WorkSafe BC Guidelines Regarding Demolition and Asbestos Waste Materials

G20.112 Hazardous Materials - Asbestos

Issued June 18, 2008; Revised consequential to February 1, 2012 Regulatory Amendment

Regulatory Excerpt

Section 20.112 of the *OHS Regulation* ("*Regulation*") states:

> ***Before work begins on the demolition or salvage of machinery, equipment, buildings or structures, the employer or owner must***
>
> > ***(a) ensure that a qualified person inspects the site to identify any asbestos-containing materials, lead, or other heavy metal or toxic, flammable or explosive materials that may be handled, disturbed or removed,***
> >
> > ***(b) have the inspection results available at the worksite, including any drawings, plans or specifications, as appropriate, to show the locations of any hazardous substances,***
> >
> > ***(c) ensure that any hazardous materials found are safely contained or removed, and***
> >
> > ***(d) if hazardous materials are discovered during demolition work that were not identified in the inspection required by paragraph (a), ensure that all work ceases until such materials are contained or removed.***

Purpose of Guideline

Demolition and salvage work involve the taking apart and destruction, in whole or in part, of buildings, structures, equipment, and machinery. These processes have the potential to create harmful exposures to hazardous materials. *Regulation* section 20.112 names several types of hazardous materials which must be identified and either safely contained or safely removed prior to demolition or salvage work. Asbestos is one of these materials.

The purpose of this guideline is to explain the hazards associated with the uncontrolled release of asbestos. It also provides information for owners, employers, consultants, workers, and other involved persons on what constitutes a compliant asbestos inspection, arranging for and confirming the safe abatement of asbestos, and what to do if additional materials suspected to contain asbestos are encountered during demolition or salvage work.

Note: Demolition work is often a necessary component of a building renovation project or restoration work following a fire or flood, and the requirements of section 20.112 of the *Regulation* and the information in this guideline also apply when demolition work is part of building renovation or restoration.

Background Information

Demolition and salvage work, if performed incorrectly, can create harmful dust exposures to a variety of workers and other persons, including owners, developers, demolition workers, inspectors, transportation workers, landfill workers, and the public. If demolition of a house/building proceeds without first ensuring the identification and safe removal of the asbestos hazards, asbestos dust can be released, and remain airborne for a long period of time, potentially exposing workers. During the demolition of the interior walls and ceilings, the demolition or salvage workers may then be exposed to airborne asbestos fibres in the dust from the gypsum board filling compound (sometimes called drywall mud) and from textured ceilings and walls. Vermiculite attic insulation containing asbestos fibres can spill out of the attic when the ceiling material is removed. Asbestos-containing dusts from these demolition activities can contaminate the site and disperse to neighbouring properties exposing other persons. As demolition debris is loaded into a disposal truck the excavator operator and the truck

driver can be exposed to asbestos-containing dusts which can also drift into neighboring properties. As the disposal truck travels to the landfill site, dust that contains asbestos can blow out of the truck, spreading asbestos dust along its travel route. When the truck discharges its asbestos contaminated load at the landfill, unprotected landfill site workers can be exposed to the airborne hazard. These demolition practices are unacceptable and non-compliant with the *Regulation*.

Asbestos hazards must be controlled through the identification and safe abatement of asbestos, by trained persons, before demolition. This guideline provides information for acceptable identification, assessment, reporting, and removal of asbestos hazards in buildings and structures slated for demolition (refer also to the "Ten Steps to Compliance" chart at the end of this guideline).

The requirements in *Regulation* section 20.112 are related to other requirements in both the *Regulation* and the *Workers Compensation Act* ("*Act*"). For example, when asbestos is removed, other requirements in *Regulation* Part 6-Asbestos are also applicable. The requirements in sections 115 (General duties of employers) and 119 (General duties of owner) in the *Act* also apply.

More information related to asbestos hazard assessment and control measures for building demolition can be found in

(1) OHS Guideline G6.8 "Procedures for abatement of asbestos materials during house and building demolition/renovation"
(2) WorkSafeBC publication BK27 "Safe Work Practices for Handling Asbestos" (PDF 1 mb)
(3) WorkSafeBC hazard bulletin WS03-03 "Asbestos Hazards in Demolition, Renovation and Salvage" (PDF 204 kb)
(4) WorkSafeBC bulletin WS2008-03 "The dangers of exposure to asbestos in vermiculite attic insulation" (PDF 1 mb)

Responsibilities and Qualifications

Regulation section 20.112 specifies explicit responsibilities for the owner and the employer. As per the *Act* section 124, these parties need not duplicate the same compliance efforts providing they coordinate their actions to ensure that compliance with all provisions of section 20.112 is achieved.

Prior to asbestos removal occurring, the owner or prime contractor must ensure that a Notice of Project (NOP) for asbestos, including detailed written safe work procedures, as required under *Regulation* section 20.2, is submitted to WorkSafeBC at least 24 hours in advance of the asbestos removal occurring. An asbestos risk assessment must be done by a qualified person (see *Regulation* section 6.6) and the assessment report should accompany the NOP for asbestos. A qualified person is defined in *Regulation* section 6.1 and described and explained in OHS Guideline 6.1-1.

In addition to conducting the risk assessment and work activity classification, the following activities must also be conducted by the qualified person as part of an asbestos survey:

- Identification of asbestos-containing materials
- Preparation of asbestos work procedures
- Collection of samples of materials suspected of containing asbestos
- Completion of the asbestos survey report

The following activities should also be conducted by the qualified person:

- Collection and interpretation of air samples during asbestos abatement projects
- Preparation of inspection reports
- Conduction of workplace inspections

Inspection For And Identification of Any Asbestos-Containing Materials

Regulation section 20.112(a) requires that before work begins on the demolition or salvage of machinery, equipment, buildings, or structures, the employer or owner must inspect the site to

identify any asbestos-containing materials that may be handled, disturbed, or removed. This is separate from an inventory required by section 6.4 of the *Regulation*. The inventory prepared under section 6.4(3) is required for the protection of workers who may occupy a building. Although it may not include asbestos that wasn't readily accessible (e.g., hidden behind concrete walls or under a number of layers of flooring), the inventory required by section 6.4(3) will be a useful aid in conducting the inspection specified in section 20.112. The inspection required by section 20.112 will locate and identify all asbestos-containing material prior to renovation and demolition activities.

The asbestos inspection process is referred to as a pre-renovation or pre-demolition *asbestos survey* and the person conducting the inspection is often referred to as the *surveyor*. The asbestos survey includes a walk-through inspection, sample collection, sample analysis, reporting, and communication of the results. Surveyors must be familiar with proper walk-through and sample collection practices. There are a number of recognized industry standards which provide guidance on conducting asbestos surveys, and include the following:

(1) The Ontario Regulation 278/05 Designated Substance - "Asbestos on Construction Projects and in Buildings and Repair Operations"

(2) Asbestos: The Survey Guide (HSE - HSG264)

(3) EPA How to Manage Asbestos in School Buildings EPA 910-B-96-001 (PDF 653 kb)

The first step in the asbestos survey is to identify asbestos hazards by a thorough and systematic walk-through inspection of the site. The site may be a building (commercial, industrial, residential), a structure, a machine, or a piece of equipment. Asbestos identification and recognition is a specialized skill and it is essential that the surveyor be adequately instructed, trained, and experienced in identifying materials known to, or likely to, contain asbestos.

Table 1 lists some of the materials that commonly contain asbestos in older commercial and residential buildings.

Table 1: Asbestos Materials in Commercial and Residential Buildings

Exterior	Interior insulation
• Asbestos cement pipes (e.g., drain pipes) • Roof felting • Asphalt shingles • Soffit boards • Stucco • Asbestos cement siding • Brick mortar • Window putty • Deck undersheathing • Asbestos cement shingles	• Spray-applied insulation (acoustic and fireproofing) • Vermiculite (blown-in) insulation (e.g., in attics) • Paper backing on fibreglass insulation
Flooring	**Heating (HVAC) and ducting**
• Vinyl sheet flooring and mastic • Vinyl floor tile and mastic • Poured flooring/leveling compound • Asphalt flooring	• Furnace duct tape • Furnace/boiler insulation • Pipe (mechanical) insulation • Hot water tank insulation • Mastic • Asbestos rope and gaskets • Asbestos cement board • Asbestos cardboard insulation
Walls & Ceilings	**Other**
• Drywall mud • Plaster • Asbestos cement board • Textured coatings • Ceiling tiles	• Fireplace box and mantel • Artificial fireplace logs and ashes • Fire doors • Insulation on electrical wiring • Fire blankets • Chalk boards • Heat reflectors • Penetration firestopping • Candescent light fixture backing (pot lights)

Note: This list does not include every product that may contain asbestos. It is intended as a general guide (see also the online WorkSafeBC Bulletin WS 03-03 (PDF 274 kb)).

During the initial walk-through inspection the surveyor systematically goes through each area and room in the building observing the wall, ceiling, floor, and other materials including any machinery or equipment (e.g., an old boiler or HVAC system) and hidden insulating materials to make a preliminary determination if asbestos could be present. During this walk-through, the surveyor will also consider where to collect representative bulk samples of suspected asbestos material. Once the walk-through is complete, the surveyor has the necessary information to begin the sampling process (see next section).

The following Asbestos Inspection Results worksheet (and example completed worksheet) (PDF version 148 KB) illustrates an acceptable method by which asbestos survey results can be summarized for an owner or contractor.

Asbestos Inspection Results					
Project Name:				Date of Survey:	
Address:				Survey Company:	
Description:				Surveyor:	
Previous Renovations?				Age of Structure:	
Laboratory Name:				Analysis Method(s):	

Area or Room (directions from front of house)	Building Materials	Sampling Location	Material Collected (sample #)	Asbestos Type and Percentage	Approximate Quantity of Asbestos

Asbestos Inspection Results (Example)

Project Name:	Chan Residence	Date of Survey:	15 Oct 07
Address:	123 Anystreet, North Vancouver, B.C.	Survey Company:	Bob's Asbestos Consulting
Description:	Residential (house); One Storey Rancher with an Attic	Surveyor:	Bob Smith
Previous Renovations?	Yes, Bathroom and Kitchen (10 years ago)	Age of Structure:	45 Years
Laboratory Name:	Asbestos Laboratories Inc	Analysis Method(s):	NIOSH Method 9002 EPA/600/R-04/004

Area or Room (directions when facing house)	Building Materials	Sampling Location	Material Collected (sample #)	Asbestos Type and Percentage	Approximate Quantity of Asbestos
Entry	Walls and ceiling are drywall; floor is ceramic tile	Right Wall	Drywall Mud (1)	Chrysotile 1-3%	All walls and ceiling
Hallway	Walls are drywall; ceiling is textured; floor is carpet (concrete beneath)	Ceiling	Texture Coat (2)	Chrysotile 1-3%	All walls and ceiling
Living Room	Walls are drywall; ceiling is textured; floor is carpet (concrete beneath)	Ceiling	Texture Coat (3) Drywall mud (4)	Chrysotile 1-3% Chrysotile 1-3%	Ceiling All walls
Dining Room	Walls are drywall; ceiling is textured; floor is carpet (concrete beneath)	Left Wall	Drywall mud (5)	Chrysotile 1-3%	All walls and ceiling
Kitchen	Walls and ceiling are drywall; floor is linoleum	Right Wall Floor	Drywall mud(6) Linoleum (7)	None None	None
Bathroom	Walls and ceiling are drywall; floor is ceramic tile	Left Wall Floor	Drywall Mud (8)	None	None
Right Bedroom	Walls are drywall; ceiling is textured; floor is carpet (concrete beneath)	Ceiling	Texture Coat (9)	Chrysotile 1-3%	All walls and ceiling
Left Bedroom	Walls are drywall; ceiling is textured; floor is carpet (concrete beneath)	Rear Wall	Drywall Mud (10)	Chrysotile 1-3%	All walls and ceiling
Attic	Insulation is fibreglass batt with vermiculite beneath	Left Attic Right Attic	Vermiculite (11) Vermiculite (12)	Actinolite 0.7% Actinolite 1% Actinolite 1%	Entire attic

			Vermiculite (13)		
Exterior	Exterior is wood; roof is composition shingles; aluminum frame windows	Roof	Shingle (14)	None	None
Furnace		Ducting	Tape (15)	Chrysotile 30%	All ducting
Crawl Space	Pipe Insulation	Below kitchen	Pipe wrapping (16)	Chrysotile 35%	All crawl space piping

Bulk Asbestos Sample Collection

During the walk-through inspection the surveyor identifies materials suspected to contain any asbestos. To confirm or discount the presence of asbestos, representative bulk samples must be collected. Multi-layered materials, like multiple layers of old tile and linoleum flooring or multiple layers in wall or ceiling materials, will commonly be encountered. Careful consideration must be given to which layers of multi-layered materials to sample. Ideally a sample should be collected from each suspected layer. The surveyor should identify the sample location in the building with a unique sample number.

The sampling technique and quantity of material sampled are two other important factors to consider. Sufficient quantities of material must be collected. Check the laboratory method for required sample quantities or check with the laboratory analyst. For materials like vermiculite, the surveyor ensures that samples contain the full depth of the material down to the bottom and that the quantity collected is at least what would fill a standard size sealable plastic sandwich bag. Sample collection methods should minimize disturbance and exposure to the persons collecting the bulk samples. Use of protective clothing is recommended and wearing of a properly fitted approved respirator is required. Persons collecting the samples must have a written sample collection procedure as part of their asbestos Exposure Control Plan. (See *Regulation* sections 6.3 and 5.54 for Exposure Control Plan requirements). A Respiratory Protection Program is also required. (See *Regulation* section 8.5 and sections 8.32 through 8.44 and the associated OHS Guidelines.)

The number of representative bulk samples collected should be consistent with recognized industry standards and principles of good occupational hygiene practice (three examples of recognized industry standards are referred to earlier in this OHS Guideline under "Inspection for and identification of any asbestos"). For a two-storey 1960's - 1970's house that has asbestos in both the drywall joint compound and the textured ceilings, vermiculite attic insulation, asbestos-containing linoleum and vinyl tile floorings, and furnace duct tape, collection of a total of 18 to 25 bulk samples would be considered as reasonable to ensure representative sampling and principles of good occupational hygiene practice have been met and that a thorough asbestos survey has been performed. The professional judgment of a qualified person can be used to reduce the number of bulk samples for homogeneous materials. For example, for the upper level of a home with visually similar plaster and where the history of the home is known (e.g., no significant renovations), 1 - 2 samples may be sufficient for representative sampling of the upper level walls.

Table 2 provides guidance on the minimum number of bulk samples that should be collected to identify any asbestos that might be present in a residence or a commercial building prior to demolition.

Type of Material	Size of Area of Homogeneous Material	Minimum Number of Bulk Material Samples To Be Collected*
Surfacing materials, including textured coatings, drywall mud, plasters, and stucco	less than 90 square metres (approx. 1,000 square feet)	At least 3 samples of each type of surfacing material
	between 90 square metres and 450 square metres (approx. 5,000 square feet)	At least 5 samples of each type of surfacing material
	greater than 450 square metres	At least 7 samples of each type of surfacing material
Sprayed insulation and blown-in insulation, including sprayed fireproofing and vermiculite insulation (including vermiculite insulation within concrete masonry units - CMUs).	less than 90 square metres (approx. 1,000 square feet)	At least 3 samples
	between 90 square metres and 450 square metres (approx. 5,000 square feet)	At least 5 samples
	greater than 450 square metres.	At least 7 samples
Flooring, including vinyl sheet flooring (and backing) and floor tiles	Any size	At least 1 sample per flooring type in each room (and 1 from each layer of flooring)
Mechanical insulation, including duct taping, pipe insulation, elbows, and boiler/tank insulation	Any size	At least 3 samples per house or mechanical or boiler room
Mastics and puttys, including duct mastic (around penetrations) and window putty	Any size	At least 3 samples per house or mechanical or boiler room
Roofing materials, including felting and shingles	less than 90 square metres (approx. 1,000 square feet)	At least 1 sample (each layer of material must be sampled)
	between 90 square metres and 450 square metres (approx. 5,000 square feet)	At least 2 samples (each layer of material must be sampled)
	greater than 450 square metres	At least 3 samples (each layer of material must be sampled)
Asbestos cement (transite) board and pipe	Any size	At least 1 sample
Other materials	Any size	At least 1 sample per type of material

* If the material is assumed to contain asbestos then samples do not have to be collected. The professional judgment of a qualified person can be used to reduce the number of bulk samples of homogeneous materials. If fewer samples than the minimum recommended number are collected, the surveyor should document the rationale for his/her position in the survey report.

Sample Analysis

Asbestos bulk samples should be analyzed by an accredited asbestos laboratory (if the laboratory is not accredited, it must be a participant in a quality control program). Methods accepted by WorkSafeBC for bulk sample analysis are specified in *Regulation* section 6.1. These methods include requirements for laboratory equipment, calibration, quality control, and result reporting. Refer also to the online WorkSafeBC publication *Safe Work Practices for Asbestos Laboratories*.

WCB Method 0205 for asbestos bulk sample analysis is no longer an acceptable method since it does not provide sufficient specificity of quantitation at low levels of asbestos.

Risk Assessment for Identified Asbestos

When the presence of asbestos is either confirmed through bulk sample analysis or a material is assumed to contain asbestos (e.g., asbestos furnace duct tape, asbestos cement transite board, or asbestos exterior shingles, etc.), a risk assessment must be performed before demolition work begins to determine the exposure risk to workers and other persons. The risk assessment must be conducted by a qualified person and helps provide the scope of work for the abatement of asbestos. Refer to Responsibilities section earlier in this guideline and to *Regulation* section 6.6 and OHS Guidelines G6.6-1 to G6.6-2.

Inspection Results Must Be "Available At The Worksite"

The surveyor should meet on-site with the asbestos abatement contractor prior to commencement of abatement activity in order to explain the inspection results from the survey. This will help ensure that the contractor's workers adequately understand the areas where asbestos is present and what has to be removed.

A copy of the inspection results must be immediately available at the site whenever workers are present. The site documentation should include the inspection results from the survey, any drawings, plans, or specifications that show the locations of any asbestos, and comments from the surveyor about recommended abatement. Workers must have the information about the asbestos hazards on hand to use as a reference in planning their work and to avoid exposure to asbestos materials.

Having the inspection results available at the worksite includes confirmation by the qualified person that the asbestos materials specified for removal were safely removed. A document such as a post-asbestos abatement inspection report, that confirms that an inspection was conducted to verify the safe removal of identified asbestos, is acceptable for this purpose. This document can also be used by a demolition contractor to verify that asbestos abatement has been completed.

Safe Removal of Asbestos

All asbestos specified for removal must be removed using safe work practices and procedures before demolition occurs. The WorkSafeBC publication "*Safe Work Practices for Handling Asbestos*" (PDF 1 mb) and OHS Guideline G6.8 describe acceptable practices. Workers and other persons must not be exposed to asbestos during the demolition of a building or structure. The asbestos removal practices and procedures must minimize the release of airborne asbestos fibres and must be in compliance with all applicable asbestos requirements in Part 6 of the *Regulation*.

Asbestos Encountered During Demolition

If any asbestos is unexpectedly encountered during demolition, such as in walls or some other concealed space or location that was missed during the pre-demolition inspection process, work must cease until a risk assessment has been conducted by a qualified person and subsequent control measures (usually removal of the asbestos) are implemented. This means that the demolition workers need some basic awareness and skill in recognition of materials likely to contain asbestos. Having the ability to recognize building materials and products that may contain asbestos is part of the training and instruction that demolition, renovation, and salvage employers need to provide to their workers who may be exposed to asbestos (see *Regulation* section 6.11 for asbestos training requirements).

Other Requirements

The BC Building Code and various municipal by-laws also have requirements regarding demolition procedures. The owner or employer should check with the appropriate local authority for further details.

Ten Steps to Compliance with asbestos abatement requirements of section 20.112 of the *Regulation* for a pre-1990 house/building demolition

(1) A pre-1990 house/building is to be demolished or renovated.

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(2) The building owner (or owner's representative) or the employer (e.g., builder, demolition contractor) retains a qualified person (usually a consultant) to perform a risk assessment and asbestos survey before conducting work where asbestos may be disturbed.

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(3) The qualified person inspects the house/building, collects representative bulk samples, and has the samples analyzed by a qualified laboratory.

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(4) The qualified person prepares a report that identifies all inspection results (including drawings, plans, or specifications), risk assessment, and scope of work for the abatement of the asbestos.

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(5) The report containing the inspection results is provided to the owner/employer. The inspection results must be available at the worksite whenever workers are on-site.

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(6) The owner or employer retains trained asbestos abatement workers; An NOP with written work procedures is submitted to WorkSafeBC before commencement of asbestos removal work.

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(7) Safe removal and disposal of identified asbestos occurs.

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(8) After the asbestos removal the owner or employer receives written confirmation that the asbestos specified for removal on the NOP has been removed. A copy of the inspection results is on site.

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(9) The owner authorizes demolition of the house/building to proceed. The demolition employer proceeds to demolish house using safe work procedures. Copy of inspection results and post-abatement reports are on-site.

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(10) If any asbestos is found during demolition, all work is to cease until a risk assessment is done and the asbestos is safely contained or removed. In this case, go back to step 7.

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