

O T T A W A

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**R E P O R T**

of the

ORE DRESSING AND METALLURGICAL LABORATORIES.

Report No. *482*

Sintering Tests on High Sulphur Magnetite  
from Tenada Island, B. C.

By

F. W. Hardy

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Shipment -

A carload shipment of 29½ tons of Tenada Island magnetite was received on September 7, 1932, from Mr. John D. Galloway, Provincial Mineralogist, Province of British Columbia.

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Object of Investigation -

This shipment was submitted in order that the favourable results obtained with a previous shipment of 2,496 lbs., as recorded in our report dated May 18, 1931 on "The Laboratory Concentration of Texada Island Iron Ore" and also in that dated April 28, 1932 on "The Production of Sponge Iron from Texada Island (B.C.) Iron Ore" might be confirmed by tests on a larger and possibly more representative shipment. The belief that the sulphur content of the orebody as a whole might be considerably higher than that of the first shipment made additional tests particularly desirable.

This report which covers one of several investigations designed to show the potential value of this ore to the iron and steel industry and to indicate the general procedure by which commercial products may be obtained, is concerned only with the preparation of a suitable blast furnace feed from this ore by sintering, since the ore is too high in sulphur for use as mined.

Nature of Ore and Analysis of Shipment -

Like the first shipment, this shipment is made up of a high grade magnetite ore in which much of the gangue present exists in comparatively coarse particles readily visible to the naked eye. The sulphur content of this shipment however is considerably higher than that of the first lot, as shown by the following analysis made from a carefully prepared sample.

(Dried at 105°C)

Fe <sub>3</sub> O <sub>4</sub>	83.54%	Fe	62.27 %
CuFeS <sub>2</sub>	0.29	S	2.10
FeS <sub>2</sub>	3.74	P	0.015
MnO <sub>2</sub>	0.16	Mn	0.10
SiO <sub>2</sub>	6.45	Cu	0.10
P <sub>2</sub> O <sub>5</sub>	0.034		
CaO	2.78		
H <sub>2</sub> O	0.96		
Al <sub>2</sub> O <sub>3</sub>	0.54		

Except for the high sulphur content this would be an excellent ore for direct use in the blast furnace. The high sulphur content however makes some form of desulphurisation necessary before the ore can be considered satisfactory for blast furnace use.

Sintering Tests Carried Out -

Since sintering affords a convenient and cheap method of desulphurisation, a number of sintering tests were carried out on this ore. The tests carried out may be classified under two headings -- tests on the raw ore after crushing to suitable sizes and tests on the ore after dry magnetic concentration. The tests on the raw ore were carried out with both minus 12 and minus 3 mesh material, but, as these tests indicated that there was no necessity for crushing finer than minus 3 mesh, tests on the concentrated material were carried out on the minus 3 mesh size only. All sintering was done on a 12" x 48" Dwight & Lloyd continuous sintering machine.

Results obtained -

The results obtained in these tests are tabulated in tables I, II, III, and IV. These results show that for both the raw ore and the concentrate the best results are obtained from a mix containing about 2.5% coke. They also show that a mix of these proportions yield a sinter of excellent chemical and physical characteristics, the grade of the sinter from the concentrate being naturally appreciably higher than that from the raw ore.

Summary -

Sintering tests were carried out on Texada Island magnetite of high sulphur content. Tests on the raw ore showed that the sinter from material crushed to minus 3 mesh was just as satisfactory physically and chemically as that from minus 12

mesh material. They also indicated that a mix made up of about 94.0% ore, 2.5% coke, and 3.5% moisture yielded excellent results.

The tests also showed that by crushing to minus 3 mesh a sufficient amount of gangue is liberated to warrant passing the crushed material over a magnetic separator before sintering since by so doing a sinter higher in iron by about 4.0% and lower in insoluble by about 3.0% is obtained.

TABLE I

**Dry Magnetic Concentration of Minus 3 Mesh Ore  
(1 Pass over Stearns Drum Type Separator).**

<b>Separator Feed</b>		
Weight		100%
Iron		62.27
Sulphur		2.10
Insoluble		11.05
<b>Concentrate</b>		
Weight		90.01
Iron		66.59
Sulphur		1.30
Insoluble		7.09
<b>Tailing</b>		
Weight		10.0%
Iron		25.00
Sulphur		9.35
Insoluble		46.70

Ratio of Concentration	-	1.11 to 1.00
Iron Recovery	-	95.9%
Sulphur Rejection	-	44.5%