# ANNEX "A"

# DESIGNATED SUBSTANCE AND DETAILED ASBESTOS BUILDING MATERIAL SURVERY REPORT (ROOM-BY-ROOM SUMMARY AND FLOOR PLAN ONLY)

Final Report

Department of National Defence

# DESIGNATED SUBSTANCES SURVEY

## Building A - 253

## 31 Hangar Road, Borden, Ontario

DCC Project: BN300075

Contract: KN75955

March 18, 2022

Arcadis Project: 30094312

# DESIGNATED SUBSTANCES SURVEY

Building A - 253

31 Hangar Road

Borden, Ontario

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# EXECUTIVE SUMMARY

Arcadis Canada Inc. (Arcadis) was retained by Defence Construction Canada (DCC) on behalf of the Department of National Defence (DND) to conduct a designated substances survey at Building A-253, located at 31 Hanger Road, Borden, Ontario.

The objective of the project was to conduct a designated substances survey to assist DND in meeting their obligations to manage designated substances and hazardous materials as required by DND/CF Asbestos Management Directive (2007) and COHS Regulations Part X, Division II. DND also references Ontario Regulation 278/05 – *Asbestos in Construction Projects and in Buildings and Repair Operations* and the Ontario Regulation 490/09 – Designated Substances.

Building A-253 is a warehouse type building which includes various offices, a meeting room and fabrication area. It is a single-storey, rectangular structure with a gross floor area of 1342.26 $m^2$, flat roof and fixed windows. It was constructed in 1994.

**Table ES-1 Summary of Designated Substances and Hazardous Materials**

| Hazardous Material or Designated Substance | Description of Homogenous Material | Concentration | Location | Estimated Quantity | Condition | Accessibility | Potential Release of Fibers | Action Level | Abatement Requirements | Notes |
|---|---|---|---|---|---|---|---|---|---|---|
| Potential asbestos-containing materials | Various building materials (1) | N/A | Throughout the building | N/A | N/A | N/A | N/A | N/A | N/A | N/A |
| Silica | Various building materials (2) | N/A | Throughout the building | N/A | N/A | N/A | N/A | N/A | N/A | N/A |
| Mercury | Thermostats | N/A | Rooms 101, 102, 104 and 112 | Four | N/A | N/A | N/A | N/A | N/A | N/A |
| PCBs | T12 fluorescent light tubes (to be confirmed by electrician at time of removal) | N/A | Room 113 | N/A | N/A | N/A | N/A | N/A | N/A | N/A |
| ODSs | Deep freezer | N/A | Room 105 | One | N/A | N/A | N/A | N/A | N/A | N/A |
| ODSs | Drink fridges | N/A | Rooms 104 and 105 | Two | N/A | N/A | N/A | N/A | N/A | N/A |
| ODSs | Mini-fridge | N/A | Room 102 | One | N/A | N/A | N/A | N/A | N/A | N/A |

**NOTES:**

(1) Potential asbestos-containing materials observed in the subject building included ceramic tile grout and mortar beds, exterior window caulking and roofing materials.

(2) Materials observed in the subject building which should be considered to contain silica included concrete, concrete block, brick, mortar, drywall, drywall joint compound, grout and mortar bed.

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# ACRONYMS AND ABBREVIATIONS

| | |
|---|---|
| ACM | Asbestos-Containing Material |
| Arcadis | Arcadis Canada Inc. |
| CLC | Canada Labour Code |
| CAF | Canadian Armed Forces |
| COHSR | Canada Occupational Health and Safety Regulations |
| DCC | Defence Construction Canada |
| DND | Department of National Defence |
| DSHMS | Designated Substances and Hazardous Materials Survey |
| HWH | Hot Water Heating |
| MOL | Ministry of Labour |
| OEL | Occupational Exposure Limit |
| OHSA | Occupational Health and Safety Act |
| OSHA | United States Occupational Health and Safety Administration |
| PCBs | Polychlorinated Biphenyls |
| PLM | Polarized Light Microscopy |
| POL | Paints, Oils and Lubricants |
| TEM | Transmission Electron Microscopy |
| UFFI | Urea Formaldehyde Foam Insulation |
| USEPA | United States Environmental Protection Agency |

# 1 INTRODUCTION

Arcadis Canada Inc. (Arcadis) was retained by Defence Construction Canada (DCC) on behalf of the Department of National Defence (DND) to conduct a designated substances survey at Building A-253, located at 31 Hangar Road, Borden, Ontario.

The objective of the project was to conduct a designated substances survey to identify any hazards in order to assist DND in meeting their obligations to manage designated substance and hazardous materials as required by DND/CF Asbestos Management Directive (2007) and COHS Regulations Part X, Division II. DND also references Ontario Regulation 278/05 – *Asbestos in Construction Projects and in Buildings and Repair Operations* and the Ontario Regulation 490/09 – *Designated Substances*.

## 1.1 Scope of Work

The scope of work for the designated substances and hazardous materials survey was based on the DCC Statement of Work (SOW) dated May 20, 2021 and the Arcadis proposal to DCC dated July 19, 2021, and included the following tasks:

1. Submitting a Health and Safety Plan (HASP) prior to commencing field work on the project, and a detailed schedule.

2. Reviewing all reports provided by DCC.

3. Conducting a room-by-room survey of designated substances and hazardous materials (asbestos, UFFI, lead, mercury, chromium, arsenic, silica, PCBs, ozone-depleting substances and biological hazards) in the building. Collecting bulk samples of materials for asbestos analysis and paint chip samples for analysis of arsenic, chromium, lead, mercury and PCBs. Repairing all sample locations.

4. Notifying DCC immediately if any conditions that pose an immediate significant threat to human health or the environment are discovered, such as asbestos debris, suspect mould and animal droppings.

5. Sending samples for laboratory analysis.

6. Preparing and submitting draft and final reports in the format outlined in the SOW. Inputting the survey data into the required fields of the asbestos database and paint chart provided by DCC.

Mr. Dwayne Kellyman and Mr. Viraj Daruwala of Arcadis visited the site on October 13, 2021, to conduct the designated substances survey.

## 1.2 Building Summary Information

Building A-253 is a warehouse type building which includes various offices, a meeting room and fabrication area. It is a single-storey, rectangular structure with a gross floor area of 1342.26 $m^2$, flat roof and fixed windows. It was constructed in 1994.

Exterior finishes include metal sidings. Interior finishes include vinyl floor tiles, concrete, ceramic floor tile, drywall, metal, concrete block, ceramic walls, drywall, ceiling tiles and metal deck ceilings.

## 1.3 Summary of Past Designated Substances Survey Reporting

Arcadis reviewed the Maple Environmental Inc. report entitled Designated Substance and Detailed Asbestos Building Materials Survey Report, dated March 2011 in preparing this report.

# 2 BACKGROUND INFORMATION ON DESIGNATED SUBSTANCES AND HAZARDOUS MATERIALS

***Canada Labour Code***

Requirements related to disclosing the presence of hazardous substances (including designated substances) in federal government buildings are specified in Part II of the Canada Labour Code, sections 125(1)y and 125(1)(z.14), which state that employers shall:

- "*ensure that the activities of every person granted access to the workplace do not endanger the health and safety of employees [Section y]; and*
- *take all reasonable care to ensure that all of the persons granted access to the workplace, other than the employer's employees, are informed of every known or foreseeable health or safety hazard to which they are likely to be exposed in the workplace [Section z.14]*".

***Canada Occupational Health and Safety Regulations***

The requirement for employers to keep and maintain a record of all hazardous substances that are used, produced, handled or stored for use in the work place and the criteria to employ in carrying out an investigation into potential exposure to a hazardous substance are specified in Part X – Hazardous Substances – of the Canada Occupational Health and Safety Regulations.

***Ontario Occupational Health and Safety Act (OHSA)***

A decision of the Ontario Superior Court of Justice [(1)] confirms that when construction or redevelopment work is undertaken by a company whose primary activity is construction or redevelopment work at the site of a federally-regulated employer, the provincial health and safety laws will apply. The *Ontario Occupational Health and Safety Act* and regulations made thereunder would therefore apply to any construction work undertaken at the subject site.

The *Occupational Health and Safety Act* (*OHSA*) sets out, in very general terms, the duties of employers and others to protect workers from health and safety hazards on the job. These duties include, but are not limited to:

- taking all reasonable precautions to protect the health and safety of workers [clause 25(2)(h)];
- ensuring that equipment, materials and protective equipment are maintained in good condition [clause 25(1)(b)];
- providing information, instruction and supervision to protect worker health and safety [clause 25(2)(a)]; and

(1) Gowlings OHS Law Report – December 2007.

- acquainting a worker or a person in authority over a worker with any hazard in the work and in the handling, storage, use, disposal and transport of any article, device, equipment or a biological, chemical or physical agent [clause 25(2)(d)].

In addition, Section 30 of the OHSA deals with the presence of designated substances on construction projects. Compliance with the OHSA and its regulations requires action to be taken where there is a designated substance hazard on a construction project.

Section 30 of the OHSA requires the owner of a project to determine if designated substances are present on a project and, if so, to inform all potential contractors as part of the bidding process. Contractors who receive this information are to pass it onto other contractors and subcontractors who are bidding for work on the project.

***Regulation for Construction Projects, O.Reg. 213/91***

The Regulation for Construction Projects, O.Reg. 213/91, applies to all construction projects. The following sections of the regulation would apply to situations where there is the potential for workers to be exposed to designated substances:

| | | |
|---|---|---|
| Section 14 | (5) | A competent person shall perform tests and observations necessary for the detection of hazardous conditions on a project. |
| Section 21 | (1) | A worker shall wear such protective clothing and use such personal protective equipment or devices as are necessary to protect the worker against the hazards to which the worker may be exposed. |
| | (2) | A worker's employer shall require the worker to comply with subsection (1). |
| | (3) | A worker required to wear personal protective clothing or use personal protective equipment or devices shall be adequately instructed and trained in the care and use of the clothing, equipment or device before wearing or using it. |
| Section 30 | | Workers who handle or use substances likely to endanger their health shall be provided with washing facilities with clean water, soap and individual towels. |
| Section 46 | (1) | A project shall be adequately ventilated by natural or mechanical means, if a worker may be injured by inhaling a noxious dust or fume. |
| | (2) | If it is not practicable to provide natural or mechanical ventilation in the circumstances described in clause (1)(a), respiratory protective equipment suitable for the hazard shall be provided and be used by the workers. |
| Section 59 | | If the dissemination of dust is a hazard to a worker, the dust shall be adequately controlled or each worker who may be exposed to the hazard shall be provided with adequate personal protective equipment. |

***Regulation for Designated Substances (O.Reg. 490/09)***

The Designated Substance Regulation (O.Reg. 490/09) specifies occupational exposure limits (OELs) for eleven designated substances in Ontario (asbestos, lead, mercury, silica, vinyl chloride, acrylonitrile, isocyanates, benzene, arsenic, ethylene oxide and coke oven emissions) and requires an assessment and a control program to ensure compliance with these OELs.

Although O.Reg. 490/09 and the OELs do not apply to an employer on a construction project, or to their workers at the project (O.Reg.490/09, Section 14, Exception – Construction), employers still have a responsibility to protect the health of their workers and to comply with the OHSA and other applicable regulations. Section 25(2)(h) of the OHSA requires that employers take "every precaution reasonable in the circumstances for the protection of a worker".

Other regulatory requirements (and guidelines) which apply to control of exposure to designated substances and hazardous materials are referenced in the sections below.

## 2.1 Asbestos

Asbestos has been widely used in buildings, both in friable applications (materials which can be crumbled, pulverized or powdered by hand pressure, when dry) such as pipe and tank insulation, sprayed-on fireproofing and acoustic texture material, and in non-friable manufactured products such as floor tile, gaskets, cement board and so on. The use of asbestos in friable applications was curtailed around the mid-1970s. The use of asbestos in certain non-friable materials continued beyond the mid-1970s. The import, sale or use of asbestos products was banned in Canada, effective December 30, 2018.

### 2.1.1 Provincial Government Requirements

Control of exposure to asbestos is governed in Ontario by Regulation 278/05 – *Designated Substance – Asbestos on Construction Projects and in Buildings and Repair Operations*. Disposal of asbestos waste (friable and non-friable materials) is governed by Ontario Regulation 278/05 and by Ontario Regulation 347, Waste Management – General. O.Reg. 278/05 classifies asbestos work operations into three types (Type 1, 2 and 3), and specifies procedures to be followed in conducting asbestos abatement work.

O. Reg. 278/05 prescribes certain requirements for asbestos management in buildings. For on-going asbestos management in buildings, building owners are required to:

- prepare (and keep on the premises) a record (i.e., asbestos survey report) of the locations of all friable and non-friable asbestos-containing materials in a building;
- inspect asbestos-containing materials at reasonable intervals to determine their condition and update the asbestos survey record at least once in each 12-month period, and whenever asbestos-containing material is removed or discovered;

- give any person who is an occupier[2] of the building written notice of any information in the asbestos survey record that relates to the area occupied by the person;
- give contractors written notice of the information in the asbestos survey record if the work to be carried out by contractor may involve asbestos-containing material or may be carried out in close proximity to and may disturb asbestos-containing material;
- advise staff of the information in the asbestos survey record, if work is to be performed in a facility that contains asbestos-containing material;
- provide training for staff based on the responsibilities and duties to be undertaken in relation to asbestos management;
- clean up any fallen asbestos-containing fireproofing or acoustical or thermal insulation (if the material is being disturbed so that exposure to the material is likely to occur);
- repair, seal, remove or permanently enclose asbestos-containing fireproofing as thermal insulation if it is readily apparent that material will continue to fall because of deterioration; and,
- perform work operations which involve disturbance (i.e., cleanup, removal, repair, etc.) of asbestos-containing materials in accordance with the measures and procedures (Type 1, 2 and 3 operations) specified in O. Reg. 278/05.

### 2.1.2 Federal Government Requirements – Canada Occupational Health and Safety Regulations- Hazardous

The Canada Labour Code Part II – Canada Occupational Health and Safety Regulations, Division II – Hazardous Substances Other Than Hazardous Products prescribes requirements for Asbestos Exposure Management Programs.

### 2.1.3 Federal Government Requirements – National Joint Council Directive

The National Joint Council Directive, Part XI – Hazardous Substances – 11.6 Asbestos Management – states:

11.6.1 The employer shall comply with federal, provincial, territorial and municipal regulations, statutes and requirements with respect to asbestos-containing materials (ACM) in any government-owned, managed or leased facilities.

11.6.2 An asbestos management program and code of practice meeting the intent of the appropriate standard shall be followed if material containing asbestos may exist in any building or facility.

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[2] An “occupier” is defined as:

(a) a person who is in physical possession of premises, or
(b) a person who has responsibility for and control over the condition of premises or the activities carried on there, or control over persons allowed to enter the premises.

11.6.3 As a minimum requirement, departments and agencies will comply with Public Works and Government Services Canada Policy DP 057 and Code of Practice on Asbestos Management.

### 2.1.4 DND Asbestos Management Directive

The Department of National Defence (DND) Asbestos Management Directive, March 2007, was developed in order to establish a standard and consistent approach for the management of asbestos-containing materials. The Directive identifies organizational roles and responsibilities, and establishes a comprehensive approach for the identification, management, removal and disposal of asbestos-containing materials within DND buildings and facilities. CFB Borden considers asbestos-containing materials to be 0.5% or more asbestos, by dry weight, in accordance with O. Reg. 278/05.

## 2.2 Lead

Lead is a heavy metal that can be found in construction materials such as paints, coatings, mortar, concrete, pipes, solder, packings, sheet metal, caulking, glazed ceramic products and cable splices. Lead has been used historically in exterior and interior paints.

The Surface Coating Materials Regulations (SOR/2016-193) made pursuant to the Canada *Consumer Product Safety Act* states that a surface coating material must not contain more than 90 mg/kg total lead. Health Canada defines a lead-containing surface coating as a paint or similar material that dries to a solid film that contains over 90 mg/kg dry weight of lead.

Information from the United States Occupational Health and Safety Administration (OSHA) suggests that the improper removal of lead paint containing 600 mg/kg lead results in airborne lead concentrations that exceed half of the permissible exposure limit. Lead concentrations as low as 90 mg/kg may present a risk to pregnant women and children[3].

The National Plumbing Code allowed lead as an acceptable material for pipes until 1975 and in solder until 1986.

The Ontario Ministry of Labour *Guideline, Lead on Construction Projects*, dated April 2011, provides guidance in the measures and procedures that should be followed when handling lead-containing materials during construction projects. In the guideline, lead-containing construction operations are classified into three groups - Type 1 (low risk), Type 2 (medium risk) and Type 3 (high risk) based on presumed airborne concentrations of lead. Any operation that may expose a worker to lead that is not a Type 1, Type 2, or Type 3b operation, is classified as a Type 3a operation. Type 3a operations include, but are not limited to, for example, welding or high temperature cutting of lead-containing coatings or materials indoors or in a confined space and removal of lead-containing coatings or materials using power tools without an effective

[3] *Lead-Containing Paints and Coatings: Preventing Exposure in the Construction Industry.* WorkSafe BC, 2011.

dust collection system equipped with a HEPA filter. Type 3b operations include abrasive blasting of lead-containing coatings or materials and removal of lead-containing dust using an air mist extraction system.

## 2.3 Mercury

Mercury has been used in electrical equipment such as alkaline batteries, fluorescent light bulbs (lamps), high intensity discharge (HID) lights (mercury vapour, high pressure sodium and metal halide), “silent switches” and in instruments such as thermometers, manometers and barometers, pressure gauges, float and level switches and flow meters. Mercury-containing lamps, the bulk of which are 1.22 m (four foot) fluorescent lamps contain between 7 and 40 mg of mercury each. Mercury compounds have also been used historically as additives in latex paint to protect the paint from mildew and bacteria during production and storage.

The intentional addition of mercury to Canadian-produced consumer paints for interior use was prohibited in 1991. Mercury may have remained in paints after 1991, however, as a result of impurities in the paint ingredients or cross-contamination due to other manufacturing processes. The Surface Coating Materials Regulations (SOR/2016-193) made pursuant to the Canada *Consumer Product Safety Act* states that a surface coating material must not contain more than 10 mg/kg mercury.

Mercury-containing thermostats and silent light switches are mercury tilt switches which are small tubes with electrical contacts at one end of the tube. A mercury tilt switch is usually present when no switch is visible. Mercury switches often have the word “TOP” stamped on the upper end of the switch, which is visible after removing the cover plate. If mercury switches are to be removed, the entire switch should be removed and placed into a suitable container for storage and disposal.

Waste light tubes generated during renovations or building demolition and waste mercury from equipment must either be recycled or disposed of in accordance with the requirements of Ont. Reg. 347 – *Waste Management, General*.

Waste mercury in amounts less than 5 kg (per month) are exempt from the generator registration requirements prescribed by O.Reg. 347 – *Waste Management – General*. Waste mercury from mercury switches or gauges should, however, be properly collected and shipped to a recycling facility or disposed of as a hazardous waste. Removal of mercury-containing equipment (e.g., switches, gauges, controls, etc.) should be carried out in a manner which prevents spillage and exposure to workers.

The Environment and Climate Change Canada (ECCC) document *Code of Practice for the Environmentally Sound Management of End-Of-Life Lamps Containing Mercury, February 2017* is a voluntary tool developed to complement provincial initiatives, and to promote best practices for managing end-of-life mercury-containing lamps.

## 2.4 Silica

Silica exists in several forms of which crystalline silica is of most concern with respect to potential worker exposures. Quartz is the most abundant type of crystalline silica. Some commonly used construction

materials containing silica include brick, refractory brick, concrete, concrete block, cement, mortar, rock and stone, sand, fill dirt, topsoil and asphalt containing rock or stone.

The Ontario Ministry of Labour *Guideline, Silica on Construction Projects*, dated April 2011, provides guidance in controlling exposure to silica dust during construction activities. In the guideline, silica-containing construction operations are classified into three groups – Type 1 (low risk), Type 2 (medium risk) and Type 3 (high risk) based on presumed airborne concentrations of respirable crystalline silica in the form of cristobalite, tridymite, quartz and tripoli.

## 2.5 Other Designated Substances

Vinyl chloride vapours may be released from polyvinyl chloride (PVC) products in the event of heating or as a result of decomposition during fire. PVC is used in numerous materials that may be found in building construction, including, for example, piping, conduits, siding, window and door frames, plastics, garden hoses, flooring and wire and cable protection.

Acrylonitrile is used to produce nitrile-butadiene rubber, acrylonitrile-butadiene-styrene (ABS) polymers and styrene-acrylonitrile (SAN) polymers. Products made with ABS resins which may be found in buildings include telephones, bottles, packaging, refrigerator door liners, plastic pipe, building panels and shower stalls. Acrylonitrile can be released into the air by combustion of products containing ABS.

Isocyanates are a class of chemicals used in the manufacture of certain types of plastics, foams, coatings and other products. Isocyanate-based building construction materials may include rigid foam products such as foam-core panels and spray-on insulation and paints, coatings, sealants and adhesives. Isocyanates may be inhaled if they are present in the air in the form of a vapour, a mist or a dust.

Benzene is a clear, highly flammable liquid used mainly in the manufacture of other chemicals. The commercial use of benzene as a solvent has practically been eliminated, however it continues to be used as a solvent and reactant in laboratories.

Arsenic is a heavy metal used historically in pesticides and herbicides. The primary use in building construction materials was its use in the wood preservative chromated copper arsenate (CCA). CCA was used to pressure treat lumber since the 1940s. Pressure-treated wood containing CCA is no longer being produced for use in most residential settings.

Ethylene oxide is a colourless gas at room temperature. It has been used primarily for the manufacture of other chemicals, as a fumigant and fungicide and for sterilization of hospital equipment.

Coke oven emissions are airborne contaminants emitted from coke ovens and are not a potential hazard associated with building construction materials.

## 2.6 PCBs

The management of equipment classified as waste and containing Polychlorinated Biphenyls (PCBs) at concentrations of 50 parts per million (mg/kg) or greater is regulated by *Ontario Regulation 362, Waste Management – PCBs*. Under this regulation, PCB waste is defined as any waste material containing PCBs in concentrations of 50 mg/kg or greater. Any equipment containing PCBs at or greater than this level, such as transformers, switchgear, light ballasts and capacitors, which is removed from service due to age, failure or as a result of decommissioning, is considered to constitute a PCB waste. Although current federal legislation (effective 1 July 1980) has prohibited the manufacture and sale of new equipment containing PCBs since that time, continued operation of equipment supplied prior to this date and containing PCBs is still permitted. Handling, storage and disposition of such equipment is, however, tightly regulated and must be managed in accordance with provincial and federal government requirements as soon as it is taken out of service or becomes unserviceable.

In most institutional, commercial facilities and in smaller industrial facilities, the primary source of equipment potentially containing PCBs is fluorescent and H.I.D. light ballasts. Small transformers may also be present. In larger industrial facilities, larger transformers and switch gear containing, or potentially containing, PCBs may also be present.

PCBs were also commonly added to industrial paints from the 1940s to the late 1970s. PCBs were added directly to the paint mixture to act as a fungicide, to increase durability and flexibility, to improve resistance to fires and to increase moisture resistance. The use of PCBs in new products was banned in Canada in the 1970s. PCB amended paints were used in specialty industrial/institutional applications prior to the 1970s including government buildings and equipment such as industrial plants, radar sites, ships as well as non-government rail cars, ships, grain bins, automobiles and appliances. PCB caulking was used in the 1950s and through the 1970s to seal the joints of brick, masonry, stone and metal window frames.

Removal of in-service equipment containing PCBs, such as fluorescent light ballasts, capacitors and transformers, is subject to the requirements of the federal *PCB Regulations* (discussed below).

The *PCB Regulations*, which came into force on 5 September 2008, were made under the *Canadian Environmental Protection Act*, 1999 (CEPA 1999) with the objective of addressing the risks posed by the use, storage and release to the environment of PCBs, and to accelerate their destruction. The *PCB Regulations* set different end-of-use deadlines for equipment containing PCBs at various concentration levels.

*The Regulations Amending the PCB Regulations and Repealing the Federal Mobile PCB Treatment and Destruction Regulations* were published on 23 April 2014, in the Canada Gazette, Part II, and came into force on 1 January 2015. The most notable part of the amendments is the addition of an end-of-use deadline date of 31 December 2025 for specific electrical equipment located at electrical generation, transmission and distribution facilities.

When the PCB materials are classified as waste, jurisdiction falls under the Ontario Ministry of the Environment and Climate Change (MOECC) and O.Reg. 362. All remedial and PCB management work

must be carried out under the terms of a Director's Instruction issued by an MOE District Office (for quantities of PCB fluid greater than 50 litres). The PCB waste stream, regardless of quantity, must be registered with the MOE, in accordance with O.Reg. 347, *General – Waste Management*. O.Reg. 362 applies to any equipment containing greater than 1 kg of PCBs.

## 2.7 Urea Formaldehyde Foam Insulation (UFFI)

Urea formaldehyde foam insulation (UFFI) is a polymer manufactured at point-of-use by blending urea formaldehyde resin with a phosphoric acid catalyst and compressed air at a nozzle tip. This nozzle was used to inject the freshly mixed foam product into enclosed wall cavities. UFFI was introduced in Canada in the 1970s. In response to concerns about the health effects of formaldehyde gas, the installation of UFFI was banned in Canada in 1980.

## 2.8 Ozone-Depleting Substances and Other Halocarbons

In Canada, the federal, provincial and territorial governments have legislation in place for the protection of the ozone layer and management of ozone-depleting substances and their halocarbon alternatives. The use and handling of these substances are regulated by the provinces and territories in their respective jurisdictions, and through the *Federal Halocarbon Regulations*, 2003 (FHR 2003) for refrigeration, air-conditioning, fire-extinguishing and solvent systems under federal jurisdiction.

The FHR 2003 were established in August 2003 and amended in July 2009 under the authority of the *Canadian Environmental Protection Act*, 1999. The purpose of the FHR 2003 is to reduce and prevent emissions of ozone-depleting substances and of their halocarbon alternatives to the environment from air-conditioning units, refrigeration, fire-extinguishing and solvent systems that are:

- located on federal or aboriginal lands; or
- owned by federal departments, board agencies, Crown corporations, or federal works and undertakings.

Ontario Regulation 347, *General – Waste Management*, has also been amended to provide for more strict control of CFCs. The requirements under the amended regulation apply primarily to the keeping of records for the receipt or recycling of CFC waste.

The FHR 2003 replaced the former Federal Halocarbon Regulations and incorporated new provisions to achieve an orderly transition from CFCs and Halons to alternative substances and technologies, reflecting *Canada's Strategy to Accelerate the Phase-Out of CFC and Halon Uses and to Dispose of the Surplus Stocks*.

Under the FHR 2003, a person who installs, services, leak tests, or charges a refrigeration system or an air conditioning system or does any other work on the system that may result in the release of a halocarbon must do so in accordance with the *Environmental Code of Practice for the Elimination of Fluorocarbon Emissions from Refrigeration and Air Conditioning Systems*.

Some of the requirements of FHR 2003 include:

- certification is required for all persons testing, repairing, filling or emptying equipment containing ozone-depleting substances and their halocarbon alternatives;
- no person shall store, transport or purchase a halocarbon unless it is in a container designed and manufactured to be refilled and to contain that specific type of halocarbon;
- before dismantling, decommissioning or destruction of any system, a person shall recover all halocarbons contained in the system into a container designed and manufactured to be refilled and to contain that specific type of halocarbon;
- before dismantling, decommissioning or destruction or destroying a system, a person shall affix a notice to the system containing information as required in Column 3, Item 1 of Schedule 2. This information includes the name and address of the owner of the system; name of the operator of the system, specific location of the system before its dismantling, decommissioning or destruction; description of the system; name of service technician who recovered the halocarbons; certificate number of the service technician (if applicable); name of employer of service technician (if applicable); type and quantity of halocarbon and date recovered; type and charging capacity of the system; and final destination of the system; and
- in the case of dismantling, decommissioning or destruction of any system, the owner shall keep a record of the information contained in the notice as described above.

## 2.9 Biological Hazards

### 2.9.1 Mould

Moulds are forms of fungi that are found everywhere both indoors and outdoors all year round. Outdoors, moulds live in the soil, on plants and on dead and decaying matter. More than 1000 different kinds of indoor moulds have been found in buildings. Moulds spread and reproduce by making spores, which are all small and light-weight, able to travel through air, capable of resisting dry, adverse environmental conditions, and hence capable of surviving a long time. Moulds need moisture and nutrients to grow and their growth is stimulated by warm, damp and humid conditions.

Control of exposure to mould is required under Section 25(2)(h) of the Ontario *Occupational Health and Safety Act*, which states that employers shall take every precaution reasonable in the circumstances for the protection of workers. Recommended work practices are outlined in the following documents:

- *Mould Guidelines for the Canadian Construction Industry.* Standard Construction Document CCA 82 2004. Canadian Construction Association.
- *Mould Abatement Guidelines.* Environmental Abatement Council of Ontario. Edition 3. 2015.

### 2.9.2 Animal Droppings

Histoplasmosis is an infectious disease caused by inhaling the spores of a fungus called *Histoplasma capsulatum*. Histoplasmosis primarily affects a person's lungs, and its symptoms vary greatly. Histoplasmosis can appear as a mild, flu-like respiratory illness and has a combination of symptoms,

including malaise (a general ill feeling), fever, chest pain, dry or non productive cough, headache, loss of appetite, shortness of breath, joint and muscle pains, chills, and hoarseness. Chronic lung disease due to histoplasmosis resembles tuberculosis and can worsen over months or years. [4]

*H capsulatum* grows in soils throughout the world. The fungus seems to grow best in soils having a high nitrogen content, especially those enriched with bird manure or bat droppings. The organism can be carried on the wings, feet and beaks of birds and infect soil under roosting sites or manure accumulations inside or outside buildings. Active and inactive roosts of blackbirds have been found heavily contaminated by *H capsulatum*. On the other hand, fresh bird droppings on surfaces such as sidewalks and window sills have not been shown to present a health risk for histoplasmosis because birds themselves do not appear to be infected by *H capsulatum*. Rather, bird manure is primarily a nutrient source for the growth of *H capsulatum* already present in the soil. Unlike birds, bats can become infected with *H capsulatum* and consequently can excrete the organism in their droppings.

In *addition* to *H capsulatum*, inhalation exposure to *Cryptococcus neoformans* may also be a health risk for workers in environments containing accumulations of bat droppings or bird manure. *C neoformans* is the infectious agent of the fungal disease cryptococcosis. Formerly a rare disease, the incidence of cryptococcosis has increased in recent years because of its frequent occurrence in AIDS patients. *C neofonnans* and *H capsulatum* are only two of the more than 100 microorganisms that have been reported with increased frequency among HIV-infected persons, and cryptococcosis and histoplasmosis are both classified as AIDS-indicator opportunistic infectious diseases.

### 2.9.3 Raccoon Feces

A roundworm commonly known as Raccoon Roundworm (*Baylisascaris*) lives in the digestive tracts of raccoons, and can potentially cause a serious infection in humans if infected roundworm eggs in soil, water or an object that has been contaminated with raccoon feces are accidentally ingested.

### 2.9.4 Mouse Droppings

Hantaviruses are found in the droppings, urine and saliva of infected rodents and humans can contract the virus from breathing in airborne particles or from being bitten. In Canada, a hantavirus capable of causing disease in humans – named Sin Nombre virus – has been identified in deer mice. Although the risk in Canada is low, when it happens, the disease can be very severe.

Exposure to hantaviruses can cause a rare, but often fatal, disease called Hantavirus pulmonary syndrome (HPS). The earliest documented case of HPS in Canada was contracted in Alberta in 1989. Since then,

[4] *Histoplasmosis — Protecting Workers at Risk*, Revised Edition, United States Department of Health and Human Services, Centers for Disease Control and Prevention, National Institute for Occupational Safety and Health (NIOSH), December 2004.

there have been over 70 confirmed cases. Most of the cases occurred in western Canada (Manitoba, Saskatchewan, Alberta and British Columbia), except for one case in Quebec.[5]

Hantavirus is typically transmitted by breathing particles in air from the droppings, urine and saliva of infected rodents. However, there have been a small number of reported cases of HPS believed to have been contracted through rodent bites.

[5] Health Canada – "It's Your Health – Hantaviruses" – August 2009.

# 3 METHODOLOGY

All areas of the building were surveyed, with the exception of Rooms 121 and 122 (POL Storage) and the roof.

Arcadis reviewed the Maple Environmental Inc. report entitled *Designated Substance and Detailed Asbestos Building Materials Survey Report,* dated March 2011 in preparing this report.

## 3.1 Asbestos

Bulk sampling was performed in accordance with the requirements of O. Reg. 278/05 as follows:

- the minimum number of bulk samples to be collected from an area of homogeneous material is set out in Table 1 of the regulation (Table 3.1 is reproduced below).
- if analysis establishes that a bulk material sample contains 0.5 per cent or more asbestos by dry weight:

  (a) it is not necessary to analyze other bulk material samples taken from the same area of homogeneous material; and

  (b) the entire area of homogeneous material from which the bulk materials sample was taken is deemed to be asbestos-containing material.

**Table 3.1 Bulk Material Samples (From O.Reg. 278/05)**

| Item | Type of Material | Size of Area of Homogeneous Material | Minimum Number of Bulk Material Samples to be Collected |
|---|---|---|---|
| 1 | Surfacing material, including without limitation material that is applied to surfaces by spraying, by trowelling or otherwise, such as acoustical plaster on ceilings and fireproofing materials on structural members | Less than 90 square metres | 3 |
| | | 90 or more square metres, but less than 450 square metres | 5 |
| | | 450 or more square metres | 7 |
| 2 | Thermal insulation, except as described in Item 3 | Any size | 3 |
| 3 | Thermal insulation patch | Less than 2 linear metres or 0.5 square metres | 1 |
| 4 | Other material | Any size | 3 |

These Ontario Regulation 278/05 minimum bulk sample number requirements are consistent with the bulk sampling requirements specified in the DND/CF Asbestos Management Directive.

In practice, application of the Table 3.1 requirements means that the specified minimum number of negative (i.e., less than 0.5% asbestos) bulk sample analysis results will be required in order to classify a material as non-asbestos. Area of homogeneous material means an area in a building constructed at the same time. Homogeneous material is defined as material that is uniform in colour and texture.

Bulk sampling was "non-destructive", therefore certain materials including but not limited to, ceramic tile grout and mortar beds, were only sampled from areas of existing damage, if any.

Analysis of bulk samples was performed following EPA Method 600/R-93/116 in conformity with the requirements specified in O. Reg. 278/05. A "stop positive" protocol was utilized whereby one positive (more than 0.5%) sample result from a homogeneous area can be considered evidence that all suspect material in that homogeneous area contains asbestos without analysing the remaining samples.

The "*Asbestos Condition Assessment and Response Chart*" in the DND/CF Asbestos Management Directive was used in identifying required response actions. A copy of the Chart is provided in Appendix E.

## 3.2 Lead

No samples of representative paint were collected by Arcadis during the course of the survey as such sampling could cause significant damage.

## 3.3 Mercury

The presence of equipment which may contain mercury, such as fluorescent light tubes, thermometers, gauges, etc. observed during the course of our site inspection was recorded.

No samples of representative paint were collected by Arcadis during the course of the survey as such sampling could cause significant damage.

## 3.4 Silica

The presence of silica-containing materials observed during the course of our site inspection was documented. Silica is known to be a constituent of brick, concrete, cement, etc. Sampling and laboratory analysis are not required to make this determination.

## 3.5 Other Designated Substances and Hazardous Materials

No samples of representative paint were collected by Arcadis during the course of the survey as such sampling could cause significant damage.

## 3.6 PCBs

Fluorescent lights were inspected during the course of our survey to determine whether they were the T12 type and may therefore contain PCB ballasts.

Transformers were investigated to determine whether they were the “dry” type which do not contain PCB dielectric fluids, or the “wet” type which can contain PCBs.

No samples of representative paint were collected by Arcadis during the course of the survey as such sampling could cause significant damage.

## 3.7 Urea Formaldehyde Foam Insulation

Investigations for the potential presence of UFFI entailed inspection of exterior and interior openings (i.e., “nozzle holes”) made for installation of insulation and limited visual observation of the wall cavity and insulating materials at select, representative locations.

## 3.8 Ozone-Depleting Substances and Other Halocarbons

The presence of Ozone Depleting Substances (ODSs) and other Halocarbons was reviewed within the building and recorded.

## 3.9 Biological Hazards

The presence of “suspect” mould observed during the course of our site inspection was documented. “Suspect” mould is typically a coloured, textured substance or discolouration or staining on a building material surface which, based on our experience, may be mould growth. The adjective “suspect” is used where the presence of mould has not been confirmed by laboratory analysis.

The inspection of mould was limited to visual observations of readily accessible surfaces and did not include intrusive inspections of wall cavities.

The presence of any animal droppings observed was also noted.

# 4 DISCUSSIONS AND SUMMARY OF RESULTS

## 4.1 Asbestos

The results of the bulk sample analyses for asbestos content are provided in Appendix C, and the laboratory report is provided in Appendix B. Sample locations are shown on the floor plans provided in Appendix A. A summary of building materials sampled and found not to contain asbestos is presented in Table 4.1.

Photographs are presented in Appendix D.

Potential asbestos-containing materials are materials which could contain asbestos, but which were not sampled as such sampling could cause significant damage. Potential asbestos-containing materials observed at this site include grout and mortar beds under ceramic floor and wall tiles, roofing materials and exterior window caulking.

Areas where potential asbestos-containing materials were observed are as follows:

- Rooms 101, 102, 103, 104, 105, 106, 107, 108, 110, 112 and 113 – vinyl floor tile mastic; and
- Rooms 109 and 111 – grout and mortar bed under ceramic floor and wall tiles.

Other potential asbestos-containing materials may also be present. A list of possible asbestos-containing materials in buildings from the Ministry of Labour “Sample List of Suspect Asbestos-Containing Materials” is provided in Appendix F.

Asbestos was not detected in any of the samples collected and submitted for analysis. Maple Environmental Inc. collected three samples of drywall joint compound. Asbestos was not detected in any of the samples.

**Table 4.1 Summary of Materials Sampled and Confirmed to be Non-Asbestos-Containing – Building A-253**

| Material | Substrate | Sample Locations |
|---|---|---|
| Block filler paint | Concrete block | Room 104, Corridor, Room 108, Room 107 and Room 105 |
| Drywall joint compound | Drywall | Corridor, Room 107, Room 108 and Room 114 |
| 12” vinyl floor tiles – beige with white flecks | Concrete | Room 104, Room 105 and Room 108 |
| 2’x4’ ceiling tile – pinhole and small fissure | N/A | Room 101, Room 104 and Room 108 |
| Vinyl baseboard – black | Drywall and concrete block | Room 105, Room 106 and Room 108 |
| Mastic behind vinyl baseboard – black | Drywall and concrete block | Room 105, Room 106 and Room 108 |
| Block mortar | Concrete block | Room 114, Room 108 and Corridor |

These materials may be present at other locations in the building and should be assumed to be non-asbestos-containing.

Based on visual observations, and results of laboratory analyses of samples collected by Arcadis, asbestos containing materials were not identified in the building.

Glass fibre pipe insulation is readily visually distinguishable (typically yellow in colour) from asbestos-containing insulation materials and was, therefore, not tested for asbestos content.

Asbestos may be present in materials which were not sampled during the course of the designated substances survey carried out by Arcadis, including, but not limited to mortar beds under ceramic wall and floor tiles, roofing materials and exterior window caulking.Asbestos may also be present in locations that are presently inaccessible (e.g., behind solid ceilings and walls). Asbestos may also be present in the form of vermiculite insulation in cavities in concrete or cement block walls (used as fill-in insulation). Confirmatory testing of any such materials could be undertaken as the need arises (ie., at the time of renovations) or the material can be assumed to contain asbestos.

## 4.2 Lead

No samples of representative paint were collected by Arcadis during the course of the survey as such sampling could cause significant damage. Two samples were previously collected by Maple Environmental and submitted for lead analysis only. These paint applications are still present.

Paint applications were observed to be generally in good condition.

**Table 4.2 Surface Coating – Sampling Summary – Building A-253 (Historical samples)**

| Sample ID | Sample Location | Substrate Material | Sample Description | Condition | Analytical Results (µg/g) Lead (90 µg/g^) |
|---|---|---|---|---|---|
| Pb-01 | Room 104 | door | brown trim paint | Good | <54 |
| Pb-02 | Exterior | beams, columns | green paint | Good | <78 |

**NOTES:**

< = Less than,

Analytical Results: ^SOR/2005-109 Surface Coating Materials Regulations.

Results taken from Maple Environmental Inc. report entitled *Designated Substance and Detailed Asbestos Building Materials Survey Report*, dated March 2011.

**Table 4.3 Summary of Rooms with Similar Surface Coatings – Building A-253**

| Paint Description | Rooms with Similar Surface Coating/Paint Colour |
|---|---|
| Brown trim paint | Room 104 |
| Green exterior paint | Exterior beams and columns |

## 4.3 Mercury

During the course of our site inspections, fluorescent lights were observed throughout the building. Mercury should be assumed to be present as a gas in all fluorescent light tubes. Mercury-containing thermostats were observed in Rooms 101, 102, 104 and 112.

Proper procedures for removing mercury-containing equipment (thermostats, for example, and any other mercury-containing equipment found to be present at the time of renovations or demolition) typically involve:

- removal of the mercury-containing equipment in a manner designed to prevent breakage;
- removal of the equipment over or in a containment device sufficient to collect and contain any mercury released in case of breakage;
- ensuring that a mercury clean-up system is readily available to immediately transfer any mercury resulting from spills or leaks from broken equipment and that any mercury resulting from spills or leaks is immediately transferred to an appropriate container;
- ensuring that the area in which equipment is removed is well ventilated;
- ensuring that employees removing equipment are thoroughly familiar with proper waste mercury handling and emergency procedures, including transfer of mercury from containment devices to appropriate containers;
- storing removed switches in closed, non-leaking containers that are in good condition; and
- packing removed switches in the container with packing materials adequate to prevent breakage during storage, handling and transportation.

Proper procedures for removing and handling mercury-containing fluorescent light tubes typically involve:

- ensuring that electrical power to light fixtures has been disconnected and locked out;
- taking all necessary precautions to ensure that fluorescent lamp tubes are removed in a manner that prevents breakage; and
- transporting fluorescent lamp tubes to a licensed processing location for separation and recovery of mercury.

## 4.4 Silica

Materials observed in the subject building which should be considered to contain silica included concrete, concrete blocks, brick, mortar, drywall, drywall joint compound, grout and mortar bed.

## 4.5 Other Designated Substances and Hazardous Materials

No other designated substances (vinyl chloride, acrylonitrile, benzene, isocyanates, ethylene oxide and coke oven emissions) were observed to be present in the subject building, and none would be expected to be encountered in any building materials in a form that would represent an exposure concern.

## 4.6 PCBs

Light ballasts, such as those associated with the type of fluorescent lights (T8s) observed throughout the building, are usually an electronic-type which do not contain PCBs, however, this would be confirmed by an electrician at the time of dismantling of the lights.

Light ballasts, such as those associated with the type of fluorescent lights (T12s) identified in Room 113 are typically a magnetic type which may contain PCBs. Inspection of product codes and date codes on the ballasts can be used to determine the likely presence or absence of PCBs.

One dry type transformer was observed in Room 110.

## 4.7 Urea Formaldehyde Foam Insulation (UFFI)

UFFI was not observed during the course of the investigation.

## 4.8 Ozone-Depleting Substances and Other Halocarbons

During the course of our site inspections, equipment potentially containing Ozone-Depleting Substances and other Halocarbons included:

- Deep freezer in Room 105;
- Drink fridges in Rooms 104 and 105; and

- Mini-fridge in Room 102.

## 4.9 Biological Hazards

No animal droppings were observed during the site investigation.

No suspect mould was observed during the site investigation. The investigation of mould was limited to visual observations of readily accessible surfaces and did not include intrusive investigations of wall cavities..

# 5 CONCLUSIONS AND RECOMMENDATIONS

We recommend the following on the basis of the findings of the designated substances survey outlined in this report.

## 5.1 Ongoing Management

1. If any potential asbestos-containing materials that have not been tested for asbestos may be affected by maintenance or other work activities, they should be tested prior to their disturbance or assumed to contain asbestos and handled accordingly.
2. If work activities may cause exposure to metallic elements in paint, develop an exposure control plan, write safe work procedures and implement controls in accordance with MOL *Guideline – Lead on Construction Projects.*
3. If silica-containing materials will be affected by sanding, drilling, chipping, grinding, cutting, sawing, sweeping or blasting, the measures and procedures outlined in the Ontario Ministry of Labour *Guideline, Silica on Construction Projects*, April 2011, should be followed.
4. Comply with the requirements of FHR 2003 when installing, servicing, testing, charging or doing any other work on a refrigeration system or an air conditioning system that may result in the release of a halocarbon.

## 5.2 Construction Projects

1. If there are any materials which may contain asbestos and which were not tested during the course of the hazardous building materials survey, and which may be disturbed during construction activities, a “destructive” survey may be required to access and sample potential asbestos-containing materials not sampled.
2. If asbestos-containing materials are discovered and will be affected by any construction and/or demolition work, they must be removed/handled in accordance with work practices and procedures specified in Ontario Regulation 278/05 and the DND Asbestos Management Directive. Requirements for air sampling for asbestos fibres during and upon completion of asbestos abatement operations are prescribed in the Canada Occupational Health and Safety Regulations made under the Canada Labour Code.
3. If lead-containing materials will be disturbed during the course of construction work, the measures and procedures outlined in The Ministry of Labour Guideline, Lead on Construction Projects, dated April 2011, should be followed. For building materials that are to be disposed at a landfill, all painted waste materials and associated substrate (concrete, plaster, wood, etc.) must undergo Toxicity Characteristic Leachate Properties (TCLP) testing to determine disposal procedures. The acceptable level for non-regulated disposal of lead-containing waste is less than 5 mg/L as determined through analytical TCLP. The disposal of lead-containing waste is regulated under the

Federal *Transportation of Dangerous Goods Act* and by the Ontario Ministry of Environment and Climate Change.

4. TCLP testing will also be required for arsenic, chromium and mercury. The acceptable levels for non-regulated disposal of waste containing arsenic, chromium and mercury are 5.0 mg/L, 8.0 mg/L and 0.2 mg/L, respectively.
5. If silica-containing materials will be disturbed during the course of construction work, the measures and procedures outlined The Ministry of Labour *Guideline, Silica on Construction Projects*, April 2011, should be followed.
6. If any fluorescent light tubes are removed, the light tubes should be recycled for mercury. The Environment and Climate Change Canada (ECCC) document *Code of Practice for the Environmentally Sound Management of End-Of-Life Lamps Containing Mercury, February 2017* provides guidance for managing end-of-life mercury-containing lamps.
7. Prior to undertaking renovation activities that involve fluorescent lights, ensure that a licensed electrician inspects ballasts to determine whether or not any light ballasts may contain PCBs. Guidance in identification of PCB ballasts is provided in the Environment Canada publication titled "Identification of Lamp Ballasts Containing PCBs. Report EPS 2/CC/2 (revised)", August 1991.
8. Workers involved in the demolition of any mould-impacted materials encountered during any renovation or demolition activities should wear appropriate protective clothing and equipment and follow decontamination practices as outlined in the Canadian Construction Association Standard Construction Document CCA-82 2004 – *Mould Guidelines for the Canadian Construction Industry*, and the Mould Abatement Guidelines. Environmental Abatement Council of Ontario. Edition 3. 2015.
9. If caulking will be impacted by planned construction work, it should be tested for PCBs prior to commencement of the work.

# 6 LIMITATIONS AND SERVICE CONSTRAINTS

The opinions, conclusions and recommendations presented in this report are limited to the information obtained during the performance of the specific scope of service identified in the report. To the extent that Arcadis relied upon any information prepared by other parties not under direct contract to Arcadis, no representation as to the accuracy or completeness of such information is made. This report is an instrument of professional service and the services described in the report were performed in accordance with generally accepted standards and level of skill and care ordinarily exercised by members of the profession working under similar conditions including comparable budgetary and schedule constraints. No warranty, guarantee or certification express or implied, is intended or given with respect to Arcadis' services, opinions, conclusions or recommendations.

Arcadis' observations, the results of any testing and Arcadis' opinions, conclusions and recommendations apply solely to conditions existing at the specific times when and specific locations where Arcadis' investigative work was performed. Arcadis affirms that data gathered and presented in this report was collected in an appropriate manner in accordance with generally accepted methods and practices. Arcadis cannot be responsible for decisions made by our client solely on the basis of economic factors. Observation and testing activities such as those conducted by Arcadis are inherently limited and do not represent a conclusive or complete characterization. Arcadis analyzed only the substances, conditions and locations described in the report at the time indicated. Conditions in other parts of the project site, building or area may vary from conditions at the specific locations where observations were made and where testing was performed by Arcadis. Additionally, other building material hazards which were not identified by Arcadis, may also be present in un-accessed areas and in walls, ceilings, cavities, and floors.

This report is expressly for the sole and exclusive use of Defence Construction Canada (DCC) for whom this report was originally prepared and for the particular purpose outlined in the report. Reuse of this report or any portion thereof for other than its intended purpose, or if modified, or if used by third parties, shall be at the user's sole risk. This report must be presented in its entirety.

# 7 REFERENCES

Relevant documents referenced for this project included:

- The DCC Statement of Work dated May 20, 2021;
- Arcadis proposal to DCC dated July 19, 2021; and
- Department of National Defence (DND) Asbestos Management Directive, March 2007.

# APPENDIX A

## Floor Plan


LEGEND

| | |
|---|---|
| Title: **SITE LOCATION** | |
| ARCADIS | Project: **DESIGNATED SUBSTANCES SURVEY BLDG A253 31 HANGAR ROAD, BORDEN, ONTARIO** |
| Date: January 2022 | Client: **DEFENCE CONSTRUCTION CANADA** |
| Metres 75 0 75 150 1:5000 | **FIGURE 1** |

last saved 28-Jan-22 by dlogan

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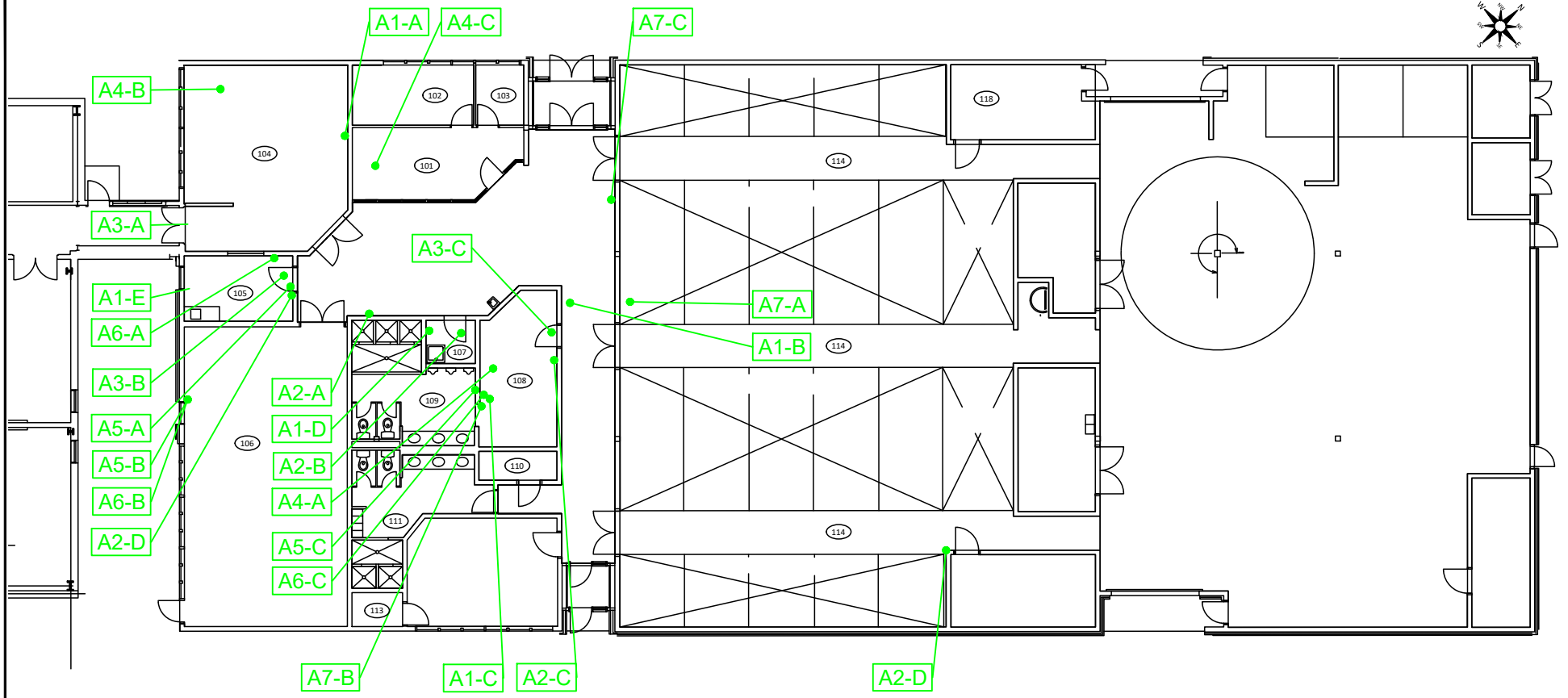


## LEGEND

- (103) FUNCTIONAL SPACE
- A1-A BULK ASBESTOS SAMPLE LOCATIONS
- P-1 BULK PAINT SAMPLE LOCATIONS

NOTE:
Potential asbestos-containing materials observed at this site include grouts between ceramic tiles, mortar beds under ceramic floor tiles, roofing materials, mastic under vinyl floor tiles and exterior window caulking.

Title: **FIRST FLOOR**

ARCADIS

Project:
**DESIGNATED SUBSTANCES SURVEY**
**BLDG A253**
**31 HANGAR ROAD, BORDEN, ONTARIO**

Date: January 2022

Client: **DEFENCE CONSTRUCTION CANADA**

Metres
1.5 0 1.5 3
1:100

**FIGURE 2**

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# APPENDIX B

## Laboratory Report

# EMSL Canada Inc.

2756 Slough Street Mississauga, ON L4T 1G3
Phone/Fax: (289) 997-4602 / (289) 997-4607
http://www.EMSL.com / torontolab@emsl.com


EMSL Canada Order 552118824
Customer ID: 55DCSL97
Customer PO: 30094312
Project ID:

**Attn:** Vraj Daruwala
ARCADIS Canada Inc.
121 Granton Drive
Unit 12
Richmond Hill, ON L4B 3N4

**Proj:** 30094312 - CFB Building A-253

Phone: (905) 882-5984
Fax: (905) 882-8962
Collected:
Received: 11/16/2021
Analyzed: 11/23/2021

## Test Report: Asbestos Analysis of Bulk Materials for Ontario Regulation 278/05 via EPA600/R-93/116 Method

***Client Sample ID:*** A1-A **Lab Sample ID:** 552118824-0001
***Sample Description:*** 104/Block filler paint

| TEST | Analyzed Date | Color | Non-Asbestos Fibrous | Non-Asbestos Non-Fibrous | Asbestos | Comment |
|---|---|---|---|---|---|---|
| PLM | 11/18/2021 | Gray/White | 0.0% | 100.0% | None Detected | |

***Client Sample ID:*** A1-B **Lab Sample ID:** 552118824-0002
***Sample Description:*** Corridor/Block filler paint

| TEST | Analyzed Date | Color | Non-Asbestos Fibrous | Non-Asbestos Non-Fibrous | Asbestos | Comment |
|---|---|---|---|---|---|---|
| PLM | 11/18/2021 | Gray/White | 0.0% | 100.0% | None Detected | |

***Client Sample ID:*** A1-C **Lab Sample ID:** 552118824-0003
***Sample Description:*** 108/Block filler paint

| TEST | Analyzed Date | Color | Non-Asbestos Fibrous | Non-Asbestos Non-Fibrous | Asbestos | Comment |
|---|---|---|---|---|---|---|
| PLM | 11/18/2021 | Gray/White | 0.0% | 100.0% | None Detected | |

***Client Sample ID:*** A1-D **Lab Sample ID:** 552118824-0004
***Sample Description:*** 107/Block filler paint

| TEST | Analyzed Date | Color | Non-Asbestos Fibrous | Non-Asbestos Non-Fibrous | Asbestos | Comment |
|---|---|---|---|---|---|---|
| PLM | 11/19/2021 | Gray | 0.0% | 100.0% | None Detected | |

***Client Sample ID:*** A1-E **Lab Sample ID:** 552118824-0005
***Sample Description:*** 105/Block filler paint

| TEST | Analyzed Date | Color | Non-Asbestos Fibrous | Non-Asbestos Non-Fibrous | Asbestos | Comment |
|---|---|---|---|---|---|---|
| PLM | 11/19/2021 | Gray | 0.0% | 100.0% | None Detected | |

***Client Sample ID:*** A2-A **Lab Sample ID:** 552118824-0006
***Sample Description:*** Corridor/Drywall joint compound

| TEST | Analyzed Date | Color | Non-Asbestos Fibrous | Non-Asbestos Non-Fibrous | Asbestos | Comment |
|---|---|---|---|---|---|---|
| PLM | 11/18/2021 | White | 0.0% | 100.0% | None Detected | |

***Client Sample ID:*** A2-B **Lab Sample ID:** 552118824-0007
***Sample Description:*** 107/Drywall joint compound

| TEST | Analyzed Date | Color | Non-Asbestos Fibrous | Non-Asbestos Non-Fibrous | Asbestos | Comment |
|---|---|---|---|---|---|---|
| PLM | 11/18/2021 | White | 0.0% | 100.0% | None Detected | |

# EMSL Canada Inc.

2756 Slough Street Mississauga, ON L4T 1G3
Phone/Fax: (289) 997-4602 / (289) 997-4607
http://www.EMSL.com / torontolab@emsl.com


EMSL Canada Order 552118824
Customer ID: 55DCSL97
Customer PO: 30094312
Project ID:

## Test Report: Asbestos Analysis of Bulk Materials for Ontario Regulation 278/05 via EPA600/R-93/116 Method

***Client Sample ID:*** A2-C **Lab Sample ID:** **552118824-0008**
***Sample Description:*** 108/Drywall joint compound

| TEST | Analyzed Date | Color | Non-Asbestos Fibrous | Non-Asbestos Non-Fibrous | Asbestos | Comment |
|---|---|---|---|---|---|---|
| PLM | 11/18/2021 | White | 0.0% | 100.0% | None Detected | |

***Client Sample ID:*** A2-D **Lab Sample ID:** **552118824-0009**
***Sample Description:*** 114/Drywall joint compound

| TEST | Analyzed Date | Color | Non-Asbestos Fibrous | Non-Asbestos Non-Fibrous | Asbestos | Comment |
|---|---|---|---|---|---|---|
| PLM | 11/19/2021 | White | 0.0% | 100.0% | None Detected | |

***Client Sample ID:*** A2-E **Lab Sample ID:** **552118824-0010**
***Sample Description:*** Corridor/Drywall joint compound

| TEST | Analyzed Date | Color | Non-Asbestos Fibrous | Non-Asbestos Non-Fibrous | Asbestos | Comment |
|---|---|---|---|---|---|---|
| PLM | 11/19/2021 | White | 0.0% | 100.0% | None Detected | |

***Client Sample ID:*** A3-A **Lab Sample ID:** **552118824-0011**
***Sample Description:*** 104/12” vinyl floor tiles – beige with white flecks

| TEST | Analyzed Date | Color | Non-Asbestos Fibrous | Non-Asbestos Non-Fibrous | Asbestos | Comment |
|---|---|---|---|---|---|---|
| PLM Grav. Reduction | 11/23/2021 | Beige | 0.0% | 100% | None Detected | |
| TEM Grav. Reduction | 11/23/2021 | Beige | 0.0% | 100.0% | None Detected | |

***Client Sample ID:*** A3-B **Lab Sample ID:** **552118824-0012**
***Sample Description:*** 105/12” vinyl floor tiles – beige with white flecks

| TEST | Analyzed Date | Color | Non-Asbestos Fibrous | Non-Asbestos Non-Fibrous | Asbestos | Comment |
|---|---|---|---|---|---|---|
| PLM | 11/18/2021 | White/Beige | 0.0% | 100.0% | None Detected | |

***Client Sample ID:*** A3-C **Lab Sample ID:** **552118824-0013**
***Sample Description:*** 108/12” vinyl floor tiles – beige with white flecks

| TEST | Analyzed Date | Color | Non-Asbestos Fibrous | Non-Asbestos Non-Fibrous | Asbestos | Comment |
|---|---|---|---|---|---|---|
| PLM | 11/19/2021 | White/Beige | 0.0% | 100.0% | None Detected | |

***Client Sample ID:*** A4-A **Lab Sample ID:** **552118824-0014**
***Sample Description:*** 108/2’x4’ ceiling tile – pinhole and small fissure

| TEST | Analyzed Date | Color | Non-Asbestos Fibrous | Non-Asbestos Non-Fibrous | Asbestos | Comment |
|---|---|---|---|---|---|---|
| PLM | 11/18/2021 | Gray/White | 80.0% | 20.0% | None Detected | |

***Client Sample ID:*** A4-B **Lab Sample ID:** **552118824-0015**
***Sample Description:*** 104/2’x4’ ceiling tile – pinhole and small fissure

| TEST | Analyzed Date | Color | Non-Asbestos Fibrous | Non-Asbestos Non-Fibrous | Asbestos | Comment |
|---|---|---|---|---|---|---|
| PLM | 11/18/2021 | Gray/White | 80.0% | 20.0% | None Detected | |

# EMSL Canada Inc.

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Phone/Fax: (289) 997-4602 / (289) 997-4607
http://www.EMSL.com / torontolab@emsl.com


EMSL Canada Order 552118824
Customer ID: 55DCSL97
Customer PO: 30094312
Project ID:

## Test Report: Asbestos Analysis of Bulk Materials for Ontario Regulation 278/05 via EPA600/R-93/116 Method

***Client Sample ID:*** A4-C **Lab Sample ID:** **552118824-0016**

***Sample Description:*** 101/2'x4' ceiling tile – pinhole and small fissure

| TEST | Analyzed Date | Color | Non-Asbestos Fibrous | Non-Fibrous | Asbestos | Comment |
|---|---|---|---|---|---|---|
| PLM | 11/19/2021 | Gray/White | 82.0% | 18.0% | None Detected | |

***Client Sample ID:*** A5-A **Lab Sample ID:** **552118824-0017**

***Sample Description:*** 105/Vinyl baseboard - black

| TEST | Analyzed Date | Color | Non-Asbestos Fibrous | Non-Fibrous | Asbestos | Comment |
|---|---|---|---|---|---|---|
| PLM Grav. Reduction | 11/23/2021 | Black | 0.0% | 100% | None Detected | |
| TEM Grav. Reduction | 11/23/2021 | Black | 0.0% | 100.0% | None Detected | |

***Client Sample ID:*** A5-B **Lab Sample ID:** **552118824-0018**

***Sample Description:*** 106/Vinyl baseboard - black

| TEST | Analyzed Date | Color | Non-Asbestos Fibrous | Non-Fibrous | Asbestos | Comment |
|---|---|---|---|---|---|---|
| PLM | 11/18/2021 | Black | 0.0% | 100.0% | None Detected | |

***Client Sample ID:*** A5-C **Lab Sample ID:** **552118824-0019**

***Sample Description:*** 108/Vinyl baseboard - black

| TEST | Analyzed Date | Color | Non-Asbestos Fibrous | Non-Fibrous | Asbestos | Comment |
|---|---|---|---|---|---|---|
| PLM | 11/19/2021 | Black | 0.0% | 100.0% | None Detected | |

***Client Sample ID:*** A6-A **Lab Sample ID:** **552118824-0020**

***Sample Description:*** 105/Black vinyl baseboard mastic

| TEST | Analyzed Date | Color | Non-Asbestos Fibrous | Non-Fibrous | Asbestos | Comment |
|---|---|---|---|---|---|---|
| PLM | 11/18/2021 | Beige | 0.0% | 100.0% | None Detected | |

***Client Sample ID:*** A6-B **Lab Sample ID:** **552118824-0021**

***Sample Description:*** 106/Black vinyl baseboard mastic

| TEST | Analyzed Date | Color | Non-Asbestos Fibrous | Non-Fibrous | Asbestos | Comment |
|---|---|---|---|---|---|---|
| PLM | 11/18/2021 | Beige | 0.0% | 100.0% | None Detected | |

***Client Sample ID:*** A6-C **Lab Sample ID:** **552118824-0022**

***Sample Description:*** 108/Black vinyl baseboard mastic

| TEST | Analyzed Date | Color | Non-Asbestos Fibrous | Non-Fibrous | Asbestos | Comment |
|---|---|---|---|---|---|---|
| PLM | 11/19/2021 | Beige | 0.0% | 100.0% | None Detected | |

***Client Sample ID:*** A7-A **Lab Sample ID:** **552118824-0023**

***Sample Description:*** 114/Block mortar

| TEST | Analyzed Date | Color | Non-Asbestos Fibrous | Non-Fibrous | Asbestos | Comment |
|---|---|---|---|---|---|---|
| PLM | 11/18/2021 | Gray | 0.0% | 100.0% | None Detected | |

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EMSL Canada Order 552118824
Customer ID: 55DCSL97
Customer PO: 30094312
Project ID:

## Test Report: Asbestos Analysis of Bulk Materials for Ontario Regulation 278/05 via EPA600/R-93/116 Method

***Client Sample ID:*** A7-B ***Lab Sample ID:*** **552118824-0024**

***Sample Description:*** 108/Block mortar

| TEST | Analyzed Date | Color | Non-Asbestos Fibrous | Non-Asbestos Non-Fibrous | Asbestos | Comment |
|---|---|---|---|---|---|---|
| PLM | 11/18/2021 | Gray | 0.0% | 100.0% | None Detected | |

***Client Sample ID:*** A7-C ***Lab Sample ID:*** **552118824-0025**

***Sample Description:*** Corridor/Block mortar

| TEST | Analyzed Date | Color | Non-Asbestos Fibrous | Non-Asbestos Non-Fibrous | Asbestos | Comment |
|---|---|---|---|---|---|---|
| PLM | 11/19/2021 | Gray | 0.0% | 100.0% | None Detected | |

**Analyst(s):**

| | |
|---|---|
| Anne Balayboa | PLM Grav. Reduction (2) |
| Madison Trusnovic | PLM (14) |
| Sandy Burany, Ph.D | TEM Grav. Reduction (2) |
| Sherise MacFeeley | PLM (9) |

**Reviewed and approved by:**

Matthew Davis or other approved signatory
or Other Approved Signatory

None Detected = <0.1%. EMSL maintains liability limited to cost of analysis. Interpretation and use of test results are the responsibility of the client. This report relates only to the samples reported above, and may not be reproduced, except in full, without written approval by EMSL. EMSL bears no responsibility for sample collection activities or analytical method limitations. The report reflects the samples as received. Results are generated from the field sampling data (sampling volumes and areas, locations, etc.) provided by the client on the Chain of Custody. Samples are within quality control criteria and met method specifications unless otherwise noted. Estimation of uncertainty available upon request. This report is a summary of multiple methods of analysis, fully compliant reports are available upon request. A combination of PLM and TEM analysis may be necessary to ensure consistently reliable detection of asbestos. This report must not be used to claim product endorsement by NVLAP of any agency or the U.S. Government.

Samples analyzed by EMSL Analytical, Inc. Carrollton, TX NVLAP Lab Code 600111-0, TX 300456, CO AL-25037, CA 2999

Initial report from: 11/23/202119:28:00

# APPENDIX C

## Summary of Results of Analyses of Bulk Samples for Asbestos Content – Building A - 253

**Table C.1 Summary of Results of Analyses of Bulk Samples for Asbestos Content – Building A - 253**

| Sample No. | Sample Location | Sample Description | Asbestos Content |
|---|---|---|---|
| A1-A (Photo 4) | Room 104 | Block filler paint | None Detected |
| A1-B | Corridor | Block filler paint | None Detected |
| A1-C | Room 108 | Block filler paint | None Detected |
| A1-D | Room 107 | Block filler paint | None Detected |
| A1-E | Room 105 | Block filler paint | None Detected |
| A2-A (Photo 5) | Corridor | Drywall joint compound | None Detected |
| A2-B | Room 107 | Drywall joint compound | None Detected |
| A2-C | Room 108 | Drywall joint compound | None Detected |
| A2-D | Room 114 | Drywall joint compound | None Detected |
| A2-E | Corridor | Drywall joint compound | None Detected |
| A3-A (Photo 6) | Room 104 | 12” vinyl floor tiles – beige with white flecks | None Detected<br>None Detected (TEM) |
| A3-B | Room 105 | 12” vinyl floor tiles – beige with white flecks | None Detected |
| A3-C | Room 108 | 12” vinyl floor tiles – beige with white flecks | None Detected |
| A4-A (Photo 7) | Room 108 | 2’x4’ ceiling tile – pinhole and small fissure | None Detected |
| A4-B | Room 104 | 2’x4’ ceiling tile – pinhole and small fissure | None Detected |
| A4-C | Room 101 | 2’x4’ ceiling tile – pinhole and small fissure | None Detected |
| A5-A | Room 105 | Vinyl baseboard – black | None Detected<br>None Detected (TEM) |
| A5-B (Photo 8) | Room106 | Vinyl baseboard – black | None Detected |
| A5-C | Room108 | Vinyl baseboard – black | None Detected |
| A6-A | Room105 | Black vinyl baseboard mastic | None Detected |
| A6-B (Photo 9) | Room106 | Black vinyl baseboard mastic | None Detected |
| A6-C | Room108 | Black vinyl baseboard mastic | None Detected |
| A7-A | Room114 | Block mortar | None Detected |
| A7-B (Photo 10) | Room108 | Block mortar | None Detected |
| A7-C | Corridor | Block mortar | None Detected |

Bulk samples were analyzed by Polarized Light Microscopy (PLM) analysis, except where “TEM” is noted, in which case Transmission Electron Microscopy analysis was also performed.

# APPENDIX D

## Photographs

## Project Photographs

Building A-253
CFB Borden, Ontario


**Photo: 1**

**Date:**
October 13, 2021.

**Location/Description:**
General South view of Building A-253.

**Photo: 2**

**Date:**
October 13, 2021.

**Location/Description:**
General west view of Building A-253.

**Photo: 3**

**Date:**
October 13, 2021.

**Location/Description:**
General north view of Building A-253.

## Project Photographs

Building A-253
CFB Borden, Ontario

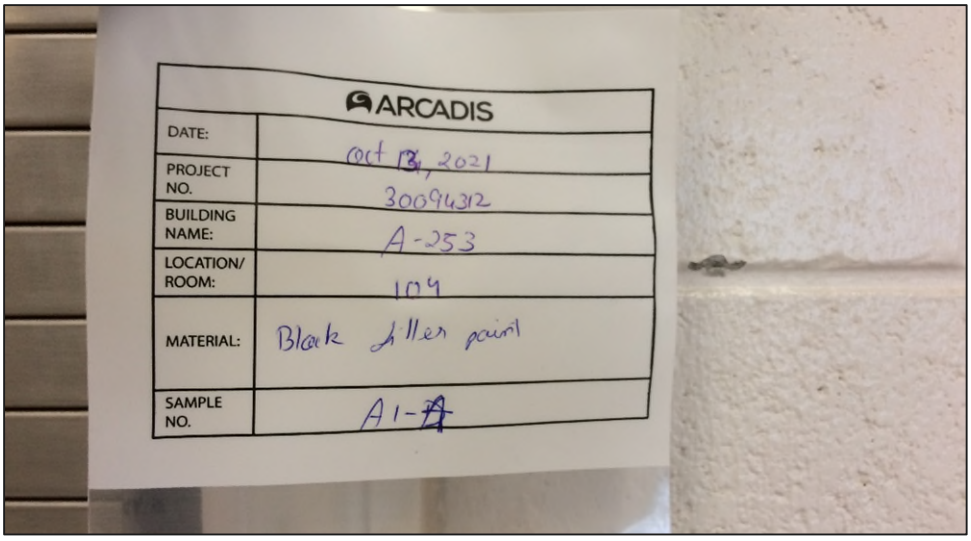



**Photo: 4**

**Date:**
October 13, 2021.

**Location/Description:**
Room 104/Sample A1-A – Non-asbestos-containing block filler paint.

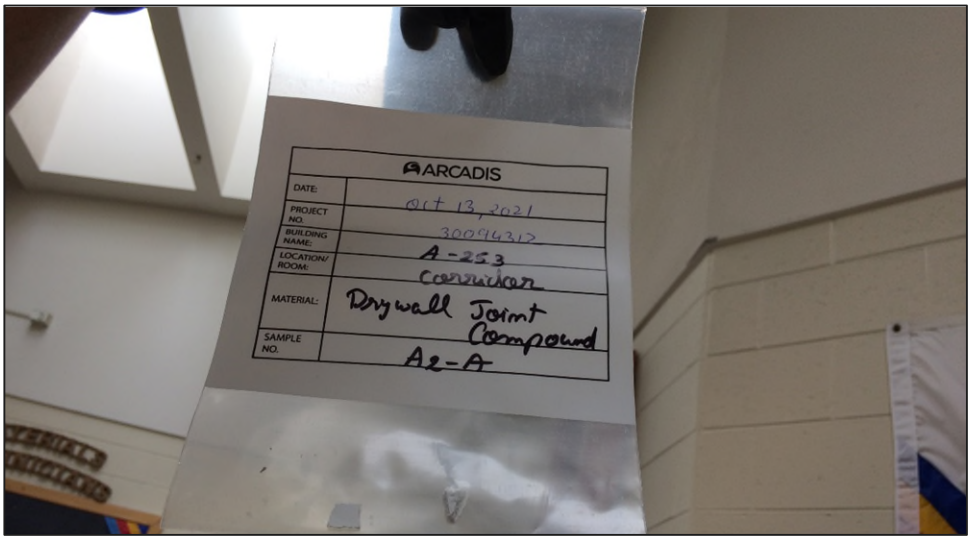



**Photo: 5**

**Date:**
October 13, 2021.

**Location/Description:**
Corridor/Sample A2-A – Non-asbestos-containing drywall joint compound.

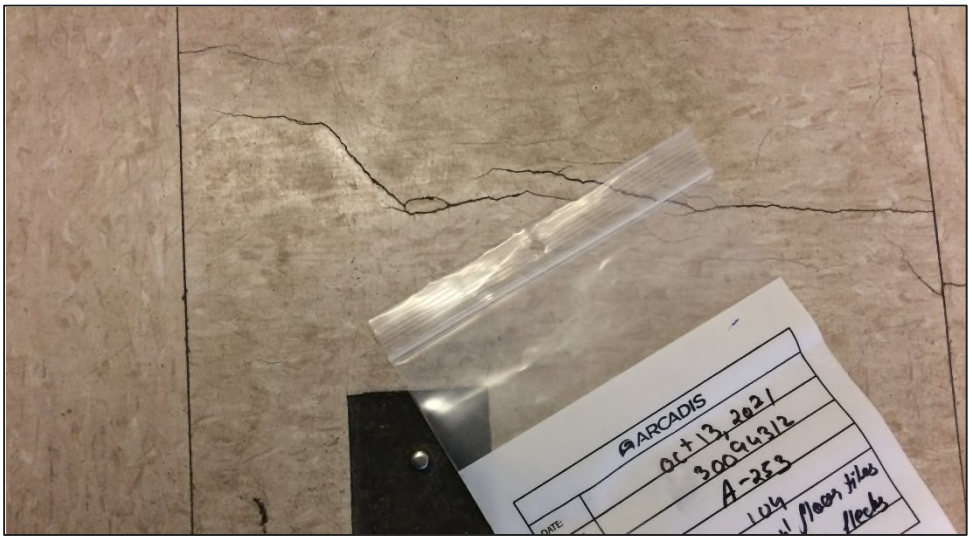



**Photo: 6**

**Date:**
October 13, 2021.

**Location/Description:**
Room 104/Sample A3-A – Non-asbestos-containing 12” vinyl floor tile – beige with white flecks.

## Project Photographs

Building A-253
CFB Borden, Ontario

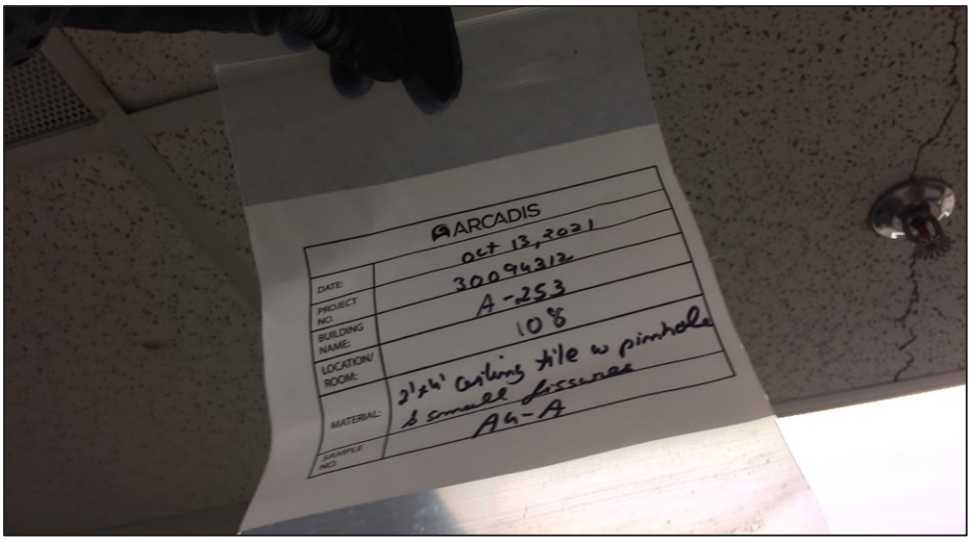



**Photo: 7**

**Date:**
October 13, 2021.

**Location/Description:**
Room 108/Sample A4-A – Non-asbestos-containing 2'x4' ceiling tile – pinholes and small fissures.

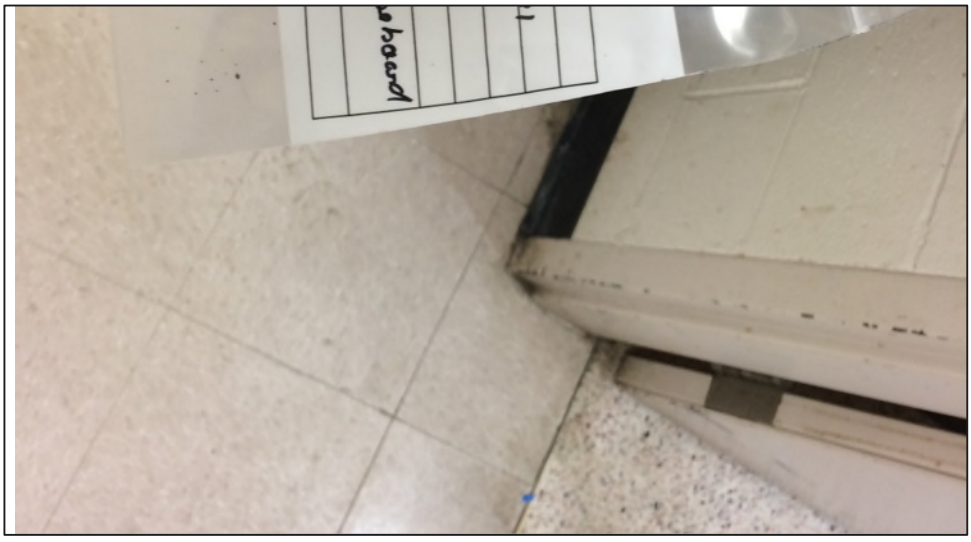


**Photo: 8**

**Date:**
October 13, 2021.

**Location/Description:**
Room 106/Sample A5-B – Non-asbestos-containing vinyl baseboard – black.

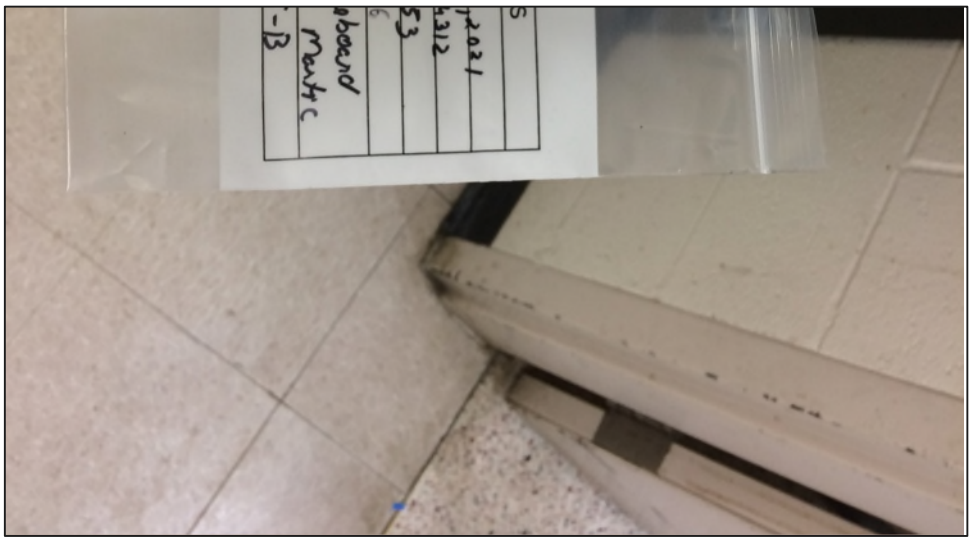


**Photo: 9**

**Date:**
October 13, 2021.

**Location/Description:**
Room 106/Sample A6-B – Non-asbestos-containing mastic behind vinyl baseboard – black.

## Project Photographs

Building A-253
CFB Borden, Ontario

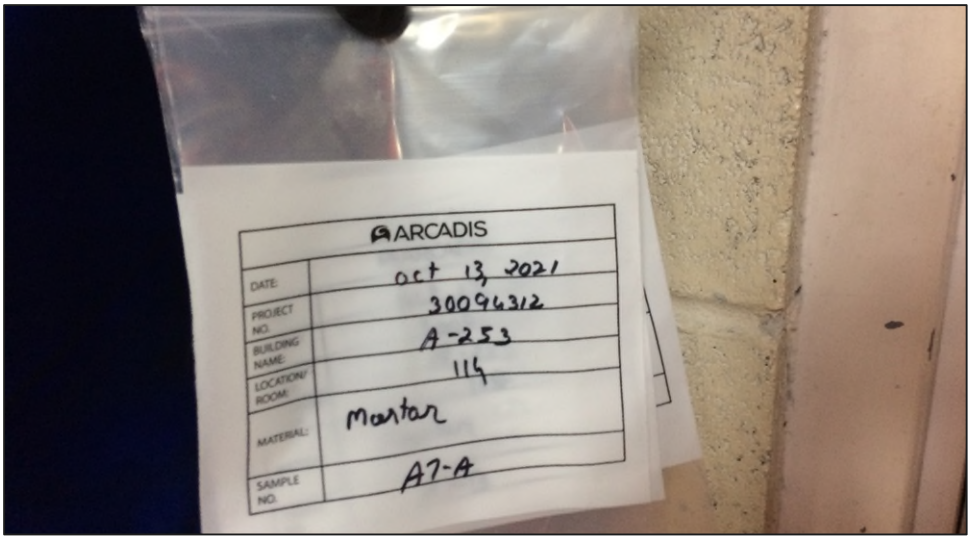



**Photo: 10**

**Date:**
October 13, 2021.

**Location/Description:**
Room 114/Sample A7-B – Non-asbestos-containing block wall mortar.

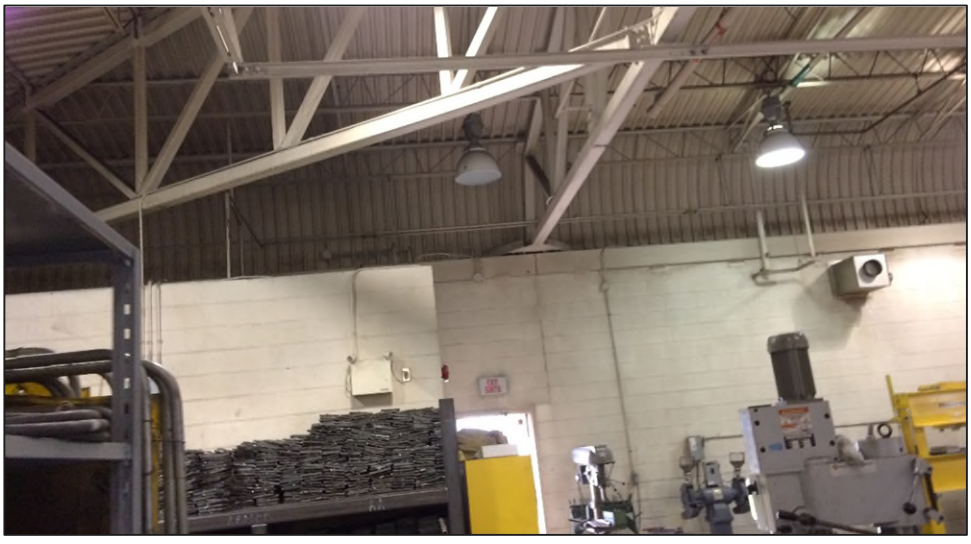


**Photo: 11**

**Date:**
October 13, 2021.

**Location/Description:**
General view of the workshop in Building A-253.

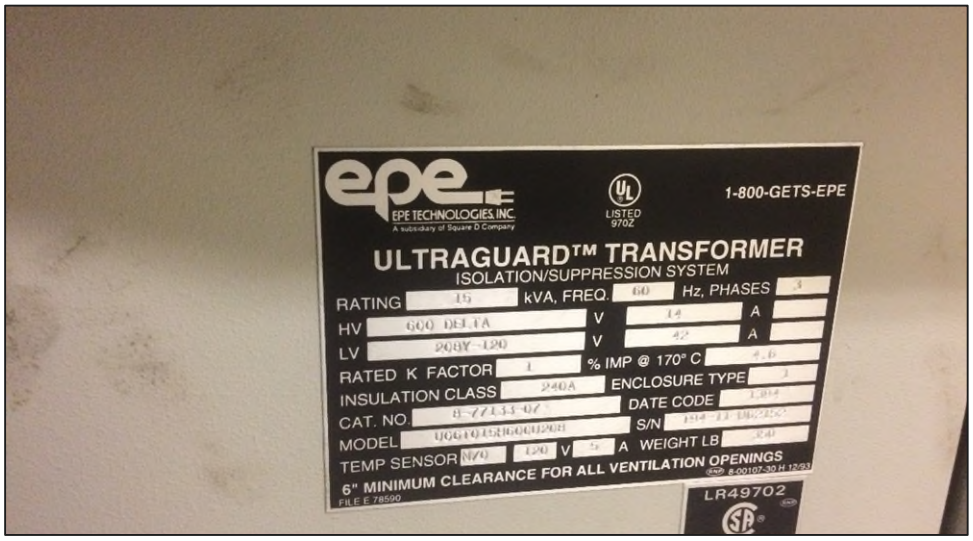



**Photo: 12**

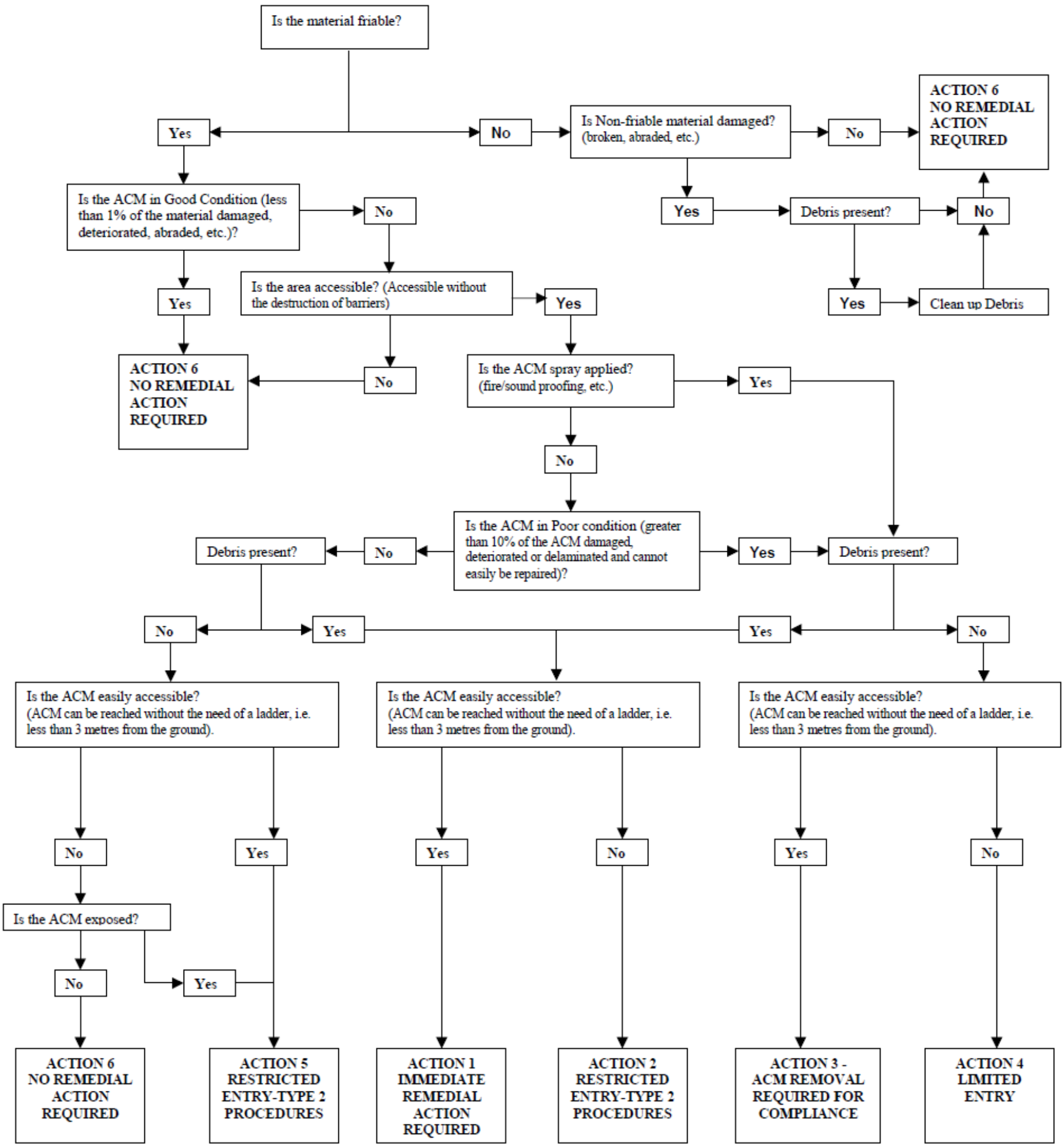
**Date:**
October 13, 2021.

**Location/Description:**
View of nameplate on dry-type transformer in Room 110.

# APPENDIX E

## Asbestos Condition Assessment and Response Chart

# ASBESTOS CONDITION ASSESSMENT AND RESPONSE CHART




| | |
|---|---|
| ACTION 1 – | Restrict access to the area and clean up the ACM debris using appropriate asbestos procedures. |
| ACTION 2 – | Restricted Entry into areas that contain, or may contain ACM Debris. All entry into the area will require at a minimum Type 2 procedures until the ACM debris have been cleaned up, and the source of the debris have been stabilized or removed. |
| ACTION 3 – | Asbestos removal required for compliance. Develop scope of work and utilize appropriate removal procedures. |
| ACTION 4 – | Limited Entry: personnel who enter into these areas have to be aware of the presence of the type and location of the ACM. If any entry into the area may cause a disturbance of the ACM, Type 2 procedures must be used for entry until the ACM is removed. |
| ACTION 5 – | ACM may be repaired if the ACM is considered to be in Fair Condition (less than 10% damaged), and it is unlikely for the material to be damaged, or disturbed again. Once the ACM has been repaired it may be treated as in GOOD condition (less than 1% damaged). |
| ACTION 6 – | No remedial action is required. The materials are to be managed in accordance with the Asbestos Management Directive. |
| NOTE: | *Pro Active Removal may be a part of an Asbestos Management plan or for removal of ACM that are in locations that may not be desirable regardless of the materials condition.* |

# APPENDIX F

## MOL – Sample List of Suspect Asbestos-Containing Building Materials

Ontario

Ministry of
Labour

# Appendix 2 – Sample List of Suspect Asbestos-Containing Building Materials

Issued: November 2007

Content last reviewed: May 2011

There are an estimated 3000 products that contain asbestos. In Ontario asbestos was widely used in sprayed-on material and in pipe and boiler insulation until 1973[3]. The use of many other asbestos containing materials continued until the mid 1980's. Asbestos is still used in the manufacture of a limited number of products, including some floor tiles, cement products, friction materials and textiles. The following list was adapted from the United States Environmental Protection Agency's (EPA) Sample List of Suspect Asbestos Containing Materials[4]. It is not an all inclusive list but is intended as a general guide to show which types of building materials may contain asbestos.

## Possible Asbestos-Containing Materials in Buildings

- Acoustical Plaster
- Adhesives
- Asphalt Floor Tile
- Base Flashing
- Blown-in (Loose fill) Insulation
- Boiler Insulation
- Breaching Insulation
- Caulking/Putties
- Ceiling Tiles and Lay-in Panels
- Cement Pipes
- Cement Siding
- Cement Wallboard
- Construction Mastics (floor tile, carpet, ceiling tile, etc.)
- Cooling Towers
- Decorative Plaster
- Ductwork Flexible Fabric Connections
- Electrical Cloth
- Electrical Panel Partitions
- Electrical Wiring Insulation
- Elevator Brake Shoes
- Elevator Equipment Panels
- Fire Doors
- Fireproofing Materials
- Flooring Backing
- Heating and Electrical Ducts
- High Temperature Gaskets
- HVAC Duct Insulation
- Joint Compounds
- Pipe Insulation (corrugated air-cell, block, etc.)
- Roofing Felt
- Roofing Shingles
- Spackling Compounds
- Sprayed-on Insulation

- Taping Compounds (thermal)
- Textured Paints/Coatings
- Thermal Paper Products
- Vinyl Floor Tile
- Vinyl Sheet Flooring
- Vinyl Wall Coverings
- Wallboard

[3] J.S. Dupre, J.F. Mustard & R.J. Uffin, *Report of the Royal Commission on Matters of Health and Safety Arising from the Use of Asbestos in Ontario*, Ontario Ministry of the Attorney General, Toronto, Ontario, 1984, page 12.

[4] US Environmental Protection Agency

ISBN 1-4249-1226-1 (HTML)
ISBN 1-4249-1226-1 (PRINT)
ISBN 1-4249-1226-1 (PDF)

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It is the responsibility of the workplace parties to ensure compliance with the legislation. This web resource does not constitute legal advice. If you require assistance with respect to the interpretation of the legislation and its potential application in specific circumstances, please contact your legal counsel.

While this web resource will also be available to Ministry of Labour inspectors, they will apply and enforce the OHSA and its regulations based on the facts as they may find them in the workplace. This web resource does not affect their enforcement discretion in any way.

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