



FINAL

Asbestos Management Program

University of Windsor
401 Sunset Avenue, Windsor, Ontario



University
of Windsor

Prepared for:

University of Windsor
401 Sunset Avenue
Windsor, Ontario, N9B 3P4

Attn: Danny A. Castellan, P.Eng.
Client Contact Title

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GLOSSARY

Amended Water	Water with wetting agent added for purpose of reducing surface tension to allow thorough wetting of ACM.
Asbestos-Containing Material(s) (ACM)	A material that contains 0.5% or more asbestos as measured by U.S. Environmental Protection Agency Test Method EPA/600/R-93/116: Method for the Determination of Asbestos in Bulk Building Materials, June, 1993.
Asbestos	Any of the following fibrous silicates: Actinolite; Amosite; Anthophyllite; Chrysotile; Crocidolite; Tremolite.
Asbestos Work Area	Area where work is being performed which will or may disturb ACM including overspray and fallen material or settled dust that may contain asbestos.
Competent Worker	In relation to specific work, means a worker who, <ul style="list-style-type: none">• is qualified because of knowledge, training and experience to perform the work;• is familiar with the Act and with the provisions of the regulations that apply to the work; and• has knowledge of all potential or actual danger to health or safety in the work.
Encapsulation	The application of a liquid sealant to asbestos-containing materials; the sealant may penetrate and harden the material (penetrants) or cover the surface with a protective coating (bridging sealants). Also called encasement. This is generally not advisable.
Enclosure	Enclosure of ACM means the construction of solid enclosure (walls, ceiling, bulkhead etc.) around ACM, or An Enclosure means the site isolation including hoarding walls, polyethylene sheeting and seals that isolates an Asbestos Work Area.
Friable Materials	Material that: <ul style="list-style-type: none">• when dry, can be crumbled, pulverized or powdered by hand pressure; or• is crumbled, pulverized or powdered.
Glove Bag Removal	A method of removing friable insulation from a piping system using a prefabricated bag which isolates the section of insulation being removed. This is a Type 2 Procedure.

HEPA Filter	High Efficiency Particulate Aerosol filter that is at least 99.97 percent efficient in collecting a 0.3 micrometre aerosol.
HEPA Filtered Negative Pressure Unit	Portable air handling unit which extracts air directly from the Asbestos Work Area and discharges the air to the exterior of the building after passing through a HEPA filter.
CSC	Central Safety Committee (Joint Health & Safety Committee)
MOE	Ontario Ministry of the Environment
MOL	Ontario Ministry of Labour
Phase Contrast Microscopy (PCM)	A method which uses an optical microscope to determine airborne fibres, normally in an occupational setting. Particles are observed for shape and size. Results are presented as a number of fibres per cubic centimetre or millilitre of air (f/mL). The method of analysis in Ontario is based on the US National Institute for Occupational Safety and Health (NIOSH) Manual of Analytical Methods, Method 7400, issue 2, Asbestos and Other Fibres by PCM (August 15, 1994).
Transmission Electron Microscopy (TEM)	A method which uses an electron microscope to determine airborne asbestos fibres. Results are presented in fibres per cubic centimetre of air (f/cc). The method of analysis in Ontario is The U.S. National Institute of Occupational Safety and Health (NIOSH) Manual of Analytical Methods, Method 7402, Issue 2: Asbestos by TEM (Aug 15, 1994).
Asbestos Abatement Procedures (classified as Type 1, 2 or 3)	Procedures defined under Ontario Ministry of Labour Regulation 278/05. The specific operations and their classification into these procedures are described under the Classification of Work Section (Appendix D, E & F of this report). Note: Work on ceiling tiles, drywall or friable asbestos-containing materials is classified according to the total area on which work is done consecutively in a room or enclosed area, even if the work is divided into smaller jobs; in accordance with O. Reg. 278/05 Subsection 12(5).
Type 1 Procedures	Any operation described in Subsection 12(2) in the MOL Reg. 278/05. Involves removal of non-friable material, using non-powered hand-held tools only; friable asbestos materials cannot be abated using Type 1 precautions. Type 1 removal includes: <ul style="list-style-type: none"> • Installing or removing ceiling tiles which are an asbestos-containing material, if the tiles cover an area less than 7.5 square metres and are installed or removed without being broken, cut, drilled abraded, ground, sanded or vibrated.

	<ul style="list-style-type: none">• Installing or removing non-friable asbestos-containing material, other than ceiling tiles, if the material is installed or removed without being broken, cut drilled, abraded, ground, sanded or vibrated.• Breaking, cutting, drilling, abrading, grinding, sanding or vibrating non-friable asbestos-containing material if,<ul style="list-style-type: none">• The material is wetted to control the spread of dust or fibres, and• The work is done only by means of non-powered hand-held tools.• Removing less than one square metre of drywall in which joint-filling compounds that are asbestos-containing material have been used.
Type 2 Procedures	<p>Any operation described in Subsection 12(3) in the MOL Reg. 278/05.</p> <p>Type 2 procedures include:</p> <ul style="list-style-type: none">• Entry into any ceiling space, wall chase or other area in which friable asbestos-containing debris is present.• Removal of any part of a false ceiling if asbestos-containing debris is likely to be lying on the surface of the false ceiling.• Removal of glued-on compressed mineral fibre tiles containing asbestos or removal of more than 7.5 square metres of lay-in tiles of this type at one time.• Clean up of asbestos-containing debris from mechanical insulations or sprayed fireproofing.• Enclosure of friable material containing asbestos.• Repair (such as application of tape or sealant or other covering) of any extent of asbestos mechanical insulation.• Removal of non-friable materials with hand-tools where the material has not been wetted.• Removal of more than 1 square metre of drywall to which asbestos-containing compound has been applied.• Removing asbestos-containing pipe insulation from a pipe, duct or similar structure using a glove bag.• Cleaning or removing filters used in air handling equipment in a building that has asbestos-containing sprayed fireproofing.

	<ul style="list-style-type: none">• Removal of any extent of asbestos-containing vinyl sheet flooring. Note: If power tools such as grinders are required to remove all paper backing from the substrate Type 3 procedures must be utilized.• Removal of minor amounts of friable asbestos-containing materials including, texture coat, sprayed fireproofing and mechanical insulation. (Minor removal is defined by most provincial regulations – in Ontario this is limited to wet removal of 1 square metre or less, or an equivalent amount of pipe insulation).
Type 3 Procedures	<p>Any operation described in Subsection 12(4) in the MOL Reg. 278/05.</p> <p>Type 3 procedures include:</p> <p>Entry into any ceiling space, wall chase or other area in which friable asbestos-containing debris is present.</p> <ul style="list-style-type: none">• The removal or disturbance of more than one square metre of friable asbestos-containing material during the repair, alteration, maintenance or demolition of all or part of a building, aircraft, ship, locomotive, railway car or vehicle or any machinery or equipment.• The spray application of a sealant to friable asbestos-containing material.• Cleaning or removing air handling equipment, including rigid ducting but not including filters, in a building that has sprayed fireproofing that is asbestos-containing material.• Repairing, altering or demolishing all or part of a kiln, metallurgical furnace or similar structure that is made in part of refractory materials that are asbestos-containing materials.• Breaking, cutting, drilling, abrading, grinding, sanding or vibrating non-friable asbestos-containing material, if the work is done by means of power tools that are not attached to dust-collecting devices equipped with HEPA filters.• Repairing, altering or demolishing all or part of any building in which asbestos is or was used in the manufacture of products, unless the asbestos was cleaned up and removed before March 16, 1986.
US EPA	United States Environmental Protection Agency



1.0 PURPOSE AND SCOPE

The Asbestos Management Program (AMP) provides information and procedures for Asbestos Management in various buildings location on the University of Windsor campus located at 401 Sunset Avenue, Windsor, Ontario. It applies to all categories of property with the exception of vacant lands. The AMP applies to all University of Windsor (“University”) staff as well as all service providers and contractors performing work in the University facilities.

The AMP outlines the responsibilities of University staff in their roles as the Owner of buildings containing Asbestos-Containing Material (ACM), as tenants of a building with ACM and outlines requirements for University personnel involved in acquisition of property which may contain ACM.

The AMP is a management system to control disturbance of asbestos-containing materials during demolition, renovation, alteration, maintenance, repair or other activities.

The AMP incorporates the following elements:

- Asbestos Assessments and Reassessments. These documents are part of the AMP and can be found on the University of Windsor Facility Services website at: <http://www.uwindsor.ca/facilityservices/AsbestosInventory>
- Regulatory Requirements and University Policies
- Roles and Responsibilities
- Notifications
- Training Requirements
- Emergency Reaction and Procedures
- Work Practices (Type 1, 2 and Glove Bag work)
- Record Keeping
- Contractor Requirements

2.0 REGULATORY REQUIREMENTS AND UNIVERSITY OF WINDSOR POLICIES

2.1 Regulatory Requirements

The University of Windsor AMP was implemented in response to the following legislation in effect as of December 2012.

- Ontario Regulation 278/05, Designated Substance - Asbestos on Construction Projects and in Buildings and Repair Operations as amended, made under the Occupational



Health and Safety Act, 1980, under the jurisdiction of the Ontario Ministry of Labour.

http://www.e-laws.gov.on.ca/DBLaws/Regs/English/050278_e.htm

- R.R.O. 1990, Reg. 347, as amended made under the Environmental Protection Act, under the jurisdiction of the Ontario Ministry of the Environment
http://www.e-laws.gov.on.ca/DBLaws/Regs/English/900347_e.htm
- Transportation of Dangerous Goods Act, 1992 (TDGA, 1992), S.C. 1992, c. 34 including Transportation of Dangerous Goods Regulations SOR/85/77 and subsequent amendments
http://www.tc.gc.ca/acts-regulations/GENERAL/T/tdg/regulations/tdg001/part_1.htm

2.2 University of Windsor Policies Related to Asbestos

University of Windsor is committed to ensuring the health and safety of all staff, service providers, and building occupants. All building operations, whether performed by University staff or service providers, shall be performed in adherence to the requirements outlined in this document and Ontario Regulation 278/05, *Designated Substance – Asbestos on Construction Projects and in Buildings and Repair Operation* made under the *Occupational Health and Safety Act* and all other applicable regulations.

University has established certain policies which exceed the minimum requirements of O. Reg. 278/05 as follows:

- The University of Windsor will avoid the use, where applicable, of any ACM in new construction and installations.
- When remedial action is undertaken on friable sprayed ACM, University of Windsor will generally opt for removal of the ACM. Encapsulation or encasement will not be undertaken unless removal is not practicable in specific locations.
- When remedial action is undertaken on friable mechanical insulation both removal and repair (re-jacketing or encapsulation of mechanical insulation) will be considered depending on the extent of work required.
- Prior to leasing properties, University of Windsor will have asbestos assessments performed in buildings constructed prior to 1995.
- Prior to leasing properties, University of Windsor will determine, at the time of lease negotiations, the requirements of ACM removal.
- At existing leased properties when ACM is discovered during any improvement, addition, renovation, demolition, maintenance, repair of any kind, or at any other time, the Landlord



shall promptly remove the ACM from the Premises or the Building if possible within existing lease agreement.

- All Type 3 asbestos operations shall be undertaken by a qualified Asbestos Abatement Contractor.
- Type 1 and Type 2 work may be undertaken by either trained University staff or a qualified Asbestos Abatement Contractor.

3.0 BACKGROUND INFORMATION AND HEALTH EFFECTS

Refer to Appendix A for Background Information on Asbestos in Building Materials and Health Hazards.

4.0 SUMMARY OF ASBESTOS AT THE UNIVERSITY OF WINDSOR CAMPUS

The asbestos data for all buildings encompassing the University of Windsor campus can be found on the University of Windsor Facility Services Website;

<http://www.uwindsor.ca/facilityservices/AsbestosInventory>.

The asbestos data for each building, found in the Asbestos HMIS program, is live, current and up-to-date. The building surveys, performed by Pinchin Ltd., were completed following all sampling criteria outlined in Regulation 278/05.

The following is a brief summary of the asbestos-containing materials that may be present in buildings throughout the campus; but are not limited to the following:

- Sprayed fireproofing
- Parging cement fittings on various pipe systems
- Aircell, sweat-wrap, mag-block straight insulation on various pipe systems
- Transite piping
- Transite sheeting in fume hoods, radiator covers, etc.
- Plaster finishes
- Drywall joint compound
- Textured finish on ceilings
- Vinyl floor tiles
- Acoustic ceiling tiles; all types (lay-in, splined or stuck-on)
- Vinyl sheet flooring
- Black mastic on piping or ducting

- Vermiculite insulation inside block walls
- Firestop material
- Exterior window or door caulking
- Fire-rated doors
- Gaskets
- Roofing materials
- Boiler cladding and internal insulations
- Duct expansion joints
- Electrical insulation

Please refer to the Asbestos Hazardous Materials Information System (HMIS) for a complete description.

5.0 ROLES AND RESPONSIBILITIES

The following University personnel have responsibilities for establishing and maintaining the AMP.

5.1 Personnel involved in Acquisition or Leasing to University of Windsor

Personnel involved in Acquisition or Leasing to University shall:

1. Prior to leasing or acquiring properties, University will have asbestos assessments performed in buildings constructed prior to 1995.
2. Prior to leasing properties, University of Windsor will determine, at the time of lease negotiations, the requirements of ACM removal.
3. Prior to occupying acquired properties, University of Windsor may remove any ACM that will be disturbed during renovations, or may negotiate to have vendor remove ACM prior to purchase.

5.2 Personnel Leasing to University of Windsor Tenants

Personnel involved in Leasing to University Tenants shall:

1. Ensure all leases signed by tenants of University include reference to this AMP and that tenants are to follow the requirements of the AMP.
2. University may remove accessible ACM that may be disturbed, from spaces to be leased, prior to tenant occupying space and performing renovations.

5.3 The University of Windsor Facility Services

Facility Services shall:

1. Ensure that an asbestos assessment has been performed for all facilities constructed or occupied prior to 1995. Where such a survey has not been performed in pre-1986 facilities, arrange for a room-by-room survey of the facility. Notify the CSC representatives and employer in the building to ensure that all aspects of committee involvement are complied with.
2. Ensure the Asbestos HMIS system is available to all building occupants.
3. Notify in writing all existing and new Tenants of University (Management Representatives) at the location of asbestos, of the information in this by directing them to the Asbestos HMIS website (accessed through the University of Windsor Facility Services website) as per the lease agreement.
4. Notify staff and outside contractors or service providers who may work with or may disturb the material in the record of its presence and location by directing them to the Asbestos HMIS website (accessed through the University of Windsor Facility Services website).
5. Arrange for the reassessment of asbestos-containing materials at regular intervals and ensure the asbestos assessment report is updated at least annually, or when new information is obtained as ACM is removed or its condition changes.
6. Arrange for the remediation of deteriorated ACM reported in the asbestos assessment report or in reassessment reports using the appropriate procedures (Type 1, Type 2 or Type 3 procedures).
7. Ensure all Project Managers, Architects, Engineers and others arranging for or planning work in at the University of Windsor are provided with necessary information on ACM and a copy of the Asbestos Survey or record. Ensure that an intrusive pre-construction assessment for friable and non-friable ACM is performed prior to any renovation, alteration or demolition. Ensure this information is provided to Constructor in plans, drawings or specifications. Such assessments shall include destructive investigation where necessary.
8. Ensure that Tenant Management Representatives, CSC and/or building occupants are informed in advance of projects which will require Type 2 or Type 3 Procedures.
9. Arrange for training for University staff (refer to Training Section).

10. Arrange for awareness training on asbestos for building occupants as required to respond to concerns over the presence of asbestos or planned asbestos work when required.
11. Ensure that procedures are in place at the University of Windsor to respond to emergencies involving asbestos by using University Personnel or an Asbestos Abatement Contractor.
12. Maintain all documentation required by this program, including but not limited to: Asbestos Management Program, Asbestos Assessment Reports and Reassessments, Tenant Notification Letters, Contractor Notification Forms, Asbestos Project Work Records, Training Certificates and Respirator Protection.
13. Upon unexpected discovery of suspect ACM, or upon an uncontrolled asbestos spill or disturbance, follow the emergency procedures of Appendix C. Ensure all University personnel that may report an emergency are aware of contact names and numbers.
14. Arrange for the inspection and air monitoring of asbestos work at the University of Windsor as required by O. Reg. 278/05 and this AMP, when contracted by Facility Services.
15. At the completion of the work, to allow updating of the asbestos assessment report to reflect altered location and condition of ACM, complete the Asbestos Project Update Form in Appendix H for each project during which asbestos is removed that is managed by the Facility Services.
16. Inform CSC committee of any sampling or testing as they have a right to be present during testing if desired.

5.4 Project Administrators

Project Administrators (may also include Facility Services Management) who plan, arrange for or oversee work at the University of Windsor shall:

1. Ensure that an intrusive pre-construction assessment for friable and non-friable ACM is performed prior to any renovation, alteration or demolition. Ensure this information is provided to Constructor in plans, drawings or specifications. Such assessments shall include destructive investigation where necessary.
2. Based on the results of the pre-construction assessment report, provide or arrange for the provision of appropriate specifications (Type 1, 2 or 3 operations) to Constructor to remove ACM from the work area.

3. Ensure all asbestos work in the facility is performed by Consultants and Asbestos Abatement Contractors who specialize in asbestos work and who have appropriate experience, equipment and insurance. See below.
4. Arrange for the inspection and air monitoring of asbestos work in the facility as required by O. Reg. 278/05 and this AMP.
5. Shall follow the Facility Services "Notice of Service Interruption" procedures.
6. Ensure all necessary notification of the Ministry of Labour for Type 1, 2 and 3 Projects have been performed by the contractor prior to start of work and that all necessary forms are posted on site.
7. At the completion of the work provide information to Facility Services to allow updating of the Asbestos HMIS system to reflect altered location and condition of ACM. Complete the Asbestos Project Update Form in Appendix H for each project during which asbestos is removed or disturbed and submit to Facility Services.

5.5 University of Windsor Occupants and Tenant Representatives

All persons at the University of Windsor who may arrange for maintenance or alteration are to be made aware of the presence of ACM and shall:

1. Ensure all personnel who may work near the location of ACM are aware of its presence and follow the procedures outlined in this AMP.
2. Avoid unnecessary contact with or disturbance of ACM.
3. Report any disturbance, damage or deterioration of ACM to the Facility Services.

6.0 ASBESTOS ASSESSMENT AND REASSESSMENT POLICIES

6.1 Asbestos Assessments for Management Purposes (Sections 7 and 8 of O. Reg. 278/05)

A description of ACM at the University of Windsor is included in Section 4 and in the Asbestos HMIS program, which is available to all staff and students of the University. If assessments have not been performed for a building (and hence is not in compliance with Regulation 278/05), use the information in this section as a minimum for an asbestos assessment.

All University buildings constructed prior to 1995 are included in the online Asbestos HMIS program, which includes both friable and non-friable ACM. The survey shall be conducted on a room by room basis and shall indicate the location, condition, friability, accessibility and type of asbestos present in the buildings as outlined below.



As the survey will be typically performed for maintenance purposes it will not usually include destructive sampling that may destroy the material or damage the building.

A number of materials which might contain asbestos will not be sampled during the assessment and will be presumed to be ACM in the Asbestos HMIS program. Reasons for not sampling these materials include:

- Sampling the material may be hazardous to the surveyor (e.g. electrical hazard);
- Sampling the materials may cause consequential damage to the property (e.g. sampling various materials may cause leaks, e.g. roofing and caulking);
- The material is inaccessible without major demolition (e.g. inside boilers etc.) or;
- The material is present in such an inconsistent fashion that without complete removal of finishes, the extent of ACM could not be determined (e.g. floor levelling compound).

If present, the following materials will be presumed to be asbestos-containing and are best sampled *immediately* prior to commencing renovation/disturbance:

- caulking
- components or wiring within motor control centers, breakers, motors or lights
- concrete levelling compound (for floors)
- fire resistant metal clad finishes
- elevator and lift brakes
- exterior cladding
- soffit and fascia boards at elevated heights
- fire-door cores
- insulation on or in high voltage wiring
- mastics, adhesives and tar
- mechanical packing, ropes and gaskets
- moulded plastic components (laboratory bench tops)
- paper products where inaccessible (e.g. under wood flooring or under metal or slate roofing)
- refractory materials in boilers or incinerators
- roofing, roofing felt and tar

The survey must include the information gathered on a room-by-room basis together with recommendations for asbestos management, control or removal for each material detected in each location. The location of materials suspected to contain asbestos but shown by analysis to be non-asbestos shall be reported. The original laboratory report of all analyses shall be provided as part of the report. Samples are to be collected at a rate that is in compliance with the requirements of O. Reg. 278/05, which states a minimum number of samples are to be collected and analyzed from each area of homogeneous material for the material to be considered non-asbestos. This frequency is indicated in the table below. A homogeneous sampling area is defined by the US EPA as containing material that is uniform in texture and appearance, was installed at one time and is unlikely to consist of more than one type or formulation of material.

Type of Material	Size of Homogeneous Material	Minimum Number of Bulk Samples
Surfacing material, including without limitation material that is applied to surfaces by spraying, by troweling or otherwise, such as acoustical plaster on ceilings, fireproofing materials on structural members and plaster	Less than 90 square metres	3
	90 or more square metres, but less than 450 square metres	5
	450 or more square metres	7
Thermal insulation, except as described below	Any size	3
Thermal insulation patch	Less than 2 linear metres or 0.5 square metres	1
Other materials	Any size	3

NOTE: That most or all surveys performed prior to November of 2005 are non-compliant with the table above and will require additional sample collection and analysis.

6.2 Bulk Sample Collection Procedures

Bulk samples collected during the initial survey and all samples collected for future testing shall be collected following the procedures provided in Appendix B. Following these procedures, samples can be collected by University staff, or by an Asbestos Consultant, under the direction of the Facility Services.

6.3 Bulk Analysis

Bulk samples will be analyzed for asbestos in accordance with O. Reg. 278/05 section 3(1). All analyses shall be performed by laboratories accredited in the US National Voluntary Laboratory Accreditation Program (NVLAP) or the American Industrial Hygiene Association (AIHA) asbestos in bulk sample programs.



6.4 Reassessment of ACM and Update of Survey Record

Facility Services will arrange for a regular reassessment of all accessible areas identified by the survey to contain ACM. The reassessment will be performed at least annually if ACM is present. If a specific area is subject to any change of use, frequent maintenance which may disturb the material, or if any report of damaged or deteriorated ACM is brought to the attention of Facility Services, the reassessment of materials in the specific area shall be performed on a more frequent basis. Reassessment shall always be performed of specific materials when damage or deterioration is reported. The CSC shall be notified of the reassessment and be invited to attend.

In buildings which are entirely leased and in which the University of Windsor are not responsible for maintenance, renovation or alteration of the initial survey and the reassessment are the responsibility of the landlord. Copies of the initial survey and reassessments shall be provided by the landlord to the Facility Services and maintained on site.

6.5 Distribution of Assessment Record and Reassessment

Facility Services are responsible to maintain a copy of records, assessment reports and Reassessment reports on site. In addition, the Facility Services will ensure the following are provided with access (not additional copies) to these reports:

- CSC representative.
- Tenant (in premises with ACM).
- Facility Services personnel planning or performing work in a University Building.

6.6 Pre-Construction Asbestos Survey (Section 10 of O. Reg. 278/05)

Prior to the commencement of any renovation, construction or demolition project (including buildings built up to 1995), the building or specific areas of the building which are to be affected by the work, shall be assessed for friable and non-friable ACM. The survey must be performed by a specialized asbestos consultant and include destructive or intrusive testing of enclosed areas which will be affected by the work.

Upon completion of the pre-construction survey, if asbestos is present in the area, specifications for removal shall be prepared (Type 1, 2 or 3 as appropriate) and provided to the Constructor in the work specifications.

7.0 NOTIFICATION OF ACM ASSESSMENTS

All asbestos related notifications will be communicated by Facility Services through University communication (email, Daily News, Notice of Service Interruptions (NSI), etc.).



7.1 Notification to Tenants

Upon completion of the asbestos assessment, the University will inform all Tenant Representatives of the presence of asbestos within their leased space and provide them with access to portions of the record regarding their premises and common areas, as detailed in the Asbestos HMIS program on the Facility Services website; as per the lease agreement.

7.2 Notification to Contractors

All external contractors who perform work at the University facilities where ACM is present shall be notified of the presence of the ACM if their work may bring them into contact or close proximity to the ACM and they may disturb it. This notification may include janitorial, security, telephone, computer cabling suppliers, mechanical maintenance contractors, etc. This notification shall be performed by Facility Services.

All external contractors who perform work at the University, where asbestos-containing sprayed fireproofing is present above ceilings, including telephone, computer cabling suppliers, electrical and mechanical contractors, etc., are to be notified that Type 2 Procedures are required for any entry to, or work within the ceiling space. This notification shall be performed by the Facility Services.

7.3 Notification of University Maintenance Personnel

Upon completion of the asbestos assessment, Facility Services will inform all University Personnel of the presence of asbestos within the building and ensure they have access to the Asbestos HMIS program on the Facility Services Website; <http://www.uwindsor.ca/facilityservices/AsbestosInventory>.

All University employees who perform work at the University, where asbestos-containing sprayed fireproofing is present above ceilings, are to be notified that Type 2 Procedures are required for any entry to, or work within the ceiling space. This notification shall be performed by Facility Services or appropriate department.

7.4 Notification of Asbestos Abatement

Certified Asbestos Abatement Contractors are to:

- Notify orally and in writing, an inspector at the office of the Ontario Ministry of Labour nearest the project site (Notice of Project), as per Regulation 278/05, prior to commencing Type 3 abatement, Glove Bag abatement (of more than 1 square metre of friable ACM) or any abatement project that exceeds \$50,000.00 in cost.
- Notify Sanitary Landfill site as per Ontario MOE Regulation 347 as amended.
- Inform all sub trades of the presence of ACM identified in the contract documents.

- Notify Facility Services if suspect ACM not identified in the contract documents are discovered during the course of the work. The contractor is to notify the MOL and the CSC if the friable material is asbestos containing, as required by Regulation 278/05.

The Facility Services is to notify the CSC of any testing or sampling that is proceeding.

The Facility Services is to notify the building occupants of any abatement work *within their space or that will impact their operations*, through the Notice of Service Interruption (NSI) procedure. This is a procedural requirement, not a regulated requirement.

8.0 TRAINING REQUIREMENTS

Only trained University employees will undertake either Type 1 or Type 2 asbestos work. Asbestos training will be provided by a competent person to all employees working in Type 1 or 2 operations. Training will be arranged by the Office of Health & Safety. The identified University departments shall receive training in asbestos including the following:

- Identification of ACM;
- Uses and hazards of asbestos;
- Regulations applying to asbestos work;
- Personal hygiene and Type 1 and Type 2 work practices;
- Safety procedures and fit-testing of respirators; and
- The use, cleaning, and disposal of respirator cartridges and protective clothing. This will include the limitations, inspection and maintenance, proper fitting, and cleaning and disinfecting of a respirator.

Training can also include asbestos management and abatement of sufficient content to allow qualified University personnel to implement the policies outlined in the AMP and to enable the University of Windsor to remain in compliance with O. Reg. 278/05.

Tenant Representatives and Building Occupants shall receive (upon request only) Asbestos Awareness Training of approximately one hour duration. Such training may be provided in advance of a project incorporating Type 2 or 3 operations or if concern over asbestos is expressed by employees.

General Asbestos Awareness training may also be arranged by the Office of Health & Safety as appropriate.

The need for training will be reviewed annually by the Office of Health & Safety and Facility Services.



The University requires all service providers, contractors, etc. to provide proof of required asbestos abatement certification and training of all workers who perform Type 1, 2 or 3 work in University Buildings. Facility Services will notify CSC of any training provided by the University.

8.1 Asbestos Work Report (Form 1)

The appropriate Facility Services Manager / Supervisor will record all asbestos work performed by employees. The Manager / Supervisor will ensure that Ontario Ministry of Labour Asbestos Work Reports (Form 1) are completed for each employee who works in a Type 2 operation.

The Manager / Supervisor will send the information regarding the employee's Type 2 hours of work to the Administrative Assistant to the Executive Director, Facility Services. The Administrative Assistant will complete the asbestos work report and send it to the Provincial Physician at least once every twelve months, and immediately upon termination of the employment of the worker. A copy will also be given to the worker, and one filed in Facility Services.

9.0 EMERGENCY PROCEDURES AND CONTACTS

9.1 Fallen Debris or Damaged Material

University staff may encounter fallen material that is suspected to contain asbestos. This may occur in locations where asbestos has been documented or in areas not included in the Assessment due to limited accessibility, etc.

In the Event that Emergency Work must be undertaken, all University employees shall follow the protocol, procedures and notifications as outlined in the "Emergency Response Plan For Accidental Disturbance Of Friable Asbestos-Containing Materials (ACM)" in Appendix C. All emergency situations shall be reported to the Facility Services as soon as possible.

Emergency Contacts

Maintenance Services (During Business Hours; until 4pm)	Ext. 2850
Campus Police (During After Hours; after 4pm & Weekends)	Ext. 1234

9.2 Disturbance of Previously Unidentified Friable Material

Previously unidentified friable materials (in buildings constructed prior to 1995) may also be uncovered during accidental disturbance of finishes, walls, doors etc. If the asbestos content of the material disturbed is unknown, these materials are to be presumed asbestos-containing until tested and all persons shall follow the protocol "Emergency Response Plan and Work Practices For Accidental Disturbance of Friable Asbestos-Containing Materials (ACM)" (Appendix C).



10.0 ASBESTOS WORK PRACTICES

The following sections briefly describe the standard operating procedures adopted for asbestos-related work. These meet or exceed the requirements of O. Reg. 278/05 and other regulatory requirements in effect on November 1, 2005. These procedures are provided as a minimum standard for all asbestos work in University buildings.

10.1 Classification of Scheduled Work

The Ministry of Labour Regulation classifies asbestos work into Types 1, 2 and 3 procedures, depending on the type of disturbance, the material being disturbed, and the extent of work. The Ministry of Labour also allows the use of Glove Bags for removal of asbestos-containing pipe insulation as a Type 2 operation.

The following is the classification of work for materials known to exist in University buildings.

10.1.1 Type 1 Work

Installing or removing ceiling tiles which are an asbestos-containing material, if the tiles cover an area less than 7.5 square metres and are installed or removed without being broken, cut, drilled, abraded, ground, sanded or vibrated.

Installing or removing non-friable asbestos-containing material, other than ceiling tiles, if the material is installed or removed without being broken, cut drilled, abraded, ground, sanded or vibrated.

Breaking, cutting, drilling, abrading, grinding, sanding or vibrating non-friable asbestos-containing material if,

- a. The material is wetted to control the spread of dust or fibres, and
- b. The work is done only by means of non-powered hand-held tools.

Removing less than one square metre of drywall in which joint-filling compounds that are asbestos-containing material have been used.

The procedures for Type 1 work are provided in Appendix D.

10.1.2 Type 2 Work

Removing all or part of a false ceiling to obtain access to a work area, if asbestos-containing materials are likely to be lying on the surface of the false ceiling.

The removal or disturbance of one square metre or less of friable asbestos-containing material during the repair, alteration, maintenance or demolition of all or part of machinery or equipment or a building, aircraft, locomotive, railway car, vehicle or ship.



Enclosing friable asbestos-containing material.

Applying tape or a sealant or other covering to pipe or boiler insulation that is asbestos-containing material.

Installing or removing ceiling tiles that are asbestos-containing material, if the tiles cover an area of 7.5 square metres or more and are installed or removed without being broken, cut, drilled, abraded, ground, sanded or vibrated.

Breaking, cutting, drilling, abrading, grinding, sanding or vibrating non-friable asbestos-containing material if,

- a. The material is not wetted to control the spread of dust or fibres, and
- b. The work is done only by means of non-powered hand-held tools.

Removing one square metre or more of drywall in which joint filling compounds that are asbestos-containing material have been used.

Breaking, cutting, drilling, abrading, grinding, sanding or vibrating non-friable asbestos-containing material if the work is done by means of power tools that are attached to dust-collecting devices equipped with HEPA filters.

Cleaning or removing filters used in air handling equipment in a building that has sprayed fireproofing that is asbestos-containing material.

An operation that,

- a. is not classified as a Type 2 operation (above)
- b. may expose a worker to asbestos, and
- c. is not classified as a Type 1 or Type 3 operation.

The procedures for Type 2 work are provided in Appendix E.

10.1.3 Glove Bag Work

The use of glove bags to remove insulation from a pipe duct or similar structure is classed as Type 2 work but it requires notification of the MOL if more than 1 square metre of ACM is removed.

The procedures for Glove Bag work are provided in Appendix F.



10.1.4 Type 3 Work

The removal or disturbance of more than one square metre of friable asbestos-containing material during the repair, alteration, maintenance or demolition of all or part of a building, aircraft, ship, locomotive, railway car or vehicle or any machinery or equipment

The spray application of a sealant to friable asbestos-containing material

Cleaning or removing air handling equipment, including rigid ducting but not including filters, in a building that has sprayed fireproofing that is asbestos-containing material.

Repairing, altering or demolishing all or part of a kiln, metallurgical furnace or similar structure that is made in part of refractory materials that are asbestos-containing materials.

Breaking, cutting, drilling, abrading, grinding, sanding or vibrating non-friable asbestos-containing material, if the work is done by means of power tools that are not attached to dust collecting devices equipped with HEPA filters.

Repairing, altering or demolishing all or part of any building in which asbestos is or was used in the manufacture of products, unless the asbestos was cleaned up and removed before March 16, 1986.

11.0 INSPECTION AND AIR MONITORING OF ASBESTOS WORK

11.1 Visual Inspection

The procedures provided in Appendices D, E, and F are suitable for the performance of most work on non-friable and friable ACM; with the exception of Type 3 (major disturbance of ACM). Facility Services will be responsible for ensuring these procedures are followed. The primary method of ensuring compliance for Type 1, Type 2, Type 3 and Glove Bag use is visual inspection of the site and work practices by a Competent Worker or Asbestos Consultant. The procedures outlined in the Appendices are to be enforced by those supervising the work.

11.2 Air Monitoring During Asbestos Work

O. Reg. 278/05 requires clearance monitoring only for Type 3 projects in buildings that will be occupied subsequent to the asbestos work. In Type 2 and Type 3 projects air monitoring is useful to provide proof of compliance with the specified work practices and will be performed as outlined below on University projects.

Air monitoring and analysis during active asbestos removal will be performed using the NIOSH 7400 method using Phase Contrast Microscopy (PCM). PCM air samples may or may not be analyzed by the consultant performing the sample collection. PCM air samples must be submitted for analysis to a



laboratory participating in a recognized quality control program such as the AIHA AAR Program or the Quality Control Program of the IRSST (Institut de Recherché en Santé et en Sécurité du Travail du Québec).

The acceptable limit for samples collected outside the asbestos work area will be 0.05 fibres/mL (f/mL). This level has been established as 50% of the current Occupational Exposure Limit (OEL) established by the MOL for industrial exposure to asbestos. In addition, the NIOSH REL (Recommended Exposure Limit), the US OSHA PEL (Permissible Exposure Limit) and the ACGIH TLV (Threshold Limit Values) for asbestos are 0.1 fibres/cc (or mL), including aspect ratio and length requirements. Other Canadian Provinces have similar OELs of 0.1.

Accurate determination of a lower concentration may be affected by the presence of low levels of non-asbestos fibrous dust in office or building environments.

11.3 Type 1 – Inspection and Air Monitoring

11.3.1 Inspection & Air Monitoring

Inspection and air monitoring is not required during or after Type 1 work; as per Ontario Regulation 278/05.

11.4 Type 2 and Glove Bag – Inspection and Air Monitoring

11.4.1 Inspection & Air Monitoring

Inspection and air monitoring is not required during or after Type 2 or Glove Bag work; as per Ontario Regulation 278/05.

11.5 Type 3 – Inspection and Air Monitoring

11.5.1 Inspection

An outside Asbestos Consultant will inspect Type 3 work. It is University of Windsor policy to ensure daily on-site inspection is performed.

Upon completion of inspection and air monitoring by the consultant, the Type 3 enclosure will remain in place. The Asbestos Consultant will inspect the Type 3 work area for final cleanliness prior to the enclosure being dismantled.

11.5.2 Air Monitoring

PCM air monitoring will be conducted on a daily basis during Type 3 work. Air monitoring will be conducted at the perimeter of the Asbestos Work Area (in occupied areas adjacent to the Type 3 Work



Area) to ensure no leakage from the enclosure. Air monitoring will be performed within the enclosure to ensure that respirator protection factors are not exceeded.

Clearance air monitoring must be performed within Type 3 Asbestos Work Areas. The air sample will be relied upon to allow clean access to the site for the Teardown Inspection. Clearance levels of 0.01 f/ml must be achieved prior to dismantling the enclosure, as required by O. Reg. 278/05. Only if clearance using PCM is not possible, will the TEM method be utilized.

Once the clearance air testing is satisfactory and within 24 hours after the clearance air testing results are received,

- a. Facility Services shall post a copy of the results in a conspicuous place or places,
 - i. at the workplace, and
 - ii. if the building contains other workplaces, in a common area of the building; and
 - iii. on the Facility Services website
- b. A copy shall be provided to the CSC or the health and safety representative, if any, for the workplace and for the building.

The University shall keep a copy of the clearance air testing results for at least one year after receiving them.

12.0 RECORD KEEPING AND DOCUMENTATION OF AMP

The following records are to be kept by Facility Services for all sites with ACM:

- Current "Live" Asbestos HMIS program, found on the Facility Services website; <http://www.uwindsor.ca/facilityservices/AsbestosInventory>.
- Asbestos Project Update Forms.
- Inspection reports during Type 3 abatement from Hazardous Materials Consultants.
- Bulk sample analytical results from any sampling; incorporated in the Asbestos HMIS program.
- Abatement or emergency response project records (i.e. Notice of Service Interruptions).
- Air monitoring reports. Note clearance air monitoring reports must be retained for a minimum of one year.

This AMP is to be re-evaluated each time there is a substantial change to the Asbestos Regulation (O. Reg. 278/05).



13.0 CONTRACTOR REQUIREMENTS

Contractors hired by the University of Windsor are to meet the following minimum requirements:

- Must maintain a Comprehensive General Liability Policy, provided on an “occurrence” basis, for a minimum of \$5,000,000 in coverage.
- Must maintain an Asbestos Liability or Pollution Liability Policy, provided on an “occurrence” basis, for a minimum of \$2,000,000 in coverage.
- Must maintain an Automobile or Fleet Policy, and Non-owned Automobile Policy for a minimum of \$2,000,000 in coverage.
- Maintain a valid Workplace Safety and Insurance Board Clearance Certificate.
- All supervisors and workers performing Type 3 work are to have attended 3 day courses regarding asbestos, as of November 1, 2007 (253 W and 253S courses).
- All workers are to be fit tested for respirators and trained in respirator care.

For large projects, Facility Services may wish to ask for references for 5 previous projects of similar scope and cost.

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APPENDIX A
Background Information on Asbestos in Building Materials and Health
Hazards

BACKGROUND INFORMATION ON ASBESTOS IN BUILDING MATERIALS AND HEALTH HAZARDS

1.0 BACKGROUND ON ASBESTOS

1.1 Occurrence and Types of Asbestos

Asbestos is not one mineral but a generic term used to describe a family of naturally occurring fibrous hydrated silicates. These are divided on the basis of mineralogical features into two groups; serpentines and amphiboles. The important property of asbestos as compared to non-asbestiform varieties of silicates is the presence of long, thin fibres that can be easily separated. According to some definitions, there are as many as thirty varieties of asbestos, but only six are of commercial importance. Chrysotile, which is by far the most abundant, is the only type that belongs to the serpentine group. Crocidolite and amosite, the two other most commonly used fibres, together with anthophyllite, tremolite, and actinolite belong to the amphibole group. The distinction between asbestos types is important due to the different degrees of severity of asbestos related disease with different asbestos types. Of the three commercially important types (chrysotile, amosite and crocidolite), chrysotile is considered the least hazardous. In general, Canadian regulations reflect this variation of health effects.



Chrysotile Asbestos



Amosite Asbestos

1.2 Health Effects of Asbestos

For many years asbestos has been recognized as a health hazard for workers employed in asbestos mining, processing and installing of asbestos products. Several serious, debilitating diseases that often end in death have been linked to the inhalation of fine asbestos fibres. It is not clear how asbestos fibres cause disease after they enter the lung. For each disease there is a period of latency, usually more than ten years, between first exposure to asbestos and the appearance of the disease. The diseases linked to asbestos exposure are described below.

Asbestosis

Asbestosis is a fibrosis (scarring) of the lung tissue, which makes breathing difficult. The most prominent symptom is breathlessness. Detection of asbestosis is by physical examination, X-ray examination and lung function testing. The disease is irreversible and may continue to progress even after exposure is stopped. Rarely a cause of death itself, asbestosis results in an appreciable reduction in life expectancy due to deaths from related illnesses. Asbestosis will develop only with chronic (long term) exposure to high levels of airborne asbestos.

Mesothelioma

This is a rare cancer of the cells of the pleura (lining of the chest cavity and lungs) and the peritoneum (lining of the abdominal cavity). The development of mesothelioma is characterized by a long latency period, usually at least 15 years and sometimes more than 40. There is no effective treatment for mesothelioma. Large proportions of mesothelioma patients die within a year of diagnosis; few survive longer than five years. The amphibole asbestos materials are considered more important than chrysotile in the causation of mesothelioma. Although asbestos was once thought to be responsible for all mesothelioma, other causes have now been identified. Still, the chance of getting mesothelioma in the absence of asbestos exposure is considered to be extremely remote. Mesothelioma is a very rare cancer in the general population.

Lung Cancer

Unlike asbestosis and mesothelioma, lung cancer is not associated only with asbestos exposure. Cigarette smoking has been and continues to be the major cause of lung cancer. Furthermore, there is no basic difference between lung cancer caused by asbestos and that due to other causes. In general, the risk of getting lung cancer increases with the extent of asbestos exposure, in terms of both intensity and duration. This risk is also greatly enhanced by smoking; most asbestos workers who develop lung cancer are smokers. There is no difference in the risk for lung cancer between chrysotile and the amphibole asbestos minerals.

Other Asbestos-Related Cancers

The relationship between asbestos exposure and asbestosis, mesothelioma and lung cancer has been clearly established and is beyond argument. Several other cancers have also been associated with inhalation of asbestos. Although the evidence is not as good as for the diseases discussed above, these cancers should be noted. They are gastrointestinal cancer affecting all sites in the gastrointestinal tract (oesophagus, stomach, colon and rectum) and cancer of the larynx. The elevated risks of these diseases in the most heavily exposed asbestos workers have always been much less than the elevated risk for

lung cancer and mesothelioma. If asbestos exposures are controlled to prevent any increase in lung cancer or mesothelioma risk, the other potential cancer risks should also be well controlled.

Other Asbestos-Related Conditions

A number of less serious effects have been associated with asbestos exposure, namely pleural plaques and asbestos warts. Pleural plaques are areas of scarring of the pleural surfaces. In general, they are not associated with any functional abnormality and are merely an indicator of asbestos exposure. Asbestos warts are harmless skin growths that occur when asbestos fibres penetrate the skin. These will usually retract when exposure ceases.

1.3 Uses of Asbestos in Building Materials

Asbestos has been widely used in buildings and several uses continue today. The uses of asbestos are generally classed into two groups for purposes of hazard assessment; friable and non-friable products. A friable material is a material that when dry can be crumbled, pulverized or powdered by hand pressure. The use of friable materials in construction is banned today but due to the widespread use of friable materials in the past, these materials still are present in many buildings. In order to establish an asbestos management program, the possible uses of asbestos must be known. These are discussed below in the categories of non-friable, potentially friable and friable products.

1.4 Non-Friable Asbestos Materials

Asbestos-cement Products (Transite)

The largest use of asbestos, in terms of the tonnage of fibres employed, is as a reinforcing agent in cement products. Asbestos-reinforced cement is strong, durable, rigid and resistant to both fire and weather. Portland cement, water and asbestos are mixed to form a slurry from which end-products can be fabricated by a process similar to that used in paper making. Products include sheets, pipes and a wide variety of other shapes. The asbestos fibre content of asbestos cement products is usually about 15 percent.

Asbestos-cement sheet is produced in four basic forms: flat sheet, corrugated sheet, siding shingles and roofing shingles. The main use of asbestos cement sheet is for the roofing and cladding of buildings. Other uses are ceiling tiles, decorative panelling, electrical insulation, fume hood liners and laboratory tabletops. Asbestos-cement pipe is used for water supply, sewage, irrigation, drainage applications, the transport of corrosive chemical fluids, and electric and telephone conduits. Asbestos cement products are still in production. Non-asbestos substitute cement products are available for some though not all asbestos products.



Transite Drain Pipe



Corrugated Transite Siding/Roofing



Laboratory Bench Countertop



Transite Blocks in Elevator Switchgear

Gaskets and Packings

The combination of long asbestos fibres and high temperature rubbers has provided some of the best gasket materials. The asbestos, in bulk fibre, woven, or plaited form, provides strength and temperature resistance, while the rubber or synthetic compound acts as binder and sealing material. Asbestos yarns have been commonly used in the manufacture of braided and woven packing materials. Many of these uses, particularly in sheet forms are still in production and use.



Rope Gasket



Roper Gasket at Boiler Plate

Coatings and Sealants

Asbestos has been used in roof coatings and cement and, to a lesser extent, in sealants and caulk. Roof coatings consist of asphalt liquefied with solvents and asbestos fibre filler. Roof cements are similar, but are formulated to a thicker consistency so that they can be used to seal openings through which a liquid coating would flow. Some of these are still in production.



Asbestos Roof Cement



Caulking at Glazing

Paper Products

Asbestos paper products have been used in a wide variety of applications. Among the most important in construction are roofing felt, gaskets, pipe wrap, as building paper under roof tiles and wood flooring, tape at joints on ducts and duct insulation, as a finishing layer over fibreglass pipe insulation, as heat shields in incandescent light fixtures, as an underpad beneath vinyl sheet flooring, millboard and electrical insulation. Some of these applications are discussed under the headings "Insulation" and "Gaskets and Packings".



Paper Heat Shield on Incandescent Fixture



Paper on Seams of Duct



Vinyl Sheet Flooring with Paper Underpad



Building Paper Under Roof Tiles

Plastics

Asbestos has been used as a reinforcing agent in a wide range of asbestos/polymer composites.

Applications include, floor tiles, engine housings, bins and containers, and a variety of coatings, adhesives, caulk, sealants, and patching compounds. Two areas dominated asbestos use in plastics: phenolic moulding compounds and vinyl-asbestos tile. Few of these products remain in production.



Vinyl Asbestos Tile

Asbestos Textiles

Asbestos textile materials are manufactured from chrysotile fibres. Two types of yarn are produced: plain, possibly braced with organic fibres, and reinforced, which incorporates either wire or another yarn such as nylon, cotton or polyester. Major uses for asbestos textiles are gaskets, packings, vibration damper/duct connectors, friction materials, thermal and electrical insulation, and fire resistant applications, e.g. welding curtains, protective clothing, theatre curtains, hot conveyor belts and ironing board covers. These products may be considered or become friable in use. Asbestos textiles are no longer in widespread production.



Textile Vibration Damper/Duct Connector



High Voltage Cable Insulation

Friction Materials

Asbestos has been used in the manufacture of brake and clutch linings and pads. The asbestos fibres may be embedded in a phenolic resin with various mixtures of fillers or a woven asbestos cloth may be impregnated with the resin. Friction products are primarily used in vehicles but may be used in any rotating machinery, for example elevators or printing presses. They are still produced and used although not widely.

Drywall Joint Compound

Drywall joint compound also contained asbestos until the early 1980's. The concentration is quite low (near or less than 5%; always chrysotile). The product in place is quite hard and is normally treated as non-friable.



Drywall Joint Compound on Drywall



Drywall Joint Compound 1963-1965

1.5 Potentially Friable Asbestos Materials

Acoustic Ceiling Tiles

Some types of mineral wool type acoustic ceiling tiles were formulated with asbestos from the early 1960's. The use of asbestos in ceiling tiles was discontinued in the early 1980's. Analytical testing is required to distinguish the asbestos and non-asbestos ceiling tiles. From field experience at Pinchin Ltd., the fire-rated tiles are more likely to contain asbestos. Amosite was the predominant fibre type used.

Acoustic tile, particularly if splined or glued on, can become friable or release dust when removed. They are usually considered non-friable as they are normally handled intact.



Glued on (Laminated) Ceiling Tiles



Lay-in Ceiling Tile

Plaster

Asbestos was used in random fashion in the brown coat and surface coat of smooth plaster finishes. This has been used at a low level (less than 5% in most cases). In many instances the asbestos content is less than 1% or even less than 0.5%. This is often due to the presence of vermiculite in plaster.

Vermiculite frequently contains actinolite or chrysotile as an impurity which contributes to the asbestos content. Only Chrysotile was ever intentionally added to plaster.

Plaster is non-friable in place but removal is impossible without causing it to become friable. This is significantly different than lay-in acoustic tiles or transite boards which can be removed intact.



Plaster on Wood Lath



Plaster on Speed Tile

1.6 Friable Asbestos Materials

Friable asbestos products are the main concern of the public and the asbestos management program due to the ease of fibre release. None of the products are still in production in North America or Europe.

Fireproofing or Sprayed Insulation

Several types of fireproofing or insulation were applied by spraying or trowel application in the period from the mid 1930's to 1974. Fibrous products were spray applied after being blown as a dry mix through an

application gun. These products may contain up to 90% asbestos and any of the three major types (chrysotile, amosite or crocidolite). Cementitious products were trowelled or sprayed as a wet slurry. These were harder products that did not contain more than 25% asbestos. Only chrysotile asbestos was used in the cementitious type materials.



Cementitious Sprayed Fireproofing



Debris from Fireproofing on Top of Ceiling



Fibrous Sprayed Fireproofing



Fibrous Sprayed Fireproofing (beam only)

Texture or Acoustic Plasters

The use of asbestos was widespread in trowelled or sprayed texture coats, stipple coats and acoustic plasters from the 1950's to the late 1970's (at least as late as 1980). These products always contain less than 25% chrysotile. Some of the harder stipple coats may be considered non-friable in place and only become friable when disturbed by construction or demolition. Other products in this group can be very soft and extremely friable.



Sprayed Limpet Texture Ceiling on Lath



Texture Coat Ceiling

Mechanical Insulation

This is the most widespread use of friable asbestos in buildings. The use dates from the late 1800's to the late 1970's. The material can have a number of appearances and asbestos contents. The more prevalent types of asbestos mechanical insulations are:

- white, brown, pink or grey block (Magnesia block, Caposite)
- white or grey corrugated paper (Aircell)
- white, grey or brown layered paper (sweatwrap)
- grey trowelled or hand applied material (with the appearance of hard or granular, grey, dry mud) (Parging cement)

It is possible to find all asbestos types in mechanical insulation although chrysotile is predominant and amosite the next most common.



Aircell Insulation (corrugated paper)



Caposite Block Insulation



Parging Cement on Pipe Fitting



Parging Cement on Sweatwrap and Aircell

Vermiculite

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 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 vermiculite contains asbestos.



Vermiculite Attic Insulation



Libby Vermiculite

1.7 Hazards of Asbestos Materials in Buildings

Beginning in the late 1970's, public health authorities, the media, and the public in general, became concerned about the health effect of these asbestos materials on building occupants. It was known that asbestos miners and factory workers and installers who handled asbestos materials suffered a higher incidence of several respiratory diseases. These groups had been exposed to very high levels of asbestos dust for prolonged periods. In order to assess whether the public anxiety over the current situation of asbestos materials and the hazard of in-place materials was justified, the Ontario Royal Commission on Matters of Health and Safety Arising from the Use of Asbestos in Ontario was established in 1981. This 3 year study considered all aspects of the asbestos problem, from production, through installation and use in-place, to maintenance and demolition. After considering all available data and commissioning several research studies, the Commission concluded in its final report (Chapter 9, Page 585):

"...The risk to occupants from asbestos in buildings is a small fraction of the risks faced by workers exposed to asbestos under the 1 f/cc control limit for chrysotile (which was the current exposure limit for industrial asbestos use in Ontario at that time). It is less than 1/50 as great as the risk of commuting by car to and from those buildings. In concluding that this risk is insignificant, we conclude that the risk does not present a public health problem. While asbestos has caused serious health problems for workers and may present a problem for building maintenance, renovation, construction, and demolition workers, we conclude that it does not pose a significant problem for the general occupants of a building, except in the three situations outlined in Section D of this chapter, namely: (i) the occupant is in the immediate vicinity of work that disturbs friable asbestos-containing insulation; (ii) the occupant is within the range of air

circulation of work that disturbs friable asbestos-containing insulation; or (iii) significant quantities of friable asbestos-containing insulation have fallen onto building surfaces and are being disturbed."

and in the overview to this section (Chapter 9, page 548):

"We will conclude that it is rarely necessary to take corrective action in buildings containing asbestos insulation in order to protect the general occupants of those buildings. On the other hand, construction, demolition, renovation, maintenance, and custodial workers in asbestos-containing buildings may be exposed to significant fibre levels and may, during their work, cause elevated fibre levels for nearby occupants."

The general conclusions of the Royal Commission have been supported by independent testing by independent researchers, the Ontario Ministry of Labour, and authorities in other jurisdictions. Air sampling has shown that the airborne asbestos levels in buildings with sprayed asbestos are no higher than outdoor levels, unless the friable asbestos or asbestos debris is being disturbed at the time. Airborne levels in buildings are not elevated even when the ceiling space containing the sprayed asbestos or asbestos mechanical insulation functions as an air plenum.

The Ministry of Labour Regulation respecting Asbestos on Construction Projects and in Buildings and Repair Operations was modelled on the Commission findings. Several other provinces have since issued regulations or guidelines similar to the Ministry of Labour Regulation. The Asbestos Management Program was prepared to be consistent with the recommendations of the Commission and to meet all requirements of the Regulation.

APPENDIX B
Bulk Sample Collection Procedures

BULK SAMPLE COLLECTION PROCEDURES

1.0 OBJECTIVES

To obtain a sample for analysis to determine if asbestos is present within a material.

To determine the type of asbestos and the quantity of asbestos of each type.

Sampling of vermiculite is specifically excluded from these procedures.

2.0 EQUIPMENT AND SUPPLIES

- Pen and Sharpie marker.
- Retractable knife (with extra blades).
- Hook knife.
- Flashlight and batteries.
- Screwdriver(s) with multiple bits.
- Small hammer.
- Sample bags.
- Insulation tape or duct tape.
- Spray bottle.
- Wipes for cleaning tools so as to not contaminate subsequent samples.
- NIOSH approved half-face respirator with P100 filters.

3.0 SAMPLE COLLECTION

Only those persons needed for sampling should be present in the immediate area.

Where necessary, provide a drop sheet below sample location if debris or dust may be generated by sampling operation (e.g. below a ceiling tile if sprayed fireproofing is above).

Use cleaned/new tools, or clean the tool to be used with a sanitizing wipe prior to sample collection. Wipe or wash again prior to each subsequent sample.

Spray the material with a light mist of water if necessary to prevent fibre release during sampling. Do not disturb the material any more than necessary. Note that using water may delay the receipt of sample results as samples cannot be analyzed if wet.

Each homogeneous material should be sampled separately. A homogeneous sampling area is defined by the USEPA as containing material that is uniform in texture and appearance, was installed at one time

and is unlikely to consist of more than one type or formulation of material. The surveyor is to use information obtained by visual examination, available information on the phases of the construction and information on renovations obtained from the client to determine the extent of each homogeneous area and the number of samples required.

Number of samples required is in Table 1 of O. Reg. 278/05 and is as follows:

Type of Material	Size of Homogeneous Material	Minimum Number of Bulk Samples
Surfacing material, including without limitation material that is applied to surfaces by spraying, by troweling or otherwise, such as acoustical plaster on ceilings, fireproofing materials on structural members and plaster	Less than 90 square metres	3
	90 or more square metres, but less than 450 square metres	5
	450 or more square metres	7
Thermal insulation, except as described below	Any size	3
Thermal insulation patch	Less than 2 linear metres or 0.5 square metres	1
Other materials	Any size	3

Collect the sample by penetrating the entire depth of the material to the underlying substrate since it may have more than one layer. Examples of materials with more than one layer include plaster, sweatwrap with tar paper, and parging cement over other insulations, etc. The following points are exceptions to this rule.

- When collecting drywall joint compound samples, do not sample the paper on the drywall or the drywall itself. To ensure that the drywall joint compound itself is sampled, collect the sample at previously damaged outside corners or above ceiling where unpainted.
- When sampling texture coat that is applied in a thin layer to drywall, try to ensure that you only collect a sample of the texture coat and not any drywall compound beneath that may skew the sample result. Try to sample at an area that is 1' x 1' away from a corner (and likely away from drywall joint compound), or sample overspray above ceiling. Do not sample too deep, trying only to remove the texture coat itself.
- When collecting samples try to minimize damage to finishes. Sample flooring at door jambs or in corners, sample plaster above ceilings or where damaged, break ceiling tiles off at corners so that the damage cannot be seen when placed back in grid, etc. A piece a big as your thumbnail is all that is required.

- When sampling VAT, try to obtain a sample of the mastic whenever possible. If the survey is for pre-construction, the mastic must be analyzed. Add this note to the transmittal.
- On pipes insulated with fibreglass and sweatwrap, check the lap joints, butt joints, staples, and hangers for asbestos parging cement.

If pieces of material break off and fall during sampling, remove the debris by wet wiping and place wipe in sample bag for disposal.

Scrape directly into, or place sample into a Ziploc bag and seal closure strip. Write the following information on the sample bag:

- Sample Number. Ensure that samples of the same homogenous material are numbered the same number but with a different letter to signify it is a different sample of the same homogeneous material (e.g. 001A, 001B, and 001C for three samples of the same type of ceiling tile).
- Date (year/month/day).
- Collected by.
- Company name.
- Material.
- Location. Include building name, room name, location number, type of system etc.

Temporarily seal any openings created to collect the sample, for example, with metal foil tape or duct tape wrapped completely around pipe insulation where the jacket was cut.

4.0 PERSONAL SAFETY

The use of a respirator is recommended for all sampling of materials. However, sampling can be performed without a need for one but depends on care used and the friability of the material being sampled.

Wash your hands after sampling, and you must wash your hands prior to eating drinking or smoking.

5.0 SAMPLE SUBMISSION

Samples must be analyzed at only NVLAP or AIHA certified laboratories.

Acceptable labs include:

- Pinchin Ltd. Mississauga Laboratory, 2470 Milltower Court, Mississauga ON, L5N 7W5, Contact: Kendra Bertuzzi, (905) 363-1433 (Direct line).

Complete the Bulk Sample Transmittal. On the transmittal ensure that you instruct the lab to use the Stop Positive approach.

Submit samples using separate transmittals if separate reports are to be written (for separate sites/buildings).

6.0 SAMPLE HANDLING AND SHIPPING

Include the Bulk Sample Transmittal.

Bulk samples do not require special handling (temperature, pressure etc.).

7.0 ANALYSIS

The analytical method follows the Ontario Ministry of Labour Code for the Determination of Asbestos from Bulk Samples, August 1985 and U.S. EPA Method 600/R-93/116 dated July 1993.

Analysis is to be completed using a stop positive approach. Only one result of greater than 0.5% asbestos content is required to determine that a material is asbestos-containing, but all samples must be analyzed to conclusively determine that a material is non-asbestos (O. Reg. 278/05). The laboratory will stop analyzing samples from a homogeneous material once greater than 0.5% asbestos is detected in any of the samples of that material. All samples are analyzed if no asbestos was detected.

8.0 INTERPRETATION OF BULK SAMPLE RESULTS

Any material containing more than 0.5% asbestos is considered an asbestos-containing material in Ontario. The thresholds for all provinces are as follows:

Ontario	0.5%
Québec	0.1%
Manitoba	0.1% Friable, 1% Non-Friable
Saskatchewan	Not Defined
Newfoundland, PEI, Nova Scotia, New Brunswick, Alberta, British Columbia	1%



Asbestos Bulk Samples

Chain of Custody Form

EPA/600/R-93/116

Authorized by: _____ Date: _____

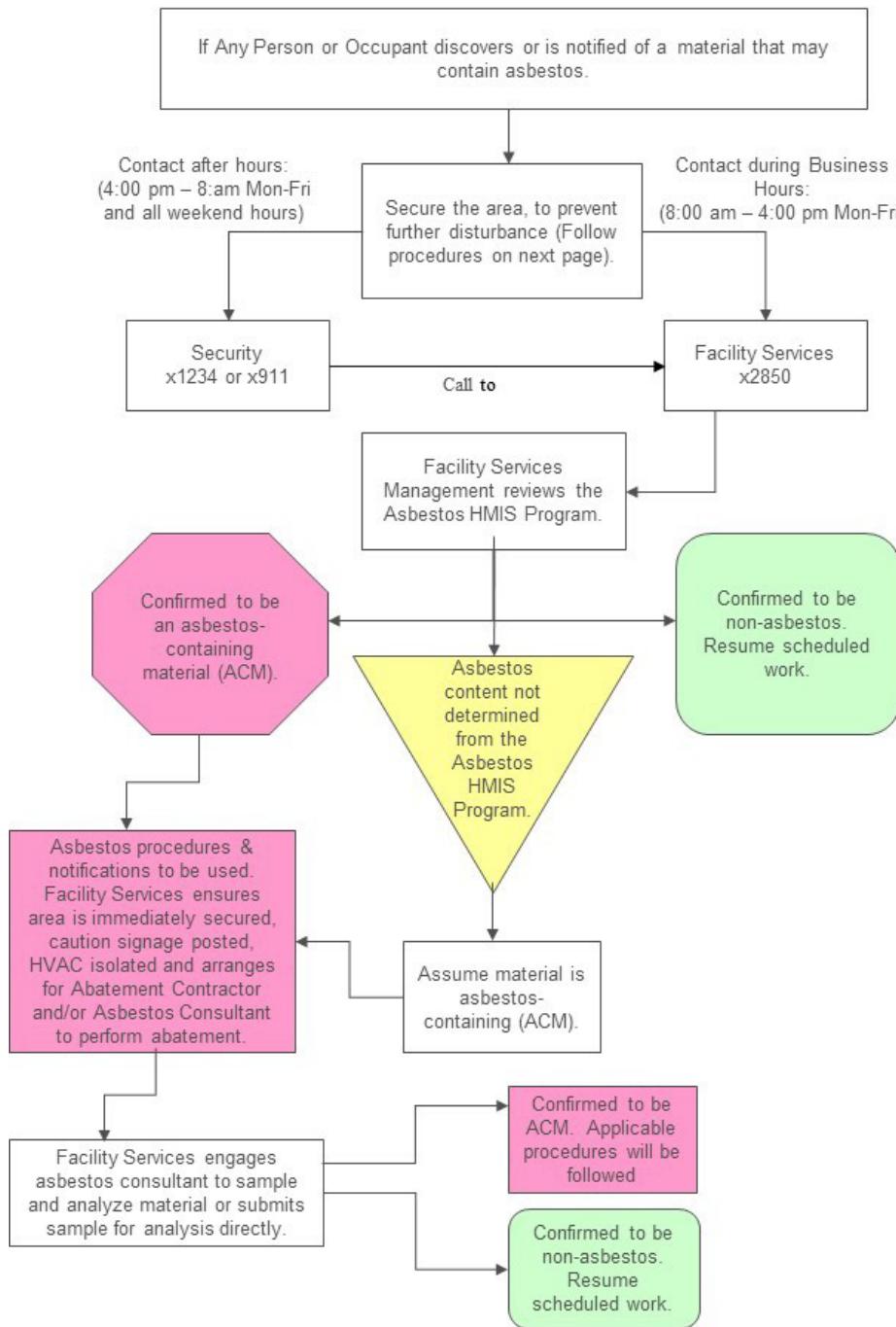
Client Signature MUST Accompany Request. Client accepts Pinchin Ltd. Standard Terms and Conditions for Laboratory Services (see over/next page)

TO BE COMPLETED BY LAB PERSONNEL ONLY		LAB REF. #:
Received By:	Date:	
Analyzed By:	Date:	

APPENDIX C

**Emergency Response Plan and Work Practices for Accidental Disturbance
of Friable Asbestos-Containing Materials (ACM)**

EMERGENCY RESPONSES AND NOTIFICATION IN THE EVENT OF ASBESTOS-SUSPECT MATERIAL DISCOVERED BY ANY PERSONS OR OCCUPANT





EMERGENCY RESPONSE PLAN FOR ACCIDENTAL DISTURBANCE OF FRIABLE ASBESTOS- CONTAINING MATERIAL (ACM)

The University has prepared an inventory of both friable and non-friable ACM on campus and has established procedures to advise workers and contractors of these locations. The objective of having these procedures in place is to prevent accidental disturbances of friable ACM. If, however, such material is accidentally disturbed or if there is an unexpected discovery and/or disturbance of a friable material that may have been overlooked when the initial survey was done, the following response plan will be implemented.

Contractors and subcontractors shall comply with this procedure and all other University of Windsor rules and procedures when doing work on university property. It is the responsibility of Facility Services to ensure that contractors comply with these procedures.

1.0 FIRST RESPONSE

1.1 Stop Work Immediately

All work in the area of the disturbance must stop immediately to avoid further disturbance of the material.

1.2 Leave the Area

Do not clean up, cover, move or contact asbestos-containing or suspect material.

Leave affected area immediately and report incident to Supervisor or Facility Services.

Upon leaving affected area, worker shall post danger signage on all entry points to the area.

The worker must maintain communications with immediate supervisor or Campus Community Police (after hours).

Do not resume any work in the affected area until advised by Supervisor or Facility Services.

1.3 Secure Area

The affected area shall be secured as necessary until an assessment can be made to determine if the material contains asbestos. The Supervisor and/or Facility Services shall arrange for additional signage to be posted at the affected site, if required. Facility Services is responsible for stocking and providing the appropriate signs.

Isolate the area by locking doors if this can be done without blocking emergency or fire routes. If it is not possible to safely isolate the area, Facility Services will notify appropriate persons not to enter the area. If possible, post security to prevent unnecessary access.

1.4 Decontaminate Clothing and/or Tools if Necessary

If a worker's clothing or equipment was contaminated by the ACM, the worker will leave the immediate area where the disturbance of the friable material took place and radio for assistance and a change of clothing (i.e. clean coveralls). The worker will remain in a safe place near the area until help arrives. Care shall be taken to not further contaminate other areas with the ACM that is on the clothing/equipment.

When help arrives, the worker with the contaminated clothing will have their clothing thoroughly vacuumed with a vacuum equipped with a HEPA filter. Following this vacuuming, the worker shall change into the clean clothing provided. The contaminated clothing shall be discarded as part of the asbestos waste. Contractors are responsible for providing their workers with the resources they need for decontamination. Tools will be decontaminated by damp wiping or HEPA vacuum.

1.5 Notification

Promptly notify your Supervisor and/or Facility Services during regular business hours and Campus Community Police after hours.

The Supervisor or Facility Services is responsible for ensuring that all University of Windsor personnel and/or contractors having access to the affected area are notified that the area is restricted until further notice.

The UWindsor alert System may be used for notification, if appropriate. Health & Safety to be notified, as deemed necessary, to perform additional notifications (CSC, MOL, WSIB, etc.) as required.

1.6 Shutdown of Ventilation System

The Supervisor and/or Facility Services will arrange to shut down ventilation systems to the affected area including supply, return and exhaust.

The ventilation system is to remain inoperable until clean-up of ACM and air monitoring has been completed.

1.7 Assessment

The Supervisor of the worker and/or a competent manager who is qualified and trained in asbestos management will visit the area to assess the situation, wearing appropriate Personal Protective Equipment (PPE) as necessary. An assessment will be made to determine whether or not the suspect friable material contains asbestos and if so what type of asbestos (with reference to the Asbestos HMIS program). Once this is determined, steps must be taken to minimize the risk to workers and building occupants of exposure to airborne fibres of the friable material.

If material cannot be confirmed non-asbestos by records or appearance it MUST be presumed asbestos-containing and cleaned up using appropriate ACM precautions, as follows:

2.0 WORK PRACTICES – TYPE 2 EMERGENCY CLEAN UP

Emergency asbestos procedures shall be implemented, when required, in order to protect those undertaking the work, as well as to protect all others from, or limit exposure to, airborne asbestos. Procedures indicated shall be followed as closely as possible, in the event of an emergency situation.

Procedures for asbestos work, required as an immediate response to floods through asbestos fireproofing, accidental disturbance of ACM, ceiling collapses at asbestos-containing ceiling tiles, or other emergencies that affect asbestos materials, are as follows:

- Clear area of all occupants. In critical situations clear area of only non-essential personnel only, and provide essential personnel with proper respiratory protection.
- Shut down ventilation systems serving area including supply, return and exhaust.
- Post danger signage and isolate the area by locking doors, if this can be done without blocking emergency or fire routes.
- If it is not possible to safely isolate the area, Facility Services will notify personnel not to enter the area; through Notice of Service Interruption (NSI). If possible, post security to prevent unnecessary access.
- Close access doors to area or construct enclosure around area if time permits. Do not obstruct emergency exits under any circumstances.
- Only trained workers or Abatement Contractors will perform the emergency clean up.
- Entrance to the area will now be limited to those wearing applicable respiratory protection and disposable Tyvek coveralls. Half face NIOSH approved respirators with P100 (HEPA) filters are adequate.
- No eating, smoking or chewing in the Asbestos Work Area.
- Remove all debris within the area of the accidental disturbance of ACM using HEPA vacuums.
- Place polyethylene drop sheets under area of repair.
- Repair ACM pipe insulation, replace ceiling tiles or stabilize ACM as required with minimum disturbance to ACM.
- Remove dust using HEPA vacuums or wet wiping from all surfaces within area of disturbance.

- Dispose of items that cannot be cleaned as asbestos waste.
- Dispose of all cleaning supplies and drop sheets as asbestos waste.
- Remove coveralls and dispose of as asbestos waste.
- Proceed to washroom and wash face and hands.
- At their option, Facility Services may decide to employ an Asbestos Consultant to perform air monitoring and consulting, after clean-up to ensure airborne fibre levels are within acceptable limits to re-occupy the space.
- Facility Services must notify the Central Safety Committee (CSC) of the results of air monitoring or testing.

3.0 CLEARANCE AIR TESTING

When clearance air testing is required, it will be conducted in accordance with the prescribed requirements detailed in Ontario Regulation 278/05.

Prior to clearance air testing being conducted, the Central Safety Committee worker Co-chair or representative shall be notified of the date and time of the testing so that they may choose to be present at the beginning of the testing.

Within 24 hours of the clearance air being received, the results shall be posted on the Facility Services website and a copy provided to the appropriate Central Safety Committee worker representative(s). A copy of clearance air testing results shall be retained by Facility Services for a minimum of one year.

Note: The University may choose to conduct air sampling for operations other than Type 3 although there are no legislative requirements to do so.

Following appropriate abatement and cleanup, the Supervisor will give authorization for return to work when safe to do so. All appropriate parties must be notified.

4.0 NOTIFICATION AND REPORTING

The Supervisor of the worker shall complete an Accident /Incident Investigation Report with the worker and submit it to the Office of Health & Safety within 24 hours. This report will include corrective actions taken to prevent recurrence.

For all exposures to confirmed asbestos materials, the Office of Health & Safety will provide affected workers with a WSIB Worker's Exposure Incident Form (395BA) under the Program for Exposure Incident Reporting (PEIR). This program is voluntary. Affected workers may also choose to seek medical attention from their physician.

The Office of Health & Safety will notify the Central Safety Committee (CSC) Co-chairs of unexpected asbestos exposures of University of Windsor staff.

5.0 UNEXPECTED DISCOVER OF ACM

If the disturbance was the result of an unexpected discovery of ACM (not referred to in the Asbestos HMIS program), the following people shall be immediately notified, both orally and in writing, as per Ont. Reg. 278/05 Section 8:

- a. an inspector at the office of the Construction Safety Branch of the Ministry of Labour nearest the workplace;
- b. Facility Services;
- c. the contractor; and
- d. the Co-Chairs of the Central Safety Committee

6.0 ROLE OF HEALTH & SAFETY DEPARTMENT DURING ACCIDENTAL DISTURBANCE OF POTENTIAL ACM

Upon notification of a potential exposure Health & Safety will:

- Investigate the incident in conjunction with Facility Services and/or the appropriate department to determine if the material does contain asbestos, and if so, initiate remediation action as required. The investigation will also include determining all potential employees that may have been affected.
- Draft a notice to occupants of affected area advising of disturbance.
- Personally contact each employee who has potentially been affected to provide them with a WSIB Worker's Exposure Incident Form (3958A) under the Program for Exposure Incident Reporting (PEIR). This program is voluntary. Should the affected workers choose to seek medical attention from their physician, they must notify Health & Safety promptly. The personal contact by Health & Safety will also provide an opportunity for employees to ask questions or express any concerns.
- Manage all WSIB claims.
- Advise employees of any applicable air monitoring results and updates on corrective and preventive actions.
- Notify the Central Safety Committee (CSC) of unexpected asbestos exposures of University of Windsor staff.

APPENDIX D
Type 1 Asbestos Work Procedures

TYPE 1 ASBESTOS WORK PROCEDURES

These procedures are to be followed by all trained University Personnel and qualified abatement contractors performing the following work in University buildings.

- Installing or removing ceiling tiles which are an asbestos-containing material, if the tiles cover an area less than 7.5 square metres and are installed or removed without being broken, cut, drilled, abraded, ground, sanded or vibrated.
- Installing or removing non-friable asbestos-containing material, other than ceiling tiles, if the material is installed or removed without being broken, cut, drilled, abraded, ground, sanded or vibrated.
- Breaking, cutting, drilling, abrading, grinding, sanding or vibrating non-friable asbestos-containing material if,
 - The material is wetted to control the spread of dust or fibres, and
 - The work is done only by means of non-powered hand-held tools.
- Removing less than one square metre of drywall in which joint-filling compounds that are asbestos-containing material have been used.

These Type 1 Asbestos Procedures assume the non-friable material can be removed with relatively little loose dry dust released. Generation of debris is permissible as long as the debris can be well wetted before being removed. If the work will release more than a trivial amount of dry loose dust, do not proceed further with work. Facility Services or an assigned representative will determine which of Type 1, 2 or 3 procedures are appropriate.

Note: Friable material can NEVER be removed utilizing Type 1 precautions. Friable material requires either Type 2 or Type 3 abatement; depending on the material and quantity removed.

1.0 EQUIPMENT

All equipment must be on site before proceeding.

1.1 HEPA Vacuum

Use of a vacuum is optional. Wet cleaning methods may be used in place of a HEPA vacuum. If a vacuum is used, it must be equipped with a high efficiency particulate aerosol (HEPA) filter. The vacuum must only be opened to be cleaned or dislodging of blocked objects in an enclosure following Type 2 procedures. The vacuum exterior should be carefully wet cleaned after each use or after each emptying.

1.2 Respirators

Use of a respirator is optional. However, a respirator is recommended for all Type 1 work. The employer will supply at the workers' request a half face respirator with P100 (HEPA) filters, with training on use and qualitative fit testing. Respirator must be used according to written use procedures provided to worker as per training procedures. Filters must be changed after 16 hours of wear or sooner if breathing resistance increases as filters become damp. No person using a respirator shall have facial hair that affects the seal between respirator and face.

1.3 Protective Clothing

Disposable protective clothing is optional. The employer will supply at the workers request. Non-disposable clothing with visible asbestos contamination shall be cleaned with a HEPA vacuum and laundered as asbestos contaminated. Disposable clothing and respirator filters are to be disposed of as asbestos waste.

1.4 Other Equipment

The following equipment will also be required to perform the work.

- 6 mil polyethylene to serve as a drop sheet.
- Pump sprayer with misting nozzle or alternative method to wet material.
- Labelled yellow asbestos waste bags (6 mil) - for all asbestos waste, disposable equipment, plastic, etc.
- Small tools and cleaning supplies - e.g. scouring pads, sponges, brushes, buckets, etc.

2.0 OTHER PROTECTIVE MEASURES

Do not eat, drink or smoke in the work area.

Upon leaving the work area, proceed to the washroom and wash all exposed skin on hands and face.

3.0 SCHEDULING OF WORK

A Notice of Service Interruption Form **MUST** be issued by Facility Services for both routine and emergency work.

Schedule work when occupants are absent. If persons are present, do not start work.

If work is required on an emergency basis and the area is occupied, Facility Services is to advise occupants to vacate area until work is complete and clearance is given to return.

4.0 PREPARATION

Before disturbing non-friable asbestos materials, cover floor (vinyl tile excepted) and surfaces below work with polyethylene sheeting as appropriate to catch debris.

Wherever dust on a surface is likely to be disturbed, pre-clean and remove using a HEPA vacuum or damp cloth.

5.0 EXECUTION

5.1 Removal of Vinyl Asbestos Floor Tile

Do not use electric powered scrapers.

Wet material with amended water.

Start removal by wedging a heavy-duty scraper in seam of two adjoining tiles and gradually force edge of one tile up and away from floor. Do not break off pieces of tile, but continue to force balance of tile up.

Continue removal of tiles using hand tools, removing tiles intact wherever possible. When adhesive is spread heavily or is quite hard, it may prove easier to force scraper through tightly adhered areas by striking scraper handle with a hammer using blows of moderate force while maintaining scraper at 25° to 30° angle to floor. When even this technique cannot loosen tile, removal can be simplified by heating tile thoroughly with a hot air gun until heat penetrates through tile and softens the adhesive.

When tiles are removed, place into asbestos waste receptor. Do not break into smaller pieces.

After removal, scrape up adhesive remaining on floor with a hand scraper until only a thin smooth film remains. Where deposits are heavy or difficult to scrape, a hot air gun may be used. Deposit scrapings in the asbestos waste disposal bag. Do not dry scrape surface of adhering pieces of tile. Do not use powered electric scrapers.

On completion of removal, vacuum clean floor with HEPA vacuum or wet mop.

Dispose of the mop head as contaminated waste. Alternatively, store this and other materials that cannot be cleaned in asbestos waste bags until next use (open only inside work area).

5.2 Installing, Cutting, or Drilling Non-Friable Asbestos Materials

Work using power tools or power equipment must not be performed as Type 1 work.

Where possible wet all materials to be disturbed. If wetting is not possible use Type 2 procedures.

Immediately place waste in asbestos waste container. Clean area frequently during work with HEPA vacuum or by wet methods.

At completion of work, clean drop sheets and dispose of as asbestos waste.

5.3 Removal of Other Non-Friable Asbestos Materials

The Type 1 procedures apply only to materials that can be removed intact, or in sections, without producing a pulverized or powdered waste. This method is most applicable to transite and small quantities of lay-in ceiling tiles.

Wet all material to be disturbed with amended water.

Undo fasteners necessary to remove material. Whenever possible remove asbestos cement panels intact. Break only if unavoidable. If broken, wet freshly exposed edges.

Where sections are adhered to the substrate, wet material and use hand scraping to remove adhering material.

Place removed material into asbestos waste receptor. Clean surrounding surfaces and asbestos work area frequently with HEPA vacuum or with wet methods (i.e. damp cloth disposed of as asbestos waste after cleaning).

Drop sheets shall be cleaned and disposed of as asbestos waste.

5.4 Waste Transport and Disposal

Place waste into asbestos labelled disposal bag, seal with tape, clean the exterior of the bag with a clean cloth, and place into a second clean bag, also to be sealed with tape.

Provide storage area for holding minor amounts of asbestos waste in sealed containers. Garbage containers shall be labelled and assigned exclusively for asbestos waste.

When waste is removed from site, collect the completed waste waybills from the disposal firm. For work performed by a contractor, the contractor will complete and provide to Facility Services copies of a waste manifest. Waste generated by staff will be stored at a secure location until sufficient accumulates for a waste pick-up.

APPENDIX E
Type 2 Asbestos Work Procedures

TYPE 2 WORK PROCEDURES

These procedures are to be followed by all trained University Personnel and qualified abatement contractors performing the following work in University buildings.

- **Entry into any ceiling space, wall chase or other area in which friable asbestos-containing debris is present.**
- **Removal of any part of a false ceiling if asbestos-containing debris is likely to be lying on the surface of the false ceiling.**
- Removal of glued-on compressed mineral fibre tiles containing asbestos or removal of more than 7.5 square metres of lay-in tiles of this type at one time.
- Clean up of asbestos-containing debris from mechanical insulations or sprayed fireproofing.
- Enclosure of friable material containing asbestos.
- Repair (such as application of tape or sealant or other covering) of any extent of asbestos mechanical insulation.
- Removal of non-friable materials with hand-tools where the material has not been wetted.
- Removal of more than 1 square metre of drywall to which asbestos-containing compound has been applied.
- Removing asbestos-containing pipe insulation from a pipe, duct or similar structure using a glove bag. (See Appendix F).
- Removal of any extent of asbestos-containing vinyl sheet flooring. Note: If power tools such as grinders are required to remove all paper backing from the substrate Type 3 procedures must be utilized.
- Removal of minor amounts of friable asbestos-containing materials including, texture coat, sprayed fireproofing and mechanical insulation. (In Ontario minor removal is defined as wet removal of 1 square metre or less, or an equivalent amount of pipe insulation.)

NOTE: This work procedure shall not be used for the cleaning and/or removal of air handling equipment, including ductwork, in a building with sprayed fireproofing containing asbestos. (See Section 12(4), (3) of O. Reg. 278/05.)

1.0 EQUIPMENT

Equipment required for the work must be on site before proceeding.

1.1 HEPA Vacuum

As asbestos-approved vacuum (HEPA filtered) equipped with brushes, fittings, etc. A vacuum can be opened to empty only by a fully protected worker within a Type 2 enclosure.

1.2 Respirators

Workers within the work area must wear an approved respirator. Respirators and filters will be provided by the employer, and individually assigned to workers. Respirator shall be a half-facepiece respirator with high efficiency (P100) filters, for all classifications of Type 2 work, except as follows: Full face piece air purifying respiratory or powered air purifying respirator with high efficiency (P100 or HEPA filters) shall be used for ceiling access with ACM debris on ceiling or for use of power tools equipped with HEPA filtered dust collector to cut, grind or abrade non-friable ACM. Respirators must be kept in position on the face during the entire time the worker is in the Type 2 Work Area. This is the period from the first removal of the ceiling tile, opening of hatches or the first disturbance of the asbestos material until the final cleaning of the area and the bagging of waste is completed. Change filters after 24 hours of wear or sooner if breathing resistance increases as filters become damp. No person wearing a respirator shall wear facial hair which affects seal between respirator and face.

1.3 Protective Clothing

All workers shall wear disposable Tyvek coveralls (or equivalent) with attached elasticized hood. Coveralls should be worn with the hood in place at all times. Coveralls may be vacuumed or wet wiped clean for re-use, for a maximum of 8 hours cumulative wear. Suit and head cover shall remain in place until worker leaves the Type 2 enclosure or work area. Boot covers are required if wet wiping or HEPA vacuuming cannot effectively clean footwear.

1.4 Other Equipment

- Polyethylene (6 mil polyethylene) - to erect a total enclosure or to serve as drop sheet.
- Wood framing or clips to support polyethylene sheeting, as appropriate to work area.
- Duct tape to fasten plastic enclosure to ceiling, walls, or to tape drop sheet to floor; 3/4" double-sided tape recommended for attaching polyethylene to T-bar ceiling.
- Labelled asbestos waste bag (6 mil) - for all asbestos waste, disposable suit, plastic for disposal, etc.

- Pump sprayer containing water with wetting agent to wet asbestos as necessary; dilute wetting agent 2 oz per gallon of water.
- Asbestos warning signs.
- Cleaning supplies - e.g. scouring pads, sponges, brushes, buckets, etc.
- Insulation repair supplies (lagging compound, cloth, PVC covers).
- Encapsulating sealer, for brush or airless spray application.

2.0 OTHER PROTECTIVE MEASURES

Do not eat, drink or smoke in the work area.

On completing clean-up of work area, use vacuum or wet cloth to clean hands, face, respirator and boots. Remove protective equipment and proceed to nearest washroom to wash exposed skin on hands and face.

3.0 SCHEDULING OF WORK

A Notice of Service Interruption Form MUST be issued by Facility Services for both routine and emergency work.

Schedule work when occupants are absent. If persons are present, do not start work.

If work is required on an emergency basis and the area is occupied, Facility Services is to advise occupants to vacate area until work is complete and clearance is given to return.

4.0 PREPARATION

Shut down ventilation systems to and from the work area. Seal over all ventilation openings, diffusers, grilles, etc. with plastic and tape.

Where practical, clear areas of movable furnishings or equipment. This should include anything which occupants may wish to use during work period. Any furnishings or equipment not removed shall be adequately covered and sealed using 6-mil polyethylene and tape.

Post signs or barrier tape to indicate asbestos hazard and requirement for protective clothing for anyone entering the space.

Provide, soap, towels and a container of water to allow workers to wash their hands and face each time they leave the enclosure.

Note that a full enclosure is only required for ceiling entry and for removal of friable materials. All other operations may have dust protection appropriate for the work.

For small rooms, cover walls with plastic such that the complete room becomes the work area.

For larger rooms, erect enclosure of 6-mil polyethylene of suitable dimensions to enclose the work area.

If a suspended ceiling is present, the enclosure shall extend to the ceiling line. The enclosure shall be as airtight as conditions permit including the provision of a double overlapping flap at the entrance. The floor of the work area shall be a layer of minimum 6-mil polyethylene sealed to the plastic walls of the enclosure.

Alternate to erecting an enclosure, as described above, use the portable enclosure designed for this work.

Use a HEPA vacuum or appropriately sized air unit equipped with HEPA filter to induce negative pressure inside work area. Vacuum should be outside the enclosure with hose inserted inside enclosure to extract air from enclosure.

Don protective clothing and respirator prior to disturbing any asbestos-containing materials in Type 2 enclosure.

5.0 EXECUTION

To remove sprayed fireproofing perform the following:

- Erect site isolation and don protective clothing as per Preparation Section 4.0.
- Saturate the ACM with amended water. Scrape wetted ACM directly into waste containers.
- Do not allow ACM to fall to the floor of the enclosure.
- Clean all surfaces from which ACM has been removed with scouring pads, vacuuming or wet-sponging to remove all visible material after completion of removal of ACM.
- Maximum removal is 1 square metre of material.

To provide access into ceiling spaces where sprayed fireproofing or asbestos-containing debris is present perform the following:

- Erect site isolation and don protective clothing as per Preparation Section 4.0.
- Carefully remove one tile or small portion of ceiling and clean top of removed section with HEPA vacuum.
- Vacuum top of remaining ceiling while still in place.
- Do not break tile or allow tiles to drop to floor.
- Perform all work above ceiling inside Type 2 enclosure.

To remove pipe insulation perform the following:

- Erect site isolation and don protective clothing as per Preparation Section 4.0.
- Wet any area of damage, then carefully cut jacket. Keep insulation surface wetted by mist of water with wetting agent.
- Remove insulation in large sections and place immediately in disposal bag.
- After all large pieces have been removed, saturate debris and clean all exposed surfaces with abrasive pads, sponges, cloths, etc.
- Maximum removal is 1 square metre of material.

To repair pipe insulation, perform the following:

- Don protective equipment as per Preparation Section 4.0.
- Use drop sheet under area of work to aid clean-up of any dislodged material. Plastic enclosure is not required.
- Mist any exposed insulation to wet surface and apply lagging paint and canvas or PVC jacketing as required.

To remove ceiling tiles and drywall perform the following:

- Erect site isolation and don protective clothing as per Preparation Section 4.0.
- Wet tiles or drywall and remove intact as much as possible and place immediately in disposal bag.
- After all large pieces have been removed, saturate debris and clean all exposed surfaces and support structure with abrasive pads, sponges, cloths, etc.

To remove vinyl asbestos sheet flooring perform the following:

- Remove binding strips or other restrictive mouldings.
- Make series of cuts 100 to 200 mm (4" to 8") apart through top layers and about halfway through felt backing, parallel to wall.
- Pry up corner of a strip at end of room furthest from access to work area. Pull sheet back upon itself slowly and evenly along with any adhering paper backing which remains attached to top layers.
- Roll up strip (finished side out) into tight roll, tape or tie securely, and place into Asbestos Waste Container.
- Remove maximum of three strips before wet scraping residual exposed paper underpad.

- Remove remaining adhered underpad by wet scraping as follows:
 - Soak area with amended water applied by sprayer; Scrape off all remaining material; Place scrapings in asbestos waste container. Allow floor to dry and clean with HEPA vacuum.
 - Removed asbestos-containing materials should be placed directly into 6 mil polyethylene bags as they are removed. Avoid dropping material to floor wherever possible. After bulk removal is complete, brush clean completely, and wet wash the exposed surface.

Frequently, and at regular intervals during the work, clean up dust and waste in the work area by wet mopping, placing in disposal bags, or by HEPA vacuuming.

After completion of removal, seal exposed ends of mechanical insulation with heavy layer of encapsulating sealer.

Apply post removal sealer and coat surfaces from which asbestos material was removed.

At completion of work, decontaminate equipment, tools and materials used in the work area by wet cleaning or HEPA vacuum.

Dispose of drop sheets and enclosures by wetting the polyethylene, then folding into disposal bags. Do not reuse drop sheets or enclosures.

Before leaving work area, decontaminate shoes and protective clothing by using HEPA vacuum or damp wiping. When protective clothing is to be disposed of, it shall be decontaminated as above and placed in labelled disposal bags. Workers shall vacuum all exposed skin, suit and respirator, and proceed to nearest washroom to wash hands and face.

6.0 WASTE TRANSPORT AND DISPOSAL

Place waste into asbestos labelled yellow disposal bag, seal with tape, clean the bag, and place into a second clean bag. Seal outer bag with tape.

Provide storage area for holding minor amounts of asbestos waste in sealed containers. Containers shall be labelled and assigned exclusively for asbestos waste.

When waste is removed from site, collect copies of the waste waybills from the disposal firm. For work performed by a contractor, the contractor will complete and provide to Facility Services copies of a waste manifest. Waste generated by personnel will be stored in a secure location until sufficient accumulates for a waste pick-up.



7.0 GENERAL PRECAUTIONS

A wetting agent shall be added to the water required to be used by this work procedure; to improve its capability to control the spread of asbestos dust.

The HEPA vacuum cleaners referred to in this work procedure are special asbestos vacuums equipped with HEPA filters.

No eating, drinking or smoking is allowed in the work area.

Compressed air shall NOT be used to clean up or remove asbestos from any surface.

APPENDIX F
Glove Bag Work Procedures

GLOVE BAG WORK PROCEDURES

These procedures are to be followed by all trained University Personnel and qualified abatement contractors performing the following work in University buildings.

NOTE: If more than a minor amount of insulation (more than 1 square metre) is to be removed a notification to the Ministry of Labour will be required.

1.0 EQUIPMENT

1.1 Single Use Glove Bag

A pre-fabricated plastic bag with air-tight sleeves and gloves permanently sealed to the bag to allow access to pipe insulation. Bag shall be equipped with valves or openings for vacuum hose and nozzle of water sprayer, a tool pound with a drain, a seamless bottom and a means of sealing off the lower portion of the bag.

1.2 Moveable Glove Bag

A Glove Bag as defined in 1.1 but equipped with a high strength double throw zipper and removable straps. Required if the bag is to be moved during the removal operation.

1.3 HEPA Vacuum

An asbestos-approved vacuum (HEPA filtered) equipped with brushes, fittings, etc. A vacuum can be opened to empty only by fully protected worker within a Type 2 enclosure.

1.4 Respirators

Workers using glove bag must wear approved respiratory protection. Respirators and filters must be provided by the employer, and individually assigned to workers. Respiratory protection shall be a half-face piece respirator with high efficiency (P100) filters. Respirators must be kept in position from the time the worker attaches bag to pipe until final cleaning of the pipe and bagging of waste is completed. Filters shall be changed after 24 hours of wear or sooner if breathing resistance increases. No person using respirator shall wear facial hair which affects the seal between respirator and face.

1.5 Protective Clothing

Workers shall wear disposable Tyvek coveralls (or equivalent) with attached elasticized hood. Coveralls and hood shall remain in place until worker completes cleaning of pipe. Overalls may be cleaned for re-use, for a maximum of 8 hours cumulative wear or disposed of as asbestos waste.

1.6 Other Equipment

Labelled asbestos waste bags (6 mil) - for all asbestos waste in glove bag, disposable suit, cleaning materials, etc.

Asbestos warning signs.

Wire saw - saw with flexible serrated wire blade and handles to allow use inside glove bag.

Knife with fully retractable blade or carpet (hook) knife for use inside glove bag.

Securing Straps - Reusable nylon straps at least 1" wide with metal buckle for sealing ends of Moveable Glove Bag around pipe and/or insulation.

Water Sprayer - Garden reservoir type, low velocity, capable of producing mist or fine spray with water containing wetting agent. Wetting agent shall be diluted 2 oz. per gallon of water.

Plastic sheet (2 mil polyethylene) to cover exposed or damaged sections of pipe prior to attaching glove bag.

Plastic drop sheet (6 mil polyethylene) to protect furnishings, flooring or equipment in the event of a spill.

Sealer or encapsulant suitable for service temperature of pipe applied by brush, cloth or hand sprayer.

Miscellaneous tools and cleaning supplies, wire cutters, snips, scouring pads, sponges, brushes, buckets, tape, etc.

2.0 OTHER PROTECTIVE MEASURES

Do not eat, drink or smoke in the work area.

On completing clean-up of work area, use HEPA vacuum or wet cloth to clean hands, face, respirator and boots. Remove protective equipment and proceed to nearest washroom to wash all exposed skin on hands and face.

3.0 SCHEDULING OF WORK

A Notice of Service Interruption Form MUST be issued by Facility Services for both routine and emergency work.

Schedule work when occupants are absent. If persons are present, do not start work.

If work is required on an emergency basis and the area is occupied, Facility Services is to advise occupants to vacate area until work is complete and clearance is given to return.

4.0 PREPARATION

Where practical, clear area below pipe of moveable furnishing or equipment. Provide scaffold as required to reach pipe.

Install plastic drop sheet over furnishings, flooring or equipment for protection in the event of a spill. Drop sheet shall be sufficient size to capture any material dislodged from the pipe.

Post an asbestos warning sign at all entrances to room in which the procedure is being used. If necessary use rope or tape barriers to separate work area.

Disable ventilation system in area of Glove Bag operation. Seal voids and openings in the proximity of the Glove Bag operation, including ventilation ducts.

Don protective clothing and respirator prior to disturbing any asbestos-containing material by any work.

Pre-clean with HEPA vacuum or wet methods any loose material on surface of pipe or any material on the floor. If asbestos-containing material is on floor, Type 2 procedures may be required for clean-up. (See Type 2 Procedures.)

Check condition of pipe insulation where removal will be performed. If the insulation has minor damage, mist surface and patch with tape. If damage is more extensive, wrap pipe with 2 mil plastic and "candy stripe" with duct tape first. If pipe insulation is severely damaged and cannot be simply repaired, glove bag is not appropriate. (Use Type 2 or Type 3 Procedures.)

5.0 EXECUTION

Follow manufacturer's instructions for Glove Bag being used.

Place tools necessary to remove insulation in tool pouch. Fasten bag onto pipe and seal all openings to pipe with cloth securing straps or tape.

Place hands into gloves and use necessary tools to remove insulation. Arrange insulation in bag to obtain full capacity of bag. Do not use glove bag method on insulation jacketing made of aluminium of thickness greater than 0.51 mm (24 gauge) or steel.

Insert nozzle of spray pump into bag through valve and wash down pipe and interior of bag thoroughly. Use one hand to aid washing process. Wet surface of insulation in lower section of bag and exposed end of asbestos insulation remaining on pipe by spraying with water prior to moving bag.

If Glove Bag is to be moved along pipe, adjust strap tension, move bag and re-seal to pipe using double-pull zipper to pass hangers. Repeat stripping operation.

If Glove Bag is removed from pipe for use on new section of pipe, extract the air from the Glove Bag with a HEPA vacuum and seal interior zip lock. Re-install in new location before opening zip lock.

If Glove Bag is ripped, cut or opened in any way, cease work and repair with tape before continuing work.

If damage is not readily repaired, discontinue use of Glove Bag, thoroughly wet contents, extract the air from the Glove Bag with a HEPA Vacuum and place Glove Bag in an asbestos waste container.

To remove bag once filled, wash top section and tools thoroughly. Place tools in 1 hand (glove), pull hand out inverted, twist to create separate pouch, double tape to seal. Cut between tape and place pouch with tools in next glove bag; or into water bucket, open pouch underwater, clean tools and allow to dry.

Extract air from the Glove Bag with a HEPA vacuum and pull asbestos waste container over Glove Bag before removing the pipe. Remove securing straps or tape. Remove Bag from pipe directly into asbestos waste container.

After removal of bag ensure pipe is clean of residue and clean surfaces of pipe or wipe with wet cloth.

Before completion of shift, apply sealer to all surfaces of freshly-exposed pipe. Apply heavy coat of sealer or end cap to exposed ends of asbestos insulation to remain.

Once Glove Bag is filled dispose of as contaminated waste. Do not reuse bag.

Clean work area with HEPA vacuum or by damp wiping.

6.0 WASTE TRANSPORT AND DISPOSAL

Provide storage area for holding minor amounts of asbestos waste in sealed containers. Containers shall be labelled and assigned exclusively for asbestos waste.

When waste is removed from site, collect the completed waste waybills from the disposal firm. For work performed by a contractor, the contractor will complete and transfer copies of the waste manifest, on behalf of the owner. Waste generated by Maintenance staff will be stored at a secure location until sufficient accumulates for a waste pick-up.

7.0 NOTICE OF PROJECT

If trained University Personnel or qualified contractor use glove bags for major amounts of removal (more than one square meter of pipe insulation measured on the outside diameter of the insulation), they must submit a written **Notice of Project** to the Ministry of Labour as required by Regulation 278/05.

8.0 GENERAL PRECAUTIONS

If pipe is badly damaged the use of a GLOVE BAG is not appropriate

Care should be taken when using a utility knife or any sharp tool in the GLOVE BAG not to puncture it.

Glove bag shall be used only on surfaces less than 155 Deg. F.

MEMBER OF



Asbestos Management Program

University of Windsor

Glove Bag Work Procedures

January 11, 2016

Pinchin File: 89222

Appendix F

A wetting agent shall be added to water and is required to be used by this work procedure to improve its capability to control the spread of asbestos dust.

HEPA Vacuum cleaners referred to in this work procedure are special asbestos vacuums equipped with HEPA filters.

No eating, drinking or smoking is allowed in the work area.

APPENDIX G
Respirator Protection Program

Issue Date: September 9, 2015
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Doc. No: OHS-4.5.8
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1.0 PURPOSE

The Respiratory Protection Program was developed to protect the health of workers, students and visitors from hazardous airborne contaminants. The program aims to ensure that the correct respiratory protection is provided to and properly used by appropriate personnel at the University of Windsor and to comply with applicable codes and regulations regarding respirator use.

2.0 SCOPE

This program applies to all workers, students and visitors who may be exposed to respiratory hazards during the course of their work. It applies at the University of Windsor and at other places where workers and students work.

3.0 DEFINITIONS

CSA: Canadian Standards Association

CCC: Chemical Control Centre

NIOSH: A National Institute of Occupational Safety and Health,

OEL: Occupational Exposure Limit

Respirator User: Any individual who uses a respirator during the course of their work or study at the University of Windsor. Respiratory users may include a supervisor, worker, student or visitor.

Supervisors: As defined in the Occupational Health & Safety Act (OHSA)
http://www.labour.gov.on.ca/english/hs/pubs/gl_supervisor.php

Qualitative Fit Test (QLFT): A pass/fail test method that relies on the subject's sensory response to detect a challenge agent in order to assess the adequacy of the respirator fit.

Quantitative Fit Test (QNFT): A fit-test method that uses an instrument to assess the amount of leakage into the respirator in order to assess the adequacy of respirator fit.

Respiratory Protection Factor (RPF); A calculation determined by the Measured level of contamination divided by the Exposure limit for contamination

Workers: As defined in OHSA http://www.labour.gov.on.ca/english/hs/worker_defn.php

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4.0 RESPONSIBILITIES

4.1 Health & Safety/Chemical Control Centre

Health and Safety oversees the Respiratory Protection Program at the University and shall;

- develop and administer the program;
- provide technical advice and recommendations regarding assessments for respiratory hazards;
- assist in determining the type of respiratory protection required for the specific respiratory hazard(s);
- assist in arranging for the fit testing;
- evaluate the effectiveness of the Respiratory Protection Program;
- ensure procedures for medical surveillance are established;
- submit asbestos exposure report form 1 to the Provincial Physician of the Ministry of Labour annually;
- update the program to maintain consistency with regulatory criteria; and
- create and maintain program, training, fit testing and medical records.

4.2 Departments/Faculty

Each Department or Faculty that requires personnel to use a respirator is responsible to ensure that this program is implemented and maintained. All fit testing results, program evaluations and training records shall be maintained by the department or Faculty and sent to Health & Safety.

Each department or Faculty shall designate a qualified person(s) (i.e. one who has the knowledge, experience and training to fulfill the responsibilities outlined in this program) to coordinate the program. The departments/faculty shall;

- provide oversight of this program for the department, and be the designated contact to address questions regarding this program;
- obtain a copy of the latest version of the CSA Standard "*Selection, Use and Care of Respirators*";
- order and/or issue respirators and filters;
- work in consultation with Supervisors/Principal Investigators and Health & Safety on issues pertaining to this program;
- ensure applicable workers complete the asbestos exposure report form 1 annually and submit the completed forms to Health & Safety;
- arrange for a consultant to perform fit testing and respirator training in conjunction with asbestos training or attend 3M Respirator Fit Testing and Training Course, and provide training and fit testing.
- If performing fit testing in house, the department/faculty shall obtain and maintain a 3M Bitrex Fit Respirator Fit Testing Kit; and
- report the number of hours each worker, works on Type 2 or Type 3 asbestos operation (if applicable to your department/faculty). The completed Asbestos Work Report Form 1 shall be sent to Health & Safety annually.

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4.3 Supervisors

Supervisors shall;

- identify situations where respirators are required;
- conduct, in consultation with the CCC, assessments or respiratory hazards;
- determine (using the Respirator Standards) the type of respiratory protection required for the specific respiratory hazard;
- provide workers with appropriate respiratory protection;
- ensure that health screening, training and fit testing of workers are completed prior to assigning workers a task that requires a respirator;
- ensure that workers use the respirators in accordance with the instructions and the training received;
- ensure that the workers use only those respirators for which they have been qualified;
- ***ensure respirators are cleaned, sanitized, inspected, maintained, repaired, and stored in accordance with training and manufacturer's recommendations;***
- in case of a tight-fitting face piece, ensure that respirator users are clean-shaven and do not have any object or material that would interfere with the seal or operation of the respirator;
- notify the department/faculty and Health & Safety of respirator users' concerns, changes in processes, equipment, or operating procedures that have impact on environmental conditions, and respiratory protection requirements;
- notify the department/faculty and Health and Safety of the incidents where the use of a respirator may have prevented or contributed to an accident or injury;
- ensure that workers wear appropriate respiratory protection at all times in respiratory hazard areas and;
- in addition to these responsibilities, the responsibilities listed under Respirator User also apply to Supervisors.

4.4 Respirator Users

Respirator Users shall;

- be aware of the respirator requirements in their work area;
- wear respirators as appropriate and check that the respirator is clean and in working condition prior to each use;
- report any respirator that is determined to be defective to their supervisor and remove the respirator from service;
- perform negative and positive pressure check after each donning of a tight-fitting respirator;
- report to their supervisor or other person in authority any condition or change that may impact on their ability to use a respirator safely;
- when using a tight-fitting face piece respirator, ***be clean shaven and ensure that no object or material interferes with the seal or operation*** of the respirator; and
- use the respirator in accordance with the manufacturer's instructions and training received.

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5.0 REFERENCES DOCUMENTS

(CSA) Standard Z94.4-02 (Selection, Use and Care of Respirators).
(CSA) Standard Z108.1-00
National Institute for Occupational Safety and Health (NIOSH) or its equivalent,
Ontario Occupational Health and Safety Act.
Asbestos Regulation 278/05 and 279/05.
Ontario Industrial Establishments Regulation (O.Reg.851). "Selection, Use and Care of Respirators"

6.0 PROCEDURE

The University is committed to the protection of University workers and students from the potential health risks associated with exposure to airborne contaminants. If there is a risk of exposure to airborne contaminants and engineering controls are not feasible, appropriate respiratory protection must be used. Personal Protective Equipment (PPE), including respirator protection, is normally the last resort in minimizing the hazards of airborne contaminants.

6.1 Hazard Assessment

The supervisor of the worker, student visitor or of a work area is responsible for identifying the need for a respirator.

Engineering controls shall be considered as the primary means of controlling respiratory hazards (i.e. ventilation, fume hoods, biosafety cabinets, etc.). Respiratory protection is meant to supplement the protection provided by the engineering controls.

Respiratory hazards in certain work areas and laboratories may include but are not limited to airborne contaminants such as dusts, mists, fumes, gases, and/or oxygen-deficient atmospheres. If these hazardous conditions exist in a work area or lab, a respirator shall be worn. Each department is responsible for the cost of supplying the appropriate personal protective equipment (PPE).

6.2 Respirator Selection

Respirators shall not be issued indiscriminately. The need for respiratory protective equipment will be assessed and the appropriate type of respirator for the situation will be selected. The selection criteria used will follow CSA Standard Z94.4-02. Respirator selection shall be selected by the supervisor, department/faculty and done in accordance with Regulations.

Respiratory protection shall be used to protect workers, students and visitors from exposure to all respiratory hazards including but not limited to asbestos. **Please Note:** Although respirator use is optional during Type 1 work, it is University of Windsor policy that respiratory protection is **mandatory** for all workers, students and visitors performing Type 1 Work. All respirators shall be NIOSH-approved and where practicable, respirators will be assigned to individual users for their exclusive use.

6.3 Medical Surveillance

Prior to fit-testing and respirator use, the respirator user shall ensure that they are free from any psychological or physiological condition that may preclude him or her from being assigned the use of the selected respirator. This can be done by visiting a general practitioner. The respirator user and supervisor shall complete their respective parts of the respirator user screening form and send a copy to the department/faculty and Health & Safety. (Please see Appendix A: OHS 4.5.8a)

Individuals that do not meet medical requirements to wear a selected respirator shall not work in an area where the use of a respirator is required.

Health & Safety will submit the asbestos exposure report form 1 submitted by the applicable departments to the Provincial Physician of the Ministry of Labour annually.

6.4 Fit Testing

Supervisors shall ensure that respirator users are required to wear tight-fitting respirators will be fit- tested prior to initial use and every two years thereafter, whenever there is a change in the respirator face piece, and whenever there is a change in the user's physical condition that could affect the respirator fit. A qualitative fit- test (QLFT) is the minimum fit-test required, a quantitative fit test (QNFT) is recommended. The results of the fit test shall be used to select the specific model and size of face piece for the individual user and in accordance with CSA Standard Z94.4-02

Compressed breathing air and air compressors used for supplied-air respirators or self-contained breathing apparatus shall comply with CSA Standard Z180.1-00.

Individuals will not be fit-tested if a good seal cannot be obtained. Possible situations that may prevent a good seal include facial hair and physical deformities.

Individuals that do not pass the fit test shall not work in an area where the use of a respirator is required.

Records of fit-testing shall be maintained by the Department and a copy sent to Health & Safety.

6.5 Training

The department/faculty shall arrange or provide respirator training. Individuals, using respirators on a voluntary or mandatory basis shall be included in the training program.

As well as the respirator user, the following persons must be trained to ensure the proper use of respirators:

- i. The supervisor of the respirator user
- ii. The person issuing respirators
- iii. The person performing fit-checks
- iv. The person maintaining and repairing respirators.

Individuals to be trained and the content of the training, shall be repeated annually and meet the requirements set out in CSA Standard Z94.4-02.

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Training certificates and copies of the training materials shall be maintained by the Department and a copy sent to Health & Safety. Records shall include a list of the individuals trained, a description of training, and the training date. Training records shall be maintained for at least 10 years.

6.6 Use, Care & Maintenance of Respirators

All respirators shall be sanitized, inspected and maintained in accordance with CSA Standard Z94.4-02

Individuals with beards or stubble at the respirator's sealing edge are not permitted to wear respirators requiring a facial seal (whether they are negative pressure or positive pressure respirators). Any individual who is not clean-shaven at the time a respirator is required shall not be allowed to wear a tight-fitting respirator, even though the person has previously obtained a satisfactory fit when clean-shaven.

Respirators shall be used, cleaned, inspected, maintained and stored by the individual using them, following the instructions provided in the respirator manufacturer's guidelines, training and the regulations.

Respirator users shall inspect face pieces and respirator components prior to use on each day of use, and shall report any defective respirators to their Supervisor. These respirators shall be tagged and removed from service until repaired or replaced

Only the use of non-powered half face or full face respirators are included in this program.

6.7 Signage

Specific work areas (maintenance areas, laboratories, hazardous materials processing areas etc.) that are identified as containing high airborne hazard require external signage. The posted signage must minimally state the following: CAUTION Respiratory Protection Required.

6.8 Record Keeping & Annual Review

All records shall be kept by the department/faculty and Health and Safety. Health & Safety will keep records for a minimum of 10 years. The program shall be evaluated by the department/faculty, and Health & Safety on an annual basis.

If deficiencies in the program are identified, the department/faculty shall be responsible for ensuring that remedial measures are developed and communicated with Health & Safety for implementation. A record of the evaluation and any corrective actions will be kept on file by Health & Safety.

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6.9 Respirator Protection Factors and Concentration of Airborne Fibre

The Occupational Exposure Level (OEL) for airborne fibres that a worker is typically allowed to inhale over an 8 hour period is 0.1 fibres/mL (MOL Reg. 279/05, NIOSH REL, the US OSHA PEL and the ACGIH TLV). Typically, respirator protection factors accepted by the MOL (other provinces and the CSA are different) are as follows:

Non-powered half face	10 RPF
PAPR	50 RPF
Pressure Demand	1,000 to 10,000 RPF

Based on these, the maximum allowable airborne concentration while wearing a respirator would be (Protection factor x OEL of 0.1 f/mL):

Non-powered half face	1 fibre/cc.
PAPR	5 fibres/cc.
(Powered Air Purifying Respirator)	
Pressure Demand	100 fibres/cc (based on 1000 RPF).

7.0 REVISION HISTORY

Date (yyyy/mm/dd)	Revision



RESPIRATORY PROTECTION PROGRAM

Health and Safety

Issue Date: September 9, 2015
Review Date: New
Revision Date: New

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Appendix A: OHS 4.5.8a University of Windsor Respirator User Screening Form

Name: _____

Occupation / Title: _____

Employee# _____

Student #: _____ Department: _____

Supervisor: _____

Activities requiring respirator use: _____

Avg. frequency of respirator use: Daily Weekly Monthly Yearly Other: _____

Please complete this form prior to respirator fit testing.

PART A RESPIRATOR USER'S HEALTH CONDITIONS

1. Check "Yes" or "No" boxes only. DO NOT specify conditions. Medical information is NOT to be offered on this form.

a) Some conditions can seriously affect your ability to safely use a respirator. Do you have or do you experience any of the following, or another condition which may affect respirator use?

YES NO

Shortness of breath	Breathing difficulties	Chronic bronchitis	Emphysema
Lung disease	Chest pain on exertion	Heart problems	Allergies
Hypertension	Cardiovascular disease	Thyroid problems	Diabetes
Neuromuscular disease	Fainting spells	Dizziness/nausea	Seizures
Temperature susceptibility	Claustrophobia/fear of heights	Hearing impairment	Dentures
Panic attacks	Colour blindness	Asthma	Pacemaker
Vision impairment	Reduced sense of smell	Reduced sense of taste	Other condition(s) affecting respirator use
Back/neck problems	Unusual facial features/skin conditions		Prescription medication to control a condition

*** Note medical information is not to be offered on this form ***

b) Have you had previous difficulty while using a respirator? **YES** **NO**

c) Do you have any concerns about your future ability to use a respirator safely? **YES** **NO**

If "YES" was answered to questions a), b) or c), further assessment by a health care professional is required prior to respirator use. Please complete **PART B Health Care Professional Primary Assessment** on next page.

Signature of Respirator User: _____

Date: _____

Office of Health & Safety use only



University
of Windsor

RESPIRATORY PROTECTION PROGRAM

Health and Safety

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Individual is fit for respirator use : YES NO

Type of Fit Test: QLFT QNFT

Respirator Type: Make: _____ Model: _____

Filtering Face Piece Half Mask Full Face Piece

Fit Tested by: _____

Date: _____

Recertification Date (2 years): _____

For additional respirators please attach a separate sheet

PART B HEALTH CARE PROFESSIONAL PRIMARY ASSESSMENT (if required)

Assessment date: _____

**Respirator use
permitted:** YES NO

Referred to medical assessment: YES NO

Comments: _____

Reassessment date: _____

Name of Health Care Professional (print): _____

Signature of HCP: _____

PART C MEDICAL ASSESSMENT (if required)

Assessment date: _____

Class 1. No Restrictions

Class 2. Some specific Restrictions apply (specify): _____

Class 3. Respirator use is NOT permitted

Name of Physician (print): _____

Signature of Physician: _____

APPENDIX H
Asbestos Project Update Form

ASBESTOS PROJECT UPDATE FORM

Project Update Form Instructions

This form will be used in all cases where asbestos abatement has occurred.

The form will be completed by Project Administrators, Managers or Supervisors and signed by the same.

The form shall be submitted promptly, following the completion of the work, to the Office of the Associate Vice-President, Operations, attention Operations Coordinator.

University of Windsor Asbestos Project Update Form

Building Name: _____

Room Description: _____
(Room Name) _____ (Room #) _____ (HMIS Location #) _____

Date and Time: _____
(Start Date) _____ (End Date) _____ (# hrs. worked) _____

Name of Contractor: _____

Dollar Amount: \$ _____

Project Type: Emergency Type 1 Type 2
 Planned Project Glove Bag Type 3

Description of
Abatement: (including
what ACM was removed)

Authorized By: _____

Project #: _____

W.O.# or P.O.#: _____

Comments: _____

Pre-Construction Survey for ACM performed and reported to Contractor?

Yes No (Explain) _____

Air Sampling during abatement?

Yes No

Clearance Air Monitoring performed (Regulated requirement after Type 3 abatement)?

Yes No

Air Monitoring results to Central Safety Committee (CSC)?

Yes No

Has the Asbestos HMIS Program Been Updated to Reflect Changes (Abated ACM)?

Yes No. No changes to ACM inventory resulted.
 No. Forward copies to Consultant prior to next re-assessment.

Asbestos waste removed from site and disposed of?

Yes. Dump tickets attached. No. ACM waste not generated.
 No. ACM waste remains on site for later disposal.

Append the following information relating to asbestos abatement to this work record, if applicable, and file Asbestos Work Record and attachments with Asbestos Management Program. Check where attached.

Submittals including Insurance	<input type="checkbox"/> Yes	<input type="checkbox"/> No
Dump tickets, waybills, etc for waste.	<input type="checkbox"/> Yes	<input type="checkbox"/> No
Specifications, Change Orders, Drawings.	<input type="checkbox"/> Yes	<input type="checkbox"/> No
Consultant Inspection Reports.	<input type="checkbox"/> Yes	<input type="checkbox"/> No
Air Monitoring Results.	<input type="checkbox"/> Yes	<input type="checkbox"/> No
Analytical Certificates.	<input type="checkbox"/> Yes	<input type="checkbox"/> No
Correspondence as required.	<input type="checkbox"/> Yes	<input type="checkbox"/> No

APPENDIX I
Variance Letter for HVAC Filter Changes



December 6, 2019

University of Windsor
401 Sunset Avenue
Windsor, Ontario, N9B 3P4

E-mail: smenard@uwindsor.ca

Attention: Sherri Lynne Menard
Environmental Health & Safety Manager

Re: Varied Procedure Development For HVAC Filter Changes

Various University of Windsor Campus Buildings
Pinchin File: 241122

1.0 INTRODUCTION

University of Windsor (Client) retained Pinchin Ltd. (Pinchin) to develop varied work procedures for the changing of filters inside stand-alone Heating Ventilation and Air Conditioning (HVAC) units within various buildings located on the University of Windsor campus which is known to have asbestos-containing sprayed fireproofing applied to the structural steel components.

The production of the varied work procedures involved collection of bulk samples of the used HVAC filter media and the collection of Phase Contrast Microscopy (PCM) air samples during routine filter changes in various campus buildings where asbestos-containing sprayed fireproofing is present.

Currently Ontario Regulation 278/05 contains a clause which can be problematic for building owners and operators when buildings are sprayed with asbestos-containing materials (ACM). This clause reads as follows:

- Section 12 (3) 8 “Cleaning or removing filters used in air handling equipment in a building that has sprayed fireproofing that is asbestos-containing material” is a Type 2 operation.

2.0 REGULATORY BACKGROUND

The purpose of the investigation was to determine if the work is eligible to develop varied work procedures using Section 23 of the Ontario Asbestos Regulation 278/05 (O.Reg. 278/05). Section 12(3)8 states that cleaning or removing filters used in air handling equipment in a building that has sprayed fireproofing that is asbestos-containing material is classified as a Type 2 operation.

Section 23 in O.Reg. 278/05 allows a constructor or employer to vary a measure or procedure required by the Regulation, if the revised measure or procedure affords at least equal protection for workers

performing the work and if the Joint Health and Safety Committee (JHSC) for the workplace is notified in writing prior to commencing with work following the varied work procedure.

By performing our testing and evaluation, Pinchin hopes to achieve the following outcomes in regard to removing filters:

1. A varied Type 2 work procedure for changing filters only inside stand-alone HVAC units, which would be modified to follow reduced worker personal protective equipment and waste handling precautions and would include the following:
 - Respirators and disposable coveralls impervious to asbestos fibres are not required, unless requested by the worker.
 - Prove that the filters are not asbestos waste as defined by Regulation 347 and the Ministry of the Environment. This will allow the waste to be removed as non-hazardous industrial waste.

3.0 SAMPLING STRATEGY

3.1 Air Sampling

Air sampling was conducted during changing of filters inside stand-alone HVAC units. The purpose of the air sampling was to confirm whether or not there is an actual risk of asbestos exposure when completing such tasks. Air samples were analyzed by Phase Contrast Microscopy (PCM).

3.1.1 Changing Filters Only

Personal PCM air samples were collected in the worker's breathing zone during changing of filters inside the HVAC units. Occupied air samples were also collected inside the Mechanical Room; approximately six feet from the HVAC filter change area; to document "clean" conditions at locations occupied by staff, tenants, or the public.

The following buildings and HVAC units were included in the testing procedures:

- HVAC Unit AS-1 in Erie Hall 4th Floor Mechanical Room M403
- HVAC Unit AC-16 in Essex Hall 4th Floor Penthouse Mechanical Room
- HVAC Unit AHU#5 in West Leddy Library Basement Mechanical Room
- HVAC Unit AHU 1A & 1B in the Biology Building North Penthouse
- HVAC Unit AC 1 & 2 in the Chrysler Hall Tower
- HVAC servicing Chrysler Hall North

3.2 Bulk Sampling

Bulk sampling of filter media within each of the stand-alone HVAC units was conducted. The purpose of the bulk sampling was to determine whether or not the filter media would be considered an “asbestos-containing material” as defined by Regulation in Ontario. Bulk samples of filter media were collected by cutting small sections from the filter media prior to their removal, disposal and replacement.

4.0 ANALYTICAL METHODOLOGY

4.1 Air Sampling

4.1.1 PCM Air Sampling

Air samples for PCM analysis were prepared and analyzed according to the U.S. National Institute for Occupational Safety and Health (NIOSH) Method 7400 – Asbestos and Other Fibres by PCM, dated August 15, 1994. All PCM air samples were analyzed by a Pinchin technician accredited by the Institut de recherché Robert-Sauvé en santé et en sécurité du travail (IRSST). Fibres are not identified or characterized in the PCM method. All particles equal to or longer than 5 micrometres and with length-to-width ratios of 3-1 or greater are included in the count. Therefore if fibreglass, cellulose, or gypsum fibres are also present, the PCM method will overestimate the true asbestos concentration. Fibres with diameters less than about 0.25 micrometres are not detected by the method, regardless of length. This is the resolution limit of the optical microscope set up with phase contrast illumination.

4.2 Asbestos Bulk Sampling

Bulk samples collected for asbestos identification were analyzed at the SAI, Scientific Analytical Institute, Inc. Asbestos Laboratory, following the US EPA method specified in O.Reg. 278/05. The laboratory is accredited in the analysis of asbestos in bulk materials by the US National Voluntary Laboratory Accreditation Program (Laboratory Number 101270-0). The analysis was performed in accordance with Test Method EPA/600/R-93/116: Method for the Determination of Asbestos in Bulk Building Materials, July 1993, which is the regulated method for bulk sample analysis in Ontario as specified in the Ontario Regulation 278/05. This method was used to determine if the dust or filter media would be considered an “asbestos-containing material” as defined by Regulation in Ontario.

5.0 FINDINGS

5.1 Air Sampling

5.1.1 PCM Air Sampling

Results of the PCM personal and occupied air samples collected during the filter change work indicated that all results were found to be below the quantitation limit of 0.1 (personal samples) and 0.01 (occupied

samples) fibres per cubic centimetre of air collected. All air samples are below the asbestos 8-hour Time Weighted Average (TWA) limit value of 0.1 fibres/cc that is specified in O.Reg. 490/09 Table 1.

5.2 PLM Asbestos Bulk Sampling

Asbestos was not detected in any of the bulk samples of the filter media collected within the stand-alone HVAC units (samples 001A-C, 002A-C, 003A-C, 004A-C 005A-C and 006A-C). Bulk sample results are included in Appendix I of this report.

5.3 Air and Bulk Sampling Results

The following table summarizes the results and details of the PCM air and PLM bulk samples collected.

Sample No.	Sample Type	Description	Start Time	Flow Rate (L/min)	Duration (Minutes)	Air Volume (L)	Result
315636	Personal (PCM)	Filter change – HVAC Unit AS-1 in Erie Hall 4 th Floor Mechanical Room M403	8:05 am	3.01	10	30.1	<0.1 (f/cc of air)
315616	Occupied (PCM)	Filter change HVAC Unit AS-1 in Erie Hall 4 th Floor Mechanical Room M403	8:00 am	15.035	20	300.7	<0.01 (f/cc of air)
315628	Personal (PCM)	Filter change HVAC Unit AC-16 in Essex Hall 4 th Floor Penthouse Mechanical Room	9:00 am	3.01	10	30.1	<0.1 (f/cc of air)
315618	Occupied (PCM)	Filter change - HVAC Unit AC-16 in Essex Hall 4 th Floor Penthouse Mechanical Room	9:47 am	15.035	20	300.7	<0.01 (f/cc of air)
315646	Personal (PCM)	Filter change – HVAC Unit AHU#5 in West Leddy Library Basement Mechanical Room	8:37 am	3.01	10	60.2	<0.1 (f/cc of air)
315645	Occupied (PCM)	Filter change – HVAC Unit AHU#5 in West Leddy Library Basement Mechanical Room	8:30 am	15.028	20	300.6	<0.01 (f/cc of air)



Sample No.	Sample Type	Description	Start Time	Flow Rate (L/min)	Duration (Minutes)	Air Volume (L)	Result
315638	Personal (PCM)	Filter change – HVAC Unit AHU 1A & 1B in the Biology Building North Penthouse	10:15 am	3.01	10	30	<0.1 (f/cc of air)
315648	Occupied (PCM)	Filter change – HVAC Unit AHU 1A & 1B in the Biology Building North Penthouse	10:12 am	15.028	40	601.1	<0.01 (f/cc of air)
313118	Personal (PCM)	Filter change – HVAC servicing Chrysler Hall North	8:13 am	3.01	15	45.1	<0.1 (f/cc of air)
313148	Occupied (PCM)	Filter change – HVAC servicing Chrysler Hall North	8:10 am	15.028	20	300.6	<0.01 (f/cc of air)
313138	Personal (PCM)	Filter change – HVAC Unit AC 1 & 5 in the Chrysler Hall Tower	7:25 am	3.01	20	60.2	<0.1 (f/cc of air)
315623	Occupied (PCM)	Filter change – HVAC Unit AC 1 & 5 in the Chrysler Hall Tower North	7:20 am	15.028	30	450.8	<0.01 (f/cc of air)
0001A-C	Bulk	Filter Media – HVAC servicing Chrysler Hall North	N/A	N/A	N/A	N/A	None Detected
0002A-C	Bulk	Filter Media HVAC Unit AC 1 & 5 in the Chrysler Hall Tower	N/A	N/A	N/A	N/A	None Detected
0003A-C	Bulk	Filter Media – HVAC Unit AHU#5 in West Leddy Library Basement Mechanical Room	N/A	N/A	N/A	N/A	None Detected

Sample No.	Sample Type	Description	Start Time	Flow Rate (L/min)	Duration (Minutes)	Air Volume (L)	Result
0004A-C	Bulk	Filter Media – HVAC Unit AS-1 in Erie Hall 4 th Floor Mechanical Room M403	N/A	N/A	N/A	N/A	None Detected
0005A-C	Bulk	Filter Media – HVAC Unit AC-16 in Essex Hall 4 th Floor Penthouse Mechanical Room	N/A	N/A	N/A	N/A	None Detected
0006A-C	Bulk	Filter Media – HVAC Unit AHU 1A & 1B in the Biology Building North Penthouse	N/A	N/A	N/A	N/A	None Detected

6.0 CONCLUSIONS AND RECOMMENDATIONS

The results obtained during the testing, in our opinion, are sufficient in number and sufficiently consistent to draw some conclusions related to the stand-alone HVAC units serving the buildings included in the testing (buildings with known sprayed fireproofing on structure), refer below for a brief summary:

- All bulk samples collected of the used HVAC filter media confirms that no asbestos was detected in the media. These results prove that the filters are not asbestos waste as defined by Regulation 347 and the Ministry of the Environment. This will allow the waste to be removed as non-hazardous industrial waste.
- All Phase Contrast Microscopy (PCM) air samples collected were well below the quantitation limit of 0.1 (personal samples) and 0.01 (occupied samples) fibres per cubic centimetre of air collected. All air samples are below the asbestos 8-hour Time Weighted Average (TWA) limit value of 0.1 fibres/cc that is specified in O. Reg. 490/09 Table 1.

The above results confirm that at no time, during the filter change procedures, was elevated airborne asbestos fibres present. With the agreement of the University of Windsor Joint Health and Safety Committee, reduction of the Type 2 personal protective equipment (PPE) and site isolation requirement; as required by O. Reg 278/05 (during filter changes in buildings with asbestos-containing sprayed fireproofing) can be made. Respirators and disposable coveralls (impervious to asbestos fibres) are not required, unless requested by the worker.

Pinchin recommends conducting periodic air monitoring in the future to validate our conclusions and recommendations.



The above findings, conclusions and our recommendations should be provided to the Joint Health and Safety Committee, and we recommend that they also be communicated to the Ontario Ministry of Labour for their review and agreement.

7.0 TERMS AND LIMITATIONS

This work was performed subject to the Terms and Limitations presented or referenced in the proposal for this project.

Information provided by Pinchin is intended for Client use only. Pinchin will not provide results or information to any party unless disclosure by Pinchin is required by law. Any use by a third party of reports or documents authored by Pinchin or any reliance by a third party on or decisions made by a third party based on the findings described in said documents, is the sole responsibility of such third parties. Pinchin accepts no responsibility for damages suffered by any third party as a result of decisions made or actions conducted. No other warranties are implied or expressed.

8.0 CLOSURE

Should you have any questions or concerns regarding the contents of this letter, please contact Tina Manning at tmanning@pinchin.com or 519.682.4492, ext. 3301.

Yours truly,

Pinchin Ltd.

Prepared by:

Ralph Verbeek
Senior Project Technologist
519 682.4492, ext. 3304
rverbeek@pinchin.com

Reviewed by:

Tina Manning, CRSP, PMP, LEED AP
Operations Manager
519.682.4492, ext. 3301
tmanning@pinchin.com

Encl.: Appendix I – PLM Asbestos Bulk Sample Results



Bulk Asbestos Analysis

By Polarized Light Microscopy
**EPA Method: 600/R-93/116 and 40 CFR, Part 763, Subpart E,
 App.E**



NVLAP LAB CODE 200644-0

Customer: Pinchin Ltd.
 5 Superior Street
 Tilbury, Ontario N0P 2L0

Attn: Ralph Verbeek
 Tayler McIntosh

Lab Order ID: 71927276

Analysis ID: 71927276_PLM

Date Received: 10/24/2019

Date Reported: 10/30/2019

Project: 241122, University of Windsor, Various Buildings, 401 Sunset Ave. Windsor

Sample ID	Description	Asbestos	Fibrous Components	Non-Fibrous Components	Attributes
					Treatment
0001A	Filter Media from Filters of HVAC - HVAC Servicing Chrysler Hall North	None Detected	97% Cellulose	3% Other	Green Fibrous Heterogeneous
					Teased
0001B	Filter Media from Filters of HVAC - HVAC Servicing Chrysler Hall North	None Detected	97% Cellulose	3% Other	Green Fibrous Heterogeneous
					Teased
0001C	Filter Media from Filters of HVAC - HVAC Servicing Chrysler Hall North	None Detected	97% Cellulose	3% Other	Green Fibrous Heterogeneous
					Teased
0002A	Filter Media from Filters of HVAC AC #1 - HVAC Servicing Chrysler Hall Tower	None Detected	97% Cellulose	3% Other	Green Fibrous Heterogeneous
					Teased
0002B	Filter Media from Filters of HVAC AC #1 - HVAC Servicing Chrysler Hall Tower	None Detected	97% Synthetic Fibers	3% Other	Gray Fibrous Heterogeneous
					Teased
0002C	Filter Media from Filters of HVAC AC #1 - HVAC Servicing Chrysler Hall Tower	None Detected	97% Cellulose	3% Other	Gray Fibrous Heterogeneous
					Teased
0003A	Filter Media from Filters of HVAC AHU #5 - HVAC Servicing West Leddy Library	None Detected	97% Cellulose	3% Other	Green Fibrous Heterogeneous
					Teased
0003B	Filter Media from Filters of HVAC AHU #5 - HVAC Servicing West Leddy Library	None Detected	97% Cellulose	3% Other	Green Fibrous Heterogeneous
					Teased

Disclaimer: Due to the nature of the EPA 600 method, asbestos may not be detected in samples containing low levels of asbestos. We strongly recommend that analysis of floor tiles, vermiculite, and/or heterogeneous soil samples be conducted by TEM for confirmation of "None Detected" by PLM. This report relates only to the samples tested and may not be reproduced, except in full, without the written approval of SAI. This report may not be used by the client to claim product endorsement by NVLAP or any other agency of the U.S. government. Analytical uncertainty available upon request. Scientific Analytical Institute participates in the NVLAP Proficiency Testing program. Unless otherwise noted blank sample correction was not performed. Estimated MDL is 0.1%.

Aquila Johnson (18)

P-F-002 r15 1/16/2021

Analyst

Approved Signatory

Scientific Analytical Institute, Inc. 4604 Dundas Dr. Greensboro, NC 27407 (336) 292-3888

Page 1 of 3



Bulk Asbestos Analysis

By Polarized Light Microscopy
**EPA Method: 600/R-93/116 and 40 CFR, Part 763, Subpart E,
 App.E**



Customer: Pinchin Ltd.
 5 Superior Street
 Tilbury, Ontario N0P 2L0

Attn: Ralph Verbeek
 Tayler McIntosh

Lab Order ID: 71927276

Analysis ID: 71927276_PLM

Date Received: 10/24/2019

Date Reported: 10/30/2019

Project: 241122, University of Windsor, Various Buildings, 401 Sunset Ave. Windsor

Sample ID	Description	Asbestos	Fibrous Components	Non-Fibrous Components	Attributes
					Treatment
0003C	Filter Media from Filters of HVAC AHU #5 - HVAC Servicing West Leddy Library	None Detected	97% Cellulose	3% Other	Green Fibrous Heterogeneous
					Teased
0004A	Filter Media from Filters of HVAC AS-1 - HVAC Servicing Erie Hall	None Detected	97% Cellulose	3% Other	Green Fibrous Heterogeneous
					Teased
0004B	Filter Media from Filters of HVAC AS-1 - HVAC Servicing Erie Hall	None Detected	97% Cellulose	3% Other	Green Fibrous Heterogeneous
					Teased
0004C	Filter Media from Filters of HVAC AS-1 - HVAC Servicing Erie Hall	None Detected	97% Cellulose	3% Other	Green Fibrous Heterogeneous
					Teased
0005A	Filter Media from Filters of HVAC AC-16 - HVAC Servicing Essex Hall	None Detected	97% Cellulose	3% Other	Green Fibrous Heterogeneous
					Teased
0005B	Filter Media from Filters of HVAC AC-16 - HVAC Servicing Essex Hall	None Detected	97% Cellulose	3% Other	Green Fibrous Heterogeneous
					Teased
0005C	Filter Media from Filters of HVAC AC-16 - HVAC Servicing Essex Hall	None Detected	97% Cellulose	3% Other	Green Fibrous Heterogeneous
					Teased
0006A	Filter Media from Filters of HVAC AHU 1A + 1B - HVAC Servicing Penthouse Biology	None Detected	97% Cellulose	3% Other	Green Fibrous Heterogeneous
					Teased

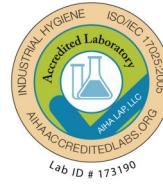
Disclaimer: Due to the nature of the EPA 600 method, asbestos may not be detected in samples containing low levels of asbestos. We strongly recommend that analysis of floor tiles, vermiculite, and/or heterogeneous soil samples be conducted by TEM for confirmation of "None Detected" by PLM. This report relates only to the samples tested and may not be reproduced, except in full, without the written approval of SAI. This report may not be used by the client to claim product endorsement by NVLAP or any other agency of the U.S. government. Analytical uncertainty available upon request. Scientific Analytical Institute participates in the NVLAP Proficiency Testing program. Unless otherwise noted blank sample correction was not performed. Estimated MDL is 0.1%.

Aquila Johnson (18)



Bulk Asbestos Analysis

By Polarized Light Microscopy
**EPA Method: 600/R-93/116 and 40 CFR, Part 763, Subpart E,
 App.E**



NVLAP LAB CODE 200644-0

Customer: Pinchin Ltd.
 5 Superior Street
 Tilbury, Ontario N0P 2L0

Attn: Ralph Verbeek
 Tayler McIntosh

Lab Order ID: 71927276
Analysis ID: 71927276_PLM
Date Received: 10/24/2019
Date Reported: 10/30/2019

Project: 241122, University of Windsor, Various Buildings, 401 Sunset Ave. Windsor

Sample ID	Description	Asbestos	Fibrous Components	Non-Fibrous Components	Attributes
					Treatment
0006B	Filter Media from Filters of HVAC AHU 1A + 1B - HVAC Servicing Penthouse Biology	None Detected	97% Cellulose	3% Other	Green Fibrous Heterogeneous
					Teased
0006C	Filter Media from Filters of HVAC AHU 1A + 1B - HVAC Servicing Penthouse Biology	None Detected	97% Cellulose	3% Other	Green Fibrous Heterogeneous
					Teased
71927276PLM_17					
71927276PLM_18					

Disclaimer: Due to the nature of the EPA 600 method, asbestos may not be detected in samples containing low levels of asbestos. We strongly recommend that analysis of floor tiles, vermiculite, and/or heterogeneous soil samples be conducted by TEM for confirmation of "None Detected" by PLM. This report relates only to the samples tested and may not be reproduced, except in full, without the written approval of SAI. This report may not be used by the client to claim product endorsement by NVLAP or any other agency of the U.S. government. Analytical uncertainty available upon request. Scientific Analytical Institute participates in the NVLAP Proficiency Testing program. Unless otherwise noted blank sample correction was not performed. Estimated MDL is 0.1%.

Aquila Johnson (18)

Analyst

Approved Signatory

Client Contact: Pinchin Ltd. Ralph Verbeek 30 Queen Street South, PO Box 339, Tilbury, ON N0P 2L0 519-682-4492 rverbeek@pinchin.com tmcintosh@pinchin.com 241122, University of Windsor, Various Buildings, 401 Sunset Ave. Windsor		Instructions: <i>Use Column "B" for your contact info</i> To See an Example Click the bottom Example Tab. Enter samples between "<<" and ">>"	
Project: Client Notes:		Begin Samples with a "<<" above the first sample and end with a ">>" below the last sample. Only Enter your data on the first sheet "Sheet1"	
P.O. #: 241122 Date Submitted: 10/23/2019 Analysis: PLM - Stop Positive Turn Around Time: 4-day		Note: Data 1 and Data 2 are optional fields that do not show up on the official report, however they will be included in the electronic data returned to you to facilitate your reintegration of the report data.	

Invoice to: AP ap@pinchin.com	 Scientific Analytical Institute
--	---

Sample Number	Data 1 (Lab use only)	Sample Description	Data 2 (Lab use only)
<<		Filter Media from Filters of HVAC - HVAC Servicing Chrysler Hall North	
0001A		Filter Media from Filters of HVAC - HVAC Servicing Chrysler Hall North	
0001B		Filter Media from Filters of HVAC - HVAC Servicing Chrysler Hall North	
0001C		Filter Media from Filters of HVAC - HVAC Servicing Chrysler Hall North	
0002A		Filter Media from Filters of HVAC AC #1 - HVAC Servicing Chrysler Hall Tower	
0002B		Filter Media from Filters of HVAC AC #1 - HVAC Servicing Chrysler Hall Tower	
0002C		Filter Media from Filters of HVAC AC #1 - HVAC Servicing Chrysler Hall Tower	
0003A		Filter Media from Filters of HVAC AHU #5 - HVAC Servicing West Leddy Library	
0003B		Filter Media from Filters of HVAC AHU #5 - HVAC Servicing West Leddy Library	
0003C		Filter Media from Filters of HVAC AHU #5 - HVAC Servicing West Leddy Library	
0004A		Filter Media from Filters of HVAC AS-1 - HVAC Servicing Erie Hall	
0004B		Filter Media from Filters of HVAC AS-1 - HVAC Servicing Erie Hall	
0004C		Filter Media from Filters of HVAC AS-1 - HVAC Servicing Erie Hall	
0005A		Filter Media from Filters of HVAC AC-16 - HVAC Servicing Essex Hall	
0005B		Filter Media from Filters of HVAC AC-16 - HVAC Servicing Essex Hall	
0005C		Filter Media from Filters of HVAC AC-16 - HVAC Servicing Essex Hall	
0006A		Filter Media from Filters of HVAC AHU 1A + 1B - HVAC Servicing Penthouse Biology North	
0006B		Filter Media from Filters of HVAC AHU 1A + 1B - HVAC Servicing Penthouse Biology North	
0006C		Filter Media from Filters of HVAC AHU 1A + 1B - HVAC Servicing Penthouse Biology North	

Accepted

Rejected

10-24 10:30
M. Westphal

APPENDIX I
PHASE CONTRAST MICROSCOPY ANALYTICAL RESULTS

PCM Sample #	Time Taken	Duration (min.)	Volume Sampled (L)	Description of sample	Calculated Result (fibres/field)	Result (fibers/ml)
185097	10:30	28	421.1	Occupied sample in Mechanical Room M403 during filter changing	7 / 460	< 0.01
185081	10:40	15	227.7	Area sample inside HVAC AS1 during filter changing	14 / 850	< 0.01
185093	11:30	15	225.6	Occupied sample in North Penthouse Mechanical Room during filter changes	11 / 858	< 0.01
185092	11:35	8	121.4	Area sample inside HVAC unit AC-16 during filter changing	16 / 1595	< 0.01
185095	13:06	7	106.3	Occupied sample in Basement Mechanical Room, directly at filter access hatch, during filter changing	12 / 1821	< 0.01
185091	13:51	32	485.8	Occupied in North Penthouse during filter changing	10 / 398	< 0.01
185100	13:55	26	391.0	Area sample inside HVAC Unit AHU 1 A&B during filter changing	8 ½ / 495	< 0.01
185094	15:20	27	406.1	Occupied sample in Chrysler Hall Tower during filter changing	5 / 476	< 0.01
185098	15:25	20	303.6	Area sample inside HVAC Unit AC 1&2 during filter changing	8 / 638	< 0.01

APPENDIX II
FILTER MEDIA BULK SAMPLE ANALYTICAL RESULTS

Pinchin Environmental Asbestos Laboratory

Certificate of Analysis

Project Name:	University of Windsor, Various Campus Buildings		
Project No.:	60427		
Prepared For:	T. Manning	Date Received:	October 15, 2010
	G. Manning	Date Analyzed:	October 25, 2010
Lab Reference No.:	b75974	# Samples submitted:	15
Analyst(s):	A. Di Giulio	# Phases analyzed:	15

Method of Analysis:

EPA 600/R-93/116 - Method for the Determination of Asbestos in Bulk Building Materials dated July, 1993

Bulk samples are checked visually and scanned under a stereomicroscope. Slides are prepared and observed under a Polarized Light Microscope (PLM) at magnifications of 40X, 100X or 400X as appropriate. Asbestos fibres are identified by a combination of morphology, colour, refractive index, extinction, sign of elongation, birefringence and dispersion staining colours. A visual estimate is made of the percentage of asbestos present. The percentage range category reported reflects the level of uncertainty of the method for estimating quantities of asbestos in bulk samples. A reported concentration of less than (<) the regulatory threshold (see chart below) indicates the presence of confirmed asbestos in trace quantities, limited to only a few fibres or fibre bundles in an entire sample. This method complies with all provincial regulatory requirements (NIOSH 9002, I.R.S.S.T. 244-2). Multiple phases within a sample are analyzed separately.

Provincial Jurisdiction	Regulatory Threshold	Provincial Jurisdiction	Regulatory Threshold
Ontario	0.5%	Manitoba	0.1% friable 1% non-friable
Quebec	0.1%	Saskatchewan	Unstated, likely 1.0%
Alberta, British Columbia, NWT, Yukon, Nunavut	1%	Atlantic Provinces	1%

All bulk samples submitted to this laboratory for asbestos analysis are retained for a minimum of three months. Samples may be retrieved, upon request, for re-examination at any time during that period.

Pinchin Environmental Ltd. is accredited by the National Institute of Standards and Technology, National Voluntary Laboratory Accreditation Program (NVLAP Lab Code 101270-0 and 200795-0) for selected test methods for the identification of asbestos in bulk samples and meets all requirements of ISO/IEC 17025:2005 and relevant requirements of ISO 9002:1994.

This report relates only to the items tested.

NOTE: This test report may not be reproduced, except in full, without the written approval of the laboratory. The client may not use this report to claim product endorsement by NVLAP or any agency of the U.S. Government. This report is valid only when signed in blue ink by the analyst. Vinyl asbestos floor tiles contain very fine fibres of asbestos and may be missed by some laboratories using the PLM method. Internal verification studies performed by Pinchin indicate that the chance of missing asbestos in floor tiles is no higher than about 2%. Supporting laboratory documentation is available upon request.

Pinchin Environmental Asbestos Laboratory

Certificate of Analysis

Project Name: University of Windsor, Various Campus Buildings
Project No.: 60427
Prepared For: T. Manning
G. Manning
Lab Reference No.: b75974
Date Analyzed: October 25, 2010

BULK SAMPLE ANALYSIS

SAMPLE IDENTIFICATION	SAMPLE DESCRIPTION	% COMPOSITION (VISUAL ESTIMATE)		
		ASBESTOS	OTHER	
B-001A M, AS-1, FILTER, Filter media from filters of HVAC Unit AS-1 in Erie Hall 4th Floor Mechanical Room M403	Homogeneous, grey, dust.	None Detected	Cellulose Mineral Wool Fibreglass Synthetic Fibres Non-Fibrous Material	0.5-5% 0.5-5% 0.5-5% 0.5-5% > 75%
Comments:	This sample is small in size and present on the surface of a synthetic fibre filter media.			
B-001B M, AS-1, FILTER, Filter media from filters of HVAC Unit AS-1 in Erie Hall 4th Floor Mechanical Room M403	Homogeneous, grey, dust.	Chrysotile < 0.5%	Cellulose Synthetic Fibres Non-Fibrous Material	0.5-5% 0.5-5% > 75%
Comments:	This sample is small in size and present on the surface of a synthetic fibre filter media.			
B-001C M, AS-1, FILTER, Filter media from filters of HVAC Unit AS-1 in Erie Hall 4th Floor Mechanical Room M403	Homogeneous, grey, dust.	Chrysotile < 0.5%	Cellulose Mineral Wool Fibreglass Synthetic Fibres Non-Fibrous Material	0.5-5% 0.5-5% < 0.5% 0.5-5% > 75%
Comments:	This sample is present on the surface of a synthetic fibre filter media.			
B-002A M, AS-16, FILTER, Filter media from filters of HVAC Unit AS-16 in Essex Hall 4th Floor Penthouse Mechanical Room	Homogeneous, grey, dust.	None Detected	Cellulose Mineral Wool Fibreglass Synthetic Fibres Non-Fibrous Material	5-10% 0.5-5% < 0.5% 0.5-5% > 75%
Comments:	This sample is present on the surface of a synthetic fibre filter media.			



A. DiStilio

Pinchin Environmental Asbestos Laboratory

Certificate of Analysis

Project Name: University of Windsor, Various Campus Buildings
Project No.: 60427
Prepared For: T. Manning
G. Manning
Lab Reference No.: b75974
Date Analyzed: October 25, 2010

BULK SAMPLE ANALYSIS

SAMPLE IDENTIFICATION	SAMPLE DESCRIPTION	% COMPOSITION (VISUAL ESTIMATE)		
		ASBESTOS	OTHER	
B-002B M, AS-16, FILTER, Filter media from filters of HVAC Unit AS-16 in Essex Hall 4th Floor Penthouse Mechanical Room	Homogeneous, grey, dust.	None Detected	Cellulose Mineral Wool Fibreglass Synthetic Fibres Non-Fibrous Material	5-10% < 0.5% < 0.5% 0.5-5% > 75%
Comments:	This sample is present on the surface of a synthetic fibre filter media.			
B-002C M, AS-16, FILTER, Filter media from filters of HVAC Unit AS-16 in Essex Hall 4th Floor Penthouse Mechanical Room	Homogeneous, grey, dust.	None Detected	Cellulose Mineral Wool Fibreglass Hair Synthetic Fibres Non-Fibrous Material	5-10% < 0.5% < 0.5% < 0.5% 0.5-5% > 75%
Comments:	This sample is present on the surface of a synthetic fibre filter media.			
B-003A M, AHU #5, FILTER, Filter media from filters of HVAC Unit AHU # 5 in the West Leddy Library Basement Mechanical Room	Homogeneous, grey, dust.	None Detected	Cellulose Synthetic Fibres Non-Fibrous Material	25-50% 25-50% 25-50%
Comments:	This sample is small in size and present on the surface of a synthetic fibre filter media.			
B-003B M, AHU #5, FILTER, Filter media from filters of HVAC Unit AHU # 5 in the West Leddy Library Basement Mechanical Room	Homogeneous, grey, dust.	None Detected	Cellulose Synthetic Fibres Hair Non-Fibrous Material	25-50% 25-50% < 0.5% 25-50%
Comments:	This sample is small in size and present on the surface of a synthetic fibre filter media.			



Pinchin Environmental Asbestos Laboratory
Certificate of Analysis

A. DiStilio

Pinchin Environmental Asbestos Laboratory Certificate of Analysis

Project Name: University of Windsor, Various Campus Buildings
Project No.: 60427
Prepared For: T. Manning
G. Manning
Lab Reference No.: b75974
Date Analyzed: October 25, 2010

BULK SAMPLE ANALYSIS

SAMPLE IDENTIFICATION	SAMPLE DESCRIPTION	% COMPOSITION (VISUAL ESTIMATE)	
		ASBESTOS	OTHER
B-003C M, AHU #5, FILTER, Filter media from filters of HVAC Unit AHU # 5 in the West Leddy Library Basement Mechanical Room	Homogeneous, grey, dust.	None Detected	Cellulose 50-75% Synthetic Fibres 25-50% Non-Fibrous Material 5-10%
Comments:	This sample is small in size and present on the surface of a synthetic fibre filter media.		
B-004A M, AHU 1A&B, FILTER, Filter media from filters of HVAC Unit AHU 1A & B in the Biology Building North Penthouse	Homogeneous, grey, dust.	None Detected	Cellulose 5-10% Mineral Wool 0.5-5% Fibreglass 0.5-5% Synthetic Fibres 5-10% Non-Fibrous Material 50-75%
Comments:	This sample is present on the surface of a synthetic fibre filter media.		
B-004B M, AHU 1A&B, FILTER, Filter media from filters of HVAC Unit AHU 1A & B in the Biology Building North Penthouse	Homogeneous, grey, dust.	None Detected	Cellulose 25-50% Mineral Wool 0.5-5% Fibreglass 0.5-5% Synthetic Fibres 5-10% Hair < 0.5% Non-Fibrous Material 50-75%
Comments:	This sample is present on the surface of a synthetic fibre filter media.		
B-004C M, AHU 1A&B, FILTER, Filter media from filters of HVAC Unit AHU 1A & B in the Biology Building North Penthouse	Homogeneous, grey, dust.	None Detected	Cellulose 5-10% Mineral Wool 0.5-5% Fibreglass 0.5-5% Synthetic Fibres 5-10% Hair < 0.5% Non-Fibrous Material 50-75%
Comments:	This sample is present on the surface of a synthetic fibre filter media.		



Pinchin Environmental Asbestos Laboratory
Certificate of Analysis

A. DiStilio

Pinchin Environmental Asbestos Laboratory

Certificate of Analysis

Project Name: University of Windsor, Various Campus Buildings
 Project No.: 60427
 Prepared For: T. Manning
 G. Manning
 Lab Reference No.: b75974
 Date Analyzed: October 25, 2010

BULK SAMPLE ANALYSIS

SAMPLE IDENTIFICATION	SAMPLE DESCRIPTION	% COMPOSITION (VISUAL ESTIMATE)	
		ASBESTOS	OTHER
B-005A M, AC 1&2, FILTER, Filter media from filters of HVAC Unit AC 1 & 2 in the Chrysler Hall Tower	Homogeneous, grey, dust.	None Detected	Cellulose 0.5-5% Mineral Wool 0.5-5% Fibreglass < 0.5% Synthetic Fibres 5-10% Non-Fibrous Material > 75%
Comments:	This sample is present on the surface of a synthetic fibre filter media.		
B-005B M, AC 1&2, FILTER, Filter media from filters of HVAC Unit AC 1 & 2 in the Chrysler Hall Tower	Homogeneous, grey, dust.	None Detected	Cellulose 0.5-5% Mineral Wool 0.5-5% Fibreglass < 0.5% Synthetic Fibres 5-10% Non-Fibrous Material > 75%
Comments:	This sample is present on the surface of a synthetic fibre filter media.		
B-005C M, AC 1&2, FILTER, Filter media from filters of HVAC Unit AC 1 & 2 in the Chrysler Hall Tower	Homogeneous, grey, dust.	None Detected	Cellulose 0.5-5% Mineral Wool < 0.5% Fibreglass < 0.5% Synthetic Fibres 0.5-5% Non-Fibrous Material > 75%
Comments:	This sample is present on the surface of a synthetic fibre filter media.		



Pinchin Environmental Asbestos Laboratory
Certificate of Analysis

A. DiStilio

November 14, 2010

University of Windsor
401 Sunset Avenue
Windsor, Ontario
N9B 3P4

Email: danc@uwindsor.ca

Attention: **Mr. Danny Castellan**
Manager, Facility Planning, Renovations and Construction

Re: **Summary of Results Letter-Air Monitoring During HVAC Filter Change**
Various University of Windsor Campus Buildings
Pinchin File Number 60427

Pinchin Environmental Ltd. (Pinchin) was retained by the University of Windsor to collect bulk samples of the used HVAC filter media and to perform air monitoring during routine filter changes in various campus buildings where asbestos-containing sprayed fireproofing is present.

Currently Ontario Regulation 278/05 contains a clause which can be problematic for building owners and operators when buildings are sprayed with asbestos-containing materials (ACM). This clause reads as follows:

- Section 12 (3) 10 “Cleaning or removing filters used in air handling equipment in a building that has sprayed fireproofing that is asbestos-containing material” is a Type 2 operation.

1.0 Objective

The objective of the sampling was to use Section 23 of Ontario Regulation 278/05 to vary the procedures in Section 12(3)10. Section 23 allows an employer to vary a measure or procedure required by the Regulation if the revised measure affords at least equal protection for the worker **and** the employer gives written notice to the joint health and safety committee for the workplace. By performing our testing and evaluation, Pinchin hopes to achieve the following outcomes in regard to cleaning and removing filters:

- Prove that the filters are not asbestos waste as defined by Regulation 347 and the Ministry of the Environment. This will allow the waste to be removed as non-hazardous industrial waste.
- Reduce some of the Type 2 personal protective equipment and site isolation procedures required for filter changes.

2.0 Description of Services

The following is a brief summary of the work performed:

- Collected and analyzed nine (9) phase contrast microscopy (PCM) air samples and fifteen (15) bulk filter media samples, during the HVAC unit filter changes in the following campus buildings:
 - Lambton/Erie Hall
 - Essex Hall
 - West Leddy Library
 - Biology Building
 - Chrysler Hall Tower
- The PCM air samples were collected both as occupied samples in the room containing the HVAC equipment and as area samples inside the HVAC equipment during filter changes.
- Analysed all samples by Phase Contrast Microscopy (PCM) method, as specified in Section 18(6) of O. Reg. 278/05. Analysis of PCM samples will be performed by an IRSST registered analyst.
- Three (3) bulk filter media samples were collected inside each of the five HVAC units for determination of asbestos content.

Tina Manning, of Pinchin Environmental collected the bulk filter media samples and performed the air monitoring during regular scheduled filter changes on October 13, 2010.

3.0 Description of Types of Air Samples

The types of Air Samples that were collected correspond to the categories described as follows:

Area	Sample collected inside the asbestos work area during Type 2 operations. Gives a good indication of the amount of airborne asbestos present inside an abatement worksite during asbestos removal. Aids in determination of worker exposure level and ensures airborne fibre concentrations do not exceed the respirator protection factor.
Occupied	Sample collected at some distance from the Asbestos Work Area to document "clean" conditions at locations occupied by staff, tenants, or the public.

4.0 Analysis

The PCM air samples were collected through a high volume air sampling pump connected to a standard PCM air cassette. The air monitoring and analysis was performed in accordance with the National Institute of Occupational Safety and Health (NIOSH) Method 7400 (analysis by Phase Contrast Microscopy (PCM)). The only variation related to the collection of a lower volume of air collected (due to the time constraint to collect the samples) however this was compensated for by counting additional sample fields during analysis. Analysis of additional fields to obtain a lower limit of quantitation is a commonly used method to provide a lower limit of quantitation when larger volumes of air cannot be collected. Lower volumes of air must on occasions be utilized due to the presence of other (non-asbestos) dusts which prevent collection of large volumes of air. It may also be required when the work operation is short and it is not possible to collect large air volumes.

Analysis of PCM samples was be performed by Ron Downs, who is accredited by the US American Industrial Hygiene Association Asbestos Analyst Registry or the Institut de recherche Robert-Sauvé en santé et en sécurité du travail (IRSST) registered analyst program.

The bulk samples of HVAC filter media collected for asbestos identification will be analyzed at the Pinchin Laboratory in Mississauga or Ottawa. Preliminary identification of asbestos fibres was made using polarized light microscopy, with confirmation of the presence and type of asbestos by dispersion staining optical microscopy. The analysis was performed in accordance with Test Method EPA/600/R-93/116: Method for the Determination of Asbestos in Bulk Building Materials, July 1993. Pinchin is certified under the National Voluntary Laboratory Accreditation Program (NVLAP) to perform asbestos analysis of bulk samples. The samples will be compared to the MOL criteria of 0.5% asbestos content, to determine if the sample should be considered an “asbestos-containing material” and thus subject to the requirements of the regulation. Results have been presented in Appendix II.

Analysis was not completed using a *stop positive* method, as results from all samples were requested for evaluation purposes. Effectively, if $>0.5\%$ asbestos is noted, none-detected results in the same group would not override the Regulatory requirement of stop positive analysis.

3.0 Results

Air Sampling:

The nine (9) samples consisted of four area samples collected inside the HVAC units and five occupied samples collected in the room containing the HVAC equipment. Additional fields on all samples were-counted as required to reduce the Quantitation Limit (QL) to 0.01 fibres per millilitre (f/ml) of air. This was necessary as the duration of the filter change operation is quite short, and it is not technically possible to collect a large volume of air in such a short duration.

Calculated results (fibres/fields) have also been included in the analytical table presented in Appendix II for reference, although the QL is the reportable value. Calculated values have been included to demonstrate the extremely low airborne fibre concentration present in the samples.

All sample results were well below 0.01 f/ml of air and meet the requirements of the air monitoring section of the Procedure and the Appendix A agreement with the MOL.

Analytical results and fibre counts are presented in Appendix I for reference.

Sampling of HVAC Filter Media:

Three (3) bulk samples of the filter media were collected in each of the five (5) HVAC units involved in the testing procedures, for a total of fifteen (15) samples collected. Bulk samples were collected in the following HVAC units found in the following campus buildings:

- HVAC Unit AS-1 in Erie Hall 4th Floor Mechanical Room M403
- HVAC Unit AC-16 in Essex Hall 4th Floor Penthouse Mechanical Room
- HVAC Unit AHU # 5 in the West Leddy Library Basement Mechanical Room
- HVAC Unit AHU 1A & 1B in the Biology Building North Penthouse
- HVAC Unit AC 1 & 2 in the Chrysler Hall Tower

Results from all fifteen (15) bulk samples collected of the used filter media found inside the above five (5) HVAC units indicated that no asbestos was found. Although two of the samples (B-001 A-C) collected from the filter media in Unit AS-1 in Erie Hall 4th Floor Mechanical Room M403 indicated that a trace amount of chrysotile asbestos (<0.5 %) was present this minute quantity of asbestos fibres and is to be considered as non asbestos according to O. Reg 278.05.

Analytical results and fibre counts are presented in Appendix II for reference.

4.0. Recommendations

All Phase Contrast Microscopy (PCM) air samples collected were well below the quantitative limit of 0.01 f/ml which indicates that at no time, during the filter change procedures, was elevated airborne asbestos fibres present. With the agreement of the University of Windsor Joint Health and Safety Committee, reduction of the Type 2 personal protective equipment (PPE) and site isolation requirement; as required by O. Reg 278/05 (during filter changes in buildings with asbestos-containing sprayed fireproofing) can be made.

All bulk samples collected of the used HVAC filter media confirms that no asbestos was detected in the media. These results prove that the filters are not asbestos waste as defined by Regulation 347 and the Ministry of the Environment. This will allow the waste to be removed as non-hazardous industrial waste.

The above findings, conclusions and our recommendations should be provided to the Joint Health and Safety Committee, and we recommend that they also be communicated to the Ontario Ministry of Labour for their review and agreement.

5.0 Limitations

This report is limited to the bulk and air sampling work performed during HVAC filter changes in the above mentioned buildings known to have asbestos-containing sprayed fire-proofing.

The work performed by Pinchin was conducted in accordance with generally accepted engineering or scientific practices current in this geographical area at the time the work was performed. The Client acknowledges that subsurface and concealed conditions may vary from those encountered or inspected. Pinchin can only comment on the environmental conditions observed on the date(s) the assessment is performed. The work is limited to those materials or areas of concern identified by the Client or outlined in our proposal. Other areas of concern may exist but were not investigated within the scope of this assignment.

Pinchin makes no other representations whatsoever, including those concerning the legal significance of its findings, or as to other legal matters touched on in this report, including, but not limited to, the application of any law to the facts set forth herein. With respect to regulatory compliance issue, regulatory statutes are subject to interpretation and these interpretations may change over time. Pinchin accepts no responsibility for consequential financial effects on transactions or property values, or requirements for follow-up actions and costs.

No warranty is either expressed or implied, or intended by this agreement or by furnishing oral or written reports or findings. The liability of Pinchin or its staff will be limited to the lesser of the fees paid or actual damages incurred by the Client. Pinchin will not be responsible for any consequential or indirect damages. Pinchin will only be liable for damages resulting from negligence of Pinchin. Pinchin will not be liable for any losses or damage if client has failed, within a period of (2) years following the date upon which the claim is discovered within the meaning of the Limitations Act, 2002 (Ontario), to commence legal proceedings against Consultant to recover such losses or damage.

Information provided by Pinchin is intended for Client use only. Pinchin will not provide results or information to any party other than the Client, unless the Client, in writing, requests information to be provided to a third party or unless disclosure by Pinchin is required by law. Any use by a third party, of reports or documents authored by Pinchin, or any reliance by a third party on or decisions made by a third party based on the findings described in said documents, is the sole responsibility of such third parties. Pinchin accepts no responsibility for damages suffered by any third party as a result of decisions made or actions conducted.

Closure

Thank you for the opportunity to prepare this report.

Should you have any questions, please contact Tina Manning at 519-564-3078.

Yours truly,

Pinchin Environmental Ltd.

Prepared by:



per: Tina Manning, PMP, LEED AP
Operations Manager
Hazardous Materials Group
tmanning@pinchinsw.com

c

Reviewed by:



per: Graham Manning, CET
Regional Manager
Hazardous Materials Group
gmanning@pinchinsw.com

APPENDIX I
PHASE CONTRAST MICROSCOPY ANALYTICAL RESULTS

PCM Sample #	Time Taken	Duration (min.)	Volume Sampled (L)	Description of sample	Calculated Result (fibres/field)	Result (fibers/ml)
185097	10:30	28	421.1	Occupied sample in Mechanical Room M403 during filter changing	7 / 460	< 0.01
185081	10:40	15	227.7	Area sample inside HVAC AS1 during filter changing	14 / 850	< 0.01
185093	11:30	15	225.6	Occupied sample in North Penthouse Mechanical Room during filter changes	11 / 858	< 0.01
185092	11:35	8	121.4	Area sample inside HVAC unit AC-16 during filter changing	16 / 1595	< 0.01
185095	13:06	7	106.3	Occupied sample in Basement Mechanical Room, directly at filter access hatch, during filter changing	12 / 1821	< 0.01
185091	13:51	32	485.8	Occupied in North Penthouse during filter changing	10 / 398	< 0.01
185100	13:55	26	391.0	Area sample inside HVAC Unit AHU 1 A&B during filter changing	8 ½ / 495	< 0.01
185094	15:20	27	406.1	Occupied sample in Chrysler Hall Tower during filter changing	5 / 476	< 0.01
185098	15:25	20	303.6	Area sample inside HVAC Unit AC 1&2 during filter changing	8 / 638	< 0.01

APPENDIX II
FILTER MEDIA BULK SAMPLE ANALYTICAL RESULTS

Pinchin Environmental Asbestos Laboratory

Certificate of Analysis

Project Name:	University of Windsor, Various Campus Buildings		
Project No.:	60427		
Prepared For:	T. Manning	Date Received:	October 15, 2010
	G. Manning	Date Analyzed:	October 25, 2010
Lab Reference No.:	b75974	# Samples submitted:	15
Analyst(s):	A. Di Giulio	# Phases analyzed:	15

Method of Analysis:

EPA 600/R-93/116 - Method for the Determination of Asbestos in Bulk Building Materials dated July, 1993

Bulk samples are checked visually and scanned under a stereomicroscope. Slides are prepared and observed under a Polarized Light Microscope (PLM) at magnifications of 40X, 100X or 400X as appropriate. Asbestos fibres are identified by a combination of morphology, colour, refractive index, extinction, sign of elongation, birefringence and dispersion staining colours. A visual estimate is made of the percentage of asbestos present. The percentage range category reported reflects the level of uncertainty of the method for estimating quantities of asbestos in bulk samples. A reported concentration of less than (<) the regulatory threshold (see chart below) indicates the presence of confirmed asbestos in trace quantities, limited to only a few fibres or fibre bundles in an entire sample. This method complies with all provincial regulatory requirements (NIOSH 9002, I.R.S.S.T. 244-2). Multiple phases within a sample are analyzed separately.

Provincial Jurisdiction	Regulatory Threshold	Provincial Jurisdiction	Regulatory Threshold
Ontario	0.5%	Manitoba	0.1% friable 1% non-friable
Quebec	0.1%	Saskatchewan	Unstated, likely 1.0%
Alberta, British Columbia, NWT, Yukon, Nunavut	1%	Atlantic Provinces	1%

All bulk samples submitted to this laboratory for asbestos analysis are retained for a minimum of three months. Samples may be retrieved, upon request, for re-examination at any time during that period.

Pinchin Environmental Ltd. is accredited by the National Institute of Standards and Technology, National Voluntary Laboratory Accreditation Program (NVLAP Lab Code 101270-0 and 200795-0) for selected test methods for the identification of asbestos in bulk samples and meets all requirements of ISO/IEC 17025:2005 and relevant requirements of ISO 9002:1994.

This report relates only to the items tested.

NOTE: This test report may not be reproduced, except in full, without the written approval of the laboratory. The client may not use this report to claim product endorsement by NVLAP or any agency of the U.S. Government. This report is valid only when signed in blue ink by the analyst. Vinyl asbestos floor tiles contain very fine fibres of asbestos and may be missed by some laboratories using the PLM method. Internal verification studies performed by Pinchin indicate that the chance of missing asbestos in floor tiles is no higher than about 2%. Supporting laboratory documentation is available upon request.

Pinchin Environmental Asbestos Laboratory

Certificate of Analysis

Project Name: University of Windsor, Various Campus Buildings
Project No.: 60427
Prepared For: T. Manning
G. Manning
Lab Reference No.: b75974
Date Analyzed: October 25, 2010

BULK SAMPLE ANALYSIS

SAMPLE IDENTIFICATION	SAMPLE DESCRIPTION	% COMPOSITION (VISUAL ESTIMATE)		
		ASBESTOS	OTHER	
B-001A M, AS-1, FILTER, Filter media from filters of HVAC Unit AS-1 in Erie Hall 4th Floor Mechanical Room M403	Homogeneous, grey, dust.	None Detected	Cellulose Mineral Wool Fibreglass Synthetic Fibres Non-Fibrous Material	0.5-5% 0.5-5% 0.5-5% 0.5-5% > 75%
Comments:	This sample is small in size and present on the surface of a synthetic fibre filter media.			
B-001B M, AS-1, FILTER, Filter media from filters of HVAC Unit AS-1 in Erie Hall 4th Floor Mechanical Room M403	Homogeneous, grey, dust.	Chrysotile < 0.5%	Cellulose Synthetic Fibres Non-Fibrous Material	0.5-5% 0.5-5% > 75%
Comments:	This sample is small in size and present on the surface of a synthetic fibre filter media.			
B-001C M, AS-1, FILTER, Filter media from filters of HVAC Unit AS-1 in Erie Hall 4th Floor Mechanical Room M403	Homogeneous, grey, dust.	Chrysotile < 0.5%	Cellulose Mineral Wool Fibreglass Synthetic Fibres Non-Fibrous Material	0.5-5% 0.5-5% < 0.5% 0.5-5% > 75%
Comments:	This sample is present on the surface of a synthetic fibre filter media.			
B-002A M, AS-16, FILTER, Filter media from filters of HVAC Unit AS-16 in Essex Hall 4th Floor Penthouse Mechanical Room	Homogeneous, grey, dust.	None Detected	Cellulose Mineral Wool Fibreglass Synthetic Fibres Non-Fibrous Material	5-10% 0.5-5% < 0.5% 0.5-5% > 75%
Comments:	This sample is present on the surface of a synthetic fibre filter media.			



A. DiStilio

Pinchin Environmental Asbestos Laboratory

Certificate of Analysis

Project Name: University of Windsor, Various Campus Buildings
 Project No.: 60427
 Prepared For: T. Manning
 G. Manning
 Lab Reference No.: b75974
 Date Analyzed: October 25, 2010

BULK SAMPLE ANALYSIS

SAMPLE IDENTIFICATION	SAMPLE DESCRIPTION	% COMPOSITION (VISUAL ESTIMATE)	
		ASBESTOS	OTHER
B-002B M, AS-16, FILTER, Filter media from filters of HVAC Unit AS-16 in Essex Hall 4th Floor Penthouse Mechanical Room	Homogeneous, grey, dust.	None Detected	Cellulose 5-10% Mineral Wool < 0.5% Fibreglass < 0.5% Synthetic Fibres 0.5-5% Non-Fibrous Material > 75%
Comments:	This sample is present on the surface of a synthetic fibre filter media.		
B-002C M, AS-16, FILTER, Filter media from filters of HVAC Unit AS-16 in Essex Hall 4th Floor Penthouse Mechanical Room	Homogeneous, grey, dust.	None Detected	Cellulose 5-10% Mineral Wool < 0.5% Fibreglass < 0.5% Hair < 0.5% Synthetic Fibres 0.5-5% Non-Fibrous Material > 75%
Comments:	This sample is present on the surface of a synthetic fibre filter media.		
B-003A M, AHU #5, FILTER, Filter media from filters of HVAC Unit AHU # 5 in the West Leddy Library Basement Mechanical Room	Homogeneous, grey, dust.	None Detected	Cellulose 25-50% Synthetic Fibres 25-50% Non-Fibrous Material 25-50%
Comments:	This sample is small in size and present on the surface of a synthetic fibre filter media.		
B-003B M, AHU #5, FILTER, Filter media from filters of HVAC Unit AHU # 5 in the West Leddy Library Basement Mechanical Room	Homogeneous, grey, dust.	None Detected	Cellulose 25-50% Synthetic Fibres 25-50% Hair < 0.5% Non-Fibrous Material 25-50%
Comments:	This sample is small in size and present on the surface of a synthetic fibre filter media.		



Pinchin Environmental Asbestos Laboratory
Certificate of Analysis

A. DiStilio

Pinchin Environmental Asbestos Laboratory Certificate of Analysis

Project Name: University of Windsor, Various Campus Buildings
Project No.: 60427
Prepared For: T. Manning
G. Manning
Lab Reference No.: b75974
Date Analyzed: October 25, 2010

BULK SAMPLE ANALYSIS

SAMPLE IDENTIFICATION	SAMPLE DESCRIPTION	% COMPOSITION (VISUAL ESTIMATE)	
		ASBESTOS	OTHER
B-003C M, AHU #5, FILTER, Filter media from filters of HVAC Unit AHU # 5 in the West Leddy Library Basement Mechanical Room	Homogeneous, grey, dust.	None Detected	Cellulose 50-75% Synthetic Fibres 25-50% Non-Fibrous Material 5-10%
Comments:	This sample is small in size and present on the surface of a synthetic fibre filter media.		
B-004A M, AHU 1A&B, FILTER, Filter media from filters of HVAC Unit AHU 1A & B in the Biology Building North Penthouse	Homogeneous, grey, dust.	None Detected	Cellulose 5-10% Mineral Wool 0.5-5% Fibreglass 0.5-5% Synthetic Fibres 5-10% Non-Fibrous Material 50-75%
Comments:	This sample is present on the surface of a synthetic fibre filter media.		
B-004B M, AHU 1A&B, FILTER, Filter media from filters of HVAC Unit AHU 1A & B in the Biology Building North Penthouse	Homogeneous, grey, dust.	None Detected	Cellulose 25-50% Mineral Wool 0.5-5% Fibreglass 0.5-5% Synthetic Fibres 5-10% Hair < 0.5% Non-Fibrous Material 50-75%
Comments:	This sample is present on the surface of a synthetic fibre filter media.		
B-004C M, AHU 1A&B, FILTER, Filter media from filters of HVAC Unit AHU 1A & B in the Biology Building North Penthouse	Homogeneous, grey, dust.	None Detected	Cellulose 5-10% Mineral Wool 0.5-5% Fibreglass 0.5-5% Synthetic Fibres 5-10% Hair < 0.5% Non-Fibrous Material 50-75%
Comments:	This sample is present on the surface of a synthetic fibre filter media.		



Pinchin Environmental Asbestos Laboratory
Certificate of Analysis

A. DiStilio

Pinchin Environmental Asbestos Laboratory

Certificate of Analysis

Project Name: University of Windsor, Various Campus Buildings
Project No.: 60427
Prepared For: T. Manning
G. Manning
Lab Reference No.: b75974
Date Analyzed: October 25, 2010

BULK SAMPLE ANALYSIS

SAMPLE IDENTIFICATION	SAMPLE DESCRIPTION	% COMPOSITION (VISUAL ESTIMATE)	
		ASBESTOS	OTHER
B-005A M, AC 1&2, FILTER, Filter media from filters of HVAC Unit AC 1 & 2 in the Chrysler Hall Tower	Homogeneous, grey, dust.	None Detected	Cellulose 0.5-5% Mineral Wool 0.5-5% Fibreglass < 0.5% Synthetic Fibres 5-10% Non-Fibrous Material > 75%
Comments:	This sample is present on the surface of a synthetic fibre filter media.		
B-005B M, AC 1&2, FILTER, Filter media from filters of HVAC Unit AC 1 & 2 in the Chrysler Hall Tower	Homogeneous, grey, dust.	None Detected	Cellulose 0.5-5% Mineral Wool 0.5-5% Fibreglass < 0.5% Synthetic Fibres 5-10% Non-Fibrous Material > 75%
Comments:	This sample is present on the surface of a synthetic fibre filter media.		
B-005C M, AC 1&2, FILTER, Filter media from filters of HVAC Unit AC 1 & 2 in the Chrysler Hall Tower	Homogeneous, grey, dust.	None Detected	Cellulose 0.5-5% Mineral Wool < 0.5% Fibreglass < 0.5% Synthetic Fibres 0.5-5% Non-Fibrous Material > 75%
Comments:	This sample is present on the surface of a synthetic fibre filter media.		



Pinchin Environmental Asbestos Laboratory
Certificate of Analysis

A. DiStilio

APPENDIX J Plaster and Drywall Drilling Procedures

University of Windsor
401 Sunset Avenue
Windsor, Ontario N5B 3P4

Re: Type 2 Drilling Procedures – Asbestos Containing Drywall & Plaster

University of Windsor, Renovation Activities
Pinchin File: n/a

The following are the procedures to be followed when drilling holes in known asbestos-containing drywall and plaster, during renovations within University of Windsor campus buildings.

1.0 EQUIPMENT

All tools, supplies and equipment necessary for the safe and effective completion of the work must be on-site before work proceeds.

1.1 Vacuum

A HEPA filtered vacuum must be used to clean-up any debris during the Type 2 drilling in asbestos-containing drywall and plaster walls. HEPA vacuum should be equipped with miscellaneous brushes, fittings, etc. as required to adequately clean all visible dust and debris. Vacuum must not be opened, except by a fully protected worker while within a sealed Type 2 enclosure.

1.2 Personal Protective Equipment (PPE)

The use of a negative pressure non-powered half-face respirator equipped with P100 cartridge filters and protective coveralls shall be mandatory for all work performed within the established Type 2 work area.

1.3 Other Equipment Required

- Labelled asbestos waste bag (6 mil) – for all asbestos waste, disposable suits, plastic for disposal, etc.
- Pump sprayer with misting nozzle or alternative method to wet material before handling.
- “Caution Asbestos Hazard” barrier tape and signage – to identify extent of work area.
- Drill equipped with a local exhaust and attached to a HEPA vacuum.
- Cleaning supplies – i.e. scouring pads, sponges, rags, brushes, buckets, etc.

Pinchin Ltd.
Tilbury, ON

2.0 SITE ACCESS & EGRESS

- Before entering Asbestos Work Area, each worker shall first don an approved respirator with new or tested filters, coveralls and all other personal protective equipment deemed appropriate to the work at hand.
- Before leaving the Asbestos Work Area, remove contamination from protective clothing and equipment using a HEPA vacuum or damp cloth.
- Immediately after exiting the Asbestos Work Area, each worker shall complete the following:
 - Remove contaminated clothing and place it into a labelled asbestos waste container for disposal.
 - Clean contaminated footwear, hard hats, etc., or place into a sealed polyethylene bag for re-use.
 - Wash hands in wash bucket provided for this purpose.
- Following the above, remove respirator then proceed directly to wash station and complete the following:
 - Wash exposed skin and respirator with soap and water.
 - Seal inlet side of respirator filters with tape then remove filters for testing or dispose of as asbestos contaminated waste.

3.0 PREPARATION

- All ventilation openings (HVAC servicing work area) within the work area MUST be sealed off with plastic sheeting, sealed with tape, prior to commencement of drilling activities, to prevent possible contamination to other areas of the building.
- Identify areas in which drilling would occur; this will be the Asbestos Work Area and provide warning for the requirement of protective clothing for anyone entering the space.
- Wherever any non-asbestos dust settled on surfaces throughout the Asbestos Work Area is likely to be disturbed, pre-clean such surfaces using a HEPA vacuum or damp cloth prior to commencing any other work in the area.
- Ensure all additional tools, supplies and equipment necessary for the safe and effective completion of the work has been placed inside the designated Asbestos Work Area prior to commencement.

- Post signs or barrier tape to indicate asbestos hazard and requirement for protective clothing for anyone entering the space.
- Full enclosure not required for Type 2 work using a drill equipped with a HEPA dust collection system; however, a polyethylene drop sheet below low area of drilling is required.

4.0 EXECUTION

4.1 Drilling holes into Drywall or Plaster

- Cover the point to be drilled with tape to prevent edges from crumbling prior to drilling into plaster. Do not allow materials or debris to fall to the floor.
- Cover the entry point with a thick paste such as wallpaper paste. Drill through the paste
- Use wet rags to clean off paste and debris generated
- Remove dust and loose material with a HEPA vacuum or by damp wiping.
- Frequently, and at regular intervals during the work, clean-up dust, waste materials and debris throughout the work area by wet mopping or by HEPA vacuuming.
- At completion of work, decontaminate work area, any equipment, tools and materials used in the work area by wet cleaning or HEPA vacuum.

Should you have any questions or concerns regarding the contents of this letter, please contact Tina Manning at (519) 564.3078.

Yours truly,

Pinchin Ltd.

Prepared by:

Tina Manning, PMP, LEED AP
Operations Manager
Hazardous Materials Group
tmanning@pinchin.com