

Unit 170 2188 No. 5 Road
Richmond, British Columbia
Canada V6X 2T1

Phone : 604.279-9445
Fax : 604.279.9447

info@weshar.com

www.weshar.com

Reference Sources

Health Canada

March 2004
Attic Insulation
ISBN # H50-3/150-2004E-HTML

April 2004
Asbestos
ISBN # H50-3/83-2004E-PDF

EPA

Asbestos Contamination
March 2004
910-R-04-004

Attic Insulation
January 2004
600/R-04/004

Asbestiform Amphiboles [Asbestos in Vermiculite Attic Insulation]

Wes-Har reports asbestos fibres found in Vermiculite Attic Insulation as 'Asbestiform Amphiboles' as determined by the Polarized Light Microscopy (PLM) procedure outlined in section 9 of the EPA/600/R-04/004 'Research Method for Sampling and Analysis of Fibrous Amphibole in Vermiculite Attic Insulation'

The common commercially viable asbestiform amphiboles (Actinolite, Anthophyllite, Amosite, Crocidolite and Tremolite) have demonstrated or have the potential to cause Asbestos Related Diseases and are part of the regulated Asbestos Fibre Group. Other asbestiform amphiboles specifically richterite and winchite have been associated with the vermiculite('zonolite') of the Libby Montana area, which has and is being extensively evaluated with numerous publications available for review.

Health Canada has classified Asbestos as a generic term for fibrous minerals found naturally in rock formations around the world, commercial Asbestos is divided into two groups Serpentine (Chrysotile) and Amphibole (tremolite, actinolite and others)

Studies of Libby vermiculite have shown that the ore contains varying quantities of amphibole minerals, which have commonly been referred to as asbestos. A United States Geological Survey (USGS) study identified several amphiboles including winchite, richterite, tremolite, magnesioriebeckite, magnesio-arfvedsonite, and possibly edenite in Libby vermiculite. The most abundant of these were winchite, richterite, and tremolite. The USGS also determined the morphology of a majority of the amphiboles in their study falls between prismatic crystals and asbestiform fibers. All of the amphiboles observed, with the possible exception of magnesioriebeckite, can occur in the fibrous or asbestiform habit. Among the list of amphiboles present in Libby vermiculite, only tremolite is included by name in EPA's regulations and ACGIH's TLV's [2004].

Preparation procedures and Polarized Light Microscopy Techniques [PLM] are commonly used to identify these regulated Asbestos minerals in bulk samples, NIOSH 9002 method. The minerals winchite, richterite, tremolite, and actinolite represent subtle crystallographic and chemical compositional variations closely related to the tremolite-actinolite amphibole series. Further classification to specify the type of amphibole requires elemental / structural analysis employing one or in combination TEM-EDS / SEM-EDS /TEM- SAED analytical techniques.

Definitions:

FIBROUS (National Research Council, 1984) refers to "(1) single crystals that resemble organic fibers such as hair or cotton and (2) large crystals or crystalline aggregates that look like they are composed of fibers (i.e., long, thin, needlelike elements) (Dana and Ford, 1932). The apparent fibers do not need to be separable. If the fibers are separable and are strong and flexible, they are asbestiform. If they have the normal strength and brittleness of the mineral, they are acicular." The terms "apparently fibrous" or "pseudofibrous" are sometimes applied to single crystals or polycrystalline aggregates that have a fibrous appearance but are not composed of separable fibers. In such cases, the fibrous appearance may be the result of oscillatory crystal growth, twinning, or pseudomorphic replacement of another fibrous mineral.

ASBESTIFORM (National Research Council, 1984) refers to "the unusual crystallization habit of a mineral when the crystals are thin, hair like fibers. Historically, the definition of asbestiform habit was based primarily on appearance, and the properties were only implied. At present, the definition of asbestiform habit is often augmented to include a statement on the properties of asbestiform fibers, i.e., shape; enhanced strength, flexibility, and durability; diameter-dependent strength; and unique surfaces. The fibers of asbestos are good examples of the asbestiform habit." In these guidelines, "asbestiform" refers to the crystallization habit of a mineral where the crystals are thin, hair like fibers, with unique properties as mentioned above. The term "fibrous" is a broad term that refers to fibrous appearing crystals without any implication regarding the special properties implied by the term asbestiform. Asbestiform describes a special type of fibrosity. Asbestiform minerals are fibrous but not all fibrous minerals are asbestiform.

TEM-EDS Transmission Electron Microscopy-Energy Dispersive X-ray Spectroscopy
SEM-EDS Scanning Electron Microscopy-Energy Dispersive X-ray Spectroscopy
TEM-SAED Transmission Electron Microscopy-Selected Area selected-area electron diffraction

