



BUREAU
VERITAS

Asbestos Sources, Exposure Risks and Analytical Methods

TECHNICAL BULLETIN

Asbestos is a general term used for a group of six naturally occurring silicate minerals: chrysotile, amosite, crocidolite, anthophyllite, tremolite and actinolite. Mined since the mid-1800s, asbestos was valued for its tensile strength and its fire and chemical resistive properties.

Once called the “miracle mineral”, asbestos was used in a wide variety of everyday products, including floor tiles, ceiling tiles, roofing, and insulation for attics, walls and pipes.

Asbestos is commonly found in commercial, industrial and residential structures constructed before the 1990s. Once the health risks due to asbestos exposure were recognized, its use declined.

Exposure and Health Risks

Prolonged inhalation of airborne asbestos fibres can lead to health problems including asbestosis, mesothelioma and lung cancer. Asbestos-related diseases can arise many years after the initial exposure.

Exposure can occur when asbestos-containing material is disturbed during product use, demolition, construction, renovation or maintenance and repair activities that release asbestos fibers into the air.

Regulated Substance

Asbestos is defined as a hazardous material under provincial and territorial laws. As such, provincial regulations exist for the production, handling and safe disposal of asbestos to protect the health of humans and the environment.

To comply with laws and regulations, suspected Asbestos-Containing Material (ACM) must be tested at a laboratory and subsequently handled and disposed of properly.

Testing

Inspection by the naked eye is insufficient to determine if a material contains asbestos. Samples suspected of containing

asbestos should be sent to a laboratory that is accredited for testing asbestos.

Bureau Veritas' accredited Asbestos Testing Laboratories have the instrumentation, expertise and experience to test for asbestos in bulk, soil, dust, water and air samples. Our laboratories are accredited by NVLAP and AIHA. Bureau Veritas laboratories routinely perform asbestos analyses using ASTM, EPA, AHERA, ISO, and NIOSH methods.

Bulk Building Materials

Bureau Veritas tests various bulk building materials using Polarized Light Microscopy, point counting and Gravimetry.

Polarized Light Microscopy (PLM)

This is the primary and most economical technique used to identify asbestos in building materials. Samples are analyzed in accordance with U.S. EPA 600/R-93/116 Method for the Determination of Asbestos in Bulk Building Materials, which complies with all provincial regulatory requirements including NIOSH 9002 and IRSST Analytical Method 244. Results are reported as a visual estimation of asbestos and non-asbestos fibres, by-layer.

Point counting

This is an optional technique for samples with low concentrations of asbestos. Point counting provides a more accurate determination of the area percent asbestos in a sample versus PLM. Reporting limits are based on the number of points counted: 200 point count provides a 0.5% DL; 400 point count provides a 0.25% DL; 1000 point count provides a 0.1% DL.

Gravimetry

This is used for the analysis of asbestos in non-friable, organically-bound materials, for example floor tile, asphalt shingles, caulking and mastic. Samples are prepared using a combination of ashing and acid treatment. Gravimetric reduction may be used in conjunction with PLM and/or Transmission Electron Microscopy (TEM). Results are reported as percent asbestos, calculated by weight.

PROVINCIAL / TERRITORIAL DEFINITION OF ACM
Alberta: >0.1% Material Amount Exceeding 10kg ¹ >1% Waste Material ²
British Columbia: ≥0.5% Vermiculite >0% ³
Manitoba: ≥0.1% Friable Materials ≥1% Non-friable Materials ⁴
New Brunswick: ≥1% ⁵
Newfoundland and Labrador: >1% ⁶

¹Occupational Code of Practice, Alberta Asbestos Abatement Manual

²Guidelines for the Disposal of Asbestos Waste – Environmental Protection Services Alberta Environment, August, 1989

³B.C. Regulation 296/97: Workers Compensation Act – Occupational Health and Safety, Regulation Part 6 - Substance Specific Requirements: Asbestos

⁴Manitoba Workplace Safety and Health Act and Regulation 2016 – Chapter W210 10/02 The Workplace Safety and Health Act

⁵New Brunswick Regulation 92-106 under the Occupational Health and Safety Act

⁶Newfoundland and Labrador Regulation 111/98: Asbestos Abatement Regulations, 1998 under the Occupational Health and Safety Act (O.C. 98-730)

Northwest Territories: >1% ⁷
Nova Scotia: 0.5% ⁸ >1% Friable Waste Material ⁹
Nunavut: >1% ¹⁰
Ontario: ≥0.5% ¹¹
Prince Edward Island: >1% ¹²
Quebec: ≥0.1% ¹³
Saskatchewan: >0.5% Friable Materials 1% Non-Friable Materials >0% Vermiculite ¹⁴
Yukon: ≥1% ¹⁵

Soil

Asbestos in soil can represent health risks if fibres become airborne. Sources of exposure include deposits of Naturally Occurring Asbestos (NOA), contamination from improper building demolition and illegal construction waste dumping. Depending on provincial legal requirements, supply, storage, transport, sale, use and re-use of asbestos-contaminated soil is prohibited. Bureau Veritas recommends analysis of soils

⁷Occupational Health and Safety Regulations, NWT Regulation 039-2015

⁸Nova Scotia Department of Labour and Advanced Education, Asbestos in the Workplace: A Guide to Assessment & Management of Asbestos in the Workplace

⁹Asbestos Waste Management Regulations: made under Section 84 of the Environment Act S.N.S 1994-95, N.S. Regulation 53/95

¹⁰Department of Environment, Government of Nunavut, Environmental Guideline for Waste Asbestos

¹¹Ontario Occupational Health and Safety Act, O. Reg. 278/05: Designated Substance – Asbestos on Construction Projects and in Buildings and Repair Operations

¹²Chapter O-1: Occupational Health and Safety Act General Regulations, Government of Prince Edward Island

¹³Légis Québec, Regulation respecting occupational health and safety (Chapter s-2.1, r.13)

¹⁴Saskatchewan Regulations, The Occupational Health and Safety Regulations, 1996

¹⁵Yukon Workers' Compensation Health and Safety Board, Occupational Health and Safety Act and Regulations

using ASTM method D7521-16, which estimates asbestos concentration by PLM and, optionally, provides a TEM concentration of asbestos in weight percent.

Water

Asbestos can be introduced into water from natural sources, such as erosion of asbestos-containing ores; or released from asbestos-containing products, such as asbestos-cement pipes during breakdown or wear.

The Health Canada Guidelines for Canadian Drinking Water Quality has not established a maximum acceptable concentration (MAC) for asbestos in water, however the method of choice for the determination of asbestos in water is [TEM](#).

Vermiculite

Vermiculite is a naturally occurring mineral that undergoes significant expansion when heated to high temperatures. In this expanded form, vermiculite is lightweight and fire-resistant, which makes it suitable for use as insulation or as a soil amendment. The most vermiculite was extracted from a mine near Libby, Montana from 1919-1990. Trademarked as Zonolite, the vermiculite from this mine was contaminated with amphibole asbestos and non-regulated winchite and richterite.

To meet provincial regulatory requirements, vermiculite insulation can be analyzed according to EPA 600/R-93/116, or EPA/600/R-04. To confirm the presence of non-regulated asbestos, Bureau Veritas recommends analysis according to ASTM D7521-16 by PLM and TEM.

Air

Phase Contrast Microscopy (PCM)

This is used to measure fibre concentrations in air samples. PCM does not differentiate between asbestos and other fibres, but may be used in conjunction with TEM (NIOSH

Method 7402) as an aid for fibre identification. Fibre counts meet NIOSH 7400 (Asbestos and Other Fibres by PCM) method criteria for fibre determination. Results are reported as fibres per cubic centimeter.

Transmission Electron Microscopy (TEM)

This is used in conjunction with PCM or PLM. It works by transmitting a beam of electrons through a sample to display a highly magnified image onto a screen. TEM uses energy dispersive x-ray analysis and selected area electron diffraction to identify asbestos based on morphology, crystalline structure, and elemental identification.

About Us

Bureau Veritas Laboratories is a North American provider of analytical services and solutions to the environmental, energy, food, DNA and industrial hygiene industries with an extensive laboratory network in Canada. Our work supports critical decisions that improve performance, reduce risk or help customers meet safety, quality and regulatory objectives. Founded in 1828, Bureau Veritas is the global leader in testing, inspection and certification services with 75,000 employees in 1,500 locations worldwide.

For more information, please contact:

enviro@bvlabs.com

1.800.665.8566 (British Columbia)

1.800.563.6266 (Ontario)