W.K. Buck

CANADA

DEPARTMENT OF MINES AND TECHNICAL SURVEYS

OTTAWA

MINES BRANCH INVESTIGATION REPORT IR 66-34

BENEFICIATION OF SILICA SAND FROM ST. CANUT, QUEBEC PART 2 (PROJECT MP– IM–6301)

by

R. A. WYMAN

MINERAL PROCESSING DIVISION

NOTE: THIS REPORT RELATES ESSENTIALLY TO THE SAMPLES AS RECEIVED. THE REPORT AND ANY CORRESPONDENCE CONNECTED THEREWITH SHALL NOT BE USED IN FULL OR IN PART AS PUBLICITY OR ADVERTISING MATTER.

COPY NO. 8

MARCH 28, 1966

INDUSTRIAL CONFIDENTIAL

CANADA

DEPARTMENT OF MINES AND TECHNICAL SURVEYS

OTTAWA

MINES BRANCH INVESTIGATION REPORT IR 66-34

BENEFICIATION OF SILICA SAND FROM ST. CANUT, QUEBEC PART 2 (PROJECT MP-IM-6301)

by

R. A. Wyman

MINERAL PROCESSING DIVISION

Note: This report relates essentially to the samples as received. The report and any correspondence connected therewith shall not be used in full or in part as publicity or advertising matter.

COPY NO.

MARCH 28, 1966

~~INDUSTRIAL CONFIDENTIAL~~

Mines Branch Investigation Report IR 66-34

BENEFICIATION OF SILICA SAND FROM ST. CANUT, QUEBEC PART 2 (PROJECT MP-IM-6301)

by

R. A. Wyman*

SUMMARY OF RESULTS

As an extension to experimental work reported in IR-63-104, three separate composite samples from plant production at St. Canut, Quebec, were treated on a Holman table to remove pyrite. Debris, in the form of paper scrap, fiber, and wood slivers, can be removed as washings in the tabling operation. A distinct band of pyrite, usually representing less than 1 per cent of the feed weight, can also be removed. Coarse plus 28 mesh material composed of dark quartz, agglomerates of fine silica cemented to oxidized pyrite, and some debris can also be removed. The overall reduction of iron in the product is not more than 3 per cent of the original iron content.

---

*Head, Industrial Minerals Milling Section, Mineral Processing Division, Mines Branch, Department of Mines and Technical Surveys, Ottawa, Canada.

INTRODUCTION

Early in 1963 an investigation was underaken to determine the extent to which pyrite could be removed from sand produced by Canadian Silica Corporation at St. Canut, Quebec. Two 100 lb. samples were received, experiments were performed, and the results reported in Investigation Report IR 63-104.

Late in the same year a further request was received from Canadian Silica Corporation to repeat the testing on 10-day composite samples taken from production before they committed themselves to an installation. This was agreed to and, accordingly, three such composite samples were sent to the Mineral Processing Division. They arrived on March 9, 1964.

On completion of the experiments, samples of the products, both bulk and analytical, were sent to Canadian Silica Corporation for assessment. Analytical results were to be returned to the Division for inclusion in a Mines Branch Report. Before this could be done, Canadian Silica Corporation was taken over by Industrial Minerals of Canada Limited. Following additional correspondence, INDUSMIN provided analyses of the samples supplied, and requested more detailed information on the project. Copies of the original report, IR 63-104, and background information, were sent to Industrial Minerals of Canada Limited in April, 1965. The firm indicated that they felt the investigation had been carried far enough and expressed interest in a report on the project.

SAMPLES

Three, 200 lb. samples were submitted. The samples were described as 1, 2 and 3, each representing a 10-day composite of Desliming Cyclone Discharge, presumably taken at different periods of operation. The material was virtually all minus 28 mesh in size. However, each sample contained small quantities of fiber, paper, wood slivers, dark quartz, stained quartz, and agglomerates of small silica grains attached to oxidized pyrite grains that were above 28 mesh in size. Some fine silica cemented to iron oxide could be observed in sizes smaller than 28 mesh in each sample, as well as debris.

Screen analyses performed on portions riffled from each sample are given in Table 1.

TABLE 1

Screen Analysis of Samples

Fraction (mesh)	Sample No.		
	1	2	3
+20	Nil	Nil	Nil
-20+28	0.9	0.8	1.4
-28+35	11.2	10.2	13.2
-35+65	66.7	66.6	68.0
-65+100	15.6	16.2	14.4
-100	5.6	6.2	3.0
	100.0	100.0	100.0

According to the above Table, Sample No. 3 is slightly coarser than the other two.

ANALYSIS

Chemical analyses of the products were performed by Industrial Minerals of Canada Limited.

TEST WORK

Tabling tests similar to those reported in IR 63-104 were performed on each of the three samples submitted. The experiments were made with a Holman diagonal deck table set to produce maximum separation of pyrite from the sand. A thin band of pyrite formed high on the deck. This was followed by a comparatively wide band, thinly populated with coarser particles and agglomerates (silica cemented to oxidized pyrite), then a dense band of sand. Most of the debris present in the samples was washed over the front of the table and collected separately.

One run was made with each feed lot, and during it two sets of samples were taken. In the first set, Sample No. 1 included only the thin pyrite band, and Sample No. 2 the remainder. For the second set, Sample No. 1 included the pyrite band and the wide transition zone, with only the sand band in Sample No. 2.

Care was taken in handling the table feed in order to ensure that there was a minimum of segregation during the feeding process. Each sample was riffled into a set of 10-lb lots. As each table run progressed these lots were dumped in turn into the feeder, thus ensuring reasonally consistent feed.

RESULTS

The results of these experiments are summarized in Table 2.

TABLE 2

Tabling Results

Test Sample No.	Set No. 1			Set No. 2
	Wt %	Fe_2O_3 %	Dist. %	Wt %
Feed Sample No. 1				
1	0.75	0.170	4.6	1.4
2	99.25	0.0268	95.4	98.6
	100.0	0.0279	100.0	100.0
Feed Sample No. 2				
1	0.59	0.398	6.9	1.3
2	99.41	0.0320	93.1	98.7
	100.0	0.0342	100.0	100.0
Feed Sample No. 3				
1	0.77	0.250	5.8	3.1
2	99.23	0.0314	94.2	96.9
	100.0	0.0331	100.0	100.0

REMARKS

The results for the three composite feeds parallel each other closely, and also parallel the results reported in IR 63-104. The low product assay for Feed Sample No. 1 evidently is the result of an overall low iron in feed for that period of production.

The results for the slightly coarser material in Feed Sample No. 3 are similar to those for the finer material in Feed No. 2, although the table settings had to be adjusted slightly for No. 3 feed.

Tabling would remove debris from the product as washings. Removing the +28 mesh would also eliminate some debris as well as a little iron and dark quartz. On the other hand, in a tabling operation, the +28 mesh should report with the pyrite and be eliminated in this way.

CONCLUSIONS

The tabling of composite samples from plant production at St. Canut is shown to reduce the content of debris and pyrite, although the overall reduction in iron is slight. It should be determined whether the remaining iron is present as pyrite or as oxide, particularly as staining on quartz grains.

ACKNOWLEDGEMENTS

The equipment was prepared for operation, and the experiments were performed by P. Vanasse and P.R. Lachapelle, Mines Craftsmen, under routine supervision.