



HEDMAN MINES LIMITED

P.O. BOX 500

TIMMINS, ONTARIO, CANADA

"Hedman Fundamental Cationic Fibre"

December 29, 1972

Mr. Harry Sheppard, Vice President
Steel Mill Products Division
Pescor Incorporated
P.O. Box 8728
CLEVELAND, Ohio 44135, U.S.A.

Dear Mr. Sheppard:

Further to our telephone discussion of yesterday we are pleased to confirm that over 99.95% of the particles in Hedman Cationic Fibre are those with which the OSHA asbestos regulations are not concerned. In view of the fact that the amount of HCF to be added to your product is quite low the total percentage of asbestos fibres above five microns (0.04%) will be further reduced depending on the exact percentage of HCF in your product.

The composition of Hedman Cationic Fibre and its position concerning Occupational Safety and Health regulations may be best described by giving clear official textbook definitions of the terms "asbestos", "chrysotile", "serpentine" and "magnesium silicates", and by relating Hedman Cationic Fibre to those terms.

"Asbestos": A general term embracing the fibrous varieties of minerals. There are several kinds of asbestos, of which the most common are: Chrysotile ($\text{H}_3\text{Mg}_3\text{Si}_2\text{O}_9$), Crocidolite ($\text{NaFe}(\text{SiO})_2\text{FeSiO}_3$), Tremolite ($\text{Ca}_2\text{Mg}_5\text{Si}_8\text{O}_{22}(\text{OH})_2$), Actinolite ($\text{Ca}(\text{MgFe})_3(\text{SiO}_3)_4$), Anthophyllite and Anosite ($\text{MgFe})\text{SiO}_3$.

Apart from being non-flammable, the characteristic all asbestos minerals have in common is a fibrous structure; they differ widely in chemical composition and physical properties. Medical authorities and British government occupational health regulations make a clear distinction between various asbestos minerals also as to their relative safety (see below).

"Chrysotile": The fibrous form of the serpentine mineral. Not as harsh or brittle as other asbestos, chrysotile is recommended by the British government as a safer substitute for South African crocidolite asbestos. British occupational safety regulations are 10 times as stringent with crocidolite than with chrysotile.

"Serpentine": A mineral (rock) which chemically belongs to the magnesium silicates. (Serpentine is a geological name, magnesium silicate a chemical term which applies also to several other minerals.) Only the variety of serpentine which is fibrous in structure is chrysotile asbestos. The platy form is either antigorite or lizardite. Lizardite is also lath-like in structure. Being non-fibrous neither antigorite nor lizardite are asbestos.

"Magnesium Silicates": Chemical term of compounds of magnesium oxide and silica. Many minerals, such as olivine, serpentine, talc, some clays, soap stone etc. are magnesium silicates.

"Hedman Cationic Fibre": A natural mixture of magnesium silicate particles produced by a special process from a unique serpentine host mineral. Electron micrograph

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studies at 17,600X (lower magnification is less accurate) indicate that only 0.04% of the particles in HCF are chrysotile fibres above 5 microns. This is arrived at as a result of there being up to 20% chrysotile fibres in the product, 0.2% of which are estimated to be above 5 microns (see report) (20% of 0.2% = 0.04%). The balance was determined to be mainly prismatic laths of lizardite 0.2 to 1.0 microns in length and non-fibrous, therefore non-asbestos. Due to the predominance of non-fibrous and therefore non-asbestos particles in HCF it should not be confused with the asbestos grades on the market. (as a similar example we may cite talcs, which are magnesium silicates, basically non-fibrous but with a content of tremolite asbestos).

OSHA

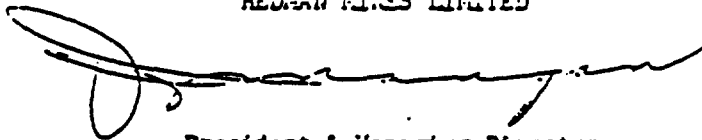
The OSHA regulations governing the exposure to air-borne asbestos dust concentrations are based on medical research, originally carried out in Britain where a higher than average rate of lung diseases was found among workers who smoked and were exposed to uncontrolled concentrations of asbestos dust, mainly crocidolite. Suspected as a possible health hazard were asbestos fibres longer than 5 microns. OSHA asbestos regulations, which limit the permissible concentrations of air-borne fibres longer than 5 microns to 5 fibres per milliliter (to be reduced to 2 fibres in 1976), are not concerned with fibres of 5 microns or shorter, or non-fibrous particles.

Based on the foregoing and on practical experience in our own operations and at our customers' plants, it is reasonable to expect that it should be much easier to comply with OSHA standards using Hedman Cationic Fibre than with the asbestos fillers tested, under identical conditions. Membrane Filter Tests provide conclusive data at each location.

Should you require anything further please give us a call.

Yours sincerely,

HEDMAN MINES LIMITED



President & Managing Director

J.J. Mangan/rb
encl.

Sources of Information

- * The New Jersey Zinc Company Research Department, Palmerton, Pa.
 - * Dana's Manual of Mineralogy (Revised by C.S. Hurlbut, Jr. Ph.D. Harvard University)
 - * Industrial Minerals and Rocks - published by the American Institute of Mining and Metallurgical Engineers.
 - * Occupational Health Bulletin, 1971, Vol. 26
 - * Department of Employment, Britain, "Health & Safety at Work"
 - * U.S. Department of Labour, OSHA, "Standard for Exposure to Asbestos Dust" 2910.93a
 - * Hygiene Standards for Chrysotile Asbestos Dust by British Occupational Hygiene Society
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