

All samples were collected and handled according to applicable occupational health and safety regulations. Specific sampling methodology are summarized for each designated/hazardous substance in Sections 2.3 to 2.14. The safety of building occupants was ensured at all times.

2.2 Record Keeping

In order to maintain consistency one member of the Aqua Terre survey team was selected to record all observations. Observations were recorded on a room by room basis for each building.

Sample labelling was kept simple to limit the potential for error and to provide greater efficiency. For example CBA1-As-1 indicates the sample was collected in building CBA1, the sample is for asbestos analysis and it was the first sample for asbestos analysis in the building. Replicates collected to satisfy the requirements of Ontario Regulation 278 were identified with a letter appended to the sample name. If the sample was labelled CBA2-Pb-20 it indicates that the sample was collected in building CBA2, it is a lead sample and it is the 20th sample collected in that building.

All sampling locations were recorded on copies of the existing building plans provided by PWGSC and later transferred into the digital CAD drawing. Some building plans were altered slightly from what was indicated on the original plans. These slight alterations consisted solely of different room configurations and room numbers. On several occasions, the room numbers in the building did not match the room numbers on the plans. In all cases, the room numbers on the plans were used to identify the location of samples.

2.3 Asbestos-Containing Materials

“Room-by-room” visual inspections of all accessible areas of the buildings were made in order to identify suspected asbestos-containing materials (ACMs). Areas above suspended lay-in tile ceilings, above plaster or gypsum board ceiling with access hatches and accessible pipe chases were also inspected. The survey included but was not limited to: thermal insulation, sprayed fireproofing, acoustic plaster, textured coat, plaster applications, ceiling tiles, vinyl flooring material and drywall joint compounds. When materials suspected of containing asbestos were found, the risk of exposure to building occupants was assessed. In addition, the accessibility of the material was also noted.

2.3.1 Assessment of Condition and Accessibility and Remedial Actions

The methodology used to assess the risk of exposure to building occupants was consistent with the PWGSC document entitled DM Directive 057- Asbestos Management (1997). The criteria used to assess the condition of the ACM are based on the type of asbestos material. In evaluating the condition of ACM spray applied as fireproofing, thermal insulation or texture, decorative or acoustic finishes the following criteria apply:

GOOD	Surface of material shows no significant signs of damage, deterioration or delamination. Up to one percent visible damage to surface is allowed within range of GOOD. Evaluation of sprayed fireproofing requires the surveyor to be familiar with the irregular surface texture typical of GOOD sprayed asbestos products. GOOD condition includes unencapsulated or unpainted fireproofing or texture finishes, where no delamination or damage is observed, and encapsulated fireproofing or texture finishes where the encapsulation has been applied after the damage or fallout occurred.
POOR	Sprayed materials show signs of damage, delamination or deterioration. More than one percent damage to surface of ACM spray.

In evaluating the condition of mechanical insulation (on boilers, breeching, ductwork, piping, tanks, equipment, etc.) the following criteria were used:

GOOD	Insulation is completely covered in jacketing and exhibits no evidence of damage or deterioration. No insulation is exposed. Includes conditions where the jacketing has minor surface damage (i.e. scuffs or stains), but the jacketing is not penetrated.
FAIR	Minor penetration damage to jacketed insulation (cuts, tears, nicks, deterioration or delamination) or undamaged insulation that has never been jacketed. Insulation is exposed but not showing surface disintegration. The extent of missing insulation ranges should be minor to none.
POOR	Original insulation jacket is missing, damaged, deteriorated or delaminated. Insulation is exposed and significant areas have been dislodged. Damage cannot be readily repaired.

Non-friable materials (e.g. vinyl floor tiles) generally have little potential to release airborne fibres, even when damaged by mechanical breakage. However, some non-friable materials (i.e. exterior asbestos cement products) may have deteriorated so that the binder no longer effectively contains the asbestos fibres. In such cases of significantly deteriorated non-friable material, the material will be treated as a friable product.

The accessibility of building materials known or suspected of containing ACMs was rated in the field according to the following criteria:

ACCESS A	Areas of the building within reach (from floor level) of all building users.
ACCESS B	Frequently entered maintenance areas within reach of maintenance staff, without the need of a ladder.
ACCESS C (Exposed)	Areas of the building above 2.4m where use of a ladder is required to reach the asbestos containing material.
ACCESS C (Concealed)	Areas of the building that require the removal of a building component, including lay-in ceilings and access panels into solid ceiling systems.
ACCESS D	Areas of the building behind inaccessible, solid ceiling systems, walls or mechanical equipment etc. where demolition of the ceiling, wall or equipment etc. is required to reach the asbestos containing material.

If laboratory analysis confirmed the presence of asbestos in the materials sampled, recommendations for remedial actions (if any) based on the condition and accessibility of the ACM were made and are discussed later in this report.

The Action Matrix provided below establishes the recommended asbestos control action for friable ACMs and was used to determine the appropriate remedial actions with respect to ACMs in the buildings. The matrix considers the exposure risk and accessibility of the ACMs. The Actions are described in full following the matrix.

ACCESS	CONDITION			DEBRIS
	GOOD	FAIR	POOR	
A	Action 5/7 ¹	Action 5/6 ²	Action 3	Action 1
B	Action 7	Action 5/6 ³	Action 3	Action 1
C (Exposed)	Action 7	Action 6	Action 4	Action 2
C (Concealed)	Action 7	Action 7	Action 4	Action 2
D	Action 7	Action 7	Action 7	Action 7
Notes: 1. If material in ACCESS A (GOOD Condition) is not removed, ACTION 7 is required. 2. If material in ACCESS A (FAIR CONDITION) is not removed, ACTION 6 is required. 3. Remove ACM in ACCESS B (FAIR CONDITION) if ACM is likely to be disturbed.				

ACTION 1	<p>Immediate Clean-up of Debris That is Likely to be Disturbed</p> <p>Restrict access that is likely to cause a disturbance of the ACM debris and clean up ACM debris immediately. Utilize correct asbestos procedures. This action is necessary for compliance with regulatory requirements. The surveyor should immediately notify the Institutional Chief of Plant Maintenance of this condition.</p>
ACTION 2	<p>Entry into Areas with ACM Debris —Type 2 Precautions</p> <p>At all locations where ACM debris can be isolated in lieu of removal or clean up, use appropriate means to limit entry to the area. Restrict access to the area to persons utilizing Type-2 asbestos work precautions. The precautions will be required until the ACM debris has been cleaned up and the source of the debris has been stabilized or removed.</p>
ACTION 3	<p>ACM Removal Required for Compliance</p> <p>Remove ACM for compliance with regulatory requirements. Utilize asbestos procedures appropriate to the scope of the removal work.</p>
ACTION 4	<p>Access into Areas Where ACM is present and likely to be disturbed by Access-Type 2 Precautions</p> <p>Use Type 2 asbestos precautions when entry of access into an area is likely to disturb the ACM. Action 4 must be used until the ACM is removed. (Use Action 1 or 2 if debris is present).</p>
ACTION 5	<p>Proactive ACM Removal</p> <p>Remove ACM in lieu of repair, or at locations where the presence of asbestos with an Exposure Risk of 1 is not desirable.</p>
ACTION 6	<p>ACM Repair</p> <p>Repair ACM that has an exposure risk of 2, and is not likely to be damaged again or disturbed by normal use of the area or room. Upon completion of the repair work, treat ACM as material with an exposure risk of 1 and implement Action 7. If ACM is likely to be damaged or disturbed during normal use of the area or room, implement Action 5.</p>
ACTION 7	<p>Routine Surveillance</p> <p>Institute routine surveillance of the ACM. Trained workers or contractors must use appropriate asbestos precautions (Type 1, Type 2 or Type 3) during the disturbance of the remaining ACM.</p>

For non-friable materials, such as vinyl floor tiles, reported in GOOD condition, Action 7 (surveillance) is recommended regardless of accessibility.

DM Directive 057 defines Type 1, 2, and 3 work as follows:

Type 1 Work

- Installation or removal of a non-friable ACM with a hand tool;
- Disturbance of a non-friable ACM with a powered tool equipped with a HEPA dust collection device;
- Removal of drywall materials where joint-filling materials contain asbestos (in Ontario the removal of more than 1 m² of drywall with ACM joint-filling is considered Type 2 work);
- Removal or replacement of ten or less asbestos-containing compressed mineral fibre type ceiling tiles;
- Collecting samples of asbestos-suspect friable materials; and,
- Working close to friable sprayed asbestos, where the material may be affected by the work activities.

Type 2 Work

- Removal or replacement of more than ten asbestos-containing compressed mineral fibre type ceiling tiles (in Ontario the requirement is for an area of ACM ceiling tiles that is greater than 7.5 m² that are installed or removed without being broken, cut, drilled, abraded, ground, sanded or vibrated);
- Entry into ceiling spaces, crawlspace, pipe tunnels, etc., where friable asbestos debris is present;
- In British Columbia, removal of drywall installed before 1980;
- Minor removal of friable ACM. Type 2 removal is limited to a maximum per work period of:
 - In British Columbia — 0.1 m² surface area, or 3 lineal metres of pipe insulation;

- In Quebec — 0.03 m² of debris; and,
 - All Others — 1 m² of surface area.
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- Repair of asbestos mechanical insulation (no limit is imposed as to the amount of repair permitted under Type 2 conditions).

Type 3 Work

- More than minor removal or disturbance of friable ACM;
- Use of a power tool on non-friable ACM without HEPA exhausted dust collection;
- The spray application of an encapsulant or sealer to friable asbestos surfacing materials;
- Disturbance of ductwork and air handling equipment serving or passing through areas of buildings with sprayed asbestos fireproofing or insulation; and,
- Repair, alteration or demolition of a boiler, furnace, kiln, or smaller equipment with asbestos-containing refractory.

Ontario Regulation "Designated Substance - Asbestos on Construction Projects and in Buildings and Repair Operations O. Reg. 278/05" has similar but not identical definitions. Where more stringent, the requirements of O. Reg 278/05 were used to provide repair or abatement costs.

2.3.2 Sampling of Suspected Asbestos-Containing Materials

Samples were collected to satisfy the requirements outlined in Section 3 of O.Reg. 278/05. Specifically, confirmation that asbestos is not present at concentrations of 0.5% or more by weight requires analysis of multiple bulk material samples as specified in Table 1 of O. Reg. 278/05 (based on material type and/or quantity). For example, a minimum of three negative samples are required to determine that a vinyl floor tile does not contain asbestos, however one sample is sufficient to indicate presence of asbestos. All the layers of a material suspected of containing asbestos were sampled. During asbestos sample collection, procedures to minimize the potential release of asbestos fibres were followed, including the use of wetting methods. Personal protective equipment,

including disposable gloves, were used when collecting samples to minimize cross-contamination between samples and the potential for inhalation of airborne asbestos fibres. After sample collection, the area was wet wiped to remove any dust that may have been created by sampling.

2.3.3 Analytical Methodology

Samples for laboratory analyses were collected in sealable plastic bags and shipped by courier to Lex Scientific Inc. (Lex) of Guelph, Ontario under Chain of Custody protocols. Lex is accredited by the National Voluntary Laboratory Accreditation Program (NVLAP 101949) by the National Institute of Standards and Technology for analyses of bulk asbestos. The laboratory method detection limit for asbestos analysis is 0.1% by weight. Asbestos, if present, was identified as one or more fibrous asbestos minerals, including chrysotile, amosite or crocidolite. Analyses of bulk samples for determination of asbestos content were performed using polarized light microscopy (PLM) procedures detailed in the US Environmental Protection Agency (EPA) "Methods for the Determination of Asbestos in Bulk Building Materials, US EPA Report No. 600/R-93/116". The EPA method indicates that floor tiles may contain fibres too small to be resolved by PLM and that binder/matrix materials may coat asbestos fibres, affect colour or obscure optical characteristics to the extent of masking fibre identity. For these reasons, vinyl flooring material (i.e., vinyl floor tiles and vinyl sheet flooring) and tar impregnated material were analysed using transmission electron microscopy (TEM) Chatfield methodology (Rev 2).

The laboratory was requested to not test subsequent samples of an asbestos containing material if the previous sample tested was positive for asbestos (i.e. contained greater than 0.5 percent asbestos). This is known as the "positive stop method".

As indicated in DM Directive 057, ACMs have been defined as materials containing 0.5 percent or greater of asbestos fibres. The materials that are commonly found are actinolite, amosite, anthrophyllite, chrysotile, crocidolite or tremolite.

2.4 Lead

During the "room-by-room" survey of the buildings, the presence of any materials or equipment that may contain lead were identified. These materials included (but were not limited to) paint, batteries and plumbing. The quantity and the condition of these materials were noted and identified on building plans.

