

O T T A W A

January 22, 1946.

R E P O R T

of the

ORE DRESSING AND METALLURGICAL LABORATORIES.

Investigation No. 1992.

(Further to Investigation Report  
No. 1965, dated Dec. 1, 1945.)

Final Report on the Concentration of Barytes  
Tailings from Canadian Industrial Minerals  
Limited, Walton, Nova Scotia.

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Note:

This report relates essentially to the samples as received. It shall not, nor any correspondence connected therewith, be used in part or in full as publicity or advertising matter for the sale of shares in any promotion.

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Shipments:

A total of three separate samples were submitted to these Laboratories by Canadian Industrial Minerals Limited, Walton, Nova Scotia, per Mr. A. D. Dickson, Manager. Samples Nos. 1 and 3 represented the undersize from the No. 2 screen in the company's washing plant and Sample No. 2 represented the Akins classifier overflow from the same circuit. The details of these samples are given in Table I.

(Continued on next page)



(Shipments, cont'd) -

TABLE I. - Samples Received.

Sample: No. :	Material	Date :Received:	Weight, :pounds :	Analysis, per cent			
				BaSO <sub>4</sub>	SiO <sub>2</sub>	Fe <sub>2</sub> O <sub>3</sub>	CaCO <sub>3</sub>
1.	:No. 2 screen : underside	:Oct. 5/45:	335	92.05	1.96	1.66	
2.	:Akins classifier: : overflow	:"	110	59.53 <sup>Ⓢ</sup>			
3.	:No. 2 screen : underside	:Dec. 5/45:	600	92.00	0.84	4.20	1.92

<sup>Ⓢ</sup> Calculated from test products.

In a covering letter Mr. Dickson requested that test work be undertaken in an attempt to obtain a barite concentrate analysing 94 per cent BaSO<sub>4</sub> (minimum) and 2 per cent SiO<sub>2</sub> (maximum).

Results of Test Work:

Laboratory tests conducted on Sample No. 1 resulted in a final barytes concentrate analysing 95.70 per cent BaSO<sub>4</sub> and 0.80 per cent SiO<sub>2</sub>. Barite recovery was 82.3 per cent. This work was covered in detail in an interim report (Investigation Report No. 1965), issued by the Department on December 1, 1945, in which it was requested that a larger sample be submitted so that a final test could be undertaken on a continuous basis to confirm the results obtained in the laboratory work. This resulted in Sample No. 3's being submitted on December 5, 1945.

The test work undertaken on Sample No. 3 has confirmed the previous results. The final barytes concentrate obtained by screening, hydraulic sizing of the screen underside, and tabling of the sized products analysed as follows: BaSO<sub>4</sub>, 95.56 per cent; SiO<sub>2</sub>, 0.39 per cent. The barite recovery was 87.8 per cent.

The present report deals with the test work performed



(Results of Test Work, cont'd) -

on Sample No. 3.

Sample No. 2, which was found to be approximately 89.3 per cent minus 200 mesh, was tabled, resulting in a concentrate analysing as follows: BaSO<sub>4</sub>, 95.32 per cent; SiO<sub>2</sub>, 0.68 per cent. The barite recovery was 27.4 per cent. The results of the test work on this sample were covered in a letter to Mr. Dixon under date of January 12, 1946.

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Test Work Performed, Sample No. 3.

The 600-pound sample was fed to a Wilfley centrifugal pump which, in turn, passed the ore to a 10-mesh (square openings) Hum-mer screen. The ore passing over the screen was subjected to a thorough washing from sprays. This operation saved approximately one-third of the feed to the screen as finished product. The screen undersize was thickened and sent to a 4-spigot, Richards, launder type, Vortex classifier, the classifier overflow passing to an Allen-type cone.

The product obtained from the No. 1 spigot was finished concentrate. Tabling was required to improve the grade of the other products.

The No. 2 Spigot product was tabled on a Wilfley quarterdeck concentrating table with circulation of middlings. The products from Spigots Nos. 3 and 4 were combined with the cone underflow to make one product for a tabling test. The cone overflow was discarded.

Table II shows the results of screen tests on the various products obtained from screening and hydraulic sizing. Table III shows the results of the sizing tests, and Table IV gives the results of the tabling tests. Table V summarizes the results obtained in terms of the sample as submitted.

(Tables II to V follow,  
(on Pages 4 and 5.))



TABLE II. - Screen Tests on Sized Products.

Mesh	+10 Mesh Product		No. 1 Spigot Product		No. 2 Spigot Product		No. 3 Spigot Product		No. 4 Spigot Product		Cone underflow		Cone overflow		
	Wt. %	Cum. %	Wt. %	Cum. %	Wt. %	Cum. %	Wt. %	Cum. %	Wt. %	Cum. %	Wt. %	Cum. %	Wt. %	Cum. %	
	+2:	0.5	0.5												
-2	+3:	2.0	2.5												
-3	+4:	4.4	6.9												
-4	+6:	10.9	17.8												
-6	+8:	22.0	39.8												
-8	+10:	51.1	90.9												
-10	+14:	8.4	99.3	21.3	21.3	1.1	1.1								
-14	+20:	0.5	99.8	38.1	59.4	8.6	9.7								
-20	+28:	0.1	99.9	24.0	83.4	16.4	26.1								
-28	+35:	0.1	100.0	11.6	95.0	24.1	50.2								
-35	+48:			3.1	98.1	19.5	69.7	0.1	0.1						
-48	+65:			1.0	99.1	18.7	88.4	1.1	1.2						
-65	+100:			0.9	100.0	7.2	95.6	7.4	8.6	1.3	1.3				
-100	+150:					2.6	98.2	26.9	35.5	7.1	8.4	0.4	0.4		
-150	+200:					0.2	98.4	27.4	62.9	14.7	23.1	2.3	2.7	0.1	0.1
-200						1.6	100.0	37.1	100.0	76.9	100.0	97.3	100.0	99.9	100.0
Total		100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0

(Test Work Performed, Sample No. 3, cont'd)



(Test Work Performed, Sample No. 3, cont'd) -

TABLE III. - Results of Screening and Sizing.

Product	Weight		Analysis, per cent		Distribution of Barite, per cent
	Pounds	Per cent	BaSO <sub>4</sub>	SiO <sub>2</sub>	
+10 mesh	196	32.7	95.90	0.36	34.05
-10 mesh (calc.)	404	67.3	90.28		65.95
No. 1 Spigot	176	29.2	95.58	0.42	30.30
No. 2 Spigot	172	28.7	86.18		26.85
No. 3 Spigot	13	2.2	84.34		2.02
No. 4 Spigot	8	1.3	87.34		1.24
Cone underflow	22	3.7	88.10		3.54
Cone overflow	15	2.2	82.54		2.00
Total	600	100.0	92.12		100.00

TABLE IV. - Results of Tabling Tests.

Product	Weight, per cent	BaSO <sub>4</sub> , per cent
No. 2 Spigot -		
Table conc.	72.95	95.08
Table tailing	27.05	65.78
Spigots Nos. 3 and 4 Products plus Cone Underflow -		
Table conc.	25.0	94.24
Table tailing	75.0	77.94

TABLE V. - Summary of Results.

Product	Weight, per cent		Analysis, per cent		Distribution of Barite, per cent
			BaSO <sub>4</sub>	SiO <sub>2</sub>	
+10 mesh	32.7	95.90	0.36		34.1
No. 1 Spigot conc.	29.2	95.58	0.42		30.3
No. 2 Spigot -					
Table conc.	20.9	95.08	0.38		21.6
Table tailings	7.8	65.78			5.6
Nos. 3 and 4 Spigots and Cone Underflow -					
Table conc.	1.8	94.24	0.64		1.8
Table tailings	5.4	77.94			4.6
Cone overflow (discarded)	2.2	82.54			2.0
Total	100.0	92.00			100.0



Conclusions:

The test work performed on Sample No. 3 resulted in a barytes concentrate analysing as follows:

	<u>Per Cent</u>
BaSO <sub>4</sub> -	95.56
SiO <sub>2</sub> -	0.39

The barite recovery was 87.8 per cent.

From Table V it may be calculated that, if only the +10 mesh product, the No. 1 Spigot product and the table concentrate from the No. 2 Spigot product are taken into account, the final barytes concentrate will analyse:

	<u>Per Cent</u>
BaSO <sub>4</sub> -	95.58
SiO <sub>2</sub> -	0.39

The barite recovery in this case would be 86 per cent.

Recommendations:

From the test work performed on the samples submitted, there would appear to be two possibilities regarding the treatment of the tailings from the present washing plant at Walton. These are outlined below:

A.

Installation of a square-opening 10-mesh screen following the 10-mesh screen at present in the washing circuit. The further washing given the ore in this way would reduce the present tailing losses by approximately one-third. It might be found advantageous to change the present screen to 4 or 6 mesh rather than 10 mesh and wash more of the finer sizes on the new 10-mesh screen.

The 10-mesh-screen undersize would have to be thickened before passing to a hydraulic sizer. This operation could be most readily performed in an oversize Akins spiral or a Dorr rake classifier, either of which would sufficiently dewater the pulp. The Akins is less likely to become sanded



(Recommendations, cont'd) -

and would give a better washing of the ore. The classifier overflow would go to waste.

A two-spigot hydraulic sizer, probably made on the property, would give three products, namely, the No. 1 Spigot, meeting the required specifications as to barytes and silica; the No. 2 Spigot, for tabling to grade; and an overflow going to waste. The No. 2 Spigot product would have to be tabled using a large capacity concentrating table having a suitable deck.

B.

Installation of a square-opening, 10-mesh screen, exactly as outlined under "A" above, with thickening of the screen undersize.

Thickening of the screen undersize, because of the relatively large particle size (-10 mesh), should be done in two steps: (1) Akins spiral or Dorr rake classifier for dewatering the coarse sizes, and (2) the classifier overflow passing to a thickener for thickening the fines.

The dewatered coarse pulp, together with the thickened fines, then passing to a hydraulic sizer, preferably of the Fahrenwald type, would result in five or six products. One, perhaps two, of the spigot products would meet the required specifications as to grade of barite and silica. The other spigot products would have to be tabled to grade, the type of table used depending upon the size of particles obtained from the various spigots. It would probably be possible to combine the products from two or more spigots as feed to one table (as was done in the laboratory test). The final overflow from the sizer would go to waste.

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Based on the test work undertaken in the laboratory, flowsheet "B" would give 2 or 3 per cent higher recovery of barite than would be obtained with the flowsheet outlined



(Recommendations, cont'd) -

under "A", but a considerable increase in equipment would be required to obtain this additional recovery. One distinct advantage of the "B" flowsheet is that it would be immediately available to handle any changes in the ore that may be found at a later date and could, in the meantime, be operated as outlined under "A" above, by allowing the last two or three spigots to go to waste.

Note: If it is decided to attempt to concentrate, by tabling, the overflow from the present Akins classifier, it might be found economical to thicken the overflow from the sizer (either from "A" or from "B" above) and add this to the classifier overflow as feed to a slime table.

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