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DEPARTMENT OF MINES AND RESOURCES  
BUREAU OF MINES  
CANADA

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Ottawa, February 17, 1947.

REPORT  
of the  
MINERAL DRESSING AND METALLURGICAL LABORATORIES.

Investigation No. 2090.

Investigation to Determine the Suitability of a Sand  
from Barrington Bay, N.S., for Moulding Purposes.



(Copy No. 4.)

CANADA

Bureau of Mines

Mineral Dressing and  
Metallurgy Division

DEPARTMENT  
OF  
MINES AND RESOURCES

Physical Metallurgy  
Research Laboratories

Mines and Geology Branch

O T T A W A

February 17, 1947.

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from Barrington Bay, N.S., for Moulding Purposes.

Introduction:

On July 31, 1946, a sample of sand, received by the Ore Research Laboratory from the Nova Scotia Bureau of Mines, was transferred to the Foundry Sand Research Laboratory with the request that it be tested to determine its suitability as a moulding sand. The sand was described as washed sand from Barrington Bay, Nova Scotia.

Method of Testing:

The procedures recommended by the American Foundrymen's Association (Foundry Sand Testing Handbook, 1944 Edition, A.F.A.) were used in testing the sand.

Screen Test:

The screen test, supplied by the Ore Research laboratory of the Metallic Minerals Division is shown in Table I.

TABLE I. - Screen Test.

<u>Tyler Screen No.</u>	<u>Weight Retained</u>
	- Per Cent -
35	4.0
48	17.6
65	43.8
100	31.2
150	2.6
200	0.3
Pan	0.5
A.F.A. Fineness No.	56
Per cent on 3 adjacent screens	92.6

Microscopic Examination:

The sand was found to contain considerable feldspar, mica and other minerals besides quartz. The grains are rough and sub-angular. A photomicrograph of the sand is shown in Figure 1. A photomicrograph of a good grade of commercial sand is also included, for comparison.

Figure 1.



X20.

SAND FROM BARRINGTON BAY, NOVA SCOTIA.

Grains rough and sub-angular.

(Microscopic Examination, cont'd) -

Figure 2.



X20.

COMMERCIAL CORE SAND.

Grains smooth and sub-angular to round.

Mechanical Tests:

Mechanical tests made on the sand included core oil requirements, permeability of the moulding sand, weight of the A.F.A. specimen of moulding sand, and hot strength determination. The mixtures used were as follows:

(1) Mixture to Test Core Oil Requirements:

- 2,000 grams sand.
- 20 grams cereal.
- 20 grams core oil.
- Water added to produce moisture content of 2.7%.

Baked at 400° F. for 2 hours.

(2) Mixture to Test Hot Strength:

- 2,000 grams sand.
- 20 grams cereal.
- 20 grams "No-Vein".
- 20 grams core oil.
- Water added to produce moisture content of 2.7%.

Baked at 400° F. for 2 hours.

(3) Moulding Sand Mixture:

- 2,000 grams sand.
- 100 grams western bentonite.
- Water added to produce moisture content of 2.3%.

(Mechanical Tests, cont'd) -

Mulled 2 minutes dry and 4 minutes after adding water in an 18-in. laboratory mixer,

The results of these tests are shown in Table II.

Table II - Mechanical Properties.

	<u>Barrington Bay Sand</u>	<u>Good Commercial Sand</u>
<u>Core Sand</u>		
A.F.A. fineness No. -	56	43
Per cent on 3 adjacent screens -	92.6	90.5
Tensile strength, p.s.i. -	92.5	224
Hot compressive strength of mixture No. 2, p.s.i. (2500°F.)	Fused at 2200°F.	36
<u>Moulding Sand</u>		
Green compression, p.s.i. -	5.9	7.4
Permeability -	250	375
Flowability -	83	83
Wt. of A.F.A. specimen, grams -	155	164

Discussion:

This sand is not sufficiently refractory for steel or iron foundry work. As most synthetic sands are used in steel and ironfoundries, it would find a very limited use as a synthetic moulding sand.

The sand would be suitable for making cores for non-ferrous work, but the core oil consumption would be excessive, as is shown by the low tensile strength developed by the mixture used. This excessive consumption of core oil is the result of the rough grain. This roughness increases the

(Discussion, cont'd) -

surface area of the sand, but lowers the surface contact area between grains.

Gores produced with this sand would probably cost more than those made from a more expensive sand with a lower oil consumption. The excess core oil would also result in casting troubles such as blows and pinholes.

Conclusions:

1. This sample of sand cannot be considered sufficiently refractory for use as an iron and steel core or moulding sand.

2. The excessive amount of core oil required by this sand would impair its usefulness as a non-ferrous core sand.

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