

GRACE

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SEP 16 1983



Construction Products Division

TO: R. J. Bettacchi
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R. C. Walsh

DATE: September 14, 1983

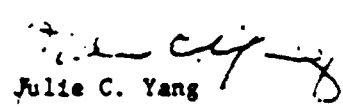
FROM: Julie C. Yang

SUBJECT: Arthur D. Little
Documents

CC: File 1184

In the package of ADL documents, which I sent to you on September 7, the letter dated 6/27/83 had no signature from the writer.

A signed copy was just received. Please replace the whole letter with the one attached herewith and destroy the unsigned letter. The new one is 3 pages instead of 4, but the content remains unchanged.


Julie C. Yang

JCY/ph

Attachment

15137289

GP 26199.182

 Arthur D. Little, Inc.

June 27, 1983

Dr. Julie Yang
Manager - Research Technologies
W.R. Grace & Co.
62 Whittemore Avenue
Cambridge, Massachusetts 02140

Dear Julie:

C76494

In accordance with your request of June 23, 1983, we have analyzed a commercial sample of Monokote MK-5 (W.R. Grace & Co.) for the presence and quantity of amphibole fibers. For this purpose, we have defined fiber as any particle with approximately parallel sides and with an aspect ratio of 3 or greater.

PROCEDURE

An unopened bag of Monokote (Lot 1F1, Easthampton, MA) delivered by you was poured on a polyethylene sheet, coned and quartered until reduced to about four pounds. From this sample, one quarter was reserved (about 1 pound) and the opposite quarter was coned and quartered to give a sample of about 100g. This sample was digested with 1N HCl at 60°C to dissolve the plaster of paris (the major component). Each digestion utilized about 800 ml of acid with 15 min. of stirring. The suspension was allowed to settle for 10 minutes after which the supernate was decanted with a squeeze bulb and reserved. This was repeated for a total of seven digestions, after which x-ray diffraction failed to show a plaster of paris (or gypsum) peak. As you recall, a previous analysis had shown that a lg sample of Montana Tremolite (asbestiform variety) wet ground with a mortar and pestle was quantitatively recovered after a similar digestion treatment.

After digestion, the residue was wet screened and washed through a 20# screen. The filtrate was added to the previous decants, neutralized with NaOH and made up to 4000 ml. After agitating, samples were withdrawn from the center of the suspension to provide separate samples of 1, 4 and 16 ml. These were each diluted to 100 ml and filtered through 0.1 μ m pore size, 47 mm

Buenos Aires	Paris	Tokyo
Houston	Rio de Janeiro	Toronto
London	San Francisco	Washington
Madrid	Sao Paulo	Wiesbaden

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Arthur D. Little, Inc.

June 27, 1983

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Fiber mass concentrations are calculated by

$$\frac{\text{Fibers} \times \text{Fiber mass (g)}}{100.2 \text{ g (sample)}} \times \frac{4000 \text{ ml (sample)}}{1 \text{ ml (aliquot)}} \times \frac{960 \text{ mm}^2 \text{ (filter)}}{81 \times 10^{-4} \text{ mm}^2 \text{ (pore area)}}$$
$$\times \frac{1}{20 \text{ pores}} \times 10^6 \text{ (ppm)} = 0.24 \times 10^{12} \times \text{Fibers} \times \text{Fiber mass (g)}$$

This gives the following results for observed concentrations of tremolite fibers in Monokote MK-5.

Basis:

	<u>Average Mass</u>	<u>Median Mass</u>
Tremolite	1.4 ppm	1.4 ppm
Tremolite + probable tremolite	28.4	8.1
Tremolite + probable tremolite + possible tremolite	76.6	14.4

In my opinion, the median values should be used as the best indication of mass concentration. Based upon our laboratory experience, replicate analysis agree within a factor of two times, indicating a confirmed tremolite concentration of 1 to 3 ppm and a possible tremolite concentration of 7 to 30 ppm.

Please call me if you have any questions.

Very truly yours,

Edward T. Peters

Edward T. Peters

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June 27, 1983

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dia. Nuclepore filters were then carbon coated. Samples (4 or 5) were incised from each and placed on 200 mesh copper electron microscope grids. The filter media was cleared with chloroform using the modified Jaffee wick procedure. When cleared, optical microscopy at 430X indicated the 4 and 16 ml samples were both heavily loaded. The 1 ml sample was used for electron microscopy.

For analysis, 20 random pore openings were traversed at 10,000X and any particle meeting the fiber definition was measured (length and width) and analyzed by selected area electron diffraction (SAED). Photographs of several typical fibers and their SAED's were recorded.

RESULTS

For the 20 pore openings, a total of 59 fibers were observed, with the following identifications.

<u>Category</u>	<u>Number of Fibers</u>
Vermiculite (image and SAED)	29
Probable vermiculite (image only)	7
Tremolite (image and SAED)	2
Probable tremolite (image only)	12
Possible tremolite (ambiguous image)	9
	59

Based on the measured fiber dimensions and the conservative assumption of fiber thickness being the same as the fiber width, fiber weights were calculated on the basis of both mean and median fiber mass. The latter is a more useful indication of central tendency in cases where a particularly large fiber found in the sample area analyzed may not be representative of the whole. The calculated values are

<u>Category</u>	<u>Fiber Mass (g) x 10⁻¹²</u>	
	<u>Mean</u>	<u>Median</u>
Tremolite	2.84	2.84
Tremolite + probable tremolite	8.44	2.40
Tremolite + probable tremolite + possible tremolite	13.87	2.61

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Arthur D. Little, Inc.

June 27, 1983

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<u>Category</u>	<u>Fiber Mass (g) x 10⁻¹²</u>		<u>Mean</u>	<u>Median</u>	<u>1.44</u>	<u>2.53</u>
	<u>Mean</u>	<u>Median</u>				
Tremolite	2.84	2.84				2.53
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$$\times \frac{1}{20 \text{ pores}} \times 10^6 \text{ (ppm)} = 0.24 \times 10^{12} \times \text{Fibers x Fiber mass (g)}$$

This gives the following results for observed concentrations of tremolite fibers in Monokote MK-5.

	<u>Basis:</u>		
	<u>Average Mass</u>	<u>Median Mass</u>	
Tremolite	1.4 ppm	1.4 ppm	2.53
Tremolite + probable tremolite	28.4	8.1	3.7
Tremolite + probable tremolite + possible tremolite	76.6	14.4	7.4

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△ Arthur D. Little, Inc.

June 27, 1983

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Dr. Julie Yang
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W.R. Grace & Co.

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