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YEAR-END REPORT

for

TASMANIAN MINES DEPARTMENT

on

MINERAL LEASE 27M/71

EXPLORATION LICENCE 1-63

by

Cominco Exploration Pty. Ltd.

for

CLEVELAND TIN N.L.

Period:

September 1971 to June 1972

June 30, 1972

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1. SUMMARY

Cleveland Tin N.L. at Cleveland profitably mine cassiterite and copper at an average grade (1971/72) of 0.845% Sn, 0.392% Cu, with an annual throughput of 357,498 tons.

In September 1971, Cominco Exploration Pty. Ltd. were appointed geological consultants to Aberfoyle Management Pty. Ltd., and through them, Cleveland Tin N.L. At that time, it was felt that the north and south limits of the Cleveland mine were not well tested - yet these strike limits are critical points under the retreat method of mining in current practice.

A programme was designed:

* to test the validity of zoning by drilling, particularly at the north end of the mine

* to test the concept of an imbricate structure by re-examination of the geology observed in the developing mine

* to examine the exploration methods in use, and to test these by field checks, then by appraisal, to decide which will be the most useful exploration approach - both within the mine environs and in the surrounding area

* to conclude the appraisal by an assessment of the current ore reserves, plus the potential for added reserves.

The appraisal work involved the thorough examination of all geological, geochemical and geophysical data, and the collation of this data, together with field checks to establish the various stages reached in previous exploration to ensure that the 1972/73 programme goes beyond the previous exploration efforts. Four surface diamond drill holes were drilled at the mine south end and two underground diamond drill holes were drilled across the mine north end. The examination was extended to the stage of a preliminary re-interpretation of the mine geology.

The most important finding is that the ore bodies are conformable in a stratigraphic setting, and hence the limitations to the strike extent of the ore bodies will be stratigraphic rather than structural. Any stratigraphic extent is unknown.

The conclusions:-

a) The mine: re-interpretation of ore setting established that ore reserves were less than previously calculated, but that excellent potential for added reserves exists in depth in the mine, to the north end of the mine and to the south.

b) The mine environs: previous exploration work has not adequately explored strike extension to the mine as a result of over-emphasis of the importance of structure and zoning as the ore controlling process. Further it is believed that an improved method of exploration has been developed.

The recommendations are:-

1) to extend deep drilling to the north (from a 9/10 level north drive for exploration purposes) to test anticipated ore reserves;

2) to explore by diamond drilling and/or development the recently confirmed north extension, now opened up, in 9C North;

3) to test Smithy's-Battery zone, as an exploration target;

4) to test the down-plunge extension of Khaki ore body, and to explore the possibility of ore development in Luck's lode;

5) to establish the distribution of sulphide and gangue minerals, for better appreciation of the zoning;

6) regional mapping - an urgent need - coupled with continued combination of SP and geochem traverses.

Recommendations (1) to (4) are located on the 1:500 scale surface and mine composite plans.

Note: Mine geology is described on page 16, et seq.

2. INTRODUCTION

A. History

CEPL interest follows Cominco Ltd's. acquisition of 54% equity in Aberfoyle Ltd. concluded in early August 1971 by successful tender in a liquidation sale of the assets of Mineral Securities Australia Ltd.

CEPL work programmes commenced from October 1971.

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:-

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

South west EL 1-63 (as at June 30/72)
Washington Hey - Ag Pb
Washington Extended (The Confidence) - Ag Pb
Godkin - North Godkin - Ag Pb

All locations are shown on the summary map, scale 1":500'. (This plan also shows the old Magnet Mine to the NE, in ground no longer held by CTNL.)

EL 1-63 (in two parts) is granted for 6 monthly intervals, with next renewal date August 11, 1972.

C. Location

Latitude 41°28'S, longitude 145°24'E.
Mine township is LUINA, 60 miles SSE of Burnie, on the Tasmanian north coast.
EL 1-63 comes under the jurisdiction of Mines Department, Hobart. Mining activity on ML 27/71 comes under the local Mines Department inspectorate at Burnie.

D. Production

Pre 1968	oxidised ore	36,311 tons
1968-June 30/72		1,281,008 tons milled

Current production rate approximates 360,000 tpa.

E. Objectives (current)

For the 1972/73 season, we propose to produce a regional map of the exploration licence and its immediate surrounds which will form the basis for the control of future exploration activity.

The exploration programme is intended to locate ore at shallow depth. Several shallow drill holes are recommended within the mine environs. Outside the immediate extent of the mines, continued exploration will aim at establishing the distribution of mineral-isation within ML and EL prior to selection of new DD targets.

3. EXPLORATION AND DEVELOPMENT

Period September 1971 - June 1972

A. Reconnaissance and Research

Mine and exploration data was concurrently reviewed, with an initial bias towards appreciation of exploration problems.

Revision of the mine data is discussed under item 3.H. below.

In consolidating the exploration data 1953-1971, research covered the following -

i) a review of BMR 1953-54 self-potential and ground magnetics results, and particularly the comparison of SP profiles with records of near-surface mine development and/or with mineralisation recorded in near-surface drill holes.

ii) A review of BMR (1963) and Falvey (1966) SP and ground magnetics work, and a reappraisal of the conclusions drawn from those surveys following appreciation of the arcuate strike.

iii) An examination of the spread and quantity of fact geological data available to Cox and Glasson at the time of their interpretation, which created an awareness that the greater proportion of fact geology was sub-parallel to strike. Later appreciation of the arcuate strike variation meant that mapping to the south was across areas other than Hall's Formation.

iv) Compilations of the extent and density of surface drilling, (which clearly showed drilling off the mine north end to be inadequate.)

v) Collation of geochemical survey results - any interpretation was deferred until CEPL staff (RVS) completed orientation work, discussed under 3.D., below.

vi) Correlation on cross section of the SP profiles, the geochemical results and geology from mine development and/or early drilling.

Results:

The BMR SP work related to mine development demonstrated the use of SP as one exploration tool. Conclusion drawn in 1963 and 1966 that SP was not useful were shown to be invalid because the surveys did not cover Hall's Formation.

Re-examination of the data also showed

* an untested 750 ft. long SP anomaly 1000 ft. north of the mine (lines G2-G4)
* an untested "Henry's type" SP anomaly immediately north of the mine and to the west.

Reinterpretation of the data showed an SP trend sub-parallel to Deep Creek, coincident with a clearly definable Cu-Zn geochemical anomaly. (This trend is now under development as 9C North.)

The DD holes drilled off the ends of the mine do not validly test the strike extent of the orebodies, particularly when the orebodies have plunge and when it is known from mine drilling and openings that traces of mineralisation may be persistent down dip over several hundred feet before developing into ore.

B. Prospecting

The appraisal work led to the progressive selection of areas and/or sections of cross lines as targets for check coverage of previous work. These checks were carried out during the first half, 1972. The techniques used were a combination of SP, geology by broad-line mapping and/or by pitting together with bedrock/soil geochemistry.

The locations of CEPL work are shown on the Summary map, scale 1"=500 ft., and the results are discussed under D-E, below.

The combination of SP geophysics and geochemical analyses of sub-humic soils appears effective. For its better control, there is an urgent need for the compilation of a regional map. As a framework for commencement of this regional mapping a number of old lines were cleaned out and re-surveyed and a number of new lines were cut and surveyed. Further clearing and surveying is anticipated.

C. Geological Mapping

Minor. (for Mine geology , refer page 21)

Restricted to check line coverage on geochemical orientation lines and check lines, plus mapping along line G2A (over the SP anomaly), reconnaissance mapping along line AH to the east, and reconnaissance (but detailed) mapping along the Godkin track where it crosses the stratigraphy south of the Confidence Mine.

Extensive geological mapping is proposed for the latter half, 1972, prior to recommencement of the SP geochem. programme.

D-E Geochemical - Geophysical work

The intended use of geophysics (SP) and geochemistry in combination makes their joint discussion preferable.

The geochemical environment:

Hilly, undulating with steep slopes. Rain forest, sometimes with dense vegetation. Annual rainfall 85 inches. Cool to cold temperatures.

Typical profile:

A few inches of very dark brown or grey humic-rich clay, amongst a tangled network of fine roots, overlying clay and decomposing rock fragments. It is necessary to collect considerable humic material to obtain sufficient -80# material for analyses in this part of the profile.

The more resistant rocks - cherts, sandstones - often form a scree over more deeply weathered softer rocks - shales, tuffs. It is often difficult to decide whether a pit has penetrated to bedrock.

The depth of oxidised sulphides varies from zero on the steeper slopes, to a few feet on the gentler slopes where physical erosion has not outstripped oxidation. Secondary dispersion appears governed largely by downslope physical transportation (gossans, cassiterite, tourmaline) or downslope solution transfer (Cu, Zn).

Past soil sampling programmes (variable quality) produced a number of untested Cu-Zn soil anomalies extending intermittently from the Confidence mine to the Waratah road.

No geochemical orientation data was available. Prior to checking these various known anomalies (using SP-geochem-geology) an orientation pitting and profiling geochemistry programme was carried out on 8 selected lines. Five of these lines were adjacent, and thoroughly tested the geochemical anomaly SE of the mine.

Details of Work Done

Pick and shovel were used to dig pits to bedrock on cut lines surveyed to 25m or 50m intervals horizontal distance. Pit spacing was normally 5m or 10m if practicable. Normally 3 samples were collected in each pit, viz:

A. shallow (1"-6") humic soil. This is assumed as being equivalent to material collected in previous soil programmes. The -80# fraction was analysed.

B. C-horizon soil, i.e. normally decomposing rock and clays of a largely residual nature. The -80# fraction was analysed.

C. weathered bedrock. Total sample pulverised for analysis.

Orientation Lines

Qa	100mW - 60mE	5m intervals	31 pits	92 samples
X	100mW - 98mE	10m intervals	20 pits	65 samples
W	100mW - 70mE	10m "	18 pits	53 samples

SE Prospecting Lines

AD	30mW - 50mE	5m intervals	16 pits	51 samples
AG	75mW - 50mE	5m "	26 "	84 "
AH	30mW - 70mE	5m "	21 "	66 "
AL	0 - 110mE	5m "	23 "	72 "
AN	0 - 105mE	5m "	22 "	74 "
		Total	177 pits	557 samples

The work took 15 days, and approximately 40 man-days.

A hand specimen of bedrock from each pit was collected and the field identification confirmed with the mine geologist.

Samples were analysed for Cu, Zn, Ni, Mn and (later) Sn. In addition, gossans located on QA, W, and X were given a semi-quantitative spectrographic scan in an attempt to find pathfinder elements more specific to Sn-Cu mineralisation.

Conclusions from the orientation work

1. Cu geochemistry can detect Cleveland-type Sn-Cu lodes.

2. Near surface soil sampling is a more powerful technique than bedrock sampling, for it shows the overall tenor of this irregular mineralisation.

3. Significant Cu and Zn values can be obtained from the basic volcanics and particularly tuffaceous zones. Attempts to differentiate basic volcanics from Hall's Fm. rocks using Ni and/or Cr geochemistry were not successful.

4. Sn (itself) may also be a pathfinder.

5. Soil anomalies are quite broad, and extend downslope from their source.

It was also suggested that Ag, Bi, W, Ga and As offer some promise as potential pathfinders. Fluorite and tourmaline are common ore associates, but both flourine and boron are analytically difficult.

The initial SP work

SP traverses (using the "leap frog" method) were run on lines-

QA-P	method trials over known workings
W-X	trials over geochemical orientation lines
G5A-G6	over new ground
G2	over known BMR data.

The "leap frog" technique moves both pots together, station by station. Mathematical correction techniques are required to spread the drift over readings, and as the drift correction values were seen to be numerically large relative to the actual reading, the "leap frog" technique was abandoned in favour of the "long wire" technique.
i.e. travelling front pot, semi-fixed back pot.

The combination SP-geochem. Check programme

The location of the various check lines is shown on the Summary Plan, scale 1"=500 Ft. Their extent and results are summarised as follows-

1) Lines AD, AG, AH, AJ, AL, AN

Except for AJ, these lines checked the Cu-Zn-Mn anomaly with coincident magnetic high to the SE of the mine.
The Cu-Zn anomaly was confirmed.
Pitting revealed that the source of these anomalies is a tuff zone within the basic volcanics. Geology from the pitting (essentially across the "anomaly") showed that none of the check lines completely covered Hall's Formation.

Subsequent SP on all lines between the "anomaly" and Deep Creek produced two relatable but low order (70 mV) anomalies on lines AH and AG (only in Hall's Fm. rocks, with evident but very weak (relative to volc gch.) coincident Cu-Zn peaks. In view of the steep plunges that can occur in ore lenses these weak SP responses are considered significant.

AG, AH Follow up

EM Geophysics. Extend pit-geology to Deep Creek.
Extend SP-soils to east across second zone of Hall's Fm. type rocks.

2) Line W (at the northern extremity of the mine workings)

The results, and the relationships between SP, geochemistry and geology are clearly illustrated on the Composite W Cross Section, included with this report.

W Follow up

DD is recommended, as shown - but modifications to this suggested drilling are likely as 9C North development is currently advancing towards the area recommended for testing.

3) Line X (Refer to composite Cross Section for X)

The major feature in the orientation work was a peak value of 8375 Cu in bedrock, 85m E of Hall's Ref. Plane - not accompanied by any marked Zn values. This peak corresponds with an SP low. It is also related to mineralisation observed at the collar of DDH C46 (drilled away from this zone). Subsequent analyses for bedrock Sn confirmed lode at the 85m E position (7000 ppm Zn), and also reasonably correlated with other SP lows across the profile.

Old DDH C46 tested westerly from C lens (?) to the Cleveland Tram, to show only very narrow intersections which can be correlated with the SP and geochemistry results. There was no subsurface testing below the 85m E position.

Underground development has now shown that these extremely narrow intersections are capable of development to ore in depth - in this case, about 80 m. below surface the lens 9C North and 9D North are predicted.

X Follow up

Drilling is recommended, to test the broad SP anomaly (Henry's type) to the west of the Cleveland Tram.

Drilling to the east, to depth below Deep Creek is recommended if the development on 9C North terminates (for grade reasons) prior to X Section.

4) Line Y

Extent - for SP, 260m E of Tram, 275m W of Tram.
for soils, 260m E of Tram, 170m W of Tram.

SP Effects - Prominent SP anomaly 110-120m E of Tram, plus a minor SP anomaly 80m E of Tram. A general low W of Tram is interpreted as due to topography. (The western section of the profile does not have a marked, sharp return to zero, as for G1)

Soils Cu/Zn - Anomalous Cu and Zn, downslope from the Tram. Anomaly increases in strength in the zone of SP anomaly.

Y Follow up

Analyse soils for Sn, from Tram to water race. Geological traverse - specifically for location of contact between Hall's Fm. and volcanics (pits, if required).

5) <u>Line G1</u>

Extent - SP and soils from the Water race. west for 600m.
SP Effects - Generally ?topographic. Perhaps a weak SP anomaly 50-80m W of the H.E.C. power line. Only erratic SP about Cleveland Tram.
Soils Cu/Zn - Anomaly downslope from C.Tram into Deep Creek.
Magnetics (Falvey) anomaly just to W of C.Tram.

<u>G1 Follow up</u>

1. pits, 12.5m intervals, for 150m to W of Deep Creek.
2. pits, 12.5m intervals, for 100m to W of H.E.C. power line. (This zone is of interest because of increased values in this position on line G2)

For each, detail pit geology. Bedrock sample for CuZnSn. Ground magnetics, repeated.

6) <u>Line G2</u> (over 1953-54 BMR anomaly)

Extent - For SP, 400m E of Tram, 200m W of Tram. For soils, 525m E of Tram, 100m W of Tram.
SP Effects - Two moderate anomalies confirmed. One lies immediately W of Tram, another 40-50m E of Tram. Two minor lows occur further east.
Soils Cu/Zn - very weak Zn reflection downslope of best SP (W of Tram). Better reflection of SP east of Tram. No parallel Cu values. Commencing about 150m E of Tram, Cu and Zn values rise and fall, probably reflecting volcanics.

<u>G2 Follow up</u>

Analyse soils for Sn - 50m W to 100m E of Tram. Pits 50m W to 100m E of Tram, then geology and bedrock sampling. Extend geology/SP/soils to the west 150m (see G2A).

7) <u>Line G2A</u> (Refer to Composite cross section for G2A)

This line over 1953-53 BMR anomaly.
Extent - For SP/soils 800m E of Tram. For SP, 150m W of Tram. For soils 250m W of Tram.
SP Effect - Good anomaly confirmed. Apparent convergence of the 2 good anomalies recorded on line G2. A broad low-order SP anomaly (?) occurs 200-270m E of Tram, which should be correlated against lines to the north when gridding is carried out.
Soils Cu/Zn -

i) Zn peak over, and slightly downslope from principal SP anomaly, plus very weak similar Cu trend.
ii) low order Cu peaks 160-200m E of Tram, and downslope of broad SP low east of Deep Ck tributary, probably reflects sulphides in volcanics.

Geology is available 150m E and W of Tram.

G2A Follow up
Detailed grid work around this anomaly. Test drilling (2 shallow E500 drill holes) is recommended in advance of grid work.

8) Line G5A - to check high Cu-Zn values, from earlier work.
Extent - This line is incomplete. Wet weather, water-logged pits and prevented completion of the line.

G5A Follow up
Completion of geology/SP/soils, then appraisal relative to line G6, adjacent.

9) Line G6 - to check high Cu-Zn values from earlier work
Extent - SP/soils and bedrock samples, from H.E.C. power line W for 350m. Pitted. Geology available.
SP Effect - very low profile. Not anomalous, but one very weak low is noted just E of Tram.
Soils Cu/Zn - Both Cu and Zn generally sympathetic with Cu a better indication of anomalous zones (from volcanics)
Bedrock Cu/Zn - confirms soils. Cu/Zn values generally of similar order to soils, with 2 exceptions, the peaks-
i.e. 50-80m E of C. Tram
75-50m W of C. Tram - this peak was not indicated by soils analyses.
Geology - is able to differentiate bedrock Cu-Zn W of Tram as cherts
and bedrock Cu-Zn E of Tram as probably due to volcanics - tuffs. Mineralisation was observed in pit at Tram, but has no geochem value.

G6 Follow up
Extend geology/SP/soils 200m to west.
Analyse soils W of Tram for Sn.
Check ground magnetics west of Tram.

10) Godkin Track - Traverse parallel to RA12, to check existence of Sn highs.
Extent - Geology/SP/soils and some bedrock samples, across stratigraphy south of "Confidence" workings.
Comment - samples collected still drying, and results are not available. Geology shows rock types similar to the mine sequence. One gossanous specimen from a chert sequence analysed separately contained 600 ppm Sn to indicate Sn highs may be confirmed.

11) KA, L, QA (ext'd west) QB (refer to Composite, L Section)
Examination of BMR profiles showed unexplained rapid return towards zero-datum at the western extremities BMR lines "I" (mine sections KA/L) "J" (mine sections L/M) and about "O" (mine sections QB/R/S). Geochemical orientation work on line QA showed rising Zn, Sn trends at the west end of that line, or about the crest of Crescent Spur.

Wet weather prevented extension of SP traverses to the west. However, check soil traverses were completed along compass controlled traverse lines and anomalous Cu Zn peaks occur just to the west of the BMR coverage, in ?mica sandstones.

Follow Up

Geology and SP on all soil traverses.
Completion of selected Sn-soils analyses.
Some pitting is anticipated to establish geology.

12) VA

As an aid to appreciation of north end geology, SP/soils were run on this line. The results are in process of compilation. No follow up is contemplated,

13) GB

This traverse crosses the Khaki orebody. Controlled survey lines were cut, each commencing at Hall's Reference, and extended 175m west, on mine sections GA, GB, GC. Only GB was pegged and soil/bedrock sampled, to provide orientation data across a discrete ore body and to check if Sn mineralisation outcropped below the vegetation cover. The extension of the lines so far west was designed to check the dispersion of Sn from the crest of Crescent Spur. (the Khaki body is located right under the crest). Currently, samples are drying prior to any analyses.

Comment on Exploration Technique

From these check programmes and results of testing, the combination of geology/SP/soils is considered to be effective as a first-pass exploration approach in any methodical programme proposed for Cleveland area.

In the 1972/73 Summer, EM trials are proposed to endeavour to achieve greater geophysical penetration.

Geology in some detail is absolutely necessary, to effectively differentiate between results from Hall's Fm and from volcanic sequence. It is preferable to establish geological data in advance of SP/soils traverses so follow-up pitting need not be delayed. Further geology would follow pitting.

F. Trenching

Nil.

G. **Diamond Drilling** (Surface and underground)

All holes drilled under direct CEPL supervision were "Mine Exploration" holes.

1) **MINE SOUTH END**

A number of deep holes intersected this area, and confirmed the existence of ore at least to RL600 ft. Drilling was proposed, to test for ore at shallow depth and to infer tonnages in the region of 8-9-10 Levels.

Four surface DD holes were drilled, as follows:-

Hole #	Section	Angle	Depth		Results at-	Sn	Cu
C403	A	-40 to W	673'		163'3"-171'3"	3.32	4.82
					174'2"-218'8"	1.88	0.56
					267'5"-283'6"	0.66	0.18
				or,	267'5"-299'0"	0.41	0.12
					472'3"-475'5"	0.62	0.54
C404	A	-50 to W	704'		273 -292	0.27	0.54
					293'6"-329'0"	0.54	0.31
					340'7"-352'6"	1.03	0.36
					other low grade intersections		
C405	A	-60 to W	829'		545'5"-553'8"	0.55	0.30
Note: C403-4-5 from same collar.							
C406	AD	-	1085'		158'6"-161'5"	1.59	0.34
					619'11"-621'3"	0.30	1.95
					633'6"-634'6"	0.07	4.50
					650'6"-667'6"	0.32	1.47

four holes - 3291 feet

A major mineralised interval occurred in C404, but assayed low grade. This group of holes provided important geological data on the southern limits of the low grade zone, and allowed inference of 350,000 tons in the lens opened up by 9B South, above RL600 ft.

2) **MINE NORTH END**

Two holes were drilled from 9D North development - hole C408 to the west, across Hall's Formation, and hole C450 to the east into the volcanics.

			Sn	Cu
C408	Horiz, west.	40'5"- 60'4"	0.79	0.19
		197'4"-204'1"	1.11	

These results are significant because the two intersections established the presence of 9C North (current development) and the narrow intersection is west of Hall's Reference, within sandstones.

3) MINE DEEP DRILLING

Four holes were drilled off the decline, at

Sections	- J/K	hole C473
	- L	C489
	- P	C500
	- QA	C449

for the confirmation of ore reserves (C and D lenses) about the 14 Level horizon.

The results of these holes are illustrated on the Longitudinal Sections (scale 1:1000) for C-D lens. Results confirm the ore continuity to 14 Level, and indicate excellent potential for ore below 11 Level, north of QA Section.

For the entire Cleveland operation, comparative drilling statistics are as follows:-

Year	No. of holes	Footage
1969/70	104	29,192 feet
1970/71	78	17,227
1971/72	N.A.	28,863
1972/73 Estimates for budget		29,000

H. Underground Development

Development status (with notes on stoping) is summarised below-

2 Level: Access drive from 2 Level A lens and Henry's drive intersection, has progressed to about two-thirds its anticipated length before encountering Khaki lode.

3 Level: 3 Level Khaki has been silled out to near completion. Minor stripping is left.

7 Level: Access drive from Henry's to Khaki is nearing completion. Minor mineralisation encountered during driving.

Air leg stoping on 7 Henry's north end is practically complete.

8 Level: Stripping on A lens (north) was completed and retreat stoping is in progress on A lens north and south.

9 Level: Henry's development was completed. A and B lens were developed to their apparent limits (both north and south). Short section of low grade zone encountered in A lens south. Fat pod at south end of B lens (south west extension), developed to its southern extremities.

9D North developed from two separate crosscuts with a narrow uneconomic zone in between. 9C North is currently being developed from a crosscut off the northern end of 9B North.

Retreat stoping is currently in progress in the north end of 9D North.

10 Level: 10 Level crosscut was driven out to Henry's which was developed to its known extremities.
Vertical rise from 10 to 9 was completed.
A lens not present.
B lens developed southwards into the low grade zone and then discontinued.
B lens was developed northward to its apparent extremity. C lens developed northwards to a point where consistent low grade mineralisation was encountered.
D lens is currently being developed from a crosscut of 10C North.

The true northern end of B, C and D lenses has not been encountered.

11 Level: Crosscut was driven out to just west of C lens but is currently being extended for ventilation purposes.

Development has commenced on C and D lenses. C lens south has entered the low grade zone and development has stopped.
C lens north and D lens north development is in progress.
D lens will not be developed to the south.

Services rise is currently being developed from 11 Level to 10 Level.

Decline: is stationary at a point midway between 11 and 12 pending a decision on transfer of the decline spiral to the west side of Hall's lode.
(i.e. into the footwall of Hall's ore lenses.)

4. **PRODUCTION** (Current)

For the year to June 27, 1972, the mill throughput was 357,498 long tons, at an average grade of 0.845% Sn, 0.392% Cu.

5. GEOLOGY

i) Regional Setting

The Cleveland Cassiterite-sulphide ore bodies occur in the middle-upper Cambrian Dundas Group, a sequence of greywackes and basic volcanics. These sediments occupy the Dundas Trough, which extends as a narrow sinuous belt of flysch-type sediments from Waratah to Queenstown. These sediments are overlain and underlain unconformably by Precambrian and Ordovician formations, and are intruded by the Devonian Meredith and Heemskirk granites. The palaeogeography of the region is described in detail by Carey (1953), Banks (1962), and Campana and King (1963).

The stratigraphy in the immediate vicinity of the Cleveland mine is as follows:

1. a basic volcanic unit (uppermost)
2. a lode bearing unit (Hall's Formation)
3. a mica sandstone unit (lowermost)

- See Summary Map, scale 1"=500 Ft.

Cox (1968) and Cox and Glasson (1971) have defined this sequence as the Crescent Spur Group. However, it is doubtful that the definition of the formations, apart from Hall's Formation, is adequate to form a "Group" and the nomenclature should probably be dropped.

An ultrabasic intrusion with contacts parallel to the stratigraphy occurs below the mica sandstone unit. This is one of a series of ?Cambrian basics and ultrabasics which seem to define the centre of the Dundas Trough.

ii) Rock Types

Mica sandstone unit: This stratigraphic unit is a sequence of poorly bedded, feldspathic and micaceous sandstones, classified petrographically as subgreywackes. These sandstones are characteristically massive, grey to brown rocks in outcrop interbedded with thin beds of light to medium grey shale. Individual beds are 0.5m to 10.0m thick occasionally exhibiting weak graded bedding in drill core. In outcrop, they are friable, soft rocks with a distinctive, coarse mica content. In thin section, these rocks consist of poorly sorted, angular, detrital quartz grains up to 2.5mm in diameter, with conspicuous detrital white mica. Lithic fragments are rare. The sandstones exhibit the gross characteristics of turbidite sequence.

Lode bearing unit (Hall's Formation): The lode bearing unit (or Hall's Formation) overlies the mica sandstones, and is composed of a sequence of variegated shales, cherts, sulphide-rich "beds" and sandstones. The shales are fine grained, generally poorly bedded, and dark grey, light grey and dark purple in colour. They exhibit few sedimentary structures in core or outcrop, being predominantly massive. In outcrop, they are friable, extensively jointed, dark brown on weathered surfaces, but generally lack cleavage. Carbonate blebs are commonly included, defining bedding occasionally.

The cherts are fine grained, medium to light grey and pink coloured rocks, massive to well bedded in core and fresh outcrop. They weather to a light brown or khaki colour. Typical chert is brittle and exhibits an irregular fracture, but may also exhibit a bedding fissility in some exposures. Bedding, where developed, is usually defined by colour changes, but may also be defined by mineralogy such as actinolite-or carbonate-rich layers. Sulphides and a jaspery coloured variety of chert are characteristic close to the tin ore bodies, with sulphides mainly occupying fine fractures and microfaults. In thin section, the cherts are composed of microcrystalline quartz, white mica and carbonate. They rarely exhibit spherical structures attributed to colloidal processes, and are thought to be sedimentary in origin rather than a product of the mineralisation.

The sulphide-rich "beds" which carry the tin, are complex mineralogical combinations of pyrrhotite, pyrite, chalcopyrite, marcasite, cassiterite, quartz, carbonate, fluorite, actinolite and tourmaline. Accessory sulphides are arsenopyrite, sphalerite, hematite, stannite and tetrahedrite. The sulphide-rich "beds" are usually intimately associated with chert and may be finely interlayered with them. Generally such layering is irregular in orientation and is defined by sulphide content or other mineralogy of individual layers. Sulphide content varies from nil to almost massive material, but averages 20 to 30% in most instances. Cross cutting veins of various phases are characteristic. Tourmaline -rich zoning occurs commonly at certain contacts. The microstructure of the sulphide-rich "beds" is poorly known and no systematic petrography has been carried out.

In outcrop, the sulphide-rich "beds" do not form large gossans. Sulphides are generally visible at outcrop.

Basic volcanic unit: The basic volcanic sequence is composed of basalts and tuffs of spilitic composition. The basalts (probably flows) dominate the sequence and are separated by a variety of tuff breccias, lapilli tuffs and tuffaceous shales. The basalts are massive apart from minor carbonate and quartz-chlorite veining (± sulphides). In core they occasionally exhibit voids, which are interpreted as vesicles. No pillows have been recognised to date. The tuff breccias and lapilli tuffs are composed of rounded to sub-angular volcanic fragments in a fine grained carbonate and chlorite matrix. They are commonly mineralised with sphalerite and chalcopyrite and, more rarely, cassiterite. The largest fragments are up to 20cm in diameter and may be useful facing indicators. The basalts and fragmented tuffs are dark green in colour, both in fresh exposures and outcrop. The tuffaceous shales are purple to dark grey coloured rocks, usually well bedded in contrast to the shales of Hall's Formation. In outcrop, these rocks are distinctively "chocolate" coloured and widespread throughout the region. In thin section, the volcanics are typically albite-actinolite-chlorite rocks with accessory quartz, epidote, and iron oxides. The purplish colour of the shales is a result of the commonly large content of hematite. Pyrite is a common accessory. Cox (1968) claims that the coarser grained pyroclastics are restricted to the immediate vicinity of the mine, inferring the possibility of a local vent. This possibility will be examined. Minor chert, usually pink in colour, also occurs within the basic volcanics.

The ultrabasics: At Cleveland these rocks are typically dark green serpentinites, after peridotites and harzburgites. In outcrop they are variable in character, from dark green fresh material to a soft greenish brown weathered product. The depth of weathering is very variable.

iii) Metamorphism and Alteration

The albite-actinolite-chlorite-oxide assemblages of the basic volcanics indicate the grade of metamorphism in the areas adjacent to the mine is low - probably lower greenschist facies. The alteration of the volcanics is interpreted as being purely a result of low grade regional metamorphism and unrelated to the mineralisation. Cox (1968), however, claims the existence of an alteration zone related to mineralisation, of oval shape, 1000m long and 200m wide, centred on the mine and elongate along strike. This is defined by "sericitization" of feldspar.

iv) Structural Geology

The structural geology of the region is poorly known. Cox (1968) and Cox and Glasson (1971) claim that the regional structure is characterised by tightly apressed folds of similar style, overturned to the south west. Strikes are predominantly steep north-east. However, the rocks of the mine area exhibit no significant slaty cleavage, lineation, deformed markers, nor significant numbers of small folds, and it is currently thought that the regional folding is characterised by "buckling" rather than "flattening", as illustrated by Fig.1. The cleavage, formerly treated as an axial plane structure, is almost certainly a bedding fissility, and a locus for fold related fault movements.

The mine lies on the overturned limb of an anticline, the hinge of which occurs immediately to the north west of the mine on Crescent Spur. Dips are overturned in the upper levels of the mine but upright deeper. Hopwood (1962) - see Figure 3 - has suggested that the syncline to the south east of the mine with its hinge along Deep Creek possesses a shortened south eastern limb, hence the folds are probably assymetrical, verging east. Away from the mine area, the shape of the folds is unknown.

The ubiquitous occurrence throughout the region of minor faults and slickensides in outcrop are evidence of widespread faulting. This is in keeping with the "buckling" type fold movements envisaged. The displacements on faults within the mine area are generally small (10-20m maximum), normal, and most seem to be related to a set of steeply plunging buckles which post-date the regional folds. Figure 2 illustrates the fault geometry.

The limb structure of the mine area has been defined fairly closely over a strike length of 1,000m and a width of almost 300m. The exact dimensions such as the wavelength and amplitude of the regional folds is unknown. The model of axial plane thrusting proposed by Cox (1968) and Cox and Glasson (1971) is not thought to be applicable. The inconsistencies in this interpretation are discussed in Ransom (1972)

MINERALISATION AND ORE

i) Mineralogy and Zoning

As described above, the sulphide-rich or mineralised "beds" are composed of complex combinations of pyrrhotite, pyrite, marcasite, cassiterite, quartz, carbonate, fluorite, actinolite, chlorite and tourmaline. Accessory sulphides are arsenopyrite, sphalerite, hematite, stannite and tetrahedrite. Sulphides normally compose between 20 and 30% of the mineralised rock by volume,

Fig.1 Examples of folds in which strain was predominantly

(a) "flattening" (b) "buckling"

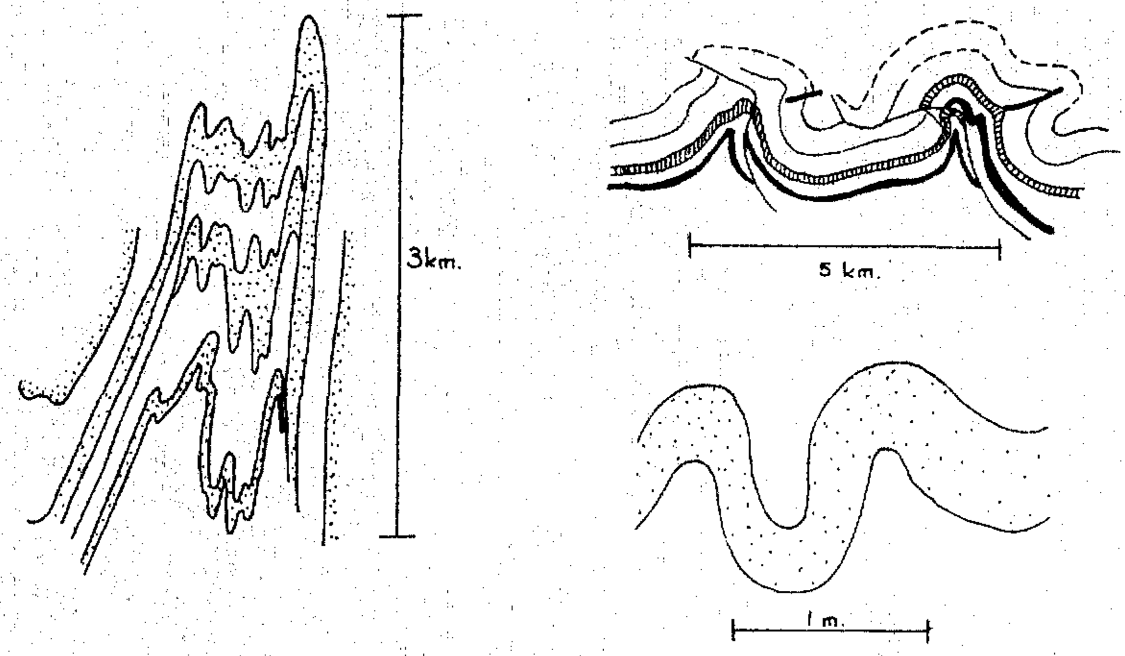
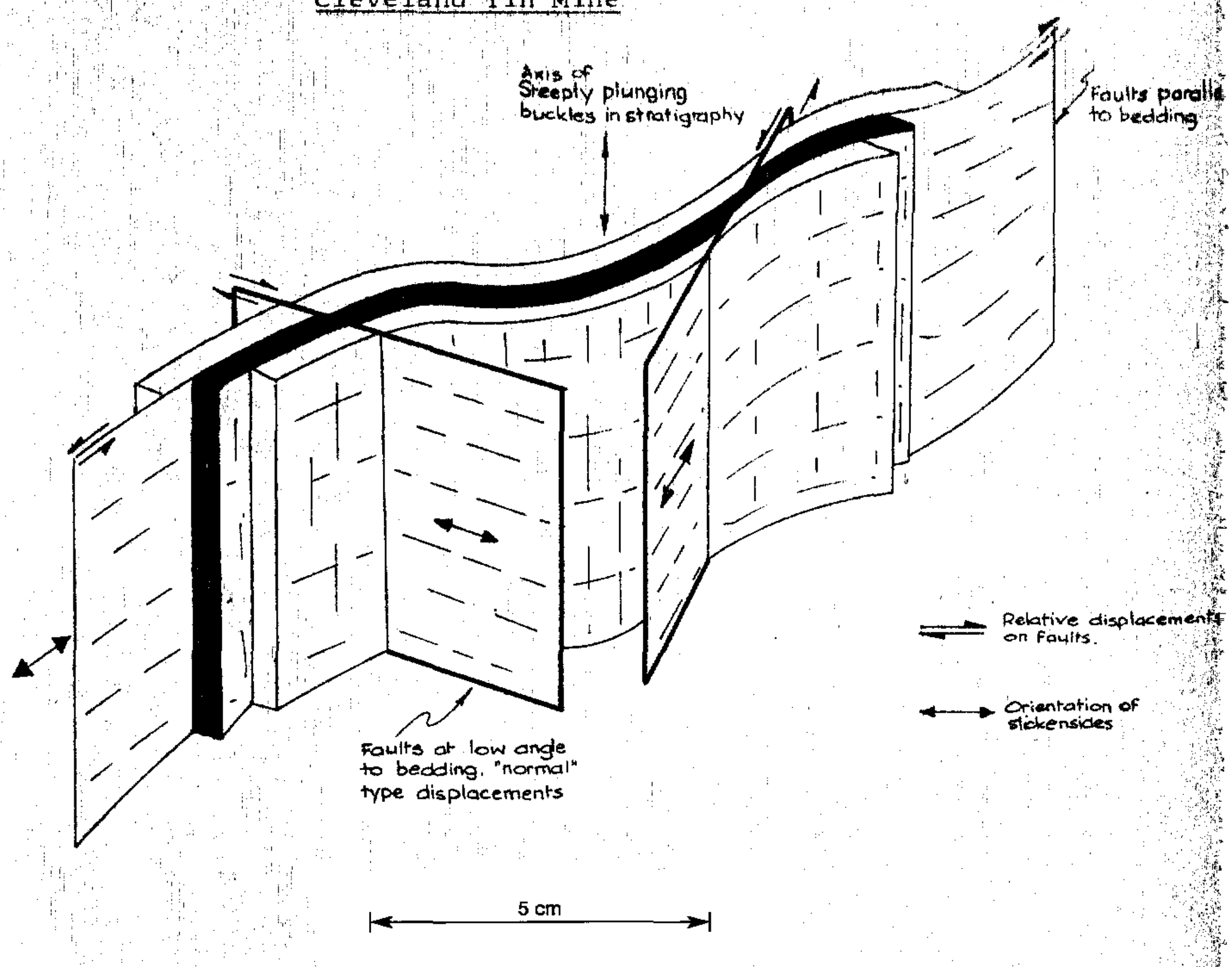


Fig.2 Model for fault geometry Cleveland Tin Mine



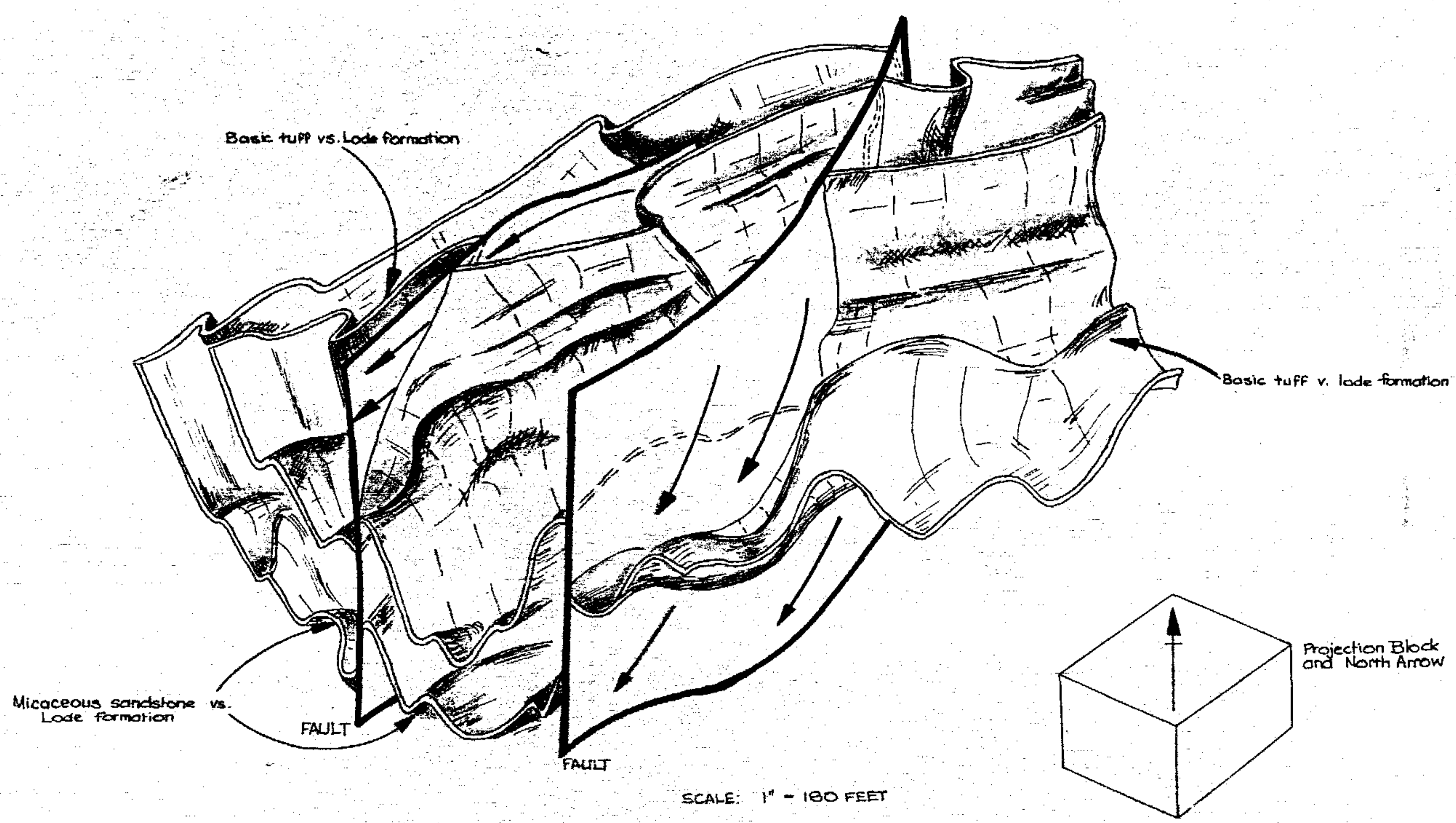


Fig.3 Schematic Diagram showing approximate inferred structure of stratigraphic surfaces
(after Hopwood, 1962)

and their grain size normally varies between 0.5 and 3mm. The most common sulphide is pyrrhotite. Cassiterite occurs as euhedral to subhedral grains, 0.1 to 1.0 mm in diameter. It is normally not visible in concentrations less than 2% Sn. Quartz and carbonate are the most common gangue minerals, usually comprising 30 to 40% of the rock. The mineralogy of the remainder is variable.

A zoning pattern defined by the sulphide and gangue mineralogy, was proposed by Cox (1968) and further developed by Jessup (1970). In this scheme, three concentric mineralogical zones are defined, enveloping a low tin zone, which lies below 9 Level and between sections L and AD (Fig. 4). The mineralogy of these zones has been determined in hand specimen and no systematic petrography has been undertaken to verify or refine the scheme. The zones of Jessup (1970) are as follows:

MINERAL	ZONE			
	I	II	III	IV
Pyrite	Minor	Common	Trace	Trace
Fluorite	Common	"	-	-
Tourmaline	"	"	Trace	-
Quartz	"	"	Minor	Minor
Carbonate	"	"	Common	"
Pyrrhotite	"	Trace	"	Common
Cassiterite	Trace	Common	"	Minor
Chalcopyrite	Minor	Minor	"	"
Stannite	Trace	"	"	"
Arsenopyrite	-	-	Trace	Trace
Chlorite	-	-	Common	Common
Sphalerite	-	-	Trace	"

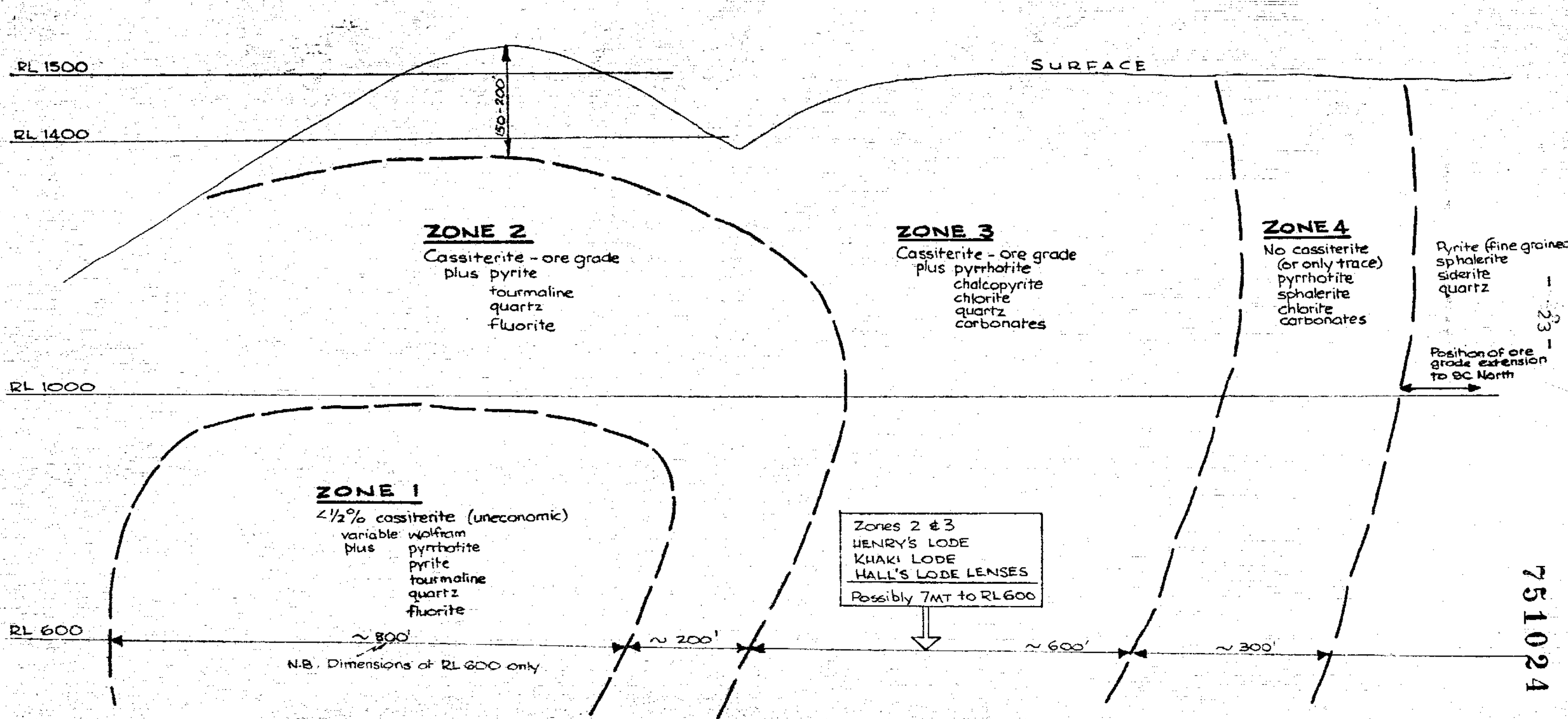
As Jessup (1970) states, overlaps and inconsistencies are common, and at present it is considered that only the low tin zone (Zone 1) and possibily the sphalerite zone (Zone IV) can be recognised unequivocally.

Recently, drilling in Zone IV has revealed ore grade (cassiterite-bearing) material on an extension of 'C' lens (see Fig. 4) on 9 Level, in ground previously thought to be tin-poor. This has cast some doubt on the current interpretation of the zones as temperature dependent phenomena, similar to classic examples in Cornwall. A clearer interpretation awaits further sampling and petrography to establish the mineralogy and microstructural relationships more rigorously. This project will proceed as part of the reinterpretative work commenced in April 1972. It is clear that if a zoning pattern does exist, it is important to know its exact distribution in order to efficiently direct future mine exploration.

SECTION ALONG STRIKE TO SHOW ZONING PATTERN AT CLEVELAND TIN MINE N.W. TASMANIA

SCALE: 1" = 200'

Fig. 4



23

751024

ii) Ore Controls

The sequence of shales and chert which define Hall's Formation contain two mineralised sequences. The lower sequence, which is separated from the upper by a distinctive mica sandstone unit, contains the Henry's, Luck's and Khaki lodes. The upper sequenee includes Hall's lode, which is a group of five lenses. From the base the sequence is - "A", "B", "C", and "E" lenses. Each of the lodes in both sequences is restricted to a particular stratigraphic interval and is conformable with the surrounding shales. Longitudinal sections for the lodes A-B, C-D, and Khaki-Henry's are attached. However, the Henry's/Khaki lodes are distinct from Hall's lode in their form and shape. They exhibit a strongly lenticular geometry, have a restricted strike length, and their greatest dimension is parallel to a line within bedding plunging approximately 40° south west - see Long. Sections. For example, in Henry's lode, ore pods may be up to 15m wide, 30m along strike and 200m down pitch. By contrast, A, B, C and D lenses are of much greater strike length and stratigraphic continuity, but again appear to be elongate parallel to a south pitch. For example, a clearly defined thick section of A lens averages about 10m in width, is 400m along strike and is over 600m long parallel to a line plunging about 30° south west.

Cox (1968) and Cox and Glasson (1971) define A, B, C, D, and E lenses as part of the same ore body (i.e. Hall's) split into multiple units and stacked up by thrust faulting - Fig. 5. Recent re-examination of Cox (1968) and Cox and Glasson (1971) has revealed inconsistencies in this interpretation which arise from a misinterpretation of the regional structure as a series of tight folds, and from misinterpreting the scale of faulting within the mine area. At present, it is envisaged that A, B, C, D, and E lenses are discrete bodies in their own right and that they overlie each other in stratigraphic sequence (Fig. 6). The mineralisation controls are therefore essentially stratigraphic.

The contrast in shape between Henry's/Khaki lodes and A, B, C, D, E lenses has previously been attributed to tight folding with thickening in hinge areas. Evidence for tight folding in the form of small folds, cleavage, etc. is absent. It is proposed that the elongate shape of Henry's/Khaki is the result of their stratigraphic position, which immediately overlies the turbidite sequence of the mica sandstones. It seems possible that if reflects deposition on an uneven base and that the environment is transitional to the overlying shales. It is suggested

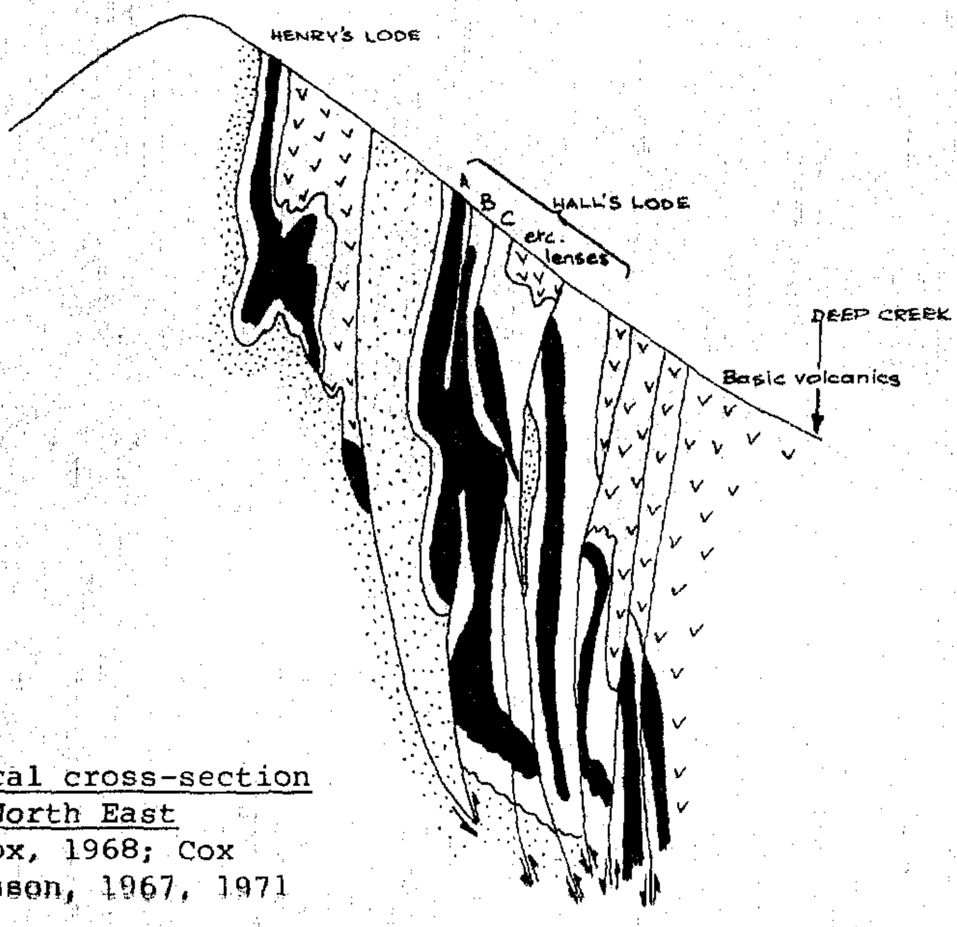


Fig. 5

Geological cross-section to the North East after Cox, 1968; Cox and Glasson, 1967, 1971

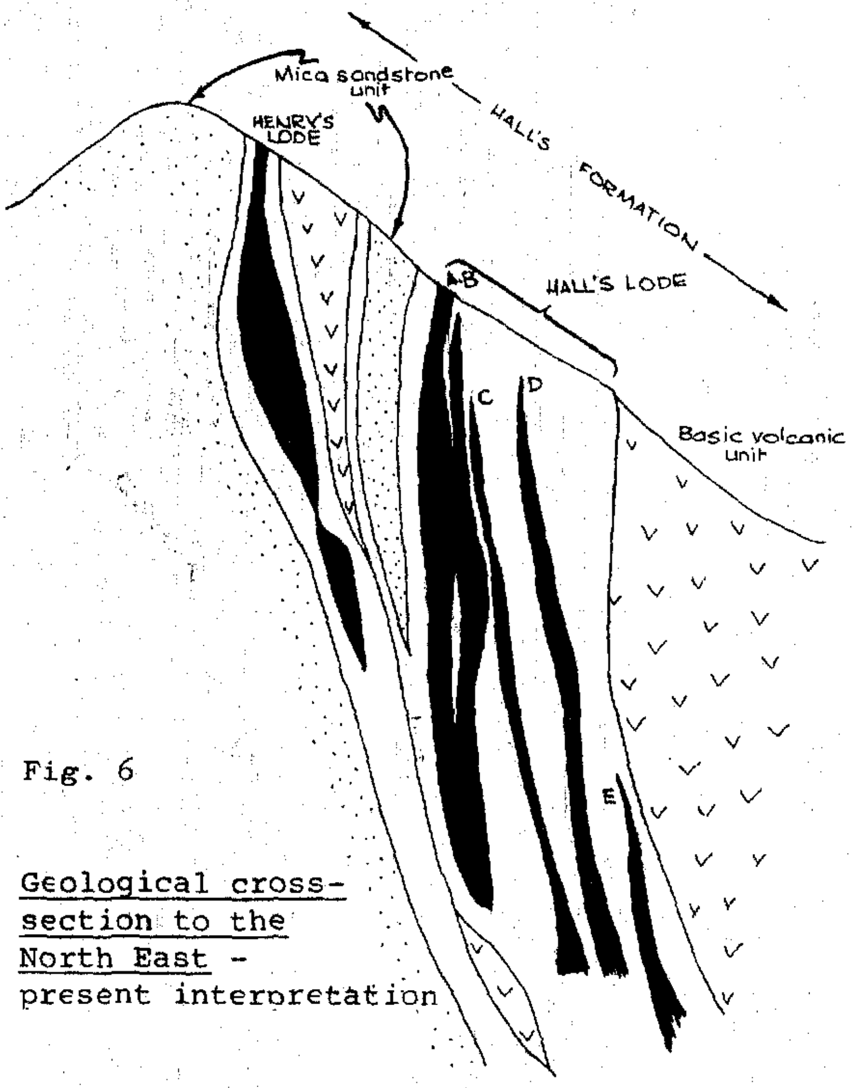


Fig. 6

Geological cross-section to the North East - present interpretation that A, B, C, D, and E lenses attain their regular shape from deposition on a more even, stable basement in more tranquil conditions of sedimentation. The rough parallelism of the elongation of all of the ore lenses may be related to the direction of transport of the sediments in the basement mica sandstones or to some other stratigraphic control. It may also be argued that the south pitch of the ore bodies is a result of strain during regional folding, but at this stage there is no definitive evidence either way. The stratigraphic model is preferred because of the general lack of structural influences on the mineralisation.

To the south of the mine area, it is apparent that the ore lenses become progressively separated from one another as a result of thickening by the sediments between the lenses. This has been mapped between A and B lenses on the 8 and 9 Levels on the mine. It is also noticable that the sediments between the lenses are predominantly sandstones. The northern extension of the mine is much less extensively drilled and this relationship is not so evident. This increasing predominance of sandstone in the sequence may be interpreted as a facies change to the south, which may define the limits of Hall's Formation and possibly the mineralisation as it is now known. This does not preclude the discovery of further mineralisation to the south east.

From the above, it is evident that the controls on mineralisation are almost entirely stratigraphic. Mineralisation is restricted to discrete layers within a well defined shale and chert sequence. The distribution of ore within the mineralised layers is apparently controlled by some form of zoning as described above.

Whether the mineral zoning is a temperature controlled phenomenon or a result of some further stratigraphic feature such as a change in composition of the mineralised layers connot be distinguished at this time. Nor can the origins of the mineralisation be strictly tied down. However, considering certain evidences of replacement such as occasional cross cutting contacts, small scale zoning in gangue minerals and the ubiquitous veining of sulphides and other minerals, it seems likely that the tin and possibly the sulphides were introduced. The chemistry of the replaced beds is unknown, but may have been a carbonate-rich sediment such as a dolomitic shale or tuff. Since these rocks are intimately associated with chert, the origin of the chert will probably be similar.

To summarise the above, the ore controls at Cleveland are essentially

1) stratigraphic: the ore bodies lie within discrete, conformable, mineralised layers within a well defined shale and chert formation. The shape and extent of these layers probably depends on the persistence of the facies.

2) mineralogical: ore is restricted to areas within the mineralised layers by zoning.

6. FINANCE

A. Expenditures (to July 3, 1972)

E.L. 1-63

Geology	$ 2,942
Surveying	19,289
Geophysics	1,720
Geochemistry	6,691
Miscellaneous	296
	$ 30,938

No diamond drilling occurred on EL 1-63.

7. CONCLUSIONS

Appraisal of past activity on the exploration licence has established that weaknesses occur in the exploration methods employed, and an inadequate regional geological interpretation, have hampered the effective coverage of tenement area. The programme for 1971/72 has concentrated on the development of an efficient exploration procedure involving SP, geological mapping and soil sampling. This method is based on orientation surveys in the mine area.

The new stratigraphic interpretation of the mine area has been extrapolated to the exploration licence as the basis for a new regional interpretation. As geological data in a number of critical areas is sparse or absent, a more complete re-interpretation awaits the regional mapping programme aproposed for 1972/73. For this reason, it is materially impossible at present to define potential areas for repetition of the Cleveland type environment. In principle, however, the prospects for the existence of similar areas are excellent.

Aside from the Sn Cu mineralisation, there exists in the exploration,licence, potential for Ag Pb mineralisation to the south of Cleveland in the Godkin areas. At present, the Washington Hey-Confidence area is thought to have far less potential than the Godkin, where the mineralisation is more widespread and occurs in stratigraphically younger formations.

028

751029

8. **ATTACHMENTS**

References (listed)

	Scales
Summary Plan ML27/71, EL	1"=500 ft.
Mine Area - Surface & Mine Composite Plan	1:1000
Longitudinal Section for A-B lens	1:1000
" " C-D lens	1:1000
" " Khaki-Henry's	1:1000

Composite Cross Section for Line L
" " " Line W
" " " Line X
" " " Line Y
" " " Line G1
" " " Line G2
" " " Line G2A

Note: Composites for Lines G5A, G6 are not included.

Signed: Frederick L Hunt
F.L. Hunt
Administrative Engineer
Cominco Exploration Pty. Ltd.

Signed: D M Ransom
D.M. Ransom
Senior Geologist
Cominco Exploration Pty. Ltd.

Endorsed: N L Wolff
N. Wolff
Acting Mine Manager
Cleveland Tin N.L.

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3106
N E TASMANIA
EL 1-63
ML 43M/66
ML 27M/71
LUINA TOWNSHIP
ULTRAMAFIC
MICA SANDSTONE UNIT
MICA SANDSTONE
HALL'S FORMATION
CLEVELAND MINE
BASIC VOLCANIC UNIT
MAGNET MINE
MAGNET RANGE
Data available, but not assessed
WHYTE HILL AREA
SCALE OF FEET
LEGEND.
FALVEY LINES - MAGNETICS (Complete cover G1-G18)
Mag. high
SP limits, Falvey, on Mag. traverses.
BMR SP Cover 1953-54, 1963
SURVEY 1972
PROPOSED SURVEY 1972-73
CEPL SP/SOIL TRAVERSE
SP ANOMALY, UNTESTED
+100 ppm Cu in soils.
+200 ppm
GEOCHEM / GEOLOGICAL PITTING.
GEOLOGICAL LEGEND
Uppermost - basic volcanic unit.
vb basic volcanics
vt tuff, tuffaceous shales
≡ vb, mag. high
COX - sh-c chocolate shales & cherts.
HALL'S FORMATION
sh shale
ch chert
mineralisation
Lowermost - mica sandstone unit
ss sandstone
ultramafic
751032
5 cm
72-878
CLEVELAND TIN N.L.
DRAWN BY: DMR. FLH Cox et al.
TRACED BY:
CHECKED BY:
REVISED BY
DATE
SUMARY MAP - EXPLORATION ACTIVITY
CLEVELAND MINE AREA
30 JUNE 1972
3106
prepared by COMINCO EXPLORATION PTY. LTD
Scale: 1"=500'
Date: JUNE 1972
Plate: RP 10


(212 N, 1350 E, RL 1208)
MILL BUILDINGS
PRIMARY CRUSHER
STOCKPILE
Top Road
Haulage Road
3 Level Road
LINE OF ADIT PROPOSED (RL 1222)
Note. Position of old workings subject to confirmation.
TENTATIVE SHAFT POSITION
LUCK'S-KHAKI
KHAKI ZONE
KHAKI
UNTESTED (WEAKER)
HENRY'S
HENRY'S WORKINGS
UNTESTED
KHAKI-HENRY'S
3 LONGITUDINAL SECTION REFERENCES (APPROXIMATE)
HALL'S A-B
HALL'S C-D
Fault ?
1972 SP
NO UPPER LEVEL HOLES THROUGH HERE
CLEVELAND TRAM
HALL'S REFERENCE PLANE
HALL'S WORKINGS
ACCESS TO CLEVELAND TRAM
8A Sth
8A Sth
8B Sth
9B Sth
8B Sth
5L
5 level
?A Horizon
C Horizon
D Horizon
9C NORTH
9D Nth
8L
7L
BATTERY
Deep Creek
Margin of SP indicates geological contact.
Cu + 200 ppm
Cu + 300 ppm
Cu + 200 ppm
Extreme south end 25 m zone of SP
SMITHY'S
Approx. position Battery Wkgs
BATTERY
Battery Adit
9-10 L NORTH DRIVE
Down Decline to 10 L.
MINE OFFICE
Deep Creek
CLEVELAND WATER RACE
LINE G1
LINE X
LINE Y
751033
CLEVELAND TIN N.L. 72-878
DRAWN BY FCH
TRACED BY
CHECKED BY
REVISED BY DATE
3107 MINE AREA
SURFACE & MINE COMPOSITE PLAN
prepared by COMINCO EXPLORATION PTY. LTD.
5 cm
Scale: 1:1000
Date: MAY 1972
Plate:

CROWN PILLAR
RIB PILLAR
LOW GRADE ZONE
A-B INFERRED
118,600T
HALL'S OPEN CUT
A & B LENS WORKINGS
Narrow portion of A and of B lens, south end
ABOVE 9L - INCLUDED IN ORE RESERVES
SOUTH END - BELOW 9L EXCLUDED FROM ORE RESERVES
PROPOSED EXPLORATION DRIVE
After Stage I
After Stage II
Interpreted (June 1972) lower limit A lens
Proposed last hole of 5 deep holes (DD July 72)
This series of holes planned for extension beyond C-D in anticipation of B lens developing
Recently completed no details of intersected ore
To RL 200 M INFERRED 350,000 TONS
Upper margin untested South of AD Sec'n
SP penetration ?
Surface, untested SP line
SURFACE, HRP
AD SECTION Normal to Battery Ref. Plane
RL 450 M
RL 400 M
RL 350 M
RL 300 M
RL 250 M
RL 200 M
GG
GD
GC
G
K
L
M
N
P
QA
T
U
V
VA
W
X
LEGEND
DDH completed (pre 1972)
Mine development DDH proposed 1972-73 (1973-74)
Mine exploration DDH proposed
Surface exploration DDH proposed
Ore in drive
Sub-ore in drive
DDH in ore
DDH in sub-ore / waste
Completed 1972
751034
72-878
CLEVELAND TIN N.L.
Cleveland Mine
3108
HALL'S LODE-LONG SECTION ON A-B LENS
prepared by COMINCO EXPLORATION PTY. LTD.
Scale 1:1000
Date JULY 1972
Plate
DRAWN BY
TRACED BY
CHECKED BY


LEGEND
DDH completed (pre 1972)
Mine development DDH proposed 1972-73 (1973-74)
Completed 1972
Mine exploration DDH proposed
Surface exploration DDH proposed
Ore in drive
Sub-ore in drive
DDH in ore
DDH in sub-ore
RL 450 M
RL 400 M
RL 350 M
RL 300 M
RL 250 M
SURFACE
2 Level horizon absent eroded
AF SECTION
AD SECTION Battery Rd Mine
MINE OFFICE
Smithy's open Cut
Battery open Cut
7L Haulage Rd
SMITHY'S LODE (W Battery)
2 LEVEL
4 LEVEL
5 LEVEL
7 LEVEL
8 LEVEL
9 LEVEL
10 LEVEL
11 L X-CUT
X-CUT
RIB PILLAR
9C North extension
C-D 645,400 TONS INFERRED
UNTESTED - EXCELLENT POTENTIAL
LOW GRADE ZONE
BATTERY SMITHY'S INTERSECTIONS FOR REINTERPRETATION (1972) THEN SURFACE EXPL'N DD
No details available for lower limit of C-D lens.
Expected margin low grade zone
DD planned July 1972
Development DD in advance of 11 L (from Expl'n Drive)
751035
72-878
CLEVELAND TIN N.L.
DRAWN BY:
CHECKED BY:
REVISED BY
DATE
F.L.H.
D.M.R.
4 July 72
TRACED BY:
Cleveland Mine
3109
HALL'S LODE-LONG SECTION ON C-D LENS
SHOWING SMITHY'S-BATTERY LENS
prepared by COMINCO EXPLORATION PTY. LTD.
Scale: 1:1000
Date: JULY 1972
Plate:
5 cm

LEGEND
DDH completed (pre 1972)
Mine development DDH proposed 1972-73( ) 1973-74)
Completed 1972
Mine exploration DDH proposed
Surface exploration DDH proposed
Ore in drive
Sub-ore in drive
DDH in ore
DDH in sub-ore
RL 450 M
RL 400 M
RL 350 M
RL 300 M
RL 250 M
SURFACE
? CROWN PILLAR
KHAKI WORKINGS
SP interest
SP interest (RL480)
Major SP anomaly
LUCK'S SHEAR
PROPOSED 2 LEVEL KHAKI
DRIVEN 3 LEVEL KHAKI
KHAKI - 738,000 T. INFERRED
ORE RESERVE BLOCK
Access to 2nd Khaki
1 in 20
3L Silling (17,000T, 088 excluding pillar)
CROWN PILLAR
50,000T.
Note: Henry's crown pillar previously given 101,000 T
2 LEVEL
3 LEVEL
4 LEVEL
5 LEVEL
6 LEVEL
7 LEVEL
8 LEVEL
9 LEVEL
10 LEVEL
WASTE
ORE
ORE ?
ABOVE 7th EXTRACTED
No access
SHAFT (W. of Henry's)
Flat dip (25°)
Assume bench scrape ore
10,000 T.
HENRY'S :
120,000T INFERRED - 30 JUNE 72
SUBJECT TO REINTERPRETATION
(PARTICULARLY D.D. APPROACH)
? bottom of KHAKI
Apparently new lens developing at depth
AD SECTION
GJ GG GD GC G K L M N P QA QB R S T U V VA W
751036
5 cm
72-878
CLEVELAND TIN N.L.
Cleveland Mine 3110
LONG SECTION, KHAKI HENRY'S LODES
prepared by COMINCO EXPLORATION PTY. LTD.
DRAWN BY
TRACED BY
CHECKED BY
REVISED BY DATE
Scale: 1:1000
Date: JULY 1972
Plate:

CLEVELAND TIN. N.L.

DRAWN BY:	TRACED BY:	EXPLORATION LICENCE 1/63
CHECKED BY:	REVISED BY / DATE	CLEVELAND MINE COMPOSITE L SECTION 3111
REVISED BY / DATE		prepared by COMINCO EXPLORATION PTY. LTD.

Scale: 1:1000 | Date: JULY 1972 | Plate:


ZERO FOR SP
RL 400 M
GEOCHEM ZERO (PPM)
Geology by CEPL pitting
C-TRAM
NB - mineralised basics? updip from C Lens
? weak SP anomaly
Correlates with Sn geochem
Difficult DD site
CEPL to extend this SP
He type SP response?
-17°
-50°
siltstone?
ch-sh
?basic
C75
C46
C74 W Section
3 Level workings end W Section
2L
4L
Stop workings at U: why?
?D
580 Sn
390 Cu
2600 Zn
450 Sn
38 Cu
400 Zn
A-B
Stop short of section
C293, nth of VA Section 5 Level
C296 on VA Section 7 Level
Anom. Sn in scree
Suggested as south end, top, new lens developing to north of W Section
HALLS REFERENCE PLANE
C408
(minor sh)
lode ore in sandstone
A-B Lens absent 9L ?Faulted to E
(B Lens faulted?)
last face
Projection of mineralisation
9 LEVEL
End proposed Drift at VA
Dev DD -12° 150M
Ex D.D. -40° 200m Brg 310 from VA
DD HOLE SUMMARY
-17 W 105
-50 W 90
195 metres or 600 feet
Development D.D. from 9C Nth to West, extend below C408 W Section (HRP)
SP Scale H 1:1000 / V 1cm = 20 Mv
BMR vertical Scale not given
BMR SP
C.E.P.L. SP
Topography H/V 1:1000
Proposed Exploration Hole
Geochem H 1:1000 / V 1cm = 50 ppm
Cu, Soils
Zn, Soils
Sn, Soils
751038
5 cm
72-878
CLEVELAND TIN N.L.
DRAWN BY: R.L.H.
TRACED BY: K.N.B.
CHECKED BY:
REVISED BY
DATE
EXPLORATION LICENCE 1/63
3112
CLEVELAND MINE
COMPOSITE W SECTION
prepared by COMINCO EXPLORATION PTY. LTD.
Scale: 1:1000
Date: JULY 1972
Plate:

ZERO FOR SP
RL 500
Crescent Spur
Topography
BMR Baseline BMR "T"
Geology by CEPL pitting
C.7RAH
250 m from SP zero
SP (May 1972)
Deep Creek
SP C Lens ? 9C Nth.
? 9D Nth.
RL 400 M
Deep creek
Access for DD sites very difficult east of creek
BMR "T" SP
Reflection B lens
550 ppm Sn
DD Hole Summary
45W 100M
60E 220M
320M
7000 ppm Sn
Test for lode development 9L - 10L
CEPL to extend this sampling
HALL'S REFERENCE PLANE
Projection C.min Zn
9L
W Section
Supported by rising Cu, Zn in bedrock
Bedrock Sn
GEOCHEM ZERO (PPM)
Proposed Exploration Hole
ZERO FOR SP
SP Scale H 1:1000 V 1cm = 20 Mv
BMR Vertical Scale not given
BMR SP
C.E.P.L. SP
RL 400 M
Topography H/V 1:1000
GEOCHEM. ZERO (PPM)
Geochem. H 1:1000 V 1cm = 50 ppm
Cu, Soils
Sn, Soils
751039
5 cm
72-878
CLEVELAND TIN. N.L.
DRAWN BY:
TRACED BY:
CHECKED BY:
REVISED BY DATE
EXPLORATION LICENCE 1/63
3113
CLEVELAND MINE
COMPOSITE X SECTION
prepared by COMINCO EXPLORATION PTY. LTD.
Scale: 1:1000
Date: JULY 1972
Plate:

ZERO FOR SP
RL 500
BMR "U" SP
BMR "U" SP
(insufficient E. ext'n?)
Topography
BMR Baseline "U"-"V"
C. TERM
?C North
2000 Zn
?D North
900 ppm. Zn
SP (1972)
SP (1972)
Spike from transfer of base station
Topography
Deep Creek
RL 400 M
HALL'S REFERENCE PLANE
Cleveland Tram
Dozed area
Crest of hill
GEOCHEM ZERO (PPM)
C TERM
ZERO FOR SP
SP Scale H 1:1000 / V 1cm = 20 Mv
BMR Vertical Scale not given
BMR SP
C.E.P.L. SP
RL 400 M
Topography H/V 1:1000
GEOCHEM. ZERO (PPM)
Geochem. H 1:1000 / V 1cm = 50 ppm
Cu, Soils
Zn, Soils
751040
5 cm
72-878
CLEVELAND TIN. N.L.
DRAWN BY:
CHECKED BY:
REVISED BY
DATE
TRACED BY:
REVISED BY
DATE
EXPLORATION LICENCE 1/63
3114
CLEVELAND MINE
COMPOSITE Y SECTION
prepared by COMINCO EXPLORATION PTY. LTD.
Scale: 1:1000
Date: JULY 1972
Plate:

751041

72-878

CLEVELAND TIN. N.L.

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EXPLORATION LICENCE 1/63

CLEVELAND MINE 3115

COMPOSITE GI SECTION

prepared by COMINCO EXPLORATION PTY. LTD.

Scale: 1:1000 | Date: JULY 1972 | Plate:

ZERO FOR SP
RL 500
WEST LIMIT BMR-SP Traverse
BMR Baseline About BB/BC
BMR "BB" SP
creek
C.E.P.L. Line
C. TRAM
BMR "BB" SP
BMR "BC" SP
SP (1972)
Tributary of Deep creek
? Deep creek
RL 400 M
Cleveland Tram
HALL'S REFERENCE PLANE
Zn, soils
Cu, soils
Deep Creek
Traverse continues 250m further
GEOCHEM ZERO (PPM)
C. TRAM
ZERO FOR SP
SP Scale H 1:1000 V 1cm = 20 Mv
BMR vertical Scale not given
BMR SP
C.E.P.L. SP
RL 400 M
Topography H/V 1:1000
GEOCHEM ZERO (PPM)
Geochem H 1:1000 V 1cm = 20 ppm
Cu, Soils
Zn, Soils
751042
5 cm
72-878
CLEVELAND TIN N.L.
DRAWN BY:
CHECKED BY:
TRACED BY:
REVISED BY DATE
EXPLORATION LICENCE 1/63
CLEVELAND MINE
COMPOSITE G2 SECTION
3116
prepared by COMINCO EXPLORATION PTY. LTD.
Scale: 1:1000
Date: JULY 1972
Plate:

ZERO FOR SP
RL 600
Topography
WEST LIMIT BMR SP Traverses
No apparent SP anomaly (BMR)
BMR Baseline About BF/BG
BMR-Minor SP
BMR 'BF' SP
C.TRAM
'BG'
creek
SP(1972)
BMR 'BF' SP
creek
Topography
NOTE: Magnetics see Falvey (1966)
NOTE: SP continues 300m farther - no interest
ZERO FOR SP
SP Scale H 1:1000 / V 1cm = 20 Mv
BMR Vertical Scale not given
BMR SP
C.E.P.L. SP
RL 400 M
RL 400 M
Topography H/V 1:1000
HALL'S REFERENCE PLANE
Cu, soils
Zn, soils
Cu, soils
Zn, soils
Zn soils
NS (Adit)
NOTE: Soils geochem continues 325m further
GEOCHEM ZERO (PPM)
GEOCHEM. ZERO (PPM)
Geochem H 1:1000 / V 1cm = 20 ppm
Cu, Soils
Zn, Soils
5 cm
C.TRAM
Shallow trench intermittent ss
mica ss boulders with slickensides
Trench sandy soil
sandy soil
ss Float
ss/sh Float
boulders qtz veined
py ch Float
ss Finer grained qtz vein (vughy) minor sph, ccp chloritised & silicified
ch/ss rubble
Adit 10m North in ss(ch)
ss Float
ss rubble
ss, ch rubble
Creek (tributary of Deep creek)
NO SHALES EVIDENT
interpreted basic volcanics
interpreted vt ?
GEOLOGICAL TRAVERSE Scale: H 1:1000
751043
72-878
CLEVELAND TIN. N.L.
DRAWN BY:
CHECKED BY:
REVISED BY DATE
TRACED BY:
REVISED BY DATE
EXPLORATION LICENCE 1/63
3117
CLEVELAND MINE
COMPOSITE G2A SECTION
prepared by COMINCO EXPLORATION PTY. LTD.
Scale: 1:1000
Date: JULY 1972
Plate: