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TITLE: REPORT ON THE EXPLORATION FOR
IRON ORES IN THE NORTH PILBARA BY
MT. GOLDSWORTHY MINING ASSOCIATES.

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DATE: 14th November, 1962.

C O N F I D E N T I A L .



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IN THE NORTH PILBARA BY MT. GOLDSWORTHY
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14th November, 1962.

SUMMARY

During the past six months Mount Goldsworthy Mining Associates have undertaken a vigorous programme of detailed investigation of the Mt. Goldsworthy ore bodies and continued their exploratory work in other Temporary Reserves in the Ord Range, at Yarrie and at Strelley Gorge and Abydos.

At Mt. Goldsworthy drilling has proved the presence of a large additional ore body south of, and trending roughly parallel with the main lens. This ore body substantially increases the reserves.

The main ore lens (No.1) has been explored by two adits and numerous diamond and percussion drill holes. Sufficient data now exists for the accurate computation of indicated ore reserves. Of these a large proportion may be regarded as proven ore.

Total indicated and inferred reserves at Mt. Goldsworthy now amount to 58,080,000 tons of ore of grade exceeding 60 per cent iron with an additional 8,040,000 tons of ore of grade between 54 and 60 per cent. Of this tonnage 42,830,000 may be regarded as indicated ore and 23,290,000 as inferred ore. If the structural interpretation of the company geologists is correct there is every likelihood that these figures will be greatly increased.

Regional exploration in the Ord Range, situated about midway between Port Hedland and Mt. Goldsworthy, has revealed the presence of several more iron ore bodies which are favourably located in relation to the proposed railway to Depuch Island. This area is at present being drilled and inferred reserves are estimated at 60,140,000 tons.

Several important ore bodies have been located in the eastern block of Temporary Reserves near Yarrie Station on the De Grey River. These have been surface mapped and sampled but no drilling has taken place as yet. Inferred reserves in this area are estimated at 31,790,000 tons.

In the southern group of Temporary Reserves two hematite-goethite ore bodies have been found near Strelley Gorge and there is a distinct possibility that more may exist. Inferred reserves of 16,000,000 tons are available in this area.

There are numerous bodies of limonitic sedimentary ore of lower grade within the Temporary Reserves held by the company. These have been mapped and sampled by the Geological Survey and the total ore tonnage amounts to nearly 10,000,000.

The exploratory work of the company has established indicated and inferred ore reserves totalling 194,795,000 tons of which 44,180,000 tons can be regarded as indicated ore. The figures for the indicated ore can be regarded as conservative.

Although this iron ore field is small in comparison with the vast iron ore deposits of the Hamersley and Ophthalmia Ranges, it is nevertheless of considerable importance by virtue of its proximity to the coast, the high quality of much of the ore and the convenient grouping of the deposits which can greatly reduce mining, transportation and servicing costs. The existence of large reserves of highest grade ore in the Mt. Goldsworthy block would permit the concurrent exploitation of lower grade zones and the production of a blended product of suitable grade for shipment and sale.

INTRODUCTION

An examination of the Temporary Reserves for iron ore held by Mt. Goldsworthy Mining Associates was made by the writer between October 15th and October 18th, 1962. The iron ore deposits at Mt. Goldsworthy, the Ord Range and Yarrrie were examined on the ground, and other areas, notably Strelley Gorge, Lalla Rookh and Abydos were seen from the air by charter flight arranged by the Company. Plans showing the progress of exploration and assessment have been provided and a comprehensive picture of the Company's activities and development plans has been gained.

MT. GOLDSWORTHY

Since the tender for the development of the Mt. Goldsworthy ore bodies was granted to this Company earlier in the year, a vigorous and competent programme of detailed geological mapping and sub-surface exploration of the ore bodies has been conducted. Three adits have been driven into the ore bodies in addition to numerous deep diamond drill holes and shallower percussion holes. The initial drilling by the Mines Department has proved of considerable value to the Company in the assessment of reserves.

Surface mapping and drilling at Mt. Goldsworthy have revealed the presence of five ore bodies. The ore zone lies within a west plunging syncline of which the northern limb has been partly sheared out and attenuated by a east-west trending fault. The main ore lens (No. 1) is developed by replacement of the sheared jaspilite and shaly meta-sediments forming the southern limb of the faulted syncline.

No. 1 Ore Body has received the most attention. It has been explored with two adits and numerous diamond drill holes. Indicated reserves are estimated at 31,710,000 tons of hematite with an average grade of 65 per cent iron. In their computations the Company have used a conversion factor

of 10 cu. ft. per ton of ore. In view of the dense, high-grade nature of the ore this figure is considered to be conservative and the reserves could be 15 to 20 per cent greater than the figures quoted. There are further inferred reserves of 10,130,000 tons for the main ore lens.

No. 2 Ore Body lies at the extreme western end of the Goldsworthy structure and, like the main ore lens, has probably been localized by the main east-west fault. This ore body occupies the uppermost stratigraphic horizon. The body has been cut in depth by a diamond^{drill}/hole, and a percussion drilling programme is now in progress. Reserves of indicated ore amount to 110,000 tons with a further 3,610,000 tons of inferred ore. There are extensive outcrops of beneficiable ore of lower grade in this section of the structure which are worthy of closer examination. The iron formation is intensely brecciated near the western end of the structure close to the main fault zone. In view of this structural similarity to the main lens the possibility of 'blind' ore bodies in depth must be considered.

No. 3 Ore Body lies at a lower stratigraphic level than the main lens and appears at the surface as an extensive zone of hematite-goethite crust ore south of and parallel with No. 1 lens on the southern limb of the syncline. At the present time a deep diamond drilling programme is in progress to fully delineate the sub-surface extent of this ore body and to prove the continuation of ore down the plunge along the keel and southern limb of the syncline. If this ore body continues to the same depth as No. 1 lens the ore reserves would be greatly increased. From drilling results on hand, indicated reserves of 9,880,000 tons of average grade 60.7 per cent iron have been computed with further inferred reserves of 6,360,000 tons. An adit (No. 3) is being driven to intersect the ore body near its eastern end. The structural interpretation of the Company geologists appears

to be valid, and in the writer's view there is every likelihood that No. 3 Ore Body may well prove to be the most important of the field.

No. 4 Ore Body lies at the extreme eastern end of the structure and represents the lowest stratigraphic horizon. This zone has not yet been investigated in depth and 790,000 tons have been inferred from surface examination.

No. 5 Ore Body is situated at the western end of No. 3 and probably represents a continuation of this body through a zone much disturbed by cross-faulting. Most of the surface exposures of the ore are rich in goethite of grade averaging 54 per cent iron. Indicated ore reserves amount to 1,130,000 tons with an additional 2,400,000 tons of inferred ore.

The writer agrees with the structural interpretation and the mode of computation of ore reserves quoted by the Company for these deposits. Further drilling results are more likely to increase than decrease the quoted reserves.

ORD RANGE

Regional exploration by the Company geologists disclosed the presence of several hematite ore bodies in the Ord Range. This is situated about midway between Port Hedland and Mt. Goldsworthy, and close to the line of the proposed railway from Mt. Goldsworthy to Depuch Island. These ore bodies are in two groups on the northern and southern limbs of a large open synclinal fold in Archaean jaspilites.

The northern group is referred to as the Ridley ore bodies. There are four zones of hematization in the jaspilite close to the old Tertiary land surface, and these appear to have originated by selective leaching of silica from the jaspilite. Ridley No. 1 is the most extensive and drilling is in progress at the moment. On the assumption that the ore extends to an average depth of 50 feet, 9,190,000 tons of ore have been

inferred. At the time of my visit six percussion holes had been drilled and the average depth of ore was 58 feet. The base of the ore is probably highly irregular and there are numerous 'horses' of unaltered jaspilite within the ore zone. This deposit is similar in origin to the hematite deposits in the Proterozoic jaspilites of the Hamersley Range. Total inferred reserves for the Ridley group are of the order of 15,000,000 tons.

Extensive zones of superficial hematization likewise appear in the jaspilites on the southern limb of the fold. These are referred to as the Ord ore bodies. A lens of high-grade massive hematite has formed along a fault plane in this zone. Outcrops are rare on the old surface and there are extensive flat areas masked with platy hematite scree. Without drilling it is impossible to gauge the full extent of the ore zones. Reserves of 45,000,000 tons are quoted for this area. This may be rather optimistic but even if the total were halved the ore potential would still be substantial.

The Ord Range offers interesting possibilities for the existence of large and easily mineable ore bodies and the Company plan to explore it thoroughly. The favourable position in relation to the proposed railway is an added inducement.

THE EASTERN RESERVES

Several ore bodies have been found by the Company in the Temporary Reserves near Yarrrie (T.R's 2059H, 2061H, 2329H, 2330H and 2331H). Of these the most important is the Cattle Gorge deposit which, like the Ord Range deposits, has developed as a result of supergene leaching and enrichment of jaspilite beneath the old erosion surface. This surface is well preserved in the Yarrrie district and can be followed from the Archaean rocks across to the Mesozoic sediments to the east and north.

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The Cattle Gorge deposit has a surface area of about 2,500,000 square feet and grab samples assayed between 62.8 and 64.8 per cent iron with hematite as the main ore mineral. Inferred reserves are 7,500,000 tons for an average depth of 30 feet and 12,500,000 tons for a depth of 50 feet. In the author's opinion the former figure is the more probable.

Another ore body in the same district is situated on T.R. 2330H, about 3.1/2 miles north-west of Shay Gap. This is a lens of massive hematite which can be followed on the surface for 3,000 feet with an average width ranging between 75 and 130 feet. The ore is high-grade massive hematite. Inferred tonnage to a depth of 100 feet is 3,644,000 and 7,288,000 tons to a depth of 200 feet. Smaller hematite lenses exist nearby.

Conglomeratic ores derived by the erosion of hematite ore bodies or by the supergene up-grading of jaspilitic detritus are common in the district. One of these on T.R. 2331H is 30 feet thick and assays at 64 per cent iron. Other conglomerates are of lower grade. If the ore bodies of this area were developed and mined the conglomeratic ores would certainly provide a useful additional reserve. Inferred reserves of this type of ore amount to 12,000,000 tons.

THE SOUTHERN RESERVES

The most important iron ore deposit in the southern block of Temporary Reserves occurs about a mile east of Strelley Gorge on the crest of a range composed mainly of Archaean jaspilite. This deposit has originated as a result of supergene leaching of the jaspilite and at the surface measures 3,400 feet by 400 feet. The ore is relatively rich in goethite and assays at about 61 per cent iron. Assuming a depth of 50 feet for the ore inferred reserves amount to 6,800,000 tons.

Extensive areas of the old land surface are well preserved in the plateau country south of Strelley Gorge. Exploration of this area is at present in progress and another orebody has been located with inferred reserves of 10,000,000 tons. These deposits are similar to those in the jaspilites of the Hamersley Range and there appears a strong likelihood that more ore zones will be found in this district.

The lower-grade, sedimentary limonitic ores of Lalla Rookh, Pincunah and Abydos lie within the southern group of Temporary Reserves held by the Company. These have been sampled by the Geological Survey.

Total inferred reserves for the southern deposits amount to 26,520,000 tons.

CONCLUSION

The investigations of this Company have established the existence of an important iron ore field in the northern Pilbara. The main development activities have been centred on Mt. Goldsworthy, where it is apparent that the total ore reserves are much greater than was initially assessed. The discovery of the favourably located ore bodies in the Ord Range provides a useful ancilliary to the Goldsworthy block. The mineable ore potential of these two zones must be at least 100,000,000 tons; this is of comparable scale to the deposits of Yampi Sound.

The deposits of secondary importance near Yarrie and Strelley Gorge require much work of assessment before a true estimate of their potential is available. In view of the relative smallness and scattered nature of the deposits they could only be economically developed in association with the main deposits at Mt. Goldsworthy and the Ord Range.

In the author's opinion the Company has set a commendably high standard of geological investigation in the exploration of these deposits, and has made a reliable appraisal of the iron ore potential in the allocated Temporary Reserves.