

EL. 1/63

COMINCO EXPLORATION PTY. LTD.

Report to Tasmanian Mines Dept.

Progress Report - CLEVELAND TIN N.L.

6 months ending June 30, 1973

D.M.Ransom

D.C. Simpson

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COMINCO EXPLORATION PTY. LTD.

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Subject: Progress Report - CLEVELAND TIN. N.L.  
Period: 6 months Ending June 30, 1973  
Date: August 21, 1973  
By: D.M. Ransom

1. SUMMARY

The objectives of the past year's work were ;

- i) to produce a regional map of the exploration licence and its immediate surrounds to form the basis for the control of exploration activity;
- ii) conduct detailed grid mapping of the strike extensions of the mine;
- iii) carry out a combined geochemical and self potential survey of the mine sequence extensions.

These objectives were achieved in the western part of EL 1/63 but are incomplete in the eastern part of EL 1/63. Some of the data is in compilation, and has yet to be assessed.

Regional geological mapping showed that the EL area is divisible into four sedimentary sequences, separated from one another by ultramafic bodies. Correlation across these bodies is difficult.

The geochemical and geophysical programmes have produced anomalies which are not resolved, and follow up on those is now proposed.

2. INTRODUCTION

A. History

Cominco Ltd., acquired, in August 1971, 54% equity in Aberfoyle Ltd, and subsequently CEPL were appointed exploration managers to Aberfoyle Ltd. and, through it, to Subsidiary Company Cleveland Tin N.L.

B. Ownership

Lease 27M/71 (previously 43M/66) and surrounding EL 1/63 are 100% owned by Cleveland Tin N.L.

Previous names are still in use:-

- i) around Cleveland mine Hall's, Henry's, Khaki,  
(Sn Cu) Luck's, Smithy's, Battery.

ii) Within EL 1/63 (as at August 1973)

Washington Hay (Ag Pb)  
 Washington Extended (Ag Pb)  
 Badger Prospect (Sn?)  
 Godkin (Ag Pb) is no longer within the EL.

EL 1/63 is granted for six monthly intervals, with the next renewal date being August 11, 1973.

C. Location

Latitude  $41^{\circ}28'S$ , Longitude  $145^{\circ}24'E$   
 Mine township is LUINA, 60 km SW of Burnie, which is on the Tasmanian north coast.

D. Production

Production for the year ended June 30, 1973 are as follows

|              |         |
|--------------|---------|
| Tons Broken  | 360,681 |
| Tons Treated | 358,288 |

E. Objectives

Exploration will continue to be aimed at establishing the distribution of Cleveland type mineralisation within the ML and EL, and testing to locate ore grade mineralisation.

3. EXPLORATION AND DEVELOPMENTA. Reconnaissance and Research

The zoning of Zn within the Cleveland Mine is under study as time permits. The results of this work may offer useful guidelines for exploration.

B. Prospecting

Nil, outside the geochemical programme.

C. Geological Mapping

An area of 80 square kilometres between Luina and Waratah was mapped as part of the summer field programme (1972-73) in the Cleveland Mine area. No map of this area had been published since 1923. The mapping was reconnaissance work only, intended to define stratigraphy and establish any regional relationship between the tin deposits of Mt. Bischoff and Cleveland. It successfully defined four stratigraphic sequences.

Compilation of detailed mapping at 1:5000 scale and 1:100 scale in the area immediately surrounding Cleveland was incorporated in the final map. This compilation includes 1" to 40' and 1" to 100' mapping in the Cleveland-Magnet area by R. Cox. All new mapping was carried out by D.M. Ransom, P.J. O'Shea and G.O. Boyle.

D. Geochemical Work

i) Programme Followed

A soil sampling programme has covered a total area of 150 hectares of favourable stratigraphy north and south along strike from the mine.

Control was by cut lines pegged at 25 metre horizontal distance intervals.

A total of 2312 soil samples have been collected over a total line distance of approximately 29.6 kilometres.

The samplers were instructed to collect material immediately below the humic cover.

Previous orientation studies (reported in 1972) had demonstrated the effectiveness of this technique for detecting Cleveland type mineralisation on the steep hill slopes.

All soil samples were dried and broken down with gentle rolling and the -80# fraction sieved off for analysis.

Analysis of samples over less favourable rock types has been deferred and currently 1726 samples have been analysed.

Analytical techniques have been AAS following hot perchloric acid leach for one hour on the -80# fraction for Cu, Zn and emission spectrography on material ground to -300# for Sn, Bi, Ag and As.

Results are available for 1418 samples for the emission spec. elements.

The current position illustrating where samples have been collected in this and previous years together with analyses available is shown at 1:5000 scale on Plate CT 112B/72 and CT 112C/72.

The results for Sn, Cu and Zn are currently being plotted at 1:1000 scale for evaluation.

Strongly anomalous SnCuBiAg values have been detected in Deep Creek alluvium from Lines AI to AS inclusive. Some pitting beneath this alluvium is currently underway to test if the values represent

contamination from known mineralisation upstream or mineralisation beneath the alluvium.

E. Geophysical Work

Self potential geophysics were carried out in conjunction with soil geochemistry.

59 lines totalling 32,552 metres were traversed using the self potential method.

The SP programme has revealed a number of possible anomalies in the vicinity of lines RA11, RA12, RA13, south of Fall's Creek. The significance of these "anomalies" has not been explored at this time, due to withdrawal of field crews over winter.

F. Trenching

None completed in EL 1/63.

Pitting is underway currently between lines AK - AM in the area of Deep Creek (just inside the southern boundary of ML 27M/71)

G. Diamond Drilling

One exploration hole was drilled to test a self potential anomaly on the Cleveland Tram near the HEC Power Line. As this hole was drilled inside ML27M/71, its cost is not reported as EL 1/63 expenditure.

The hole was drilled at 55° decline with a bearing of 335°.

Interbedded micaceous sandstones and shales of turbiditic character were intersected to a completed depth of 541 ft.

Minor amounts of disseminated sulphides including pyrite, sphalerite and arsenopyrite, were encountered.

5. GEOLOGY

i) Regional Setting

The earliest comprehensive geological cover of the area mapped last summer, was by Twelvetrees (1900) who assigned the rocks at Mt. Bischoff to the Cambro-Silurian, these pre-dating fossiliferous rocks outcropping in the Godkin area. Subsequently, McIntosh-Reid (1923), Nye (1923), Henderson (1937) and Carey (1945) have variously assigned the sediments of the area to the Cambrian on the basis of lithological correlations with Dundas "Series". McIntosh-Reid (1923) differentiated the Bischoff Formation (slates quartzites and sandstones) from the Magnet

Range Formation (red and purple slates, cherts and tuffs), which it overlies, and correlated the former with the Dundas Series and the latter with the Balfour Formation. More recently, Groves and Solomon (1964) remapped part of the Mt. Bischoff area correlating the Bischoff Formation with the Carbine Group and the overlying rocks with the Crimson Creek Formation.

Cox (1968) mapped the area between the Cleveland and Magnet mines and defines five formations as follows:

- (Magnet Creek Lithic Sandstone Formation (uppermost))
- (Whyte Hill Basic Volcanic Formation)
- Dundas Group (Deep Creek Basic Volcanic Formation)
- (Hall's Formation)
- (Crescent Spur Micaceous Sandstone Formation (lowermost))

This stratigraphy was an extrapolation of the sequence at the Cleveland Mine and depends on a complicated structural interpretation.

Groves (1971) considered the Mt. Bischoff sequence to be surrounded by younger sediments, which he grouped into two sequences; a sequence of greywackes, sandstones and mudstones (the Waratah River sequence) and a sequence of red mudstones and sandstones, (the Arthur River sequence).

ii) Rock Types

A. The Sediments

Drawing nos. CT 115/73 (Map 1) shows the distribution of rock types in the area mapped. As with previous attempts, it has not been possible to erect a single stratigraphy for the whole area. Instead four stratigraphic sequences have been mapped as follows:

1. Mt. Cleveland Sequence
2. Fall's Creek-Cleveland Mine Sequence
3. Magnet Range Sequence
4. Mt. Bischoff Sequence

Each of these sequences contains mappable rock units, and each is separated from the others by major units of ultramafic and mafic rocks. The significance of these ultramafic and mafic units is discussed in Section B.

1. Mt. Cleveland Sequence

This sequence occupies the north western part of the area mapped, being

bound on its eastern edge by an ultramafic rock unit in the valley of the Whyte River. The western boundary has not been mapped, but appears to dip under mica schist on the road between Luina and Savage River. The sequence is composed of light to dark grey, massive micaceous sandstones and contains two major chert units, one outcropping on the west of Mt. Cleveland, and the other about 1 km to the west of Mt. Cleveland. These units are traceable on aerial photos. The sandstones are usually composed of poorly sorted quartz grains (up to 60% by volume) rock fragments and feldspar (10%), matrix (20%), and coarse detrital muscovite and biotite (5%). Despite their massive character, these rocks are considered to be turbidites on the basis of characteristic sedimentary structures visible in core at the Cleveland Mine. The cherts on Mt. Cleveland are black to grey-green in colour, massive or bedded. Three sub-units have been recognised on Mt. Cleveland: an eastern unit, which is black; a middle unit which is pale grey and glassy; and a western unit which is massive, grey-green and brown. The thickness of the Mt. Cleveland Sequence is greater than 2,000 metres.

Facing in this the Mt. Cleveland Sequence is indeterminate but has similar dip to the sequence described below.

## 2. Fall's Creek-Cleveland Mine Sequence

This sequence occupies the area between the Whyte River ultramafics and the Magnet Range (Map 1) and it includes the Cleveland Mine rocks. The sequence is best exposed in Fall's Creek, where five distinctive rock units are mappable from the west as follows:

micaceous sandstone unit

shale and chert unit (Hall's Formation)

basic volcanic unit

volcanic arenite and micaceous sandstone unit

black argillite and arenite unit.

The thickness of the sequence in Fall's Creek (which in its thickest development) is about 1500 m. Only the micaceous sandstone unit and the volcanic arenite

and micaceous sandstone unit persist along strike (Map 1). The other rock units lens along strike and the basic volcanic unit appears to undergo a facies change to the volcanic arenite near Whyte Hill (Map 1).

The first three units in the sequence above are equivalent to the stratigraphy of Cox (1968) for the mine area. The volcanic arenite and micaceous sandstone unit above is probably equivalent to the Whyte Hill volcanics of Cox (1968).

In detail, the mica sandstone unit is similar to the rocks of the Mt. Cleveland sequence but contains minor lenses of chocolate shale and volcanics near the contact with the shale and chert unit.

The shale and chert unit (Hall's Formation of Cox, 1968) is a well defined grey shale, chocolate shale and chert unit. In detail, it is divisible into two similar sub-units separated by a thin volcanic layer.

The northern end of the western unit contains the Cleveland orebody. The main distinction between the rocks of the mine and the shale and chert equivalents to the south and east is the predominance of grey shales. Chocolate shales are absent from the mine sequence except in drill holes adjacent to the south west extension of the orebody. Carbonate rocks have been drilled in the eastern sub units near the Cleveland mine.

The basic volcanic sequence consists of flows, tuffs, tuffaceous shales and chocolate shales. The tuffs and flows are spilitic in composition. Tuffs dominate the sequence.

Around the Cleveland Mine, there may be a concentration of lithic tuffs, lapilli tuffs and tuff breccias. No pillow lavas have been observed anywhere within the area mapped, and the current bedding in the tuffaceous shales indicates a shallow water depositional environment.

The volcanic arenite and micaceous sandstone unit grades into the basic volcanic unit both along and across strike. Typically, the micaceous sandstones exhibit a slightly greyer colour than the micaceous sandstones to the west, but are often indistinguishable,

The volcanic arenites are composed of well sorted, angular, rock, crystal and glass fragments, altered to albite, chlorite, epidote and carbonate. In hand specimen, and outcrop they are difficult to distinguish from the lavas. Fine grained varieties containing abundant brown mica are interlayered. The ubiquitous bedding in this sequence serves to distinguish the sandstones in outcrop from the micaceous sandstones to the west. This rock unit is recognisable over a total strike length of about 12 km. probably lensing out to the west of the Magnet mine. To the north of Whyte Hill, chocolate shale is a common constituent of this unit, possibly as a facies equivalent of the spilitic volcanics.

Volcanic arenites are also present to the south of the Washington Hay mine (Map 1).

The volcanic arenite and micaceous sandstone unit does not occur in South Fall's Creek and a facies change to the black argillites and arenites is interpreted.

The black argillite and arenite unit is a well bedded sequence of quartz greywackes and shales. Similar rocks are present in the volcanic arenite unit. Graded bedding has been observed. In the eastern end of Fall's Creek, a black micaceous sandstone occurs, apparently conformably with the argillites. In this section, all of these black rocks are characterised by a significant content of ragged carbonaceous material and fine grained brown mica.

As a whole, the Cleveland Mine-Fall's Creek sequence resembles the Mt. Cleveland sequence, but is distinguished mainly by its basic volcanic content.

### 3. Magnet Range Sequence

This sequence is a narrow unit of chocolate coloured argillites, arenites and cherts extending north from the Badger prospect through Whyte Hill, along the Magnet Range, and seems to disappear to the north of the junction of Magnet Creek and the Arthur River. The cherts are of slightly different character to those in the Cleveland mine-Fall's Creek Sequence. They occur mostly as bleached spots and

layers within the chocolate coloured rocks, commonly cutting across bedding. They vary in colour from white to red. In some instances they are clearly related to faulting on a mesoscopic scale, e.g. on Whyte Hill.

The Magnet Range Sequence resembles the chocolate shale members of the Cleveland Mine-Fall's Creek Sequence. It is the thinnest sequence mapped, being approximately 300 metres thick.

Facing in this sequence is unknown, as with the Mt. Cleveland Sequence, but exhibits similar westerly dips to the Cleveland Mine-Fall's Creek Sequence.

#### 4. Mt. Bischoff Sequence

In this sequence is included all rocks east of the Magnet Range. The sequence is best exposed along the Arthur River from the Corinna-Waratah road to Magnet Creek. The sequence is divisible into three rock units from south to north as follows:

black argillite unit

purple shale and tuff unit

quartzite, slate and dolomite unit

The quartzite, slate and dolomite unit is the Bischoff Formation of McIntosh-Reid (1923). The quartzites and slates are well bedded and strongly deformed in part. Only their southern contact with the tuffs has been mapped in any detail, but a conformable or at least disconformable contact seems to exist with the purple shale and tuff unit. This unit exhibits purple and chocolate coloured shales closely interbedded with basic tuffs, similar in petrography to the volcanic arenites described above. The quartzites differ from the Magnet Range Sequence in their almost complete lack of chert.

The black argillite sequence is gradational to the purple shale and tuff sequence over about 200 metres. They differ from the black argillites of Fall's Creek in their generally massive character and relative lack of arenaceous beds. In thin section, they are rich in chlorite, biotite, and carbonateous material. The tuff and argillite units are over 200 metres in thickness. The thickness of the slates and quartzites is indeterminate.

## 5. Stratigraphic Relations

It is considered virtually impossible to correlate rocks across the ultra-mafic bodies with certainty, especially the Mt. Bischoff Sequence with the others. The sequences, other than the Mt. Bischoff Sequence, exhibit extensive chert members, and in the case of the Mt. Cleveland and Cleveland Mine-Fall's Creek Sequences, certain rock types are common to both. It is suggested therefore, that the Mt. Bischoff Sequence is separated from the other sequence by a major time break or facies change.

Uncertainties in the stratigraphy also exist within the sequences themselves. This is mainly a function of the lack of unambiguous facing criteria throughout the area. This is especially significant in the Cleveland Mine-Fall's Creek Sequence, which contains the Cleveland orebody. In this sequence, almost all dips are to the west. Unambiguous facing criteria in South Fall's Creek (Map 1) suggest the sequence youngs to the west. However, Hopwood and Glasson (1962) and Cox (1968) state that in the mine area, the rocks young to the east, i.e. they are overturned. A brief re-examination of some surface exposures shows that such facing criteria are ambiguous and difficult to interpret. Further, a repetition of Hall's Formation on the eastern side of the volcanics is absent. The stratigraphy within each sequence can be summarised as follows:

### Mt. Bischoff Sequence

Black argillites  
tuff and purple shales  
Unconformity ?-----?-----  
quartzites and slates (Mt. Bischoff  
Fm)

### Magnet Range Sequence

Red argillites and cherts.

### Cleveland Mine-Fall's Creek Sequence

Micaceous sandstone  
Grey shales and cherts (Hall's Formation)  
Spilites, tuffs  
Volcanic arenities, micaceous sandstone

### Mt. Cleveland Sequence

Micaceous sandstone and chert

#### B. The Ultramafic Rocks

The sedimentary sequences are separated from one another by units of mafic and ultramafic rock. The largest of these units extends approximately 18 kilometres from Mt. Bischoff to the Meredith Granite along Bett's Track (Map 1).

These ultramafic rocks are complexes of intrusive and possible extrusive types, ranging in composition from peridotites to basalts. The most common rock type appears to be a medium to coarse grained sub-ophitic dolerite or gabbro which forms bouldery scree slopes where it outcrops. The next most common rock types are pyroxenites, serpentinites and basalts. The basalts occur in creeks south of Whyte Hill, and are represented by amygdaloidal varieties. Amygdaloidal rocks are also present near the Magnet mine (Nye, 1923). The volcanic sequence near the Cleveland Mine has been mapped into a cross cutting ultramafic body (probably part of the Heazlewood River complex) which outcrops in South Fall's Creek. In the Cleveland mine area, drill holes have intersected ultramafic rocks within the micaceous sandstones and their contacts are invariably brecciated and mixed with sediments. The Magnet Range Sequence may be an integral part of the ultramafic sequence. The ultramafics appear to be typical ophiolites.

#### C. The Granite

The contacts of the granite have been traced by combining aeromagnetic data and field mapping. The granite is Devonian in age (McDougall and Leggo, 1965) and is petrographically an adamellite with porphyritic phases. The dyke mapped within the Mt. Bischoff Sequence is a tourmaline-bearing quartz feldspar porphyry. The dykes are also Devonian in age. They are prominent in the old Mt. Bischoff tin mine, and have been mapped in detail by McIntosh-Reid (1923) and Groves (1968).

D. Other Rocks

These rocks are not mapped completely or in detail. They are summarised as follows:

Tertiary Olivine basalt cappings, commonly overlying gravels of similar age.

Permain A few outcrops of grey shales occur below the Tertiary capping to the north of the Magnet Mine (Map 1).

Silurian Limestones and sandstones, fossiliferous in part, occurring in the south west corner of the area mapped (Map 1).

iii) Structural Geology

Inspection of Map 1 shows that within the area mapped there are two distinct structural subareas separated exactly by the ultramafic unit outcropping along the eastern side of the Magnet Range Sequence. In the north west sub area, dips are consistently to the west and north west, and in the eastern sub area, dips are to the south. The eastern sub area corresponds with the mapped outcrop of the Mt. Bischoff Sequence. A major structural break between the two sub areas is implied.

Mineralisation

Detailed study of the tin mines at Cleveland and Mt. Bischoff has shown that the mineralisation occurs in sediments of dolomitic affinity. In the case of Mt. Bischoff, it is closely related to porphyry dykes of established Devonian age, which strongly implies that the other examples of these deposits in Western Tasmania (Cleveland, Mt. Lindsay Renison Bell, Queen Hill) are Devonian in age and have a hydrothermal replacement-type origin.

6. FINANCE

Expenditure

|              |                 |
|--------------|-----------------|
|              | \$              |
| Geology      | 23,444          |
| Surveying    | 6,253           |
| Geophysics   | 2,788           |
| Geochemistry | 4,637           |
| Drilling     | <u>58</u>       |
|              | <u>\$37,180</u> |

7. CONCLUSION

Exploration activity carried out over the past year revealed general areas of interest. Further work will be carried out on these in the coming field season.

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(Old Series)

ATTACHMENTS

- |                         |   | Scale   |
|-------------------------|---|---------|
| Map 1 (Plan CT 115/73)  | Regional Geology of Waratah-Luina                 | 1:50000 |
| Map 2 (Plan CT 112B/73) | Summary map showing Geochemical sampling coverage | 1:5000  |

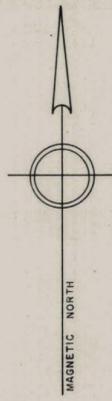
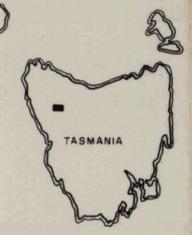
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|       |   | Scale  |
|-------|---|--------|
| Map 3 | (Plan CT 112C/73) Summary map showing<br>Geochemical sampling<br>coverage | 1:5000 |
| Map 4 | (Plan CT 112A/73) Summary map showing<br>factual geology                  | 1:5000 |
| Map 5 | (Plan CT 112B/73) Summary map showing<br>factual geology                  | 1:5000 |
| Map 6 | (Plan CT 112C/73) Summary map showing<br>factual geology                  | 1:5000 |

Submitted *D.M. Ransom*  
 D.M. Ransom  
 Geologist

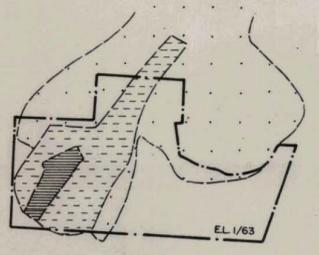
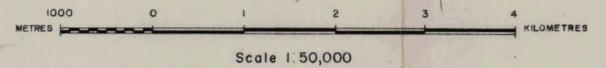
and *David Simpson*  
 D.C. Simpson  
 Geologist

DMR/DCS:imk



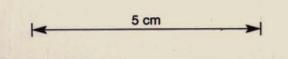
- TERTIARY**
- Tb Basalt
- DEVONIAN**
- Dg Granite, quartz porphyry dykes
- MT. BISCHOFF SEQUENCE**
- ba Black argillites
  - sh/vt Tuffs, greywackes, Grey shale, purple shale
  - MBF Slates, quartzites - Mt Bischoff Formation
- MAGNET RANGE SEQUENCE**
- mb Red argillites, arenites and cherts
- CLEVELAND MINE - FALLS CREEK SEQUENCE**
- ss Mica sandstones
  - sh/vt Cherts, grey shales - Hall's Formation
  - vb Basic lavas, tuffs
  - ss/vt Mica sandstones, tuffaceous shales, volcanic arenites
- MT. CLEVELAND SEQUENCE**
- um Mica sandstone with chert members
  - um Ultramafic rocks dunite, pyroxenites, gabbros, basalts (probably allochthonous)

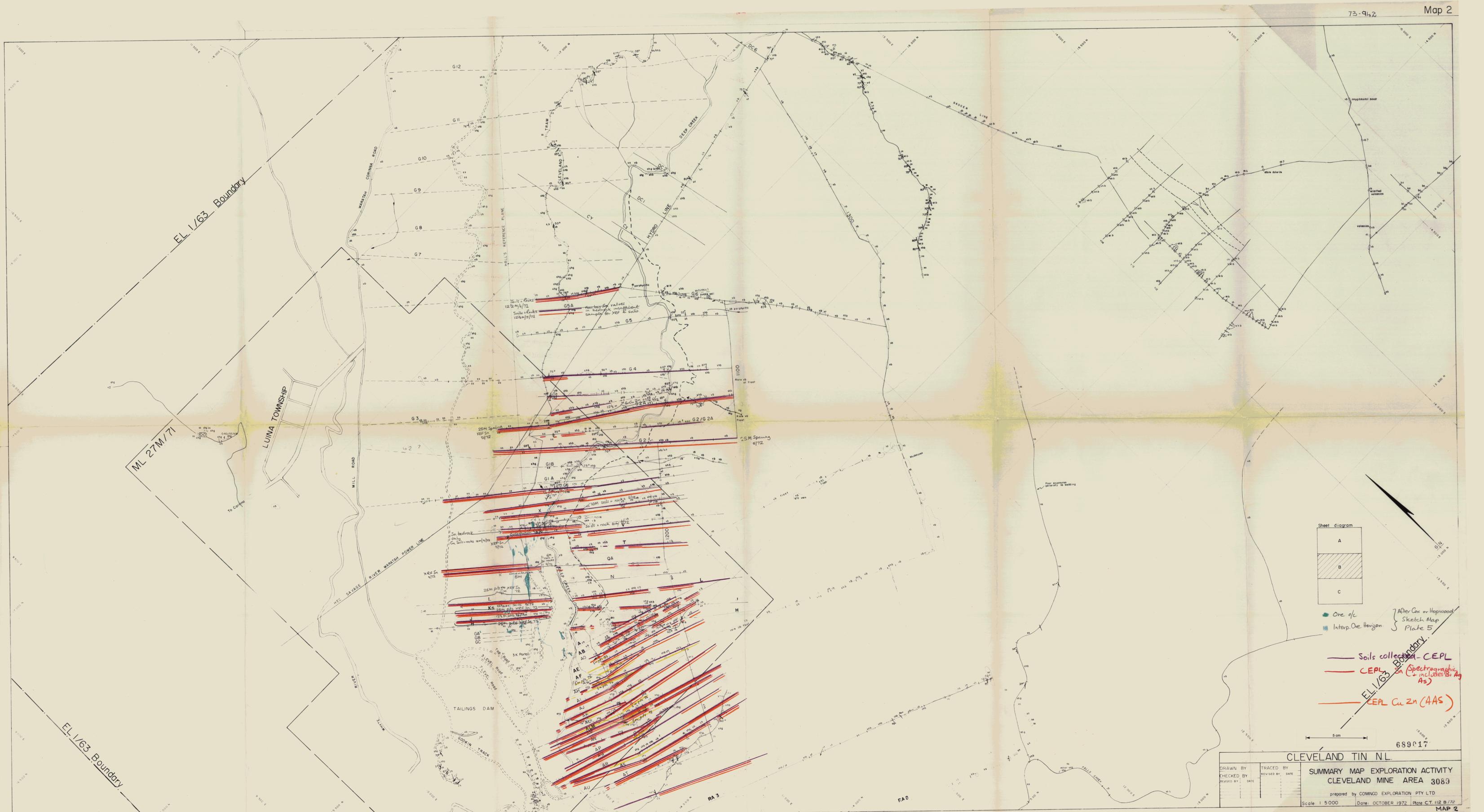
- Tram
- Mine
- E.L. Boundary
- M.L. Boundary
- Interpreted Boundary
- Fault
- Dip & Strike of Bedding
- Road or track
- River or creek



- RELIABILITY DIAGRAM**
- Detailed outcrop and float/soil mapping 1:1000 scale
  - 1:5000 scale outcrop mapping and detailed stream traversing
  - Regional stream and ridge traversing 1:10,000 and 1:50,000 scale
  - Remainder photo interpretation and regional magnetics

AMG REFERENCE POINTS ADDED



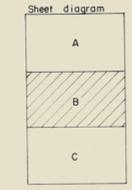


EL 1/63 Boundary

ML 27M/71

LUINA TOWNSHIP

EL 1/63 Boundary



- Ore d/c
- Interp. Ore Horizon
- Soils collected - CEPL
- CEPL Zn (Spectrometric + includes Bi, Ag, As)
- CEPL Cu Zn (AAS)

5 cm

689017

CLEVELAND TIN N.L.

|              |            |   |  |
|--------------|------------|---|--|
| DRAWN BY     | TRACED BY  | SUMMARY MAP EXPLORATION ACTIVITY        |  |
| CHECKED BY   | REVISED BY | CLEVELAND MINE AREA 3083                |  |
| REVISED BY   | DATE       | prepared by COMINCO EXPLORATION PTY LTD |  |
| Scale 1:5000 |            | Date: OCTOBER 1972 Plate CT. 112 B/72   |  |

LEGEND

- ss Micaceous sandstone
  - vb Basic volcanic, probably lavas, spilitic mineralogy
  - vt Basic tuff, includes tuffaceous shales, lithic & lapilli beds, tuff breccias & volcanic breccias
  - shg Grey shale or mudstone
  - shb Brown & purple shales or mudstones
  - ch Chert, undifferentiated
  - ub Rocks of ultrabasic affinity, includes serpentinite, pyroxenite, gabbro diorite, both coarse & fine grained occasionally amygdaloidal probably related to Hazelwood River Complex
  - ba Dominantly dark to black argillites containing rarer arenaceous layers & micaceous varieties
- 
- Grid lines
  - Survey Points
  - Rock outcrops
  - Distribution of float on grid lines
  - Dips on bedding
  - Dips on faults
  - Dips on cleavage
  - Fold axes
  - Creeks with rock outcrops indicated

— CEPL soils collected & stored in Adelaide

— CEPL Sn (Spectrographic and includes Bi, Ag, Ar)

— CEPL Cu Zn (AAS)

Data compiled from variety of informal maps and plotted at 1:1000 scale. Samples destroyed.

— Aberfoyle Sn (Estimate)

— Aberfoyle Cu Zn (Includes Pb, Mn)

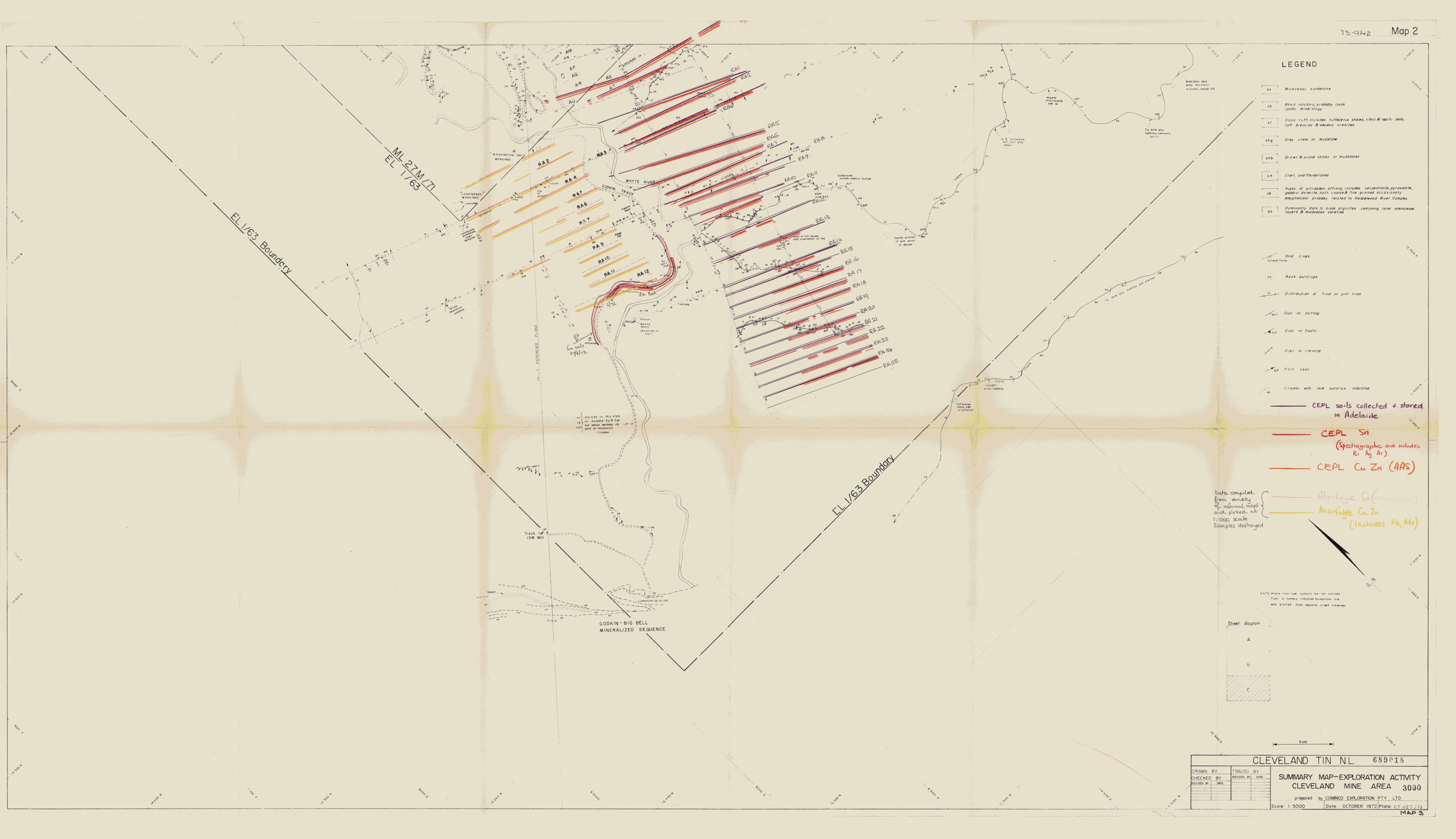
NOTE: Where rock type symbols are not outlined float is normally indicated. Exceptions are data plotted from regional cross traverses.

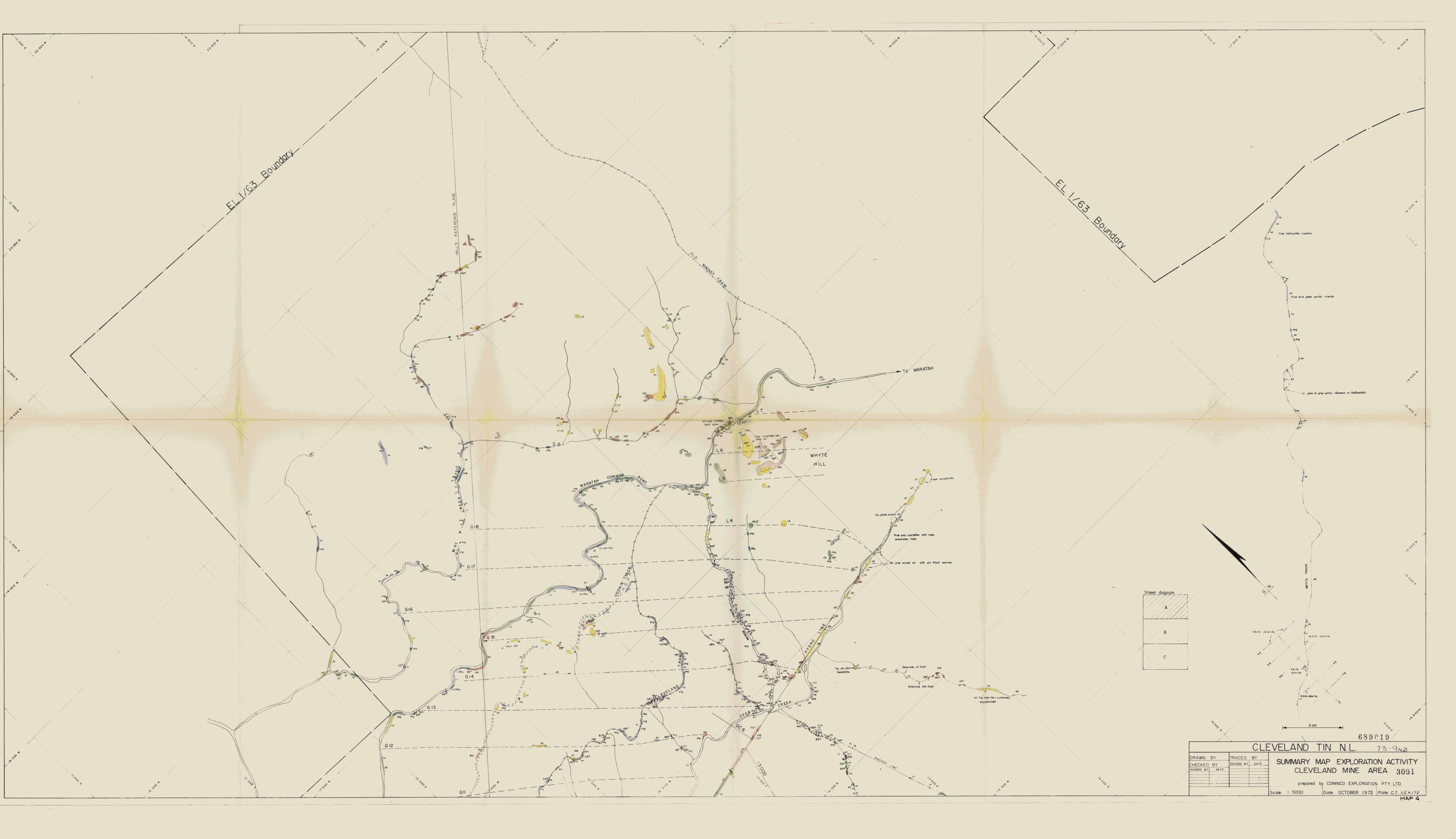


5cm

CLEVELAND TIN N.L. 689018

|            |            |  |  |
|------------|------------|--|--|
| DRAWN BY   | TRACED BY  | SUMMARY MAP-EXPLORATION ACTIVITY                   |  |
| CHECKED BY | REVISED BY | CLEVELAND MINE AREA 3030                           |  |
| REVISED IN | DATE       | prepared by COMINCO EXPLORATION PTY. LTD.          |  |
|            |            | Scale: 1:5000 Date: OCTOBER 1972 Plate: CT 112C/72 |  |





EL 1/63 Boundary

EL 1/63 Boundary

HALL'S REFERENCE PLANE

OLD MARKET TANK

TO WARATAH

WHYTE HILL

WARATAH CORNING ROAD

CADDIS INLET

HYDRO LINE

CLEVELAND

DEEP CREEK

BADGER LINE

METTS TRACK



5 cm

689019

CLEVELAND TIN N.L. 73-942

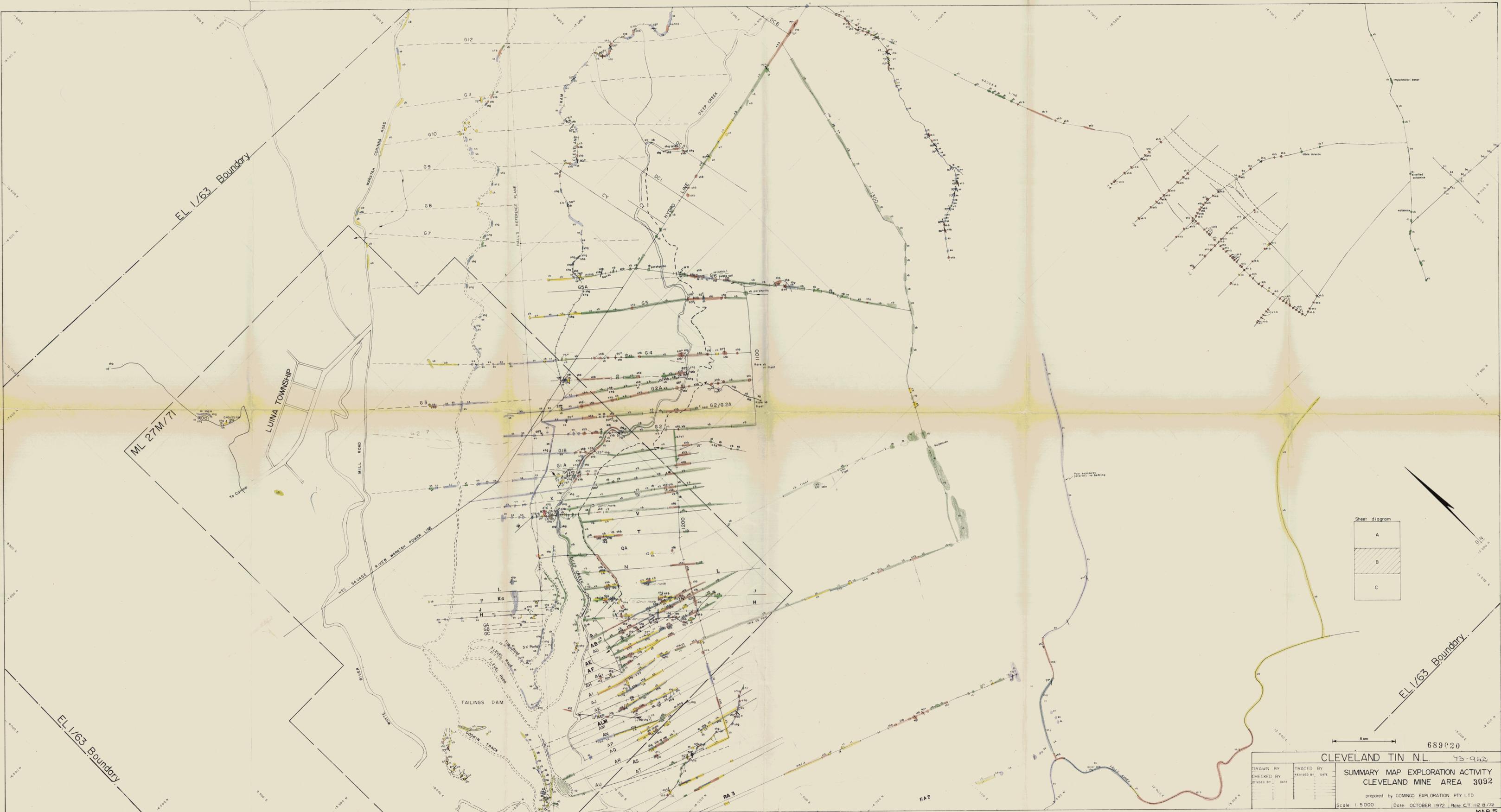
SUMMARY MAP EXPLORATION ACTIVITY  
CLEVELAND MINE AREA 3091

prepared by COMINCO EXPLORATION PTY. LTD.

Scale: 1:5000 Date: OCTOBER 1972 Plate: CT 112A/72

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MAP 4



689020

**CLEVELAND TIN N.L.** 43-942

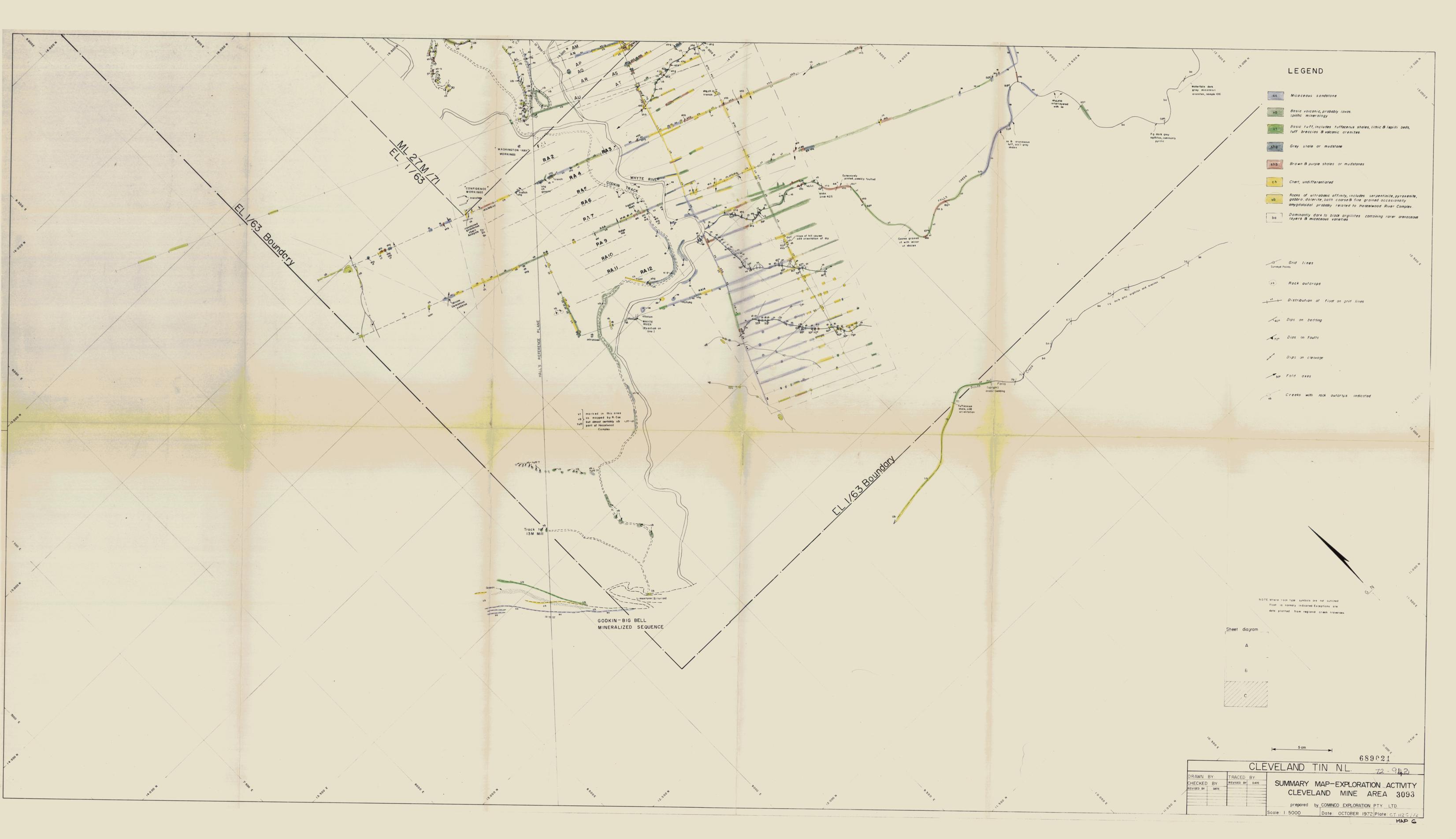
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**SUMMARY MAP EXPLORATION ACTIVITY  
CLEVELAND MINE AREA 3092**

prepared by COMNOCO EXPLORATION PTY LTD

Scale 1:5000 Date: OCTOBER 1972 Plate CT 112 B/72

MAP 5



**LEGEND**

- ss Micaceous sandstone
  - vb Basic volcanic, probably lavas, spilitic mineralogy
  - vt Basic tuff, includes tuffaceous shales, limic & lapilli beds, tuff breccias & volcanic breccias
  - shg Grey shale or mudstone
  - shb Brown & purple shales or mudstones
  - ch Chert, undifferentiated
  - ub Rocks of ultrabasic affinity, includes serpentinite, pyroxenite, gabbro, dolerite, both coarse & fine grained, occasionally amygdaloidal probably related to Heatwood River Complex
  - ba Dominantly dark to black argillites containing rarer arenaceous layers & micaceous varieties
- 
- Grid lines
  - Survey Points
  - Rock outcrops
  - Distribution of floor on grid lines
  - Dips on bedding
  - Dips on faults
  - Dips on cleavage
  - Fold axes
  - Creeks with rock outcrops indicated

NOTE: Where rock type symbols are not outlined floor is normally indicated. Excavations are data plotted from regional creek traverses.



5 cm

689021

72-982

**CLEVELAND TIN N.L.**

**SUMMARY MAP-EXPLORATION ACTIVITY**  
**CLEVELAND MINE AREA 3093**

prepared by COMINCO EXPLORATION PTY. LTD.

Scale: 1:5000 Date: OCTOBER 1972 Plate: CT 112C/24

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MAP C