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ABERFOYLE TIN DEVELOPMENT PARTNERSHIP

CLEVELAND DEVELOPMENT PROJECT

Report of the Resident Geologist upon Completion of Exploratory Underground Development, R.L. 1300' Level.

R. COX, January, 1965.

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R. COX, Jan. 1965.

A. INTRODUCTION

This report summarises to date the geological and sampling work undertaken by the writer for the Cleveland Development Project since mid-April, 1964.

After a brief appraisal of the regional setting in company with Mr. K.R. Glasson, detailed surface mapping on a scale of 1" = 40' was undertaken on the Partnership's leases at Mt. Cleveland, 10 miles west of Waratah, Tasmania, together with underground mapping on a scale of 1" = 20' of the old workings (Hall's, Henry's, Battery, Luck's and Khaki).

The Cleveland Development Project entailed the construction of an Access Road at R.L. 1300 ft, and exploratory development on the 1300' R.L. horizon from an adit on the "Qa" section, to define Hall's and Henry's lodes. This development was supplemented by 991 ft. of underground diamond drilling (holes C.47-59 inclusive) from sites in the 1300' R.L. "Qa" adit. The results of geological mapping at 4 ft. above rail level have been plotted on plans at a scale of 1" = 20'. All geological x-sections are at a scale of 1" = 40'.

A groove and channel sampling programme was carried out concurrently and consistently with geological mapping by Mr. G. Keygan and the writer. Groove samples were taken from a continuous groove 1" wide x ½" deep. Channel samples were taken from a continuous channel 6" wide x 2" deep. All samples were taken at 4 ft. above rail level. Sample locations were chosen so that rocks with different physical properties were sampled separately. All mineralisation intersected in x-cuts was sampled (groove and channel) on both walls, while that exposed in the contour drives was groove sampled at 5 ft. intervals along strike (i.e. across each face). In addition, 250'8" of the split core was taken for assay from D.D.H.'s C.47 - C.58 inclusive (see Table 10). All samples were forwarded to the Chief Chemist, Department of Mines, Launceston, Tasmania, for assay for tin and copper. The location plans for all groove, channel and split-core samples are attached to this report as Appendix 4.

In addition to the above field work, grade calculations and analyses of sample results have been carried out. A summary of these computations is included in this report in Sections C and F and, together with the structural interpretation by Mr. K.R. Glasson and the writer, forms the basis for ore-reserve calculations.

The subjects of (1) ore-reserve calculations and (2) the proposed diamond drilling programme will be dealt with in separate reports.

It is intended to present the results of D.D.H. logging and re-logging in a separate report at the earliest opportunity.

A bulk sampling programme of the Hall's Lode, Lens "A", mineralisation, encountered in the 1300' R.L. development from the "Qa" adit x-cuts "K" to "V" (inclusive) was laid out, based upon geological mapping. Plans and sections of this mapping were prepared on a scale of 1" = 5', together with bulk sample location plans.

Calculations were also undertaken with respect to obtaining an ore-sorting composite bulk sample from Hall's Lode, Lens "A", based upon mapping and sampling results.

B. GEOLOGY

1) General

Previous work on the Partnership's leases at Mt. Cleveland and adjoining areas has been referred to in Mr. K.R. Glasson's report of February, 1962. Earlier investigations of Mr. T.D. Hughes (1953), the Bureau of Mineral Resources (Geophysical Report No. 7, 1954), Mr. Q.J. Henderson and Prof. S.W. Carey (Tasmanian Mines Dept., 1945) are acknowledged.

Mr. Glasson's work has been freely drawn upon, and his help and advice are gratefully acknowledged. The data presented in this section should be considered in the light of, and as a natural continuation of, the field work detailed in Mr. Glasson's report of February, 1962.

It should be noted that all underground mapping shown on the attached geological fact plans (Appendix 2) is at 4 ft. above rail level.

2) Stratigraphy

The stratigraphic column of the rock types occurring on the Cleveland leases is given in Table 1. These rocks are considered by the Tasmanian Mines Department as part of the Dundas Series of Cambrian Age.

The three main subdivisions adopted by Mr. Glasson in February, 1962, are used throughout this report. Petrological details of the rock types have been dealt with in Mr. T. Hopwood's report (Section 2, Part 2, dated February, 1962)

The three main sub-divisions are:-

Crescent	Basic Volcanics Formation (youngest)
Spur	Lode Formation
Group	Micaceous Sandstone Formation (oldest)

A serpentine body, probably intrusive into the core of a major NE-striking anticline, is located to the NW of the Cleveland ore-bodies, in the vicinity of the Whyte River flats. The contact of a large Devonian granite batholith outcrops at approx. 2½ miles south of the Cleveland ore-bodies

a) The Micaceous Sandstone Formation

This formation consists of medium grained, micaceous and felspathic sandstones varying in colour from light to medium grey. Minor interbedded shale horizons occur locally towards the top of this formation, while blue and white chert bands occur away from the uppermost contact. In mapping and drill core logging, three units were adopted, which subsequently proved to be of little stratigraphic importance:-

	Swan Stabilo
mg. m. ss. (medium grey, micaceous sandstone)	8753
lg. m. ss. (light grey, micaceous sandstone)	8736
mg. m. ss. with minor shale horizons	8733



The total thickness of this formation is unknown.

b) The Lode Formation

This formation occurs between the Micaceous Sandstone (oldest) and Basic Volcanics (youngest) formations, and has a total thickness of approx. 100 ft. in the area of the 1300' R.L. "Qa" adit. Regional work has shown that the upper and lower boundaries of this formation are unconformities.

The sequence is:-

i) Footwall Beds: light to medium grey, finely foliated shales, up to 20 ft. thick, with chocolate brown to medium-grey banded chert, up to 10 ft. thick, in contact with the lode beds.

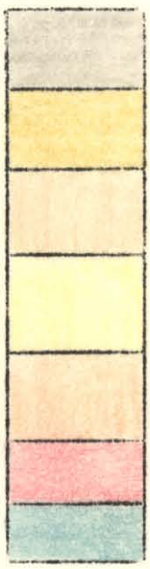
ii) Lode Beds: calcareous or dolmitic (?) horizons replaced by massive and disseminated sulphides, chiefly pyrrhotite, pyrite and chalcopyrite, with minor amounts of sphalesite and arsenopyrite, interbanded with medium to dark-grey and chocolate brown, banded chert horizons. The sulphide bands have a dominantly carbonate-quartz gangue, with sulphides forming approximately 20% of the volume. The interbanded chert horizons show strong deformation parallel to the axial plane direction. Plates 1 to 9 (inclusive) illustrate general attitudes, textures and structures of the interbanded lode and chert horizons.

These beds are of the order of 5 to 25 ft. thick (overall), although axial plane shearing and bedding plane slip cause a repetition of the beds, so that in the Hall's Lode, Lens "A", complex on the 1300' R.L. "Qa" adit level, overall widths vary from 12 to 55 ft.

iii) Hangingwall Beds: chocolate brown to medium grey, banded chert, up to 10 ft. thick, in contact with the lode beds is succeeded by light to medium grey, finely foliated shale, up to 80 ft. thick. A minor medium grey felspathic sandstone horizon, up to 10 ft. thick, occurs within the shale. This brittle sandstone horizon is locally sheared out.

During mapping and core logging, the following units were adopted:-

	Swan Stabilo
lg. ff. sh. = light grey, finely foliated shale	8749
mg. ff. sh. = medium grey to brown, finely foliated shale	8739
dg. ff. sh. = dark grey to brown, finely foliated shale	8735
mg. b.ch. = medium to light grey, banded chert	8744
choc.b. b.ch/sh. = chocolate brown, banded chert/shale	8754
Lode = banded sulphide lode beds	8748
mg. felspathic sandstone	8753



c) The Basic Volcanics Formation

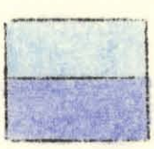
This formation consists of dark greenish-grey, fine to medium grained, massive lavas (dgg. m. bv.) with minor agglomeritic horizons, interbedded with dark greenish-grey to medium grey, banded tuffaceous shale (dgg. b. tuff).

Within the mine area, the basal unit of this formation is a dgg. b. tuff horizon of the order of 30 ft. thick. The total thickness of this formation is unknown.

It should be noted that some of the interbedded tuff horizons are chocolate-brown in colour, and appear identical in hand specimen to the chocolate-brown shales of the Lode Formation.

In mapping and core logging only two rock types within this formation were adopted:

	Swan Stabilo
dgg. b. tuff	8731
dgg. m. bv.	8732



Positive evidence of unconformities within the structurally complex mine area has not been found, but regional investigations have shown the existence of major unconformities at the upper and lower boundaries of the Lode Formation.

The tuff and agglomeritic horizons provide valuable data concerning the "way up" of the sequence, indicating that the Basic Volcanics Formation is the youngest sub-division of the Crescent Spur Group (see Plate 10).

As recognised by Mr. Glasson and his party during their initial mapping of the lease in February, 1962, the banded sulphide lode beds are intimately associated with chocolate-brown cherts and shales which provide an excellent marker horizon. The colouration is probably due to oxidation

at the time of deposition of the shales, as it persists into the primary zone.

For future mine and regional work, the simplified classification and colour index given in Table 2 is proposed. During regional work the location of the upper and lower boundaries of the Lode Formation is of the utmost importance.

B. 3) Structural Interpretation

For the purposes of this report, a structural interpretation has been made only for the strike length opened up on the 1300' R.L. "Qa" adit level (i.e. cross-sections "J" to "V" inclusive), and above the 1100 ft. R.L. horizon. Paucity of the data precludes a reliable interpretation outside these limits, due to the complex nature of the structures.

It is proposed to deal further with the stratigraphy and structural geology of the Partnership's leases at Mt. Cleveland embracing Hall's, Henry's, Luck's, Khaki, Battery, etc. in a future report. Similarly, a detailed appraisal of the regional geology of the Partnership's exploration licence in the Mt. Cleveland area, to be undertaken during the first half of 1965, will be dealt with in a separate report.

Detailed mapping and structural analyses of the surface between cross-sections "K" and "V" (inclusive) from Crescent Spur down to Deep Creek (refer drawings C.1-12 and C.23 separately available), combined with similar studies on the 1300 ft R.L. "Qa" adit level (drawings C.20-22 inclusive, also separately available), 1400 ft. Lower Hall's adit, Hall's Upper adit, Hall's Open Cut, and Henry's Open Cut have led to the establishment of the stratigraphic sequence described in the previous section. This work, coupled with re-logging of D.D.H.'s C.1 to C.46, and logging of D.D.H.'s C.47 to C.59, has led to a new structural interpretation.

Three alternatives present themselves: the ore-bodies known as Henry's, Hall's and the three (or more) un-named lodes to the SE of Hall's Lode on the 1300' R.L. horizon could be:-

i) Five (or more) different lode horizons.

ii) The same lode horizons, repeated by tight isoclinal folding.

iii) The same lode horizon, repeated by axial plane thrusting.

The first possibility could only be accounted for by assuming numerous unconformities resulting in small, lens-like bodies of ore. These requirements are not found in the structure of the area.

The second possibility, whereby one lode horizon, together with the other stratigraphical units, have been tightly folded so that the limbs of the folds are sub-parallel to the axial plane cleavage is also discounted. An unsuccessful attempt was made to fit this interpretation for the geological cross-sections "K" to "V" (inclusive). While it was a distinct

possibility for some cross-sections ("R" to "V" inclusive), it could not be fitted to the whole area. There is also the practical point that these rocks could hardly have been so tightly folded without the occurrence of axial plane thrusting.

Thus the third alternative has been adopted, which fits the observed structures, and allows a consistent interpretation of the geological fact plans and sections.

Between Deep Creek and Crescent Spur in the area under consideration, the major structure is the SE limb of an overturned, NE-striking anticline occurring to the NW of the mine area. Serpentine occurs in the core of this anticline, along the Whyte River flats, and is probably intrusive. A synclinal axis probably occurs to the SE of the mine area. Minor folding, with plunges at varying amounts to the NE and SW, occurs within this overturned limb. Dips vary from steep and overturned to the NW, to steep to the SE. The axial plane cleavage is well developed locally, striking NE and dipping approximately 75°NW.

Faulting is well developed along the axial plane direction. The movement is essentially thrusting with the NW side moving down and towards the SW relative to the SE side, as shown by well developed slickensides or fault planes (see plate 11). The major faults are up to 6 ins. wide with an infill of clay gouge, quartz and carbonate, with minor sulphides (see plate 12). Adjacent to major faults, the ground is usually well sheared over approximately 20 ft. Within the mine area, four major faults have been recognised, designated F_A, F_B, F_C and F_D. Movements on these major faults are of the order of up to 800 ft., giving displacements of up to 600 ft. measured in a vertical plane.

The stratigraphic sequence in the mine area has thus been repeated by movements on these four major faults, but is further complicated by smaller movements or minor axial plane shears and on bedding planes (see plate 13). It is this minor thrusting which has resulted in the horizontal width of Hall's Lode, Lens "A", on the 1300' R.L. "Qa" adit level varying between 12 ft. and 55 ft.

Faulting in other directions is essentially minor movement on joint planes. A prominent set of flat tension joints occurs throughout the area, filled with vughy quartz, sulphides and minor cassiterite.

This interpretation modifies Mr. Glasson's original interpretation (February, 1962), in the light of more exposures. The "way-up" of the stratigraphy and the structural interpretation presented here and previously by Mr. Glasson differ from earlier investigators.

Geological Fact Plans (scale 1" = 20') and Sections (scale 1" = 40') are separately available, whilst Geological Interpretation Plans and Sections are included in Appendix 2. The Geological Legends for the (1) Fact Plans and Sections and (2) Interpretation Plans and Sections are given in Tables 1 and 3 respectively.

In order to elaborate more on this interpretation, it will be convenient to describe the structure on three cross-sections, say the "Qa", "N" and "T" cross-sections.

With reference to the "Qa" Fact and Interpretation cross-sections (drawings C.7 and C.27 respectively), the stratigraphic sequence detailed in section B. (2) of this report is seen to be repeated by major movements on axial plane faults F_A, F_B and F_C. These thrusts dip steeply NW, while the bedding dips either steeply NW or SE, locally flattening out adjacent to the major faults. The structure is more complicated than actually shown, due to smaller movements or minor axial plane faults (not shown) and along bedding planes sub-parallel to the axial plane direction. Thus is explained the local thickening and thinning, or even shearing out completely, of the more brittle beds.

To the NW of fault F_A the ore-body known as Henry's Lode plunges into the section at 1410' R.L. and, for this reason, does not outcrop. This ore-body has an overall SE dip, and bottoms against fault F_A at 1100 ft. R.L. The thickness of the Lode Formation to the NW of fault F_A is particularly small, partly due to shearing.

A vertical component of movement of approximately 600 ft. on fault F_A results in a repetition of the stratigraphic sequence between faults F_A and F_B. The ore-body outcrops between these two faults, and is known as Hall's Lode, Lens "A". It is between these faults that minor thrusting has increased the overall width of the ore-body up to 40 ft. The Basic Volcanics Formation does not outcrop between faults F_A and F_B.

Similar, but lesser, movements on faults F_B and F_C result in further repetitions of the stratigraphic sequence as shown in drawing no. C.27. The lenses of ore between faults F_B and F_C, and between F_C and F_D, are known as Hall's Lode, Lenses "B" and "C" respectively.

With reference to the "N" Fact and Interpretation cross-sections (drawings C.3 and C.26 respectively), it will be seen that the stratigraphic sequence is repeated by major movements on faults F_A, F_B, F_C and F_D in a manner similar to that described for cross-section "Qa".

On the "N" x-section, it will be seen that Henry's Lode is absent to the NW of fault F_A. Evidence as to the location of Hall's Lode, Lens "D" to the SE of fault F_D is provided by D.D.H. no. C.41.

The vertical components of movement on F_B and F_C are approximately 400 ft. and 150 ft. respectively.

With reference to the "T" Fact and Interpretation cross-sections (drawings C.10 and C.30 respectively), it will be seen that the stratigraphic and structural picture is similar to that for cross-sections "Qa" and "N".

To the NW of fault F_A, Henry's Lode dips SE from outcrop (in Henry's Open Cut) to its lower limit against fault F_A at R.L. 1170 ft. approximately.

Between faults F_A and F_B, Hall's Lode, Lens "A" shows numerous irregularities due to folding and thrusting, between outcrop and its lower limit at R.L. 1100 ft.

Hall's Lode, Lenses "B" and "C" occur between faults F_B and F_C and between faults F_C and F_D respectively. Lens "B" does not outcrop, while a minor plunge causes Lens "C" to plunge into this section at R.L. 1160 ft. approximately.

From the interpretation cross-sections "K" to "V" (drawings C.24 to C.32 inclusive), interpretation plans for the 1100 ft., 1200 ft., 1300 ft. and 1400 ft. R.L. horizons have been constructed (drawings C.33 to C.36

inclusive), in addition to longitudinal projections of Henry's Lode and Hall's Lode, Lenses "A", "B", "C" and "D" onto the vertical Hall's Reference Plane, (drawing no. C.37). These plans and sections provide a reliable interpolation and extrapolation of the structure down to the R.L. 1100 ft. horizon. Insufficient data are available at present to project the structure below this horizon with a reasonable degree of certainty.

It should be stressed here that detailed surface mapping beyond the area bounded by the "K" and "V" lines indicates that:-

1) Hall's Lode, Lens "A" continues to outcrop for approximately 550 ft. SW of the "K" line.

2) Hall's Lode, Lenses "B" and "C" outcrop again to the SW of this area in the vicinity of the old Battery workings.

A proposed diamond drilling programme, presented as a separate report by Mr. Glasson and the writer, is designed to investigate further the structure of the mine area, both in depth and laterally along strike to the SW of the "K" line.

C. SAMPLING

1) Introduction

The mineralisation at Cleveland consists of sulphide-cassiterite replacement lode beds (possibly originally limestones or calcareous sandstones) with interbanded chert horizons. Hall's Lode, Lenses "A", "B", "C" and "D", together with Henry's Lode and the lode horizons encountered in the old Luck's and Khaki workings are of this type.

All sulphide-cassiterite and interbanded chert horizons exposed during the development of the 1300' R.L. "Qa" adit level were subjected to an intensive and systematic sampling programme, consisting of split core, groove, channel, grab and bulk sampling. Mineralised joints and faults were not sampled.

The groove, channel and split core sampling programme was supervised by the writer, who ensured that sound sampling practice was employed throughout:-

i) All samples were taken by one sampler, Mr. G. Keygan.

ii) All sampling was done concurrently with the writer's geological mapping.

iii) All sample locations were painted up, at 4 ft. above rail level, and are referable to the mine survey grid.

iv) Geological units were sampled separately, so as to avoid errors due to including more than one rock type of different physical properties in one sample location.

v) Each sample was placed in a new, clean canvas bag with the identification number marked on the outside, in ink, and on an aluminium foil marker placed inside the bag.

vi) Groove samples were taken by hand, using hammer and moil, from a continuous 1" wide x $\frac{1}{2}$" deep groove.

vii) Channel samples were also taken by hammer and moil, from a continuous 6" wide x 2" deep channel.

viii) Groove and channel samples were taken from the same sample location, in order to facilitate correlation.

A total of 982 groove samples, 318 channel samples and 144 split core samples were taken, as detailed in Table 4. Sample location plans for the 1300' R.L. "Qa" adit level are included in Appendix 4.

2) Groove Sampling of Contour Drives

The mineralisation exposed in every face in the contour drives on Hall's Lode, Lens "A" and on Henry's Lode was groove sampled (i.e. at 5 ft. intervals along strike) at 4 ft. above rail level, and at right angles to the strike of the lode. Sample widths in all cases were horizontal widths and not true widths, due to the complex nature of the folding.

The groove samples from contour drives on Hall's Lode, Lens "A" to the NE and SW of peg A.5 ("Qa" x-cut) were prefixed "QN" and "QS"

respectively. The groove samples from contour drives on Henry's Lode to the NE and SW of peg A.28 ("R" x-cut) were prefixed "RN" and "RS" respectively.

A summary of the results of this groove sampling programme is presented in Table 5. It should be noted that the full width of the ore-bodies is not exposed in these contour drives.

3) Groove, Channel and Split Core Sampling of Hall's Lode, Lens "A", on x-section lines

From the contour drives NE and SW of peg A.5, along the NW boundary of Hall's Lode, Lens "A", eight x-cuts (K, L, N, P, Qa, R, T and V) exposed the full width of the ore-body. These x-cuts are all on a bearing of 132° (reference grid meridian), perpendicular to the Hall's Lode Longitudinal Projection Plane. The sulphide-cassiterite and interbanded chert horizons comprising Lens "A" were groove and channel sampled on both walls.

Midway between the predetermined x-cut lines, diamond drill holes (nos. C.57, 54, 51, 50, 48, 47, 53 and 55) from the contour drives, on bearings of 132°, intersected the full width of Hall's Lode, Lens "A". These drill hole intersections were also split according to the sound practice outlined in section C. (1).

Full details of the sampling results of Hall's Lode, Lens "A" on the 16 x-section lines, "J" to "V" inclusive, 1300' R.L. "Qa" adit level, are given in Table 6.

4) Groove, Channel and Split Core Sampling of Mineralisation other than Hall's Lode, Lens "A"

Mineralisation other than Hall's Lode, Lens "A", including Henry's Lode and Hall's Lode, Lenses "B" and "C", was also systematically sampled using groove, channel and split core methods as previously described. A summary of these results is presented in Table 7.

5) Bulk Sampling and Ore Sorting Composite

Upon completion of the geological mapping, groove and channel sampling in each of the eight x-cuts (K, L, N, P, Qa, R, S, T and V) on the 1300' R.L. "Qa" adit level, bulk sample locations were marked up on the back for Hall's Lode, Lens "A". These locations were consistent with the major geological units as far as was practical, dependent upon the large size of the bulk samples (4 ft. long x 2'6" deep x 3'6" to 5'0" wide). The actual taking and preparing of these samples was supervised by Messrs. H.S. Fraser and J.D. Cox. A bulk sample location plan, drawing no. C.44, is attached in Appendix 4.

A bulk sample composite for ore sorting investigations was also required, and detailed measurements and calculations, summarised in Table 8, were undertaken by the writer.

C. 6) Sample Data Analysis

All groove, channel, split core and bulk samples from Hall's Lode, Lens "A" on the 1300 ft. R.L. "Qa" adit level, between x-sections "J" and "V" (inclusive), were assayed for tin and copper by the Tasmanian Department of Mines, Launceston.

Grade calculations and sample data analyses on the results of the samples were undertaken by the writer during the course of the Cleveland Development Project, and computation sheets were prepared. Table 9 presents a detailed summary of the results of these calculations and analyses on the sixteen x-sections, "J" to "V" (inclusive) of Hall's Lode, Lens "A", on the 1300' R.L. "Qa" adit level. These results, together with the structural interpretation presented in section B. (3), form the basis of a separate report on ore-reserves by Mr. K.R. Glasson and the writer.

The value of sampling the sulphide-cassiterite and interbanded chert horizons separately is readily appreciated from Table 9. The chert horizons, forming 30% bulk volume for the area under consideration, contain negligible quantities of tin and copper. Also, variation in the tin and copper content of the aggregate sulphide beds is readily appreciated.

D. CONCLUSIONS

1) Geology

The sulphide-cassiterite ore-bodies at Cleveland are conformable with the bedding. They occur in the Lode Formation, above the Micaceous Sandstone Formation and below the Basic Volcanics Formation. The lode beds are located on the overturned SE limb of a major NE-striking anticlinal structure, whose axis is in the vicinity of the Whyte River flats (to the NW of Crescent Spur). The disposition of the lode beds is steeply inclined to the NW and SE, between sets of NW-dipping axial plane faults. These major faults move the stratigraphical sequence several hundreds of feet (with the NW sides moving down and towards the SW, relative to the SE sides), causing a repetition of the lode beds.

2) Sampling

During the Cleveland Development Project strike lengths of approx. 1000 ft. and 350 ft. were opened up on Hall's Lode, Lens "A", and Henry's Lode respectively, on the 1300' R.L. "Qa" adit level. An intensive sampling programme has provided valuable data regarding:

a) the grade of the ground opened up;

b) the distribution of tin and copper values within the sulphide-cassiterite and interbanded chert horizons;

c) the bulk percentage chert within the ore-body;

d) the reliability of the various methods of sampling;

e) variations in the grade of tin and copper mineralisation within the aggregate sulphide bands.

These sampling results are incorporated into a separate report on ore-reserves by Mr. Glasson and the writer.

The interbanded chert horizons form 30% of the bulk volume of the ground investigated and contain negligible quantities of tin and copper. The removal of this barren chert at the earliest possible stage in mineral dressing is, therefore, highly desirable.

It would appear that split-core samples at 50 ft. centres (combined with groove samples where necessary) provide as reliable an estimate of the width and grade as the more elaborate, expensive and time-consuming methods of groove, channel and bulk sampling of x-cuts.

It has also been shown (Table 9) that the groove samples taken in the x-cuts provide as reliable a weighted average of the overall grade as the much larger channel samples.

3) Limits of Ore

The lode beds and structure have been defined by driving, etc. over a strike length of approximately 1000 ft. ("J" to "V" x-sections inclusive) on the 1300' R.L. horizon. The results of surface mapping and

diamond drilling allow the structure to be interpreted between the 1100 ft. R.L. horizon and outcrop at 1400' - 1500' R.L. with a reasonable degree of reliability The structure, and especially the configuration of the faulted lode beds, can be extrapolated outside these limited, based upon surface mapping and structural data. For example, the two ore-bodies exposed in the old Battery workings may be correlated with Lenses "B" and "C" of Hall's Lode. Similarly, Hall's Lode, Lens "A" may be traced at outcrop for 550 ft. SW of the "K" x-section.

Further diamond drilling to delineate the structure of the lode beds in depth and to the SW of the "K" x-section is recommended in a separate report by Mr. Glasson and the writer.

E. RECOMMENDATIONS

1) Drilling to Define Lode Structure Laterally and in Depth

On the basis of the geological work so far completed, and in the light of the structural interpretation presented in section B. (3), a programme of diamond drilling to investigate and define further the structures, both laterally and at depths down to the 900 ft. R.L. horizon, has been prepared. These recommendations are embodied in a separate report by Mr. Glasson and the writer.

2) Continuation of Exploration to Define Limits of Ore

It is recommended that:-

a) The 1300 ft. R.L. "Qa" adit level be extended by continuing the contour driving NE and SW of peg A.5 on Hall's Lode, Lens "A", supplemented by diamond drilling at approximately 60 ft. intervals, to define the limits of economic cassiterite-chalcopyrite mineralisation on this horizon.

b) Subject to future mining requirements, an 1100 ft. R.L. exploratory adit be commenced in the vicinity of the old Battery workings to define the economic limits of cassiterite-chalcopyrite mineralisation on Hall's Lode, Lenses "A", "B" and "C", and to check the interpretation presented in section B. (3) and Appendix 3.

F. TABLES

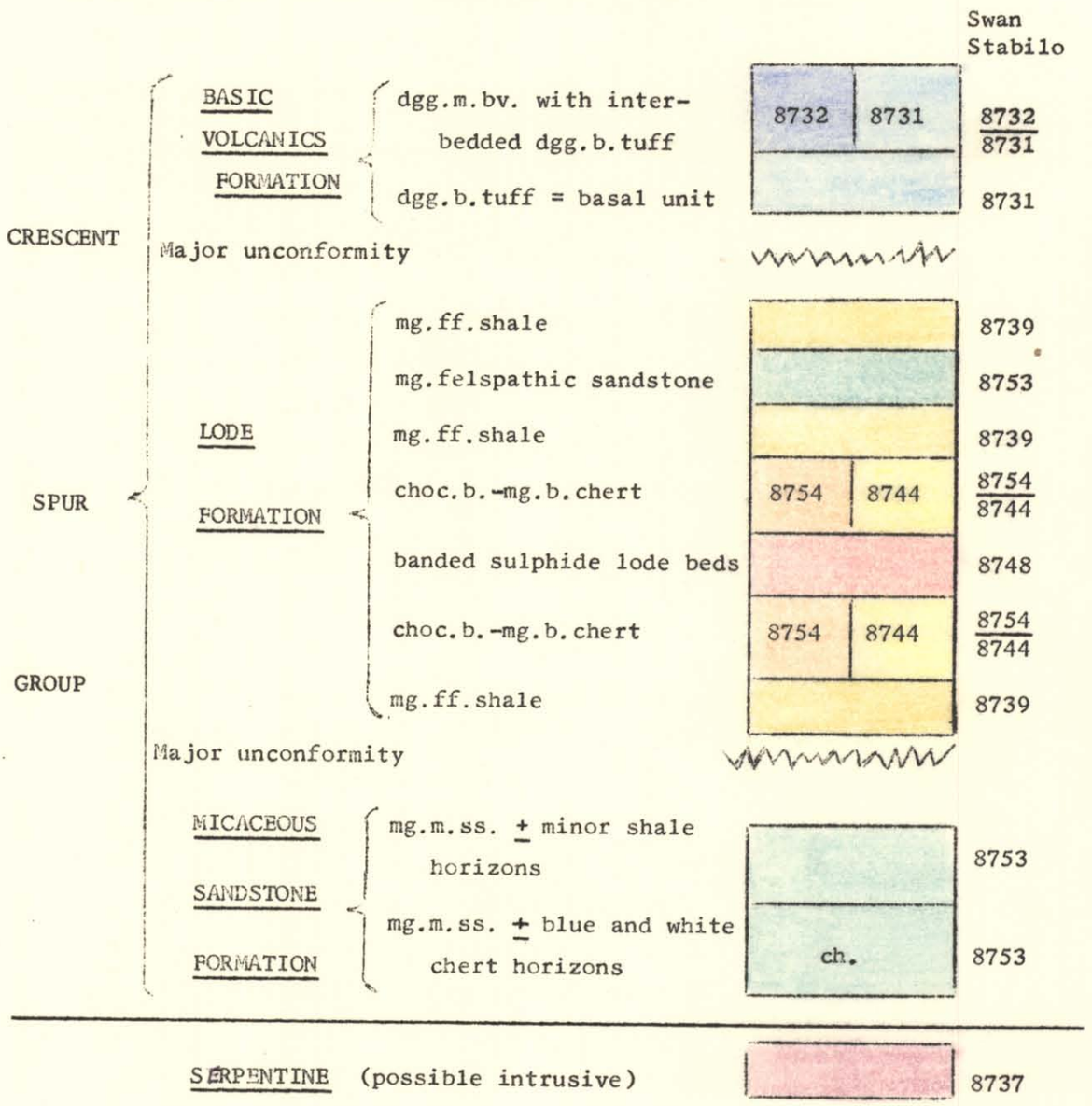
The tables, Nos. 1 to 10 inclusive, referred to frequently in the text are grouped here together for convenience and ease of reference. Details are given below:-

Table No.	Description	Page No.
1	Stratigraphic Column and Geological Legend for Mt. Cleveland Leases.	17.
2.	Proposed Rock Classification for future mine and regional work.	18.
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4.	Summary of Sampling Programme, 1300' R.L. "Qa" Adit Level.	20.
5.	Summary of Results of Groove Sampling Programme, 1300' R.L. "Qa" Adit Level Contour Drives, Hall's Lode Lens "A" and Henry's Lode.	21.
6.	Summary of Sampling Results, 1300' R.L. "Qa" Adit Level, Hall's Lode, Lens "A".	22.
7.	Summary of Sampling Results, 1300' R.L. "Qa" Adit Level, Mineralisation other than Hall's Lode, Lens "A".	25.
8.	Details of Ore Sorting Composite Bulk Sample, Hall's Lode, Lens "A", 1300' R.L. "Qa" Adit Level.	28.
9.	Summary of Sample Data Analysis, Hall's Lode, Lens "A", 1300' R.L. "Qa" Adit Level	29.
10	Summary of Underground Diamond Drilling Programme, 1300' R.L. "Qa" Adit Level.	30.

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TABLE 1.

MT. CLEVELAND LEASES, STRATIGRAPHIC COLUMN



LEGEND

	Symbol	Nomenclature
1)	17/180	S_1 (bedding) dips 17° towards 180°
2)	17/170, 45°	F (Fault) dips 75° towards 170°; s/s pitch 45° W.
	a)	h.w. moved down relative to f.w.
	b)	f.w. " " " " h.w.
	c)	relative movements unknown
3)	42/220	Minor fold axis plunges 42° towards 220°

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TABLE 2.

PROPOSED ROCK CLASSIFICATION & COLOUR LEGEND FOR FUTURE MINE AND REGIONAL WORK

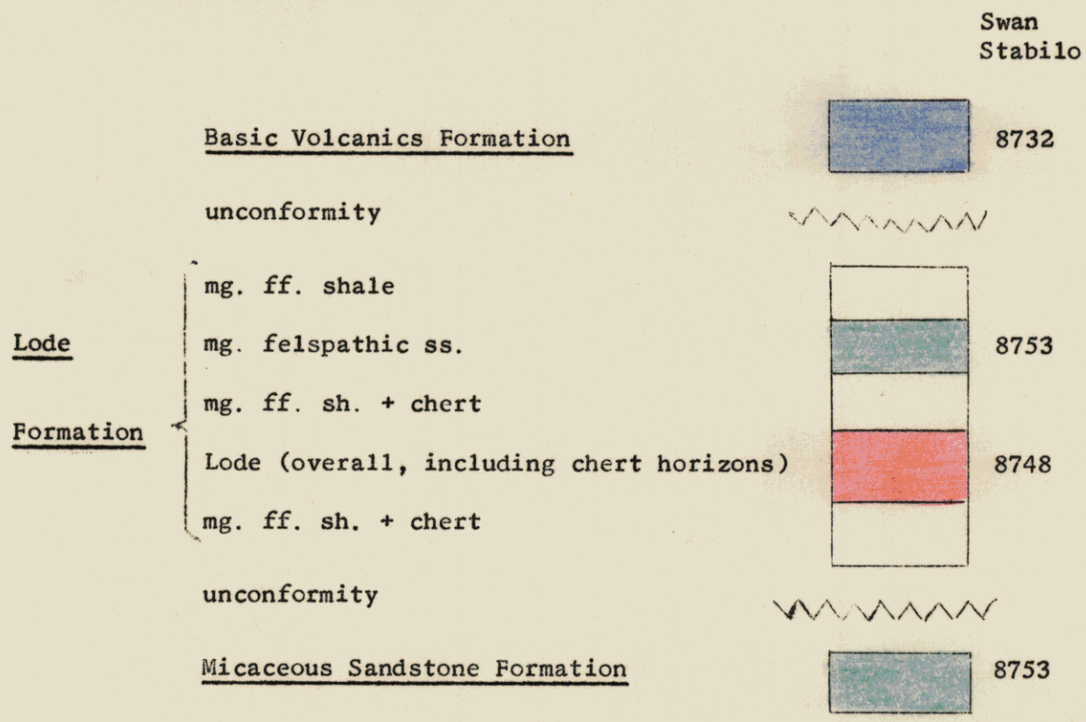
FORMATION	ROCK TYPE	MINE Swan Stabilo No.	REGIONAL Swan Stabilo No.
BASIC VOLCANICS	dgg. m. bv.	8732	8732
	dgg. - mg. b. tuff	8731	
LODE	mg. ff. shale	8739	8739
	mg. felspathic ss.	8753	
	choc.b. b. chert	8754	8754
	lg.- mg.- dg. b. chert	8744	8739
	sulphide lode horizon	8748	8748
MICACEOUS SANDSTONE	mg. m. ss. ± mg. sh. horizons	8753	8753
	mg. m. ss. + blue and white chert horizons	8753	8733
GRANITE		8740	8740
SERPENTINE		8737	8737
TERTIARY BASALT FLOW		-	8747

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TABLE 3.

GEOLOGICAL LEGEND FOR INTERPRETATION PLANS AND SECTIONS

Simplified Stratigraphic Column:-



LEGEND

1) 80 — S_1 (bedding) dips 80°

2) 75 — F (fault) dips 75°

a) s/s on fault plane; h.w. moved down relative to f.w.

b) s/s on fault plane; f.w. moved down relative to h.w.

R. COX, Jan. 1965.

TABLE 4.

SUMMARY OF SAMPLING PROGRAMME, 1300' R.L. "Qa" ADIT LEVEL

1. Contour Drives on Hall's Lode, Lens "A", SW and NE of Peg A.5, Groove Samples

a) Sample Nos. QS 1-307 inclusive = 307 samples

b) " " QN 1-172 " } = 208 "

c) " " QN 172B-207 " }

Total = 515 groove samples

2. Contour Drives on Henry's Lode, SW and NE of Peg A.28, Groove Samples

a) Sample Nos. RS 1-87 inclusive = 87 samples

b) " " RN 1-49 " = 49 "

Total = 136 groove samples

3. D.D.H. Split Core Samples

Sample Nos. 807-950 inclusive = 144 s/c samples

4. Cross-Cut Sampling

X-cut	CHANNEL SAMPLES			GROOVE SAMPLES		
	Sample Nos.	No. of Samples	Sampled Footage	Sample Nos.	No. of Samples	Sampled Footage
K	K1A-43A incl.	43	129'9"	K1-43 incl.	43	129'9"
L	L1A-11A "	11	23'9"	L1-11 "	11	23'9"
N	N1A-37A "	37	77'3"	N1-37 "	37	77'3"
P	P1A-29A "	29	72'4"	P1-29 "	29	72'4"
Qa etc	Q1A-70A "	70	139'9"	Q1-70 "	70	139'9"
R	R1A-59A "	59	136'11"	R1-59 "	59	136'11"
T	T1A-24A "	24	57'6"	T1-42 "	42	108'3"
V	V1A-40A "	40	113'7"	V1-40 "	40	113'7"
Totals		313	750'10"		331	801'7"

5. Lower Halls Adit X-cut, 1400 Ft. R.L., Channel Samples*

Sample Nos. LH 1A-5A inclusive = 5 channel samples

R. COX, Jan. 1965.

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TABLE 5.

SUMMARY OF RESULTS OF GROOVE SAMPLING PROGRAMME 1300' R.L. "Qa" ADIT LEVEL CONTOUR DRIVES, HALL'S LODE LENS "A" AND HENRY'S LODE.

Development Opening	Lode	Location	Width - horizontal (full width not exposed)	Wt. Av. Grade	
				% Sn	% Cu
Drive SW of Peg A.5	Hall's Lens "A"	Sta. 5'-110' SD	65.0"	1.13	0.59
		110'-140' SD	*		
		140'-250' SD	44.6"	1.00	0.52
		250'-315' SD	*		
		315'-370' SD	55.4"	1.18	0.41
		370'-430' SD	*		
		430'-505' SD	85.6"	0.67	0.40
		505'-550' SD	*		
		550'-585' SD	41.9"	1.83	0.42
		585'-600' SD	*		
		600'-655' SD	84.5"	1.27	0.22
Drive NE of Peg A.5	Hall's Lens "A"	Sta. 5'-105' ND	74.5"	1.17	0.55
		105'-200' ND	*		
		200'-270' ND	61.3"	1.01	0.33
		270'-285' ND	*		
		285'-295' ND	63.3"	0.81	0.26
		295'-305' ND	*		
		305'-330' ND	36.2"	0.52	0.22
		330'-365' ND	*		
		365'-445' ND	60.1"	0.62	0.20
Drive SW of Peg A.28	Henry's	Sta. 11'-201' SD	38.2"	1.50	0.69
Drive NE of Peg A.28	Henry's	Sta. 14'-134' ND	39.5"	3.76	0.82

* Refers to sections

(1) where the drive diverts into underwall rock to facilitate bulk sampling, or

(2) where the lode "plunges-out".

R. COX, Jan. 1965.

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TABLE 6.

SUMMARY OF SAMPLING RESULTS, 1300' R.L. "Qa" ADIT LEVEL, HALL'S LODE, LENS "A".

X-Section Line	Location	Horizontal Width	Wt.Av. Grade % Sn.	% Cu.	Type of Sampling
"J"	Sta. 650'SD:groove samples + D.D.H. No. C.57	346"=28'10"	0.77	0.14	s/c + groove
"K"	"K" x-cut, SW wall, 5'0" - 34'1" SE of peg A.30	349"	1.36	0.31	groove
	"K" x-cut, NE wall, 0'2"NW - 30'1" SE of peg A.30	403"	0.94	0.42	"
	"K" x-cut Av. both walls	376"=31'4"	1.13	0.37	"
	"K" x-cut, SW wall	349"	1.68	0.44	channel
	"K" x-cut, NE wall	403"	0.73	0.38	"
	"K" x-cut, Av. both walls	376"=31'4"	1.17	0.41	"
"Ka"	Sta. 505'SD:groove samples + D.D.H. No. C.54	414"=34'6"	0.84	0.26	s/c + groove
"L"	"L" x-cut, SW wall, 0'2"NW - 11'6" SE of peg A.23	140"	0.36	0.33	groove
	"L" x-cut, NE wall, 1'0"NW - 11'1" SE of peg A.23	145"	0.48	0.11	"
	"L" x-cut Av. both walls	142½" = 11'10½"	0.42	0.22	"
	"L" x-cut, SW wall	140"	0.51	0.33	channel
	"L" x-cut, NE wall	145"	0.69	0.38	"
	"L" x-cut, Av. both walls	142½" = 11'10½"	0.60	0.36	"
"M"	Sta. 350'SD:groove samples + D.D.H. No. C.51	367"=30'7"	1.32	0.35	s/c + groove
"N"	"N" x-cut, SW wall, 15'3"- 51'4" SE of peg A.17	433"	1.22	0.37	groove
	"N" x-cut, NE wall, 15'1"- 51'0" SE of peg A.17	431"	1.15	0.29	"
	"N" x-cut, Av. both walls	432"=36'0"	1.18	0.33	"
	"N" x-cut, SW wall	433"	1.25	0.34	channel
	"N" x-cut, NE wall	431"	1.17	0.34	"
	"N" x-cut, Av. both walls	432"=36'0"	1.21	0.34	"
"O"	Sta. 205'SD:groove samples + D.D.H. No. C.50	210"=17'6"	0.53	0.25	s/c + groove
"P"	"P" x-cut, SW wall, 0'4"NW - 33'9" SE of peg A.13	409"	1.05	0.46	groove
	"P" x-cut, NE wall, 1'3"SE - 35'3" SE of peg A.13	408"	1.01	0.55	"
	"P" x-cut, Av. both walls	408½"=34'0½"	1.03	0.50	"
	"P" x-cut, SW wall	409"	1.11	0.46	channel
	"P" x-cut, NE wall	408"	0.91	0.42	"
	"P" x-cut, Av. both walls	408½"=34'0½"	1.01	0.44	"

TABLE 6 (Continued).

X-Section Line	Location	Horizontal Width	Wt.Av. Grade % Sn.	% Cu.	Type of Sampling
"Q"	Sta. 55' SD:groove samples + D.D.H. No. C.48	241"=20'1"	0.76	0.43	s/c + groove
	or	409"=34'1"	0.61	0.44	"
"Qa"	"Qa" x-cut, SW wall,241'11" - 265'6" NW of Zero	283"	0.88	0.44	groove
	"Qa" x-cut, NE wall,240'8" - 265'9" NW of Zero	301"	1.12	0.54	"
	"Qa" x-cut, Av. both walls	292"=24'4"	1.00	0.50	"
	"Qa" x-cut, NE wall only	301"=25'1"	0.95	0.60	channel
"Qb"	Sta. 65' ND:groove samples + D.D.H. No. C.47	534" 44'6"	1.05	0.43	groove
"R"	"R" x-cut, SW wall, 20'0"-67'7" SE of peg A.12	571"	0.84	0.25	groove
	"R" x-cut, NE wall, 21'0"-66'4" SE of peg A.12	544"	0.72	0.22	"
	"R" x-cut, Av. both walls	557½"=46'5½"	0.78	0.24	"
	"R" x-cut, SW wall	571"	0.89	0.26	channel
	"R" x-cut, NE wall	544"	0.87	0.26	"
	"R" x-cut, Av. both walls	557½"=46'5½"	0.88	0.26	"
"R"	"R" x-cut, SW wall, 20'0"-80'10" SE of peg A.12	730"	0.76	0.25	groove
	"R" x-cut, NE wall, 21'0"-79'6" SE of peg A.12	702"	0.62	0.20	"
	"R" x-cut, Av. both walls	716"=59'8"	0.69	0.22	"
	"R" x-cut, SW wall	730"	0.78	0.25	channel
	"R" x-cut, NE wall	702"	0.73	0.24	"
	"R" x-cut, Av. both walls	716"=59'8"	0.76	0.24	"
"S"	Sta. 210'ND:groove samples + D.D.H. No. C.53	396"=33'0"	0.81	0.21	s/c + groove
"T"	"T" x-cut, SW wall only, 0'6"-40'11" SE of peg A.31	485"=40'5"	0.79	0.24	groove
	"T" x-cut, SW wall only	485"=40'5"	0.71	0.23	channel
	"T" x-cut, SW wall only, 0'6"-55'9" SE of peg A.31	663"=55'3"	0.64	0.21	groove
	"T" x-cut, SW wall only	663"=55'3"	0.64	0.21	channel
"U"	Sta. 365'ND:groove samples + D.D.H. No. C.55	255"=21'3"	1.31	0.16	s/c + groove
"V" Hall's Lode Lenses "A" & "B"	"V" x-cut, SW wall, 1'0"NW - 59'9" SE of peg A.35	717"	0.27	0.12	groove
	"V" x-cut, NE wall, 12'6"-62'1" SE of peg A.35	595"	0.15	0.16	"
	"V" x-cut Av. both walls	656"=54'8"	0.22	0.14	"
	"V" x-cut, SW wall	717"	0.41	0.14	channel
	"V" x-cut, NE wall	595"	0.18	0.17	"
	"V" x-cut, Av. both walls	656"=54'8"	0.30	0.16	"

TABLE 6 (Continued).

X-Section Line	Location	Horizontal Width	Wt.Av. Grade		Type of Sampling
			% Sn.	% Cu.	
"L"	D.D.H. No. C.58, 8'8"-17'8" inclined @ -55°	62"= 5'2"	1.18	0.20	s/c
"N" approx.	1400' R.L. Lower Hall's Adit, 103'5" - 113'10" NE of peg No. 10 - Hall's Lode, Lens "A"	125"=10'5"	0.43	0.22	channel

R. COX, Jan. 1965.

TABLE 7.

SUMMARY OF SAMPLING RESULTS, 1300' R.L. "Qa" ADIT LEVEL, MINERALISATION OTHER THAN HALL'S LODE, LENS "A".

X-Section Line	Lode	Location	Horizontal Width	Wt.Av. Grade % Sn.	% Cu.	Type of Sampling
"Qa"	Henry's	D.D.H. No. C.49 78'0" - 80'4"	28"= 2'4"	3.84	1.57	s/c
"S"	Henry's	D.D.H. No. C.52, 83'3" - 94'2"	131"=10'11"	1.47	0.37	s/c
"R"	Henry's	"R" x-cut, SW wall, 119'9" - 124'7" NW of A.12	97"	1.89	1.20	groove
	"	"R" x-cut, NE wall, 114'0" - 119'9" NW of A.12	69"	1.19	0.35	"
	"	"R" x-cut, Av. both walls	83"= 6'11"	1.60	0.84	"
	Henry's	"R" x-cut, SW wall	97"	1.72	0.87	channel
	"	"R" x-cut, NE wall	69"	1.24	0.31	"
	"	"R" x-cut Av. both walls	83"= 6'11"	1.52	0.64	"
"J"	Lens "B"	D.D.H. No. C.57, 61'6" - 63'4"	22"= 1'10"	0.44	Trace	s/c
"K"	Lens "B"	"K" x-cut, SW wall, 51'3" - 64'0" SE of A.30	153"	0.47	0.30	groove
	"	"K" x-cut, NE wall, 43'0" - 56'8" SE of A.30	164"	0.51	0.11	"
	"	"K" x-cut, Av. both walls	158½"=13'2½"	0.49	0.20	"
	Lens "B"	"K" x-cut, SW wall	153"	0.52	0.19	channel
	"	"K" x-cut, NE wall	164"	0.31	0.08	"
	"	"K" x-cut, Av. both walls	158½"=13'2½"	0.41	0.13	"
"Ka"	Lens "B"	D.D.H. No. C.54, 53'2" - 59'1"	71"= 5'11"	0.46	0.35	s/c

TABLE 7. (Continued)

X-Section Line	Lode	Location	Horizontal Width	Wt.Av. Grade % Sn.	% Cu.	Type of Sampling
"L"	Lens "B"	"L" x-cut, SW wall, 51'2" - 57'10" SE of A.23	80"	0.25	0.12	groove
	"	"L" x-cut, NE wall, 50'6" - 56'9" SE of A.23	75"	0.16	0.29	"
	"	"L" x-cut, Av. both walls	77½"=6'5½"	0.21	0.20	"
	Lens "B"	"L" x-cut, SW wall	80"	0.40	0.08	channel
	"	"L" x-cut, NE wall	75"	0.25	0.51	"
	"	"L" x-cut, Av. both walls	77½"=6'5½"	0.33	0.29	"
"Qa"	Lens "B"	"Qa" x-cut, SW wall, 197'6" - 203'0" NW	84"	0.23	0.31	groove
	"	"Qa" x-cut, NE wall, 197'2" - 201'0" NW	46"	0.07	0.22	"
	"	"Qa" x-cut, Av. both walls	65"= 5'5"	0.17	0.28	"
	Lens "B"	"Qa" x-cut, SW wall	84"	0.33	0.34	channel
		"Qa" x-cut, NE wall	46"	0.23	0.39	"
		"Qa" x-cut, Av. both walls	65"= 5'5"	0.30	0.36	"
"U"	Lens "B"	D.D.H. No. C.55, 61'0" - 66'11"	71"= 5'11"	1.17	0.11	s/c
"Qa"	Lens "C"	"Qa" x-cut, SW wall, 118'3" - 119'5" NW	14"= 1'2"	0.46	0.27	groove
	"	"Qa" x-cut, SW wall	14"= 1'2"	0.22	0.18	channel

TABLE 7. (Continued)

X-Section Line	Lode	Location	Horizontal Width	Wt.Av. Grade % Sn.	% Cu.	Type of Sampling
"R"	Henry's	"R" x-cut, SW wall, 20'7" - 29'4" NW of A.12	105"	0.87	0.26	channel
	"	"R" x-cut, NE wall, 19'10" - 24'10" NW of A.12	60"	1.32	0.46	"
	"	"R" x-cut, Av. both walls	82½"=6'10½"	1.03	0.33	"
	Henry's	"R" x-cut, SW wall	105"	0.66	0.33	groove
	"	"R" x-cut, NE wall	60"	1.42	0.42	"
	"	"R" x-cut, Av. both walls	82½"=6'10½"	0.94	0.37	"
	Henry's	"R" x-cut, SW wall, 20'7" - 36'9" NW of A.12	194"	0.61	0.20	channel
	"	"R" x-cut, NE wall, 19'10" - 29'10" NW of A.12	120"	0.92	0.28	"
	"	"R" x-cut, Av. both walls	157"=13'1"	0.73	0.23	"
	Henry's	"R" x-cut, SW wall	194"	0.53	0.26	groove
	"	"R" x-cut, NE wall	120"	0.87	0.33	"
	"	"R" x-cut, Av. both walls	157"=13'1"	0.66	0.29	"

R. COX, Jan. 1965.

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TABLE 8.

DETAILS OF ORE SORTING COMPOSITE BULK SAMPLE, HALL'S LODE, LENS "A", 1300' R.L. "Qa" ADIT LEVEL.

X-cut	Proportional volume from each x-cut. cu. ft.	Length of Sample Slice ft.	Length of Chert in Slice		Av. Length of Chert in slice	Bulk % Chert in each slice
			@ +7' RL	@ +9' RL		
"V"	140.8	50	22'5"	19'5"	20'11"	42.0
"T"	98.4	40½	15'1"	13'9"	14'5"	35.8
"R"	104.0	46	15'9"	14'2"	15'0"	32.3
"Qa"	80.0	24	5'3"	5'5"	5'4"	22.2
"P"	80.0	34	8'1"	6'8"	7'4"	21.3
"N"	95.2	36	8'4"	11'0"	9'8"	26.9
"L"	91.2	12	3'8"	3'3"	3'6"	29.2
"K"	111.2	31	5'7"	9'1"	7'4"	23.7
Totals	800.8	274	84'2"	82'9"		

1) Average length of chert in "Ore Sorting Bulk Sample" slices

= 84'2" + 82'9" ÷ 2 = 83'6"

∴ Bulk % chert in O/S Bulk Sample Composite

= 83'6" ÷ 274'

= 30.5%

2) Bulk % chert in Hall's Lode, Lens "A", from 16 x-sections ("J" to "V" inclusive) @ +4' RL, both walls (see Table 9)

= 1820" ÷ 6112½"

= 29.8%

R. COX, Jan. 1965.

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TABLE 9.

SUMMARY OF SAMPLE DATA ANALYSIS, HALL'S LODE, LENS "A",
1300' R.L. "Qa" ADIT LEVEL.

Cross-Section	OVERALL LODE (including chert)						AGGREGATE SULPHIDE BANDS					AGGREGATE CHERT BANDS					BULK % CHERT			BULK SAMPLES		
	Width		CHANNEL		GROOVE + S/C		Width	CHANNEL		GROOVE + S/C		Width	CHANNEL		GROOVE + S/C		@	@	@	Overall Lode		
			% Sn	% Cu	% Sn	% Cu		% Sn	% Cu	% Sn	% Cu		% Sn	% Cu	% Sn	% Cu	+4'RL	+7'RL	+9'RL	Width	% Sn	% Cu
"V"@	656"	54'8"	0.30	0.16	0.22	0.14	373"	0.53	0.26	0.38	0.23	283"	0.02	0.03	Nil	0.02	43	45	39	59'6"	0.38	0.18
"U"	255"	21'3"	-	-	1.31	0.16	151"	-	-	1.92	0.24	104"	-	-	0.42	0.04	41	-	-	-	-	-
"T"*	485"	40'5"	0.71	0.23	0.79	0.24	313"	1.10	0.36	1.23	0.37	172"	Nil	Nil	Nil	Nil	35	37	34	41'6"	0.77	0.21
"S"	396"	33'0"	-	-	0.81	0.21	238"	-	-	1.34	0.34	158"	-	-	Nil	Nil	40	-	-	-	-	-
"R"	557½"	46'5½"	0.88	0.26	0.78	0.24	394½"	1.24	0.37	1.09	0.33	163"	0.01	Nil	0.03	Nil	29	34	31	47'6"	0.78	0.28
"Qb"	534"	44'6"	-	-	1.05	0.43	417"	-	-	1.34	0.54	117"	-	-	Nil	Nil	22	-	-	-	-	-
"Qa"	292"	24'4"	0.95⊕	0.60⊕	1.00	0.50	242"	1.13⊕	0.72⊕	1.19	0.60	50"	not available both walls		0.08	0.01	17	22	23	26'6"	0.87	0.55
"Q"	241"	20'1"	-	-	0.76	0.43	110"	-	-	1.64	0.93	131"	-	-	0.02	Nil	54	-	-	-	-	-
"P"	408½"	34'0½"	1.01	0.44	1.03	0.50	322"	1.27	0.55	1.30	0.62	86½"	0.06	0.04	0.04	0.06	21	24	20	32'9"	1.87	0.54
"O"	210"	17'6"	-	-	0.53	0.25	102"	-	-	1.10	0.51	108"	-	-	Nil	Nil	51	-	-	-	-	-
"N"	432"	36'0"	1.21	0.34	1.18	0.33	344"	1.51	0.42	1.48	0.41	88"	0.04	0.01	0.03	0.01	20	23	30	36'6"	1.18	0.31
"M"	367"	30'7"	-	-	1.32	0.35	311"	-	-	1.50	0.39	56"	-	-	0.37	0.09	15	-	-	-	-	-
"L"	142½"	11'10½"	0.60	0.36	0.42	0.22	120½"	0.67	0.40	0.48	0.22	22"	0.19	0.12	0.08	0.23	15	27	30	12'0"	0.75	0.29
"Ka"	414"	34'6"	-	-	0.84	0.26	276"	-	-	1.04	0.32	138"	-	-	0.44	0.13	33	-	-	-	-	-
"K"	376"	31'4"	1.17	0.41	1.13	0.37	334½"	1.31	0.46	1.27	0.41	41½"	0.03	Nil	Nil	Nil	11	18	29	35'6"	0.79	0.28
"J"	346"	28'10"	-	-	0.77	0.14	244"	-	-	1.10	0.20	102"	-	-	Nil	Nil	29	-	-	-	-	-
Totals	6112½"		-	-	-	-	4292½"	-	-	-	-	1820"	-	-	-	-	-	-	-	291'9"	-	-
Averages	382"	31'10"	-	-	-	-	268" = 22'4"	-	-	-	-	114"= 9'6"	-	-	-	-	29.8	30.7	30.2	36'6"	-	-
Weighted Averages	-		0.83	0.32	0.86	0.29	-	1.12	0.43	1.20	0.41	-	0.02	0.01	0.08	0.02	-	-	-	-	-	-
			over 35'0"		over 31'10"			over 25'6"		over 22'4"			over 9'5"		over 9'6"							

* SW wall only, "T" x-cut, groove and channel samples.

⊕ NE wall only, "Qa" x-cut, channel samples only.

@ Data from Hall's Lodes, Lenses "A" and "B".

R. COX, Jan. 1965.

TABLE 10.

SUMMARY OF UNDERGROUND DIAMOND DRILLING PROGRAMME, 1300' R.L., "Qa" ADIT LEVEL.

D.D.H. No.	Coords of Collar N	E	Bearing	Inclination	Total Footage	Split Core Footage	Total Split Core Footage	Sample Nos. (S/C)
C.47	2096	3096	132°	Hor.	35'7"	Zero-35'7"	35'7"	807-827
C.48	2017	3007	132°	Hor.	34'0"	Zero-14'9" 23'0"-26'0"	17'9"	847-854 855
C.49	2095	3001	312°	Hor.	97'0"	30'0"-36'0" 75'7"-82'6" 91'0"-92'2"	14'1"	828-830 831-837 838
C.50	1928	2900	132°	Hor.	36'0"	Zero-14'0"	14'0"	856-862
C.51	1838	2796	132°	Hor.	34'9"	Zero-26'6"	26'6"	863-875
C.52	2182	3174	312°	Hor.	176'0"	77'10"-94'2" 98'2"-98'5"	16'7"	876-880 881
C.53	2172	3183	132°	Hor.	61'0"	Zero-19'0" 22'0"-29'6"	26'6"	882-893 894-898
C.54	1709	2719	132°	Hor.	61'0"	Zero-30'4" 50'10"-59'1"	38'7"	899-910 911-914
C.55	2271	3291	132°	Hor.	93'0"	Zero-19'6" 59'3"-66'11"	27'2"	915-927 928-932
C.56	2279	3282	312°	Hor.	101'0"	44'4"-44'7"	0'3"	933
C.57	1573	2663	132°	Hor.	89'0"	Zero- 9'3" 16'0"-21'6" 61'6"-65'9" 71'1"-76'9"	24'8"	934-939 940-941 942-944 945
C.58	1757	2776	312°	-55°	70'0"	8'8"-17'8"	9'0"	946-950
C.59	1896	2819	312°	Hor.	103'0"	-	-	-
Totals					991'4"		250'8"	

G. PLATES

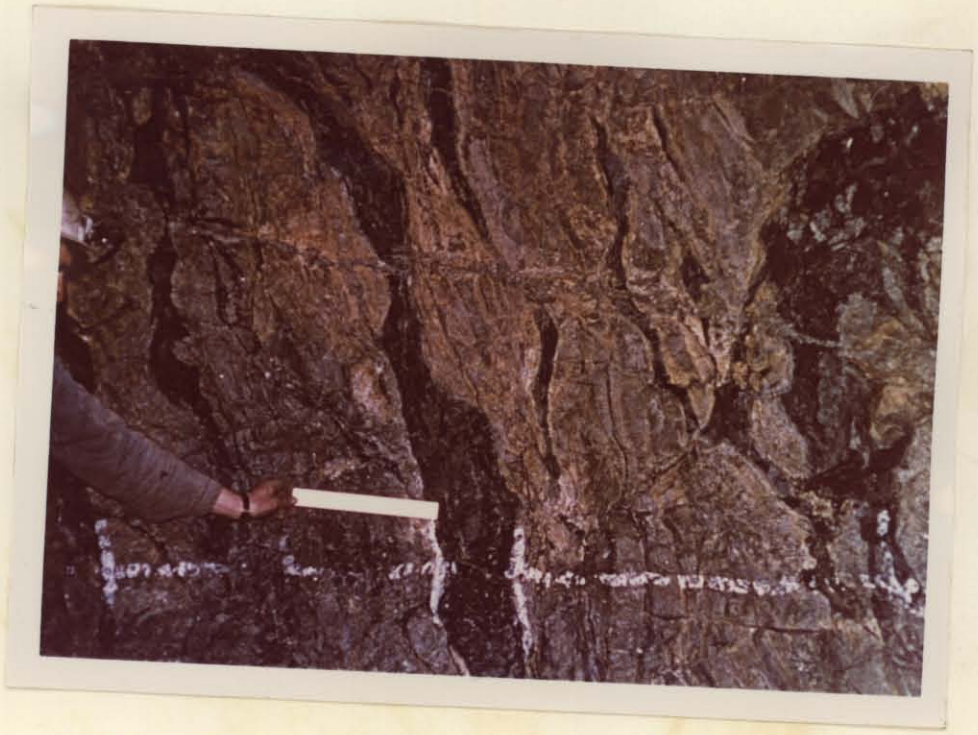
The plates, Nos. 1 to 13 inclusive, referred to in the text are grouped here together for convenience and ease of reference. Details are given below:-

Plate No.	Description	Page No.
1.	Hall's Lode, Lens "A", 1300' R.L. "Qa" Adit, Sta. 635' SD.	32.
2.	Hall's Lode, Lens "A", 1300' R.L. "Qa" Adit, "K" x-cut.	33.
3.	Henry's Lode, 1300' R.L. "Qa" Adit, Sta. 136' SD.	34.
4.	Hall's Lode, Lens "A", 1300' R.L. "Qa" Adit, Sta. 470' SD.	35.
5.	Hall's Lode, Lens "A", 1300' R.L. "Qa" Adit, Sta. 374' SD.	36.
6.	Hall's Lode, Lens "A", 1300' R.L. "Qa" Adit, "K" x-cut.	37.
7.	Hall's Lode, Lens "A", 1300' R.L. "Qa" Adit, "P" x-cut.	38.
8.	Hall's Lode, Lens "B", 1300' R.L. "Qa" Adit, "L" x-cut.	39.
9.	Hall's Lode, Lens "A", 1300' R.L. "Qa" Adit, "K" x-cut.	40.
10.	Basic Volcanics Formation, 1300' R.L. Access Road.	41
11.	Hall's Lode, Lens "A", 1300' R.L. "Qa" Adit, Sta. 370' SD.	42.
12.	Hall's Lode, Lens "A", 1300' R.L. "Qa" Adit, Sta. 160' ND.	43.
13.	"Qa" x-cut, 1300' R.L. "Qa" Adit, 47' NW of Peg A.5.	44.

033

255034

PLATE NO. 1.



C.D.P. - 1300' R.L. "Qa" Adit Level, Hall's Lode,
Lens "A" Coords. 1589N, 2669E, R.L. 1312 ft.

View of face at Sta. 635' SD (looking SW), showing sulphide-cassiterite beds with interbanded black chert horizons. White paint lines refer to groove sample locations, from left to right = QS 291 (lode), QS 292 (black chert) and QS 293 (lode with minor amounts of chert).

034

255035

PLATE NO. 2.



C.D.P. - 1300' R.L. "Qa" Adit Level, Hall's Lode,
Lens "A" Coords. 1594N, 2731E, R.L. 1313 ft.

View of SW wall of "K" x-cut (looking SW) at 61'5" SE of peg A.30, showing local swelling and pinching of a black chert horizon interbanded with sulphide-cassiterite lode beds. White paint lines refer to groove and channel sample locations, K2 and K3, at 4 ft. above rail level.

035

255036

PLATE NO. 3.



C.D.P. - 1300' R.L. "Qa" Adit Level, Henry's Lode

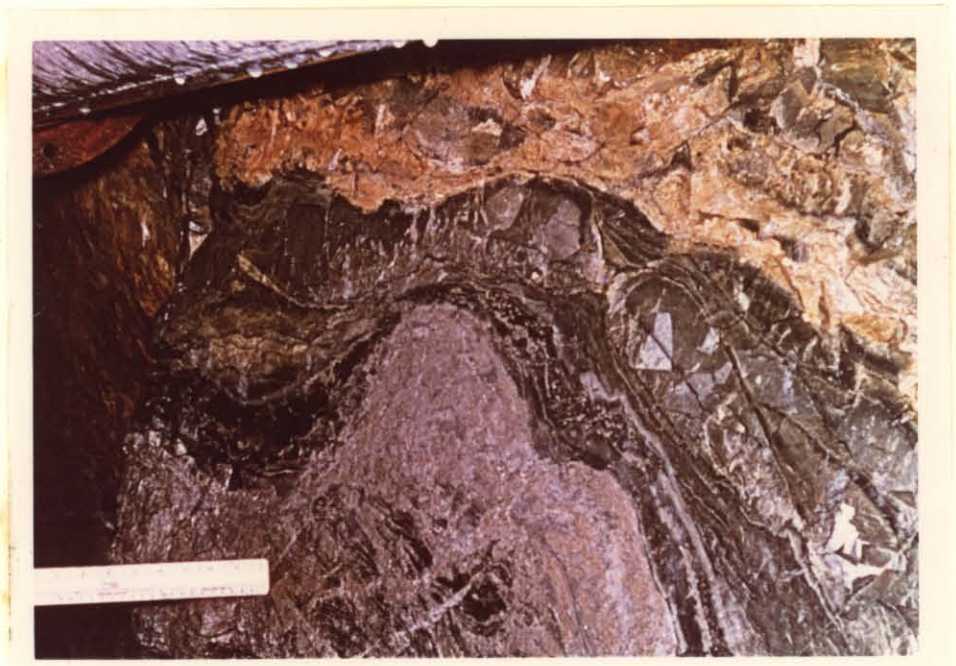
Coords 2142N, 2938E, R.L. 1312 ft.

Illustrating interbanded sulphide-cassiterite and medium grey-black chert horizons exposed in face of contour drive on Henry's Lode at Sta. 136' SD. (looking SW).

036

255037

PLATE NO. 4.



C.D.P. - 1300' R.L. "Qa" Adit Level, Hall's Lode,
Lens "A" Coords. 1734N, 2741E, R.L. 1311 ft.

Showing NW wall of ore-body as exposed on the NW wall of the contour drive at Sta. 470' SD (looking west). Minor folding developed in sulphide-cassiterite and black to medium grey, banded chert horizons.

037

255038

PLATE NO. 5.



C.D.P. - 1300' R.L. "Qa" Adit Level, Hall's Lode,
Lens "A" Coords. 1820N, 2777E, R.L. 1314 ft.

Showing nose of vertical-plunging minor fold developed in a sulphide-cassiterite bed, exposed in the back of the contour drive at Sta. 374' SD. The lode-chert contact shown is the NW wall of the ore-body. View looking vertically up at back, SW at base of plate.

038

255039

PLATE NO. 6.



C.D.P. - 1300' R.L. "Qa" Adit Level, Hall's Lode,
Lens "A" Coords. 1618N, 2707E, R.L. 1318 ft.

Showing the development of a minor fold in a medium-brown, banded chert horizon interbanded within sulphide-cassiterite beds, as exposed in the new back (after bulk sampling) of the "K" x-cut at 28 ft SE of peg A.30. View looking vertically up at back, NW at base of plate.

039

255040

PLATE NO. 7.



C.D.P. - 1300' R.L. "Qa" Adit, Hall's Lode, Lens "A"
Coords. 1971N, 2953E, R.L. 1308 ft.

Illustrating the nose of a minor fold (plunge 26° SW) developed within a medium grey, banded chert horizon interbanded within sulphide-cassiterite beds, exposed on the NE wall of the "P" x-cut at 21 ft SE of peg A.13 (looking NE). Groove and channel sample location P9.

040

255041

PLATE NO. 8.



C.D.P. - 1300' R.L. "Qa" Adit Level, Hall's Lode,
Lens "B" Coords. 1734N, 2805E, R.L. 1310 ft.

Illustrating complex banding in sulphide-cassiterite and mineralised chert beds, exposed on the NE wall of the "L" x-cut at 52 ft. SE of peg A.23 (looking NE). Groove and channel sample location L 67.

041

255042

PLATE NO. 9.



C.D.P. - 1300' R.L. "Qa" Adit Level, Hall's Lode,
Lens "A" Coords 2706N, 1625E, R.L. 1312 ft.

Illustrating deformed "mud-ball" structures developed sub-parallel to the axial plane direction in a mg-dg/b/chert horizon, interbanded within sulphide-cassiterite beds. Exposure on the NE wall of the "K" x-cut at 21'6" SE of peg A.30 (looking NE). Groove and channel sample location K 32.

042

255043

PLATE NO. 10.



C.D.P. - 1300' R.L. Access Road, Basic Volcanics Formation, Coords 1351N, 2798E.

Outcrop on NW side of road in cliff-cutting, illustrating a "bomb" structure developed within an agglomeritic, tuffaceous horizon representing the basal unit of the Basic Volcanics Formation (Crescent Spur Group).

Exposure face dips $87^{\circ}/340^{\circ}$ (looking NW). The "way-up" of the sequence is given as youngest beds to the right-hand side of the plate.

043

255044

PLATE NO. 11.



C.D.P. - 1300' R.L. "Qa" Adit Level, Sta. 370' SD.
Coords 1821N, 2784E, R.L. 1310 ft.

Illustrating slickensides developed on a minor axial plane fault ($90^{o}/305^{o}$; s/s pitch 45^{o} SW; NW side moved down and to SW, relative to SE side), exposed in the contour drive on the NW wall of Hall's Lode, Lens "A" at Sta. 370' SD. View of SE wall of drive, looking SE.

044

255045

PLATE NO. 12.



C.D.P. - 1300' R.L. "Qa" Adit Level, Sta. 160' ND.

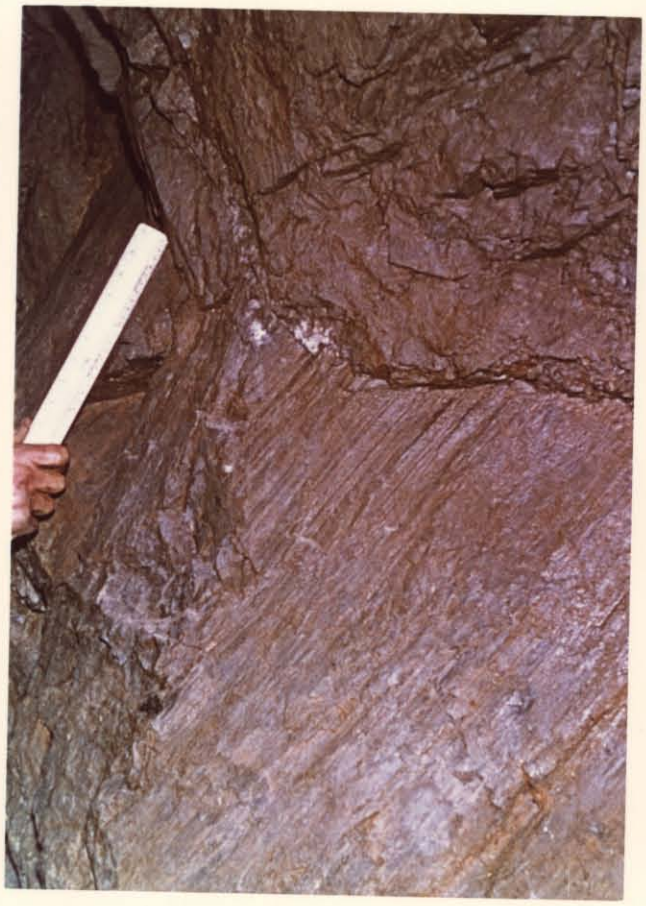
Coords. 2189N, 3132E, R.L. 1309 ft.

Illustrating a minor axial plane fault ($76^{o}/304^{o}$), exposed in the contour drive on the NW wall of Hall's Lode, Lens "A" at Sta. 160' ND. View looking NE.

045

255046

PLATE NO. 13.



C.D.P. - 1300' R.L. "Qa" Adit Level, "Qa" x-cut,
Coords. 2086N, 3016E, R.L. 1308 ft.

Illustrating slickensides developed on folded bedding planes within the mg. ff. shale of the Footwall Beds of the Lode Formation, exposed on the NE wall of the "Qa" x-cut at 47' NW of peg A.5 (looking NW) The bedding plane illustrated ($80^{o}/187^{o}$; s/s pitch 50^{o}SW) forms the SE limb of a minor fold (plunge $65^{o}/225^{o}$).

H. APPENDIX

1) Underground D.D.H. Programme - 1300' R.L. "Qa" Adit Level

A programme of 13 diamond drill holes, with a total footage of 991'4", was drilled from underground sites in the 1300' R.L. "Qa" adit level during the Cleveland Development Project. The specific purpose of these holes, Nos. C.47 to C.59 (inclusive), was to investigate the structure and provide data relating to the width and grade of the various ore-bodies. All holes were drilled on bearings of 132° or 312° (reference grid meridian), perpendicular to the Hall's Lode Longitudinal Projection Plane. All holes, with the exception of No. C.58, were horizontal. Full details of D.D.H.'s C.47 to C.59 (inclusive), including split core data, are tabulated in Table 10.

Earlier holes, Nos. C.1 to C.46, have been relogged by the writer and it is intended to present a complete record of all drill holes, Nos. C.1 to C.59 (inclusive), in a separate, typewritten form at the earliest opportunity.

Recommendations for further diamond drilling to investigate the structure, especially that of Hall's Lode, Lenses "A", "B", "C" and "D", have been prepared by Mr. Glasson and the writer in a separate, but complementary, report.

2) List of Plans and Sections

Drawing No.	Description	Appendix No.
C. 1	Geological Fact Section, 1"= 40', "K" x-section	SEPARATELY AVAILABLE IF REQUIRED
C. 2	" " " " "L" "	
C. 3	" " " " "N" "	
C. 4	" " " " Hall's Adit x-section	
C. 5	" " " " "P" x-section	
C. 6	" " " " "Q" "	
C. 7	" " " " "Qa" "	
C. 8	" " " " "R" "	
C. 9	" " " " "S" "	
C.10	" " " " "T" "	
C.11	" " " " "U" "	
C.12	" " " " "V" "	
C.13	" " " " D.D.H. No. C.31 x-section	
C.14	" " " " D.D.H. Nos. C.24, 27 & 30 x-section	
C.15	" " " " D.D.H. Nos. C.23 & 25 x-section	
C.16	" " " " D.D.H. No. C.10 x-section	
C.17	" " " " D.D.H. No. C.13 x-section	
C.18	" " " " D.D.H. No. C.17 x-section	
C.19	" " " " D.D.H. No. C.18 x-section	
C.20	Geological Fact Plans, 1"=20',1300'RL "Qa"Adit Level	
C.21	ditto	
C.22	ditto	
C.23	Geological Fact Plan, 1"=40', "K"-"V" x-sections inclusive (surface)	
C.24	Geological Interpretation Sections, 1"= 40', "K" x-section	2
C.25	" " " 1"= 40', "L" x-section	"
C.26	" " " 1"= 40', "N" x-section	"
C.27	" " " 1"= 40', "Qa" x-section	"
C.28	" " " 1"= 40', "R" x-section	"
C.29	" " " 1"= 40', "S" x-section	"
C.30	" " " 1"= 40', "T" x-section	"

List of Plans and Sections (continued)

Drawing No.	Description	Appendix No.
C.31.	Geological Interpretation Sections, 1"= 40', "U" x-section	2
C.32.	" " " 1"= 40', "V" x-section	"
C.33.	" " " 1"= 40', R.L. 1400' horizon	"
C.34.	" " " 1"= 40', R.L. 1300' horizon	"
C.35.	" " " 1"= 40', R.L. 1200' horizon	"
C.36.	" " " 1"= 40', R.L. 1100' horizon	"
C.37.	Longitudinal Projections, Henry's Lode and Hall's Lode, Lenses "A", "B", "C" and "D"	3
C.38.	Sample Location Plan, 1300' R.L. "Qa" Adit Level, 1" = 20'	4
C.39.	ditto	"
C.40.	ditto	"
C.41.	ditto	"
C.42.	ditto	"
C.43.	ditto	"
C.44	Bulk Sample Location Plan, 1300' R.L. "Qa" Adit Level, 1" = 40' Unavailable	4

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APPENDIX 4

255050

ABERFOYLE TIN DEVELOPMENT PARTNERSHIP - CLEVELAND DEVELOPMENT PROJECT

RECEIVED 3 SEP 1965 DEPT. OF MINES ROSEVILLE

Progress Report on Sample Data Analyses

1300' R.L. Qa adit, cross sections, Hall's Lode

During the recently completed U/G exploratory development programme on the 1300' RL Qa adit (Cleveland Development Project), the lode beds referred to as "Hall's Lode" were subjected to an intensive comparative sampling programme with a view to

(1) sample data analysis, and
(2) ore reserve calculations.

The results of sample data analyses only are considered in this report.

Hall's Lode has been exposed over a strike length of approx. 1000 ft. by contour driving along the N.W. wall of the ore body (1300' RL Qa adit). From this contour drive, x-cuts and diamond drill holes, on a bearing of 132°M*, exposed the full horizontal width of Hall's Lode on 16 predetermined cross-section lines (J, K, Ka, L, M, N, O, P, Q, Qa, Qb, R, S, T, U and V). The ore-body exposed in the eight x-cuts (K, L, N, P, Qa, R, T and V) was groove and channel sampled on both walls of the x-cut at a constant height of 4 ft. above rail-level. From each sample location a groove sample, approx. 1" wide x ½" deep, and a channel sample, approx. 6" wide x 1½" deep, were taken. Samples were taken by only one sampler - Mr. G. Keygan, and were consistent with geological units, so as to provide samples of consistent physical properties.

On the intermediate cross-sections, between the x-cuts, groove samples from the ore-body exposed in the contour drive were combined with D.D.H. split core samples.

Grade calculations on all the samples referred to above have been forwarded to Melbourne office - copies are held by Mr. K.R. Glasson and myself.

The attached sheets contain the results of sample data analyses for channel and/or groove - D.D.H. S/C samples on each of the 16 x-sections, giving:-

1) Hall's Lode, overall width.
2) Width of chert bands and % chert.
3) Grade of chert bands, tin and copper.
4) Grade of sulphide bands, tin and copper.
5) Overall grade (including chert) of Hall's Lode, tin and copper.
6) No. of sample locations.
7) A comparison of groove and channel sampling results.

Ore reserve calculations will be dealt with in the immediate future and presented in a separate report.

R. COX, Resident Geologist.
21/1/65.

* M = Magnetic

Encls.

255051

ABERFOYLE TIN DEVELOPMENT PARTNERSHIP

CLEVELAND DEVELOPMENT PROJECT

Sample Data Analysis

1300' R.L. Qa adit - "J" Section

1) Hall's Lode, overall width = 346" = 28'10"

2) Chert bands = 934, 935, 937 & between 939 & 940 = 102"

3) % Chert = 102/346 = 29%

	Groove + DDH S/C Samples
4) Σ Products (l) x (V) = Nil chert bands Sn	Grade = Nil % Sn
5) Σ Products (l) x (V) = Nil chert bands Cu	Grade = Nil % Cu
6) Σ Products (l) x (V) = 267.77 sulphide bands Sn	Grade = 1.10% Sn
7) Σ Products (l) x (V) = 47.75 sulphide bands Cu	Grade = 0.20% Cu

8) No. of sample locations = 11

9) Overall lode, including chert bands:
Grade = 0.77% Sn, 0.14% Cu.

050

255052

ABERFOYLE TIN DEVELOPMENT PARTNERSHIP

CLEVELAND DEVELOPMENT PROJECT

Sample Data Analysis

1300' R.L. Qa adit - "K" x-cut SE of A.30

1) Hall's Lode, overall width = $\frac{752"}{2}$ = 376" = 31'4"

2) Chert bands = K.32, 35, 37, 39 & 41 = 83"/2 = 41½" (width)

3) % Chert = 83/752 = 11%

Channel Sample	Groove Samples
4) Σ Products (1) x (V) = 2.42 for chert bands ∴ Grade of Chert = $\frac{2.42}{83}$ = 0.03% Sn	Σ Products = Zero for chert bands ∴ Grade of chert = Nil (Sn)
5) Σ Products (1) x (V) = Zero for chert bands ∴ Grade of Chert = Nil (Cu)	Σ Products = Zero for chert bands ∴ Grade of chert = Nil (Cu)
6) Σ Products (1) x (V) = 875.66 for sulphide bands ∴ Grade of Sulphide bands = 1.32% Sn	Σ Products = 852.84 ∴ Grade of sulphide bands = 1.27% Sn
7) Σ Products (1) x (V) = 306.50 ∴ Grade of sulphide bands = 0.46% Cu	Σ Products = 276.86 ∴ Grade of sulphide bands = 0.41% Cu
8) No. of sample locations = 23	
9) Overall lode, including chert: 1.17% Sn, 0.41% Cu	1.13% Sn, 0.37% Cu

255053

ABERFOYLE TIN DEVELOPMENT PARTNERSHIP

CLEVELAND DEVELOPMENT PROJECT

Sample Data Analysis

1300' R.L.Qa adit - "Ka" x-section

1) Hall's Lode, overall width = 414" = 34'6"

2) Chert bands = 899, 902, 903 & 908 = 138"

3) % Chert = $^{138}/_{414}$ = 33.3%

		Groove + DDH Samples
4) Σ Products (l) x (V) = 61.14	Chert bands, Sn	Grade of chert = 0.44% Sn
5) Σ Products (l) x (V) = 17.82	Chert bands, Cu	Grade of chert = 0.13% Cu
6) Σ Products (l) x (V) = 286.29	Sulphide bands, Sn	Grade of sulphide bands = 1.04% Sn
7) Σ Products (l) x (V) = 88.83	Sulphide bands, Cu	Grade of sulphide bands = 0.32% Cu

8) No. of sample locations = 13

9) Overall Lode (including chert) : Grade = 0.84% Sn, 0.26% Cu.

051

255054

ABERFOYLE TIN DEVELOPMENT PARTNERSHIP

CLEVELAND DEVELOPMENT PROJECT

Sample Data Analysis

1300' R.L. Qa adit - "L" x-cut SE of A.23

1) Hall's Lode, overall width = $\frac{285"}{2}$ = 142½" = 11'10½"

2) Chert bands = L.4 & 9 = $\frac{44"}{2}$ = 22" (width)

3) % Chert = $^{22}/_{142\frac{1}{2}}$ = 15%

	Channel : Groove	Channel Samples	Groove Samples
4) Σ Products (1) x (V) = Chert bands, Sn	8.42 : 3.60	0.19% Sn	0.08% Sn
5) Σ Products (1) x (V) = Chert bands, Cu	5.46 : 10.08	0.12% Cu	0.23% Cu
6) Σ Products (1) x (V) = Sulphide bands, Sn	162.62 : 116.28	0.67% Sn	0.48% Sn
7) Σ Products (1) x (V) = Sulphide bands, Cu	96.44 : 52.09	0.40% Cu	0.22% Cu
8) No. of sample locations = 11			
9) Overall Lode, including chert		0.60% Sn 0.36% Cu	0.42% Sn 0.22% Cu

255055

ABERFOYLE TIN DEVELOPMENT PARTNERSHIP

CLEVELAND DEVELOPMENT PROJECT

Sample Data Analysis

1300' R.L. Qe adit - "F" x-section

1) Hall's Lode, overall width = 367" = 30'7"

2) Chert bands = 863, 866, 868 & 872 = 56"

3) % Chert = $^{56}/_{367}$ = 15%

	Groove + DDH S/C Samples
4) Σ Products (l) x (V) = 20.46 Chert bands, Sn	Grade of chert = 0.37% Sn
5) Σ Products (l) x (V) = 4.86 Chert bands, Cu	Grade of chert = 0.09% Cu
6) Σ Products (l) x (V) = 467.04 Sulphide bands, Sn	Grade of sulphide bands = 1.50% Sn
7) Σ Products (l) x (V) = 122.12 Sulphide bands, Cu	Grade of sulphide bands = 0.39% Cu
8) No. of sample locations = 14	
9) Overall Lode (including chert) : Grade =	1.32% Sn 0.35% Cu

052

255056

ABERFOYLE TIN DEVELOPMENT PARTNERSHIP

CLEVELAND DEVELOPMENT PROJECT

Sample Data Analysis

1300' R.L. Qa adit - "N" x-cut SE of A.17

1) Hall's Lode, overall width = $\frac{864"}{2}$ = 432" = 36'0"

2) Chert bands = N.3, 6, 10, 12, 14, 20, 23, 25, 27, 29, 32 & 34 = $\frac{176"}{2}$ = 88"

3) % Chert = 20%

	Channel Samples	Groove Samples
4) $\leq$ Products (1) x (V), chert bands Sn	7.55 ∴ Grade = 0.04% Sn	4.67 ∴ Grade = 0.03% Sn
5) $\leq$ Products (1) x (V), chert bands Cu	2.03 ∴ Grade = 0.01% Cu	1.40 ∴ Grade = 0.01% Cu
6) $\leq$ Products (1) x (V), sulphide bands Sn	1037.15 ∴ Grade = 1.51% Sn	1018.39 ∴ Grade = 1.48% Sn
7) $\leq$ Products (1) x (V), sulphide bands Cu	292.32 ∴ Grade = 0.42% Cu	280.48 ∴ Grade = 0.41% Cu

8) No. of sample locations = 33

	Channel	Groove
9) Overall lode, including chert. Grade =	1.21% Sn 0.34% Cu	1.18% Sn 0.33% Cu

053

255057

ABERFOYLE TIN DEVELOPMENT PARTNERSHIP

CLEVELAND DEVELOPMENT PROJECT

Sample Data Analysis

1300' R.L. Qa adit - "O" x-section

1) Hall's Lode, overall width = 210" = 17'6"

2) Chert bands = QS.143 + 856, 858 + 860 = 108"

3) % Chert = $\frac{108}{210}$ = 51%

Groove + DDH S/C Samples
Grade = Nil % Sn
Grade = Nil % Cu
Grade = 1.1% Sn
Grade = 0.51% Cu

4) $\sum$ Products (1) x (V) = Zero, chert bands Sn

5) $\sum$ Products (1) x (V) = Zero, Chert bands Cu

6) $\sum$ Products (1) x (V) = 112.28, sulphide bands Sn

7) $\sum$ Products (1) x (V) = 52.33, sulphide bands Cu

8) No. of sample locations = 9

9) Overall lode (including chert) : Grade = 0.53% Sn, 0.25% Cu

ABERFOYLE TIN DEVELOPMENT PARTNERSHIP

CLEVELAND DEVELOPMENT PROJECT

Sample Data Analysis

1300' R.L. Qa adit - "P" x-cut SE of A.13

1) Hall's Lode, overall width = $\frac{817"}{2}$ = 408½" = 34'0½"

2) Chert bands = P.5, 7, 9, 11, 13, 18, 22, 24 & 28 = $\frac{173"}{2}$ = 86½" (width)

3) % Chert = $^{173}/_{817}$ = 21%

	Channel Samples	Groove Samples
4)	Σ Products (1) x (V), chert bands Sn = 10.09	= 6.49
	.'. Grade = 0.06% Sn	0.04% Sn
5)	Σ Products (1) x (V), chert bands Cu = 7.30	= 11.08
	.'. Grade = 0.04% Cu	0.06% Cu
6)	Σ Products (1) x (V), sulphide bands Sn = 816.61	= 854.87
	.'. Grade = 1.27% Sn	1.30% Sn
7)	Σ Products (1) x (V), sulphide bands Cu = 351.55	= 401.21
	.'. Grade = 0.55% Cu	0.62% Cu
8)	No. of sample locations = 27	
9)	Overall lode, including chert 1.01% Sn	1.03% Sn
	0.44% Cu	0.50% Cu

055

255059

ABERFOYLE TIN DEVELOPMENT PARTNERSHIP

CLEVELAND DEVELOPMENT PROJECT

Sample Data Analysis

1300' R.L. Qa adit - "Q" x-section

1) Hall's Lode, overall width = 241" = 20'1"

2) Chert bands = QS.40, QS.36, QS.101, 847, 848, 850 & 852 = 131"

3) % Chert = $^{131}/_{241}$ = 54%

Groove + DDH S/C Samples
Grade = 0.02% Sn
Grade = Nil % Cu
Grade = 1.64% Sn
Grade = 0.93% Cu

4) Σ Products (l) x (V) = 2.75
chert bands Sn

5) Σ Products (l) x (V) = Zero
chert bands Cu

6) Σ Products (l) x (V) = 180.66
sulphide bands Sn

7) Σ Products (l) x (V) = 102.70
sulphide bands Cu

8) No. of sample locations = 12

9) Overall lode, including chert : Grade = 0.76% Sn, 0.43% Cu.

056

255060

ABERFOYLE TIN DEVELOPMENT PARTNERSHIP

CLEVELAND DEVELOPMENT PROJECT

Sample Data Analysis

1300' R.L. Qa adit - "Qa" x-cut

* Groove Samples only:-

1) Hall's Lode, overall width = $\frac{584"}{2}$ = 292" = 24'4"

2) Chert bands = Q.17, 19, 23, 25, 30, 32, 34 = $\frac{100"}{2}$ = 50"

3) % Chert = $^{100}/_{584}$ = 17%

Groove ≋ Samples only:-

4) ≋ Products (1) x (V), chert bands Sn = 7.8
∴ Grade = 0.08% Sn

5) ≋ Products (1) x (V), chert bands Cu = 0.6
∴ Grade = 0.01% Cu

6) ≋ Products (1) x (V), sulphide bands Sn = 578.2
∴ Grade = 1.19% Sn

7) ≋ Products (1) x (V), sulphide bands Cu = 288.7
∴ Grade = 0.60% Cu

8) No. of sample locations = 23

9) Overall lode, including chert : Grade = 1.00% Sn + 0.50% Cu

≋ Channel samples available ONLY for NE wall of x-cut.

057

255061

ABERFOYLE TIN DEVELOPMENT PARTNERSHIP

CLEVELAND DEVELOPMENT PROJECT

Sample Data Analysis 1300' RL
Qa Adit, Qa X-cut

Channel samples only, N.E. Wall

1. Halls Lode, O/all width = 301" = 25'1"
2. Chert bands = Q30, 32, 34 = 51"
3. Sulphide bands = 301" - 51" = 250"
4. Σ Products (1) x (v) chert bands, Sn. = 4144
   .'. Grade = 0.09% Sn.
5. Σ Products (1) x (v) chert bands Cu. = Nil
   .'. Grade = Nil
6. Σ Products (1) x (v) sulphide bands Sn. = 281.50
   .'. Grade = 1.13
7. Σ Products (1) x (v) sulphide bands Cu. = 179.70
   .'. Grade = 0.72

058

255062

ABERFOYLE TIN DEVELOPMENT PARTNERSHIP

CLEVELAND DEVELOPMENT PROJECT

Sample Data Analysis

1500' R.L. Qn adit - "Qb" x-section

1) Hall's Lode, overall width = 534" = 44'6"

2) Chert bands = QW.37, 810, 814, 816, 818, 820, 822, 824 = 117"

3) % Chert = $^{117}/_{534}$ = 22%

Groove + DDH S/C Samples
Grade = Nil % Sn
Grade = Nil % Cu
Grade = 1.34% Sn
Grade = 0.54% Cu

4) Σ Products (1) x (V) = Zero
chert bands Sn

5) Σ Products (1) x (V) = Zero
chert bands Cu

6) Σ Products (1) x (V) = 561.73
sulphide bands Sn

7) Σ Products (1) x (V) = 227.24
sulphide bands Cu

8) No. of sample locations = 24

9) Overall lode, including chert : Grade = 1.05% Sn, 0.43% Cu.

059

255063

ABERFOYLE TIN DEVELOPMENT PARTNERSHIP

CLEVELAND DEVELOPMENT PROJECT

Sample Data Analysis

1300' R.L. Go adit - "E" x-cut SE of A.12

1) Hall's Lode, overall width = $\frac{1115''}{2}$ = 557½" = 46'5½"

2) Chert bands = R.3, 5, 7, 10, 12, 14, 16, 20, 21, 23, 37, 39, 41, 43, 45, 47, 50, 52 & 54 = $\frac{326''}{2}$ = 163"

3) % Chert = $^{326}/_{1115}$ = 29%

	Channel Samples	Groove Samples
4) Σ Products (1) x (V), chert bands Sn =	1.76	9.69
∴ Grade of Chert =	0.01% Sn	0.03% Sn
5) Σ Products (1) x (V), chert bands Cu =	Zero	Zero
∴ Grade of chert bands =	Nil % Cu	Nil % Cu
6) Σ Products (1) x (V), sulphide bands Sn =	978.92	861.30
∴ Grade =	1.24% Sn	1.09% Sn
7) Σ Products (1) x (V), sulphide bands Cu =	292.56	263.16
∴ Grade =	0.37% Cu	0.33% Cu
8) No. of sample locations = 44		
9) Overall lode, including chert :		
Grade =	0.86% Sn	0.78% Sn
	0.28% Cu	0.24% Cu

060

255064

ABERFOYLE TIN DEVELOPMENT PARTNERSHIP

CLEVELAND DEVELOPMENT PROJECT

Sample Data Analysis

1300' R.L. Cx adit - "S" x-section

1) Hall's Lode, overall width = 396" = 33'0"

2) Chert bands = QW.87 + 882, 884, 888, 890, 892, 895, 897 = 158"

3) % Chert = $^{158}/_{396}$ = 40%

Groove + DDH S/C Samples
Grade = Nil % Sn
Grade = Nil % Cu
Grade = 1.34% Sn
Grade = 0.34% Cu

4) Σ Products (l) x (V) = Zero
chert bands Sn

5) Σ Products (l) x (V) = Zero
chert bands Cu

6) Σ Products (l) x (V) = 319.06
sulphide bands Sn

7) Σ Products (l) x (V) = 82.00
sulphide bands Cu

8) No. of sample locations = 20

9) Overall lode, including chert bands :
Grade = 0.81% Sn, 0.21% Cu.

061

255065

ARGYLL TIN DEVELOPMENT PARTNERSHIP

CLEVELAND DEVELOPMENT PROJECT

Sample Data Analysis

1500' R.L. Oa adit - "T" x-cut SE of A.51

1) Hall's Lode, overall width = 465" = 40'5" (S.W. wall only)

2) Chert bands = 2.13, 15, 17, 16, 20 & 22 = 172"

3) % Chert = $^{172}/_{465}$ = 37%

	Channel Samples	Groove Samples
4) Σ Products (1) x (V), chert bands Sn =	Zero	Zero
∴ Grade of chert =	Nil % Sn	Nil % Sn
5) Σ Products (1) x (V), chert bands Cu =	Zero	Zero
∴ Grade of chert =	Nil % Cu	Nil % Cu
6) Σ Products (1) x (V), sulphide bands Sn =	342.85	363.73
∴ Grade of sulphide bands =	1.10% Sn	1.23% Sn
7) Σ Products (1) x (V), sulphide bands Cu =	112.83	115.79
∴ Grade of sulphide bands =	0.36% Cu	0.37% Cu
8) No. of sample locations = 16		
9) Overall lode, including chert : Grade =	0.71% Sn	0.73% Sn
	0.23% Cu	0.24% Cu

062

255066

ABERFOYLE TIN DEVELOPMENT PARTNERSHIP

CLEVELAND DEVELOPMENT PROJECT

Sample Data Analysis

1300' R.L. On adit - "U" x-section

1) Hall's Lode, overall width = 255" = 21'3"

2) Chert bands = 916, 918, 920, 922, 924, 926 = 104"

3) % Chert = $^{104}/_{255}$ = 41%

Grooves + DDH S/C Samples
Grade = 0.42% Sn
Grade = 0.04% Cu
Grade = 1.92% Sn
Grade = 0.24% Sn

4) Σ Products (l) x (V) = 43.81
chert bands Sn

5) Σ Products (l) x (V) = 4.35
chert bands Cu

6) Σ Products (l) x (V) = 289.39
sulphide bands Sn

7) Σ Products (l) x (V) = 38.09
sulphide bands Cu

8) No. of sample locations = 14

9) Overall lode, including chert bands :
Grade = 1.31% Sn, 0.16% Cu.

063

255067

ABERFOYLE TIN DEVELOPMENT PARTNERSHIP

CLEVELAND DEVELOPMENT PROJECT

Sample Data Analysis

1300' R.L. Qa adit, "Y" x-cut SE of A.35

1) Hall's Lode, overall width = $\frac{1312"}{2}$ = 656" = 54'8"

2) Chert Bands = V.3, 6, 9, 10, 12, 14, 17, 20, 21, 22, 24, 26, 28, 30, 32, 34, 36 & 39 = $\frac{566"}{2}$ = 283"

3) % Chert = $^{283}/_{656}$ = 43%

	Channel Samples	Groove Samples
4) Σ Products (1) x (V), Chert bands Sn =	5.84	Nil
∴ Grade of Chert =	0.02 % Sn	Nil % Sn
5) Σ Products (1) x (V), Chert bands Cu =	7.42	8.91
∴ Grade of Chert =	0.05 % Sn	0.02 % Sn
6) Σ Products (1) x (V), Sulphide bands Sn =	394.04	282.99
∴ Grade of Sulphide bands =	1.06 % Sn	0.38 % Sn
7) Σ Products (1) x (V), Sulphide bands Cu =	196.25	169.06
∴ Grade of Sulphide bands =	0.53 % Cu	0.23 % Cu
8) No. of sample locations = 39.		
9) Overall lode, including chert		
Grade =	0.30 % Sn	0.22 % Sn
	0.16 % Cu	0.14 % Cu

064

255068

ABERFOYLE TIN DEVELOPMENT PARTNERSHIP

CLEVELAND DEVELOPMENT PROJECT

1300' R.L. Cn adit, Hall's Lode, Lens "A" - Sample Data Analysis

(A) = overall lode.

Cross Section	Groove Samples Product Width x Grade (Sn)	(Cu)	Channel Samples Product Width x Grade (Sn)	(Cu)	Width Groove	Channel
V	141.50	88.99	199.94	101.84	656"	656"
U	333.20	40.44	-	-	255"	-
T	385.73	115.79	342.85	112.93	485" @	485" @
S	319.06	82.00	-	-	396"	-
R	455.54	131.58	490.34	146.28	557½"	557½"
Qb	561.73	227.24	-	-	534"	-
Qa	293.00	144.65	285.94	179.70	292"	301" E
Q	183.41	102.70	-	-	241"	-
P	420.68	206.15	413.35	179.43	408½"	408½"
O	112.28	52.33	-	-	210"	-
N	511.59	140.94	522.35	147.18	432"	432"
M	487.50	126.98	-	-	367"	-
L	59.94	31.09	85.52	50.95	142½"	142½"
Ka	347.43	106.65	-	-	414"	-
K	426.42	138.43	439.04	153.25	376"	376"
J	267.77	47.75	-	-	346"	-
Totals	5284.72	1783.71	2779.33	1071.56	6112½"	3358½"

1. For Groove Samples

a) Wt. Av. = 5284.72 ÷ 6112½ = 0.86 % Sn

b) Wt. Av. = 1783.71 ÷ 6112½ = 0.29 % Cu

} Over 51'10"

2. For Channel Samples

a) Wt. Av. = 2779.33 ÷ 3358½ = 0.83% Sn

b) Wt. Av. = 1071.56 ÷ 3358½ = 0.32% Cu

} Over 55'0"

@ SW wall only - "T" x-cut - Groove & Channel Samples.

E Channel Samples from NE wall only.

065

255069

ABENFOYLE TIN DEVELOPMENT PARTNERSHIP

CLEVELAND DEVELOPMENT PROJECT

1300' R.L. Qa adit, Hall's Lode, Lens "A" - Sample Data Analysis

(B) = Aggregate Sulphide Bands

Cross Section	Groove Samples Product Width x Grade (Sn)	(Cu)	Channel Samples Product Width x Grade (Sn)	(Cu)	Width Groove	Channel
V	141.50	64.53	197.02	98.13	373"	373"
U	289.39	36.09	-	-	151"	-
T	365.73	115.79	342.85	112.93	315" @	313" @
S	319.06	82.00	-	-	238"	-
R	450.69	151.58	489.46	146.28	394½"	394½"
Qb	561.75	227.24	-	-	417"	-
Qa	289.10	144.35	281.50	179.70	242"	250" ≡
Q	180.66	102.70	-	-	110"	-
P	417.44	200.61	408.31	175.78	322"	322"
O	112.28	52.33	-	-	102"	-
N	509.20	140.24	518.58	146.16	344"	344"
M	467.04	122.12	-	-	311"	-
L	58.14	26.05	81.31	48.22	120½"	120½"
Ka	286.29	88.85	-	-	276"	-
K	426.42	138.45	457.85	153.25	334½"	334½"
J	267.77	47.75	-	-	244"	-
Totals	5140.44	1740.64	2756.86	1060.45	4282½"	2451½"

1. For Groove Samples

a) Wt. Av. = 5140.44 ÷ 4282½ = 1.20 % Sn

b) Wt. Av. = 1740.64 ÷ 4282½ = 0.41% Cu

} over 22'4"

2. For Channel Samples

(a) Wt. Av. = 2756.86 ÷ 2451½ = 1.12 % Sn

(b) Wt. Av. = 1060.45 ÷ 2451½ = 0.43 % Cu

} over 25'6"

≡ Channel samples from NE wall only, Qa x-cut.

@ Groove and channel samples from SW wall only T x-cut.

255070

ABERFOYLE TIN DEVELOPMENT PARTNERSHIP

CLEVELAND DEVELOPMENT PROJECT

1300' R.L. Qa adit, Hall's Lode, Lens "A" - Sample Data Analysis

(C) = Aggregate Chart Bands.

Cross Section	Groove Samples Product Width x Grade		Channel Samples Product Width x Grade		Width	
	(Sn)	(Cu)	(Sn)	(Cu)	Groove	Channel
V	Nil	4.46	2.92	3.71	283"	283"
U	43.81	4.35	-	-	104"	-
T ≡	Nil	Nil	Nil	Nil	172"	172"
S	Nil	Nil	-	-	138"	-
R	4.85	Nil	0.88	Nil	163"	163"
Qb	Nil	Nil	-	-	117"	-
Qa	3.90	0.30	4.44 ⊕	Nil ⊕	50"	51" ⊕
Q	2.75	Nil	-	-	131"	-
P	3.25	5.64	5.05	3.65	86½"	86½"
O	Nil	Nil	-	-	108"	-
N	2.34	0.70	3.78	1.02	88"	88"
M	20.46	4.86	-	-	56"	-
L	1.80	5.04	4.21	2.73	22"	22"
Ka	61.14	17.02	-	-	138"	-
K	Nil	Nil	1.21	Nil	41½"	41½"
J	Nil	Nil	-	-	102"	-
Totals	144.30	43.07	22.49	11.11	1820"	907"

1. For Groove Samples

a) Wt. Av. = 144.30 ÷ 1820 = 0.08% Sn
b) Wt. Av. = 43.07 ÷ 1820 = 0.02% Cu
} Over 9'6"

2. For Channel Samples

a) Wt. Av. = 22.49 ÷ 907 = 0.02% Sn
b) Wt. Av. = 11.11 ÷ 907 = 0.01% Cu
} Over 9'5"

⊕ SW wall only - "P" x-cut - Groove & Channel Samples

≡ Channel Samples from NE wall only

REFERENCE LINE
HALL'S LONGITUDINAL PROJECTION PLANE

R.L. 1600'

CRESCENT SPUR

R.L. 1400'

R.L. 1300'

R.L. 1200'

R.L. 1100'

R.L. 1000'

Fb

Fc

C 30

C 24

LENS "A"

LENS "B"

LENS "C"

Fd

LENS "D"

Fc

Fd

C 27

Fb

40 20 0 40 80
SCALE OF FEET

5 cm

CLEVELAND MINE, TASMANIA.

CROSS SECTION "K" - INTERPRETATION

LOOKING N.E. (C 24, C 27 & C 30 PROJECTED)

255071

Drg. No. C/24 (L)

R. COX. Jan 1965

HS H&E-2J 2184.

REFERENCE LINE
HALL'S LONGITUDINAL PROJECTION PLANE

CRESCENT SPUR

R.L. 1600'
R.L. 1400'
R.L. 1300'
R.L. 1200'
R.L. 1100'
R.L. 1000'

Fb
Fc
Fd

LENS "A"
LENS "B"
LENS "C"

C 58
C 31

DEEP CREEK

SCALE OF FEET
40 20 0 40 80
5 cm

CLEVELAND MINE, TASMANIA.
CROSS SECTION "L" - INTERPRETATION
LOOKING N.E. (C 31 PROJECTED)

255072

Drg. No. C/25(L)
R. COX. Jan 1965.

1815

2185

REFERENCE LINE
HALL'S LONGITUDINAL PROJECTION PLANE

CRESCENT SPUR

R.L. 1600'

R.L. 1400'

R.L. 1300'

R.L. 1200'

R.L. 1100'

R.L. 1000'

DEEP CREEK

Fa

Fb

Fc

Fd

C 59

C 58

C 61

LENS "A"

LENS "B"

LENS "C"

LENS "D"

40 20 0 40 80
SCALE OF FEET

5 cm

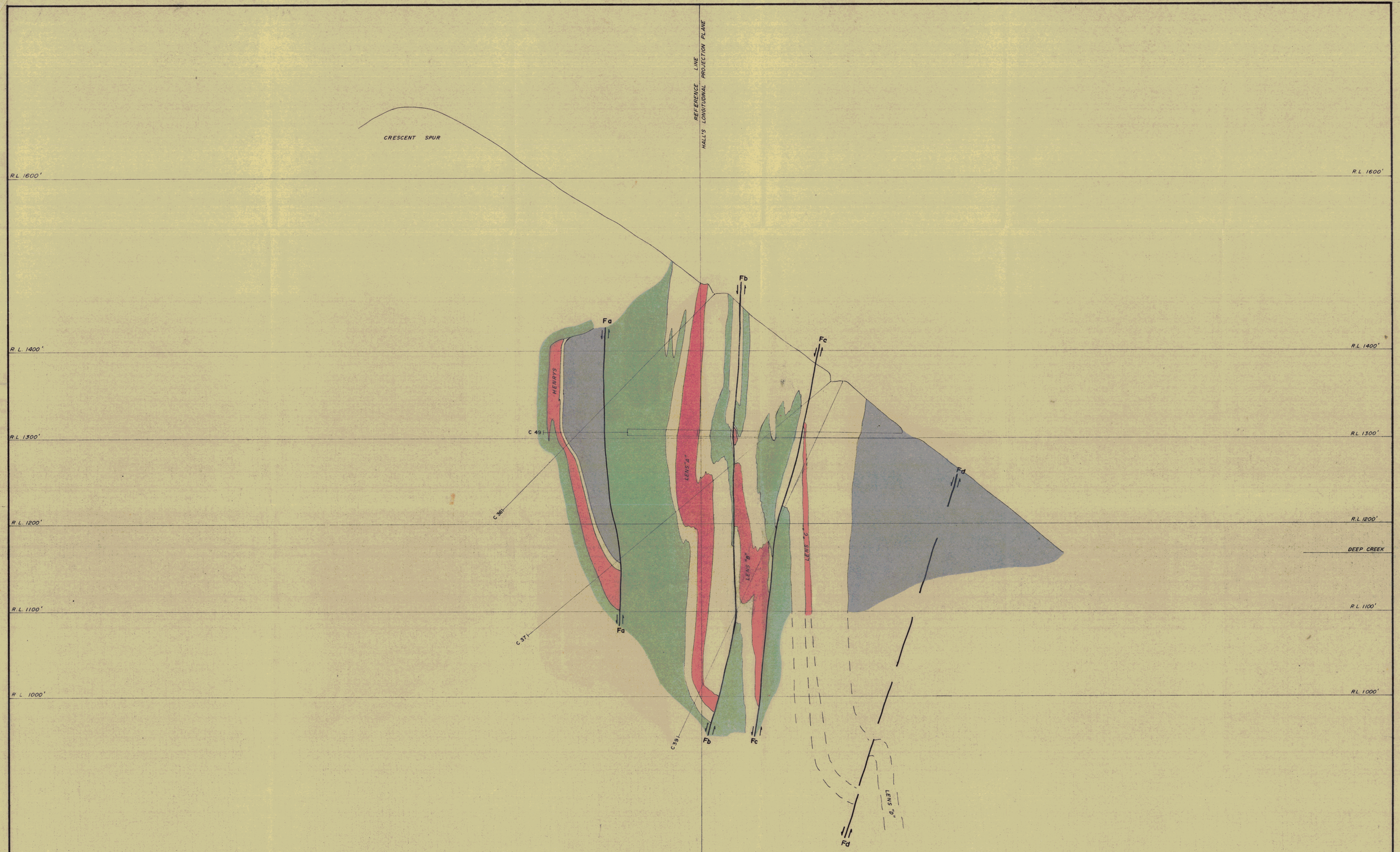
CLEVELAND MINE, TASMANIA.
CROSS SECTION "N" - INTERPRETATION
LOOKING N.E.

255073

Drg. No. C/26(L)

R.COX Jan 1965.

2186



40 20 0 40 80
SCALE OF FEET

5 cm

CLEVELAND MINE, TASMANIA.

CROSS SECTION "Qa" - INTERPRETATION

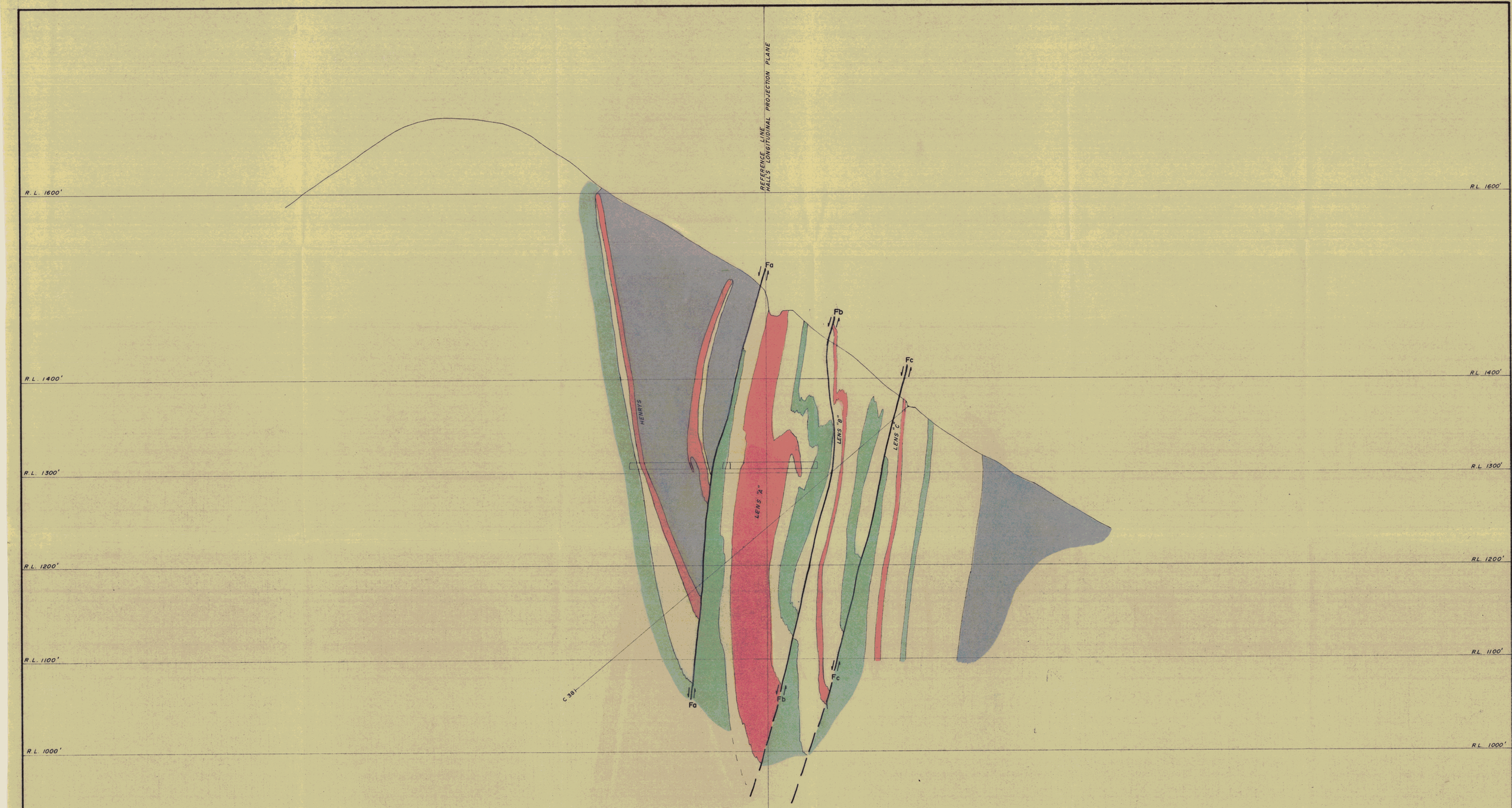
LOOKING N.E.

255074

Drg. No. C/27(L)

R COX Jan 1965

2187



CLEVELAND MINE, TASMANIA.

CROSS SECTION "R" - INTERPRETATION

LOOKING N.E.

40 20 0 40 80
SCALE OF FEET

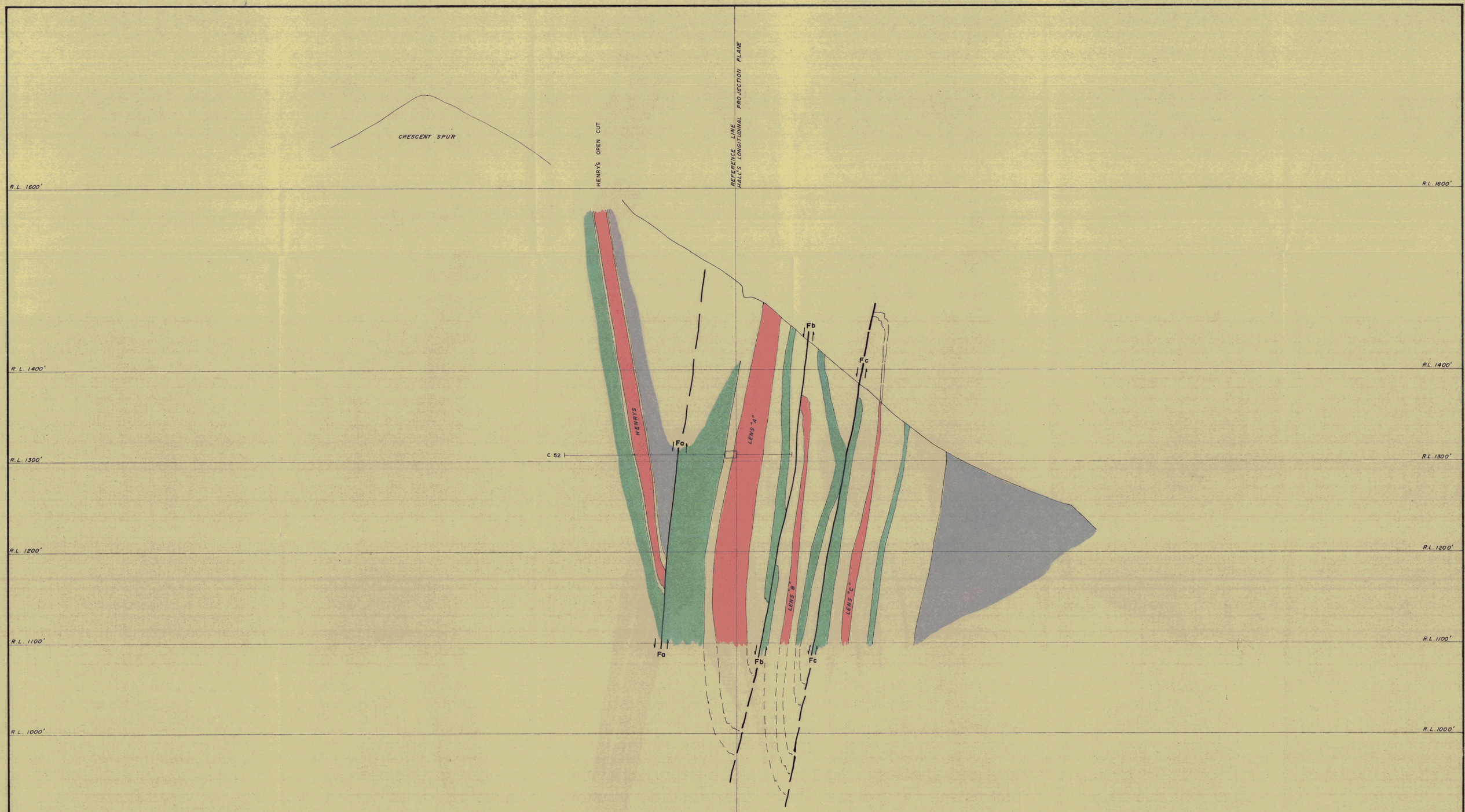
5 cm

255675

Drg. No. C/28(L)

R COX Jan. 1965

2188



CLEVELAND MINE, TASMANIA.
CROSS SECTION "S" - INTERPRETATION
LOOKING N.E.

40 20 0 40 80
SCALE OF FEET
5 cm

255076

Drg. No. C/29 (L)
R. COX. Jan 1965

CRESCENT SPUR

HENRY'S OPEN CUT

REFERENCE LINE
HALL'S LONGITUDINAL PROJECTION PLANE

R.L. 1600'

R.L. 1400'

R.L. 1300'

R.L. 1200'

R.L. 1100'

R.L. 1000'

Fa

Fb

Fc

HENRYS

LENS "A"

LENS "B"

LENS "C"

C 43

C 42

SCALE OF FEET

5 cm

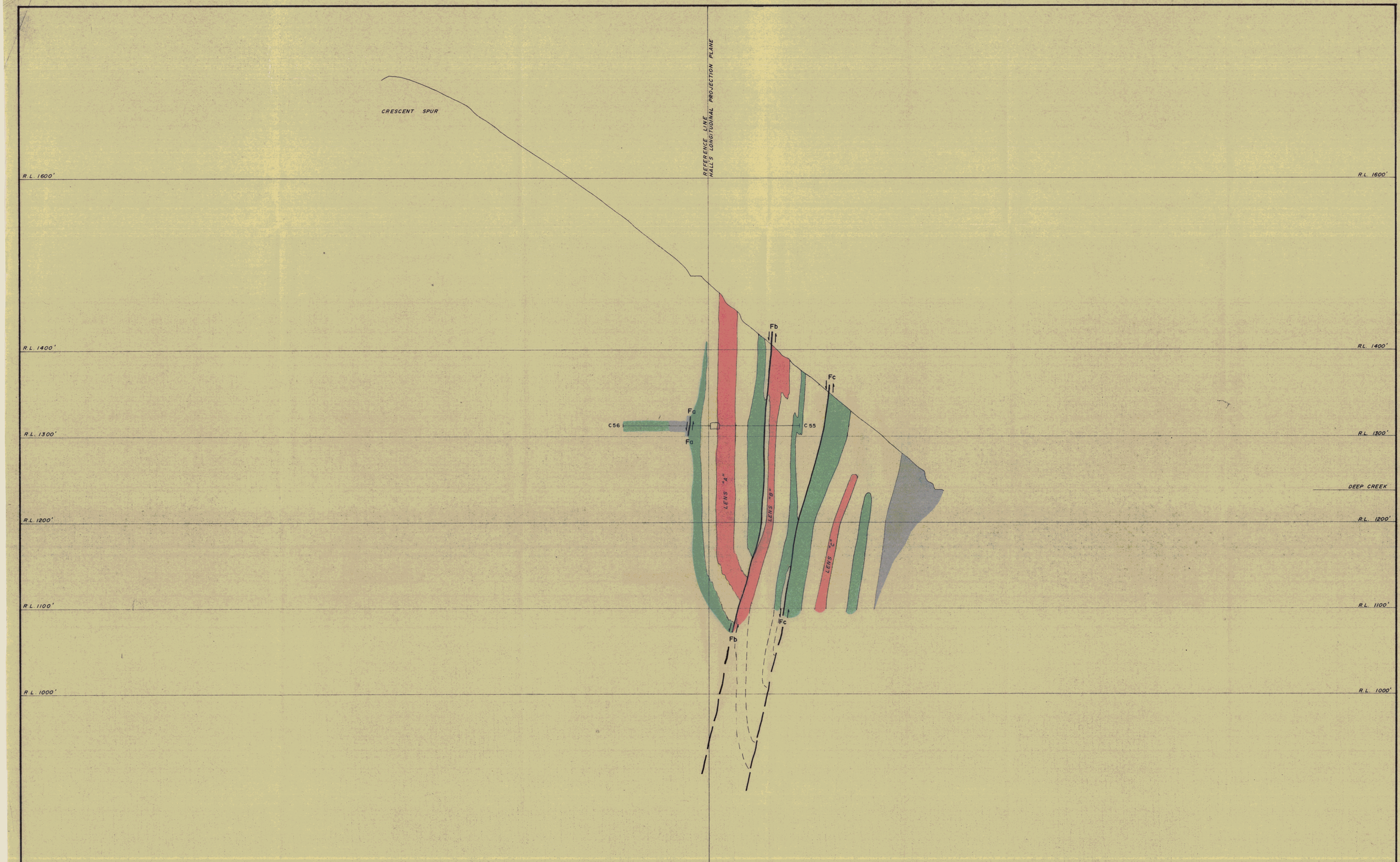
CLEVELAND MINE, TASMANIA.
CROSS SECTION "T"- INTERPRETATION
LOOKING N.E.

255077

Drg. No. C/30(L)

R. COX Jan. 1965

2190



40 20 0 40 80
SCALE OF FEET

5 cm

CLEVELAND MINE, TASMANIA.

CROSS SECTION "U" - INTERPRETATION

LOOKING N.E.

255078

Drg. No. C/31(L)

R. COX. Jan. 1965

2191

REFERENCE LINE
HALL'S LONGITUDINAL PROJECTION PLANE

CRESCENT SPUR

R. L. 1600'
R. L. 1400'
R. L. 1300'
R. L. 1200'
R. L. 1100'
R. L. 1000'

Fc
Fb
LENS "A"
LENS "B"
LENS "C"
C33
C34
C32
Fc
Fb

DEEP CREEK

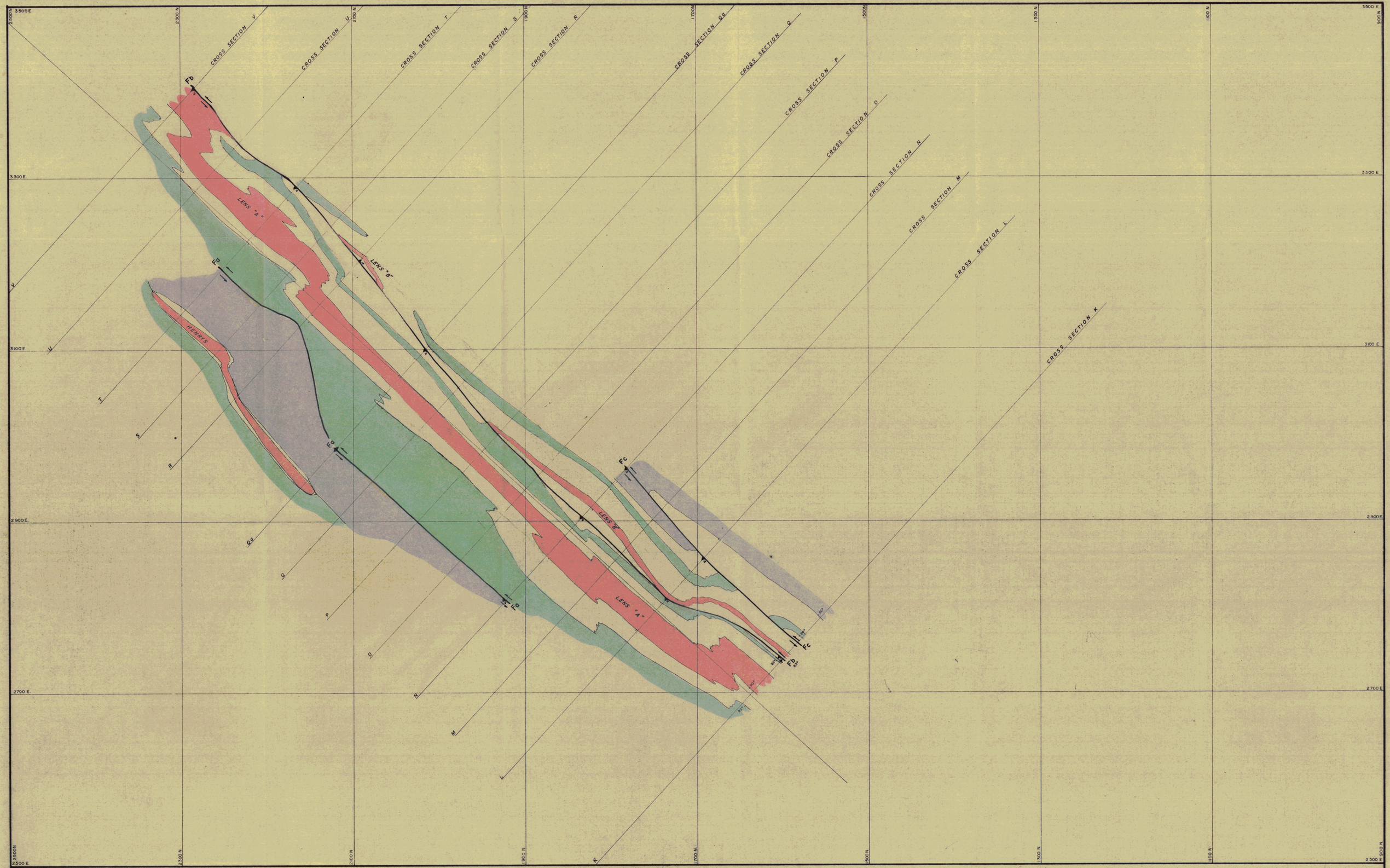
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SCALE OF FEET

5 cm

CLEVELAND MINE, TASMANIA.
CROSS SECTION "V" - INTERPRETATION
LOOKING N.E.

255079

Drg. No. C/32(L)
R. COX. Jan. 1965



CLEVELAND MINE, TASMANIA.
R.L. 1400' LEVEL HORIZON
GEOLOGIC INTERPRETATION PLAN.

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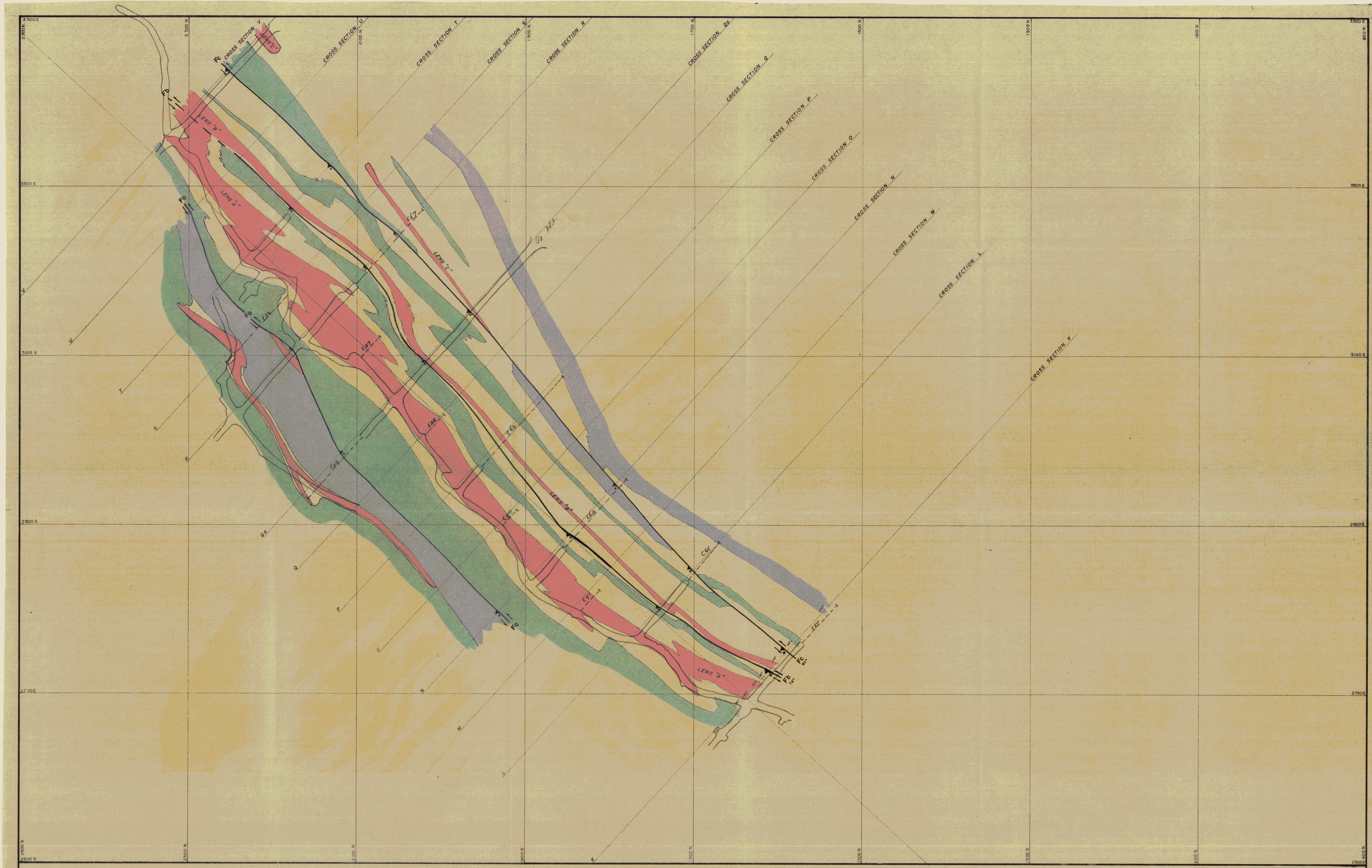
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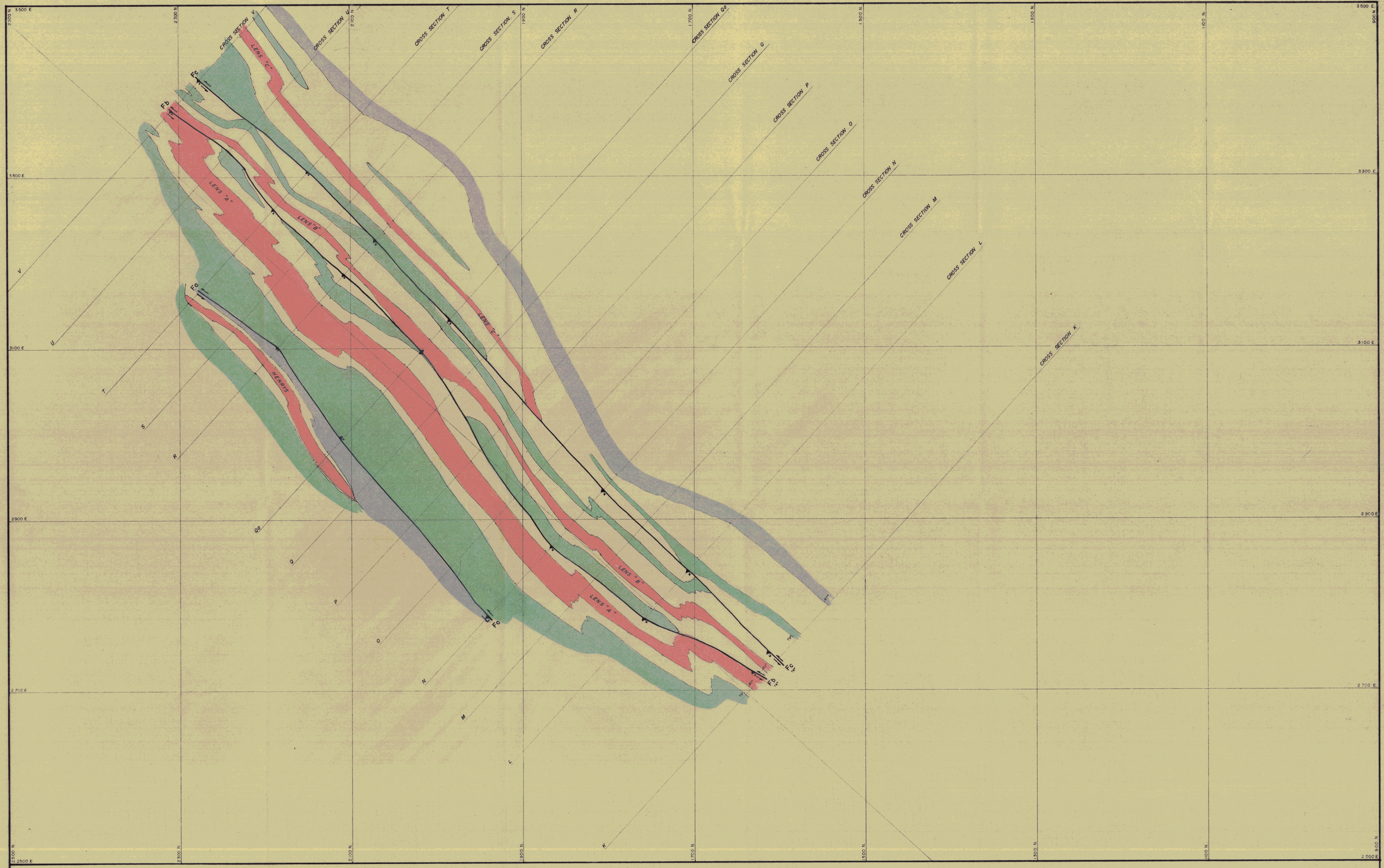
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Drg. No. C/33(L)

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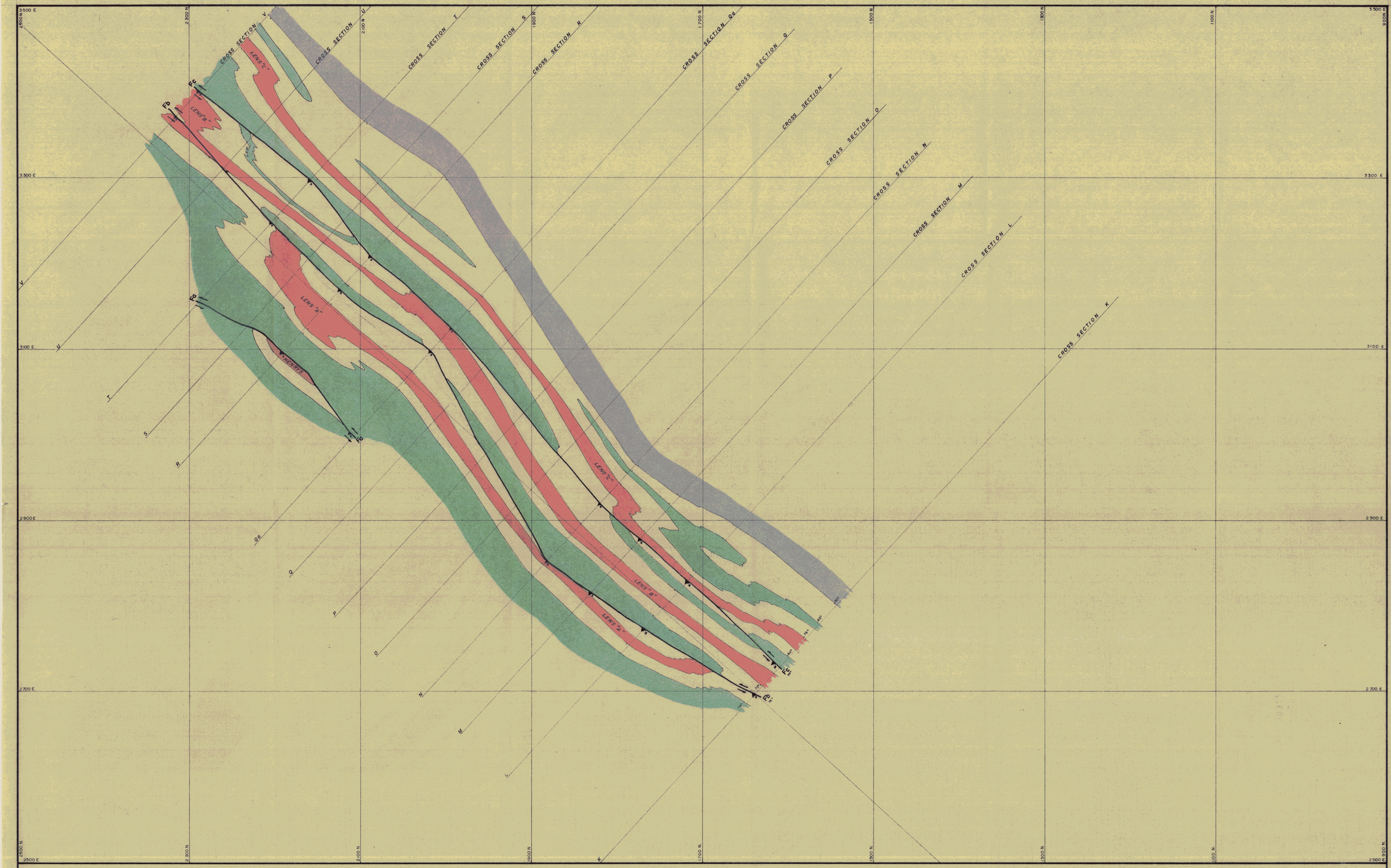


CLEVELAND MINE, TASMANIA.
R.L. 1200' LEVEL HORIZON
GEOLOGIC INTERPRETATION PLAN.

255082

Drg. No. C/35(L)
R. COX. Jan 1968

2195



CLEVELAND MINE, TASMANIA.
R.L. 1100' LEVEL HORIZON
GEOLOGIC INTERPRETATION PLAN.

40 30 0 40 80
SCALE OF FEET

5 cm

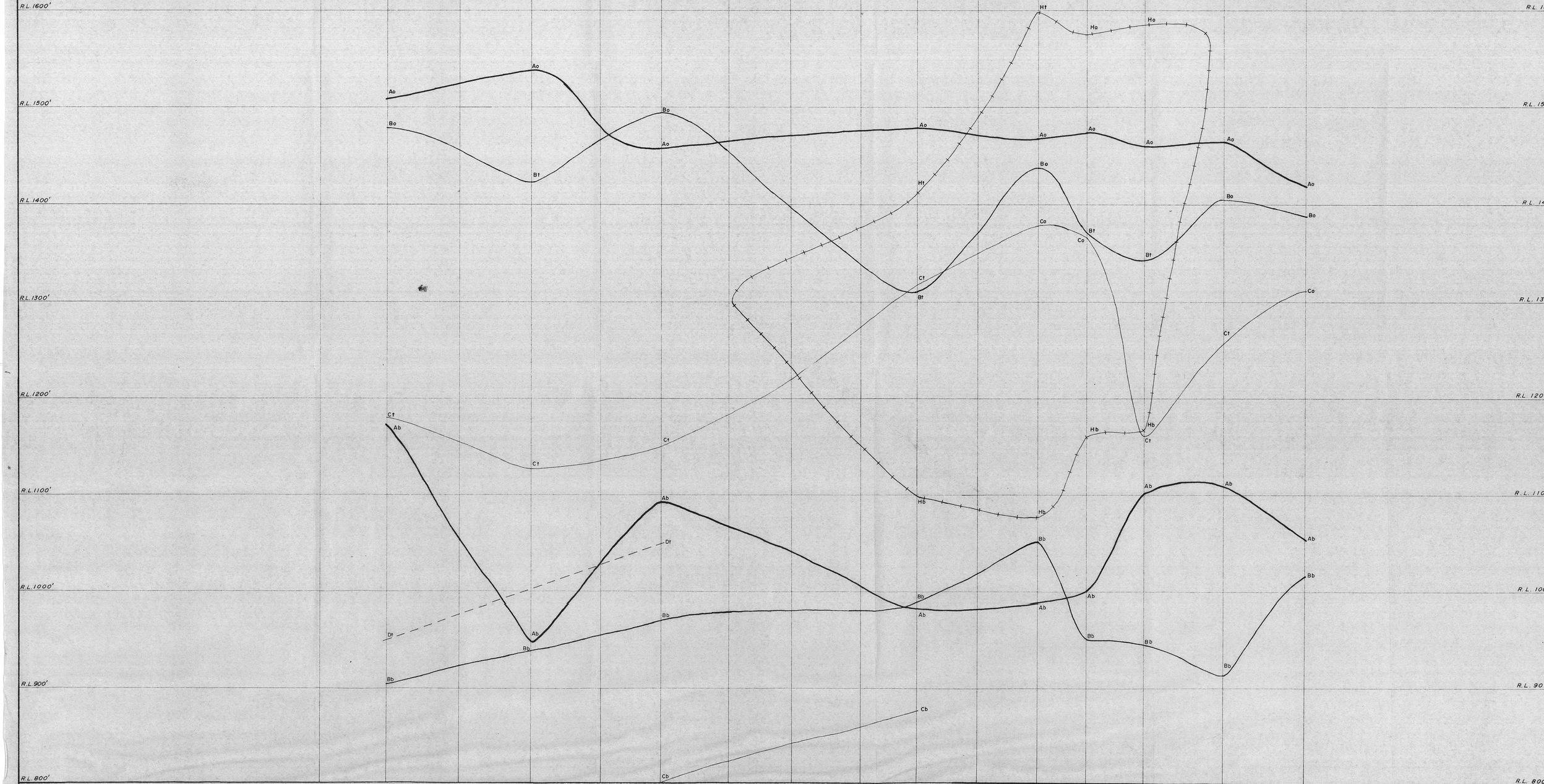
255083

Drg. No. C/36 (L)

R.COX. Jan. 1965.

J K Ka L M N O P Q Qa Qb R S T U V

R.L. 1600'
R.L. 1500'
R.L. 1400'
R.L. 1300'
R.L. 1200'
R.L. 1100'
R.L. 1000'
R.L. 900'
R.L. 800'



Thick Line : 1·2 Din. ——— Hall's Lode, Lens "A"
Medium Line :0·8 Din. ——— Hall's Lode, Lens "B"
Thin Line :0·3 Din. ——— Hall's Lode, Lens "C"
Broken Line :0·3 Din. – – – – Hall's Lode, Lens "D"
Crossed Line :0·3 Din. —|—|— Henry's Lode.

Ao = Outcrop of Lens "A"
At = Top of Lens "A"
Ab = Base of Lens

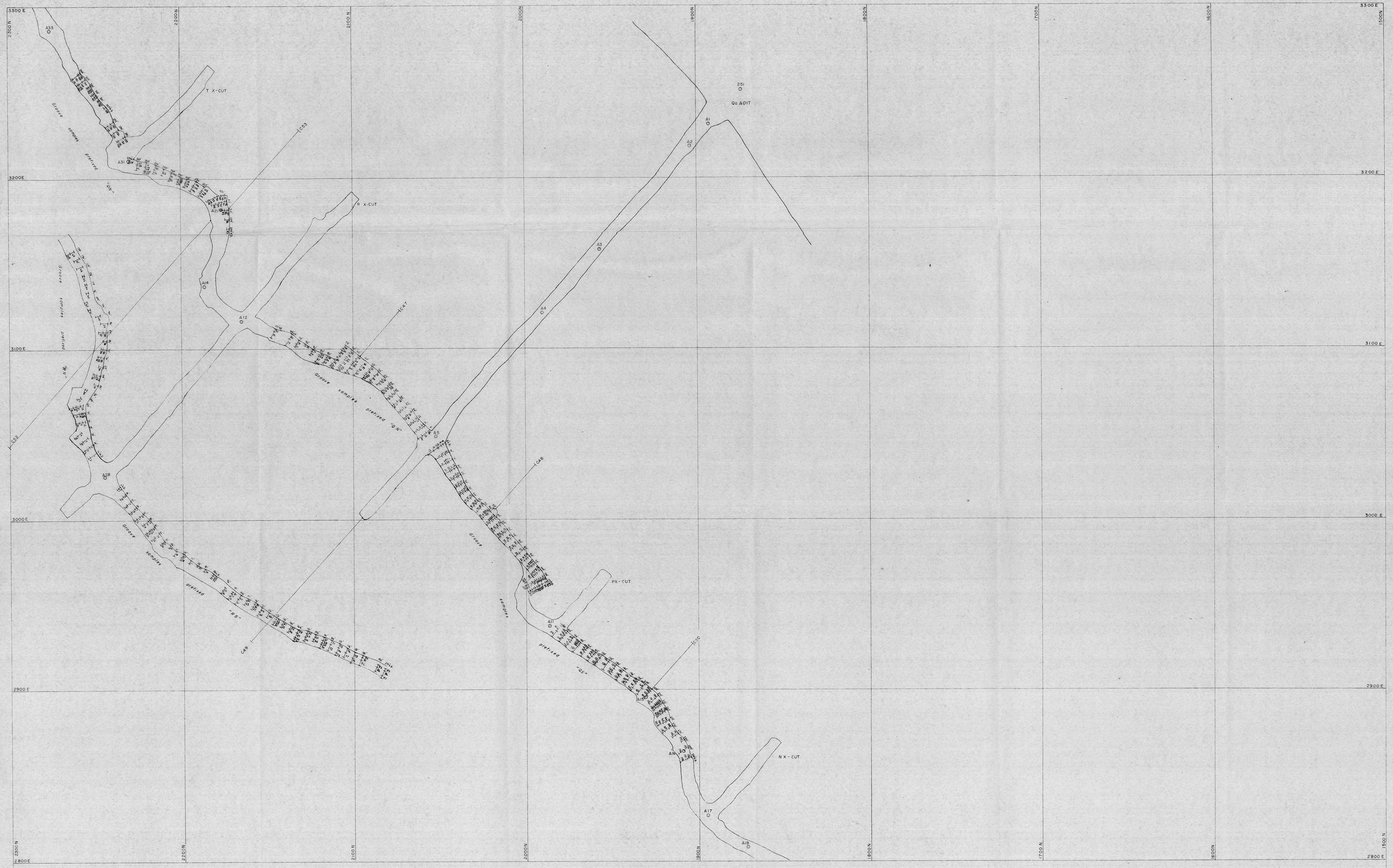
40 20 0 40 80
SCALE OF FEET
5 cm

CLEVELAND MINE, TASMANIA.
LONGITUDINAL PROJECTION OF ORE BODIES AT HALL'S REFERENCE PLANE
LOOKING N.W.

255084

Drg. No. C/37(L) 2197

R.Cox



20 10 0 20 40
SCALE OF FEET

5 cm

CLEVELAND MINE, TASMANIA.
R.L. 1300' LEVEL HORIZON
DRIVE SAMPLE LOCATION PLAN

255085

2198

Drg. No. C/38(L)

R COX

CLEVELAND MINE, TASMANIA.

R.L. 1300' LEVEL HORIZON

SAMPLE LOCATION PLAN

CROSS CUTS AND DIAMOND DRILL HOLES

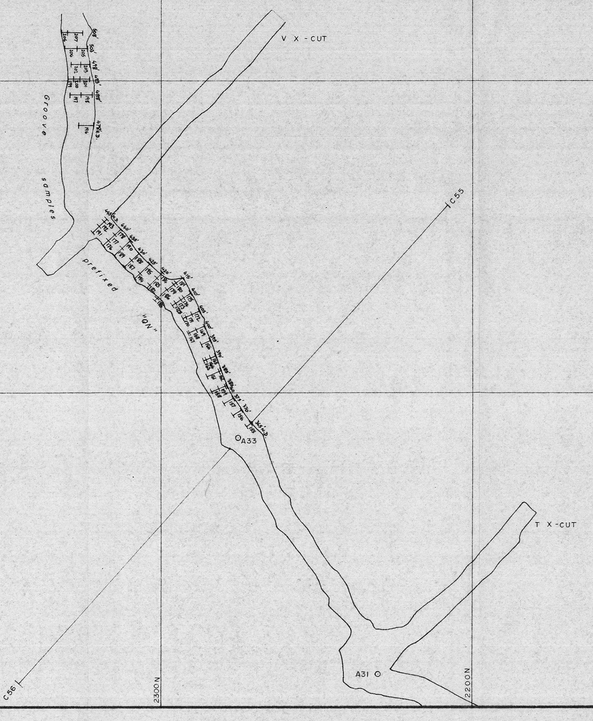
SCALE OF FEET

5 cm

255086

Drg. No. C/39(L) 2199

R. COX

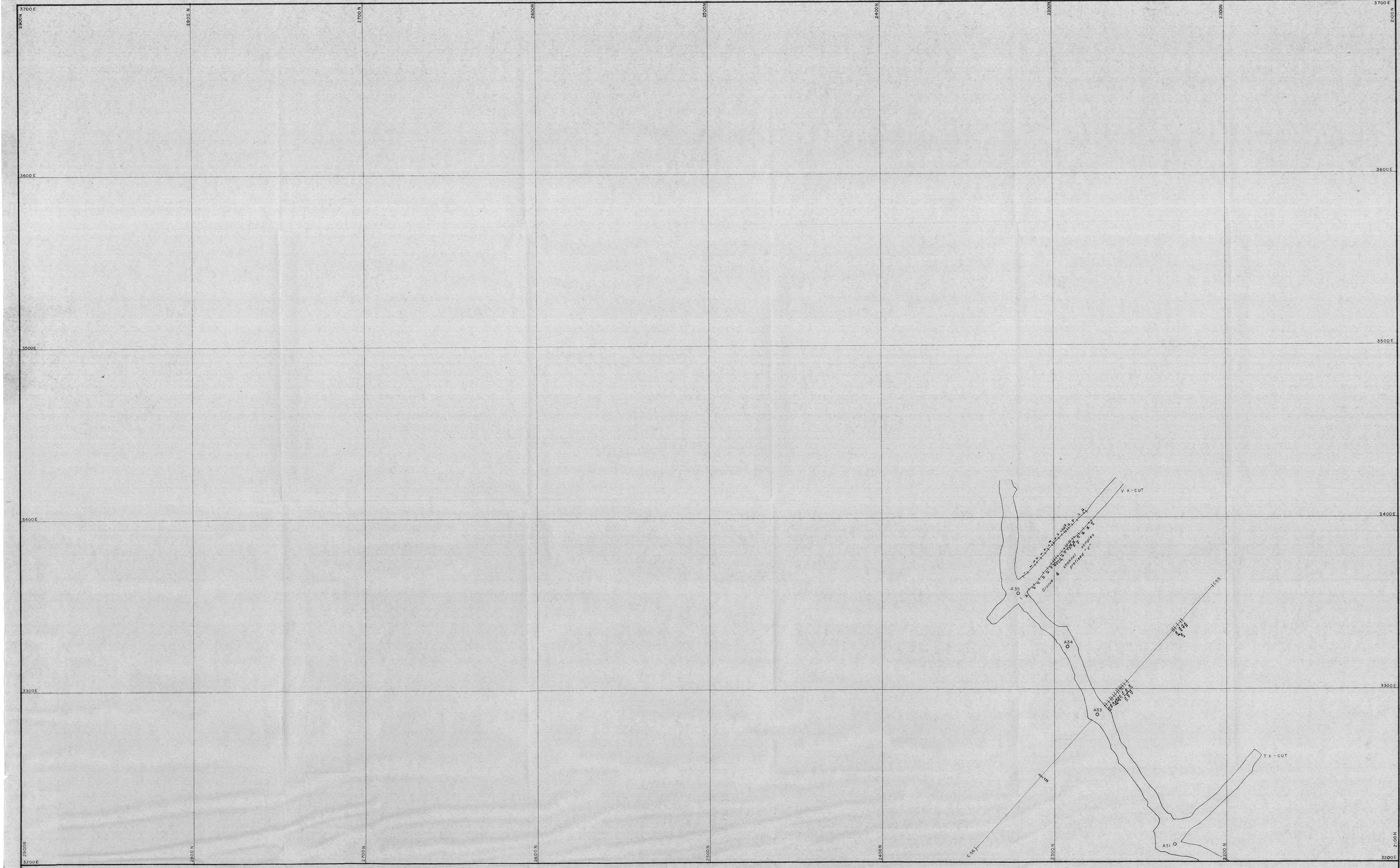


CLEVELAND MINE, TASMANIA.
R.L. 1300' LEVEL HORIZON
DRIVE SAMPLE LOCATION PLAN

255087

Drg. No. C/40 (L) 2200

R.COX



120 10 0 20 40
SCALE OF FEET

5 cm

CLEVELAND MINE, TASMANIA.

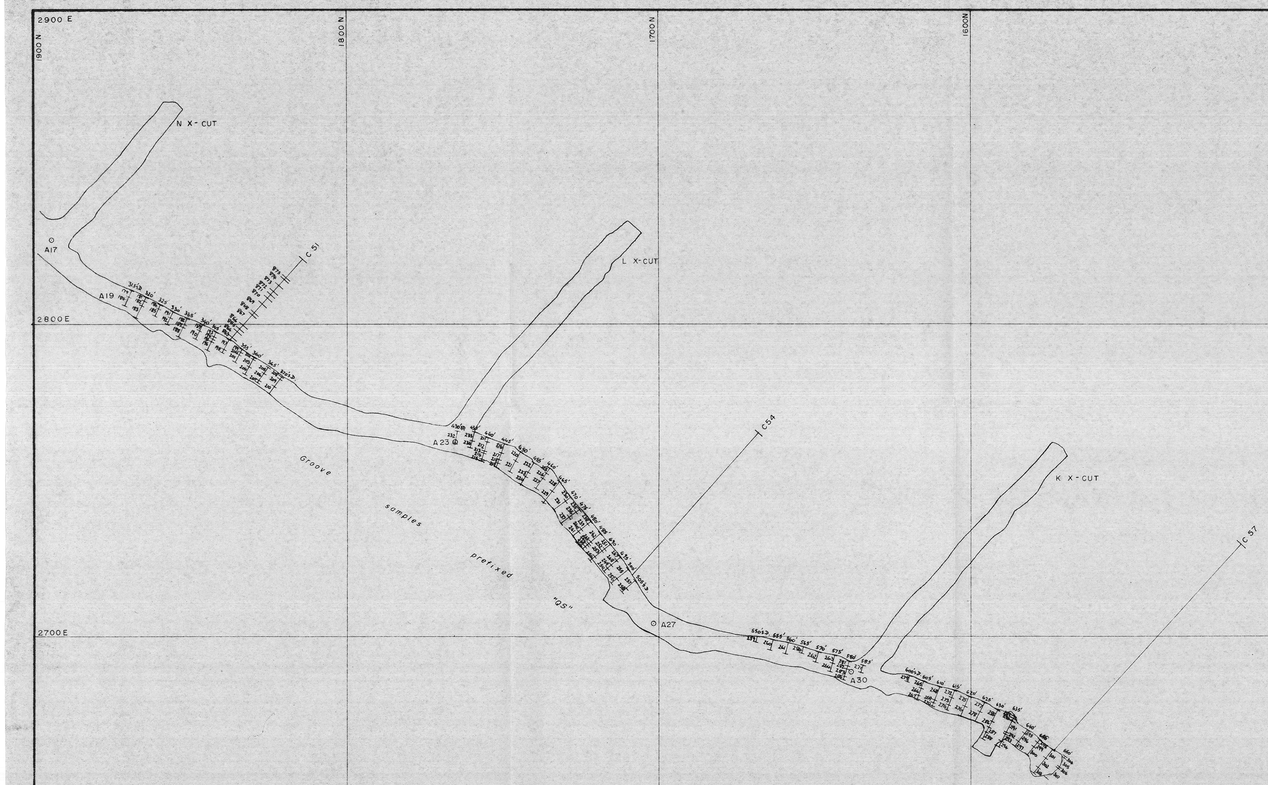
R. L. 1300' LEVEL HORIZON
SAMPLE LOCATION PLAN
CROSS CUTS AND DIAMOND DRILL HOLES

255088

2201

Drg. No. C/41 (L)

R COX



CLEVELAND MINE, TASMANIA.

R.L. 1300' LEVEL HORIZON

DRIVE SAMPLE LOCATION PLAN

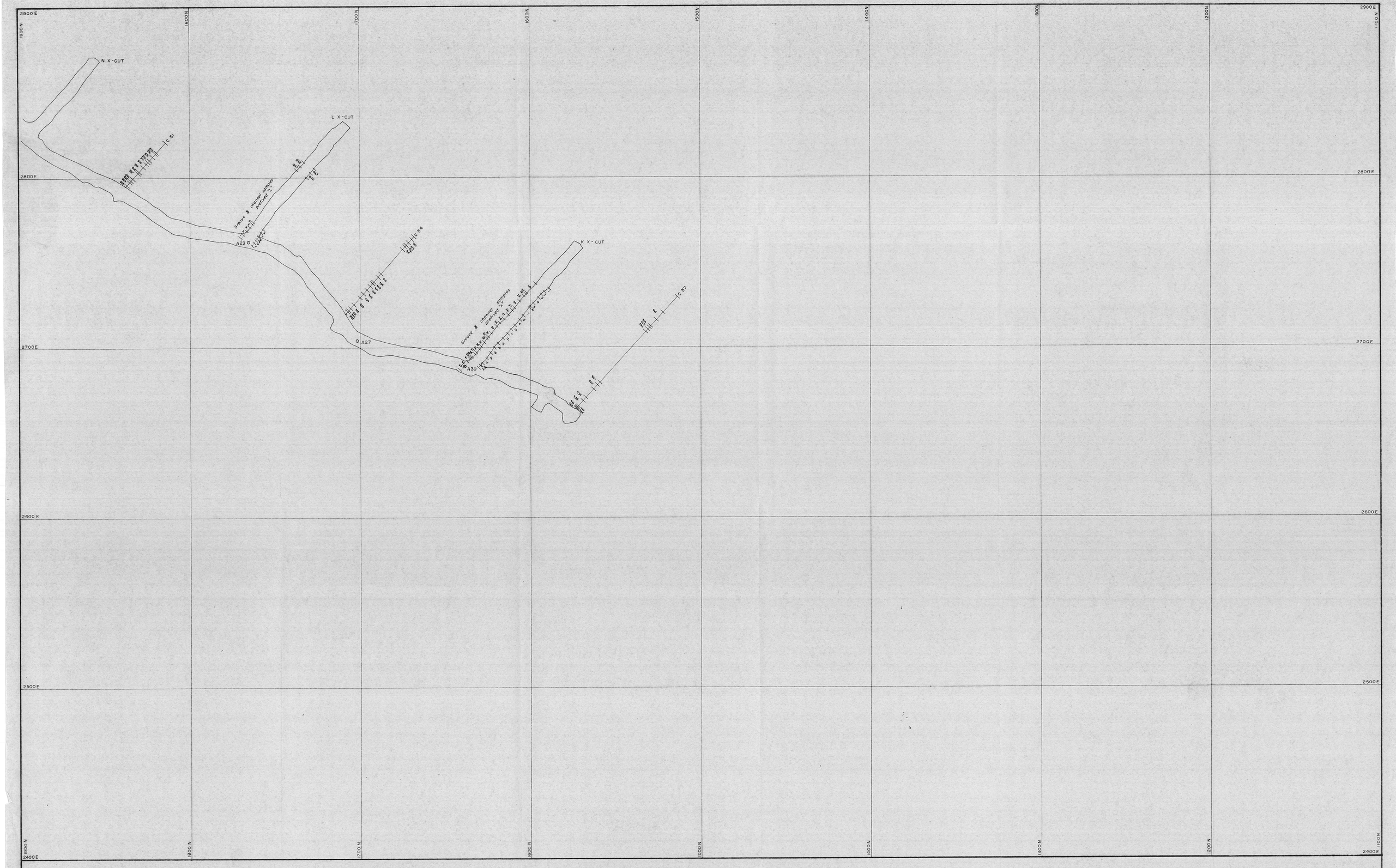
SCALE OF FEET 20 10 0 20 40

5cm

255089

Drg. No. C/42 (L) 2202

R COX



CLEVELAND MINE, TASMANIA.

R. L. 1300' LEVEL HORIZON
SAMPLE LOCATION PLAN
CROSS CUTS AND DIAMOND DRILL HOLES

255090

Drg. No. C/43 (L) 2203

R.COX