COMMONWEALTH OF AUSTRALIA.

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**DEPARTMENT OF NATIONAL DEVELOPMENT.**

BUREAU OF MINERAL RESOURCES
GEOLOGY AND GEOPHYSICS.

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**RECORDS.**

Records 1953/17.

# PINNACLES COPPER MINE, STRANGWAYS RANGE.

by

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1953/17

# PINNACLES COPPER MINE

## STRANGWAYS RANGE

### INTRODUCTION.

The area was geologically investigated at the request of the Director of Mines, Alice Springs, by A.D.M. Bell and J. Firman. Mapping was by chain and compass traverse during periods 29th to 31st October, 1952; 4th to 6th November, 1952 and 19th December, 1952. Previous geological reconaissance was made by B. Thompson of the Enterprise Exploration Company in 1948.

### LOCATION AND ACCESS.

The Pinnacles Copper workings are N.E. of Alice Springs close to the Pinnacles Well Harts Range Road. The total distance by road from Alice Springs is 72 miles; 32 miles along the Stuart Highway North; thence 32 miles to Pinnacles well and 8 miles North from Pinnacles Well, the last 40 miles graded road being impassable after heavy rains.

### CLIMATE.

The climate is of the semi-arid type with an unreliable rainfall averaging 10 inches per annum. Conditions are comfortable except for the months of November to February when midday temperatures are frequently more than 100°.

### WATER SUPPLY.

Surface supplies occur only after heavy rain, and bore holes provide the only permanent supply. The Southern Cross bore near the workings gives 1,000 gallons per hour of water which is hard but suitable for human consumption. Another bore, North of the range yields over 3,000 gallons per hour of brackish water which is used in mining.

### TIMBER.

White gum, iron wood, blood wood and mulga are scattered throughout the area. Sufficient stands to meet the requirements of small scale mining occur within a few miles radius.

### HISTORY.

Gold was found in quartz veins in the last year of the 19th century, and the occurrence have been prospected at intermittent intervals. Copper was probably first worked by P. Ciccone in the 1940's. He opened several veins, trid simple jigging to concentrate the copper ore but ceased because of the difficulty of producing concentrate of a shipable grade.

C. Johannsen was granted a Temporary Mining Reservation of 10 square miles in July 1952, and now proposes to treat the ore with a portable crushing plant and table.

GENERAL GEOLOGY.

A wide area is occupied by folded metasediments of the Arunta series. Close to the copper workings the rocks are regionally metamorphised calcareous sediments, chiefly marble and hornfels. The metasediments are intruded by large masses of quartz and veins of quartz, pegmatite and schorl. In the immediate mine area shown on the geological plan, are metasediments with a general N.N.W. trend, general dip 50° to the East Marbles inter-bedded with thin bands of hornfels crop out in the West of the area and are overlain by a thick sequence of hornfels which form the high hills on eastern part of the map. Rock type is very variable and includes pure marble, grossular marble, and epidote hornfels. The pegmatite and quartz veins have been intruded in fractures generally parallel to the strike to the bedding planes of the metasediments.

GEOLOGICAL HISTORY.

1. Deposition of alternating calcareous and siliceous Strata.

2. Large scale compression and folding with the deformation of calcareous strata and minor folding.

3. Regional metamorphism with the formation of marbles, impure marbles and hornfels.

4. Fracturing and intrusion of acid rocks producing pegmatite schorl rocks and quartz blows and quartz veins.

5. Followed closely by injection of copper minerals into fractured quartz and limestone.

6. Period of Erosion.

STRUCTURAL GEOLOGY.

The structure plan shows the regional trend and folds of the area round the mine. The complex and irregular folding of this wide area is marked contrast to the more regular East-West trend of the MacDonnell and Harts Ranges. Detailed structures of the mining area show that the calcareous sediments yielded regularly to the regional stress and minor cross folds are common, individual bands of hornfels with schistose structure having been pinched into irregular lenses. The last phase of low stress fracture was accompanied by quartz injection and copper mineralisation. Most of the quartz copper veins occupy lenticular fractures closely parallel to the bedding. Copper mineralisation is more irregular where cross fracturing has occurred in the marbles. In such places dissemination of copper mineral through the marble occurs to a limited extent.

ECONOMIC GEOLOGY.

The mineralisation is of quartz-sulphate vein type and is porphyoy copper mineralisation. The copper minerals occur in fractured quartz veins which are found in either marble of hornfels. The thicker vein occurs in marble. Metasomatic replacement of the marble by quartz and copper minerals has occurred on a small scale. The intensity of copper mineralisation was insufficient to completely replace

ECONOMIC GEOLOGY- Continued.

the marble to any extent and copper minerals are found occuping the fracture of a width up to 20 feet wide.

These irregular zones are howeverm easily worked and may average up to 5% copper. Extracting is being limited to the widest quartz copper veins and to a few disseminated zones until the grade of the ore and the economics of the extraction have been proved satisfactory.

ORE RESERVES.

Calculations of Ore Reserves are hampered by the irregular nature of copper dissemination in the Marbles.

The following figures are estimates of the inferred reserves of the zones where shallow development has been carried out. It is planned to extract this low grade ore by open cut and ore reserves are therefore calculated for a vertical depth of 20 feet.

ZONE "A".

A thin vein of quartz-calcite-chalocite ore in a disseminated zone cuts a small spur at a flat angle. The vein has been followed on the underlay for 20 feet and laterally for 20 feet. Surface measurements indicate that the vein has a workable length of 80 feet. The vein averages 1 foot in thickness with disseminated copper ore in the walls.

Samples taken at different points assayed 15% Cu across 1'6" of vein and 21% Cu across 2'6" of vein. The ore can be hand picked to yield 25% - 30% material with 5% - 30% material with 5% - 8% rejects.

It is estimated that the zone would yield 100 tons of high grade ore and 200 tons of 5% mill ore.

ZONE "B".

An irregular zone of mineralised marble extends for 500 feet up a hillslope. The average width is approximately 20 feet. Three pits have been opened in this zone by Mr. K. Johannsen, and the grab samples from these workings assayed from 1% to 6.9% Cu.

Taking a figure of 14 cubic feet to the ton the zone contains 14,000 tons of material to a depth of 20 feet. To give a millable ore of 5% Cu content about 50% of this material may have to be discarded. Inferred ore reserves are therefore 7,000 tons of 5% Cu ore.

ZONE "C".

An irregular quartz-copper vein is exposed for several hundred feet below Zone "B". Chalcocite-malachite ore is disseminated both through the fractured quartz and the marble walls. Copper mineralisation is sufficiently rich over a length of 200 feet to merit extraction. The richest of this zone averages three feet in width and to a depth of 20 feet, reserves are 800 tons of 5% Cu ore.

ORE RESERVES- Continued.

ZONE "D".

This consists of an irregular quartz-copper vein previously worked by Mr. P. Ciccone. The mineable portion of the vein is 150 feet long and averages 5 feet wide. Reserves to 20 feet are estimated at 1000 tons. Two samples taken from this vein averaged 7.6% Cu.

SUMMARY.

Total estimated ore reserves from the four areas developed to date are :-

Shipping Grade - 20% Cu

100 tons in Zone "A" (20 tons of which has been shipped)

Milling Grade - 5% greater Cu

| | |
|---|---|
| Zone A | 200 tons |
| " B | 7,000 " |
| " C | 800 " |
| " D | 1,000 " |
| Total | 9,000 tons. |

If active development proves that these grades can be maintained, other zones would repay examination and Zone "B" and "D" could both be worked to greater depth.

ASSAY RESULTS.

| Location No on Map | Where Sampled | Sampler | Length of channel samples | Assay % Cu. |
|---|---|---|---|---|
| 2 | Across lode | A.D.M. Bell | 15 ins. | 21.1 |
| | " " | J.B. Firman | 18 ins | 13.0 |
| | Wall rock adjacent to lode | J.B. Firman | 12 ins. | 3.1 |
| 3 | Across face of bench | A.D.M. Bell | - | 2.8 |
| | " " | J.B. Firman | - | 6.9 |
| 4 | Across face of bench | J.B. Firman | - | 0.1 |
| 5 | Across face of bench | A.D.M. Bell | - | 5.8 |
| | " " | J.B. Firman | - | 1.0 |
| 6 | Across reef | J.B. Firman | 72 ins | 6.3 |
| | " " | J.B. Firman | 72 ins. | 9.0 |
| 7 | Across stringers near pit base | J.B. Firman | - | 6.4 |