Tommy's Cad Copper Prospect N:

B. T. Johnson
A. F. McQueen
C. W. Patterson

CR 1965-0017
May 12, 1965
Geological Report
Geological Report
Geological Report
Geophysical Report

G. W. Patterson
A. McQueen
G. W. Patterson
B. T. Johnson
October 1964
March 1965
May 1965
May 1965

PLANS

- N. T. 127
- N. T. 135
- N. T. 131
- N. T. 132
- N. T. 133
- N. T. 134

Geological Plan
Geochemical Soil Sampling Plan
Geophysical : Induced Polarisation Profiles

" " " "
" " " "
" " " "
McIntyre's Copper Prospect, Tommy's Gap, Alice Springs N.T.

Summary & Conclusions

Copper mineralization represented by malachite stained gossans and patches of carbonate ore appears to occupy a 300-foot-wide zone in chlorite schist and limestone at Tommy's Gap. Due to creek alluvium and to scree from overlying Proterozoic Heavitree Quartzite, exposures are poor at the western end and geophysics would probably be needed to test the continuity of the zone, which appears to be more or less continuous for about 700 feet at the eastern end.

Title is held by S. J. McIntyre as an 80 acre mineral claim surrounded by a 25 square mile A.P. Option; terms could probably be arranged without difficulty.

Location and Access

Tommy's Gap is about 50 miles east northeast of Alice Springs, and is accessible by 56 miles of reasonable graded road through Ross River tourist camp. The prospect is about 1 mile off the road and is reached by a rough track which follows a creek bed.

Geology

Pre-Cambrian metamorphic rocks in which the copper occurs include chlorite schist and marble. They are bodies of amphibolite and a large body of porphyritic granite occurs at the eastern end of the mineralized zone. Upper Proterozoic quartzites and limestones unconformably overlie the metamorphic and igneous rocks and form a prominent ridge through which Tommy's Gap passes.

Mineralization

Copper occurs as isolated transgressive quartz lodes, as patches of carbonate in limestone, as gossanous
conformable lodes carrying carbonate and secondary sulphide, and
to some extent as scattered carbonate in schist. The most
interesting locality is an easterly trending gossanous zone
about 300 feet wide, exposed on the back slope of the ridge formed
by the Upper Proterozoic quartzite. Copper mineralization
occurs in gossanous bodies over a length of about 700 feet. The
zone appears to be terminated at the eastern end by a mass of
porphyritic granite. An isolated lens of gossanous quartz
with a patch of rich carbonate about a quarter of a mile further
east does not appear to be directly related to the gossan zone.
The western end of the zone is cut by a large creek and
beyond the creek to the west exposures are poor due to talus from
the quartzite ridge. Some small outcrops of copper stained
ironstone can however be seen along the base of the hill and some
carbonate in schist was observed in one exposure in a small creek.
A noteworthy feature is the occurrence of several
bodies of dense hematite, some of which is magnetic and may
represent magnetite at depth. There is a marked association
of magnetite with copper in the Yamba-Pinnacles area in the
Strangways Range 40 miles to the northwest.
A number of soil and drainage samples were taken
by the prospector, S. J. McIntyre. These were sent to Darwin,
but due to the Writer's absence, have not yet been submitted for
analysis. Should total copper values appear interesting, a
properly laid out soil grid should be sampled and drainage
reconnaissance of the surrounding area should be carried out.
Some I.P. geophysical investigation could be
undertaken to determine whether or not the gossanous zone continues
west of the creek.

Title
An 80 acre Mineral Claim has been pegged by the
prospector and an Authority to Prospect over a 25 square mile
has been obtained. A 3 year option could probably be obtained
on terms similar to those governing Mineral Claim 23 at Halls
Creek, which is currently under option from the same prospector.

G. W. Patterson.
30th March, 1965.

Memorandum to:  C. L. KNIGHT, ESQ.

from:  A. F. McQueen

Tommy's Gap Copper Prospect, N.T.

Introduction

This memorandum supplements G. W. Patterson's (1964) memorandum relating to the above prospect.

A. F. McQueen and B. T. Johnson examined the prospect during the period March 16th. to 18th., 1965, the objectives being to make a plan showing the distribution of mineralisation, to take drainage samples, if appropriate, to determine extension of the prospect, and to plan the layout of a proposed induced polarisation survey. A map of the prospect is attached as Plate 1.

Location and Access

The main copper prospect is 64 miles by road from Alice Springs and the area is covered by R.A.A.F. aerial photograph No. 5144, run 9, Alice Springs sheet. Transport consisted of one S.W.B. Landrover
hired from Drive Yourself Landrover's Pty. Limited, Alice Springs, and accommodation in the field was obtained at the Ross River Tourist Camp, 14 miles from the prospect area.

**Geology**

The regional geological setting of the prospect is illustrated in Plate 2, which is an extract of the latest mapping of the Alice Springs 4 mile sheet by the Bureau of Mineral Resources.

An east-west trending inlier of Archaean Arunta Complex about 23 miles long and five miles wide, forms the core of a large anticlinal fold, erosion of which has exposed Upper Proterozoic Keanite Quartzite in a steeply dipping to overturned attitude, entirely surrounding the core. The fold has been complicated by strike and cross faulting.

The Tommy's Gap copper prospect occurs at the extreme south west margin of the exposed Arunta Complex. At this location, the complex is comprised principally of chlorite and sericite schist. Quartz dykes are common, and intrusions of aplite, amphibolite diorite and granite porphyry occur with random orientation. Jasper is common. The granite porphyry, which occurs at the eastern end of the mineralised zone, persists for some distance to the east of Tommy's Gap.

Although not mapped, an alignment of isolated outcrops of metamorphosed limestone trending slightly north of west was noted north of the mineralised zone. This regular alignment, compared with the random orientation of other geological components in the area, leads to the possibility that this carbonate rock is a faulted-in slice of the Upper Proterozoic Bitter Springs Limestone, outcrops of which occur both to the north and south of the prospect. However, thin bands of marble have been reported in other parts of the Arunta Complex, and it is possible that the marble occurring at Tommy's Gap is part of the original complex. It is of interest to note that two rare occurrences of sulphide mineralisation occur in or closely associated with this carbonate rock in the prospect area.
Mineralisation

The nature of the mineralisation has already been described by Patterson, but mapping of the prospect indicates that the mineralisation is confined to a roughly semi-annular zone, concave to the north, and terminating approximately at the line of east-west trending carbonate rock outcrops described above. This is illustrated in Plate 1.

However, there are gaps in this general zone, and for calculation of ore tonnages, two separate areas have been selected. The principal area, to the east, has an abundance of mineralised localities over an area a little less than ten acres, calculated to be 35,000 tons/foot. In the western area mineralisation is sparse, but a general area including these localities could contain 22,000 tons/foot. Total ore, therefore is of the order of 57,000 tons/foot.

Apart from the association of mineralisation with ferruginous quartz dykes, it is noted that mineralisation does not appear to be intimately associated with the intrusive rocks.

Mr. Mick MacIntyre states that a parcel of five tons of ore taken from the richest prospect, and submitted to Port Kembla in 1964, yielded the following:-

Cu +11%
Au 2-3 dwt/ton
Ag 1 oz./ton

A second parcel of two tons of ore yielded 30% Cu.

Stream Sampling

There is little scope for stream sampling to determine ore extensions. To the north there is still drainage off the known mineralised area, and beyond this drainage area lie the Bitter Springs Limestone and Heavitree Quartzite. Samples taken to determine whether copper mineralisation extends to these rocks contained insignificant copper values.
References


Patterson, C.W., 1964  McIntyre Copper Prospect, Tommy’s Gap, Alice Springs, N.T. Memo of 21st October to C. L. Knight
Memorandum to: EXPLORATION MANAGER
from: G. W. Patterson
Attention: C. L. KNIGHT, ESQ.

TOMMY'S GAP COPPER PROSPECT, ALICE SPRINGS

On 9th. and 10th. May, on instructions from Mr. H. E. Jensen, I visited Tommy's Gap prospect after a discussion in Alice Springs with Mr. C. L. Knight.

Geochemical soil samples taken by A. F. McQueen and E. Muceniekas (preliminary plan attached) had shown only a small area of plus 500 p.p.m. copper, but some I.P. anomalies had been reported in the northern part of the area by geophysicist in charge T. Johnson. These anomalies were interpreted by C. L. Knight as having been caused by ferruginous beds containing some fresh pyrite in aplite. Mr. Knight suggested that the writer should map these beds, the position of which could be readily obtained by using the geophysical grid.

The ferruginous beds (shown in yellow on attached plan) were seen to occupy a northwesterly trending zone fairly closely corresponding to the zone of I.P. anomalies. The beds vary in composition from a quartzite to an aplite and are frequently gossanous. Lenses of dense limonite occur in places. Fine pyrite is visible at several localities in quartzite and aplite. There is a possibility that the iron rich rock is at least partly intrusive, although the apparent transgressive trend on line 6 could also be due to folding. Dips appear to be generally to the south, with a very flat dip (about 20°) at the western end.

The geochemical grid did not extend over the ferruginous zone except at the eastern end. However there has been no evidence of copper mineralization on any of the ironstone outcrops, and the only sulphide observed has been pyrite. It is therefore almost certain that the I.P. anomalies are due to pyrite. Since the anomalies are in no way related to the geochemical highs or known copper occurrences, (with the possible exception of some peaks at the eastern end of the copper zone), there is no reason for further expenditure on this prospect.

G. W. Patterson
May 12, 1965.

Memorandum to: E. McCarthy, ESQ.

from: B. T. Johnson.

Tommy's Gap Option

Induced Polarisation Survey

General

A local prospector discovered an extensive, but mostly low-grade, copper gossan and staining some sixty-five miles east of Alice Springs near Tommy's Gap, a gap through a high-standing ridge of the Heavitree Quartzite. Subsequently, a C.R.A. geologist examined the prospect and suggested that an Induced Polarisation survey be performed over the area to determine whether appreciable sulphide mineralisation underlay the surface showing. These notes pertain to that survey.

Area Covered

Six traverses were run in the area, four trending N 25° E, beginning at the base of the Heavitree Quartzite, running northerly over the gossan and continuing over the Archean complex. These were designated Lines 3, 4, 5, and 7. These Lines extended some 3,000 feet northward. Line 6 was run through a gap in the Heavitree formation and about 1,000 feet in a southerly direction from the base of the quartzite. In the northerly direction Line 6 extended some 3,600 feet from the base of the quartzite.

Lines 3, 4, 5, 6, and 7 are spaced 400 feet apart, as shown on attached Plan N. T. 127.

In addition, a traverse was run in the direction S 65° E, past an outcrop of rich copper carbonates at the eastern end of the mineralisation. This traverse is about 1,200 feet long.

An electrode separation of 400 feet was primarily used. In addition, anomalous zones were traversed using a 200 - foot separation.

Lines 4 and 6 were traversed using an electrode separation of 800 feet as well. Some traversing using a 100 - foot separation was performed on Line 6.

In all cases except that of the 800 - foot separation, the interval between reading points was 100 feet. In the latter case the interval was 200 feet.
Grid System

Reference point for the grid is a cairn set at the base of the Heavitree quartzite, in a narrow gap in the ridge. This cairn is on the western edge of the track leading into the area.

A peg was set 30 feet from this cairn in the direction S 65° E and designated Peg 12S, Line 6. Line 6 was surveyed in to the Base Line, 1,200 feet bearing N 25° E from the peg described above. Nine Baseline Pegs were set at intervals of 400 feet on a line bearing S 65° E. These pegs were numbered 0 through to 8. Traverse Lines were then pegged bearing N 25° E and S 25° W from Baseline pegs 3, 4, 5, 6, and 7. In addition, pegs were set every 100 feet along the baseline from Peg 5 to Peg 1. This line was chosen to run past the zone of high carbonate content described above.

Interval between grid line pegs is 100 feet. Pegs south of the baseline were designated by the letter S, e.g. 12S; Pegs north of the baseline were similarly designated using the letter N.

Extent of the lines are as follows:-

<table>
<thead>
<tr>
<th>Line</th>
<th>From</th>
<th>To</th>
</tr>
</thead>
<tbody>
<tr>
<td>7</td>
<td>7S</td>
<td>15N</td>
</tr>
<tr>
<td>6</td>
<td>23S</td>
<td>25N</td>
</tr>
<tr>
<td>5</td>
<td>13S</td>
<td>15N</td>
</tr>
<tr>
<td>4</td>
<td>13S</td>
<td>15N</td>
</tr>
<tr>
<td>3</td>
<td>10S</td>
<td>15N</td>
</tr>
</tbody>
</table>

In some cases I. P. traversing was extended beyond these limits.

Results and Interpretation

The results of the geophysical survey are shown in profile form on the attached plans; N. T. 131, N. T. 132, N. T. 133, N. T. 134, Plans N. T. 133 and N. T. 134 show profiles of the Induced Polarisation effect in terms of chargeability and measured in milliseconds. Plans N. T. 131 and N. T. 132 show the apparent resistivities measured in ohm/meters. The chargeabilities and resistivities are combined to give figures of Static Capacities which are shown in profile form on Plans N. T. 133 and N. T. 134.

Chargeability Background Level in the area is low; between 2. 2 and 2. 5 millisecc. In all cases chargeabilities over the copper stainings barely exceeded background level.

The profiles on Line 6 to the south suggest that the copper mineralisation may extend to the south underneath the Heavitree formation, but hold out little hope of an improvement in grade.
An anomaly exists to the north of the stainings and trends similarly to them. The maximum chargeability of 14.7 millisecond was obtained on Line 5, at Peg 5N with the 200-foot electrode separation. The anomaly appears on all North-South lines, peaking (for the 200-foot electrode separation) as follows:

<table>
<thead>
<tr>
<th>Line</th>
<th>Peak</th>
</tr>
</thead>
<tbody>
<tr>
<td>7</td>
<td>12N</td>
</tr>
<tr>
<td>6</td>
<td>10N</td>
</tr>
<tr>
<td>5</td>
<td>5N</td>
</tr>
<tr>
<td>4</td>
<td>5N</td>
</tr>
<tr>
<td>3</td>
<td>7N</td>
</tr>
</tbody>
</table>

The anomaly is somewhat complex, showing two distinct peaks. Only the highest is listed above to show the trend. Character of the anomaly is reasonably uniform on all lines except Line 3.

This anomaly is most likely caused by disseminated pyrites. A ridge of this material can be seen conforming to the above peaks rather well.

Preliminary evaluation seems to indicate that this horizon stands vertically. Depth extent may not be great.

Broad anomalies on the traverses using an electrode separation of 800 feet may be seen to the north of this pyritic zone. These are thought to be caused by the same pyrites. This effect is a well-known occurrence that appears when long electrode separations are used in traversing narrow bands of disseminated conductors.

This interpretation is substantiated by the higher anomalies of the shorter electrode separations, also indicating narrowness of the pyrite horizon. On the longitudinal Baseline traverse there occurs an anomaly peaking at Peg 12 (halfway between Baseline Pegs 1 and 2), of 9.7 millisecond maximum on the 200-foot electrode separation. This anomaly is again complex. The peak is thought not to be related to the rich carbonate zone that occurs some 350 feet to the west of the peak. Evidence of pyrites has been found in this area as well.

Resistivities are high in the whole area and are quite erratic, implying structural complexity. There seems to be little relationship between the chargeability anomalies and the resistivity, supporting the interpretation of the chargeability anomalies as being caused by disseminated pyrites.

One small zone of resistivities under 100 ohm-meters is the southern end of Line 6. This traverse runs along a creek bed. Possibly the low readings indicate the presence of saline ground water.

The Heavitree Quartzite ridge, because of its high resistivity, appears rather clearly in the resistivity data.
Conclusion

The Induced Polarisation survey of the Tommy's Gap prospect has given no indication of the existence of economic sulphide mineralisation within 500 feet of the surface. Interpretation is complicated by the presence of pyrites in the area, but careful study of the data still leads to the above conclusion.

(signed) B. T. Johnson