

O T T A W A      April 10th, 1933.

R E P O R T  
of the  
ORE DRESSING AND METALLURGICAL LABORATORIES.

Report No..472..

The Concentration of Cyanite  
from Death Rapids, B. C.

By

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Shipment -

One bag, shipping weight 65 pounds, of crude cyanite was received October 1, 1931, from Mr. B. T. O'Grady, Resident Mining Engineer, Nelson, B. C. The cyanite came originally from Death Rapids, B. C., in the Big Bend district north of Revelstoke.

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Purpose of Experimental Tests -

Mr. O'Grady suggested that preliminary tests be made. However it was decided to make not only concentration tests but also to test the cyanite for ceramic use.

Characteristics of the Cyanite -

The shipment consisted of long, flat crystals of sky-blue cyanite in white quartz. A small amount of brown mica was also present.

Experimental Tests -

Several methods of separation were tried; those giving poor results were tabling, magnetic separation, electrostatic separation and screening with square mesh screens and fine grizzlies. However the Ullrich machine used in the magnetic separation tests removed the brown mica from the cyanite and quartz.

Hand Picking -

To secure some clean cyanite 3/4 of the lot which had been crushed to 1 inch was screened on 1/2 inch and 3/4 inch screens and the -1" + 1/2" and -1/2" + 3/4" were carefully hand picked. This resulted in the following products:-

|         |              | <u>Pounds</u> |
|---------|--------------|---------------|
| Cyanite | -1" + 3/4"   | 4.1           |
| "       | -3/4" + 1/2" | 2.1           |
| Reject  | -1" + 1/2"   | 16.2          |
| "       | -3/4" + 1/2" | 4.0           |
| "       | -1" + 1/2"   | 15.5          |

Flotation -

Three small flotation tests were made on the cyanite as received. The best results were obtained by grinding 500 grammes of -20 mesh material in a pebble jar for 30 minutes with one gramme of soda ash. The ground material was then put into a small Ruth flotation machine, mixed for 5 minutes with 9 drops of oleic acid and floated for 5 minutes. The concentrates were re-run by



mixing for 5 minutes and floating for 5 minutes. Results:-

| Product     | Grammes | % Al <sub>2</sub> O <sub>3</sub> | Gms. Al <sub>2</sub> O <sub>3</sub> |
|-------------|---------|----------------------------------|-------------------------------------|
| Concentrate | 169.5   | 61.45                            | 104.15                              |
| Middling    | 44.7    | 51.29                            | 22.93                               |
| Tailing     | 282.2   | 18.41                            | 51.95                               |
| Total       | 496.4   | 36.07                            | 179.03                              |

The concentrates were quite high grade. A piece of cyanite picked out of the shipment ran 61.75 % Al<sub>2</sub>O<sub>3</sub>. The recovery in the concentrates alone is 58.2 %. If allowance were made for the cyanite in the middling the recovery would be higher. Besides with further work doubtless much better recoveries could be obtained.

In order to obtain more flotation concentrates for testing for ceramic use the discard from hand picking was crushed to 20 mesh and then ground in charges of 1000 grammes in pebble jars and floated. Two charges were floated separately and the concentrates from them were combined and re-floated. The middlings from the re-run were put into the next two charges before floating. In this way eight concentrates were obtained, the Al<sub>2</sub>O<sub>3</sub> content of which varied from 55.74 % to 61.31 %. However recoveries were poor.

Testing for Ceramic Use -

The hand picked cyanite and all flotation concentrates were sent to the Division of Ceramics and Road Materials for testing. Their report was as follows, -

This material is similar to several other cyanites which have been studied for use in the ceramic industry. It converts to mullite (3 Al<sub>2</sub>O<sub>3</sub>.2SiO<sub>2</sub>) with a drop in specific gravity from 3.62 to 3.04, and specimens containing from 88 to 98 percent cyanite showed linear expansions of from 8 to 16 percent.



Microscopic examination showed that the material upon burning maintained its original platy structure to a marked extent .

The material is worthy of further study, for use in the production of refractory products. The difficulty in the use of this material has been not that it requires calcination before use but due to the poor success met with in developing binders for the calcined material.

Conclusions -

1. The only methods of concentration found suitable were hand-picking and flotation.
2. Hand picking could not be used commercially unless the cyanite occurred in larger pieces than those in the sample received .
3. The concentrates made by flotation were very good but the recoveries were low. It is believed that this could be improved by further test work.