

This document was produced  
by scanning the original publication.

Ce document est le produit d'une  
numérisation par balayage  
de la publication originale.

~~INDUSTRIAL CONFIDENTIAL~~

*circulated*

**DECLASSIFIED**

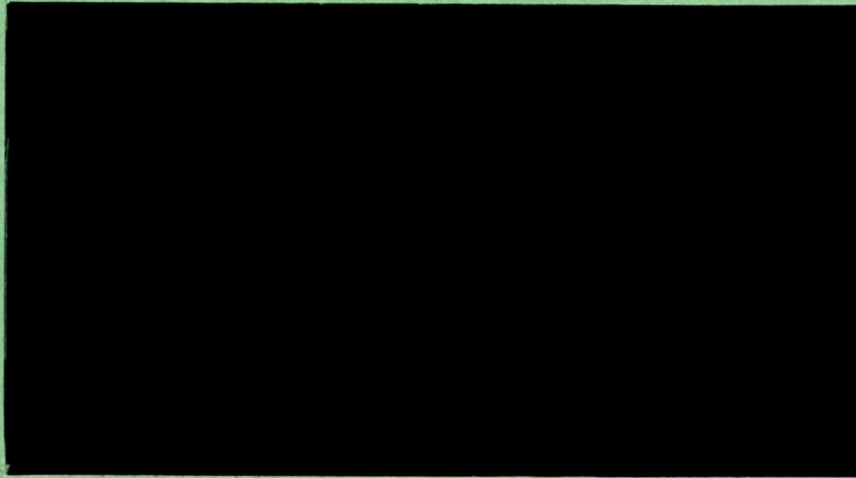
DATE 1974

AUTHORIZED BY *[Signature]*

**CANADA**

**DEPARTMENT OF ENERGY, MINES AND RESOURCES**

**OTTAWA**



*Mines Branch*

**COPY NO.**

**8**

**Declassified**  
**Déclassifié**

Industrial Confidential

CANADA

DEPARTMENT OF ENERGY, MINES AND RESOURCES

OTTAWA

IR 71-40

July, 1971

ASSESSMENT OF VERMICULITE  
FROM VICINITY OF  
VENOSTA, QUEBEC

by

H. S. Wilson

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.

Declassified  
Déclassifié

~~Industrial Confidential~~

Mines Branch Investigation Report IR 71-40

ASSESSMENT OF VERMICULITE  
FROM VICINITY OF  
VENOSTA, QUEBEC

by

H. S. Wilson\*

- - -

SUMMARY OF RESULTS

Two samples were submitted for determination of vermiculite content, range of size of flake, and exfoliation qualities. The samples contained between 40 and 50 per cent of vermiculite flakes up to 1 in. in size. Bulk densities of the exfoliated vermiculite were between 7 and 14 lb/cu ft. Optimum exfoliation was not attempted but could probably be achieved with different preparation and firing conditions.

---

\*Research Scientist, Construction Materials Section, Mineral Processing Division, Mines Branch, Department of Energy, Mines and Resources, Ottawa, Canada.

## INTRODUCTION

Two samples of granular material containing vermiculite were submitted by R. V. Hannam, representing Tracy Lee Vermiculite Mines Ltd., for evaluation. The work requested included determinations of vermiculite content of the samples, grading of the vermiculite flakes, and an indication of the exfoliating quality of the vermiculite.

The samples were reported to have been taken from the property of the former Venosta Minerals Limited, Low Township, Gatineau County, Quebec. Sample A, about 4 lb in weight, was reportedly a representative sample from a trench, 100 ft long by 6 ft deep. Sample B, about 1 lb in weight, was a grab sample from a second exposure on the same property. Both samples were of unconsolidated material ranging in size between 1 in. and 100 mesh.

Investigations previously done on samples from this property were reported in Mines Branch Test Report MPT 66-11, "Evaluation of Four Vermiculite-Bearing Samples from Gatineau County Quebec".

## GRADINGS OF SAMPLES

The gradings of both samples are shown in Table 1.

TABLE 1

Gradings of Raw Samples

Size Designation	Sample A (weight per cent)	Sample B (weight per cent)
+ 3/8 in.	5.5	42.8
- 3/8 in. + 4 mesh	8.1	10.8
- 4 + 8 mesh	17.9	8.7
- 8 + 16 mesh	25.5	13.1
-16 + 30 mesh	29.8	12.4
-30 + 50 mesh	12.1	7.0
-50 + 100 mesh	1.0	3.0
- 100 mesh	0.1	2.2
	<hr/> 100.0	<hr/> 100.0

## EXFOLIATION AND CONCENTRATION

Exfoliation was done in an electrically heated tube furnace. A stainless steel tube centred in the furnace was vibrated to move the material through the furnace in approximately 30 seconds. The maximum temperature of the tube, measured by an optical pyrometer, was maintained between 980° and 1010°C (1800° and 1850°F).

The books of vermiculite in the plus 3/8-in. fractions were too thick (up to 1/8 in.) and large to be fed through the furnace. These coarsest fractions were passed once through a jaw crusher to partially delaminate the vermiculite. This reduced the thickness of the vermiculite books to the degree where appreciable exfoliation could be expected. The flakes considered too large were broken by hand to the size at which they could be passed through the feeder into the furnace. Each size fraction was fed independently through the furnace to exfoliate the vermiculite. There was insufficient material in the minus 50 plus 100-mesh fraction of Sample A to give any satisfactory results. The minus 100-mesh materials in both samples were too fine to travel through the furnace. These three size fractions were not tested and were not included in the assessment.

The exfoliated vermiculite and non-exfoliated materials (rock and mica) of each size fraction recovered from the furnace were separated. Separations of the materials in the plus 3/8-in. and the 3/8-in. to 4-mesh fractions were accomplished by water flotation of the exfoliated vermiculite. Air separation was used on the finer-sized materials. The percentage by weight and the bulk density of the exfoliated vermiculite in each size fraction fed to the furnace were determined. The results are shown in Tables 2, 3, and 4.

TABLE 2  
Per Cent Vermiculite in Fired Fractions

Size Designation	Sample A (weight per cent)	Sample B (weight per cent)
+ 3/8 in.	40.6	53.3
- 3/8 in. + 4 mesh	10.5	34.3
- 4 + 8 mesh	23.4	17.7
- 8 + 16 mesh	53.8	40.8
-16 + 30 mesh	67.3	68.1
-30 + 50 mesh	60.9	62.6
-50 + 100 mesh	--	59.2

TABLE 3  
Per Cent Vermiculite of Whole Samples

Size Designation	Sample A (weight per cent)	Sample B (weight per cent)
+ 3/8 in.	2.2	22.8
- 3/8 in. + 4 mesh	0.9	3.7
- 4 + 8 mesh	4.2	1.5
- 8 + 16 mesh	13.7	5.3
- 16 + 30 mesh	20.1	8.4
- 30 + 50 mesh	7.4	4.4
- 50 + 100 mesh	--	1.8
Total	48.5	47.9

These figures were calculated on the fired weights of the vermiculite and non-exfoliated materials. The average loss in weight of the various size fractions during firing was 15 per cent. The higher values of weight loss were from the fractions containing the higher percentages of vermiculite. Assuming that the vermiculite lost more weight than did the rock (or mica), the actual percentage of vermiculite in the various fractions could be 5 to 10 per cent lower than is shown in Tables 2 and 3.

TABLE 4

Bulk Densities of Exfoliated Vermiculite

Size Designation	Sample A (lb/cu ft)	Sample B (lb/cu ft)
+ 3/8 in.	7.4	7.9
- 3/8, +4 mesh	7.9	7.1
- 4 + 8 mesh	7.5	7.9
- 8 + 16 mesh	7.5	7.0
- 16 + 30 mesh	9.3	9.5
- 30 + 50 mesh	11.6	10.5
- 50 + 100 mesh	--	13.3

OBSERVATIONS AND CONCLUDING REMARKS

Both samples under investigation contain between 40 and 50 per cent vermiculite, although the distribution of size of flake is considerably different. The grading of the two samples is also different, Sample B was considerably more coarse than was Sample A.

The furnace used to exfoliate the vermiculite did not necessarily produce optimum exfoliation. Vermiculite flake finer than 8 mesh was better exfoliated than was the flake coarser than 8 mesh. Other equipment and better delamination of the coarse flake would probably result in better exfoliation and lower bulk density.