

CAMBRIDGE

PLAINTIFF'S
EXHIBIT

WRG - 71

TO: H. C. Duecker

DATE: June 26, 1973

FROM: J. C. Yang ✓

SUBJECT: The possible occurrence of
asbestos in Monokote

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FILE: 500 Asb. Detn.

EXHIBIT

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fa id
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Expanded Vermiculite samples and Monokote products from various mining locations and plants have been analyzed since Dec. 1972, by quantitative X-ray diffraction method (developed by Arthur D. Little, Inc.). This is supplemented by optical microscopy (dispersion staining techniques developed by Arthur D. Little, Inc.), transmission electron microscopy (rub-cut method, developed by Johns-Manville, but used ourselves at WRG) and scanning electron microscopy with X-ray fluorescence analysis attachments (Arthur D. Little, Inc.).

Based on the experimental results collected up to date, tentative conclusions and comments are summarized as follows:

1. Vermiculite contains a small amount of asbestos in the range of 0.5%. The only asbestos species detected is tremolite; it can be either in platy or fibrous morphology. The analyses are presented in Table 1.
2. Sampling technique for the analysis is extremely important - all the analytical techniques mentioned above require very small specimens. Because of the heterogeneous nature of mineral species present, difference in density and forms, segregation tends to occur. Representative analysis of a trace mineral in this material can be achieved only by collecting a large number of samples, perhaps 10 or more randomly and average the findings. Repetitious sampling (in Tables 1 and 2) show the variations in the determinations.
3. Monokote product contains approximately a maximum of 39% expanded vermiculite, 56-60% gypsum and a minor amount (1%) of organic materials. The only asbestos containing ingredient is vermiculite. Since the tremolite content of the expanded vermiculite is about 0.5%, Monokote products will have less than 0.2% tremolite by computation. Laboratory analysis shown in Table 2 confirms the computed results.

Table 1 - Analysis of Expanded Vermiculite

No.	Identification No.	Description of Samples		Tremolite Content (%)	
		Location of Ore	Locations of Expanding	ADL	JM
1	22203-2	South Carolina	Trenton	0.30	-
2	22209-9	Montana	East Hampton	0.80	0
3	22209-10	Montana	Denver	0.65	-
4	22209-11	South Carolina	Little Rock	<0.2, 0.45	-
5	22209-12	South Carolina	Enoree	<0.2	0
Average:				ADL 0.43	JM 0
				Total 0.33	

Table 2 - Analysis of Monokote Products

No.	Identification No.	Description of Samples		Tremolite Content (%)	
		Location of Ore	Location of Manu.	ADL	JM
11	22203-9	Montana	Denver	0	-
12	22203-10	Montana	Los Angeles	0	-
13	22203-11	Montana	Muirkirk	0	-
14	22203-12	Montana	Oregon	0	-
15	22209-1	Montana	East Hampton	0.3	0
16	22203-2	Montana	Denver	<0.2	-
17	22203-3	South Carolina	Little Rock	0.1, <0.2	-
Average - Total:				0.2	

4. We are continuously improving the techniques for these analyses such as to determine the ratio of platy form vs. fibrous form of tremolite, to distinguish the fibrous tremolite vs. other fibrous-like minerals such as hornblende and contaminants which may lead to more accurate resolutions and identifications. In addition, we are trying to determine the number of samples required to give a statistically reliable analysis.

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