Emventions, Inc.

The following are comments pertaining to the FDA publication in the Federal Register, Vol. 33, #188, September 28, 1973, (Section 121.2006, paragraph c) of a method using polarizing light optics and media of selected indices of refraction to determine asbestos content in talc. We believe there are some serious technical limitations of the method described and that an alternative approach of surveying with the scanning electron microscope should be used.

The optical microscope has a practical resolution limitation of 0.2 μ. At the magnification of 400X described in paragraph c, the resolution is approximately 1.0 μ. These are seriously limiting factors in the detection of asbestos fibers in talc. We know from electron microscopic studies that large numbers of asbestos fibers with diameters between 0.025 μ and 1.0 μ exist naturally and have possible biological significance. Fibers in this size range cannot be detected by the method described in paragraph c because of the limited resolving power of optical microscopes.

In addition, talc is a mineral which is crushed and processed to give it certain size characteristics. We know also by electron microscopic studies that naturally occuring asbestos fibers, particularly larger ones, can be broken down into smaller fibrils by the same treatments and that these fibrils may then be undetectable by the optical microscope

requirement of 5.0 μ.

The SEM survey method has been used by the Environmental Protection Agency and the Food and Drug Administration as a survey tool for asbestos and should similarly be used in surveying talc for asbestos content. The method is direct, economical, and more accurate than the method described in paragraph c.

Transmission electron microscopy (TEM) of talc is generally not acceptable as a direct survey method because of the frequency of fibers lying on platelets; such fibers are not observed by TEM. This is also a limitation of the method described in paragraph c. In the SEM, however, all fibers lying between and on talc platelets are easily observed.

The SEM survey method does not positively identify a fiber as being asbestos. We know, however, that with a suitable set of standards, the asbestos content in a particular sample could be definitely and accurately established below a certain level by morphological characters alone. Moreover, the ability to do X-ray microanalysis on fibers enhances the accuracy of such a method.

Figure 1.

5 μ (1800X)

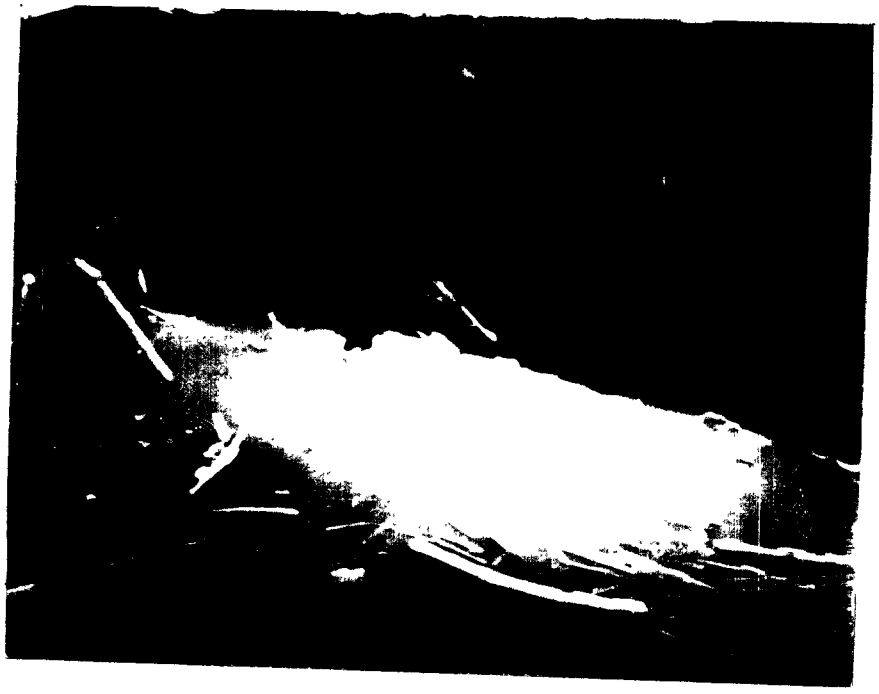

Figure 2.

5 μ (7200X)

Talc contaminated with 1% asbestos fibers (chrysotile).
Scanning Electron Micrographs

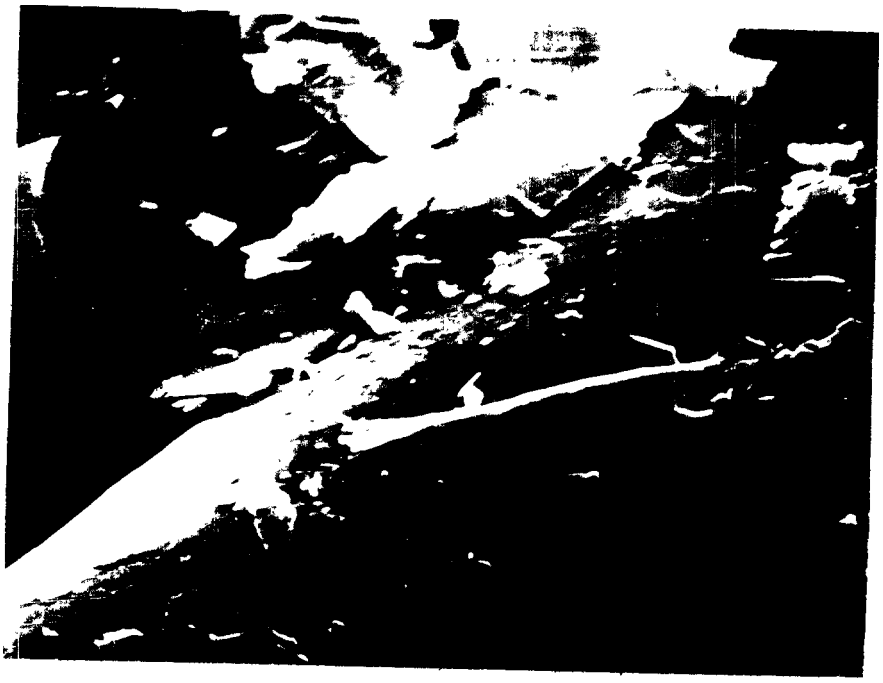

Figure 3. 5 μ (7200X)

Figure 4. 1 μ (18,000X)

Talc contaminated with 1% asbestos fibers (chrysotile).
Scanning Electron Micrographs