

Controlling the Hazard and Liability of Asbestos in Vermiculite Insulation

Warnings for the Homeowner, Building Manager, Contractor and Real Estate Industry



Vermiculite insulation in an attic.

Vermiculite insulation was installed as ceiling and wall insulation in hundreds of thousands of Canadian homes, offices, banks and other buildings. Much of this material is contaminated with potentially dangerous asbestos fibres. Homeowners and property managers need to put careful controls in place to prevent disturbance of the insulation. Careful removal should precede any significant disturbance, for example, prior to renovations. Those involved in property assessments and transfers (building inspectors, real estate agents and brokers, lawyers, mortgagors) should warn the prospective purchaser of the presence of vermiculite insulation and consider its impact on property value.

Sources of Vermiculite Insulation

Vermiculite, a mineral mined around the world, is used in a variety of commercial and consumer products. After crushing and processing, the raw ore was shipped to many plants in Canada for exfoliation or expanding.

At these plants, the ore was heated to about 1000°C causing it to expand like popcorn into a lightweight granular material that is

ACTIONS REQUIRED

Many parties are potentially affected by the asbestos hazard in vermiculite building insulation. We believe the following actions are the minimum necessary to reduce the hazard and liability posed by this material:

- Building occupants or owners with vermiculite insulation need to follow current US EPA recommendations for managing vermiculite in place. In most cases it should be carefully removed prior to renovations or demolition.
- Building/Home inspectors should carefully note the type of attic or wall insulation and provide appropriate warning to purchasers.
- Building purchasers should note the presence of vermiculite and include this consideration in buying the property.
- Environmental consultants should incorporate a comment on the presence of apparent vermiculite in all Phase 1 Environmental Property Assessments.
- Laboratories should be very cautious performing vermiculite analysis or certification of “asbestos – free” vermiculite.
- Contractors, construction or demolition workers or persons working in attics or demolishing block walls should note the presence of vermiculite and follow applicable asbestos precautions. In some cases this will require type 3 precautions.
- Government inspectors, health departments and regulators should note the hazard caused to construction trades and issue appropriate warnings or orders.

HIGHLIGHTS

- Extensive Use of Asbestos Contaminated Vermiculite Insulation
- Residential and Commercial Uses
- Likely Effect on Real Estate Value
- Significant Hazard Upon Disturbance

fire-resistant, absorbent, light weight and a good insulator. Vermiculite has been and continues to be used in a variety of building materials.

It was made into a variety of insulation products, was used as a loose fill insulation inside masonry block walls (the largest volume use), stove pipe and stack insulation, fire separations, cold rooms and in walls and attics of buildings, mostly homes. It is important to understand not all vermiculites contain asbestos.

Asbestos Contamination

Some vermiculite mines contain varying amounts of asbestos minerals mixed in the vermiculite deposit.

Of particular importance to Canada was the Libby Montana mine owned by W.R. Grace, reported by the U.S Environmental Protection Agency as the source of as much as 70% of the world's consumption until it closed in 1990.

The Libby deposit was contaminated with an asbestos mineral usually identified as tremolite. Although W.R. Grace took increasing measures through the history of the operation to reduce the asbestos content in their products, it is likely that most of their production contained at least a trace of free asbestos fiber.

Once vermiculite was mixed with a binder (as in concrete and plaster mixes, sprayed, fireproofing, etc.) it is unlikely to ever release significant airborne asbestos. The loose fill products do, however, pose a risk, causing substantial asbestos exposure when disturbed.

Exposure to asbestos for prolonged periods or at high concentrations increases the risk of lung cancer and other respiratory diseases. Many of the Libby workers and residents have become sick or died of asbestos disease originating from the mining and milling operations or from the handling and installation of vermiculite insulations. Workers involved in the vermiculite expansion plants have also been afflicted with asbestos disease. In Canada, construction workers are now protected from the hazards of asbestos exposure by detailed health and safety regulations.

Vermiculite in Canadian Buildings

The WR Grace asbestos-contaminated insulation was installed in many Canadian buildings, primarily in homes, but also in commercial, institutional and industrial buildings. There is no solid estimate of the number of affected Canadian buildings but it is almost certainly several hundred thousand or more based on US EPA estimates. Its use in Canadian residential construction was certainly increased by inclusion in the CHIP Program between 1977 and 1984. This was the same program under which most Urea Formaldehyde Foam Insulation (UFFI) was installed, although to date the Federal Government has not addressed the cost to remove vermiculite insulation in the same way as the UFFI removal was funded.

Testing for Asbestos in Vermiculite

Vermiculite insulation in loose form can be readily visually identified as a light weight, silvery grey or blonde, granular, layered material, with particle sizes of about 2 to 10 millimeters. If vermiculite is known to have been installed prior to 1990 visual identification should be adequate to confirm the material as asbestos-suspect.

The visual identification can be confirmed by laboratory testing, although caution in selecting the laboratory is advised. The laboratory should be accredited by one of the two US agencies that qualify laboratories for the analysis of asbestos

in bulk samples. Even these laboratories require extra care to detect the very fine fibres at these low concentrations. Laboratories that do not specialize in asbestos analysis should never be relied on for asbestos analysis.

If the owner decides to test the vermiculite for asbestos content, the US EPA advises using a respirator effective against asbestos during sample collection. The sample should be taken from the bottom and lower section of insulation since the finer particles or dust (which contains a higher concentration of asbestos) tend to settle out of the vermiculite particles. Sampling only the top of the insulation may provide a false negative analysis for asbestos.

It is extremely important to note that the overall percentages of asbestos in the bulk vermiculite are very low, possibly below existing legal limits for asbestos. None-the-less the airborne concentrations can be very high when the material is disturbed, due to the very fine and loose nature of the asbestos. A recent US EPA study of six homes in Vermont (references available at www.pinchin.com) showed elevated airborne asbestos concentrations even in cases where the laboratory could not detect asbestos in the bulk material. Therefore EPA recommends that all loose-fill vermiculite installed prior to 1990, be treated with asbestos precautions unless extensive testing shows the absence of even fine asbestos fibres.



Risk to Occupants and Contractors

Pinchin Environmental is aware of many studies that confirm the potential for harmful asbestos exposures when vermiculite insulation is disturbed. The US EPA study referred to earlier indicated that, in homes with vermiculite insulation, asbestos was not detected in the air or dust samples in the home in the absence of disturbance of the insulation. However even relatively minor disturbances generated excessive levels of airborne asbestos. It is not possible, partly because of the variable amounts of the asbestos in the vermiculite, to predict with certainty the actual airborne concentration. The current occupational exposure limit for asbestos is 0.1 fibers per cubic centimeter of air (f/cc). Compared to this, levels of airborne asbestos measured in various studies using either optical or electron microscopes confirmed very elevated exposure levels as shown in the accompanying table.

Residential Activities In Attic (EPA Studies)	Up to 1.3 f/cc (Optical Microscope) Up to 2.6 f/cc (Electron Microscope)
Installation Of Attic Insulation, Manufacturer's Information ¹	10-28 f/cc (Optical Microscope)
Removal of Vermiculite Insulation without Precautions ²	3-6 f/cc (Optical Microscope)

1. WR. Grace, Zonolite Products Division Report "Binder Development Program P2004, Weedsport Spraying Tests on Libby #1 "May 9, 1977
2. BJ Stewart, Pinchin Environmental, "Final Report-Site Assessment Vermiculite Removal building E-12, C.F.B Shilo, Shilo, Manitoba" April 3, 1997

These results strongly support the following recommendations for homes from the US EPA publication "Current Best Practice for Vermiculite Attic Insulation". This same advice should be followed if vermiculite insulation is found in other settings.

- Vermiculite insulation should be left undisturbed. Due to the uncertainties with existing testing techniques, it is best to assume that the material may contain asbestos.
- Do not store boxes or other items in the attic if retrieving the material could disturb the insulation.
- Children should not be allowed to play in attics with open areas of vermiculite insulation.
- If renovations are planned that might disturb the vermiculite, it should be first removed by professionals trained and certified to handle asbestos.
- The homeowner or maintenance personnel should never attempt to remove the insulation. Hire professionals trained and certified to safely remove the material.

Recent Developments in Hazard Recognition and Information

The concern throughout North America over the asbestos in vermiculite is increasing sharply due to government attention and increased public awareness. The US EPA launched a National Consumer Awareness Campaign on the issue in May 2003. Their publication "Current Best Practices for Vermiculite Attic Insulation – May 2003" is now being distributed across the US and is available to Canadians via the EPA homepage.

A major court case on behalf of homeowners with vermiculite attic insulation is being heard in late 2003. This will increase both awareness and concern over vermiculite insulation. This increased awareness has started to impact property transfers in Canada. As a result of vermiculite attic insulation being found during pre-purchase home inspections, several home sales have fallen through in Ottawa and Toronto. Some other sales have been completed on the basis that the vermiculite would be removed. Pinchin is currently working on techniques to perform the removal of



vermiculite in a more cost-effective basis and it is anticipated that this will be field tested by late summer 2003.

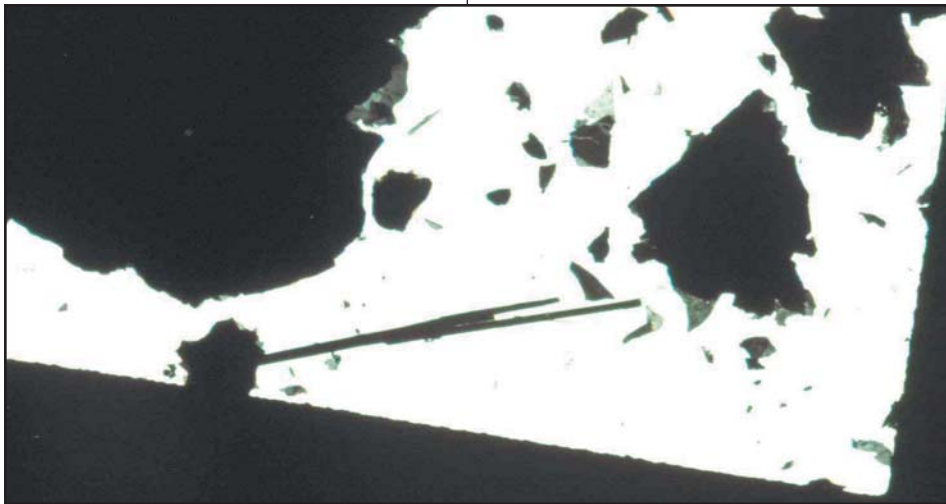
The Canadian government, through the Safe Environments Program (SEP) of Health Canada have prepared an advisory publication on Zonolite in the "It's Your Health" series. This is currently being reviewed within Health Canada prior to release to the public. To date there has been no reaction or policy from Consumers and Corporate Affairs similar

to the UFFI removal program. Demand for something of this sort is almost certainly bound to develop once the cost impacts on homeowners become apparent. To date, these costs seem to be of the order of \$10,000 per home. Although these developments have largely focused on the residential uses of asbestos, there have been a number of clean-ups or removals performed in commercial buildings including financial institutions and municipal facilities. Vermiculite is certainly not simply a residential issue.

Removal Techniques and Precautions

Although the percentage of asbestos in the vermiculite may be below the limit normally treated as asbestos, the elevated levels detected upon disturbance indicate that asbestos precautions will be necessary to protect the workers performing removal and to prevent contamination of the rest of the building or home.

Asbestos in vermiculite attic insulation (TEM, 880X)



These precautions include:

- Isolation of the area of removal.
- Use of reduced pressure in the work area to prevent air movement from the site.
- Workers will require protective clothing and asbestos respirators – Powered Air Purifying respirators and a shower for decontamination purposes may be needed.
- Careful cleaning, sealant on all surfaces and clearance air testing will be necessary to document completion.

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