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BRIEF REPORT ON
GIBBET AREA

By

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TENNANT CREEK

16th January, 1959.
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ACCOMPANYING MAP

Gibbet Area  Geological Plan.

Scale 1000' = 1''

Prospects

Wheal Doria
Big Ben
Anomaly WPA No.1
No. 3  TC
No. 4  12&12A ?
No. 5  Bull 44 P1 5 Sh2 (？)

West Gibbet
INTRODUCTION.

The West Gibbet anomaly was indicated by the aerial magnetic survey. It was located on the ground, pegged and fully surveyed with a geophysical grid and systematic observations.

An excellent anomaly was revealed indicating an appreciable tonnage of magnetite rock but unfortunately the anomaly is situated about 2½ miles west of the Gibbet hills in an area of no outcrop.

The following brief report considers the Gibbet area as a whole with a view to determining the most likely structure controlling the mineralisation at West Gibbet and to examine other potential in the area.
SUMMARY.

1. It is not possible to determine beyond doubt that the structure localising the indicated mineralisation at West Gibbet is a diagenetic slump breccia but this is the most probable localising control for the magnetite body.

2. Of the seven major ironstone outcrops occurring in the Gibbet area, five have definite evidence indicating that they are slump breccia replacement, one is apparently a slump breccia replacement and one shows no conclusive evidence of replacing a slump breccia, but this is still possible in the absence of evidence that this last body is an emplacement on a fault.

3. The West Gibbet anomaly has its long axis in accord with the strike of the sediments as far as it can be determined. This would be necessary if the mineralisation is to be localised by a slump structure.

4. The outcrop area examined has a consistent east-west strike trend which would place it approximately at the same stratigraphic horizon as the West Gibbet anomaly.

5. The sediments in the Gibbet area dip northwards. They show abundant evidence of both large and small scale diagenetic activity.

6. There are two other very interesting possibilities for ore in the Gibbet area:
   1. The Big Ben – Wheal Poria contact structure.
   2. The A.G.G.B.N.A. No.5 anomaly
7. The Big Ben - Wheal Doria structure is regarded favourably but it must be realised that it is one of several such gold bearing structures which may warrant further testing. Because of the detailed geophysical and geological work, including the diamond drilling which has been done, much more is known about this prospect than any of the others. However it is not necessarily the best of those meriting further investigation.
CONCLUSIONS.

The drilling of the West Gibbet anomaly is well advised at this stage and the results, whether ore is discovered or not, will be of considerable value in immediate future testing.

It is concluded that three of the anomalies on the Wheal Doria – Big Ben contact structure have a very good chance for ore and a potential which although not large for a copper deposit could be attractive for gold if any considerable length of the structure is auriferous.

RECOMMENDATIONS.

No further work on the area is necessary pending the result of West Gibbet drilling but irrespective of the outcome of this work the other indicated possibilities in the Gibbet area should receive attention in accord with their comparative merit as the work on the field proceeds.

It is recommended that at the appropriate time options be taken over the anomalies on the Wheal Doria line.
GENERAL GEOLOGY.

The Gibbet area and the West Gibbet prospect occur in a shale or fine grained belt of Warramunga sediments as opposed to the coarse greywacke sequences. Further study of the Warramungas is apparently revealing that the alternating "belts" of the narrow bedded fine grained greywackes and shales with the coarse greywacke series is not very distinct. Fine sediments which include a recently discovered chert or fine grained siliceous rock are interbedded with the wide coarse greywackes or "porphyroid" rocks.

The Gibbet belt of shales and fine greywacke is bounded to the north by the "Aerodrome Porphyries" which are simply a series of coarse recrystallised greywackes. It is suspected that a southern belt of coarse greywackes extends westwards from the outcrops at south Pinnacles. This may adjoin the Gibbet area including the West Gibbet anomaly immediately to the south. However no outcrop of the coarse porphyry rocks has yet been found in the bull-dust plain immediately to the south of the West Gibbet.

The extent of diagenetic activity in the fine grained sediments in the Gibbet area is very impressive. There are a number of slumps, folds etc, which extend in themselves up to several hundred feet. Most of the disturbances are mineralised to some degree by the later mineralisation and all are strongly cleaved, recontorted and faulted by the later tectonic movements.

The locality in general appears to be favourable for the occurrence of orebodies.
FUTURE PROSPECTS IN THE GIBBET AREA.

The two outstanding features requiring further attention in the Gibbet area are the A.G.G.S.N.A. No.5 anomaly and the Wheal Doria - Big Ben contact structure.

**Wheal Doria - Big Ben Contact Structure.**

In order to justify further attention to this structure we must have a valid explanation of why the previous testing failed and be confident of a better understanding on which to base future work.

The Wheal Doria which has been worked as a prospect since the earliest days of the field was also one of the first prospects to get detailed testing by diamond drilling. One vertical hole was drilled almost into one of the anomalies on the "Wheal Doria - Big Ben structure by A.G.G.S.N.A. in 1936 and six were drilled under the Wheal Doria workings by Northern Mines Development in 1955.

The first hole of the Northern Mines pattern got 108.9 dwts from 296' - 300' and 18.5 dwts from 300' - 307' as the only significant assays. They then immediately drilled an extent pattern similar to the one used around the discovery hole at Orlando spacing the subsequent intersections 60 ft. from the first. Both "wing" holes and three holes 60 ft. further down dip in relation to higher row were negative.

However the deeper intersections were at 330 ft. vertical depth and the presence of manganese is recorded in the logs with the same sort of low widespread gold assays as were encountered in Orlando Hole 3.
It is not by any means to be inferred that the Wheal Doria could match the Orlando but gold ore of workable grade could have existed on this structure being generally leached with occasional erratic pockets of enriched material left in the oxidised zone.

It is not suggested that the Wheal Doria prospect as such could be looked at further but the structure which is now understood to be a contact between the "porphyry" or coarse recrystallised greywacke and the underlying shales is over 2,500 ft. long. It is mineralised with gold, abundant hematite, manganese, secondary silica, chlorite, chrysocolla, malachite and azurite. Minor gold workings, pits and shafts etc. have been put in along its length and a sample of superferous dump material from one of these assayed 14% copper.

Whilst essentially a contact between the coarse grey-wackes and the underlying silts there is apparently some later tectonic movement on the structure as is the case at Orlando and the magnetic survey indicates three primary magnetite bodies localised on it. One of these (the No. 1 anomaly) has had a partial test as the A.G.S.N.A. vertical drill hole penetrated to 448 ft. and the body is supposedly centred at 535 ft. The core log of this hole records a little magnetite 167' to 183' but no deep magnetite such that the anomaly is accounted for. The other anomaly bodies (Nos. 3 and 4) are 590 ft. and 730 ft. deep respectively and located almost beneath a series of large mineralised slump structures at the outcrop.

On our present knowledge of the field and its mineralisation these bodies offer a good chance for ore. The anomaly bodies are probably small but the whole structure could have reasonable gold values on it. Further testing as soon as there is opportunity would seem to be appropriate.
GIBBET No. 5 ANOMALY.

The Gibbet No. 5 anomaly is in an area in which several large slumps outcrop. The indicated magnetite mineralisation could well be in one of these. However the anomaly has a complex form and the depth to the indicated body is not easily determinable.

This anomaly and its ore potential should not be forgotten but it should receive attention in proper comparison with other anomalies of the field.

TENNANT CREEK,
16th January, 1959

JOHN KLLISTON,
Chief Geologist.

T. S. Wilson, Esq.,
Secretary,
The Princess Royal Gold Mining Company No Liability,
ADELAIDE.

Dear Sir,

Pursuant to your request I have made an examination of surface and underground workings where accessible of the Black Angel and White Devil Leases. These mines are situated approximately 25 miles W.N.W. of Tennant Creek Post Office.

LEASES: There are four leases in the area under review and comprise the following:

<table>
<thead>
<tr>
<th>Lease</th>
<th>No.</th>
<th>Area</th>
<th>Acres</th>
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</thead>
<tbody>
<tr>
<td>Black Angel</td>
<td>29E</td>
<td>20</td>
<td></td>
</tr>
<tr>
<td>Black Angel Extended</td>
<td>30E</td>
<td>20</td>
<td></td>
</tr>
<tr>
<td>White Devil West</td>
<td>12E</td>
<td>10</td>
<td></td>
</tr>
<tr>
<td>White Devil East</td>
<td>13E</td>
<td>10</td>
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</tr>
</tbody>
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WATER SUPPLY: A bore situated to the north of the mine is reported by test to have a flow of 12000 gallons per 24 hours which would be sufficient for a milling capacity of 40 tons per 24 hours. Fresh water for domestic purposes would have to be carted from Tennant Creek at a cost of £6 per 1000 gallons.

PREVIOUS PRODUCTION. The Black Angel Mine has been operated by gouging the known shoot of ore and practically no systematic mining has been carried out. Approximately 6671 tons of ore have been treated at the Government Battery for a return of 10:26 dwt's. per ton by amalgamation and 3 to 4 dwt's. per ton in tailings. Most of this ore has been extracted from a stope adjacent to No. 2 Shaft and open cuts, but this production cannot be taken as an average of the grade of ore remaining in situ as this can only be ascertained by systematic sampling and exploration. The White Devil lease has produced 378 tons of ore from an open cut adjacent to No. 9 Shaft which is 50 ft. deep and situated at the end of the most westerly Haematite outcrop on the lease, the head value being stated to be 10:6 dwt's. per ton.

BLACK ANGEL WORKINGS: No. 1 Shaft which is the most western shaft has been sunk to a depth of 180 ft. Crosscutting has been carried out for approximately 20 ft. south and 10 ft. north and a drive from shaft about 10 ft. east, but no values are reported. This shaft is approximately 90 ft. from No. 2 Anomaly peg which the Geophysical Survey indicates as the position of a Haematite lens at approximately 200 ft. from surface. It is recommended that the shaft should be deepened to 220 ft. and a crosscut put out in a N.W. direction for 100 ft. toward No. 1 Anomaly to ascertain if the concealed Haematite Mass is associated with favourable lode material vide report of the Aerial Geologic and Geophysical Survey of Northern Australian made in 1936.

NO. 2 SHAFT. This shaft is the principal working shaft on the property and has recently been deepened to the 150 ft. horizon but workings are above 103 ft. level and consist of a crosscut 24 ft. north of shaft and 45 ft. south of shaft and driving has been carried out 45 ft. east and 55 ft. west from the crosscut, and values have been obtained in a winze 28 ft. below the horizon. Stoping has been carried out at 67 ft. level from which 5000 tons of ore have been gouged for an average value of 12:7 dwt's. per ton. From information available it would appear that higher values were obtained from the favourable bedding planes which have built up the average grade to 12:7 dwt's. per ton as the remaining values in the extremities of the stope out area said to vary from 4 dwt's. to 9 dwt's. per ton.
from shaft previous sampling gave an average value of 8.5 dwts. p. ton over a length of approximately 25 ft. and in south crosscut a distance of 15 ft. from shaft samples averaged 2.3 dwts. per ton.

NO. 3 SHAFT. This is approximately 60 ft. S.E. of No. 2 Shaft and been sunk to a depth of 70 ft. At 50 ft. level an inclined stope N.W. gave assays as high as 29 dwts. per ton in small shoot slightly south of the main ore shoot worked from No. 2 shaft. Wide Inspector of Mines' plan 30/5/49.

NO. 6 SHAFT. No. 6 shaft is approximately 280 ft. east of No. 5 Shaft and has recently been sunk to 100 ft. horizon. At 54 ft. level a drive has been extended for 160 ft. west. Samples taken over the whole length showing traces of gold, but at west face of drive is reported to show 3 dwts. gold per ton, and the drive 40 ft. east of shaft under open cut gave negative results. At approximately 40 ft. east of No. 6 shaft a small open cut is said to have produced recently 1000 tons of ore averaging 10 dwts. per ton. It is recommended that several crossovers should be put out North from the drive on 54 ft. level to intersect the main shear zone as present drive appears to be too far south of fault line.

WHITE DEVIL LEASES. The White Devil Leases are conspicuous with the large haematite outcrops, the most eastern has a dimension of 300 ft. long by 8 ft. average width, but the eastern end is considerably larger dimension of 160 ft. by 20 ft. in width, the central outcrop 400 ft. long by 50 ft. wide and the western outcrop being 300' x 60' at Eastern end tapering off to about 15 ft. at the western end. No. 1 Anomaly peg is situated at N.W. end of the central outcrop and an excerpt from the Aerial Geological & Geophysical Survey of Northern Australia of 1936 states:

"No. 1 Anomaly (White Devil) of 8000 gammas is the strongest discovered at Tennant Creek. It indicates a large elongate body of ironstone probably coming to within 100 ft. of the surface, but giving no geological evidence of its presence. Within the immediate vicinity of the anomaly there are outcropping bodies of dense fine grained haematite with very little quartz noticeable."

"No. 2 Anomaly (Black Angel) of 5000 gammas is also elongated and is on the Western extension of the axis of the No. 1 Anomaly. The axis of the Anomalies is parallel and not far distant from the line of outcropping ironstone in the vicinity. The body responsible probably comes to within 200 ft. of the surface."

"It is considered that the survey results on this area are extremely important as they reveal possibilities of ironstone bodies at sufficient depth to make the area a likely proposition for major operations."

The only workings of any magnitude in Haematite and Quartz carried out by the original prospectors are situated at No. 9 shaft which is 40 ft. to 50 ft. deep, at this horizon driving has been carried out for 27 ft. east and 15 ft. west, the width worked being 7 ft. Production from this shaft and open cut is said to have been 372 tons for an average head value of 10.6 dwts. per ton (vide Inspector of Mines Report 30/5/49) and at 40 ft. east of No. 9 shaft a pot hole 20' x 6' x 4' is reported to value 3.2 dwts. to 8 dwts. per ton.

There are numerous small shafts and potholes sunk principally on the southern side of the hematite outcrops in mudstone which are said to have shown good prospects, but no systematic surface exploration has been undertaken.
has been sunk to a depth of 12 ft. which is said to have produced specimen stone, but as no exploratory work has been undertaken in this immediate area and no mullock dump is remaining it would appear that 20 to 30 tons of material has been sent to the Battery for a return of 10 ozs. per ton. It is quite possible that this gold came from some extraneous source.

WHITE DEVIL: RECOMMENDATION. In view of the importance of the statement made by the Aerial Geological and Geophysical Survey of Northern Australia, it is strong recommended that a shaft should be sunk at or near No. 1 Anomaly peg to a depth of 100 ft. and crosscutting undertaken for 50 ft. North and South from the horizon, in an endeavour to ascertain if favourable bedding planes exist in the locality. Systematic sampling of workings at No. 9 shaft should be undertaken and exploratory work carried out at greater depths east of No. 9 shaft in the mudstone bed south of the massive outcrops of hematite.

BLACK ANGEL: RECOMMENDATIONS: Sampling: The ore produced from the Black Angel has been obtained by the usual local method of gouging and little systematic mining has been undertaken. In order to get a clear picture of the gold occurrence it is recommended that in the first place a systematic campaign of sampling be undertaken in the present workings by taking 4 ft. x 4 in. channel cuts in all drives, crosscuts and stopes where accessible in order to estimate the ore still remaining in situ; at present it is impossible to calculate the positive or probable ore remaining without this work being undertaken. To carry out sampling satisfactorily it will be necessary to install a sample crusher to reduce all channel samples to minus 1/4" before the bulk sample is quartered down for assay. If this work is carried out conscientiously the values obtained should approximate (in a medium grade mine) very closely the results from milling bulk parcels of ore. If desired, a check on channel sampling can be made by milling at the Government Battery of ore from significant localities.

DEVELOPMENT: No. 1 Shaft should be deepened 40 ft. and a crosscut put out approximately 100 ft. in a north westerly direction to intercept the ironstone body as indicated by No. 2 Anomaly.
No. 2 Shaft should be sunk to 200 ft. horizon where later development should be carried out in north westerly direction to locate main shaft zone.
No. 6 Shaft. The area west of No. 6 shaft has not shown any significant values, but it is stated that loaming has given colour on surface and that the large costeens at western end of this section are reported to have shown values on the north end of costeens. Crosscutting north from west drive No. 6 shaft on 54 ft. horizon should be undertaken to locate main shear zone.

Although 6671 tons of ore has been mined for a recovery of 10.26 dwts. per ton by amalgamation and 3-4 dwts. per ton in tailings, this ore has been principally obtained by gouging adjacent to No. 2 shaft and there is no guarantee that further substantial tonnages are available until exhaustive development and prospecting work has been carried out.

Any ore developed and mined during this period can be realised as an offset against development expenditure, but until such time as payable positive ore can be blocked out the installation of the Company's own treatment plant is not justified. The proposition is essentially one for exploration and the development programme recommended will occupy a period of approximately 12 months and should be carried out for an expenditure not exceeding £10,000.

SUMMARY: The development of the Black Angel known ore bodies is warranted to prove their extension at depth and should be carried out as envisaged in this report.

Yours faithfully,

CHAS. E. BLACKETT (Consulting Mining Engineer)