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MINES BRANCH INVESTIGATION REPORT IR 63-104

**BENEFICIATION OF SILICA SAND  
FROM ST. CANUT, QUEBEC  
(PROJECT MP-IM-6301)**

by

**F. H. HARTMAN**

**MINERAL PROCESSING DIVISION**

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Mines Branch Investigation Report IR 63-104

BENEFICIATION OF SILICA SAND  
FROM ST. CANUT, QUEBEC  
(Project MP-IM-6301)

by

F.H. Hartman\*

SUMMARY OF RESULTS

A small quantity of free and attached pyrite is present in the silica sand from St. Canut. The object was the removal of as much as possible of this mineral.

Gravity separation, by tabling, will reduce the iron content of the sand tested from 0.037%  $\text{Fe}_2\text{O}_3$  to 0.031%, with a loss to waste of 0.1%.

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## INTRODUCTION

Canadian Silica Corporation Limited requested that gravity tests be run on silica sand from its plant at St. Canut, Quebec, with the object of removing the iron present in the form of pyrite. The Mines Branch agreed to undertake a limited programme of research on this problem.

Two 100 lb samples, marked "Deslimed Flint Sand", were received.

## DESCRIPTION OF SAMPLE

The sample was essentially minus 28 mesh and contained about 4% minus 100 mesh material.

Examination of the head sample and various size fractions showed a small quantity of quartz particles with attached grains of pyrite of various size.

## CHEMICAL ANALYSIS

Control assays for iron were run in the Mineral Processing Division's chemical laboratory. Samples of the final products were sent to J. T. Donald and Co. Limited in Montreal, where regular analyses for iron are made for Canadian Silica Corporation.

## TEST WORK

The contents of the two bags were mixed and representative samples were cut for test and analytical purposes.

A screen analysis was made on the head sample. The results are shown in Table 1.

TABLE 1

Distribution of Screen Sizes - Head Sample

Mesh Size	Wt %
+ 28	0.9
-28 + 35	17.6
-35 + 48	30.2
-48 + 65	31.5
-65 + 100	15.7
<u>- 100</u>	<u>4.1</u>
Total	100.0

To find out how the sand would respond to gravity concentration, 1) two samples were run in the Haultain Superpanner, and 2) some representative material was separated in a heavy liquid (specific gravity 2.96).

The heavy product of the superpanner tests contained nearly all the pyrite.

The float products from two heavy liquid separation tests were analysed. Results are shown in Table 2.

TABLE 2

Heavy Liquid Separation  
Silica Samples No. 1 and No. 2

Test No.	Fraction	Wt %	Fe as Fe <sub>2</sub> O <sub>3</sub> *
Sample No. 1	Float	99.9 +	0.042
	Sink	-	n.d
Sample No. 2	Float	99.9 +	0.041
	Sink	-	n.d
Sample No. 1			0.048
" No. 2			0.051

\*Analyses by R. A. Kent, Mineral Processing Division

Two tests were tried using a Hartz jig. Neither was successful because the sand was too fine for this type of jigging.

Tabling tests were run on a Holman table - the feed was added in weighed, riffled amounts to prevent pyrite segregation. In Test No. 1 the discharge from the table was cut to give three products; Test No. 2 was divided into five parts, in each of which two fractions were cut, to obtain increasing percentages of waste. Table 3 shows the results obtained.

TABLE 3

Tabling Tests

Test No.	Fraction	Wt %	Fe* as Fe <sub>2</sub> O <sub>3</sub> %
1	Product	80.5	.029
	Middlings	19.4	.0415
	Waste	0.1	n. d
			} .031
2 a	Product	98.1	0.031
	Waste	1.9	0.204
	Heads (calc)	100.0	0.034
" b	Product	93.9	0.030
	Waste	6.1	0.117
	Heads (calc)	100.0	0.035
" c	Product	87.9	0.031
	Waste	12.1	0.082
	Heads (calc)	100.0	0.037
" d	Product	80.5	0.028
	Waste	19.5	n. d
	Heads (analysis)		0.037

\*Analyses by J. T. Donald and Co. Limited, Montreal

## DISCUSSION

Combining the middlings with the final product in Tabling Test No. 1 gave a sand containing 0.031%  $\text{Fe}_2\text{O}_3$ , with a loss to waste of 0.1%. Making wider cuts of waste products, as in Tabling Test No. 2, showed little advantage.

Heavy liquid separation was used to determine approximately how much the iron in the sand could be lowered by gravity means. Table 2 indicates that iron in the product can be lowered by 16.2% with a removal of 0.1% of the sample as waste. Table 3, test No. 1, where a Holman table was employed, also effected a reduction of the iron by 16.2% with a removal of 0.1% of the sample, a near optimum result.

## CONCLUSIONS

The sand tested, containing 0.037%  $\text{Fe}_2\text{O}_3$ , can be upgraded by tabling to give a product analysing 0.031%  $\text{Fe}_2\text{O}_3$ . Loss to waste is 0.1%.

This appears to be close to the optimum removal by gravity separation of the pyrite present.

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