



cc: to:
WH
JW
BW/BB
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J. H. H.
File CPSC

MEMORANDUM

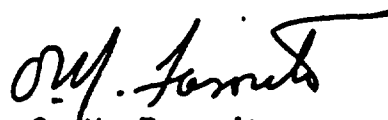
06157367

December 5, 1979

TO: F. W. Eaton
FROM: O. M. Favorito
RE: Sittenfield Associates

Attached please find a letter dated November 29, 1979 received from Lisa Barrera in the Assessment Division, Chemical Review and Evaluation Branch of EPA confirming our meeting on Tuesday, December 11, 1979 at 2:00 P.M. in Room 1209, East Tower, 401 M Street, S.W. The letter also sets out the additional specific information EPA is requesting.

Also enclosed please find a report submitted by Calculon entitled "Occupational Hazards of Vermiculite" prepared by Susan Hunsicker and Marcus Sittenfield dated November 4, 1979. Much of the report is devoted to Grace's vermiculite operations.


O. M. Favorito

OMF/rj
Enclosures

cc: E. S. Wood
R. M. Vining
R. Locke

06157368

David C. Evans, Esquire
1150 Connecticut Avenue, N.W.
Suite 900
Washington, D.C. 20036

Dear Mr. Evans,

This letter is to confirm our telephone conversation regarding the planned visit to the EPA by representatives of W.R. Grace and Company. The meeting is scheduled for Tuesday, December 11, 1979, at 2 pm in room 1209, East Tower. Our address is 401 M Street S.W., Washington, D.C. 20460.

Topics to be discussed at the meeting will include:

- (1) ~~plant information, such as specific process-related~~
work areas. We are interested in looking at process flow diagrams of your various plants.
- (2) monitoring data, especially available data on measured asbestos and vermiculite exposure levels at each work station.
- (3) employee information with regard to the 420 hourly employees mentioned in the Calculon report. For example, what process-related work areas are they involved in, what is the duration of their shifts, and are they rotated between work stations during shifts?
- (4) analytical methods, specifically, the methods you used to analyze the vermiculite samples.

A copy of the report prepared by Calculon is attached. Any additional comments concerning this report are welcome.

Harry Teitelbaum, Ph.D., Robert Carton, Ph.D., and I will be attending the meeting from our division. We look forward to meeting with you and discussing these issues. Please feel free to call me if you have any questions. 06157369

Very truly yours,

Lisa Barrera

Lisa Barrera
Assessment Division (TS-792)
Chemical Review and
Evaluation Branch

Attachment

0615737C

OCCUPATIONAL HAZARDS OF VERMICULITE

November 14, 1979

CONTRACT NO. 68-01-3899

TASK NO. 29

(CALC - 4601-123)

Submitted to:

Michael Weaver

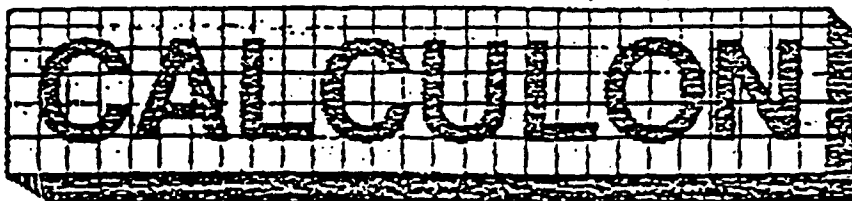
Office of Toxic Substances

U. S. Environmental Protection Agency

Prepared by:

Susan Hunsicker

Margaret Sittenfield



Formerly ... AUERBACH Associates, Inc.

121 North Broad Street
Philadelphia, Pennsylvania 19107

1. USES AND USERS (Ref. 1,2,3,4)

Vermiculite is used primarily in the building industry, where it serves a number of functions. It is used as an aggregate in making light weight concrete for construction beams and roof decks. It is also used to make fireproof coatings and insulating materials. Since 1976, it has been used increasingly as building insulation, due to heightened demand for all forms of home insulation, and tightened supply of other insulating materials. Vermiculite also serves as an insulating medium in steel mills to permit molten ingots to cool slowly to prevent formation of a "pipe".

Another important use area for vermiculite is in horticulture and agriculture where it is a component of special soil preparations and a fertilizer carrier. Additionally, it is used as a component of mine sealants, an ion exchange medium and adsorbent for metals, and a catalyst carrier.

Table I shows consumption patterns for exfoliated vermiculite by use category. In addition, about 21,000 tons of crude vermiculite were consumed in 1977 for various end uses without exfoliation.

TABLE I. EXFOLIATED VERMICULITE SOLD OR USED, BY END USE (Ref. 4)

USE	1975		1976		1977	
	SHORT TONS	PERCENT OF TOTAL	SHORT TONS	PERCENT OF TOTAL	SHORT TONS	PERCENT OF TOTAL
AGGREGATES:						
Concrete	75,000	32	67,710	25	65,920	21
Plaster	4,000	1	3,099	1	3,599	1
Premixes ¹	38,000	17	39,450	15	30,130	9
Total ²	117,000	50	110,260	41	99,650	31
INSULATION:						
Loose Fill	39,000	17	39,050	14	74,900	23
Block	35,000	15	39,310	15	50,980	16
Packing	—	—	390	—	168	—
Total ²	74,000	31	78,750	29	126,000	39
AGRICULTURE:						
Horticulture and soil conditioning	31,000	13	36,380	13	40,780	13
Fertilizer carrier	7,000	3	37,450	14	47,580	15
Total ²	38,000	16	73,830	27	88,360	28
MISCELLANEOUS						
	6,000	3	7,334	3	6,797	2
Grand Total ²	235,000	100	270,200	100	320,800	100

Revised.

¹ Includes vermiculite used in premises for acoustic and fireproofing purposes; decorative purposes.

.. MANUFACTURERS (Ref. 2,3,4)

There are five companies mining vermiculite in the United States. They are American Vermiculite, Southland Vermiculite, Virginia Vermiculite, W. R. Grace Co., and a one-man operation in Travelers Rest, S. C. About 80% of the market is controlled by Grace, who sells exfoliated vermiculite as well as the crude ore.

In addition to Grace, there are some 17 companies located in urban areas throughout the United States where vermiculite is exfoliated. They have smaller overall operations than Grace, with gross businesses of \$2 million or less annually.

Other products manufactured by these companies include the horticultural and building materials prepared at blending sites. Varying amounts of vermiculite are mixed with concrete, peat moss, clay or other materials, depending on the finished product desired.

Usage of vermiculite for agricultural purposes and building insulation tends to be seasonal, with sales peaking in the fall. Greater seasonality is evident in northern states because of a shorter growing season and diminished building construction during the winter months. However, furnace plant operations usually remain fairly constant in order to build a stockpile to meet seasonal demand.

III. MANUFACTURING PROCESSES AND HANDLING PROCEDURES (Ref. 3)

At W. R. Grace & Company's Montana site, vermiculite is mined by strip mining techniques using heavy earth moving equipment. The material is brought from the mine in totally enclosed containers to the beneficiating plant, where impurities are removed from the vermiculite by flotation. The purified crude vermiculite is then shipped to exfoliating plants throughout the United States in closed cans. Here it is unloaded onto an enclosed conveyor and carried to storage silos. The crude vermiculite is then fed into the exfoliating (expanding) furnace, which may be either a special design vertical furnace or a rotating horizontal kiln type unit. Most of the Grace exfoliating plants have blending units with them where the various building and horticultural end products are prepared.

In a typical exfoliating plant, each shift would have three men in operations and two men for other work per furnace. In mining and beneficiation, over half of the workers are non-operating support personnel. Three to four people per line work in blending operations.

Similar procedures would be followed at Grace's South Carolina site and by the other smaller vermiculite mining and exfoliation concerns.

The largest vermiculite producer, W. R. Grace, employs about 230 people at their two mines and beneficiating operation. The greater number of these workers is non-operating support personnel. In their 30 exfoliating plants, Grace employs some 420 hourly workers. These plants generally run on a 24-hour, 3 shift basis, with three men in operations and two men for other work per shift, per furnace. A plant typically contains one to four furnaces. Blending operations use three to four people per line.

According to the Grace representatives, many precautions are taken to limit employee exposure. As described in Section III, the vermiculite is transported in closed containers and conveyors. At the mine, workers operate equipment from enclosed air conditioned cabs. The mine site is continually wet down and roads are oiled to minimize dusting.

At beneficiation, all equipment is enclosed. Vacuum cleaning systems keep equipment under negative pressure, and the vented air is passed through a bag house filter.

Similar procedures are followed at the expanding furnace locations between discharge from the furnace and bagging. The vermiculite remains within a closed system fitted with vacuum air handling equipment and a bag house filter to prevent dust emission.

Industry spokesmen stated that a form of asbestos has been found in some vermiculite as mined and after exfoliation. The Grace spokesmen commented that the asbestos found in the vermiculite is the mineral tremolite, structurally different from and less hazardous than chrysotile, the basic mineral form of asbestos. The industry considers the OSHA/NIOSH testing method currently in use to be inadequate, because it cannot distinguish between the two types of asbestos fiber. The U. S. Bureau of Mines technique is considered more sophisticated, being capable of evaluating "true" asbestos concentration.

Studies on vermiculite and its asbestos content have been made by the Taft Labs (Cincinnati) of OSHA (NIOSH). Studies were also done for the Vermiculite Association by the Ontario Research Foundation, which found the asbestos content of vermiculite to be well within OSHA limits or non-existent. The Grace spokesmen concurred with this finding. Their control methods keep the asbestos level well below the OSHA TWA level of 2 fibers per cc of air per 8 hours. Their final products meet EPA standards of not more than 1% asbestos.

No data were located on concentrations or exposure to vermiculite itself or on expanded versus unexpanded vermiculite.

BIBLIOGRAPHY

1. CA Search (on-line data base). 1972 - present. Chemical Abstracts Service, Columbus, Ohio.
2. Cody, Jack. 1979. Technical Director, Vermiculite Association, and American Vermiculite Company, Atlanta, Ga. Personal communication, October 24th.
3. W. R. Grace & Company, 1979. Building Products Division. Meeting, November 8.
4. Haines, Stanley K. 1976 and 1977. Vermiculite in: Minerals Yearbook. U. S. Bureau of Mines. U. S. Government Printing Office, Washington, D. C.

~~NOTE: All references consulted are cited in the report.~~