



November 21, 2005

Ms. Rebecca J. Smith
MSHA
Office of Standards, Regulations, and Variances
1100 Wilson Blvd.
Room 2350
Arlington, VA 22209-3939

RE: RIN: 1219-AB24
Comments Related to Proposed MSHA Asbestos Regulations

Ms. Smith:

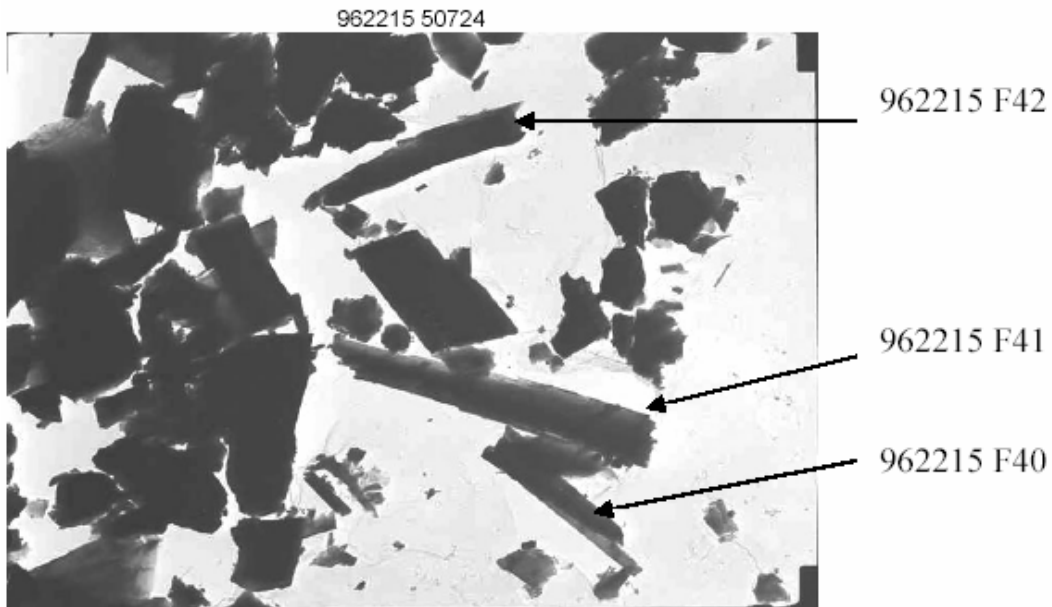
MSHA has published a proposed revision to its asbestos regulations that essentially brings MSHA exposure limits in line with current OSHA limits. We support the intent of the proposed regulations, but believe additional clarification is necessary in three areas: 1) the definition of asbestos fibers; 2) the analytical procedures used to count asbestos fibers; and 3) the classification of a particle as asbestos.

Fiber Definition

MSHA has proposed several definitions for inclusion in the regulations (page 43988, *Federal Register*, 40, July 29, 2005). The definition of fiber ("a particulate form of asbestos 5 micrometers (μm) or longer with a length-to-diameter ratio of at least 3-to-1") is inadequate. Fibers are particles with parallel sides, much as the shape of a straw. Fibers are not elongated particles with saw-tooth edges. This is a very fundamental description of a fiber that is widely and universally accepted within the analytical community.

Problems have arisen because this distinction (fibers have parallel sides) is not incorporated into various regulations. Because this additional description of a fiber is not included in the regulations, particles that are clearly not asbestos and are not regulated as such by MSHA (page 43953) are sometimes reported as asbestos. In a recent MSHA report on airborne particles at a taconite operation (MSHA, Dust Division, September 20, 2005) particles were counted that were not fibers, as shown in the figures below:

AB24-COMM-108



Debris and Fibers 2600X Magnification

Approximate Dimensions:

F40 10.1um x 1.3um

F41 15.7um x 2.2um

F42 9.5um x 2.2um



962215 F18 Magnification 10,000X

Approximate Dimensions:

9.5um x 1.9um

All of the identified particles shown in these photographs fail to meet the minimum definition of a fiber – there are no parallel sides on these particles. The laboratory acknowledged that these particles were not asbestos fibers, but were cleavage fragments ("... the fibers in these photographs were more 'fractured' in appearance ...", page 30 of report). To compound matters, MSHA interpreted the data to show the vast majority of counted airborne particles to be asbestos ("... the total percent asbestos ... ranged from 85% to 100% ...", page 7 of report).

If a correct definition of fiber had been specified in the MSHA regulations, none of the reported particles would have been counted as fibers.

Analytical Procedures

MSHA has proposed incorporating NIOSH 7400 and OSHA Appendix A as the method to use for the analysis of airborne particles. This method utilizes a phase contrast microscope (PCM) to count all visible particles that are at least 5 µm long and have a minimum aspect ratio of 3:1 (length:width). The method cannot make any differentiation between various types of particles observed in the microscope – it counts both asbestos fibers and any other elongated particle.

The PCM method does not provide any information that can be used to begin to assess whether the fibers that were counted are asbestos or non-asbestos. A modification of the PCM method was presented at the 2002 Charlottesville hearing (Lee, page 170 of transcript) which records the fibers counts in a manner that permits an evaluation of whether the fibers are from an asbestos population. The presented method is currently under consideration by the American Standard for Testing and Materials (ASTM) and will be balloted shortly.

This updated PCM method must be listed as a preferred analytical method.

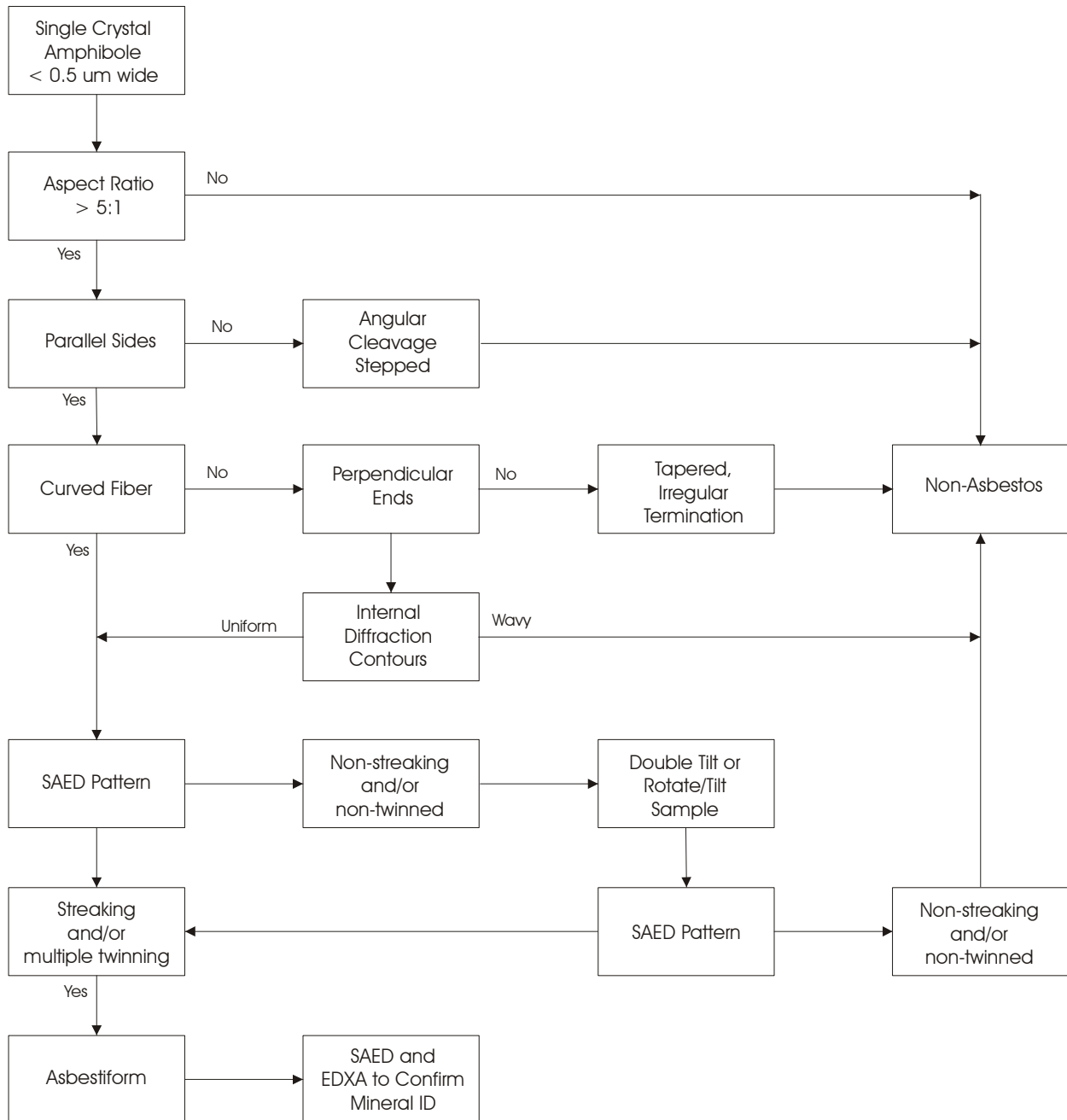
Asbestos Fiber Determination

The MSHA proposal indicates that "A determination as to whether a mineral is asbestiform or not must be made, where possible, by applying existing analytical methods" (page 43953). Unfortunately, as noted by Mr. David Dye at a meeting on October 15, 2005, there is no clearly defined procedure for making this determination within the existing analytical procedures.

As part of the investigation into the amphibole mineral found in marble located at Southdown, NJ, a procedure was used to differentiate between asbestos and non-asbestos fibers.¹ The procedure was based on well known physical characteristics of

¹ P. Liroy, et al (2001). "Quality Assurance Project Plan: Assessment of Population Exposure and Risks to Emissions of Protocol Structures and Other Biologically Relevant Structures from the Southdown Quarry", January 24, 2001.

single fiber amphibole minerals: 1) the width of amphibole asbestos fibers is generally 0.2 to 0.3 μm ; 2) the aspect ratio of asbestos fibers is $> 20:1$; 3) asbestos fibers have parallel sides; 4) the ends of asbestos fibers show regular termination; and 5) asbestos fibers show internal diffraction contours. This procedure, accepted by EPA Region 2 for the Southdown project, is shown in the following Figure:

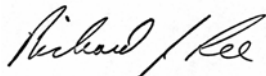


The habit of a mineral is the shape or form a crystal or aggregate of crystals take on during crystallization and is dependent on the existing environmental/geological conditions at the time of formation. Asbestiform minerals are formed through unidirectional crystalline growth that produces long thin fibers. The narrow width and long lengths of asbestos provide flexibility and high tensile strength.

Unlike asbestos, non-asbestos amphibole minerals grow in three dimensions to produce the non-fibrous (massive) form of the same mineral. When non-asbestos minerals such as amphiboles are crushed, fragments are cleaved away from the main crystal mass, a process that produces "cleavage fragments". The massive mineral will tend to fracture along sets of systematic planes within the mineral crystal and some long thin fragments may result, although the majority of the fragments will be short, non-fibrous particles. These cleavage fragments may have a similar microscopic appearance to that of true asbestos fibers; distinguishing characteristics (size, optical extinction characteristics, and morphology) can be used to segregate the asbestos from the non-asbestos particles.

Non-asbestos amphibole particles have more surface defects, a higher susceptibility for acid dissolution, and a different surface charge than do asbestos fibers. Non-asbestos amphibole particles, compared to asbestos fibers, are weak and are not flexible (more brittle).

Cleavage fragments and asbestos fibers are clearly different. While MSHA policy is to exclude cleavage fragments from the asbestos regulations, these mineral fragments are, however, being regulated as asbestos. The lack of basic definitions in MSHA regulations and the incorrect use of existing analytical procedures have created a back door regulation of cleavage fragments as asbestos fibers. It is imperative that these inconsistencies in the MSHA regulations be corrected.



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