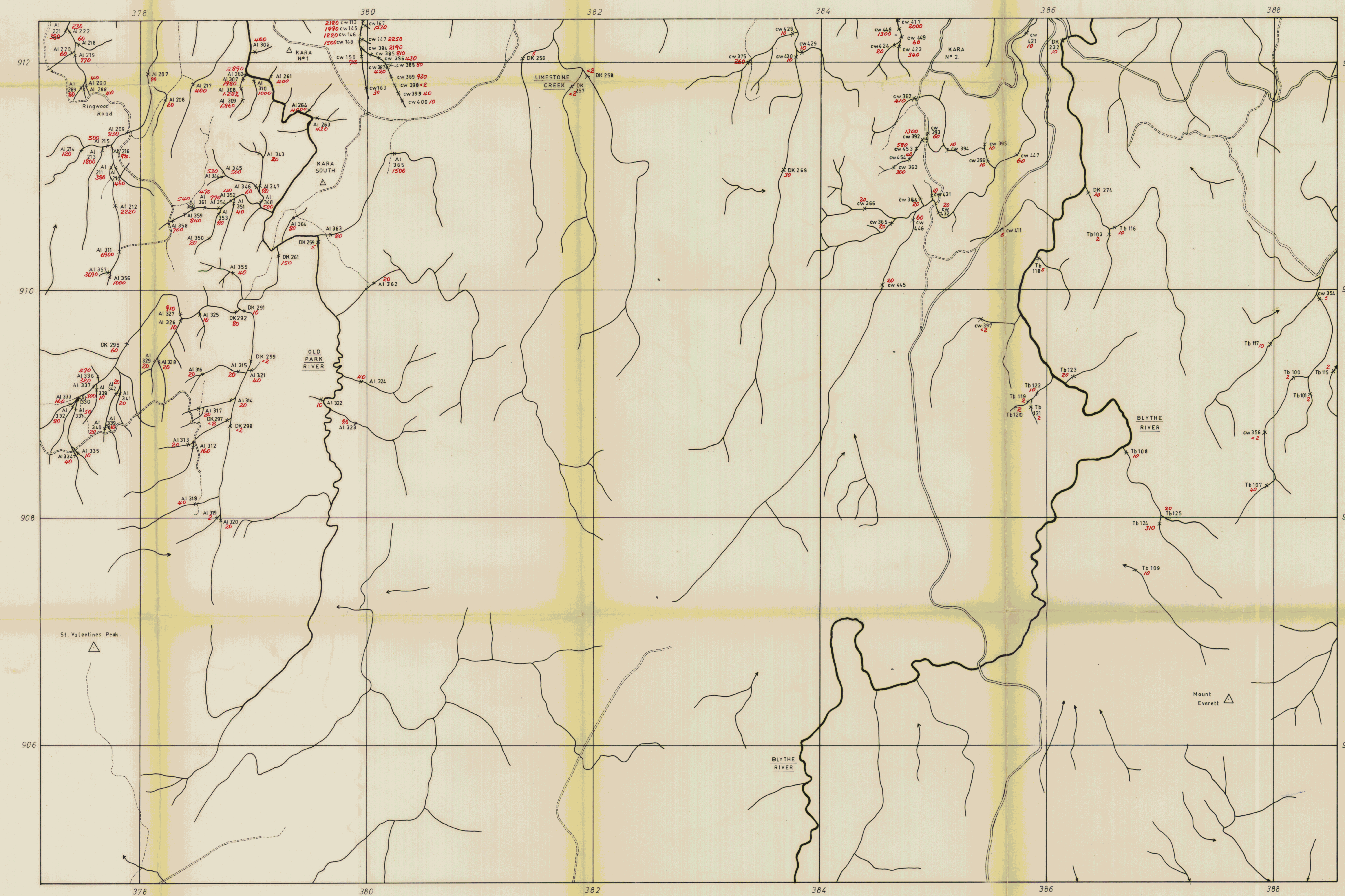
HAMPSHIRE SHEET

GEOCHEMICAL SAMPLING

1845

PREPARED BY: C.H. WHITEHEAD. A.L. LIDGARD.	DRAWN BY: C.H. WHITEHEAD. A.L. LIDGARD.	
SCALE: 20 Chains to an Inch.	DATE: October 1, 1973.	PROJ Nº: X827-016 X827-003
DRAWING Nº:	REPORT Nº:	LIB. Nº:

MAP. 4(a)



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N

GEOCHEMICAL SAMPLING

x = SAMPLE LOCATION

cw 123 x = STREAM SEDIMENT SAMPLE AND SAMPLE NUMBER

cw 234 x = ROCK SAMPLE AND SAMPLE NUMBER

150 x = ASSAY VALUE - ppm W.

REFERENCE

= ALL WEATHER ROAD

= CLEARED TRACK

= UNCLEARED FOREST TRACK

= RAILWAY

= RIVER

= CREEK

= E.L. BOUNDARY

= TRIG. BEACON.

SCALE

SCALE: 1:15840 OR 1"=1/4 MILE

1000 0 1000 2000 3000 4000 5000 ft

250 0 250 500 750 1000 1250 1500 m

MAP GRID TASMANIA STATE GRID IN YARDS

5 cm

AUSTRALIA AND NEW ZEALAND EXPLORATION COMPANY

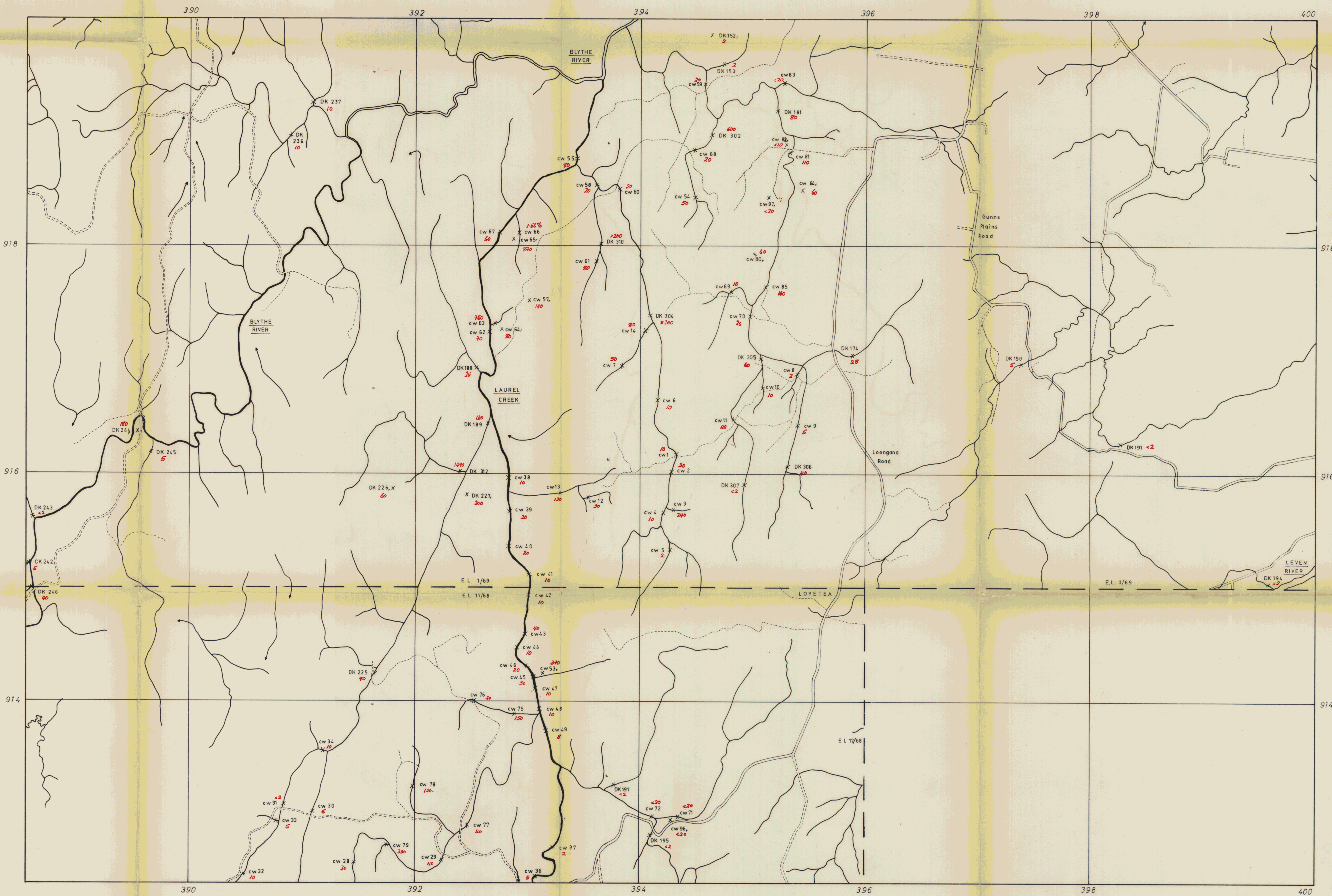
ST. VALENTINES SHEET

GEOCHEMICAL SAMPLING

1846

PREPARED BY: C.H. WHITEHEAD. A.L. LIDGARD.		DRAWN BY: C.H. WHITEHEAD. A.L. LIDGARD.
SCALE: 20 Chains to an Inch.	DATE: October 1, 1973	PROJ. No: X827-003
DRAWING No:	REPORT No:	LIB. No:

MAP A. (b)



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GEOCHEMICAL SAMPLING

X = SAMPLE LOCATION

cw 123 X = STREAM SEDIMENT SAMPLE AND SAMPLE NUMBER

cw 234r X = ROCK SAMPLE AND SAMPLE NUMBER

X 150 = ASSAY VALUE - ppm W.

REFERENCE

= ALL WEATHER ROAD

= CLEARED TRACK

= UNCLEARED FOREST TRACK

= RAILWAY

= RIVER

= CREEK

= E.L. BOUNDARY

= TRIG. BEACON

SCALE

SCALE: 1:15840 OR 1"=1/4 MILE

1000 0 1000 2000 3000 4000 5000 ft

250 0 250 500 750 1000 1250 1500 m

MAP GRID: TASMANIA STATE GRID IN YARDS

5 cm

N

AUSTRALIA AND NEW ZEALAND EXPLORATION COMPANY

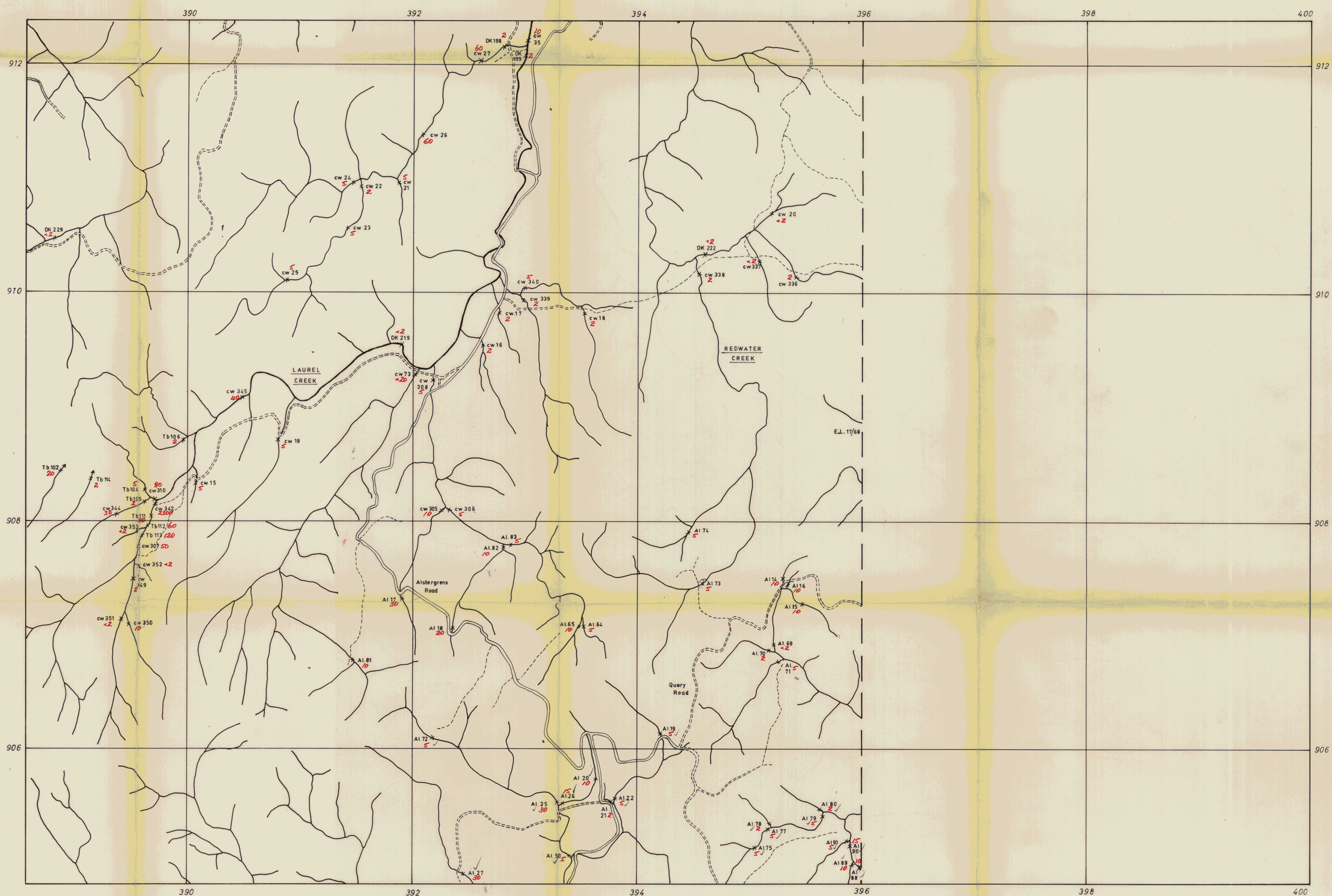
LAUREL CREEK SHEET

GEOCHEMICAL SAMPLING

1847

PREPARED BY: C.H.WHITEHEAD. A.L.LIDGARD.		DRAWN BY: C.H.WHITEHEAD. A.L.LIDGARD.	
SCALE: 20 Chains to an Inch.	DATE: October 1, 1973.		PROJ.Nº: X827-016 X827-003
DRAWING Nº:	REPORT Nº:		LIB. Nº:

MAP 4 (C)



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N

GEOCHEMICAL SAMPLING

x = SAMPLE LOCATION

cw 123 x = STREAM SEDIMENT SAMPLE AND SAMPLE NUMBER

cw 234 x = ROCK SAMPLE AND SAMPLE NUMBER

x 150 = ASSAY VALUE - ppm W.

REFERENCE

= ALL WEATHER ROAD

= CLEARED TRACK

= UNCLEARED FOREST TRACK

= RAILWAY

= RIVER

= CREEK

= E.L. BOUNDARY

= TRIG. BEACON

SCALE

SCALE : 1:15840 OR 1" = 1/4 MILE

1000 0 1000 2000 3000 4000 5000 ft

250 0 250 500 750 1000 1250 1500 m

MAP GRID: TASMANIA STATE GRID IN YARDS

5 cm

AUSTRALIA AND NEW ZEALAND EXPLORATION COMPANY

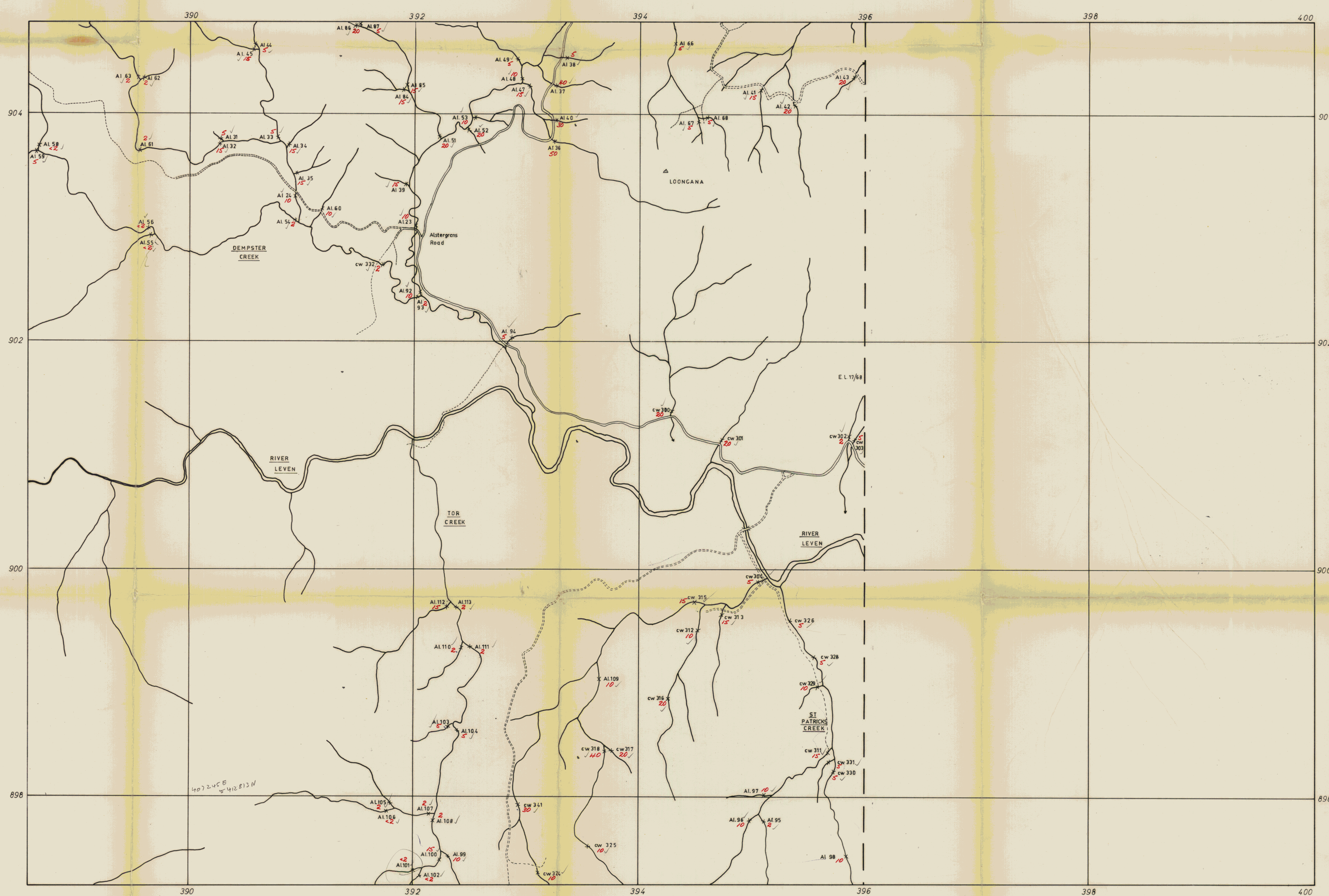
ALSTERGRENS SHEET

GEOCHEMICAL SAMPLING

1848

PREPARED BY:	C.H. WHITEHEAD A.L. LIDGARD	DRAWN BY:	C.H. WHITEHEAD A.L. LIDGARD
SCALE: 20 Chains to an Inch.	DATE: October 1, 1973.	PROJ N°: X827-003	
DRAWING N°:	REPORT N°:	LIB N°:	

MAP 4 (d)



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N		GEOCHEMICAL SAMPLING	REFERENCE	SCALE	AUSTRALIA AND NEW ZEALAND EXPLORATION COMPANY

GEOCHEMICAL SAMPLING

- X = SAMPLE LOCATION
- cw 123 X = STREAM SEDIMENT SAMPLE AND SAMPLE NUMBER
- cw 234 X r = ROCK SAMPLE AND SAMPLE NUMBER
- 150 X = ASSAY VALUE - ppm W.

REFERENCE

- = ALL WEATHER ROAD
- = CLEARED TRACK
- = UNCLEARED FOREST TRACK
- = RAILWAY
- = RIVER
- = CREEK
- = E.L. BOUNDARY
- = TRIG. BEACON

SCALE

SCALE: 1:15840 OR 1"=1/4 MILE

1000 0 1000 2000 3000 4000 5000 ft

250 0 250 500 750 1000 1250 1500 m

MAP GRID: TASMANIA STATE GRID IN YARDS

5 cm

AUSTRALIA AND NEW ZEALAND EXPLORATION COMPANY

LEVEN SHEET

GEOCHEMICAL SAMPLING

1849

PREPARED BY: C.H.WHITEHEAD A.L.LIDGARD	DRAWN BY: C.H.WHITEHEAD A.L.LIDGARD	
SCALE: 20 Chains to an Inch.	DATE: October 1, 1973	PROJ No: X827-003
DRAWING No.:	REPORT No.:	LIB No.:

MAP 4. (e)