RIO TINTO AUSTRALIAN EXPLORATION PTY. LIMITED

MELBOURNE, AUSTRALIA

PROJECT:— PRP/7/100

REPORT No.:— Miscellaneous/1959

THE GOOSENECK ANOMALY

APPRAISAL OF RESULTS OF D.D.G.N.I.

by

D. McKenna

FILE REFERENCE:— 8D/20R

MAP REFERENCE:—

DATE:— 16/2/59.

THE GOOSENECK ANOMALY

APPRAISAL OF RESULTS OF D.D.G.M.I.

by

D. McKenna

C O N T E N T S

P L A N S

THE GOOSENECK ANOMALY

Appraisal of results of D.D.G.N.I.

(A) General surface geology at Gooseneck

Surface mapping has shown that the geophysical anomaly lies entirely within black, generally well banded slates. The slate zone in R.T.A.E. sections varies between 500 feet and 900 feet wide and contains occasional narrow porphyry or tuffaceous bands. It appears from limited surface exposures that the slate horizon is narrowing southwards.

The slate is itself contained within various porphyroidal lavas and tuffaceous rocks. The slate-volcanic assemblage is overlain unconformably by Owen conglomerate which occurs as remnant outliers sitting in random attitude on the old Cambrian surface.

Post Owen faulting has occurred and from examples mapped by Fraser (Plan No. T.411) in the eastern Owen, the faults are believed to be almost exclusively of the reverse type. The fault channels are generally marked by late-phase quartz infillings. Along at least one of the fault channels traceable from the Owen into the Cambrian series, trace quantities of galena, sphalerite and chalcopyrite occur. This may be observed at surface in several old trenches and the zone has been cut at 530 feet vertical depth in D.D.G.N.I. and still contains trace sulphides. On present evidence, the fault-quartz zone is not worthy of economic consideration.

The regional behaviour of the slate zone containing the anomaly is obscure. Experience gained by several Rio Tinto field parties in the White Spur, Que River areas indicates that the slate could represent a tight syncline, infolded into the volcanic rocks. If this supposition is correct, the slate band will narrow and finally terminate in depth. The narrowing of the slate horizon from surface downwards has been recorded by Electrolytic Zinc Co's geologists in their No. 1 hole at Gooseneck.

(B) Geology of the bore-hole D.D.G.N.I.

The principal slate horizon extends from near surface to 511 feet bore-hole depth. Volcanic rocks predominate beyond this depth to the end of the hole with the exception of two narrow slate bands and three zones of quartz veining.

The black slates contain traces of pyrite throughout and two distinct zones (see cross section) contain pyrrhotite in more than trace quantities. The first pyrrhotite concentration occurs between 311 and 320 feet. The main sulphide length is between 413 feet six inches and 435 feet and weakens suddenly at this depth and trace quantities only persist to 490 feet. The pyrrhotite is present mostly as paper thin "smears" along slatey cleavages and occasionally as veinlets up to 1/10" wide. Traces of galena and chalcopyrite have been observed associated with the pyrrhotite in slates in the core.

The amount of pyrrhotite was visually estimated to be of the order of 4% by volume. This calculates to 6.3% by weight, applying Boniwell's density figures. The assay for total sulphur from three samples analysed is 2.16%. Neglecting the sulphur in chalcopyrite, galena and sphalerite (trace quantities only) and adopting Dana's figures for the average composition of pyrrhotite (sulphur = 39.6%; iron = 60.4%), the total equivalent pyrrhotite calculates as 5.4% by weight. The estimated and actual percentages of sulphide are thus of the same order.

Three samples were submitted for assay of metal content from the pyrrhotite zone, and as anticipated, the results are low. They did however, indicate that trace amounts of lead, zinc and copper are a feature of the zone. The assay results are attached as Appendix I.

Three chips of core were submitted for microscopic examination. The detailed results of this study are presented in Appendix II.

Sample No. 702 was typified by a small clot of mixed sulphides occurring in the chloritic porphyry at 648 feet. The report on this specimen bears out the fact that the sulphide is transgressive along the cleavage and schistosity of the host rock and establishes the paragenetic sequence as being: pyrrhotite, pyrite, marcasite, galena, sphalerite and chalcopyrite.

Samples Nos. 703 and 704 are from 419 feet and 435 feet 8 inches respectively in the bore hole, and are typical slate specimens containing pyrrhotite from the main sulphide zone. The petrographic examination again describes complex intergrowths of sulphides of copper, lead, and zinc with pyrrhotite lenticles arranged along slatey cleavages.

(C) Summary and Recommendations.

The geophysical anomaly is undoubtedly caused by the pyrrhotite mineralisation for the following reasons.

1. The spatial relationship between the intersected pyrrhotite and the surface position of the anomaly.

2. The fact that the surface anomaly is parallel to the regional schistosity, as is the pyrrhotite parallel to detailed schistosity and cleavage as observed in the core.

In effect, the section of the anomaly tested by D.D.I. has been due to 5-6% of iron-sulphides carrying trace amounts of lead, zinc, and copper. This first hole has not proved however, that pyrrhotite should always predominate over lead, zinc and copper sulphides over the whole length of the anomaly. For this reason alone at least one additional hole is necessary to define whether or not Pb/Zn/Cu sulphides may not increase in the total sulphide content.

Geophysical evidence is such that the order of total sulphide concentration at site D.D.2. should not be less than at site D.D.I. In addition, the type of anomaly at the second hole is somewhat different to that at No. 1, which could indicate a different set of geological conditions.

NOTE: PAGE 3 NOT RECEIVED WITH THIS REPORT

NOTE: NO PAGE 3.

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I suggest that if the anticipated sulphide mineralisation in D.D.2. contains essentially pyrrhotite with only trace amounts of lead, zinc and copper as in D.D.I., that the anomaly will have been adequately tested, and that no further drilling be undertaken as Gooseneck.

D. McKenna,
Geologist.

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APPENDIX No.1

384005 8D/20R

DEPARTMENT OF MINES TASMANIA

LABORATORY,
LAUNCESTON,

4th February, 1959.

CERTIFICATE OF ANALYSIS

To Rio Tinto Australian Exploration Pty. Ltd.,
Box 229E, Melbourne, Vic.

*The sample*s *of* slate etc. *received*
from the above *on the* 21st January, 1959
and stated to be from Goose Neck No.1 Bore ~~xxxx~~ *have been*
examined, with the following results:—

Registered Number	*Constituents*	*Per Cent*	*Per Ton* Ozs.	Dwts.	Grs.
49	(401) Lead	0.08			
	Tin	Nil			
	Copper	Nil			
	Nickel	Nil			
	Zinc	0.10			
	Gold	Nil			
50	(404) Lead	0.37			
	Tin	Nil			
	Copper	Nil			
	Nickel	Nil			
	Zinc	0.3			
	Gold	Possible Trace			
51	(407) Lead	Nil			
	Tin	Nil			
	Copper	0.02			
	Nickel	Nil			
	Zinc	0.3			
	Gold	Nil			
	Composite of samples Reg. Nos. 49,50,51.				
	Sulphur	2.16			
	* Carbon	0.62			

* excluding carbonate - C

W. L. Thomson

Chief Chemist and Metallurgist.

68894—(M160)..160 (8)

APPENDIX No.2

384006

005

Telephone :
UX 1662

SOUTH AUSTRALIA

In your reply please quote this number :

DEPARTMENT OF MINES

RESEARCH AND DEVELOPMENT BRANCH

Flemington Street, Parkside, S.A.

13th January, 19 59.

MINERALOGY & PETROLOGY SECTION

REPORT No. N.P.R.C. 2/59

MATERIAL : Drill core

SUBMITTED BY : Rio Tinto Australian Exploration Pty. Ltd.

DATE RECEIVED : 7th January, 1959.

MARKS or NOS. : No. 702.

SOURCE : Tasmania

INFORMATION REQUIRED : Petrographic and mineragraphic examination.

METHOD OF EXAMINATION : Microscopic.

RESULTS OF EXAMINATION :-

(1) The host rock -

The rock which constitutes the bulk of the core, presumably the host rock, is a quartzose sericitic schist containing chlorite and minor apatite. It is a low grade metamorphic rock of the green schist facies. Schistosity is poorly developed due to the small size of sericite particles and to the abundance of evenly disseminated granulated quartz.

The rock contains elongate accumulations of sulphides which may represent portions of an incompletely formed replacement vein. Absence of suitable structure rules out the possibility of fissure fillings.

The sulphide veins are secondary and transgressive towards the rock schistosity. They are composite in that they consist of a sulphide complex separated from host rock by a selvage of relatively coarse grained secondary quartz and secondary calcite. The quartz and calcite are also irregularly distributed within the sulphide complex.

(2) The contained ore -

The sulphide complex consists of pyrite, marcasite, galena, sphalerite, pyrrhotite and chalcopyrite.

Pyrite and sphalerite are the prominent minerals and each is coarse grained up to a size of 1 x 0.5 cm.

Marcasite is also abundant and is intergrown with pyrite as granular crystals at random orientation. Individual marcasites exhibit an internal lamellar structure due to the presence of series of filled, or unfilled 2-5 micron wide rows of cavities which are parallel and spaced 10 - 20 microns apart.

Sphalerite (marmatite variety) contains minute exsolved blebs of chalcopyrite as well as occasional larger individuals up to 50 microns in size. Sphalerite and chalcopyrite are genetically contemporaneous and replace both galena and marcasite.

Pyrrhotite occurs as ragged inclusions throughout pyrite and appears to have been replaced by it.

Galena occurs largely as cavity fillings within marcasite, but locally forms larger, more granular or subhedral grains, amongst other minerals.

(3) Summary -

It is not uncommon for pyrrhotite to alter to an aggregate of pyrite and marcasite. Several features of the ore suggest this may have occurred.

However, the peculiar form of the marcasite, as shown in the illustrations, is suggestive of its having replaced some micaceous or lamellar mineral present as inclusions in the pyrite.

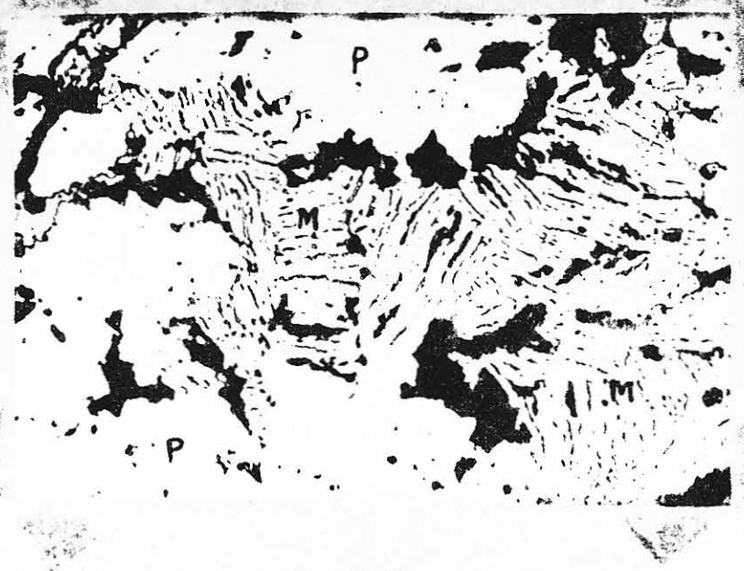
In either case however, the paragenetic sequence is similar and is interpreted as follows :-

- - - - - - - - - - - >

pyrrhotite-pyrite-marcasite-galena-sphalerite, chalcopyrite.

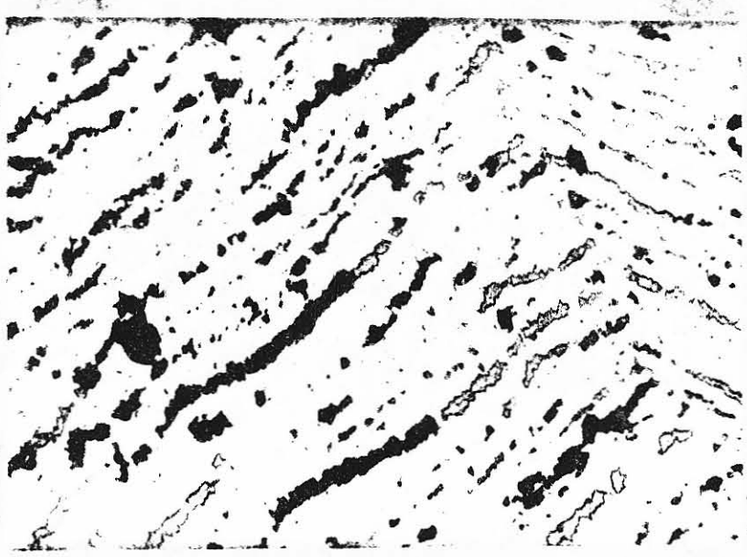
A W Whittle

A. W. Whittle,
CHIEF MINERALOGIST AND
PETROLOGIST.



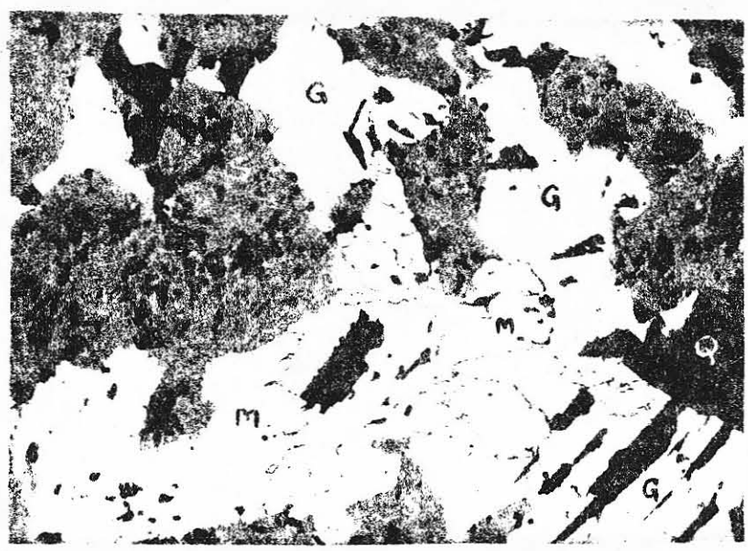
X 34

Pseudo-lamellar structure in granular marcasite, M occurring within pyrite P. Dark grey is quartz and black areas are cavities in ore.



X 240

Showing detail within pseudo-lamellar marcasite where galena (grey) partially fills cavities (black).



X 240

Complex intergrowth of sphalerite, S galena, G marcasite, M and quartz, Q.

Telephone :
UX 1662

384009

SOUTH AUSTRALIA

In your reply please quote this number :

File 88/20R

DEPARTMENT OF MINES

RESEARCH AND DEVELOPMENT BRANCH

Flemington Street, Parkside, S.A.

2nd February, 1959.

MINERALOGY & PETROLOGY SECTION

REPORT No. N.P.R.C. 4/59

MATERIAL :	Drill core
SUBMITTED BY :	Rio Tinto Aust. Exploration Pty. Ltd.
DATE RECEIVED :	27th January, 1959.
MARKS or NOS. :	703, 704.
SOURCE :	Zeehan, Tas.
INFORMATION REQUIRED :	Identification of sulphides.
METHOD OF EXAMINATION :	Microscopic.

RESULTS OF EXAMINATION :-

(1) Sample 703 : 419 ft. -

The ore is emplaced in an extremely fine grained schistose rock which consists of sericite, quartz, graphite, calcite and minor chlorite. The maximum grain size in this graphitic quartz sericite schist is 50 microns which is attained by some of the granular quartz.

Schistosity is due to the parallel alignment of sericite and graphite. Calcite occurs as elongate fine crystalline aggregates which reach 0.5 mm. in length. Granular quartz is evenly disseminated through the rock.

Ore is distributed through the rock as slender lenticles (up to 3.0 x 0.5 mm. in size) which are oriented along the rock cleavage. The ore is mostly pyrrhotite, fine granular aggregates of which produce the lenticles. Sphalerite, chalcopyrite and galena are intergrown with the granular pyrrhotite. Only pyrrhotite occurs in most ore lenticles, but in some there is up to 50% sphalerite. Chalcopyrite and galena are less abundant; chalcopyrite commonly forms rims round sphalerite; galena mostly occurs interstitial amongst granular pyrrhotite.

These ores have replaced pre-existent micro-augen shaped mineral aggregates of the rock.

(2) Sample 704 : 435' 8" :

Portion of this core is of the same schistose rock as that of No. 703. The remainder of the core is made up of a composite vein which has penetrated this schist along its cleavage with considerable replacement of the host rock.

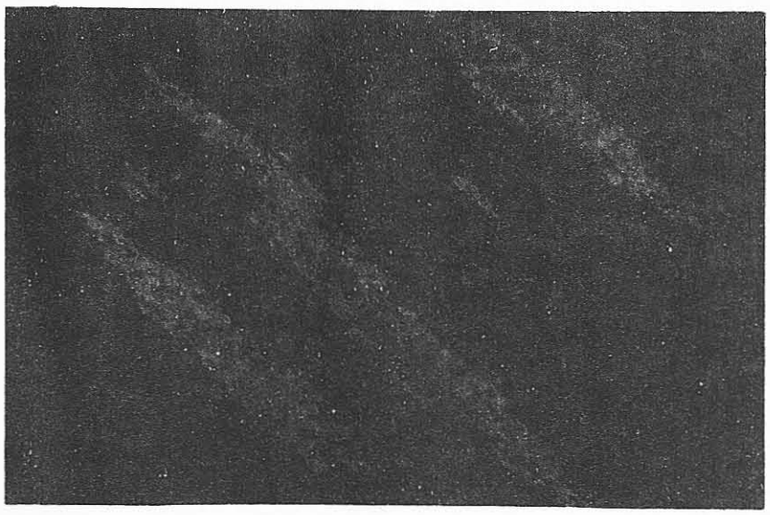
The composite vein consists of coarsely crystalline calcite, a very fine granular quartz mosaic and of ore minerals, all of which are of secondary origin. Portions of detached

and partly replaced sericite schist are caught up in the vein.

The ore is a complex intergrowth, irregular in grain size and unevenly distributed in the composite vein. The main components are pyrrhotite, pyrite and marcasite accompanied by smaller amounts of galena, sphalerite, chalcopyrite and arsenopyrite.

The photomicrograph illustrates the distribution of sphalerite in the pyrrhotite lenticles.

A. W. Whittle,
CHIEF MINERALOGIST AND
PETROLOGIST.



Photomicrograph showing sphalerite (darker grey) intergrown with pyrrhotite (lighter grey) in lenticles in quartz sericite schist.

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80ac. 105 M 55

80ac. 106M 55

51ac. Area applied for by R.B.Fraser

D.D.H.1 Dep 50° Bearing 60 mag. Depth 770'4" (complete.)

D.D.H.2

Arbitrary Datum RL.3000

5 cm

M N

Working method – Abney, compass and tape

Arbitrary datum – 3000' at foot of base-line peg 62

2940 Contour line – contour interval 20'

Creek

Lease peg

Lease boundaries

8· Grid line peg

42⊙ Base line peg

Adjusted axis of 'lines of equal phase" turam geophysical anomaly

Area of turam indication

Diamond Drill Holes

Some outcrops of Owen Conglomerate, traced to allow ready superimposition of this plan and Frasers geological plan (№ T411)

N.B. All grid pegs have been picked up and plotted relative to features on 400'to 1" (approx.) photograph – thus peg positions, and geological features as plotted by Fraser (Plan № T411), may be directly superimposed

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RIO TINTO AUSTRALIAN EXPLORATION PTY. LIMITED

TOPOGRAPHIC CONTOUR PLAN

GOOSENECK

GEOPHYSICAL – GRID AREA

011

Date: November, 1958	Geologist: D. Mc Kenna	Plan № T492
Scale: 400 ft to 1in (approx.)	P.R.P./7/100	

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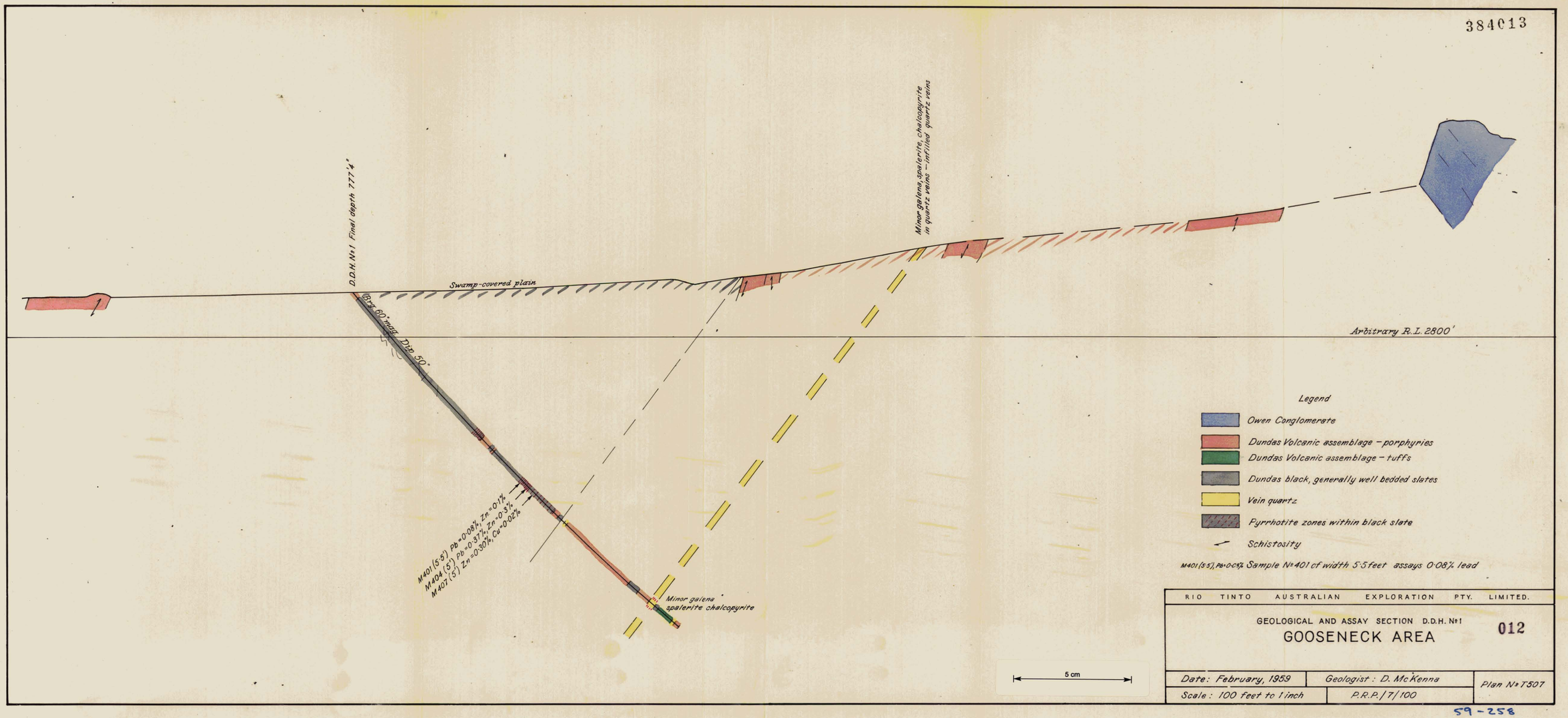

RIO TINTO AUSTRALIAN EXPLORATION PTY. LIMITED.

GEOLOGICAL AND ASSAY SECTION D.D.H. No 1

GOOSENECK AREA

012

Date: February, 1959	Geologist: D. McKenna	Plan No T507
Scale: 100 feet to 1 inch	P.R.P./7/100	

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