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Areal Estimates of the Limonitic Pisolitic Iron Ore of the Hamersley Iron Province, Western Australia

by

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AREAL ESTIMATES OF THE LIMONITIC PISOLITIC IRON ORE OF THE HAMERSLEY IRON PROVINCE, WESTERN AUSTRALIA.

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AREAL ESTIMATES OF THE LIMONITIC PISOLITIC IRON ORE OF THE HAMERSLEY IRON PROVINCE

The photogeology group has estimated from airphotographs, that the Hamersley iron province contains between 164 and 236 square miles of limonitic pisolitic iron ore. This report outlines the processes involved and the results obtained from this areal estimation.

Limonitic pisolitic iron ore (as distinct from the hematite ore of the Hamersley Group) primarily occurs as the cappings of mesa-form residuals associated with ancient drainage channels. Such cappings can be identified on air photographs by morphology and the presence of medium to dark toned talus.

The limonitic pisolitic iron ore is scattered over 30,000 square miles of the Hamersley Iron province. This area is covered by the 1:250,000 sheets: Yarraloola, Pyramid, Marble Bar, Wyloo, Mount Bruce, Roy Hill, Turee Creek, Newman. To estimate the combined total area occupied by this ore, individual outcrops were interpreted and outlined on overlays on airphotographs. Some areas suspected as being ore, but not positively identified, were also outlined.

Where ever possible W.A. State photographs at nominal scales of 1:40,000 to 1:50,000 were used for interpretation. Commonwealth photography at 1:80,000 scale was used when larger scale photographs were unavailable. No air photographs were available for the Newman 1:250,000 Sheet area.

After annotation individual areas were measured at photoscale by planimeter. For the Newman area an estimate was made by direct planimeter measurement of pisolitic ore shown on the 1:250,000 geological sheet.

To convert photoscale areas to equivalent ground areas nominal photoscales were calculated. Lack of topographic survey control precluded a more accurate method of estimation. To try to reduce scale errors due to topographic elevation and aircraft altitude variations, arbitrary ground elevation figures were calculated for various 1:250,000 sheet areas. It was assumed that elevation of the stream-deposited pisolitic iron residuals approximate to a uniformly sloping plane. From approximate maximum and minimum elevation of this plane the following mean ground elevations were applied in nominal scale calculations.

1:250,000 sheet	Mean ground elevation
Yarraloola	650'
Wyloo	650'
Pyramid	1,400'
Mount Bruce	1,400'
Turee Creek	1,400'
Roy Hill	2,200'
Marble Bar	2,200'

Total areas of limonitic pisolitic ore and suspected ore per 1:250,000 sheet are as follows.

Sheet	Pisolitic ore Area-Sq Kilometers	Suspected pisolitic ore Area-Sq kilometers
Yarraloola	68.71	3.58
Wyloo	230.13	12.18
Pyramid	53.05	0.04
Mount Bruce	100.48	7.15
Turee Creek	3.31	5.26
Roy Hill	28.16	1.84
Marble Bar		1.07
Total (from photos)	483.84	31.12
Newman (from Sheet)	15.62	
total	499.46	

499.46 sq km equals 192.84 sq miles
31.12 sq km equals 12.01 sq miles

It is considered that error from all sources (i.e., terrain elevation and flying altitude variation, photointerpretation errors, planimeter measurement error) would be in the order of ± 15%.

From the figures calculated the minimum area of pisolitic iron ore in the province would be 164 square miles. The maximum area would be 236 square miles.

Ore Reserve Calculations.

Using a Tonnage factor of 10 cubic feet per ton (MacLeod 1966) then each square mile of surface area of ore would represent 2,787,840 tons per vertical foot of depth beneath it. Applying this to the maximum and minimum area calculations:

164 sq miles represents 457,205,760 tons/vertical foot.
236 sq miles represents 657,930,240 tons/vertical foot.

At the airphoto scales used it is not possible to estimate an average thickness of the pisolitic ore. MacLeod (1966) places the thickness of the deposits within the limits of 30 to 200 feet, but most are less than 100 feet even in the deepest sections.

Calculation Check:

Almost all the ore annotated on Yarraloola photographs occurs within the Robe River deposits. Estimates from airphotographs indicate approximately 27 square miles of ore. Assuming an average depth of 40 feet for the Robe River deposits (MacLeod 1962) this approximates to 3000 million tons. MacLeod quotes figures totalling 3530 million tons (1962) and 2650 million tons (1966).

REFERENCES:

McLEOD, W.N, 1962 - Interim Report on the Pilbara Iron ore deposits. Geol. Surv. W.A. Rec. 1962/8 (unpubl.).

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