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A Report of the IMA Working Group on Asbestiform Minerals

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Proposed definitions of “asbestos” and related terms by the IMA WORKING GROUP on “Asbestos, asbestiform minerals, and other respirable minerals that pose potential negative health risks”



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Introduction

- The nature and appropriate description of “asbestos” and related terms has been the object of discussion for about 50 years. Notwithstanding, there is still controversy as to which mineral occurrences should be classified as “asbestos” occurrences.
- To date, the literature reports at least 15 mineralogical, industrial, regulatory, interdisciplinary definitions of the term “asbestos”.
- One of the first good examples:
“six fibrous silicates are classified as “asbestos”: the fibrous serpentine called chrysotile and the fibrous amphiboles actinolite, amosite, anthophyllite, crocidolite and tremolite” (US Department of Labor “Occupational exposure to asbestos”, 1975).

Introduction

- The WG was elected during the IMA 2018 meeting in Melbourne with the proposal prompted by the need to disclose existing ambiguities in the definition of “asbestos” and related terms. This lack of clarity in terminology continues to lead to widespread confusion in the regulatory process and health-related literature with consequences for workers’ protection and research advances.
- The main goal of the WG was to discuss and recommend, if possible, a set of definitions for terms most often misused.
- After 4 years of discussion, definitions were delivered but the group was unable to come to unanimous agreement on all the proposed terms and different views on several key definitions has remained. A set of definitions was voted and a 2/3 majority of the members voting approved the proposed terms.

Definition - 1

Elongate Mineral Particle

Any mineral particle with a length:width ratio (aspect ratio) of 3:1 or greater assuming the width of a particle to be an apparent parameter defined as the longest dimension of the particle in the plane perpendicular to length and the shortest dimension of the two-dimensional outline of a particle.

Definition - 2

Mineral fiber

Any elongate mineral particle that attained its shape during formation in nature with an aspect ratio sufficiently large to impart flexibility to the particle.

Definition - 3

Fibril

A single crystal of mineral fiber which cannot be further separated longitudinally into smaller components.

Definition - 4

Cleavage fragment

Any elongate mineral particle formed by fragmentation. It may have the same chemical formula as the fibrous or asbestiform variety but it is brittle and cannot separate longitudinally into fibers or fibrils.

Definition - 5

Fibrous

The crystal habit that describes particles having the appearance of a mineral fiber.

Definition - 6

Asbestiform

The crystal habit displayed by elongate mineral particles composed of bundles readily separable into fibers or fibrils which are aligned parallel to their common fiber axis direction but randomly or semi-randomly in the directions perpendicular. Both macroscopically and microscopically, the fiber bundles can display frayed/splayed ends and can be flexible and bent.

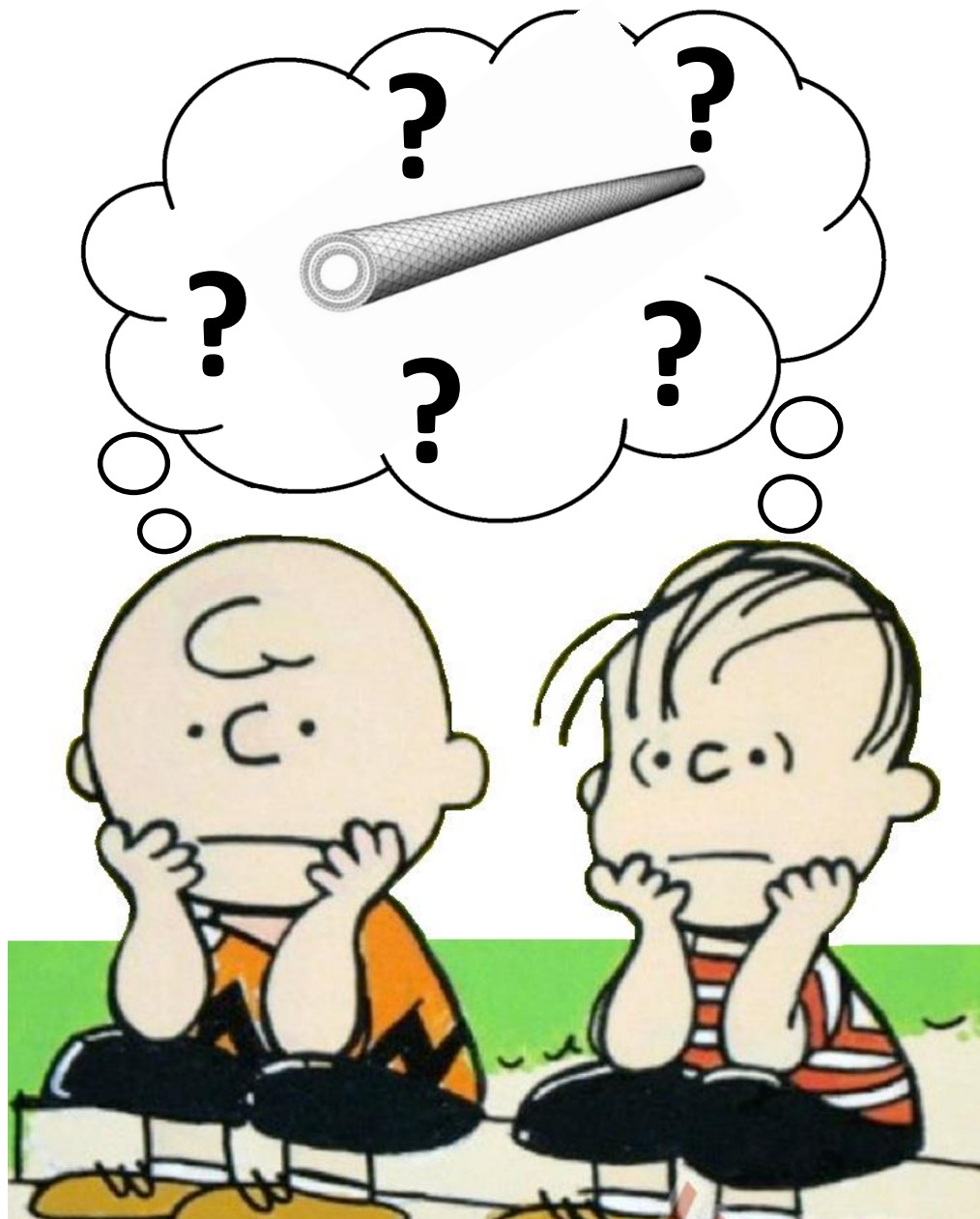
Definition - 7

Asbestos

A generic term applied to the asbestiform variety of serpentine (chrysotile) and the asbestiform variety of amphibole group minerals (anthophyllite, cummingtonite-grunerite, tremolite-actinolite and riebeckite), which have been exploited, prospected, described in the literature, traded and sold commercially for their unique physical properties resulting from fibril dimension $W \leq 0.5 \mu\text{m}$.

Discussion

- The WG was unable to come to consensus agreement as different views on several key definitions remained after extensive discussion.
- A set of definitions was formally proposed to the membership and voted. Each definition had been discussed independently. The subsequent vote was 8 in favor, 3 opposed, 1 abstained, and 1 nonvoting (an inactive member) for sending the recommendations forward to the IMA for their consideration for adoption.
- Other issues were raised by members of the WG. For example, inclusion of the definition of the term “acicular” on the list. After discussion, the WG decided that a new definition was unwarranted at this time as the meaning of acicular as “needle-like” is widely understood and should remain.



Thank you all for your attention!