JOHNS-MANVILLE CORPORATION
TWENTY-TWO EAST FORTIETH STREET
NEW YORK, N.Y.

EXECUTIVE OFFICES

January 12, 1940.

Mr. Sumner Simpson,
President,
Raybestos-Manhattan, Inc.,
Bridgeport, Conn.

Dear Mr. Simpson:

Supplementing Dr. Gardner's latest report on his experiments with asbestos dust, I am enclosing herewith copy of a letter containing the comments of Dr. A. J. Lanza on the results thus far attained.

You will note that in his opinion it would be well worth while to have Dr. Gardner pursue his experimental work to its conclusion.

Sincerely,

Vandiver Brown

Vandiver Brown,
General Attorney.

VB:y
Enc.

(d) Anthophyllite - stiff, straight fibres - atypical asbestosis bodies forms slowly but no localization or fibrosis in lungs.

(e) Amosite - Ditto.

(f) Amphibole - Ditto.

(g) Tremolite - Ditto but very few asbestosis bodies - Observation being continued.

V Control Mineral

(a) Granular Serpentine of same chemical composition as chrysotile is inert causing no fibrosis in lungs or other organs. It attracts iron from the lungs but of course, no "bodies" develop.

(b) Glass Wool (a synthetic silicate) fibres are not inhalable from air-borne suspensions, apparently because of their stiffness (the diameter is not responsible as some used were less than 1 micron thick) On injection into the lungs, they do not localize in the air tubes but are widely scattered. They cause no fibrosis. After 3 or 4 months in contact with lung fluid, a few glass fibres take up iron but remain smooth. They never show the swollen ends and lateral projections of the true asbestosis bodies.

(c) Brucite of interest because it is a fibrous mineral practically free of silica (0.9%). Crystallographically the arrangement of its Mg and OH groups in each unit cell is similar to that in chrysotile. The sample used also contained about 16% iron, probably from contaminating magnetite. The fibres are stiff and needle like. Observations not yet completed but after 2 months in the lungs, typical asbestosis bodies develop but there is as yet no fibrosis. The fibre are scattered through the lung inste of being localized inside the terminal air tubes and tissue reaction occurs around, instead of within the tubes.

VI Chemical Composition in Relation to Irritation

(a) Nothing in the following chemical compositions can be correlated with variations in capacity to provoke tissue reaction.

(See Table Next Page)

	Chrys-otile	Crocid-olite	Antho-phyllite	Amosite	Amphi-bole	Tremolite	Brucite
SiO_2	37.43%	54.99%	57.45%	46.23%	55.04%	56.20%	0.90%
Fe_2O_3	2.35%	16.27%	0.81%	4.06%	3.08%	7.21%	6.78%
FeO	0	4.29%	0 ?	33.83%	0	0	9.36%
Al_2O_3	0.36%	1.02%	0.25%	1.09%	1.69%	0.56%	0.46%
CaO	0.05%	0.79%	0.44%	2.01%	12.22%	4.45%	0.40%
MgO	38.77%	12.25%	29.64%	6.29%	23.29%	20.62%	63.99%
Na_2O	0.29	6.92	0.52	0.33	0.40	6.78	0.91
K_2O	0.08	0.57	0.15	0.10	0.12	0.99	0.16
Loss <105°	4.30	0.02	0.62	0.66	0.32	0.34	0.53
>105°	14.92	2.56	2.42	1.51	3.69	2.78	26.66

(b) Acid treatment of chrysotile fibres

i One hour in dilute or concentrated HCL does not alter appearance of fibre but after such treatment it rapidly dissolves and disappears on injecting into living tissues.

ii Treatment with CO_2 bubbled through water or lung juice suspensions of chrysotile fibres causes partial solution with liberation of silica and magnesia.

(c) Colloidal allumina does not neutralize the effects of asbestos as it does quartz. On injecting chrysotile suspended in aluminum hydrate solution, fibrosis and asbestos bodies develop at the usual rate. It remains to demonstrate whether the fibres become coated with a layer of aluminum monohydrate as has been proved in the case of quartz. If they have, the coat does not affect their capacity to irritate tissue.

VII Physical Properties in Relation to Irritation of Lung Tissue

(a) Length of Fibre

Short chrysotile fibres under 3 microns are practically inert. 20 to 50 micron fibres cause typical fibrosis.
The effects of longer ones could not be tested for technical reasons.

(b) Crushing completely destroys the fibrous structure of chrysotile. With loss of structure, all capacity to irritate disappears.