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Borg Warner

Mead Paper Specialty

South Lee, Massachusetts 01260

Telephone 413-243-1231

May 10, 1976

Mr. Ernest Ferris
V.P. of Engineering
Spring/Brummer Division
Borg-Warner Corporation
700 South 25th Avenue
Bellwood, Illinois 60104

Dear Mr. Ferris:

In accordance with a request recently made by Mr. Niblick to Mr. Pering I am forwarding separately a package containing two items:

- a - A one pound bag of XE fiber. This is the ceramic fiber used in a recent trial as a substitute for asbestos.
- b - A bag identified as "5D04". This is a white asbestos fiber used in some of your paper grades.

I understand these are desired so they may be investigated for adverse health effect, and in this regard I enclose a write-up from our suppliers titled "Summary - Health Aspects Of Kaowool" covering the XE fiber.

If anything further is desired please let me know.

Yours very truly,

MEAD PAPER SPECIALTY

E. K. Bancroft
E. K. Bancroft
Manufacturing Manager

EKB:s

Enc.

cc: Mr. T. H. Pering

bc: Mr. J. M. Nolan
Mr. J. R. O'Donnell
Mr. E. R. Stacy
Mr. D. B. Wilkinson ✓

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SUMMARY
HEALTH ASPECTS OF KAOWOOL

The following presentation is a summary of various investigations into the effects on health of the production workers in KAOWOOL. It is believed that the results, therefore, are based on conditions which are more severe than those which would normally be encountered by a user of the finished products.

During the past several years, there have been continuing investigations to determine:

1. Whether or not, and to what degree, the dust generated during the production of KAOWOOL is a health hazard (particularly silicosis).
2. To determine the concentration of dust generated and breathed by the workers.

SILICOSIS

Samples of the raw materials and finished products were collected and sent to the Occupational Health Research and Training Facility of the U. S. Public Health Service for analyses. The results as advised by the State of Georgia Department of Public Health who conducted the tests are:

<u>Type of Product</u>	<u>Phosphoric Acid Method</u>	<u>X-Ray Diffraction Method</u>
Fibrous material with lubricant	0.4%	1%
Finished material	0.4%	1%

Analysis of the samples by X-ray diffraction reveals that there is no quartz present in any of the materials.

As a matter of information, there are three forms of free silica, quartz, cristobalite, and tridymite that may be present in any sample depending upon the temperature to which the material has been subjected. The only chemical difference in these three forms is the crystalline structure since they are all SiO_2 .

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X-ray diffraction of the KAOWOOL samples reveal it to be composed of less than one percent crystalline free silica. On this basis it is considered to be a nuisance dust with a threshold limit value of fifty million particles per cubic foot of air - Reference American Conference of Governmental Industrial Hygienists, Threshold • Limit Values for 1964, p.14. The particle size determination indicated that about 41% of the airborne dust generated is between 1 and 3 microns in size. This is the range that is deposited in the alveoli of the lungs - Reference Johnston, R. T. and Miller, S. E.: Occupational Diseases & Industrial Medicine, p. 201, Saunders 1961.

On the basis of the foregoing information, it was the opinion of D. E. Deese, Industrial Hygienist, approved by A. K. Sessions, M. D., Director, Occupational Health Service State of Georgia, Department of Public Health that KAOWOOL dust at the determined concentrations (Maximum sample tested contained 10 million particles/ft³ air) does not present a predetermined pulmonary health hazard.

General Safety Survey, June, 1967, by the Travelers Engineering and Loss Control Division stated that the results of the bulk dust sample taken during this survey in the KAOWOOL Department and analyzed by their home office Chemical Analysis Department indicated that both free silica and cristobolite show a content of less than 5% in the sample. On this basis, they felt that there is no particular problem relating to free silica in this particular area.

ASBESTOSIS

KAOWOOL is a high melting point, small diameter, hard vitreous fiber made from Kaolin. The fibers are similar in form to other vitreous fibers such as glass fiber. They are quite different in form to crystalline fibers such as the minerals known as asbestos.

KAOWOOL, like glass fiber, is amorphous and isotropic. Consequently, when it is broken by crushing or grinding it breaks into short fibers and particles of irregular shape. This is quite different from the dust produced by crushing or grinding asbestos. These minerals are crystalline with an extremely pronounced fibrous cleavage. When asbestos is crushed, the particles produced are predominately fine fibers and the more the material is crushed, the more fibrous is the dust. The diameter of the fine asbestos particles is between 0.01 microns and 0.1 microns.

KAOWOOL has no fibrous structure in a true chemical or crystallographic sense and chemically it is quite different from any form of asbestos. It is unreasonable, therefore, to suppose that the reaction of the lung to KAOWOOL fibers will be identical with the reaction in the lung to asbestos fibers.

A closer analogy to KAOWOOL is fibrous glass and it is the resin and binder of fibrous glass rather than the glass alone which causes any concern.

The present state of medical knowledge is that KAOWOOL is inert when inhaled; however, experience has shown that it is a mistake to assume that any dust is totally inert. It would, therefore, be prudent to exercise modest caution until many years of user experience with it have been accumulated without adverse effects.

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