Standard Interpretations
/ Use of Transmission Electron Microscopy (TEM) instead of Phase Contrast Microscopy (PCM) to determine asbestos concentrations in air samples.

- **Standard Number:** 1926.1101

OSHA requirements are set by statute, standards and regulations. Our interpretation letters explain these requirements and how they apply to particular circumstances, but they cannot create additional employer obligations. This letter constitutes OSHA's interpretation of the requirements discussed. Note that our enforcement guidance may be affected by changes to OSHA rules. Also, from time to time we update our guidance in response to new information. To keep apprised of such developments, you can consult OSHA's website at http://www.osha.gov.

June 30, 2005

The Honorable Conrad Burns
United States Senator
116 W. Front Street
Missoula, Montana 59802

Dear Senator Burns:

Thank you for your letter dated March 17, 2005, on behalf of your constituent Mr. Victor L. Feuerstein, regarding his concerns about the Occupational Safety and Health Administration's (OSHA) use of phase contract microscopy (PCM) rather than transmission electron microscopy (TEM) to determine asbestos concentrations in air samples. Mr. Feuerstein's concerns grew out of the observation of asbestos contamination in areas of the James F. Battin Federal Courthouse Building during asbestos abatement work and the subsequent closure of the building on December 23, 2004, by the General Services Administration (GSA). This concern arose from the finding of asbestos fiber structures in excess of background concentrations using TEM.

On December 27, 2004, following press reports of the closure of the building, OSHA sent an industrial hygienist to initiate an inspection of the abatement work; she was accompanied by her supervisor, who had extensive asbestos-related experience. A total of 60 asbestos samples were taken at various times throughout the building, including in public areas as well as in areas occupied by Federal workers. All were reported as none-detected for asbestos fibers as determined by PCM. All analyses were performed in OSHA's Salt Lake City Laboratory.

OSHA'asbestos standard for construction operations (29 CFR 1926.1101) established a permissible exposure limit (PEL) for asbestos of 0.1 fibers per cubic centimeter of air (f/cc), measured as an 8-hour time-weighted average (TWA) concentration of fibers. OSHA evaluates compliance with the PEL, and requires employers to use PCM to determine whether employees are exposed in excess of the PEL. In deriving the PEL, OSHA conducted a

scientific risk assessment of available worker mortality studies, all of which used light microscopy, like PCM, to measure the exposure of workers. The risk assessment conducted by OSHA quantitatively related exposure, as measured by PCM, to risk of asbestos-induced death and disease. Exposure data determined by light microscopy were the only reliable data available at the time and remain so today.

There are no worker mortality studies available that relate the risk of asbestos-related health effects to exposures as measured by TEM.

OSHA acknowledges, as Mr. Feuerstein pointed out, that PCM does not count all of the asbestos fibers that may be present in the air since fibers thinner than about 0.25 microns cannot be seen using this method. The PCM method also cannot distinguish between asbestos fibers and non-asbestos fibrous particles, and requires that all fibers greater than 5 microns in length and having an aspect ratio of 3:1 be counted as if they were all asbestos fibers. While TEM is the best analytical tool to distinguish asbestos fibers from non-asbestos fibers, OSHA believes that PCM provides the best available **index** of exposure that can be used to assess health risks to workers. TEM is generally used to supplement PCM analysis when PCM analysis suggests that exposure to asbestos fibers is high and there is a need to confirm whether the fibrous structures observed with PCM are indeed asbestos fibers. PCM and TEM results do not correlate well, and no generally applicable conversion factor exists between the two measurement techniques.

OSHA found no detectable level of asbestos in any of the samples taken in the Battin Building using PCM analysis; since the limit of detection for PCM is about 0.01 f/cc, asbestos exposures in the areas of the building sampled by OSHA were 10 times or more below the PEL.

Rest assured that we take this responsibility very seriously and utilize the most appropriate technology available for making our determinations. We hope you find this information helpful to you in responding to the concerns of your constituent.

Sincerely,

Jonathan L. Snare
Acting Assistant Secretary

cc: Washington, D.C. Office

UNITED STATES
DEPARTMENT OF LABOR

Occupational Safety & Health Administration
200 Constitution Ave NW
Washington, DC 20210
800-321-6742 (OSHA)