Vermiculite—A Brief Discussion

Vermiculite is a naturally-occurring mineral composed of shiny flakes, resembling mica. When heated to a high temperature, flakes of vermiculite expand as much as 8-30 times their original size. The expanded vermiculite is a light-weight, fire-resistant, and odorless material and has been used in numerous products.\(^1\) Expanded vermiculite is used in construction and consumer materials (e.g., loose-fill insulation, acoustic finishes, spray-on insulation, and concrete mixes for swimming pools), agricultural and horticultural products (e.g., potting mixes and soil conditioners) and in industrial products (e.g., brake shoes and pads, drilling muds, furnaces, and insulation blocks). Expanded vermiculite granules are shaped like small accordions, and vary in color from silver/gold to gray/brown.\(^2\)

Of greatest concern is the vermiculite that was mined in Libby, MT as it is known to be contaminated with asbestos; asbestiform (asbestos-like) amphibole minerals, including the regulated forms tremolite and actinolite and forms that are not currently regulated, including winchite, richterite, and ferro-edenite\(^3\), also referred to as “Libby Amphiboles”. Research has linked all of these forms to asbestos-related diseases.\(^3\) The mine in Libby operated from approximately 1919 through 1990 and produced up to 80% of the world supply\(^4\) and 70% of all vermiculite sold in the US in that period\(^5\). Published studies\(^6\) and EPA research have shown that unmanaged disturbances of vermiculite as found in homes (and other situations) can release a significant amount of asbestos.

The community of Libby, MT has suffered an unbelievable environmental and human toll. It is a current EPA Superfund site and in 2009 the EPA issued a first ever Public Health Emergency under CERCLA for the Libby site. In addition to the site of the mine, there are 28 sites throughout the US where vermiculite was transported for processing. The vast majority of the vermiculite was transported by rail in open cars. In 2005, the State of Montana published a report “Mesothelioma in Montana”\(^7\). Within that report (page 5) was a map plotting the cases of mesothelioma. Although the report stopped short of claiming a causal relationship, it is interesting to note that most cases of mesothelioma occurred in people living in close proximity to the rail lines.

Many studies show that people who worked in the Libby mine or vermiculite processing facilities—and those who lived near these sites—were exposed to hazardous levels of asbestos while the facilities were in operation.\(^8\) The EPA has established the airborne risk level for lung scarring from exposure to Libby Vermiculite at 0.00002 fibers per cubic centimeter.\(^9\) Although not completely comparable, it is interesting to note that this risk level is significantly lower than the permissible exposure limit for asbestos, 0.1 fibers per cubic centimeter, established by OSHA.

Currently, there is no approved method from either the EPA or NYS DOH ELAP to determine the presence or content of asbestos in vermiculite. There have been a few experimental methods developed by the EPA and ASTM is currently working on a method. The EPA guidance is that when vermiculite insulation is encountered, it should be assumed that it contains asbestos and handled as such. The stance of NYS regarding loose fill vermiculite is basically the same as the EPA. NYS DOH addressed this via a guidance memo in April of 2011. New York took this guidance a step further in June of 2012 which was subsequently updated in August of 2012\(^10\) in regards to building components that contain vermiculite. In short, loose fill vermiculite is to be considered Asbestos and sampling cannot be used to prove it negative. If vermiculite is a component of a material (i.e. fireproofing- There is a good historical perspective published in 2001 in the NY Times regarding WR Grace and Monokote fireproofing\(^11\)) and the Vermiculite content is 10% or more, it is also must be considered Asbestos. If the Vermiculite content is less than 10%, the material may be analyzed as per current approved methods to determine the asbestos.
content as the DOH allows that if the vermiculite constitutes less than 10% of the total material, the vermiculite’s contribution to the asbestos content of the entire material may be assumed to be less than 1%.\(^{(10)}\)

I would be remiss if I did not point out that vermiculite itself has not, to my knowledge, been identified as being hazardous. Even though most vermiculite mines report little or no contamination, NIOSH has found asbestos in varying trace concentrations in bulk samples and in air sampling at vermiculite plants.\(^{(12)}\) The vermiculite industry maintains several web sites\(^{(13)}\) that I would encourage you to visit and to draw your own conclusions in regards to non-Libby vermiculite. NYS DOH states that “You are reminded that this interpretation of vermiculite-related guidance does not prohibit the use or application of vermiculite materials, but instead applies during renovation and/or demolishing of structures when the origin of the vermiculite material is unknown. Note that NYS Industrial Code Rule 56-5.1(c) allows for other documentation, such as manufacturer documentation that adequately documents that a material is non-ACM (e.g., MSDS compliant with all pertinent federal regulations through EPA and Occupational Safety and Health Administration (OSHA)), in lieu of bulk sample analysis. This documentation, along with any available documentation indicating the origin of the vermiculite material being used, should be shared with the building owner(s) for future reference and consideration during renovation and/or demolishing that may be required at their building in order to avoid future concerns.”\(^{(10)}\)

### Citations

1. Protect Your Family from Asbestos-Contaminated Vermiculite Insulation [http://www2.epa.gov/asbestos/protect-your-family-asbestos-contaminated-vermiculite-insulation](http://www2.epa.gov/asbestos/protect-your-family-asbestos-contaminated-vermiculite-insulation)
4. Libby Site Background [http://www.epa.gov/region8/superfund/libby/background.html](http://www.epa.gov/region8/superfund/libby/background.html)
5. Protect Your Family from Asbestos-Contaminated Vermiculite Insulation. [http://www2.epa.gov/asbestos/protect-your-family-asbestos-contaminated-vermiculite-insulation](http://www2.epa.gov/asbestos/protect-your-family-asbestos-contaminated-vermiculite-insulation)
10. NYS DOH Additional Vermiculite Guidance [http://www2.epa.gov/asbestos/protect-your-family-asbestos-contaminated-vermiculite-insulation](http://www2.epa.gov/asbestos/protect-your-family-asbestos-contaminated-vermiculite-insulation)
12. [http://www2.epa.gov/asbestos/protect-your-family-asbestos-contaminated-vermiculite-insulation](http://www2.epa.gov/asbestos/protect-your-family-asbestos-contaminated-vermiculite-insulation)
   c. [http://www.vermiculite.net/](http://www.vermiculite.net/)

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