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DEPARTMENT OF MINES
SOUTH AUSTRALIA

GEOLOGICAL SURVEY

IRON EXPLORATION SECTION

Summary Report on

METALLURGICAL TESTING

of

PEERALILLA HILL LATERITE

by

Graham Whitten
Senior Geologist

IRON EXPLORATION SECTION
GEOLOGICAL SURVEY

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N.B. This Report is based on data from

Moskovits, E.E., 1962 "Peeralilla Iron Ore Beneficiation Tests", Australian Mineral Development Laboratories Report, No. AMDL 178 to S.A. Dept. of Mines, Unpublished.

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PEERALILLA HILL LATERITE

ABSTRACT

Because of the intimate association of the iron minerals and the gangue, screening, gravity and magnetic methods, flotation and roasting have been unable to produce a high grade concentrate with high recovery. As reserves are small a high capital expenditure is unwarranted. Further geological or metallurgical work can not be justified.

1. INTRODUCTION

Six bags of ore aggregating 580 lbs. and comprising 5 types were collected by G.R. Heath and the writer and submitted to the Australian Mineral Development Laboratories for testing. The following report is based on data from:-

Moskovits, E.B., 1962, "Peeralilla Iron Ore Beneficiation Tests", Australian Mineral Development Laboratories Report, No. AMDL 178, to S.A. Dept. of Mines, Unpublished.

The samples were bulked and assayed:-

Chemical Analysis

Total Fe	39.35%	Acid Soluble Iron	39.30%
SiO_2	21.55	Mn	0.10
CaO	0.07	MgO	0.12
Al_2O_3	2.70	TiO_2	0.30
P	0.12	S	0.04

Spectrographic Analysis

Trace	0.01 - 0.1%	Pb	Mn	Ca	Ti		
Faint Trace	10 - 100 ppm	Cu	Zn	Ni	Cr	V	Ba
Very Faint Trace	1 - 10 ppm	Co	Sn	Ag	Mo	B	Sr

The ore is composed of goethite, hematite and quartz as major constituents. A mineralogical examination showed that substantial release of individual constituents requires very fine grinding because of the intimate association of the gangue material and iron oxides.

All the ore was crushed to minus ⅜ inch and a 50 lb. head sample was riffled out for testing. Screening, gravity and magnetic methods, flotation and roasting have been applied.

2. SCREENING & ROASTING

The ore was screened though 10, 52 and 200-mesh. A plus 10-mesh sample was roasted at 800°C for 3 hours. Loss in weight was 11.6%. Summarised results are:-

Means of Separation	Feed Particle Size	Feed % of Crude	Assay Fe %	Concentrate Recovery (from Feed) Fe%	Concentrate Recovery (from Feed) Weight %
Screening	- ½ in.	100	45.3 *	63.0	55.1
Screening + Roasting	-½+10 mesh	55.1	50.6	(63.0)	(48.7)

* - ½ in. + 10 mesh fraction

3. GRAVITY CONCENTRATION

A sample of minus ½ inch material was screened through 10, 36 and 100 mesh and heavy liquid separations (SG?) made. A further sample ground to pass 72 mesh was wet screened to produce a minus 72 plus 300-mesh fraction and passed over a laboratory Wilfley Table. Summarised results are:-

Means of Separation	Feed Particle Size	Feed % of Crude	Concentrate Assay Fe %	Concentrate Recovery (from Feed) Fe%	Concentrate Recovery (from Feed) Weight %
Heavy Liquid	-½ +10 mesh	55.1(?)	47.3	96.8	94.8
Wilfley Table	-72 +300 mesh	51	53.0	54.0	39.2

4. MAGNETIC SEPARATION

Samples were passed through a Davis Tube and over a Frantz Isodynamic Separator. Summarised results are:-

Means of Separation	Feed Particle Size	Feed % of Crude	Concentrate Assay Fe %	Concentrate Recovery (from Feed) Fe%	Concentrate Recovery (from Feed) Weight %
Davis Tube	- 52 mesh	100(?)	62.0	7.4	4.7
Frantz separator	- 52 mesh	100(?)	43.3	82.5	75.0

5. FLOTATION

A flotation test was made on minus 10-mesh material ground for 25 minutes in a batch rod mill. Flotation conditions were:-

Adelaide Tap Water

Temperature 22°C pH 8.8

Feed:- Particle Size 94.6% minus 300-mesh

Percent of Crude 44.9% (?)

Pulp Density 17% Solid

Reagents:- NaOH 2.75 lbs./ton

Duomac T 0.75 lb./ton 1 minute conditioning for each stage

Results:-

Product	Assay Fe %	Distribution Fe%	Distribution Weight %
Concentrate 1	33.5	26.8	32.5
" 2	35.0	24.4	19.3
Tailing	41.3	48.8	48.2
Feed Calculated	40.6	100.0	100.0

6. CONCLUSIONS

The results indicate that a high grade concentrate at high recovery is not obtainable. This is due to the intimate association of the iron minerals and the gangue. Best results could possibly be achieved by roasting the Wilfley Table concentrates to produce a product assaying approx. 59% Fe with a recovery of 54.0%. More effective concentration is not possible except by very fine grinding.

With small reserves a high capital expense is not warranted. Therefore further geological or metallurgical work can not be recommended.

G.F. Whitten
Senior Geologist
IRON EXPLORATION SECTION

GFW;AGK

APPENDIX

MINERALOGICAL EXAMINATION OF PEERALILLA IRON ORE

REPORT

These specimens consist of hematite and goethite nodules and quartz grains cemented together by goethite.

Goethite is a major constituent of each sample and occurs in nodules and as a cement for the various constituents. Massive hematite forms the central core of many nodules. These cores have a maximum diameter of about 1.0 centimetres. Most quartz grains are rounded or sub-angular and range in diameter from 30 microns to at least 3.0 millimetres. Occasionally the quartz occurs as part of the nodules but usually the grains occur in the goethite cement between the nodules.

The degree of liberation of the iron minerals in the minus ⅛ inch material is poor. Gangue material, most probably quartz forms a major part of many fragments. Several types of fragments are present viz:

1. Rounded quartz grains cemented with goethite quartz.

2. Extremely fractured goethite cemented with quartz. The fractures range from less than 5 microns to about 20 microns in width.

3. Massive hematite with minor amounts of goethite and quartz.
The first mentioned type is the most common.

Because of the intimate association of the gangue material and iron oxides, it is only possible to conclude that finer grinding is necessary to liberate the major proportion of the iron oxides present.

Investigated by: D.E. Ayres

Officer in Charge, Mineralogy Section: H.W. Fander