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MACKINTOSH REGIONAL.

1971 WINTER FIELD SEASON REPORT

71 - 806

LIST OF MAPS.

MACKINTOSH REGIONAL PROJECT

1. SUMMARY

A programme of stream sediment and heavy concentrate sampling along stream beds, soil sampling along access tracks, and geological mapping along both was carried out during the winter seasons of 1970 and 1971. The area involved covers approximately 50 square miles, and comprises quartz-sericite schists, porphyritic intrusives and extrusives, pyroclastics and associated sediments, minor Jurrasic dolerite intrusives, Tertiary basalt extrusives and major Quaternary alluvial and fluvioglacial (moraine) deposits. Certain stream and soil sample anomalies are significant but generally these are of low order for zinc, copper, silver, tin and nickel.

2. GENERAL (Map Tas 2-263)

The operating mines between Waratah and Queenstown on Tasmania's West Coast are Mt.Lyell (Cu, Ag, Au), Rosebery (Pb, Ag, Zn, Cu, Au), Renison Bell (Sn), Cleveland (Sn,Cu) and Savage River (Fe). Whereas the object of the Mackintosh programme was to search for anything of potential economic interest such as porphyry copper deposits a natural bias existed toward Mt.Lyell and Rosebery type mineralisation. The Mt.Lyell deposits occur in metamorphosed Mt.Reid volcanics (now schists) in association with faulted portions of the major West Coast anticlinorium (Solomon and Elims 8th C.M.M.C. 1970). The Rosebery deposits are metasomatic replacements of altered, sheared tuffaceous shale in a strongly folded limb of a suggested but as yet unproven major synclinal structure (Hall, et.al., 8th C.M.M.C. 1970).

The area covered by the Mackintosh programme measures ten miles N-S and five miles E-W along the southern and central portions of the eastern boundary of E.L. 5/63.

Three distinct topographical features in the area are directly related to the geology viz. in the north the Tertiary basalt forms a plateau at an average elevation of 2200', with tributaries of the main streams actively cutting back into it. In the central and western portions of the area are the low-lying swampy "button grass" plains (Fig.1) at an elevation of approximately 1100', formed by ice action during the Pleistocene and through subsequent depositions of alluvium. Rivers within these plains exhibit

FIG. 1

QUATERNARY DEPOSITS ON BUTTON GRASS PLAINS

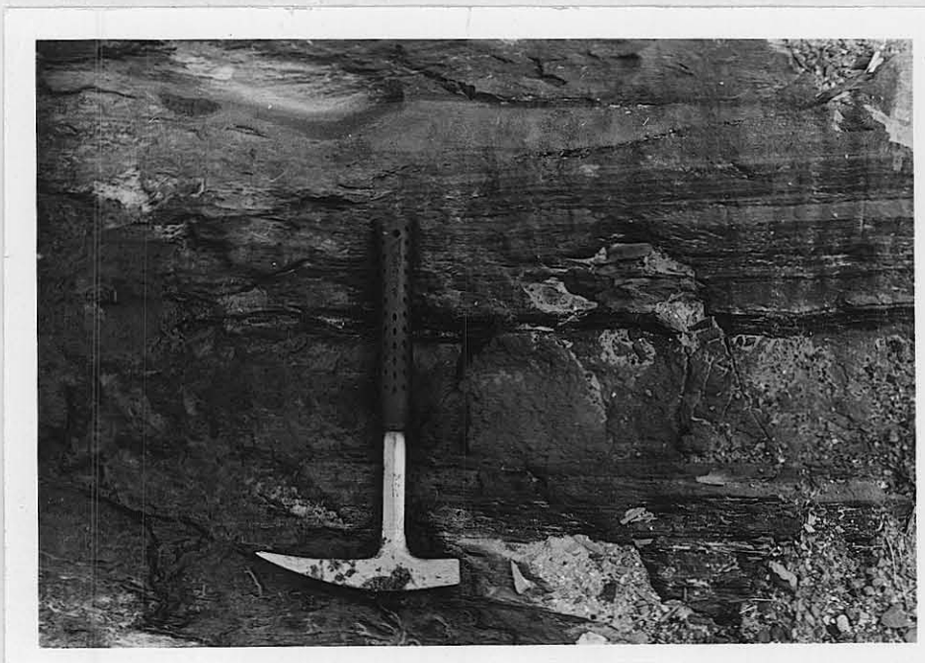

FIG. 2

INTERBEDDED SEDIMENTS

FIG. 1

QUATERNARY DEPOSITS ON BUTTON GRASS PLAINS

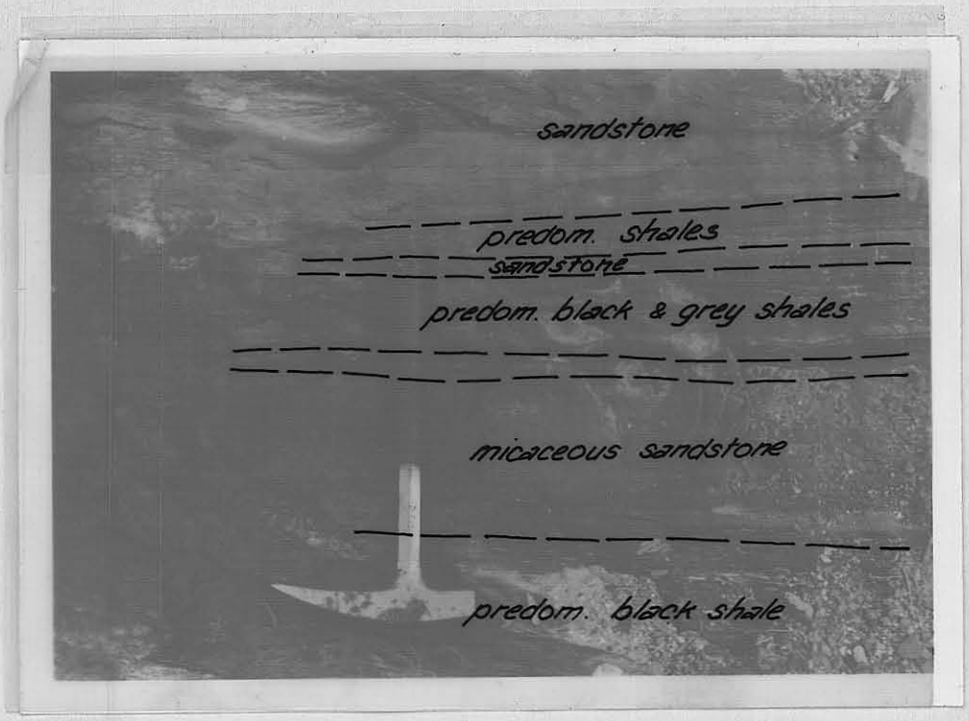

FIG. 2

INTERBEDDED SEDIMENTS

middle age cyclic characteristics of braided, flat channels, frequently flooded and in part eroded by sheet flow. Between these two features is the rugged terrain within the Mt.Reid volcanic sequence and porphyritic intrusives/extrusives. Relief ranges from the 600' level on the Mackintosh river to the 2500' peak of Mt.Block. Within this area are fast flowing, steeply incised, juvenile streams.

Two separate drainage basins are evident. In the southern portion of the area the Tullabadine, Mullabadine and Farm creeks drain southward into the Mackintosh and Pieman rivers, while in the north the Bulgobac, Mutter and Que Rivers drain ~~ea~~ five eastwards into the Huskisson. Dendritic patterns are everywhere evident and geological control of stream beds is limited to local joint patterns over short stretches, and occassional waterfalls due to hard/soft weathering characteristics of rock unit contacts.

3. GEOLOGY (Map Tas 2-264)

3.1 General

The Mackintosh area is situated in the NE sector of a large northeasterly trending belt of Cambrian? geosynclinal rocks measuring 55 miles N-S by eight miles E-W and stretching from Macquarie Harbour in the south to a point ten miles south of Waratah. This area forms a small portion of the Tasman Geosyncline which comprises folded and contorted Proterozoic and Palaeozoic sediments, pyroclastics and intrusives. The Cambrian? rocks are overlain on the west, east and south by younger sediments and to the north by a capping of Tertiary basalt. Devonian granite, intrusive into Cambrian? formations occurs to the northwest outside of the area covered by this report.

3.2 Succession

Rock units mapped comprise quartz sericite schist, metaquartzite, argillaceous siltstone, tuffs, sandstones, shales and a variety of intrusive and extrusive porphyries. These units have been intruded by a dolerite, and to the north disappear under an even younger cover of basalt. Quaternary alluvial and moraine deposits are the youngest units in the area. The following succession may be recognised.

QUATERNARY	(alluvium (moraine	
	..... unconformity	
TERTIARY	basalt	
	..... unconformity	
JURASSIC	dolerite intrusive	
	(porphyry (partly extrusive with intrusive contact.)	
CAMBRIAN? (Poss.Precambrian)	(sandstone and Quartzite (tuff and agglomerate (grey and dark shales (argillite	
PRECAMBRIAN?	(schists (metaquartzite	) These are possible metamorphic derivatives of rocks in above sequence.

3.2.1 Schist and Metaquartzite

These highly cleaved rocks occur in the SE portion of the area in the vicinity of the Tullabadine and Mullabadine rivers. The rocks were originally sandstones and siltstones and have been dynamically metamorphosed (thin sections) to the present assemblage of quartz, sericite and muscovite with minor carbonate. Quartz veining is notable in some areas especially in the Mullabadine where it is associated with disseminated chalcopyrite mineralization. These rocks differ markedly from sediments higher up in the porphyry/sediment sequence, and resemble the older Precambrian rocks noted in the Savage River area (Report Summer 1970/71).

3.2.2 Mt.Reid Volcanics

This sequence of sediments and pyroclastics form a belt roughly aligned along the Murchison Highway in the NE portion of the area. Lateral facies changes and the interbedded nature (Fig.2) of the rocks makes correlation extremely difficult and for these reasons they are lumped together as a single, heterogeneous composite unit. Fossils found in black shales in the Que River area indicate that these rocks (in part at least) are late Middle Cambrian in age (Gee, Jago and Quilty, University Communication 1969).

3.2.2.1 Argillite - Hornfels

These are hard, fine grained grey to yellow rocks consisting essentially of quartz, feldspar, chalcedony and sericite and are generally well jointed.

3.2.2.2 Dark and Grey Shales

Fine grained, soft, grey to black rocks consisting of subangular quartz grains, and muscovite flakes parallel to bedding. These rocks contain minor amounts of chlorite, pyrite and organic carbon. The pyrite is generally parallel to bedding as disseminations or randomly orientated veinlets. The rocks are in fact more siliceous than carbonaceous despite appearances and according to analyses contain $\pm$ 1% organic carbon (Gee, Jago and Quilty, op.cit.1969). The grey shales are similar in composition but without carbonaceous material.

3.2.2.3 Tuff and Agglomerate

These are grey to green coarse fragmental rocks. Vitric tuffs consist of quartz and plagioclase fragments cemented by fine ashy material. Lithic tuffs comprise devitrified green glassy blebs in a matrix of carbonate, sericite and chlorite. A number of welded tuffs (ignimbrites) occur and comprise quartz and plagioclase fragments in a felsitic flow-layered groundmass. Agglomerates consist of subangular volcanic lava fragments up to 12" across cemented by felsitic material.

3.2.2.4 Sandstone and Quartzite

These light brown, fine to medium grained rocks are composed of detrital or recrystalline quartz grains, with minor muscovite and chlorite.

3.2.3 Mt. Reid Porphyry Intrusive and Extrusive Group

These rocks are found in the northeast, northwest and southern parts of the area. Generally buff coloured they vary from basic intermediate to acid composition and fine grained equigranular extrusive to medium grained porphyritic intrusive in texture. Alteration is almost always present though not extensive and is due to deuteric action in the main rather than observed later hydrothermal activity (thin Sections).

3.2.3.1 Basic-Intermediate Division

Plagioclase and possibly hornblende phenocrysts are set in a fine grained groundmass of chlorite, calcite, feldspar and tremolite. Plagioclase phenocrysts are altered to white mica, chlorite and epidote. Calcite and chlorite are pseudomorphous after hornblende and calcite forms amygdales up to 1 cm across.

3.2.3.2 Intermediate Division

Porphyritic types consist of plagioclase phenocrysts set in a groundmass of feldspar, quartz, chlorite and opaques. Vesicles are filled with quartz and opaques. Equigranular types consist of lath-shaped plagioclase crystals and prisms of clinopyroxene with euhedral opaques and interstitial quartz and chlorite. Plagioclase is in part replaced by epidote and white mica, and epidote also forms small veins.

3.2.3.3 Intermediate - Acid Division

Porphyritic types consist of plagioclase (albite) and clinopyroxene phenocrysts set in a groundmass of quartz and alkali feldspar. Brecciated types consist of lava fragments up to 3 mm, set in a vesicular flow layered, divitrified groundmass of sericite, feldspar, pyroxene, quartz and opaques. Brecciation is slight and thought to be solely due to flowage.

3.2.3.4 Acid Division

All textures noted were porphyritic. The rocks consist of phenocrysts of albite, orthoclase or quartz set in a groundmass of devitrified feldspar, quartz, chlorite, sericite and carbonate. Deuteric alteration has produced minor chlorite and epidote.

3.2.4 Quartz Dolerite

Two outcrops and minor float of quartz-dolerite were noted in the NW portion of the area. The rock consists of serpentine chlorite pseudomorphs after euhedral olivine, sub to euhedral clinopyroxene and minor orthopyroxene, interstitial laths of andesine-labradorite and irregular patches of free primary quartz. Alteration comprises opaques of cloudy leucoxene, serpentine from olivine and the development of chlorite.

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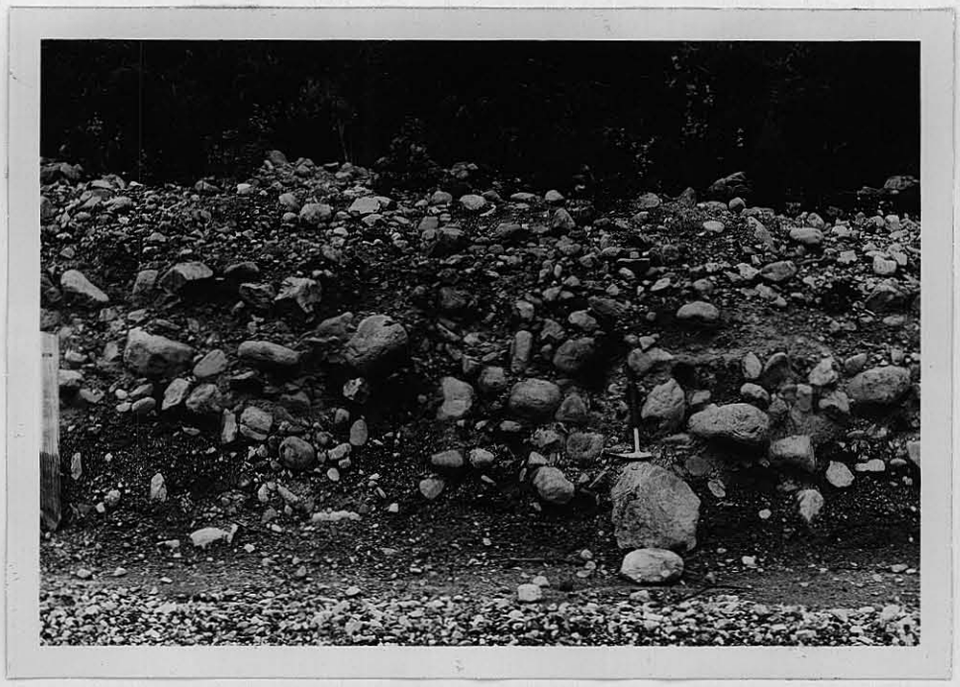

FIG. 3

FLUVIOGLACIAL
BOULDER BEDS

FIG. 4

COMPOSITION OF
CONGLOMERATE
ERRATIC

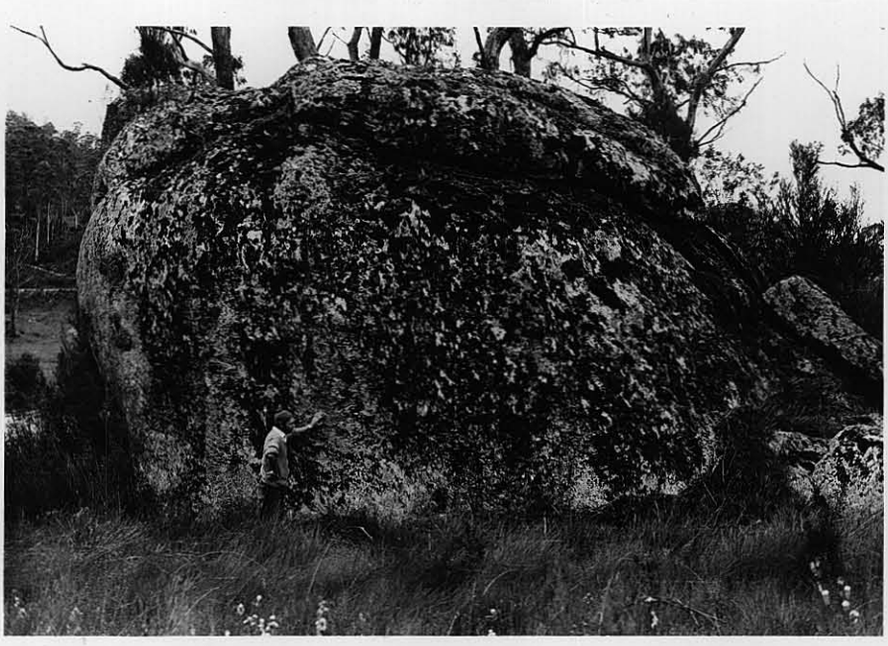

FIG. 5

CONGLOMERATE
ERRATIC

3.2.5 Basalt

An outlier of basalt was noted in the north central portion of the area. Typically dark, fine grained, the massive rock is composed essentially of labradorite and augite. Amygdaloidal and vesicular varieties occur with amygdales filled with calcite, quartz and zeolites.

3.2.6 Quaternary

The youngest deposits in the area, they occupy the low lying plains in the central and western portions. They consist of alluvium overlying fluvioglacial boulder beds (Fig.3) and moraine debris of conglomerate boulders. Some conglomerate boulders occur as "erratics" (Figs.4&5) overlying the Cambrian?/Precambrian formations.

3.3 Structure

Information gained mainly from the pyroclastics and sediments indicates that the north plunging Que syncline is the major structural feature of the area. The area mapped lies on the eastern limb of this syncline and it seems the beds face and certainly dip to the northwest. The dominant trend within the area mapped is northeast and dips range between 20 and 45 degrees.

An asymmetrical syncline (Mt.Charter Report Winter 1970) was noted in the northern portion of the pyroclastic/sediment enclave over a distance of approximately 2½ miles. The axial plane of this minor structure trends ENE with the northern limb dipping at 12 degrees to the southeast and the southern limb dipping between 27 and 43 degrees to the northwest.

Opposing variable dips measured within short distances attest to the occurrence of minor drag folds within these structures. Barren white "bull" quartz veins (Fig.6) up to three feet wide, have been noted within the porphyries and pyroclastic/sediment sequence, probably as infillings of tension joints.

The porphyries are in general structurally uninformative. Flow layering was measured from a number of outcrops and attitudes varied considerably, as does jointing, with no downward dominant trends emerging. Intrusive contacts of porphyry with the pyroclastic/sediment rocks have been noted (Fig.7) in both this and the Bulgobac (Bulgobac Report Summer 1970/71) areas which are contiguous. The occurrence of hornfels within the sediments, angular unconformities and stoped blocks of sediment within porphyry are some of the manifestations.

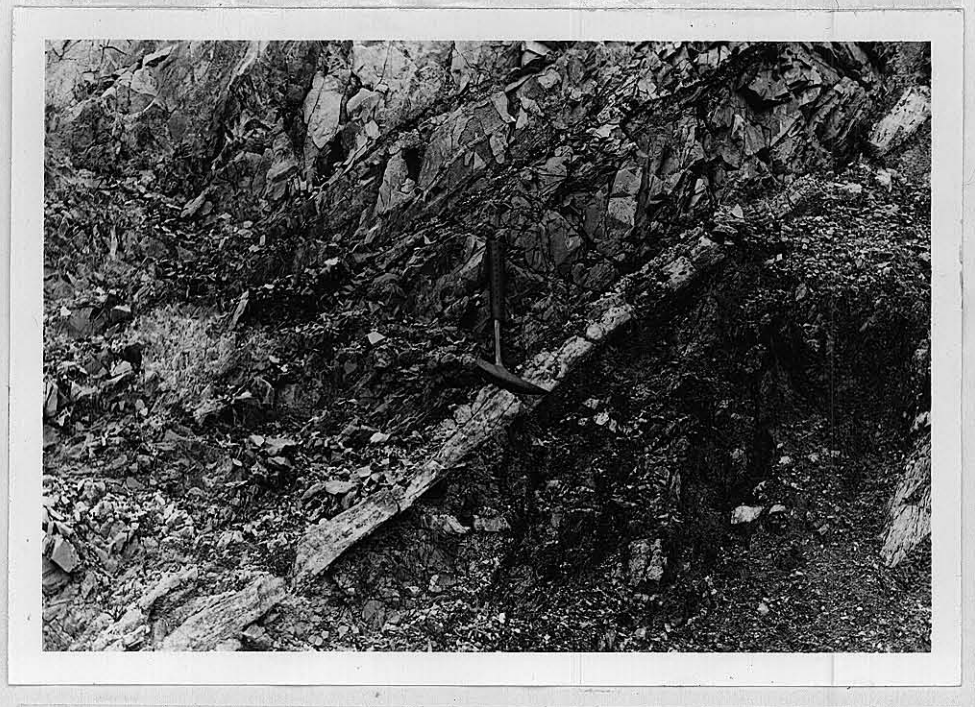

FIG. 6

QUARTZ VEIN
IN SEDIMENTS

FIG. 7

INTRUSIVE RHYOLITE/
SHALE CONTACT

FIG. 8

SAMPLE PREPARATION

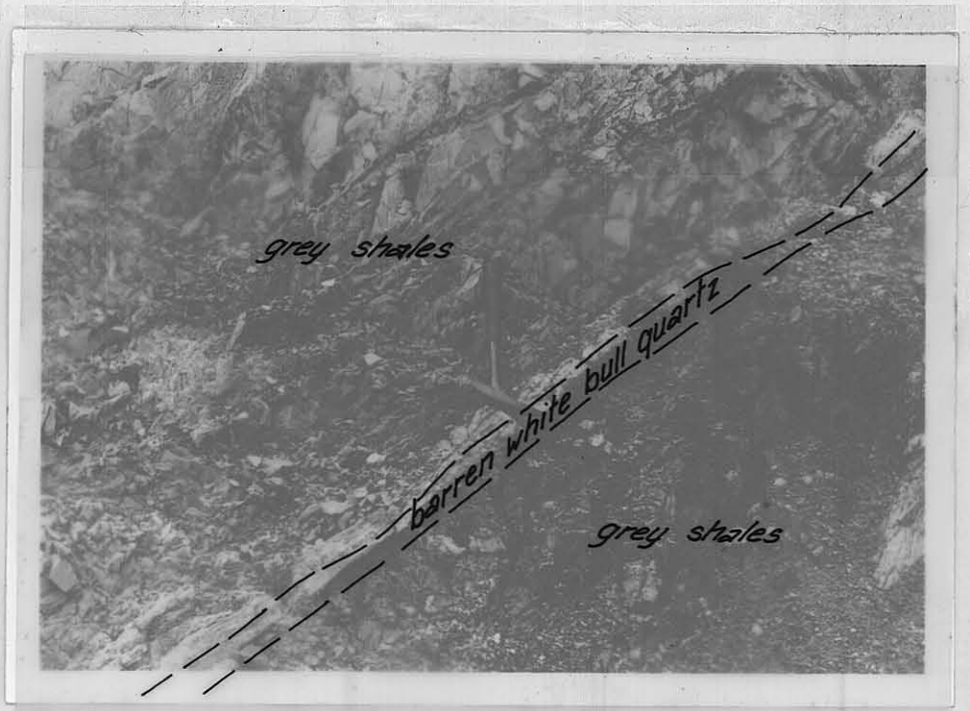

FIG. 6

QUARTZ VEIN
IN SEDIMENTS

FIG. 7

INTRUSIVE RHYOLITE/
SHALE CONTACT

FIG. 8

SAMPLE PREPARATION

A younger dolerite dyke intrudes the Cambrian sequence and apparently trends NE.

One fault plane was noted in the southern portion of the area which trends NE with a dip of 45 degrees to the NW.

A number of shear zones were noted, generally of similar trend to the rocks and unmineralized.

3.4 Mineralization

Pyrite is common within the dark shales, and has been noted within the tuffs and porphyries.

A coarse grained tuff from near the Bulgobac river/ Murchison Highway junction contained minor sphalerite blebs (thin section).

Hydrothermal quartz veining within a discordant shear zone in schists on the Mullabadine river is accompanied by disseminated chalcopyrite mineralization. A hand picked sample from this locality analysed 0.5% copper.

4. GEOCHEMISTRY

4.1 Work Completed (Map Tas 2-265)

Four types of sample were collected viz:- stream sediment, soil, heavy concentrate and rock, the greatest emphasis being placed on the stream sediment sample.

A total of 1188 samples were collected from active stream sediment at an interval of 500'. Material collected, was dried and sieved, (Fig.8) the -80 mesh fraction being despatched to Geochemical and Mineralogical Laboratories for analysis for Cu, Zn, Ag, and Ni by A.A.S. and Sn by calorimetry. On completion of these analyses samples were bulked with regard to tributaries and portions of main streams, each bulk sample consisting of approximately ten stream sediment samples. These bulk samples were then scanned spectrographically by Australian Mineral Development Laboratory for the following elements, Mo, Nb, W, Ta, Co, Bi, Sb, Sn, Pb and As.

A total of 285 soil samples were collected at 100' intervals along the logging tracks, as an adjunct to normal stream sediment sampling. Samples were taken 20' from the centre of the road and at a depth of ± 18" to avoid possible contamination from road metal and organic matter.

Samples were analysed by Geochemical and Mineralogical Laboratories for the same elements and using the same methods as for the stream sediment analyses.

Approximately 100 heavy concentrate samples were collected from significant points on the drainage systems. Samples were despatched to Australian Mineral Development Laboratory where they were weighed, then sieved to remove sub-sand-sized material (finer than 350 mesh) and the heavy mineral fraction separated by use of tetrabromethane (S.G.2.96). The heavy fraction was collected, weighed and it's proportion as a percentage of the initial sample was calculated. This fraction was then subjected to a binocular microscope examination, again as a check against stream sediment samples and to identify any indicator minerals not allowed for in element analyses. These samples will on completion of the above work be analysed through a spectrographic scan for Co, V, W, Mo, Ta, Nb, Be, Cu, Pb, Zn, Ag, Cd, Ge, Sb and Bi.

Five rock samples were collected from an old adit, pulverized and analysed by A.A.S. for Cu, Zn, Pb, Ag and Au, then further spectrographically scanned for Co, W, Mo, Ta, Nb, Pb, Sn, Bi, As and Sb.

4.2 Results (map Tas 2-266)

Histogram of population p.p.m. have been drawn up for Cu, Zn, Ni, Ag and Sn results obtained from the following programmes.

Que River	Reconnaissance	Summer	68/69	Stream Sediment	Sample
" "	Regional	"	69/70	" "	"
Mt.Charter	"	Winter	1970	" "	"
Mackintosh	"	"	1971	Soil and "	"

Soil values from this winter's programme have been included due to the similar range of soil and stream sediment values. Pertinent details are listed in the tabulation below, all results in p.p.m.

Element	Range	Background	Histogram Threshold	Preferred Threshold	No.of Possible Anomalous Values
Sn	2-75	2-5	60	60	1
Cu	2-150	5	125	40	17
Zn	4-8000	10	300	300	17
Ni	2-250	5	120	120	10
Ag	0.2-13.0	0.25	4.5	1.0	31

Preferred thresholds are plotted on the accompanying geochemical anomaly map. A number of the anomalies plotted could be due to contamination from the Murchison Highway and Emu Bay railway line, both of which transport ore from West Coast mines.

4.2.1 Tin

One possibily anomalous value of 75 p.p.m. was obtained from a sample over marshy ground in Levi Creek.

4.2.2 Copper

The preferred threshold is very much lower than the histogram threshold. The facts influencing this lower threshold are the consistently low copper values achieved during sampling in our exploration licences, and the low order anomaly of 48 p.p.m. obtained from a stream sediment sample in the vicinity of the copper mineralization on the Mullabadine river.

Seventeen possibly anomalous copper values occur over porphyries, pyroclastic/sediments and dolerite with no apparent preference for particular lithological rock types or contacts. The better values have come from marshy ground in the Tullabadine and Farm Creek areas, the former appears to be close to the porphyry pyroclastic/ sediment contact.

4.2.3 Zinc

Both thresholds are in agreement, and zinc in stream sediments on past experience in this area, would seem to be a reliable indicator of soil anomalies of the Pb, Ag, Zn, type. Seventeen possibly anomalous zinc values were noted over similiar rock types to copper, but with a distinct preference for contacts both between and within the porphyry and pyroclastic/sediment sequence.

4.2.4 Silver

The two thresholds for silver differ markedly and the lower value has been chosen because of the efficiency of silver as a pathfinder for Pb, Zn, Ag soil anomalies. At the Mt.Charter grid on the upper Que river the stream sediment and soil anomalies are both comparable and in close proximity. Higher silver values over similar rock types in the Mackintosh area are related to zinc anomalies.

The highest silver values obtained came from marshy areas on the Tullabadine and Farm Creeks and these incidentally are related to high copper values as well.

4.2.5 Nickel

Both the preferred and histogram thresholds are in agreement for nickel. All the possibly anomalous nickel values may be related to the basalt capping to the north of the area and as such are not regarded as significant.

4.2.6 Bulk Samples

Results from bulk sampling work are all of low order with no significant anomalies. A total of 91 bulk samples were analysed and of these only three results are outstanding. Pertinent details are listed below; all results are in p.p.m.

Elements	Range	Remarks
Pb	1-200	below accepted anomalous level
Sn	1-20	" " " "
Co	5-80	" " " "
Mo	1-5	" " " "
W	below detection limits	
Ta	" " "	
Nb	" " "	
Bi	" " "	
As	" " "	
Sb	" " "	

4.2.7 Soil Samples

Six soil samples are considered possibly anomalous. A copper value of 42 p.p.m. on Boot Creek road is located just north of a 44 p.p.m. copper value from a stream sediment sample on Pink Creek. Two values of 14 p.p.m. Ag and 44 p.p.m. Cu are located on the A6 road just to the north of a 1.8 p.p.m. Ag value from a stream sediment sample on Denise Creek. Three copper values of 110, 84 and 70 p.p.m. are located on the In Creek road. The highest value came from a sample next to the Murchison Highway and as such is likely to be due to contamination. The other two values near the eastern end of the road do not have any associated stream sediment copper highs, though copper values of 100, 60 and 46 p.p.m. occur to the south on Bulgobac and Murray creeks respectively.

ELEMENT and VALUE

Sample No.	Cu	Pb(AAS)	Pb(Spec)	Zn	Ag	Au	Co	W	Mo	Ta	Nb	Sb	As	Bi	Sn	Remarks
T 8	170	200	80	98	2.0	x	80	x	x	x	x	x	500	x	x	Soft, red Fe rich Stalactite
T 9	62	420	300	52	1.2	x	20	x	x	x	x	x	x	x	x	Sheared talcose schist
T10	40	450	1000	36	0.6	0.02	30	x	3	x	x	x	x	x	1	Sheared black shale
T11	44	290	450	1100	1.2	x	30	x	3	x	x	x	x	1	1	Sheared black shale with quartz veining.
T12	5600	62	100	16	1.4	x	x	x	x	x	x	x	x	x	x	Qtz.sericite schist with qtz. veins and disseminated chalcopyrite.

4.2.8 Heavy Concentrate Samples

Some of the separated heavy concentrate fractions were examined under the binocular microscope by Dr.J.F.Lambert. Not all samples have been returned to date and as a result this work remains to be completed. Of the 24 samples examined two contain chalcopyrite. Spectrographic results are outstanding on all the heavy concentrate samples.

4.2.9 Rock Samples

Five rock samples were taken from the vicinity of the old Cu/Au workings on the Mullabadine river. Results were summarised in the table opposite page 11, all results in p.p.m.

5. RECOMMENDATIONS

Possibly anomalous values have been estimated on a conservative basis, preferred threshold being lower than histogram threshold in the case of copper and silver. The following further work is recommended.

1. Stream sediment samples at 100' intervals are to be taken over all possibly anomalous values noted on the map excluding the nickel anomalies associated with the basalt capping.

2. Soil sampling is required at 100' intervals along selected portions of the Murchison Highway and Emu Bay railway lines, as a positive check against contamination. These samples should be taken from ballast material along the side of both road and railway line.

3. Auger or banka drilling at 100' intervals down to bedrock will be necessary over anomalous areas on the Tullabadine and Farm Creek marsh areas.

4. A reappraisal of all anomalies after the above steps have been carried out would include inspection on the ground and also of the order of values realised. If values obtained reach or exceed histogram thresholds, and cannot be explained by contamination or high background effects, soil sample grid sampling should be planned.

As this report was being compiled steps 1 and 2 were completed and results are awaited.

T. Chisholm.

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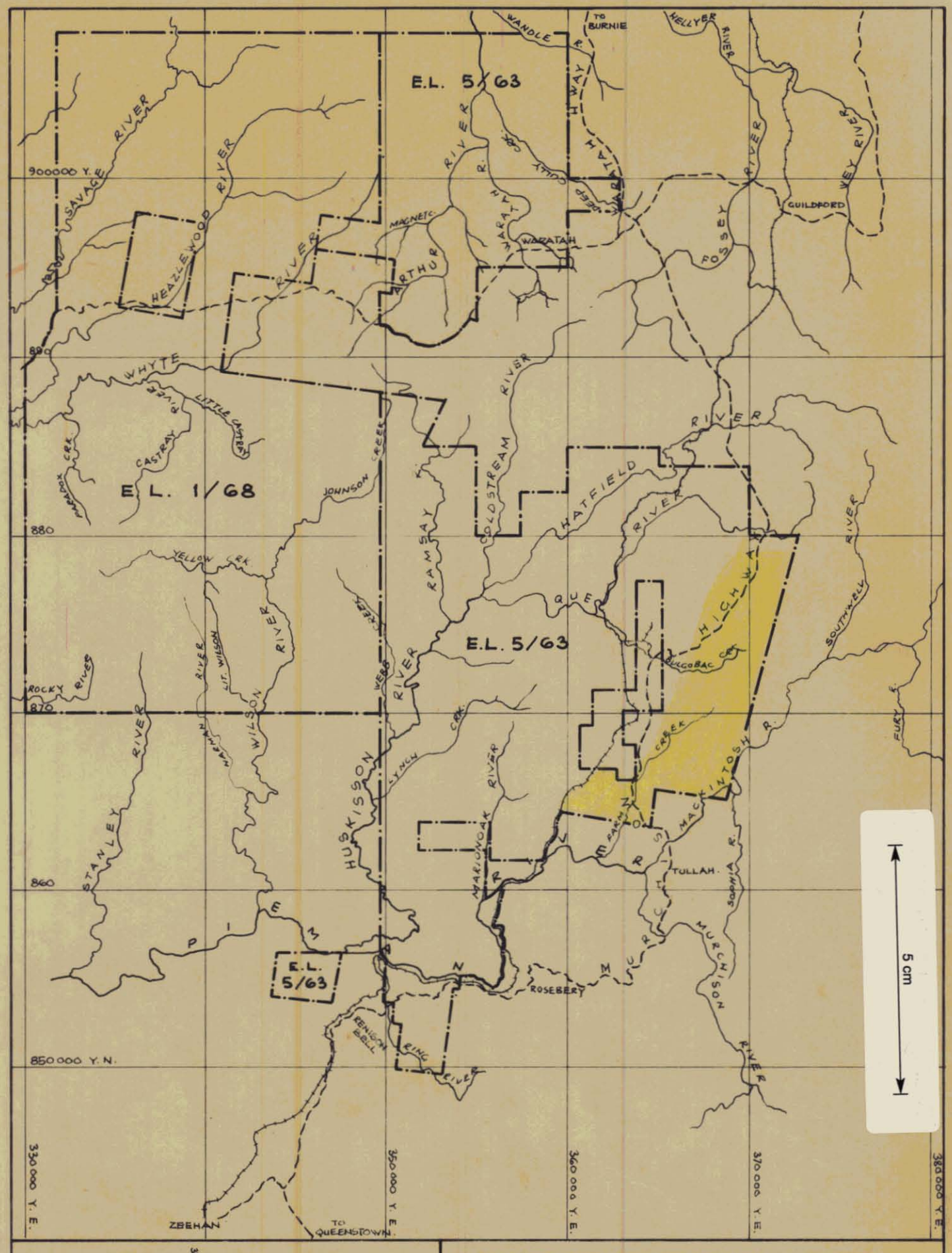

COMSTAFF PROPRIETARY LIMITED

LOCATION MAP

ANG COORDINATES

DRAWN	COMPILED	SCALE	
G.C.		1:250.000.	TAS-2-2A

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5 cm

880 000 Y. N.
875 000 Y. N.
870 000 Y. N.
865 000 Y. N.
370 000 Y. E.
365 000 Y. E.
360 000 Y. E.

TO BURNIE
TO GUILFORD
TO ROSEBERY
MACKINTOSH
MT. CHARTER
MULLABADINE
TULLABADINE
SOPHIA RIVER
QUE RIVER
MT. BLOCK
FARM
HIGHWAY
BULGOBAC
EMU BAY RAILWAY
HATFIELD RIVER
PIEMAN RIVER
BOCO CRK.
STEEP CRK.
SODOM CRK.
GOMORRAH
MURCHISON
OMITTED
DISTANT
JOINT
CLIFF
FOOT
SOCK
BIG
GREEN
PINK
PETE
BAKER
MARCUS
DYAN
ADOLPH
ABLE
KOTZE
MURRAY

QUATERNARY	GRAVEL & TILL	CAMBRIAN	SANDSTONE & QUARTZITE
TERTIARY	BASALT		TUFF & AGGLOMTE
JURASSIC	DOLERITE		GREY SHALES
TABB. OROG.			BLACK SHALES
CAMBN. ? AND/ /OR DEVONIAN ?	PORPHYRY INTRUS & EXTRUSIVES		ARGILLITE
	HORNFELS	FRENCHMAN ? OROGENY.	
		PRE-CAMBN.	SCHIST
			METAQUARTZITE

BEDDING DIP & STRIKE
JOINTING
FLOW LAYERING
SHEARING
CLEAVAGE
GEOLOGICAL BOUNDARY INFERRED.

COMSTAFF PROPRIETARY LIMITED

MACKINTOSH REGIONAL GEOLOGY

ANG COORDINATES

SCALE. 1:50,000
COMP'D. T.M.C.
DRAWN. G.E.C.
TAS. 2 - 264

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880 000 Y.N.

875 000 Y.N.

870 000 Y.N.

865 000 Y.N.

370 000 Y.E.

365 000 Y.E.

360 000 Y.E.

TO BURNIE

TO QUILPOID

TO ROSEBERY

QUE RIVER

MT CHARTER

MT BLOCK

MACKINTOSH

MULLABADINE CRK

RIVER

LEVI

SOPHIA RIVER

TULLABADINE CRK.

FARM

CREEK

KOTZE

STEED CRK.

PIEMAN RIVER

BOCO CRK.

HIGHWAY

ADOLPHUS JUNIOR CRK

BAKER'S CREEK

BAKER'S BACK ROAD

DIAMOND CRK

GOMORRAH

SOUTH CRK

MURRAY CREEK

IN CREEK RD

MARCUS

DYLAN

PINK PETE CRK

A.C. ROAD

KEEN

BIG CRK

SOCK

FOOT

APPLE

CLIFF

JOINT CRK

BOOT CRK ROAD

DISTANT CRK

OMITTED

SHOT

KULTTAR CRK

PAM CRK

BOOMERANG CRK

CHARLIE ALSO

KATE

MURCHISON

BULGOBAC

EMU BAY RAILWAY

HATFIELD RIVER

RIE RIVER

WINTER 1971

WINTER 1970

ANG COORDINATES

5 cm

COMSTAFF PROPRIETARY LIMITED

MACKINTOSH REGIONAL

GEOCHEMICAL COVERAGE

SCALE 1:50,000

COMP'D. T.M.C.

DRAWN G.E.C.

TAS. 2 - 265

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8220221

880000 Y N

875000 Y N

870000 Y N

865000 Y N

370000 Y E

365000 Y E

360000 Y E

TO BURNIE

TO GUILDFORD

TO ROSEBERY

MT CHARTER

MT BLOCK

FARM

QUE RIVER

EMU BAY RAILWAY

HAYFIELD RIVER

ROSE RIVER

MURCHISON

MULLABADINE CRK

MACKINTOSH

RIVER

SOPHIA RIVER

TULLABADINE CRK

PAMELA CRK

BOOBY CRK

CHARLIE CRK

ALSO

KATE

DYLAN

MARCUS

SHOT

OMITTED

KATHER

DISTANT CRK

JOINT CRK

CLIFF

APPLE

BOOT CRK ROAD

PINK

PETE

ROAD

BIG WET CRK

FOOT

SOCK

BOOBY

CREEK

BAKER

GOMORRAH

SODOM CRK

MURRAY

CREEK RD

BULGOBAC

ROAD

DAISY CRK

HIGHWAY

ADOLPHUS

HUNTER

CRK

ARGENT

CREEK

KOTZE

BOCO CRK.

STEELE CRK

PIEMAN RIVER

ZINC

SILVER

COPPER

NICKEL

TIN

STREAM ANOM.

SOIL ANOM.

5 cm

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MACKINTOSH REGIONAL GEOCHEMICAL ANOMALIES

ANG COORDINATES

SCALE 1:50,000

COMP'D. T.M.C.

DRAWN. G.E.C.

TAS. 2-266

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1971 WINTER FIELD SEASON REPORT

E.L. 5/63

AUSTRALIAN ANGLO AMERICAN LIMITED

Incorporated in the State of Victoria

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1971 WINTER FIELD SEASON REPORT

This report consists of detailed reports on the regional exploration of the Hatfield and Mackintosh River areas carried out under the direction of Dr. J.F. Lambert.

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HATFIELD REGIONAL.

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LIST OF MAPS.

004

WINTER 1971

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HATFIELD REGIONAL

1. ABSTRACT

A programme of geological mapping and sampling was completed over the NE portion of the Hatfield drainage (see map Tas 2-239). Access problems prevented coverage of the SW portion of the area. Rock types mapped consisted of mudstone, greywacke, quartzite and conglomerate which together form a NW dipping east limb of a major NE trending syncline (?). No mineralization was noted in hand specimens and geochemical values obtained for copper, zinc, silver, bismuth, antimony, mercury and tin are generally of low order and not considered significant.

2. INTRODUCTION

Summer planning included a regional sampling and mapping programme to cover that portion of the Hatfield drainage basin over pre-Tabberabberan (Devonian orogeny) formations. The main access road (Coldstream) into the area progressed a lot slower than planned and at one stage threatened the whole of this work programme. Despite these difficulties an alternative route was located and up-graded (vehicular and walking tracks) and this enabled a sub-project to be completed over the NE portion of the drainage basin.

The main topographical feature of the area is a large gently undulating basalt (Tertiary) plateau at an elevation of approximately 2,000'. Rising abruptly above this plateau, three miles north of the Hatfield river, are two inliers of (Ordovician) conglomerate, which hills provide the dominant feature of the area and reach a height of 3,300'. The Hatfield river flows in a SW direction and south of the basalt plateau the terrain becomes rugged. The rivers traversed are steeply incised (youthful drainage) with numerous rapids and waterfalls. The lowest elevation on the Hatfield river is at 1,000'.

Temperate rain forest covers the Cambrian (?) sediments with open ground between trees providing relatively easy walking. The basalt plateau contains groves of closely spaced gum and "pepper" trees scattered about a vast open, swampy, button grass plain.

3. GEOLOGY (see map Tas 2-240)

3.1 General

The area mapped occupies the north-central sector of a large, approximately rectangular, Cambrian (?) formation measuring 55 miles N-S by 8 miles E-W from Macquarie Harbour in the south to a point 10 miles south of Waratah. These rocks are overlain by younger sediments (Ordovician-Silurian-Tasmanian Geological Survey) on the eastern and most of the western boundaries. A Tertiary basalt capping forms the northern boundary of the area and Devonian granite has intruded the Cambrian(?) sediments in the NW corner.

3.2 Lithology

Rocks mapped include a series of mudstone, greywacke, quartzite and conglomerate. Overlying these rocks to the north and as an outlier to the south is the Tertiary basalt unit. The stratigraphical sequence is as follows:-

Tertiary	basalt
	unconformity
	mudstone
	quartzite
Cambrian(?)	mudstone (with interbedded greywacke)
	quartzite
	conglomerate

The conglomerate is thought to represent the base of a cycle of deposition. The series fines upwards which suggests sequential deposition having beds the right way up.

This series can be tentatively correlated with series at Coldstream-Ramsay (Summer Report 1969/70) and Bulgobac-Que (Summer Report 1970/71), which theory can only be proved or disproved when the intervening ground has been mapped. At Coldstream-Ramsay two series were noted, the Ramsay series consists of mudstones, sandstones, shales and tuffs and is essentially greywacke free. The Coldstream series consists of greywacke, conglomerate, greywacke and mudstone. The Hatfield series is tentatively classified as portion of the Coldstream series.

Mapping in the Bulgobac-Que area (op.cit. 1970/71) outlined a series of rocks of which the youngest unit was a coarse channel conglomerate - this unit is tentatively correlated with the conglomerate unit in the Hatfield series.

3.2.1. Conglomerate

This is a pale grey, hard, rock with rounded pebbles of quartz and quartzite cemented by a dense, dirty, siliceous matrix. The pebbles are ill-sorted and vary in size from ¼" to 6".

3.2.2 Quartzite

Two distinct quartzite units occur. The lower unit is a fine grained, hard, grey rock consisting essentially of quartz with minor muscovite and minor detrital heavy minerals. Small patches of secondary carbonate occur and veins of this material cutting through the rock carry minor sphalerite. The upper unit is an impure quartzite and easily distinguished in hand specimen by the "glittering" effect of the muscovite flakes, and quartz-limonite veins cutting the rock. The muscovite flakes are generally bent and contorted indicating diagenesis under load metamorphism.

3.2.3. Mudstone

These rocks are soft, micaceous, grey-brown sediments generally well jointed. Occasionally they are laminated, the colour of individual bands being dependant on the zircon, tourmaline and leucoxene content. Interbedded with the mudstone and having sharp contacts are greywacke bands measuring up to 8" in width. These are grey-brown, hard, fragmental rocks, the fragments comprising quartz, jasper, chert and feldspar set in a dominantly clay matrix.

3.2.4. Basalt

Tertiary basalt forms an unconformable capping to the rocks in this area, apart from the conglomerate monadnocks, and is fine-grained, hard, occasionally amygdaloidal and composed essentially of labradorite and augite.

3.3. Structure

The rocks mapped form portion of the eastern limb of a possible major synclinal structure directly related to the

Just-in-Time Anticline (Huskisson 1971 Report), striking NE with dips varying between 30° and vertical to the NW steepening westwards. The fold axis may well be to the west of the area mapped and a more detailed picture should emerge after completion of geological mapping along both the Que and lower Hatfield rivers. Superimposed on this limb are a number of asymmetrical drag folds with similar trends to the major structure, viz., NE. No faults were noted. This structural interpretation would lend credence to the tentative lithological correlations given above.

4. GEOCHEMISTRY (see map Tas 2-241)

Sample intervals were 1,000' on the Hatfield and 500' on tributaries. One tributary of the Hatfield, Rocker Creek, was sampled at 200' intervals as a sample check and results along this creek indicate that normal 500' sampling is adequate. Active stream sediment was collected, dried, sieved through - 80 mesh and analysed by A.A.S. for Cu, Zn, Ag, Hg, Bi, Sb and calorimetrically for Sn. A total of 103 samples were collected from 9 miles of stream traverses.

Results obtained are of low order apart from 6 zinc values of more than 240 ppm which are associated with basalt. Two mercury values in the same general area are anomalous reaching 0.75 ppm.

All values are in ppm. (see also map Tas 2-242)

Element	Range	Background	Possibly anomalous	Values exceeding possibly anomalous
Cu	4-46	17	Nil	
Zn	20-360	150	>240	6
Ag	0.2 -1.6	0.85	Nil	
Bi	5-15	7	Nil	
Hg	0.025-0.75	0.075	>0.4	2
Sn	10-40	27	Nil	
Sb	below limit of detection			

Samples surrounding and including the possibly anomalous zinc and mercury values were further analysed by A.A.S. for Pb, Co, Ni, V, Au and As. Results for all these elements are of low order and are tabulated below:

Element	Range	Background	Possibly anomalous
Pb	26-36	30	Nil
Co	62-160	98	Nil
Ni	98-150	120	Nil
Cd	1-2	1	Nil
Mo	0.5-2.25	1.25	Nil
As	5-10	7	Nil
V	100-170	134	Nil
Au	below detection limit		

5. CONCLUSIONS

The combination of geological and geochemical data accumulated to date indicates that the area covered has little potential for economic mineralization with regard to elements analysed.

The high order zinc values are considered to be the result of Zn^{2+} ions being released from the ferromagnesian minerals in the basalt and being concentrated within organic material in the swamps of the basalt plateau. Salient points in regard to this hypothesis are:-

1. Higher zinc values occur over or in close association to the basalt.

2. The basalt plateau has sheet flow drainage giving rise to glei type soil (reducing conditions) which is prone to give spurious geochemical anomalies.

3. The zinc "anomalies" have a low order silver and lead association which is uncommon to the norm for local mineralization which requires associations of high Cu, Pb or Ag values.

4. Cadmium values are low. This is taken as a point against the possibility of a zinc sulphide deposit a stipulation for which is the almost universal association of the two elements.

5. The only zinc sulphide mineralization noted in rock specimens gave rise to low order zinc values in stream sediments.

6. FUTURE WORK

1. A scintillometer traverse across the outcropping conglomerate horizon in the Hatfield river is required as a check against possible uranium mineralization.

2. Additional stream sediment samples ought to be taken above the 40 ppm tin value in Valley creek.

3. Heavy concentrate samples at about 2,500' intervals are required from the Hatfield and larger tributaries as an empirical check on geochemistry.

4. The window of sediments in the basalt capping about mid-Rocker creek remains to be stream sediment sampled.

T. CHISHOLM

6th September, 1971.

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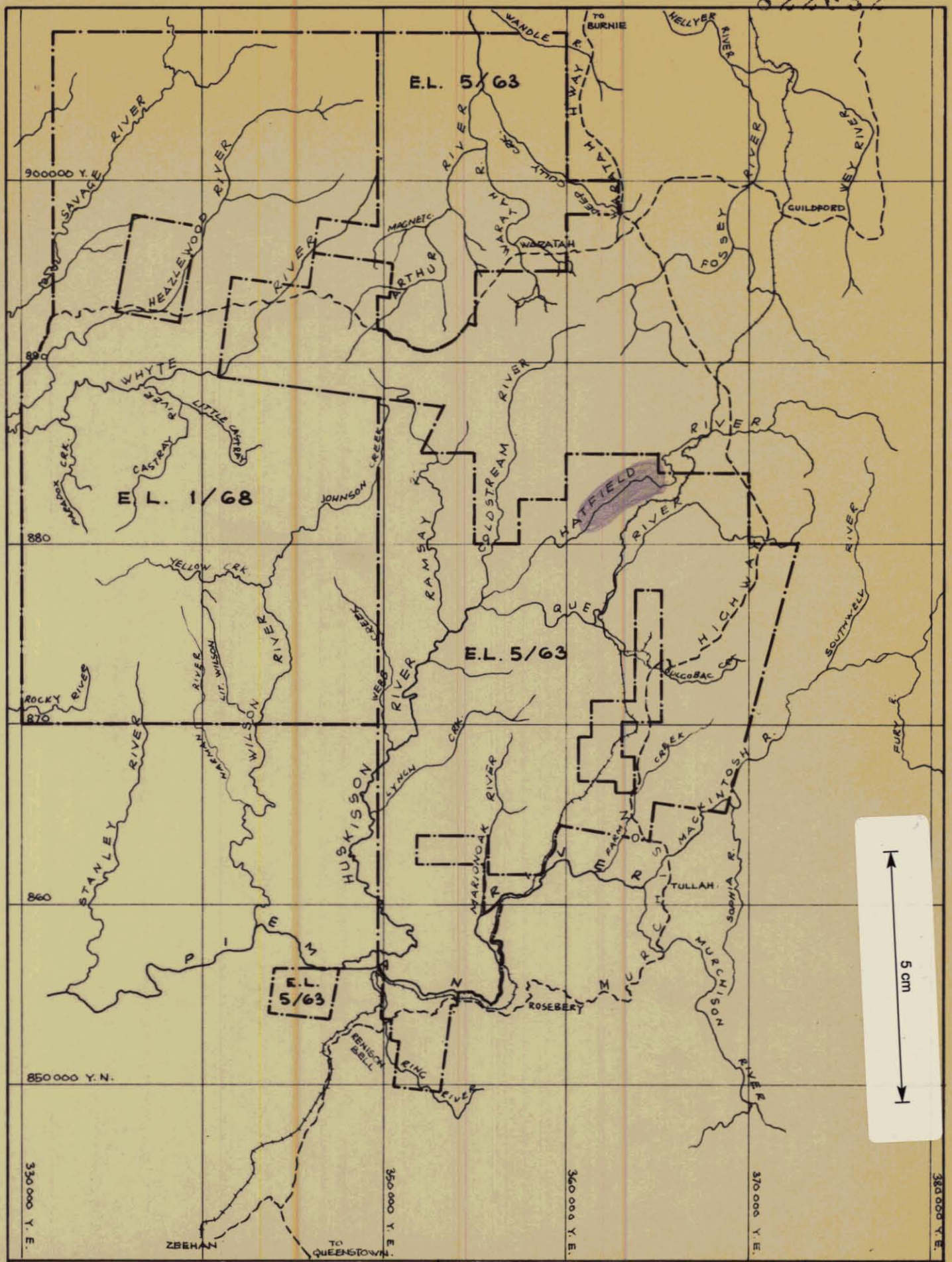

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LOCATION MAP

ANG COORDINATES

DRAWN	COMPILED	SCALE	
G.C.		1:250.000.	TAS-2-2A

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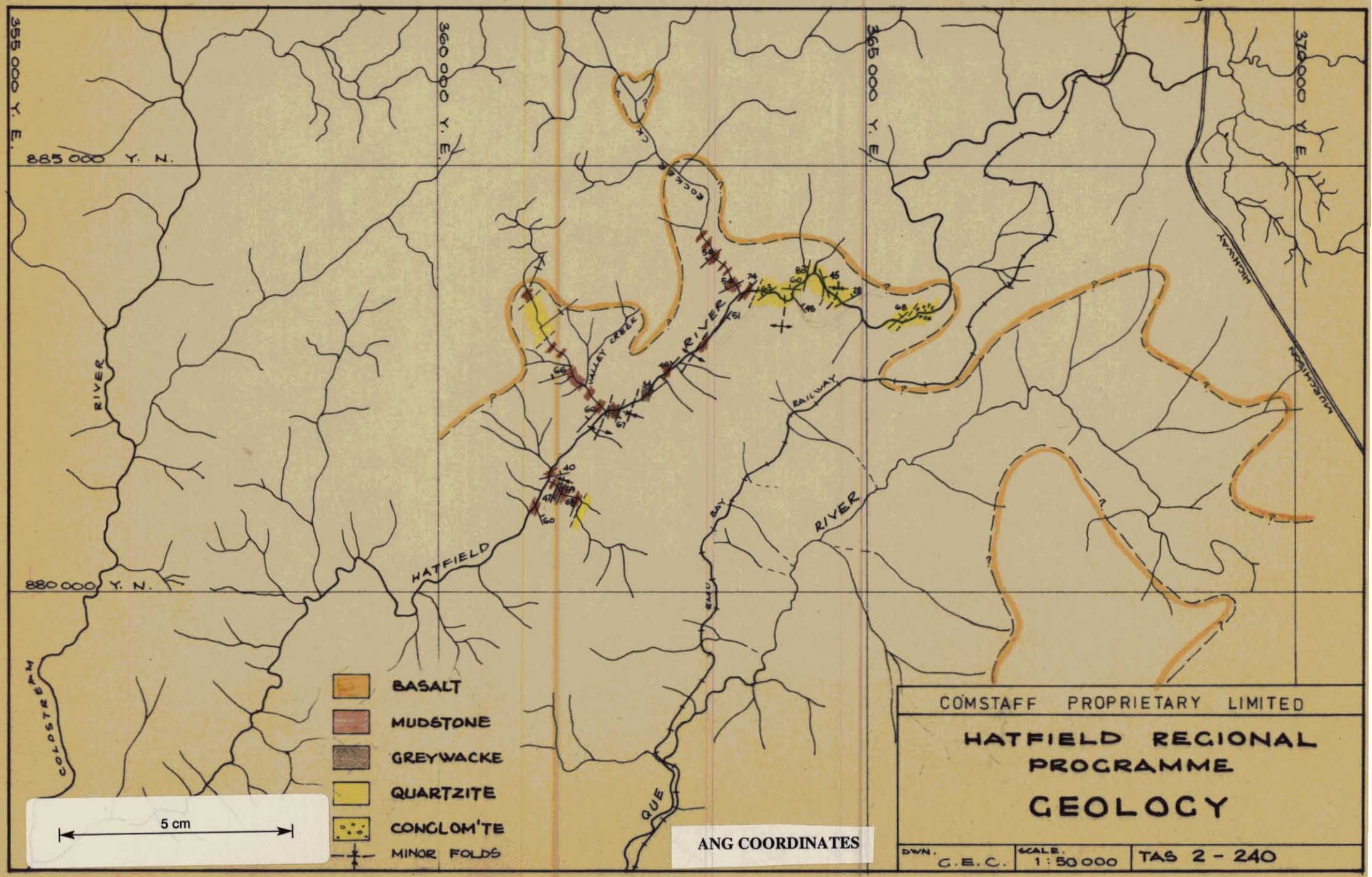

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HATFIELD REGIONAL PROGRAMME

GEOLOGY

DWN.	SCALE.	
G.E.C.	1:50 000	TAS 2 - 240

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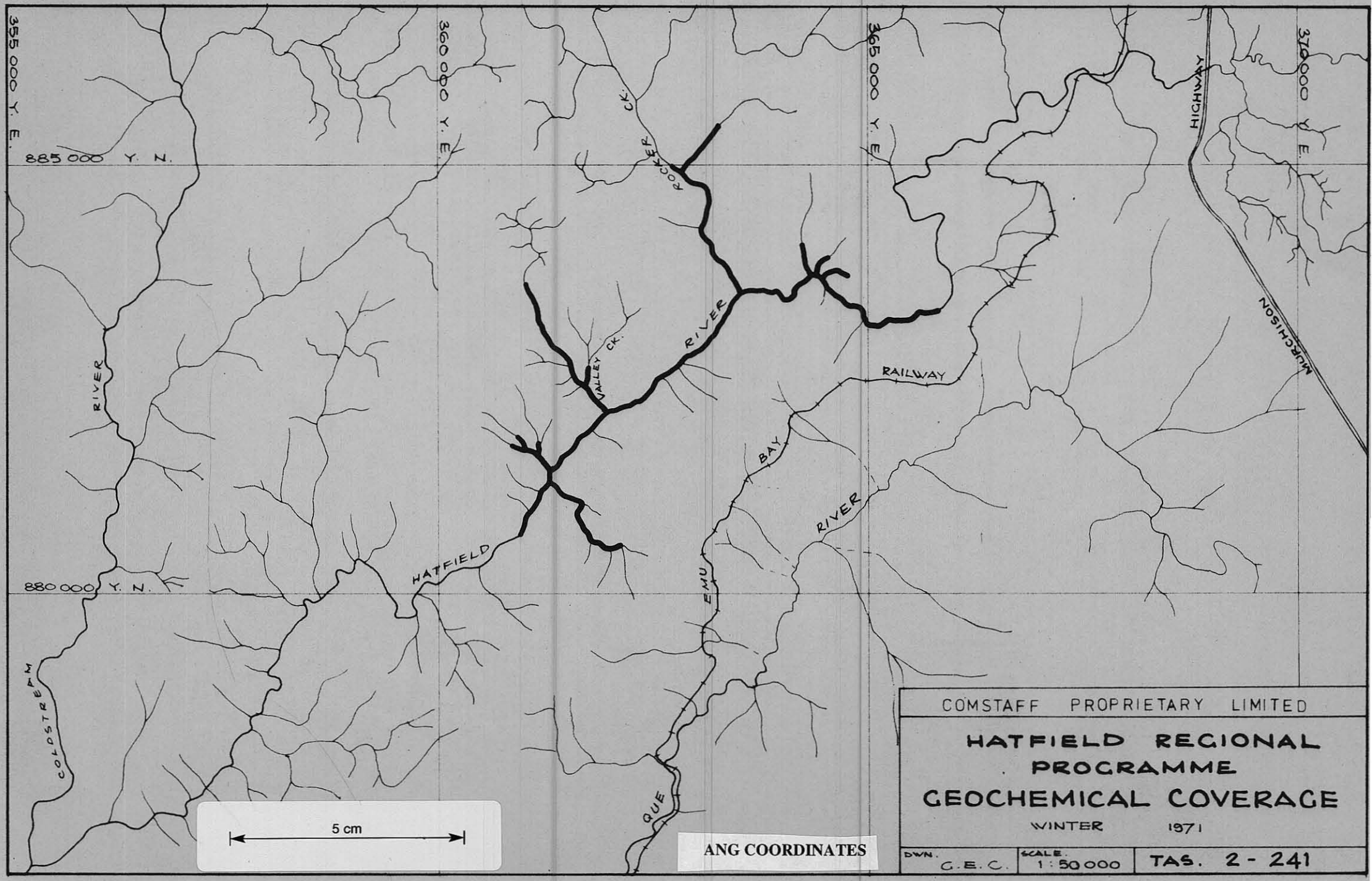

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HATFIELD REGIONAL PROGRAMME
GEOCHEMICAL COVERAGE

WINTER 1971

DWN.	SCALE.	TAS. 2 - 241
G.E.C.	1 : 50 000	

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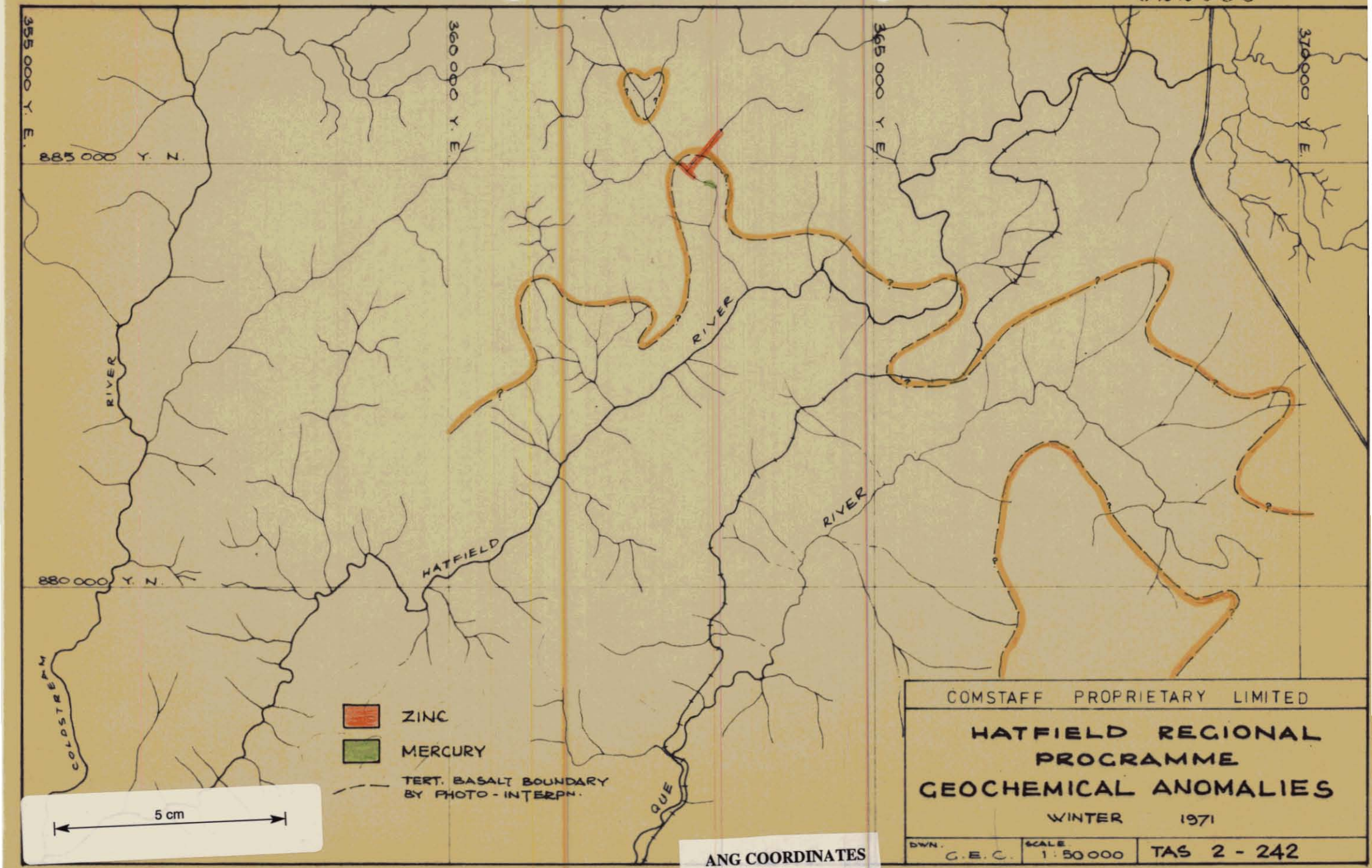

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HATFIELD REGIONAL PROGRAMME
GEOCHEMICAL ANOMALIES

WINTER 1971

DWN.	SCALE	
G.E.C.	1 : 50 000	TAS 2 - 242

ANG COORDINATES