TR11-5.6-65

13. NOTES ON THE ROYAL GEORGE TIN MINE

by G. Urquhart

INTRODUCTION

The Cornwall Coal Company requested the assistance of the Department of Mines in 1966 in making an economic appraisal of the defunct Royal George tin mine situated near the township of Royal George. The company de-watered the mine and made No. 2 level accessible for inspection and sampling as a preliminary step to the investigations in addition to surface and underground diamond drilling. The underground workings of No. 2 level and the stopes were then systematically sampled.

The Department of Mines undertook the geological survey of the surface and underground workings, logged diamond drill core and advised on the sampling of the core. Tin analyses were made in the Department of Mines laboratory in Launceston. These results and all previous work were compiled, and represented on 7 maps (figs. 16-20, 47, 48).

LOCATION AND ACCESS

The workings are located on the Royal George Sheet of Snow Hill Quadrangle 55 (8414-II-N), in the NE part of the State.

The workings are situated to the S of the settlement of Royal George in the foothills bordering the flat-floored valley of the St Pauls River. Access from Avoca is along an unsealed road for a distance of 11 miles to Royal George, thence along a gravel road for three quarters of a mile to the open cut excavated on the brow of a granite ridge (fig. 47).

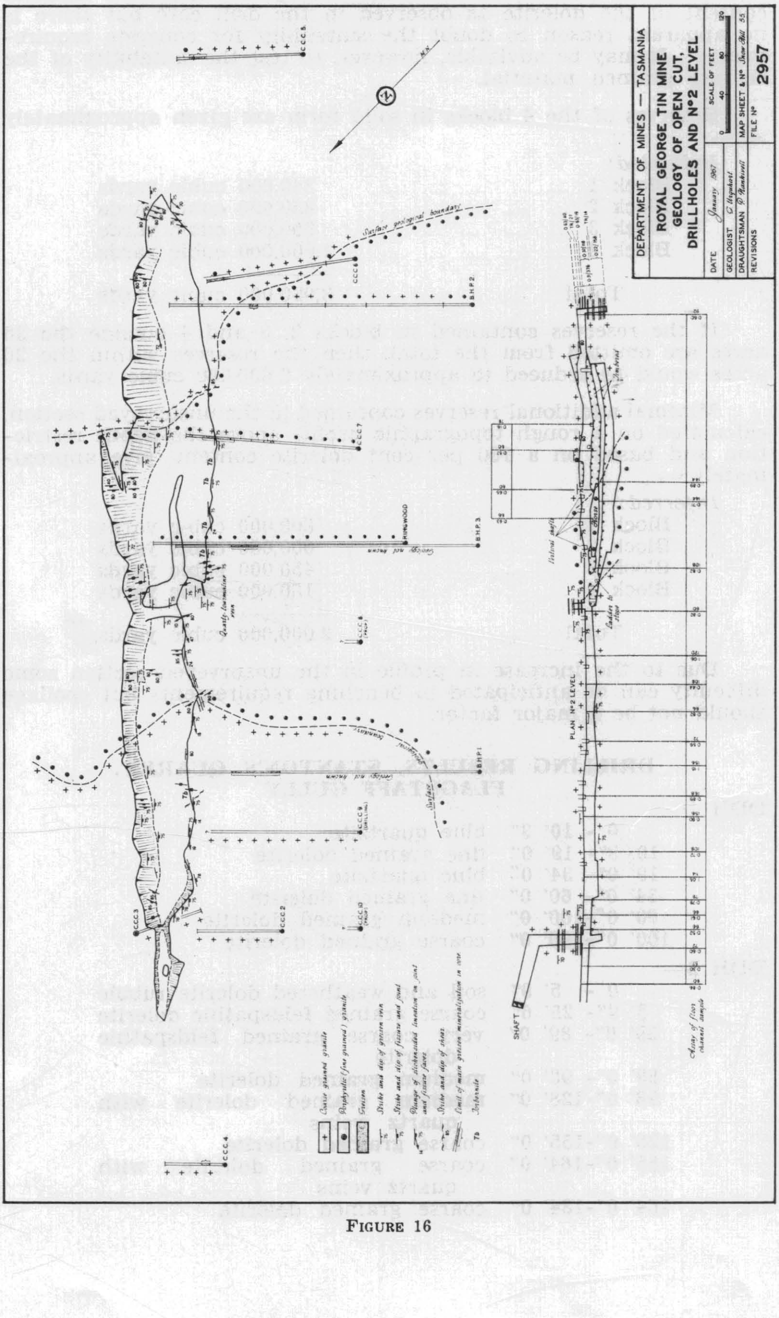

DEPARTMENT OF MINES — TASMANIA
ROYAL GEORGE TIN MINE
GEOLOGY OF OPEN CUT,
DRILLHOLES AND Nº2 LEVEL
DATE January 1957
GEOLOGIST G. Urquhart
DRAUGHTSMAN P. Nankivell
REVISIONS
SCALE OF FEET
0 40 80 120
MAP SHEET & Nº Snow Hill 55
FILE Nº
2957
Coarse grained granite
Porphyritic (fine grained) granite
Greisen
Strike and dip of greisen vein
Strike and dip of fissure and joint
Plunge of slickensided lineation on joint and fissure faces
Strike and dip of shear
Limit of main greisen mineralization in core
Tb Torbernite
C.C.C.1
C.C.C.2
C.C.C.3
C.C.C.4
C.C.C.5
C.C.C.6
C.C.C.7
C.C.C.8 (PROP.)
C.C.C.9 (DRILLING)
C.C.C.10 (PROP.)
B.H.P.1
B.H.P.2
B.H.P.3
RINGWOOD
Quartz-tourmaline vein
Geology not known
Surface geological boundary
PLAN Nº2 LEVEL
SHAFT
Vertical shafts
Horse
Ladders to stope
Assay of floor channel sample
M.N.

FIGURE 16

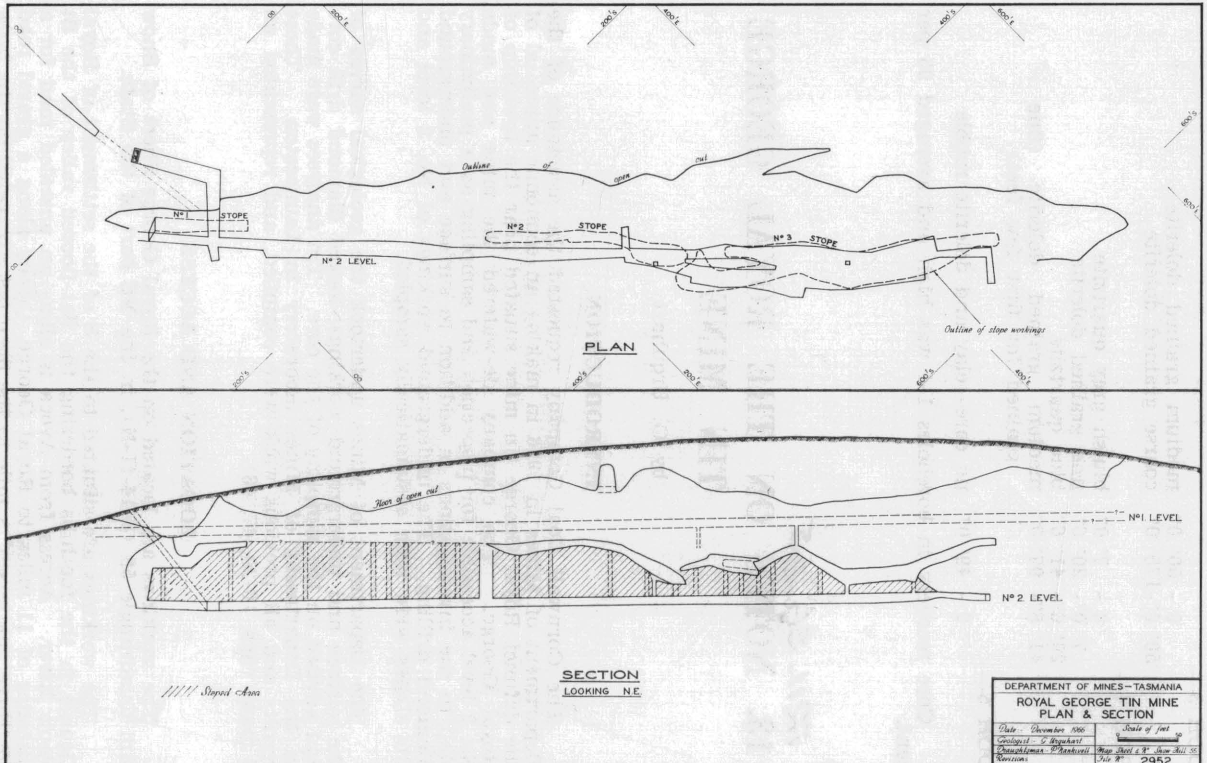

PLAN
Outline of open cut
No 1 STOPE
No 2 STOPE
No 3 STOPE
No 2 LEVEL
Outline of stope workings
SECTION
LOOKING N.E.
Floor of open cut
No 1. LEVEL
No 2 LEVEL
Stoped Area
DEPARTMENT OF MINES—TASMANIA
ROYAL GEORGE TIN MINE
PLAN & SECTION
Date: December 1966
Geologist - G. Urquhart
Draughtsman - P. Pankivell
Revisions
Scale of feet
Map Sheet & No Snow Hill 55
File No 2952

FIGURE 17

TOPOGRAPHY AND GEOMORPHOLOGY

Altitude at the shaft collar is approximately 1000 feet a.s.l. Relief in the immediate environment of the mine is between 200-250 feet, provided by the granite ridge rising from the relatively level detritus-covered flats flanking the river.

The irregular outline of the flats in the district, where they encroach on the foothills, is controlled by tributary creeks rising to the N and S in the ranges which form roughly parallel westerly trending walls to the St Pauls Valley. The flats before infilling were erosional features and an example of the incipient formation of peneplains after drainage channels had attained gradient.

METHOD OF INVESTIGATION

Base maps were constructed before any surface or underground geological surveys could be undertaken. Department of Mines surveyor B. Eaves located diamond drill hole collar sites and the outline of the open cut from theodolite survey stations 1-13 shown on fig. 47. The topography, surface features and base of the open cut were subsequently surveyed by the writer.

The underlay shaft and No. 2 level were surveyed by Mr Lee Gattey, Cornwall Coal Company surveyor, who compiled the original outline plan of the underground workings shown on fig. 16. The geological and assay data were added later by the writer.

The stope attitudes and dimensions (fig. 17) were roughly surveyed using an Abney level, compass, tape and wire rod which could be extended upwards to reach the roof of the workings. Stope No. 2 was not surveyed over its entire length due to lack of access at the NW end. Stope No. 1 is blocked off at the SE end.

The surface geology was recorded on paced traverses made at intervals starting from the perimeter of the open cut. The geological boundaries therefore may not be strictly accurate but sufficiently so to indicate the general distribution of the rock types in the mine area.

ACKNOWLEDGEMENTS

The writer wishes to acknowledge the assistance received at different times from the following personnel of the Department of Mines—B. Eaves, surveyor; W. Pitulej, C. Rose and A. V. Jackson, field assistants. Student A. Rault accompanied the writer on one visit made at the start of the University vacation.

The Cornwall Coal Company has been most co-operative during the investigation and the writer is grateful for the help given by various employees of the licence holders, especially that by the mining superintendent, Mr J. Brennan.

PREVIOUS LITERATURE

A short history is included in a description of the Royal George mine by Reid and Henderson (1929). The lodes were discovered in the eighties of the last century. The Royal George tin mining company was founded in 1911 and operated the mine until closure in 1922. A number of lessees have held the mine since that time including the Broken Hill Pty Co. who drilled three holes in 1957.

Hughes (1956) reported on the presence of uranium in the mine and discussed briefly the geology of the open cut. The mine is also the subject of a report made by the Bureau of Mineral Resources (Daly, 1958) when they investigated the deposit as a possible source of uranium.

GENERAL GEOLOGY

The regional geology is indicated in the map compiled by Reid and Henderson (1929). Briefly stated, the St Pauls Valley is filled with an accumulation of detrital dolerite, river sand and gravel deposited over a period extending from the Tertiary to the Recent. The ranges and foothills are composed of Devonian granite intrusive into Ordovician-Silurian sediments, in turn unconformably overlain by Permian sediments which are succeeded in places by Triassic sandstone. The higher ground is capped by slightly transgressive sills of Jurassic dolerite.

MINE GEOLOGY

The rocks in the mine area (fig. 47) consist of two texturally different but mineralogically similar (in hand specimen) granite types; one coarse grained, the other porphyritic with phenocrysts of feldspar and/or quartz in a finer grained groundmass. White feldspar, quartz, biotite and tourmaline are the minerals most readily observed in fresh granitic rock, but much of the granite is altered to a greater or lesser degree. Sporadic feldspars are incipiently altered to pinite (a greenish aggregate of sericite and talc), or are kaolinized. With increasing intensity of alteration, evident in closer proximity to the ore zones, the rocks are variably silicified and sericitized and pass by successive stages from granite into a fine grained quartz-sericite greisen and finally into a hard silicified quartz greisen bearing little or no sericite. Both granite types are similarly altered.

The feldspar crystals in the coarse grained granite attain a maximum length of about 2 inches. Quartz crystals are subhedral or anhedral and as much as 1 inch in size but are notably different from the quartz phenocrysts of the porphyritic granite in which many of the crystals are euhedral, and square or rectangular in outline suggestive of β quartz. Biotite and tourmaline are equally abundant in the matrix of the two granite types, but scattered segregations of tourmaline in nodules 3-6 inches in diameter are more restricted to the porphyritic granite in which they are seen in the walls of the open cut. Prismatic tourmaline in this rock is also associated with knots and bunches of segregated pegmatitic mineral. Tourmaline in these modes of occurrence appears as the last mineral to have formed as it encloses or partly surrounds euhedral quartz or feldspar crystals.

The relative age of the coarse grained granite and the porphyritic granite has not been clearly established although it would appear, from core evidence particularly, that the finer grained porphyritic granite is the younger intrusive. Certain core contacts

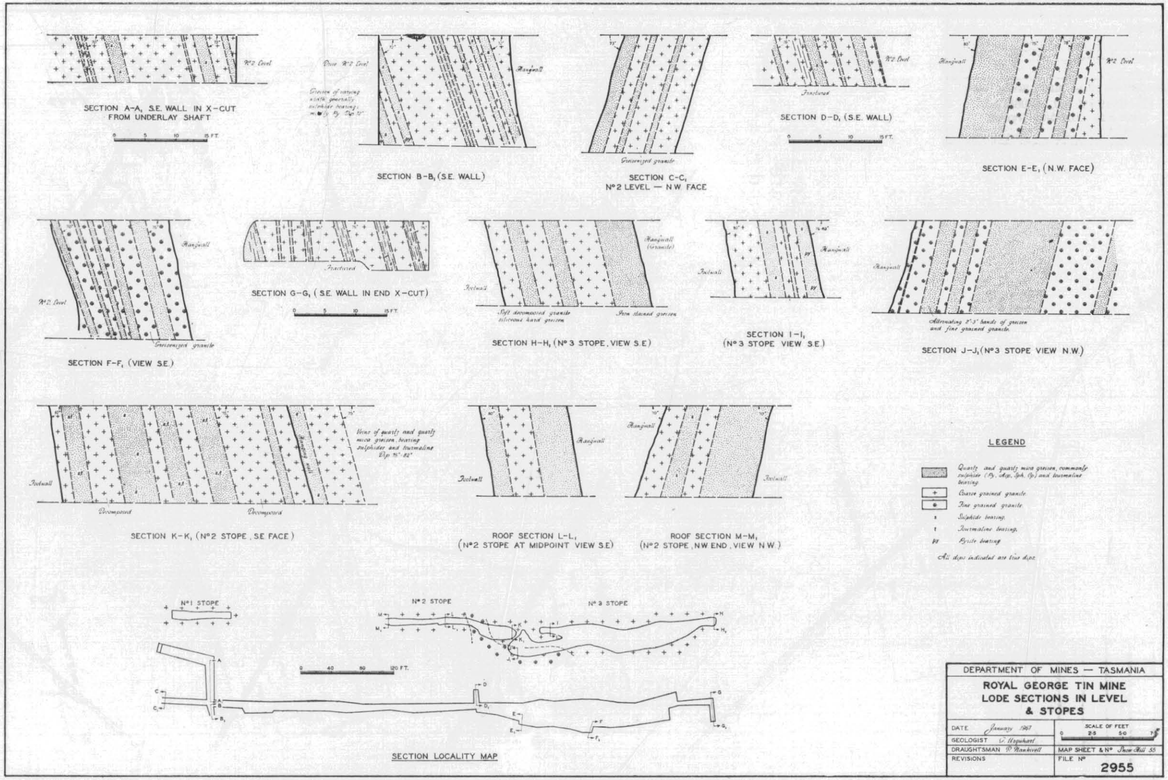
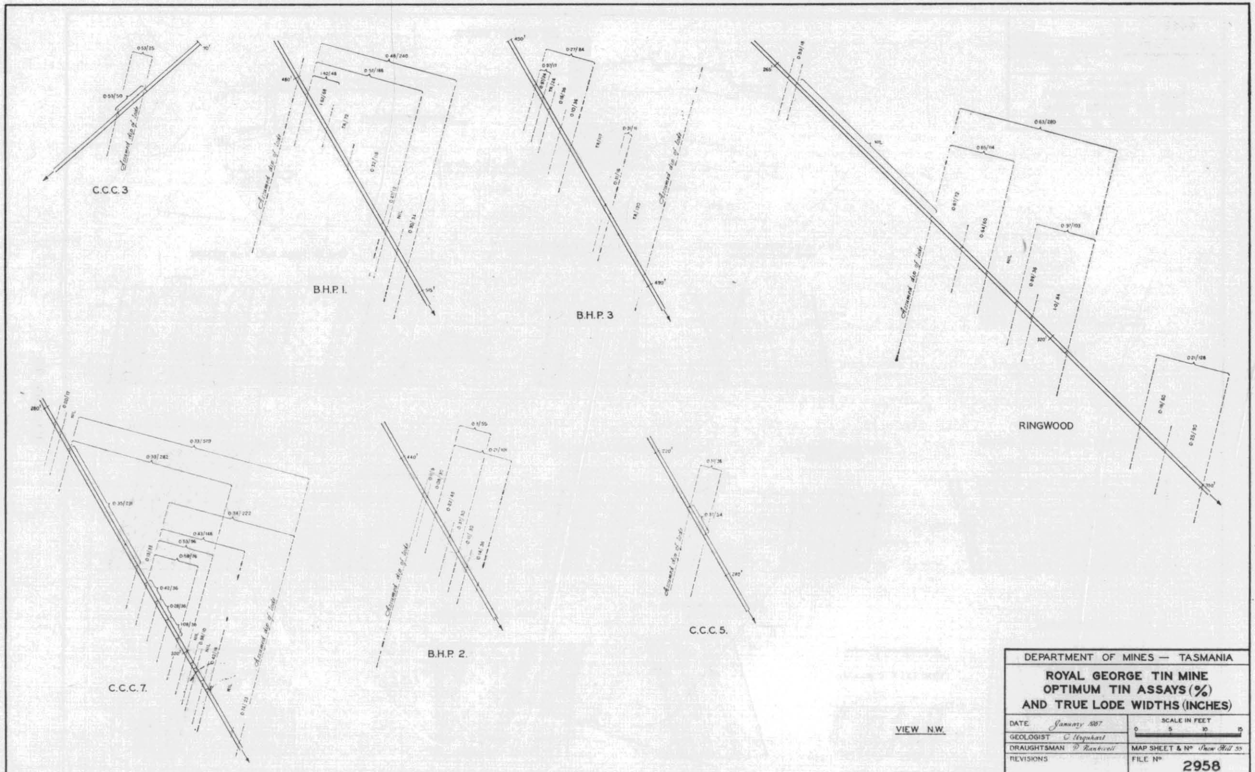

SECTION A-A, S.E. WALL IN X-CUT FROM UNDERLAY SHAFT
SECTION B-B, (S.E. WALL)
SECTION C-C, N° 2 LEVEL — N.W. FACE
SECTION D-D, (S.E. WALL)
SECTION E-E, (N.W. FACE)
SECTION F-F, (VIEW S.E.)
SECTION G-G, (S.E. WALL IN END X-CUT)
SECTION H-H, (N° 3 STOPE, VIEW S.E.)
SECTION I-I, (N° 3 STOPE VIEW S.E.)
SECTION J-J, (N° 3 STOPE VIEW N.W.)
SECTION K-K, (N° 2 STOPE, S.E. FACE)
ROOF SECTION L-L, (N° 2 STOPE AT MIDPOINT VIEW S.E.)
ROOF SECTION M-M, (N° 2 STOPE, N.W. END, VIEW N.W.)
LEGEND
Quartz and quartz mica greisen, commonly sulphide (Py, Asp, Sph, Cp) and tourmaline bearing
Coarse grained granite
Fine grained granite
Sulphide bearing.
Tourmaline bearing.
Pyrite bearing
All dips indicated are true dips
N° 1 STOPE
N° 2 STOPE
N° 3 STOPE
SECTION LOCALITY MAP
DEPARTMENT OF MINES — TASMANIA
ROYAL GEORGE TIN MINE
LODE SECTIONS IN LEVEL & STOPES
DATE January 1967
GEOLOGIST G. Urquhart
DRAUGHTSMAN P. Nankivell
REVISIONS
SCALE OF FEET
MAP SHEET & N° Snow Hill 55
FILE N° 2955

FIGURE 18



C.C.C. 3
B.H.P. 1.
B.H.P. 3
RINGWOOD
C.C.C. 7.
B.H.P. 2.
C.C.C. 5.
Assumed dip of lode
VIEW N.W.
DEPARTMENT OF MINES — TASMANIA
ROYAL GEORGE TIN MINE
OPTIMUM TIN ASSAYS (%)
AND TRUE LODE WIDTHS (INCHES)
DATE
GEOLOGIST
DRAUGHTSMAN
REVISIONS
SCALE IN FEET
0 5 10 15
MAP SHEET & No
FILE No 2958

FIGURE 19

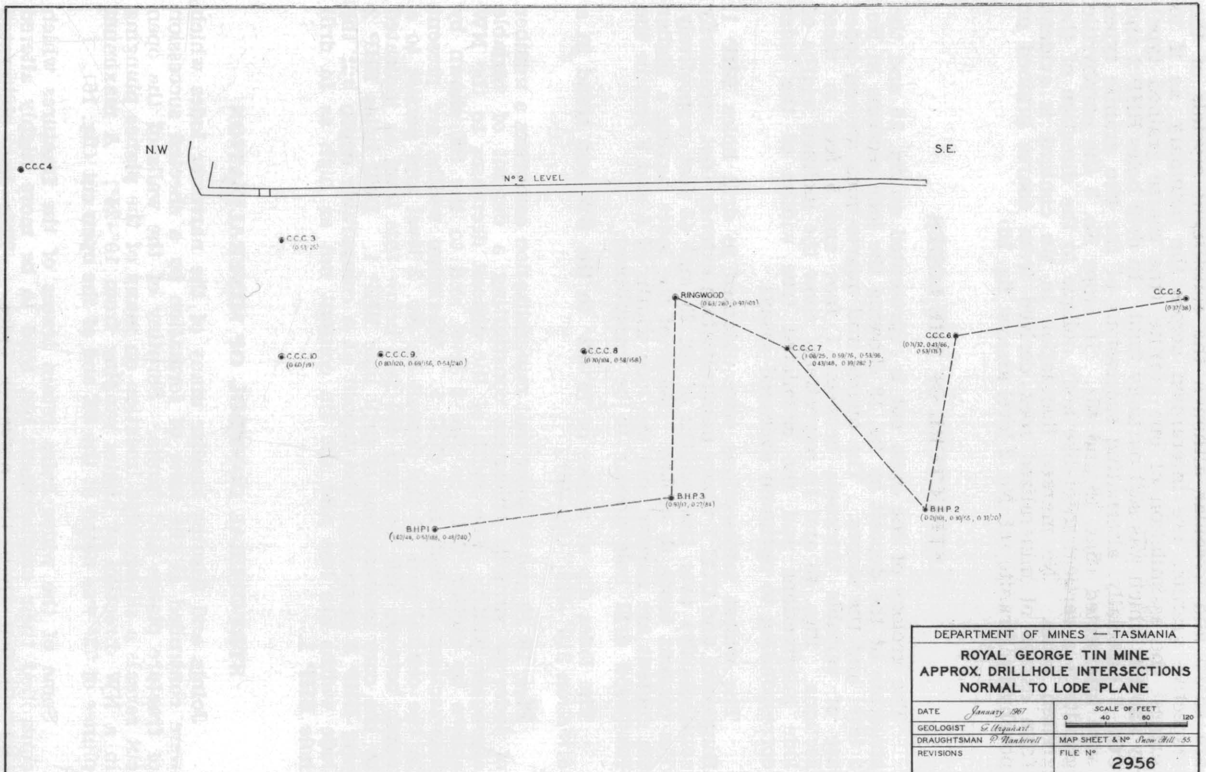

C.C.C.4
N.W.
S.E.
Nº 2 LEVEL
C.C.C. 3
C.C.C. 10
(0.60/19)
C.C.C. 9.
(0.80/120, 0.69/156, 0.54/240)
C.C.C. 8
(0.70/104, 0.58/158)
RINGWOOD
(0.63/280, 0.97/103)
C.C.C. 7
(1.08/25, 0.59/76, 0.53/96, 0.43/148, 0.39/282)
C.C.C. 6
(0.71/32, 0.43/66, 0.53/171)
C.C.C. 5
(0.37/38)
B.H.P. 3
B.H.P. 2
B.H.P. 1
DEPARTMENT OF MINES — TASMANIA
ROYAL GEORGE TIN MINE
APPROX. DRILLHOLE INTERSECTIONS
NORMAL TO LODE PLANE
DATE January 1967
GEOLOGIST G. Urquhart
DRAUGHTSMAN D. Nankivell
REVISIONS
SCALE OF FEET
0 40 80 120
MAP SHEET & Nº Snow Hill 55
FILE Nº
2956

FIGURE 20

are sharp and irregular although the constituent crystals of the respective granites are intergrown across the boundary, as if to suggest the assimilation of one granite (the coarse grained type) by another which was still partially fluid. In drill holes BHP 2 and CCC 7 especially, alternating successions of the two granite types were intersected (figs. 16 and 48). In stope No. 3 the porphyritic granite is a vertical sheet-like body oblique to the direction of the greisen veins. No marked fluctuation in tin content is evident from assays of mineralized rock derived from coarse grained or porphyritic granite (cf. No. 2 level assays: fig. 16).

STRUCTURE OF THE LODES

The geology of the open cut is represented on fig. 16 and the structure of the deposit by fig. 18 showing the lode sections in No. 2 level and the stopes. The quartz and quartz-mica greisen lodes are of variable thickness between 1 foot and 5 feet in these sections. Figs. 48 and 19 respectively show the inclined widths of lode intersections and the calculated true widths of the lodes corresponding to optimum averaged assays.

The widest intersections were obtained in drill holes BHP 1, Ringwood, and CCC 7 where mineralization extends (not necessarily continuously) over true widths of 20, 23 and 48 feet respectively. Tin content tends to be low. Many of the lodes having a higher tin content are narrow, and the lode widths of 8 and 9 feet in the Ringwood drill hole appear to be exceptional.

The lodes dip at angles of 75°-82° to the SW and trend in a direction 310°-315° (fig. 16).

Figs. 18, 19 and 48 show that mineralization comprises a number of lodes of variable thickness constituting a deposit of variable aggregate width. The width of the deposit decreases to the NW shown by section C-C, on No. 2 level and to the SE shown by intersections in drill hole CCC 5. Maximum widths are present in the central part of the deposit on No. 2 level and persist to a depth between 300 feet and 400 feet below this level as indicated by the core intersections of drill hole BHP 1. Drill holes BHP 2 and BHP 3 intersected the deposit at a comparable depth but the lode widths are less and the tin content not as high as in drill hole BHP 1.

STRUCTURAL CONTROL OF MINERALIZATION

Joints and fissures localize many of the narrower lodes which were controlled at the time of formation by a sheeted succession of fracture planes and faults. Scrutiny of the walls of the open cut reveals a slickensided lineation on many of the planes plunging in a NW direction at angles ranging from 10°-24°. A maximum plunge of 72° was noted at the SE end of the open cut (fig. 16).

Some of the wider lodes retain traces of the fractures which controlled their emplacement but tend to be more highly altered and silicified than the narrower lodes. This has obliterated evidence of the structural control in many places.

LODE MINERALS

The metallic minerals most commonly observed are pyrite, sphalerite, chalcopyrite and arsenopyrite irregularly disseminated through the greisen host rock, or localized along hairline fractures. Massive sulphides have not been seen, and sulphide minerals are estimated to total less than 10 per cent by volume, even in the most heavily metallized greisen.

Cassiterite is finely dispersed in the greisen lodes and for this reason is difficult to distinguish from tourmaline which it resembles in colour and which is generally also present as fine grains in the greisen. Cassiterite grains and aggregates were seen in very few mineralized sections of core.

Fluorite is sparse but easily detected by its purplish colour. The mineral may be disseminated in greisen or in the form of narrow (3-6 mm wide) veinlets, seen in the core from drill hole CCC 9.

The secondary uranium-copper-phosphate mineral torbernite is deposited as green spangles and flakes on rock faces and joints in the places indicated on the open cut (fig. 16) but is generally absent in core sections. Low uranium content is indicated in assays of the core from the drill hole logged by Ringwood.

ORE RESERVES

At the time of writing the diamond drilling programme had not been completed and ore reserves have not been calculated. Calculations will be made on the completion of the exploratory work and will be available at the Department of Mines, Hobart.

Geological logs of, and assay data from, the diamond drill holes are also available at the Department of Mines.

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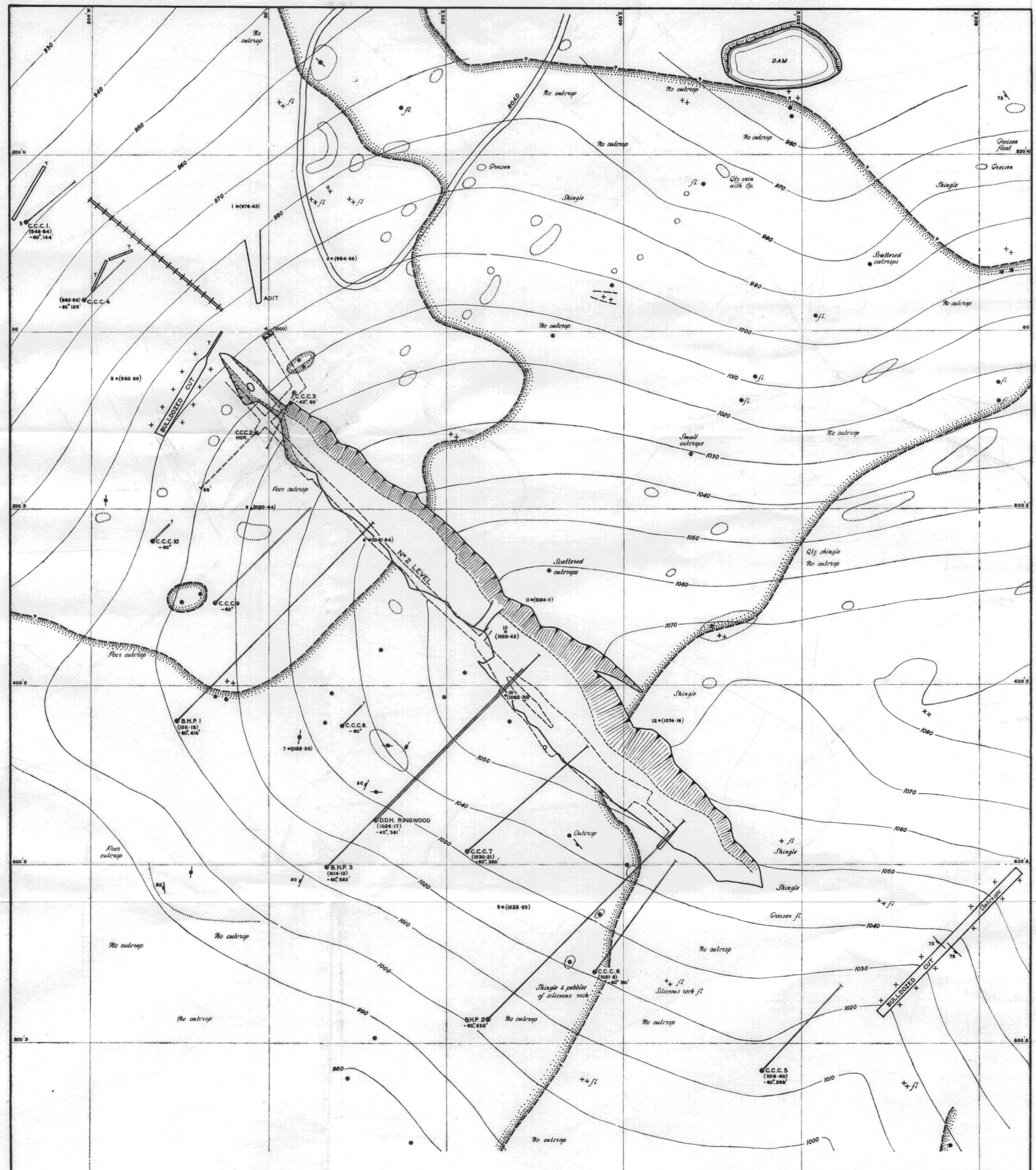
REID, A. M. and HENDERSON, Q. J., 1929—Avoca Mineral District. *Bull. Geol. Surv. Tas.* 40



LEGEND

- Coarse grained granite (+) } Devonian
- Porphyritic (qtz.; fel.) granite (•) } Devonian
- Geological boundary.
- Outcrop boundary (approx.)
- Trench
- C.C.C.1 ● Drill hole (B.H.P. or Cornwall Coal Company C.C.C.)
- 8 ● 1010·77 Survey station number & altitude relative to shaft collar (1000')
- Inclined shaft
- Strike and dip of joint.
- Vertical joint
- Qtz Quartz
- fl Float
- Cp Chalcopyrite

N.B. - Grid magnetic north

FIG 47

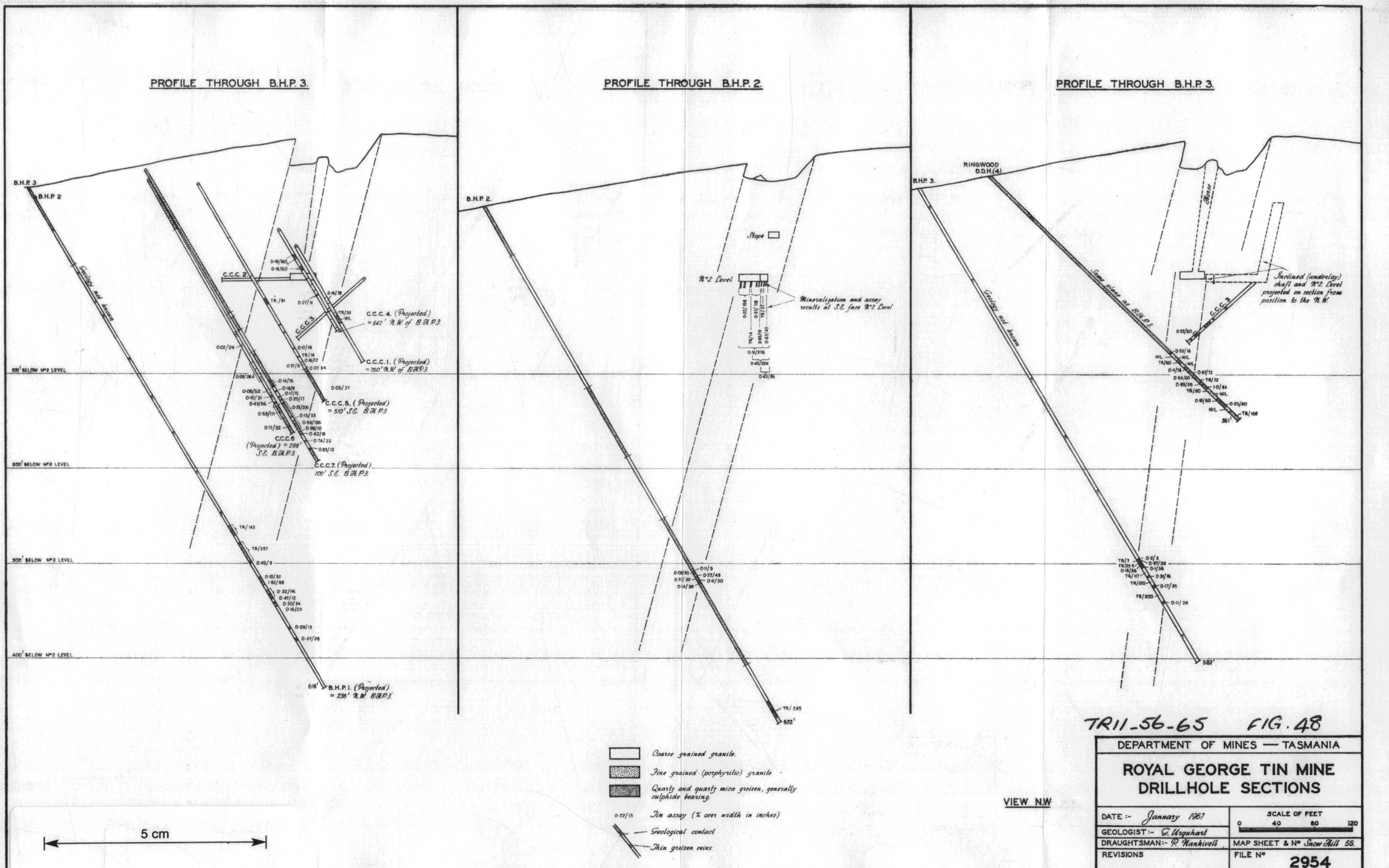
DEPARTMENT OF MINES — TASMANIA

OPEN CUT
ROYAL GEORGE TIN MINE

DATE December 1966	SCALE OF FEET 0 40 80 120
GEOLOGIST G. Urquhart	
DRAUGHTSMAN P. Nankivell	MAP SHEET & Nº Snow Hill 55.
REVISIONS	FILE Nº 2951

5 cm

TR11_56_65



PROFILE THROUGH B.H.P. 3.
PROFILE THROUGH B.H.P. 2.
PROFILE THROUGH B.H.P. 3.
B.H.P. 3
B.H.P. 2
C.C.C. 2
C.C.C. 3
C.C.C. 4. (Projected) = 642' N.W. of B.H.P. 3
C.C.C. 1. (Projected) = 750' N.W. of B.H.P. 3.
C.C.C. 5. (Projected) = 510' S.E. B.H.P. 3
C.C.C. 6 (Projected) = 298' S.E. B.H.P. 3.
C.C.C. 7. (Projected) 100' S.E. B.H.P. 3.
B.H.P. 1. (Projected) = 236' N.W. B.H.P. 3.
Geology not known
100' BELOW No 2 LEVEL
200' BELOW No 2 LEVEL
300' BELOW No 2 LEVEL
400' BELOW No 2 LEVEL
Stope
No 2 Level
Mineralization and assay results at S.E. face No 2 Level
RINGWOOD D.D.H. (4)
Same plane as B.H.P. 3.
Inclined (underlay) shaft and No 2 Level projected on section from position to the N.W.
VIEW N.W.
TR11-56-65
FIG. 48
Coarse grained granite.
Fine grained (porphyritic) granite.
Quartz and quartz mica greisen, generally sulphide bearing.
0-22/13 Tin assay (% over width in inches)
Geological contact
Thin greisen veins
5 cm
DEPARTMENT OF MINES — TASMANIA
ROYAL GEORGE TIN MINE
DRILLHOLE SECTIONS
DATE :- January 1967
GEOLOGIST :- G. Urquhart
DRAUGHTSMAN :- P. Wankivell
REVISIONS
SCALE OF FEET
0 40 80 120
MAP SHEET & No Snow Hill 55.
FILE No 2954