PLAINTIFF'S EXHIBIT

DOW-1119

May 31, 1944

Mr. U. E. Bowes
Director of Research
Owens-Illinois Glass Company
Toledo, Ohio

RE: Hydrous Calcium Silicate Animal Experiments

Dear Mr. Bowes:

I am only just now in a position to submit a final report on the results of our animal assay of the physiological effects of your product designated "Hydrous Calcium Silicate".

As received the material was too coarse for animal injection tests. After further reduction in size it proved to be quite toxic when injected into guinea pigs so that it was necessary to repeat many of the tests. However, enough animals survived for a sufficient period so that the general characteristics of the tissue reaction could be evaluated. Such reaction had none of the appearances of a silicosis but did resemble asbestosis.

One would conclude that if the dust of this material were ground sufficiently fine to be inhaled in appreciable quantities it would probably produce a pulmonary disease simulating asbestosis. However, the appended data indicate that in the samples submitted the particle size of the components was such that inhalation of most of the components would be difficult. You are in a better position than we to know whether these samples are representative of the air-borne dust in your plant. In my opinion the dust of this "hydrous calcium silicate" is potentially dangerous if in processing the material the particle size is reduced considerably below that in the samples submitted.

The appended report contains details of the physical and chemical characteristics of the dust samples and of the animal tests made to test its physiological activity.

I enclose a statement for our services.

Very truly yours,

DEFENDANT'S EXHIBIT 35/45

Leroy U. Gardner, M. D.
Director

LUG:RH

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P. S. If you could refer me to any literature on the effects of water on asbestos and its subsequent gelation it would be appreciated.

All-as collected, this box contained materials, not claimed as privileged, which were acquired or assembled during the course of litigation and were not part of OC's Historical Files. These materials are separately maintained and are available for inspection upon request.

On February 2, 1943 we received from Owens Illinois Glass Co., two samples of a new product designated as "Hydrous Caloium Silicate" for assay of physiological hazard of inhalation of inhaled dust. They were labeled respectively "Sander Dust" and "Rotoclone Dust."

Preliminary inspection indicated that they were mixtures of particulate and fibrous materials, the latter having the characteristics of asbestos. A combined petrographic and X-ray diffraction analysis revealed the following approximate compositions:

ROTOCLONE DUST

	X-RAY	PETROGRAPHIC	APPROXIMATE SIZE ETC.
Quartz	12%	20 to 30%	6 to 80 microns. Little less than 10
Calcite	3	10 to 20	Altered (by heat?)
Glass?	-	10	----------
Chrysotile (Asbestos)	25	40	Few single fibres less than 50 micron More less than 20 microns. Most of t single fibres more than 100 microns. Much in unopened bundles.
Hydrated Ca Silicate	50	—	----------
Diatomite	Trace	--	----------

SANDER DUST

Quartz	7.5%	5 to 10%	6 to 120 microns
Calcite	3	10	Altered
Fibres			
Chrysotile	25	--	Similar to that from rotoclone
Wood	—	20 to 40	Coarse, matted together
Hydrated Ca Silicate	25 to35?	—	----------

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ANIMAL ASSAYS

The material as received was too coarse to be injected into animals and had to be reduced to proper particle size. Grinding was not feasible owing to the presence of chrysotile whose structure and irritating properties are destroyed by prolonged grinding. We were therefore compelled to reduce it by prolonged cutting with scissors, sieving through a 200 mesh screen and adjusting the proportion of fibres and particulate matter in the product to that of the original specimens.

Portions of each sample were made up in physiological salt solution in strengths of 5 and 10% for guinea pig injection. The pH of the rotoclone sample was 7.5 which should cause no tissue irritation. That of the sander dust was 9 which is too alkaline to be well tolerated. The 10% suspensions were injected intraperitoneally, a single dose of 2 c.c. ie. 500 mg of dust. The 5% suspensions were administered directly into the lungs by tracheal catheter, 3 doses of 0.5 c.c each at intervals of 6 days, a total of 75 mg of dust.

Intraperitoneal injections of neither sample were well received; 60% of those treated with the rotoclone sample died within 2 to 3 weeks and 80% of the ones getting the sander dust were dead in 9 days. All these pigs showed acute inflammatory changes about masses of dead cells where large accumulations of the dust had localized. The early result could not be evaluated except for the fact that it never occurs after the injection of quartz or asbestos alone. However, there were 3 animals that survived for 8 months, 2 receiving rotoclone dust and one, sander dust. In neither of them was there any suggestion of silicosis on gross or microscopic examination. An asbestotic change is not

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recognizable outside of the lungs and hence would not be expected in this group.

Intratracheal injections were somewhat better tolerated particularly in the case of the rotoclone sample where there were only 2 deaths among 6 animals and these occurred 6 to 10 months after completing the injections. Of the sander dust animals 3 died of acute reaction during the period of injection, presumably on account of the high alkalinity. One was killed 1 month and another 4 months after completing the injections.

Both samples produced fibrosis within and about the terminal bronchioles in all animals surviving for 1 month or more. This reaction was generally comparable to that observed on injecting pure chrysotile asbestos. Typical asbestosis bodies were present in small numbers and the distribution of the lesions was typical of injection asbestosis. The only difference was a tendency for the fibrous tissue to be more dense and somewhat hyalinized after 5 to 10 3/4 months. This effect is probably attributable to the quartz in the mixture. Nothing suggestive of silicotic nodular fibrosis could be discovered either within the lungs or the associated tracheobronchial lymph nodes.

Summary: After further reduction in size the two samples of this mixture of asbestos, wood fibre, quartz and hydrated calcium silicate is toxic on intraperitoneal and intratracheal injection into guinea pigs The high alkalinity of the sander dust probably accounts for the earlier deaths in the case of intraperitoneal injection where a large dose is concentrated in a localized cavity and absorption is rapid. However, the deferred deaths from the rotoclone sample with a pH of only 7.5 suggests some other injurious property.

materials are separately maintained and are available for inspection upon request.

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ANIMAL ASSAYS CONT'D

The chronic effects in the few animals surviving for a month or more are apparently due to the fibrous components of the dust and their nature indicates that asbestos is responsible. This is somewhat modified either by previous treatment of water or by the associated quartz but there is nothing suggestive of silicotic nodular fibrosis. If the hydrous calcium silicate has any part in the picture such part is not recognizable.

Whether manufacture or use of this product would ever reduce particle size to the extent that we have done is outside of the province of this study. If it should a potential hazard would be created. However, study of the two samples submitted suggests that most of the asbestos fibre is either very long or is composed of unopened bundles of fibre, neither one of which is readily inhalable.

Leroy U. Gardner, M. D.
Director, Saranac Laboratory

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May 31, 1944

Owens-Illinois Glass Company
Toledo, Ohio

To Saranac Laboratory, Dr.

Complete Study of Samples of Hydrous Calcium Silicate	$250.00

Leroy U. Gardner, M. D.
Director, Saranac Laboratory

Pd - June 17/44

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