

JOHNS-MANVILLE

RESEARCH & ENGINEERING CENTER

P.O. BOX 159 • MANVILLE, NEW JERSEY • TELEPHONE: (201) RANDOLPH 2-9000



September 18, 1968

Mr. E. Lovick
ZONOLITE DIVISION
W. R. Grace & Co.
P.O. Box 609
Libby, Montana 59923

Dear Mr. Lovick:

An Industrial Hygiene Survey of the Libby, Montana Mine and Mill was conducted during the week of July 15, 1968. The survey was conducted by R. D. Hindmarch, Supervisor, Industrial Hygiene, Johns-Manville Products Corporation, with assistance from P. Kostic, Safety Administrator, Dewey and Almy Chemical Division.

Prior to the survey, eleven samples of vermiculite were forwarded to the Johns-Manville Research Center for analysis. All of the eleven samples were collected on April 24, 1968, and are as follows:

<u>Sample Number</u>	<u>Sample Description</u>
1-A	Vermiculite Concentrate
1-B	Expanded Vermiculite
2-A	Vermiculite Concentrate
2-B	Expanded Vermiculite
3-A	Vermiculite Concentrate
3-B	Expanded Vermiculite
4-A	Vermiculite Concentrate
4-B	Expanded Vermiculite
5-A	Vermiculite Concentrate
5-B	Expanded Vermiculite
	Raw Ore Mill Feed Vermiculite

X-ray powder diffractometer diagrams taken for qualitative analysis of these samples show them all to be mixed layer minerals of either biotite-vermiculite or hydro biotite-vermiculite composition.

No crystalline silica was identified from these patterns and quantitative analysis show these samples to contain less than one per cent quartz and less than one per cent cristobalite.

Mr. E. Lovick

-2-

September 18, 1968

The second part of the analysis consisted of examining the samples by the petrographic method for quartz, cristobalite, and asbestos minerals.

Petrographic examination failed to show any quartz, cristobalite, or chrysotile, but did show small amounts of a material having fibrous or splintary characteristics, and showing optical properties within the range of values reported for tremolite. The amount of tremolite detected was of the order of about 1 to 2 percent in the concentrate samples, and about 1 percent in the expanded samples.

Upon completion of this phase of the analysis, a meeting was held between P. Kostic and R. D. Hindmarch to discuss the low percentage of tremolite found in the samples. It was then decided that during the survey, hi-volume air samples should be taken to determine the amount of tremolite in the ambient air.

The description and results of the hi-volume samples are as follows:

<u>Sample Number</u>	<u>Sample Description</u>	<u>Tremolite in Percent</u>
1	First Floor - center of room	23
2	Second Floor - center of room	17
3	Third Floor - center of room	16
4	Fourth Floor - center of room	14
5	Fifth Floor - center of room	12
6	Sixth Floor - center of room	22

Petrographic examination of the above six samples showed a micaceous mineral resembling biotite, and substantial amounts of tremolite. Samples 1, 2, and 6 appeared somewhat higher in tremolite than did Samples 3, 4, and 5. The method failed to show any free silica minerals or chrysotile asbestos.

X-ray powder diffractometer diagrams taken for qualitative analysis of these samples show them all to be mixed layer minerals of either biotite-vermiculite or hydrobiotite-vermiculite and a minor amount of tremolite. Crystalline silica was not identified in these samples but interference of the tremolite pattern made it impossible to be certain that no quartz was present.

The threshold limit value for tremolite is 5.0 MPPCF (million particles per cubic foot of air). Based on the above analysis it would indicate that this threshold limit value would be applicable to your operation.

Simultaneously, as hi-volume air samples were being taken, impinger samples were obtained of the dust in the atmosphere. This survey was conducted according to the standard procedure for sampling and counting dust adopted by the Fifth Annual Meeting of the National Conference of Governmental Industrial Hygienists in 1942.

The results of the survey are as follows:

Mr. E. Lovick

-3-

September 18, 1968

<u>Station Number</u>	<u>Station Location</u>	<u>First Sample</u>	<u>Second Sample</u>
1-1	First Floor - Approximately 10' East of 606 Elevator	2.4 MPFCF	2.7 MPFCF
1-2	First Floor - Approximately 10' East of 109B Hi-Grade Dryer Burner	1.4 "	1.3 "
2-1	Second Floor - Approximately 5' East of 607 & 608 Elevators	8.6 "	8.4 "
2-2	Second Floor - Approximately 12' East of 602 & 603 Elevators in front of Switchboard	1.0 "	0.9 "
2-3	Second Floor - Approximately 5' South of 234 & 235 Vibrating Screens	10.1 "	10.5 "
3-1	Third Floor - Approximately 4' East of 606 & 607 Elevators	4.5 "	6.4 "
3-2	Third Floor - Between 304 Roll Crusher & 602 Elevator at Building Column	6.0 "	6.1 "
3-3	Halfway between 332 Elevator & 329 Screw Conveyor	2.5 "	1.4 "
4-1	Fourth Floor - Halfway between 606 Elevator & 418 Vibrating Screen	3.4 "	2.7 "
4-2	Fourth Floor - Halfway between 410 Vibrating Screen & Switchboard	3.2 "	3.1 "
4-3	Fourth Floor - Approximately 10' East of 619 Elevator	2.8 "	3.6 "
5-1	Fifth Floor - Approximately 5' North of 501 & 502 Vibrating Screens	4.0 "	5.7 "
5-2	Fifth Floor - Approximately 5' West of 507 Vibrating Screen	3.8 "	4.4 "
5-3	Fifth Floor - Approximately 5' South of 512 Vibrating Screen	1.8 "	1.6 "
6-1	Sixth Floor - Halfway between 615 Elevator and 611 Drag	5.4 "	5.0 "
6-2	Sixth Floor - Approximately 5' East of 608A Screw Conveyor	5.3 "	5.3 "
6-3	Sixth Floor - Halfway between 618A Screw Conveyor and Switchboard	5.0 "	3.0 "
	Sheet Metal Shop - center of room	1.2 "	1.2 "
	Machine Shop - center of room	0.6 "	0.9 "
	Warehouse - center of room	0.5 "	0.7 "
	Expanding Plant - at bagging unit	0.9 "	1.3 "

E. Lovick

-4-

September 18, 1968

<u>Station Number</u>	<u>Station Location</u>	<u>First Sample</u>	<u>Second Sample</u>
	Inside Euclid Truck - from Mine to dump and return		
	Inside Diesel Shovel Operators Cab at Pit	3.0 "	
	Inside Truck Cab at Lower Bin while loading	4.6 "	
	Inside Truck Cab at River Bin while unloading	5.4 "	
	Inside Skip Operators Control Booth at Mill	3.9 "	

During the survey the following conditions were noted:

- A. Numerous visible dust leaks from equipment on all floors of the Mill.
- B. Material periodically falling off conveyors onto floor.
- C. Moderate to heavy accumulation of dust on floors, machinery and building structure.
- D. The use of brooms and air hoses for cleaning purposes.
- E. Visible clouds of dust drifting through the open windows creating a moderate to heavy atmosphere of dust throughout the Mill.

Photographs were taken, where possible, to better define the sampling areas. They are attached and numbered to correspond with the station locations which are listed on pages 3 and 4 of this report.

Also attached are drawings of the separate floors of the Mill with the station location listed.

Very truly yours,

Ralph D. Hindmarch, Supervisor
Industrial Hygiene

RDR/aa

Attach. (2)

cc: R. W. Sterrett
ZONOLITE DIVISION
W. R. Grace & Co.
Merchandise Mart Plaza
Chicago, Illinois 60654

P. Kostic
ZONOLITE DIVISION
W. R. Grace & Co.
62 Whittemore Avenue
Cambridge, Mass. 02140
(With Attach.)

Photo 1-1

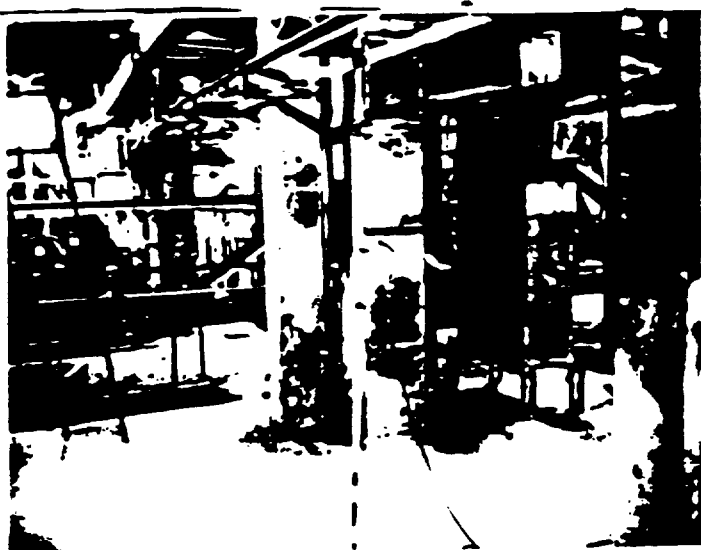


Photo 1-2

26177



Photo 2-1



Photo 2-2

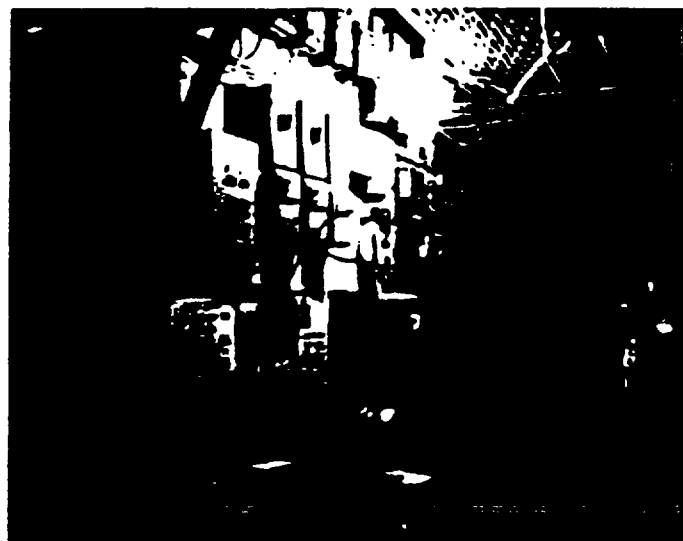


Photo 2-3



Photo 3-1

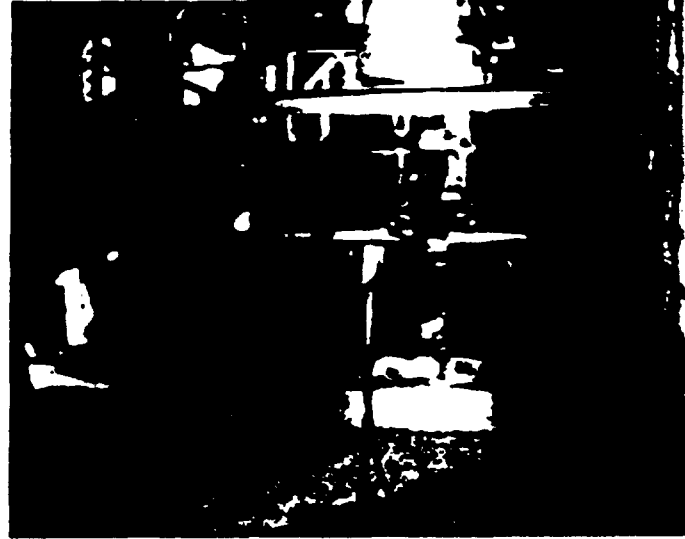


Photo 3-2



Photo 3-3



Photo 4-1

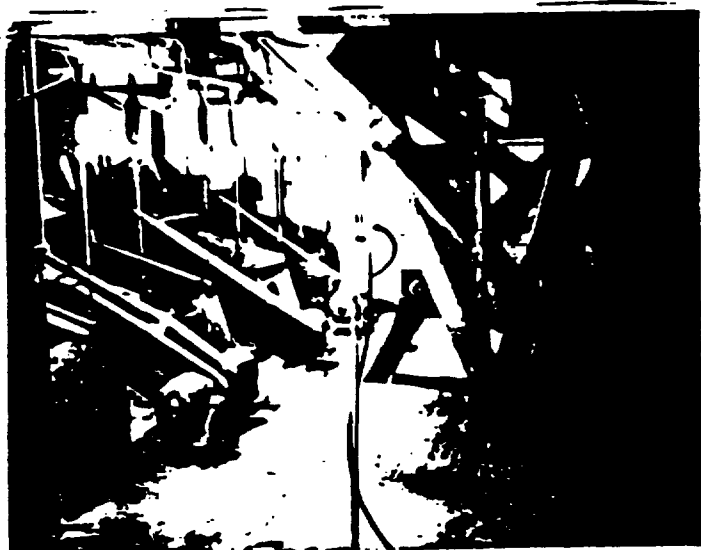


Photo 4-2



Photo 4-3



Photo 5-1



Photo 5-2

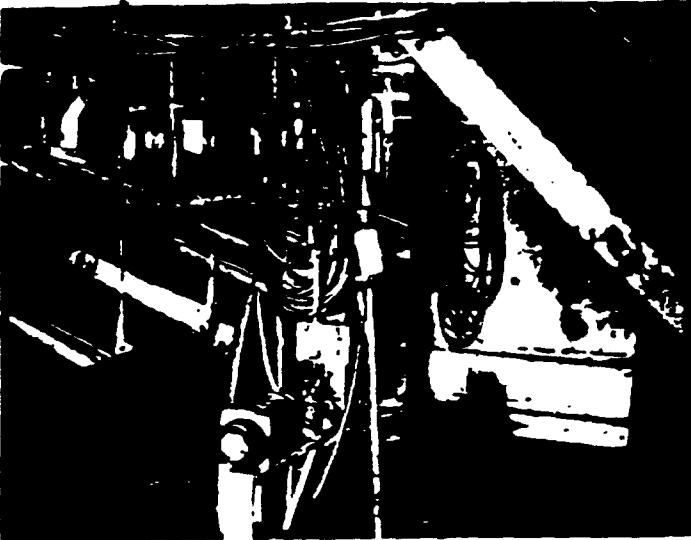


Photo 5-3



Photo 6-1



Photo 6-2



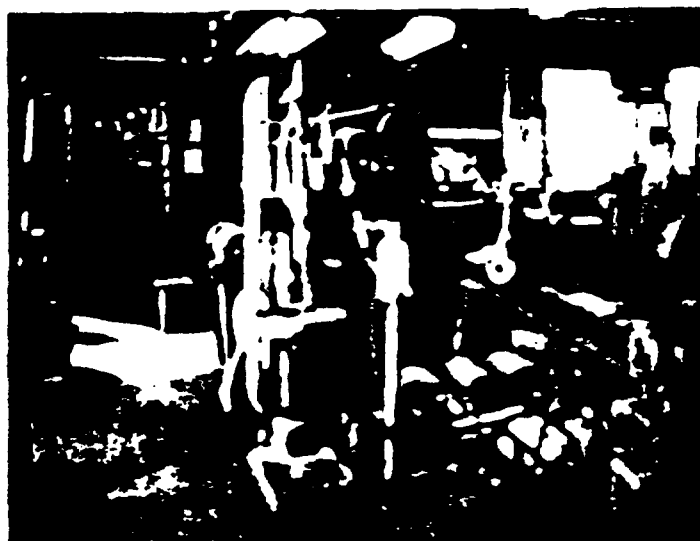
Photo 6-3



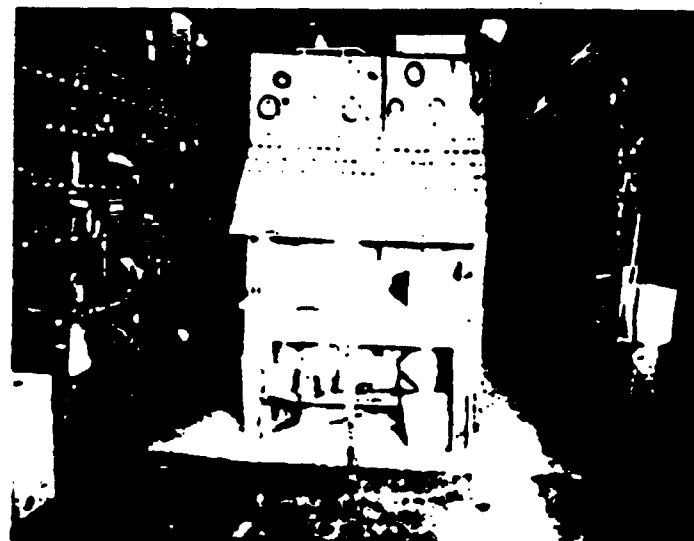
Sheet Metal Shop



Machine Shop



Warehouse



Expanding Plant

