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DEPARTMENT OF MINES.

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-RESEARCH AND DEVELOPMENT BRANCH-

R.D. 48.

ROBERTSTOWN ASBESTOS.
PREPARATION OF A MARKETABLE PRODUCT.

PART 2.

EXAMINATION OF DRILL CORE.

by

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-Abstract-

A sample of low grade asbestos-bearing material from the Robertstown district was treated by flotation, and hydraulic classification. The results were not encouraging and no further work is warranted on this sample.

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1. SUMMARY.

A sample of crocidolite ore from the Robertstown district was submitted for testing by the Geological Branch.

The following three methods of beneficiation were used in an attempt to produce a marketable product:

(a) Flotation.

(b) Air classification after crushing to minus 6 mesh following by froth flotation of the air classifier fine product.

(c) Hydraulic classification after crushing to minus 6 mesh followed by froth flotation of the classifier overflow.

The best result was obtained by method (c) in which the concentrate represented 1.9 per cent by weight of the original sample and contained 65 per cent crocidolite.

In view of this low concentrate weight no further work on this sample is warranted.

2. INTRODUCTION.

Field exploration is being conducted by the Geological Branch to locate reserves of asbestos ore.

The asbestos occurring in the Robertstown area is of the crocidolite type and tests have shown that this mineral is suitable for use in the field of heat insulation.

Earlier cost estimates (Vide Report R.D. 48), showed that, for profitable treatment, at least five per cent of the ore would have to be recovered as a high grade crocidolite product.

3. MATERIAL EXAMINED.

The sample submitted by the Geological Branch represented portion of a drill core from the "Blue Hole" asbestos deposit in Section 295, Hundred of Apoinga. The sample weighed 24.5 lbs.

Visual examination of the material indicated that the crocidolite occurred mainly as narrow veinlets a fraction of an inch in width or as bundles of fibres. The maximum fibre length appeared to be less than 1/4 inch with the average length between 1/8 and 1/16 of an inch.

4. EQUIPMENT USED.

The laboratory equipment used in this investigation included the following items.

Denver centrifugal hydraulic classifier.

Gayco centrifugal air separation.

Fagergren flotation cell.

5. EXPERIMENTAL PROCEDURE and RESULTS.

5.1 Experimental Procedure.

The object of the investigation was to prepare a relatively pure asbestos concentrate from the ore sample supplied.

The sample was crushed in a jaw and roll crushers to minus 6 mesh and all test work carried out on this crushed material.

Three methods of beneficiation were examined. viz:

(a) Flotation.

(b) Air classification after crushing followed by flotation of the air classifier fine fraction.

(c) Hydraulic classification after crushing followed by flotation of the classifier fine fraction.

5.2 Experimental Results.

If was found that grinding in the laboratory mill for five minutes gave a satisfactory liberation of the fibres.

5.2.1 Flotation of Original Sample.

Four tests were carried out under uniform grinding and flotation conditions. The reagents are shown in Table 1.

TABLE 1.

Reagent Combinations - Flotation of Original Sample.

Reagents lb/ton.	Test 1.	Test 2.	Test 3.	Test 4.
Oleic acid.	4.0	4.0	-	-
Manoxal O.T.	0.2	0.2	-	-
Sodium carbonate.	3.0	3.0	-	-
Pamak No.1.	-	-	1.0	-
Fuel Oil.	-	-	4.0	-
Naphthenic acid.	-	-	0.2	-
Nonion P100.	-	-	0.1	-
Armac CD.	-	-	-	4.5
Sulphuric acid.	-	-	-	2.3

In Tests 1 and 3 the reagents were added to the ball mill prior to grinding. In the other tests the ground pulp was conditioned with the reagents in the flotation cell prior to flotation.

The percentage weights of the products from each test are shown in Table 2.

TABLE 2.

Flotation Results - Flotation of Original Sample.

Fraction.	Weight % of Feed.			
	Test 1.	Test 2.	Test 3.	Test 4.
2nd cleaner conc.	21.9	4.9	9.4	7.8
2nd cleaner tail.	5.2	1.4		7.1
1st cleaner tail.	11.3	6.5	13.0	15.7
Rougher tail.	61.6	87.2	77.6	69.4
FEED.	100.0	100.0	100.0	100.0

The final concentrate from each of the above tests was submitted for mineralogical analysis, the results of which are shown in Table 3. Because of the difficulty in assessing the amounts of fibre, the figures shown are approximate values.

TABLE 3.

Mineralogical Composition of Final Concentrate Flotation of Original Sample.

Mineral.	Weight %.			
	Test 1.	Test 2.	Test 3.	Test 4.
Crocidolite.	10.0	25.0	5.0	tr.
Quartz and felspar.	50.0	5.0	40.0	20.0
Biotite.	20.0	20.0	25.0	80.0
Tourmaline (brown).	2.5	25.0	10.0	tr.
Opaque ferruginous.	15.0	20.0	15.0	tr.
Rutile.	2.5	5.0	5.0	tr.
	100.0	100.0	100.0	100.0

5.2.2 Air Classification and Flotation.

Portion of the minus 6 mesh material was air separated in a "Gayco" unit in an attempt to reject a coarse fraction low in crocidolite.

The percentage weights of the two air classifier products are shown in Table 4.

TABLE 4.

Air Classification.

Fraction.	Weight %.
Fine Product.	24.6
Coarse Product.	75.4
FEED.	100.0

The fine product was floated using the same procedure and reagent combination as for Test 2 (Section 5.2) except that, because of the fineness of the material, the grinding step was omitted. The result of the test is shown in Table 5.

TABLE 5.

Flotation Result - Air Classification and Flotation.

Fraction.	Weight % of Fine Product.	Weight % of Original Sample.
2nd cleaner concentrate.	7.7	1.9
2nd cleaner tailing.	5.3	1.3
1st cleaner tailing.	20.8	5.1
Rougher tailing.	66.2	16.3
FEED.	100.0	24.6

The mineralogical composition of the final concentrate is shown in Table 6.

TABLE 6.

Mineralogical Composition of Final Concentrate Air Classification and Flotation.

Mineral.	Weight %.
Crocidolite.	50.0
Quartz and felspar.	10.0
Biotite.	15.0
Tourmaline (Brown).	15.0
Opaque Ferruginous.	10.0
Rutile.	tr.
	100.0

5.2.3 Hydraulic Classification and Flotation.

Portion of the minus 6 mesh material was hydraulically separated in a Denver centrifugal classifier. The percentage weights of the two fractions are given in Table 7.

TABLE 7.

Hydraulic Classification.

Fraction.	Weight %.
Overflow (Fine Product).	19.3
Underflow (Coarse Product).	80.7
FEED.	100.0

The fine product was subjected to flotation under the same conditions adopted for flotation of the air classifier fine product. The result is shown in Table 8.

was 1.9 per cent by weight of the original sample and contained 50 per cent crocidolite.

6.3 Hydraulic Classification and Flotation.

Best results were obtained using this procedure. From the hydraulic classifier overflow a flotation concentrate was produced which was 1.9 per cent by weight of the original sample and contained 65 per cent crocidolite.

7. OBSERVATIONS and CONCLUSIONS.

Although a crocidolite product of fair grade was produced, the weight of concentrate produced was too low to warrant further investigation of this sample.

On an earlier sample of crocidolite ore from the Robertstown district (Vide Report R.D. 48) the concentrate produced was 12.3 per cent by weight of the ore and contained approximately 90 per cent crocidolite.

8. REFERENCE:

Report R.D. 48 - "Robertstown Asbestos - Preparation of a Marketable Product".