MASSACHUSETTS DEPARTMENT OF
LABOR STANDARDS

TEM Analysis of Non Friable Asbestos In Schools
Frequently-Asked Questions

Is TEM required to analyze non-friable bulk samples in schools?

If schools are going to sample non-friable organically bound (NOB) materials, the use of Transmission Electron Microscopy (TEM) would be the state-of-the-art industry standard. TEM can be used to complement Polarized Light Microscopy (PLM) analysis.

The volume of complaints regarding floor tiles in schools has escalated, and maintenance staff need assurance from the LEA that they are not being exposed during the course of their duties. It would be perfectly acceptable to assume that non-friable materials are ACM, such as floor tiles, and only test them if they are damaged and need to be replaced. A product information sheet indicating the floor tile does not contain asbestos is acceptable for new tiles.

Why might TEM be used to analyze non-friable materials?

1. **Accuracy**
   TEM is a highly accurate method for asbestos analysis that can identify asbestos fibers in challenging organically bound materials. This method is particularly useful when dealing with materials where asbestos, if present, is tightly bound to the matrix material, making it difficult to isolate and detect through PLM.
2. **Fiber Morphology**
   The PLM method may not detect asbestos fibers smaller than 0.2 microns in diameter. As NOB materials often contain fine, thin asbestos fibers less than 0.1 microns in diameter, TEM analysis can be a more accurate detection method.
3. **Concentration**
   When the concentration of asbestos fibers is low (less than 10%), particularly in NOB materials, detection of these fibers, which may be heavily coated by the matrix, could result in a false negative using PLM.

Do all non-friable materials analyzed by PLM need to be re-analyzed by TEM?

No. It is not necessary to resample non-friable materials that tested positive for asbestos by PLM. It is also acceptable to assume all non-friable materials are ACM.

For non-friable organically bound materials that test negative by PLM, TEM may be used when additional analytical information is desired. Alternatively, the material may be assumed to be asbestos containing materials and managed accordingly. The decision to use TEM is an analytical option and not a requirement under 454 CMR 28.00.

Ultimately, the protection of building occupants is the goal, and the high level of accuracy of TEM analysis can provide assurance to school or municipal employees who maintain, repair or replace floor tiles that they are not being exposed to asbestos materials.

Can PLM be used to analyze non-friable ACM?

Yes, PLM can be used as identification if the material shall remain in place undisturbed. However, prior to any disturbance, such as renovation, alteration, demolition or removal, while TEM analysis is not required, DLS permits and recommends the use of TEM for the analysis of non-friable materials, particularly non-friable organically bound materials, due to the limitations of PLM for certain materials.

How many samples are required for TEM bulk sample analysis?

The sampling requirements established in 454 CMR 28.13(3)(b) should be followed when collecting bulk samples for TEM analysis. The licensed inspector must collect representative bulk samples from each homogeneous area of miscellaneous materials and other non-friable materials in a manner sufficient to determine whether the material is ACM. The number of samples necessary is therefore determined by the applicable regulatory sampling requirements and the characteristics of the homogeneous area. Therefore, more than one sample shall be collected from a homogeneous area.