

Part 1 General

1.1 REFERENCES

- .1 Definitions:
 - .1 Hazardous Materials: dangerous substances, dangerous goods, hazardous commodities and hazardous products, include but not limited to: poisons, corrosive agents, flammable substances, ammunition, explosives, radioactive substances, or materials that endanger human health or environment if handled improperly.
 - .2 Waste Management Co-ordinator (WMC): contractor representative responsible for supervising waste management activities as well as co-ordinating related, required submittal and reporting requirements.
 - .3 Waste Audit (WA): detailed inventory of materials in building. Involves quantifying by volume/weight amounts of materials and wastes generated during construction, demolition, deconstruction, or renovation project. Indicates quantities of reuse, recycling and landfill.
 - .4 Waste Reduction Workplan (WRW): written report which addresses opportunities for reduction, reuse, or recycling of materials. WRW is based on information acquired from WA.
- .2 Reference Standards:
 - .1 CSA International
 - .1 CSA S350-M1980(R2003), Code of Practice for Safety in Demolition of Structures.
 - .2 Department of Justice Canada (Jus)
 - .1 Canadian Environmental Assessment Act (CEAA), 1995, c. 37.
 - .2 Canadian Environmental Protection Act (CEPA), 1999, c. 33.
 - .1 SOR/2003-2, On-Road Vehicle and Engine Emission Regulations.
 - .2 SOR/2006-268, Regulations Amending the On-Road Vehicle and Engine Emission Regulations.
 - .3 Transportation of Dangerous Goods Act (TDGA), 1992, c. 34.
 - .3 Underwriters' Laboratories of Canada (ULC)
 - .1 CAN/ULC-S660-08, Standard for Nonmetallic Underground Piping for Flammable and Combustible Liquids.
 - .2 ULC/ORD-C58.15-1992, Overfill Protection Devices for Flammable Liquid Storage Tanks.
 - .3 ULC/ORD-C58.19-1992, Spill Containment Devices for Underground Flammable Liquid Storage Tanks.
 - .4 U.S. Environmental Protection Agency (EPA)
 - .1 EPA CFR 86.098-10, Emission standards for 1998 and later model year Otto-cycle heavy-duty engines and vehicles.

- .2 EPA CFR 86.098-11, Emission standards for 1998 and later model year diesel heavy-duty engines and vehicles.
- .3 EPA 832/R-92-005, Storm Water Management for Construction Activities: Developing Pollution Prevention Plans and Best Management Practices.

1.2 ADMINISTRATIVE REQUIREMENTS

- .1 Pre-Installation Meetings:
 - .1 Convene pre-installation meeting 1 week prior to beginning work of this Section on-site installation, with Departmental Representative in accordance with Section 01 31 19 - Project Meetings to:
 - .1 Verify project requirements.
 - .2 Verify existing site conditions adjacent to demolition work.
 - .3 Co-ordination with other construction subtrades.
 - .2 Hold project meetings every week, month.
 - .3 Ensure key personnel, subcontractor representatives attend.
 - .4 Departmental Representative will provide written notification of change to meeting schedule established upon contract award 24 hours prior to scheduled meeting.
- .2 Scheduling:
 - .1 Employ necessary means to meet project time lines without compromising specified minimum rates of material diversion.
 - .1 In event of unforeseen delay notify Departmental Representative in writing.

1.3 ACTION AND INFORMATIONAL SUBMITTALS

- .1 Submit in accordance with Section 01 33 00 - Submittal Procedures Section 01 74 21 - Construction/Demolition Waste Management Disposal.
- .2 WMC is responsible for fulfilment of reporting requirements.
- .3 Prior to beginning of Work on site submit detailed Waste Reduction Work plan in accordance with Section 01 74 21 - Construction/Demolition Waste Management and Disposal and indicate:
 - .1 Descriptions of and anticipated quantities in percentages of materials to be salvaged, reused, recycled and landfilled.
 - .2 Schedule of selective demolition.
 - .3 Number and location of dumpsters.
 - .4 Anticipated frequency of tippage.
 - .5 Name and address of haulers waste facilities waste receiving organizations.
- .4 Submit copies of certified weigh bills, bills of lading receipts from authorized disposal sites and reuse and recycling facilities for material removed from site on a weekly, monthly basis upon request of Departmental Representative.

- .1 Written authorization from Departmental Representative is required to deviate from haulers, facilities, receiving organizations listed in Waste Reduction Work plan.

.5 Shop Drawings:

- .1 Submit for review and approval demolition drawings, diagrams or details showing sequence of demolition work and supporting structures and underpinning.
- .2 Submit demolition drawings stamped and signed by professional engineer registered or licensed in Province of Alberta, Canada.

1.4 QUALITY ASSURANCE

- .1 Regulatory Requirements: Ensure Work is performed in compliance with applicable Provincial/Territorial and Municipal regulations.

1.5 SITE CONDITIONS

- .1 Environmental protection:
 - .1 Ensure Work is done in accordance with Section 01 35 43 - Environmental Procedures.
 - .2 Ensure Work does not adversely affect adjacent watercourses, groundwater and wildlife, or contribute to excess air and noise pollution.
 - .3 Fires and burning of waste or materials is not permitted on site.
 - .4 Do not bury rubbish waste materials.
 - .5 Do not dispose of waste or volatile materials including but not limited to: mineral spirits, oil, petroleum based lubricants, or toxic cleaning solutions into watercourses, storm or sanitary sewers.
 - .1 Ensure proper disposal procedures are maintained throughout project.
 - .6 Do not pump water containing suspended materials into watercourses, storm or sanitary sewers, or onto adjacent properties.
 - .7 Control disposal or runoff of water containing suspended materials or other harmful substances in accordance with authorities having jurisdiction as directed by Departmental Representative.
 - .8 Protect trees, plants and foliage on site and adjacent properties where indicated.
 - .9 Prevent extraneous materials from contaminating air beyond application area, by providing temporary enclosures during demolition work.
 - .10 Cover or wet down dry materials and waste to prevent blowing dust and debris. Control dust on all temporary roads.

1.6 EXISTING CONDITIONS

- .1 If material resembling spray or trowel applied asbestos or other designated substance listed as hazardous be encountered in course of demolition, stop work, take preventative measures, and notify Departmental Representative immediately. Proceed only after receipt of written instructions have been received from Departmental Representative.
- .2 Structures to be demolished are based on their condition on date that tender is accepted, at time of examination prior to tendering.

- .1 Remove, protect and store salvaged items as directed by Departmental Representative. Salvage items as identified by Departmental Representative Deliver to Departmental Representative as directed.

Part 2 Execution

2.1 PREPARATION

- .1 Temporary Erosion and Sedimentation Control:
 - .1 Provide temporary erosion and sedimentation control measures to prevent soil erosion and discharge of soil-bearing water runoff or airborne dust to adjacent properties and walkways, according to: requirements of authorities having jurisdiction.
 - .2 Inspect, repair, and maintain erosion and sedimentation control measures during demolition.
 - .3 Remove erosion and sedimentation controls and restore and stabilize areas disturbed during removal after completion of demolition work.
- .2 Protection of in-place conditions:
 - .1 Prevent movement, settlement or damage of adjacent structures, services, parts of existing building to remain.
 - .1 Provide bracing, shoring and underpinning as required.
 - .2 Repair damage caused by demolition as directed by Departmental Representative.
 - .2 Support affected structures and, if safety of structure being demolished adjacent structures or services appears to be endangered, take preventative measures, stop Work and immediately notify Departmental Representative.
 - .3 Prevent debris from blocking surface drainage system, elevators, mechanical and electrical systems which must remain in operation.
- .3 Surface Preparation:
 - .1 Disconnect electrical and telephone service lines entering buildings to be demolished.
 - .1 Post warning signs on electrical lines and equipment which must remain energized to serve other properties during period of demolition.
 - .2 Disconnect and cap designated mechanical services.
 - .1 Natural gas supply lines: remove in accordance with gas company requirements.
 - .2 Sewer and water lines: remove to property line in accordance with authority having jurisdiction as directed by Departmental Representative.
 - .3 Other underground services: remove and dispose of as directed by Departmental Representative in accordance with Section 33 71 73.02 - Underground Electrical Service.

2.2 DEMOLITION

- .1 Do demolition work in accordance with Section 01 56 00 - Temporary Barriers and enclosures.
- .2 Blasting operations not permitted during demolition.
- .3 Do blasting operations in accordance with CSA S350.
- .4 Remove contaminated or dangerous materials as defined by authorities having jurisdiction, relating to environmental protection, from site and dispose of in safe manner to minimize danger at site or during disposal.
- .5 Prior to start of Work remove contaminated or hazardous materials listed as hazardous as defined by authorities having jurisdiction as directed by Departmental Representative from site and dispose of at designated disposal facilities in safe manner and in accordance with TDGA and other applicable requirements Section 02 81 01 - Hazardous Materials. Refer Existing Conditions in PART 1.
- .6 Demolish parts of structures.
- .7 Remove existing equipment, services, and obstacles where required for refinishing or making good of existing surfaces, and replace as work progresses.
- .8 At end of each day's work, leave Work in safe and stable condition.
 - .1 Protect interiors of parts not to be demolished from exterior elements at all times.
- .9 Demolish to minimize dusting. Keep materials wetted as directed by Departmental Representative.
- .10 Demolish masonry and concrete walls in pieces suitable for reuse as specified.
- .11 Remove structural framing.
- .12 Contain fibrous materials to minimize release of airborne fibres while being transported within facility.
- .13 Only dispose of material specified by selected alternative disposal option for own use as directed by Departmental Representative.
 - .1 Additional disposal options to be provided by Departmental Representative.
- .14 Remove and dispose of demolished materials except where noted otherwise and in accordance with authorities having jurisdiction.

2.3 CLEANING

- .1 Develop Construction Waste Management Plan Waste Reduction Work plan related to Work of this Section.
- .2 Waste Management: separate waste materials for reuse, recycling in accordance with Section 01 74 21 - Construction/Demolition Waste Management and Disposal.
 - .1 Remove recycling containers and bins from site and dispose of materials at appropriate facility.
- .3 Divert excess materials from landfill to site approved Departmental Representative.
- .4 Designate appropriate security resources / measures to prevent vandalism, damage and theft.

- .5 Locate stockpiled materials convenient for use in new construction. Eliminate double handling wherever possible.
- .6 Stockpile materials designated for alternate disposal in location which facilitates removal from site and examination by potential end markets, and which does not impede disassembly, processing, or hauling procedures.
 - .1 Label stockpiles, indicating material type and quantity.
- .7 Remove stockpiled material as directed by Departmental Representative, when it interferes with operations of project construction.
- .8 Remove stockpiles of like materials by alternate disposal option once collection of materials is complete.
- .9 Transport material designated for alternate disposal using approved haulers facilities receiving organizations listed in Waste Reduction Work plan and in accordance with applicable regulations.
 - .1 Written authorization from Departmental Representative is required to deviate from haulers, facilities receiving organizations listed in Waste Reduction Work plan.
- .10 Dispose of materials not designated for alternate disposal in accordance with applicable regulations.
 - .1 Disposal facilities must be those approved of and listed in Waste Reduction Work plan.
 - .2 Written authorization from Departmental Representative is required to deviate from disposal facilities listed in Waste Reduction Work plan.

END OF SECTION

Part 1 General

1.1 SUMMARY

- .1 Comply with requirements of this Section when performing following Work:
 - .1 Renovation or hand demolition involving plaster products containing asbestos.

1.2 SECTION INCLUDES

- .1 Requirements and procedures for abatement of asbestos-containing materials of the type described within.

1.3 REFERENCES

- .1 Canadian General Standards Board (CGSB)
 - .1 CAN/CGSB-1.205-94, Sealer for Application of Asbestos Fibre Releasing Materials.
- .2 Department of Justice Canada (Jus)
 - .1 Canadian Environmental Protection Act, 1999 (CEPA).
- .3 Health Canada/Workplace Hazardous Materials Information System (WHMIS)
 - .1 Material Safety Data Sheets (MSDS).
- .4 Transport Canada (TC)
 - .1 Transportation of Dangerous Goods Act, 1992 (TDGA).
- .5 Underwriters' Laboratories of Canada (ULC)
- .6 Alberta Jobs, Skills, Training and Labour, Alberta Asbestos Abatement Manual (October, 2012)
- .7 Alberta Occupational Health and Safety Act, Regulation and Code
- .8 Alberta Building Code
- .9 Transportation of Dangerous Goods Regulation and/or the Environmental Protection and Enhancement Act, Waste Control Regulation (Alberta Regulation 129/1996 with amendments up to and including Albert Regulation 62/2013)
- .10 CSA Standard Z94.4-11 Selection, Care, and Use of Respirators
- .11 CGSB 1-GP-205M Standard for: Sealer for Application to Asbestos-Fibre Releasing Materials
- .12 ANSI 9.2 Fundamentals Governing the Design and Operation of Local Exhaust Systems.

1.4 DEFINITIONS

- .1 Airlock: ingress or egress system without permitting air movement between contaminated area and uncontaminated area. Consisting of two curtained doorways at least 2 m apart.
- .2 Amended Water: water with non-ionic surfactant wetting agent added to reduce water tension to allow wetting of fibres.
- .3 Asbestos-Containing Materials (ACMs): materials that contain 0.1 per cent or more asbestos including fallen materials and settled dust.

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- .4 Asbestos Work Area: area where work takes place which will, or may disturb ACMs.
 - .5 Authorized Visitors: Departmental Representative(s) and representative(s) of regulatory agencies.
 - .6 Competent worker: in relation to specific work, means a worker who:
 - .1 Is qualified because of knowledge, training and experience to perform the work.
 - .2 Is familiar with the provincial laws and with the provisions of the regulations that apply to the work.
 - .3 Has knowledge of all potential or actual danger to health or safety in the work.
 - .7 Curtained doorway: arrangement of closures to allow ingress and egress from one room to another while permitting minimal air movement between rooms, typically constructed as follows:
 - .1 Place two overlapping sheets of polyethylene over existing or temporarily framed doorway, secure each along top of doorway, secure vertical edge of one sheet along one vertical side of doorway, and secure vertical edge of other sheet along opposite vertical side of doorway.
 - .2 Reinforce free edges of polyethylene with duct tape and add weight to bottom edge to ensure proper closing.
 - .3 Overlap each polyethylene sheet at openings 1.5 m on each side.
 - .8 Dioctyl Phthalate (DOP) Test: testing method used to evaluate particle penetration and air flow resistance properties of filtration materials - HEPA filter leak test.
 - .9 Friable Materials: material that when dry can be crumbled, pulverized or powdered by hand pressure and includes such material that is crumbled, pulverized or powdered.
 - .10 HEPA vacuum: High Efficiency Particulate Air filtered vacuum equipment with filter system capable of collecting and retaining fibres greater than 0.3 microns in any dimension at 99.97% efficiency.
 - .11 Negative Air Pressure Machine: extracts air directly from work area and filters extracted air through a HEPA filter, discharge air to exterior of building.
 - .1 Maintain pressure differential of 5 to 7 Pa relative to adjacent areas outside of work areas. Machine to be equipped with alarm to warn of system breakdown, and equipped with instrument to continuously monitor and automatically record pressure differences.
 - .12 Non-Friable Material: material that when dry cannot be crumbled, pulverized or powdered by hand pressure.
 - .13 Occupied Area: any area of building or work site that is outside Asbestos Work Area.
 - .14 Polyethylene: polyethylene sheeting or rip-proof polyethylene sheeting with tape along edges, around penetrating objects, over cuts and tears, and elsewhere as required to provide protection and isolation.
 - .15 Sprayer: garden reservoir type sprayer or airless spray equipment capable of producing mist or fine spray. Must have appropriate capacity for scope of work.

1.5 SUBMITTALS

- .1 Submit proof satisfactory to Departmental Representative(s) that suitable arrangements have been made to dispose of asbestos-containing waste in accordance with requirements of authority having jurisdiction.
- .2 Submit Provincial and/or local requirements for Notice of Project Form.
- .3 Submit proof of Contractor's Asbestos Liability Insurance.

- .4 Submit to Departmental Representative(s) necessary permits for transportation and disposal of asbestos containing waste and proof that asbestos-containing waste has been received and properly disposed.
- .5 Submit proof satisfactory to Departmental Representative(s) that all asbestos workers have received appropriate training and education by a competent person in the hazards of asbestos exposure, personal hygiene related to the work, entry and exit from Asbestos Work Areas, aspects of work procedures and protective measures while working in Asbestos Work Areas, and the use, cleaning and disposal of respirators and protective clothing.
- .6 Submit proof that supervisory personnel have attended asbestos abatement course, of not less than two days duration, approved by Departmental Representative(s). Minimum of one supervisor for every ten workers.
- .7 Submit Worker's Compensation Board status and transcription of insurance.
- .8 Submit documentation including test results, fire and flammability data, and Material Safety Data Sheets (MSDS) for chemicals or materials including:
 - .1 Encapsulants;
 - .2 Amended water;
 - .3 Slow drying sealer.
- .9 Submit proof satisfactory to Departmental Representative(s) that employees have respirator fitting and testing. Workers must be fit tested (irritant smoke test) with respirator that is personally issued.

1.6 QUALITY ASSURANCE

- .1 Regulatory Requirements: comply with Federal, Provincial and local requirements pertaining to asbestos, provided that in case of conflict among these requirements or with these specifications more stringent requirement applies. Comply with regulations in effect at the time work is performed.
- .2 Health and Safety:
 - .1 Safety Requirements: worker and visitor protection.
 - .1 Protective equipment and clothing to be worn by workers while in Asbestos Work Area include:
 - .1 Air purifying half-mask respirator with N-100, R-100 or P-100 particulate filter, personally issued to worker and marked as to efficiency and purpose, suitable for protection against asbestos and acceptable to Provincial Authority having jurisdiction. The respirator to be fitted so that there is an effective seal between the respirator and the worker's face, unless the respirator is equipped with a hood or helmet. The respirator to be cleaned, disinfected and inspected after use on each shift, or more often if necessary, when issued for the exclusive use of one worker. The respirator is to have damaged or deteriorated parts replaced prior to being used by a worker; and, when not in use, to be stored in a convenient, clean and sanitary location. The employer is to establish written procedures regarding the selection, use and care of respirators, and a copy of the procedures to be provided to and reviewed with each worker who is required to wear a respirator. A worker not to be assigned to an operation requiring the use of a respirator unless he or she is physically able to perform the operation while using the respirator.
 - .2 Disposable type protective clothing that does not readily retain or permit penetration of asbestos fibres. Protective clothing to be provided by the

employer and worn by every worker who enters the work area, and the protective clothing to consist of a head covering and full body covering that fits snugly at the ankles, wrists and neck, in order to prevent asbestos fibres from reaching the garments and skin under the protective clothing. It includes suitable footwear, and it to be repaired or replaced if torn.

- .2 Remove street clothes in clean change room and put on respirator with new filters or reusable filters, clean coveralls and head covers before entering Work Area. Store street clothes, uncontaminated footwear, towels, and similar uncontaminated articles in clean change room.
- .3 Eating, drinking, chewing, and smoking are not permitted in Asbestos Work Area.
- .4 Before leaving Asbestos Work Area, the worker can decontaminate his or her protective clothing by using a vacuum equipped with a HEPA filter, or by damp wiping, before removing the protective clothing, or, if the protective clothing will not be reused, place it in a container for dust and waste. The container to be dust tight, suitable for asbestos waste, impervious to asbestos, identified as asbestos waste, cleaned with a damp cloth or a vacuum equipped with a HEPA filter immediately before removal from the work area, and removed from the work area frequently and at regular intervals.
- .5 Ensure workers wash hands and face when leaving Asbestos Work Area.
- .6 Ensure that no person required to enter an Asbestos Work Area has facial hair that affects seal between respirator and face.
- .7 Remove gross contamination from clothing before leaving work area. Place contaminated work suits in receptacles for disposal with other lead contaminated materials. Leave reusable items except respirator in Equipment and Access Room. When not in use in work area, store work footwear in Equipment and Access Room. Upon completion of lead abatement, dispose of footwear as contaminated waste or clean thoroughly inside and out using soap and water before removing from work area or from Equipment and Access Room.
- .8 Visitor Protection:
 - .1 Provide protective clothing and approved respirators to Authorized Visitors to work areas.
 - .2 Instruct Authorized Visitors in the use of protective clothing, respirators and procedures.
 - .3 Instruct Authorized Visitors in proper procedures to be followed in entering into and exiting from Asbestos Work Area.

1.7 WASTE MANAGEMENT AND DISPOSAL

- .1 Remove from site and dispose of packaging materials at appropriate recycling facilities.
- .2 Separate for recycling and place in designated containers all waste in accordance with Waste Management Plan.
- .3 Place materials defined as hazardous or toxic in designated containers.
- .4 Handle and dispose of hazardous materials in accordance with the CEPA, TDGA, Regional and Municipal regulations.

- .5 Disposal of asbestos waste generated by removal activities must comply with Federal, Provincial and Municipal regulations. Dispose of asbestos waste in sealed double thickness 6 mil bags or leak proof drums. Label containers with appropriate warning labels.
- .6 Provide manifests describing and listing waste created. Transport containers by approved means to licenced landfill for burial.

1.8 EXISTING CONDITIONS

- .1 Reports and information pertaining to ACMs to be handled, removed, or otherwise disturbed and disposed of during this Project are appended into this specification.
- .2 Notify Departmental Representative(s) of friable material discovered during Work and not apparent from drawings, specifications, or report pertaining to Work. Do not disturb such material until instructed by Departmental Representative(s).

1.9 SCHEDULING

- .1 Hours of Work: The hazardous materials abatement will commence at a date confirmed by Departmental Representative(s).
- .2 Abatement activities shall proceed upon acceptance of the Departmental Representative(s), incorporating preparation, removal and clean-up procedures, visual inspection and air clearance.
- .3 Allow sufficient time for inspection of the site by Departmental Representative(s) after site preparations and barriers are completed and before hazardous materials removal work commences. **The Contractor shall provide a minimum of twenty-four (24) hours notification for all pre-contamination and final visual inspection requests** to Departmental Representative(s).

1.10 INSTRUCTIONS

- .1 Before beginning Work, provide Authority having jurisdiction satisfactory proof that every worker has had instruction and training in hazards of asbestos exposure, in personal hygiene and work practices, in use of glove bag procedures, and in use, cleaning, and disposal of respirators and protective clothing.
- .2 Instruction and training related to respirators includes, at minimum:
 - .1 Fitting of equipment.
 - .2 Inspection and maintenance of equipment.
 - .3 Disinfecting of equipment.
 - .4 Limitations of equipment.
- .3 Instruction and training must be provided by competent, qualified person.

Part 2 Products

2.1 MATERIALS

- .1 Drop and Enclosure Sheets:
 - .1 Polyethylene: 0.15 mm thick.
 - .2 FR polyethylene: 0.15 mm thick woven fibre reinforced fabric bonded both sides with polyethylene.
- .2 Wetting Agent: 50% polyoxyethylene ester and 50% polyoxyethylene ether mixed with water in concentration to provide thorough wetting of asbestos containing material.

- .3 Waste Containers: contain waste in two separate containers.
 - .1 Inner container: 0.15 mm thick sealable polyethylene bag.
 - .2 Outer container: sealable metal or fibre type where there are sharp objects included in waste material; otherwise outer container may be sealable metal or fibre type or second 0.15 mm thick sealable polyethylene bag.
 - .3 Labelling requirements: affix preprinted cautionary asbestos warning, in both official languages, that is visible when ready for removal to disposal site.
- .4 Tape: tape suitable for sealing polyethylene to surfaces under both dry and wet conditions using amended water.
- .5 Slow - drying sealer: non-staining, clear, water - dispersible type that remains tacky on surface for at least 8 hours and designed for purpose of trapping residual asbestos fibres.
 - .1 Sealer: flame spread and smoke developed rating less than 50.
- .6 Waste Containers: contain waste in two separate containers.
 - .1 Inner container: 0.15 mm thick sealable polyethylene bag.
 - .2 Outer container: sealable metal or fibre type where there are sharp objects included in waste material; otherwise outer container may be sealable metal or fibre type or second 0.15 mm thick sealable polyethylene bag.
 - .3 Labelling requirements: affix preprinted cautionary asbestos warning, in both official languages, that is visible when ready for removal to disposal site. Label containers in accordance with Asbestos Regulations 29 CFR 1910.1001. Label in English.
- .7 Encapsulants: Type 2 surface film forming type Class A water based conforming to CAN/CGSB-1.205 and approved by the Fire Commissioner of Canada.

Part 3 Execution

3.1 SUPERVISION

- .1 Minimum of one Supervisor for every ten workers is required.
- .2 Approved Supervisor must remain within Asbestos Work Area during disturbance, removal, or other handling of asbestos-containing materials.

3.2 DECONTAMINATION FACILITIES

- .1 Decontamination facilities shall include:
 - .1 Clean change room.
 - .2 Asbestos waste transfer rooms.
 - .3 Protective equipment storage.
- .2 Provide minimum number of entrances into decontamination facility from outside asbestos control work area.
- .3 Obtain Departmental Representative's approval of location and construction of decontamination facility prior to commencement of work.
- .4 Provide adequate facilities for storage of protective equipment in decontamination facility.

3.3 NEGATIVE PRESSURE VENTILATION SYSTEM

- .1 Provide negative pressure ventilation system that is separate from building mechanical system.
- .2 System shall include:
 - .1 Make-up air drawn through decontamination facility.
 - .2 Exhaust air vented to building exterior through negative air units. If exhausted air cannot be vented outside the building, air monitoring must be conducted at negative air unit exhaust locations.
- .3 System shall:
 - .1 be capable of changing total volume of air in the containment area four times per hour, and
 - .2 maintain a negative pressure of 5 Pa across the barrier between the clean area and the asbestos control area.
- .4 Start operation of negative air system before beginning asbestos control work. Operate continuously until asbestos control work has been completed and fibre levels stabilize at levels acceptable to Departmental Representative.
- .5 Monitor condition of negative air unit filters on a regular basis and replace filters as required to maintain air changes and negative pressure.
- .6 Provide separate makeup air ducting and combustion air ducting to prevent backdrafting or damage to boilers, hot water heaters or any other gas fired equipment that is required to remain operational during asbestos removal work.

3.4 PREPARATION

- .1 Do construction occupational health and safety in accordance with applicable occupational health and safety regulations and project requirements.
- .2 At each access to Asbestos Work Area, install warning signs in English in upper case 'Helvetica Medium' letters reading as follows, where number in parentheses indicates font size to be used: 'CAUTION ASBESTOS HAZARD AREA (25 mm) / NO UNAUTHORIZED ENTRY (19 mm) / WEAR ASSIGNED PROTECTIVE EQUIPMENT (19 mm) / BREATHING ASBESTOS DUST MAY CAUSE SERIOUS BODILY HARM (7 mm)'.
- .3 Isolate the Asbestos Work Area using asbestos hazard banner tape. Install polyethylene rip-proof drop sheets at the Asbestos Work Area. The Contractor is to supply power and worker decontamination facility at the work area with proper supply of water.
- .4 Prepare worker decontamination area adjacent to the Asbestos Work Area. Provide HEPA-vacuum, antibacterial soap and warm water for worker decontamination.

3.5 ASBESTOS REMOVAL

- .1 Before removing asbestos:
 - .1 Prepare site as outline in Section 3.2.
 - .2 Spray asbestos material with water containing specified wetting agent, using airless spray equipment capable of providing "mist" application to prevent release of fibres. Saturate asbestos material sufficiently to wet it to substrate without causing excess dripping. Spray asbestos material repeatedly during work process to maintain saturation and to minimize asbestos fibre dispersion.

- .2 Remove asbestos material in small sections. Do not allow saturated asbestos to dry out. On an on-going basis collect the asbestos waste and place in sealable plastic bags 0.15 mm minimum thick, and place in labelled containers for transport.
- .3 Seal filled containers. Clean external surfaces thoroughly by wet sponging. Remove from immediate working area to Staging Area. Clean external surfaces thoroughly again by wet sponging before moving containers. Wash containers thoroughly in the work area before removal from site. Follow proper asbestos procedures outlined in the Alberta Asbestos Abatement Manual while moving waste for disposal.
- .4 After completion of stripping work, wire brush and wet sponge surfaces from which asbestos has been removed to remove visible material. During this work keep surfaces wet.
- .5 Where Departmental Representative decides complete removal of asbestos-containing material is impossible due to obstructions such as structural members or major service elements and provides written direction, encapsulate material as follows:
 - .1 Apply surface film forming type sealer to provide 0.635 mm minimum dry film thickness over sprayed asbestos surfaces. Apply using airless spray equipment to avoid blowing off fibres.
- .6 After wire brushing and wet sponging to remove visible asbestos, and after encapsulating asbestos-containing material impossible to remove, final clean and HEPA vacuum followed by wet cleaning entire work area including Equipment, and equipment used in process.
- .7 Work is subject to visual inspection and air monitoring. Contamination of surrounding areas indicated by visual inspection or air monitoring will require complete enclosure and clean-up of affected areas.
- .8 After inspection by the Departmental Representative, apply continuous coat of slow drying sealer to surfaces of work area.
- .9 Cleanup:
 - .1 Frequently during Work and immediately after completion of work, clean up dust and asbestos-containing waste using HEPA vacuum or by damp mopping/wiping.
 - .2 Place dust and asbestos-containing waste in sealed dust tight waste bags. Treat drop sheets and disposable protective clothing as asbestos waste and wet and fold to contain dust and then place in waste bags.
 - .3 Immediately before their removal from Asbestos Work Area and disposal, clean each filled waste bag using damp cloths or HEPA vacuum and place in second clean waste bag.
 - .4 Seal and remove double bagged waste from site. Dispose of waste in accordance with requirements of Provincial authority having jurisdiction. Supervise dumping and ensure that dump operator is fully aware of hazardous nature of material to be dumped and those guidelines and regulations for asbestos disposal are followed.
 - .5 Perform final thorough clean-up of Asbestos Work Areas and adjacent areas affected by Work using HEPA vacuum.
 - .6 Work is subject to visual inspection and air monitoring by the Department Representative. Contamination of surrounding areas indicated by visual inspection or air monitoring will require enclosure and clean-up of affected areas.

3.6 AIR MONITORING

- .1 From the commencement of work until completion of cleaning operations, air monitoring as required will be the responsibility of Departmental Representative(s) and will be conducted adjacent to the work area in accordance with *Alberta Asbestos Abatement Manual* (October, 2012). Air sampling reports will be submitted to Departmental Representative(s) and the Contractor on a daily basis.

- .1 Background area air samples will be collected prior to asbestos abatement activities to establish baseline airborne fibre levels. Area samples will be collected throughout the abatement process to monitor potential airborne fibre migration from within the asbestos abatement work areas into surrounding non-restricted work areas. Occupational samples will be collected throughout the abatement process to document that workers inside the asbestos abatement work areas are wearing adequate respiratory protection and that their work procedures minimize the generation of airborne fibre concentrations.
- .2 If the fibre levels from area air samples outside the asbestos work areas exceed 10% of the Occupational Exposure Limit (0.01 fibres/cubic centimetres), work procedures will be reviewed. If the fibre levels exceed 50% of the Occupational Exposure Limit (0.05 f/cc), suspension of removal operations will result. The Contractor must bear all associated costs, including any cleaning required to the satisfaction of Departmental Representative(s).
- .2 Air clearance samples within the moderate-risk containments shall be collected in accordance with the Provincial requirements. Aggressive air sampling techniques will be used to carry out air clearance sampling in all moderate-risk containments. If concentrations are below 0.01 f/cc, the Contractor will be given permission to remove the work area enclosures and decontamination facilities.
- .3 During the course of Work, Departmental Representative(s) to measure fibre content of air outside and inside Work areas by means of air samples analyzed by Phase Contrast Microscopy (PCM).

3.7 INSPECTION

- .1 Daily inspection services will be carried out by Departmental Representative(s) who will conduct a review of the Contractor's site specific asbestos work procedures to confirm that the identified asbestos-containing materials are included within the Contractor's scope of work and to ascertain that the abatement methods proposed by the Contractor comply with applicable regulations and guidelines and this specification.
- .2 Departmental Representative(s) will conduct daily site inspections during asbestos abatement activities as required. During the asbestos abatement process, Departmental Representative(s) will conduct pre-contamination inspections, daily site inspections, and final visual inspections to assess contractor compliance and to evaluate contractor performance. The pre-contamination inspections will be conducted to review proper work area set-up and execution of the scope of work. The daily site inspections will be conducted to document the Contractor's work procedures and the proper operation of the asbestos control systems in place. The final visual inspections will be conducted to document the removal of the asbestos-containing materials within the scope of work.
- .3 Departmental Representative(s) will inspect Work for:
 - .1 Adherence to specific procedures and materials.
 - .2 Final cleanliness and completion.
 - .3 No additional costs will be allowed by Contractor for additional labour or materials required to provide specified performance level.
- .4 When asbestos leakage from Asbestos Work Area has occurred or is likely to occur Departmental Representative(s) may order Work shutdown.
 - .1 No additional costs will be allowed by Contractor for additional labour or materials required to provide specified performance level.

END OF SECTION

Part 1 General

1.1 SUMMARY

- .1 Comply with requirements of this Section when performing following Work:
 - .1 Renovation or impacting cinderblock walls filled with asbestos-containing vermiculite insulation.

1.2 SECTION INCLUDES

- .1 Remove and dispose of asbestos-containing vermiculite insulation located within cinderblock walls in the locations where roof drains will be installed at the top of the roof, and where drains will penetrate the cinderblock wall. Refer to architectural drawings for locations of roof drains and where the renovation activities may impact the cinderblock walls.
- .2 Encapsulation of cinderblock wall cavities following removal of vermiculite insulation to further reduce the likelihood of unintentional release of residual vermiculite insulation during renovation activities.

1.3 REFERENCES

- .1 Canadian General Standards Board (CGSB).
 - .1 CAN/CGSB-1.205-94, Sealer for Application of Asbestos Fibre Releasing Materials.
- .2 Department of Justice Canada (Jus).
 - .1 Canadian Environmental Protection Act, 1999 (CEPA).
- .3 Health Canada/Workplace Hazardous Materials Information System (WHMIS).
 - .1 Material Safety Data Sheets (MSDS).
- .4 Transport Canada (TC).
 - .1 Transportation of Dangerous Goods Act, 1992 (TDGA).
- .5 Underwriters' Laboratories of Canada (ULC).
- .6 Alberta Jobs, Skills, Training and Labour, Alberta Asbestos Abatement Manual (October, 2012).
- .7 Alberta Occupational Health and Safety Act, Regulation and Code.
- .8 Alberta Building Code, 2014.
- .9 Transportation of Dangerous Goods Regulation and/or the Environmental Protection and Enhancement Act, Waste Control Regulation (Alberta Regulation 129/1996 with amendments up to and including Albert Regulation 62/2013).
- .10 CSA Standard Z94.4-11 Selection, Care, and Use of Respirators.
- .11 CGSB 1-GP-205M Standard for: Sealer for Application to Asbestos-Fibre Releasing Materials.
- .12 ANSI 9.2 Fundamentals Governing the Design and Operation of Local Exhaust Systems.

1.4 DEFINITIONS

- .1 Airlock: ingress or egress system restricting air movement between contaminated area and uncontaminated area. Consisting of two overlapping curtained doorways, spaced at least 2 m apart.
- .2 Amended Water: water with a non-ionic surfactant wetting agent added to reduce water tension to allow wetting of fibres.
- .3 Asbestos-Containing Materials (ACMs): materials that contain any amount of asbestos, including fallen materials and settled dust.
- .4 Asbestos Work Area: area where work takes place which will, or may disturb ACMs.
- .5 Authorized Visitors: Departmental Representative(s) and representative(s) of regulatory agencies.
- .6 Competent worker: in relation to specific work, means a worker who:
 - .1 Is qualified because of knowledge, training and experience to perform the work.
 - .2 Is familiar with the provincial laws and with the provisions of the regulations that apply to the work.
 - .3 Has knowledge of all potential or actual danger to health or safety in the work.
- .7 Curtained doorway: arrangement of closures to allow ingress and egress from one room to another while permitting minimal air movement between rooms, typically constructed as follows:
 - .1 Place two overlapping sheets of polyethylene over existing or temporarily framed doorway, secure each along top of doorway, secure vertical edge of one sheet along one vertical side of doorway, and secure vertical edge of other sheet along opposite vertical side of doorway.
 - .2 Reinforce free edges of polyethylene with duct tape and weight bottom edge to ensure proper closing.
 - .3 Overlap each polyethylene sheet at openings not less than 1.5 m on each side.
- .8 DOP Test: testing method used to evaluate particle penetration and air flow resistance properties of filtration materials using dioctyl phthalate (DOP) - HEPA-filter leak test.
- .9 Friable Material: material that when dry can be crumbled, pulverized or powdered by hand pressure and includes such material that is crumbled, pulverized or powdered.
- .10 HEPA vacuum: High Efficiency Particulate Air filtered vacuum equipment with a filter system capable of collecting and retaining fibres greater than 0.3 microns in any direction at 99.97% efficiency.
- .11 Negative pressure: system that extracts air directly from work area, filters such extracted air through High Efficiency Particulate Air filtering system, and discharges this air directly outside work area to exterior of building.
 - .1 System to maintain minimum pressure differential of 5 Pa relative to adjacent areas outside of work areas, be equipped with alarm to warn of system breakdown, and be equipped with instrument to continuously monitor and automatically record pressure differences.

- .12 Non-Friable Material: material that when dry cannot be crumbled, pulverized or powdered by hand pressure.
- .13 Occupied Area: any area of building or work site that is outside Asbestos Work Area.
- .14 Polyethylene sheeting sealed with tape: Polyethylene sheeting of type and thickness specified sealed with tape along edges, around penetrating objects, over cuts and tears, and elsewhere as required to provide continuous polyethylene membrane to protect underlying surfaces from water damage or damage by sealants, and to prevent escape of asbestos fibres through sheeting into clean area.
- .15 Sprayer: garden reservoir type sprayer or airless spray equipment capable of producing mist or fine spray. Must be appropriate capacity for scope of work.
- .16 Glove Bag: prefabricated glove bag as follows:
 - .1 Minimum thickness 0.25 mm polyvinyl-chloride bag.
 - .2 Integral 0.25 mm thick polyvinyl-chloride gloves and elastic ports.
 - .3 Equipped with reversible double-pull double throw zipper on top.
 - .4 Straps for sealing ends around pipe.
 - .5 Must incorporate internal closure strip if it is to be moved or used in more than one specific location.

1.5 SUBMITTALS

- .1 Submit proof satisfactory to Departmental Representative(s) that suitable arrangements have been made to dispose of asbestos-containing waste in accordance with requirements of authority having jurisdiction.
- .2 Submit Provincial and/or local requirements for Notice of Project Form.
- .3 Submit proof of Contractor's Asbestos Liability Insurance.
- .4 Submit to Departmental Representative(s) necessary permits for transportation and disposal of asbestos containing waste and proof that asbestos-containing waste has been received and properly disposed.
- .5 Submit proof satisfactory to Departmental Representative(s) that all asbestos workers have successfully completed the 16-hour Alberta Asbestos Worker Certification Course.
- .6 Submit Worker's Compensation Board status and transcription of insurance.
- .7 Submit documentation including test results, fire and flammability data, and Material Safety Data Sheets (MSDS) for chemicals or materials including:
 - .1 Encapsulants;
 - .2 Amended water; and,
 - .3 Slow drying sealer.

- .8 Submit proof satisfactory to Departmental Representative(s) that employees have respirator fitting and testing. Workers must be fit tested (irritant smoke test) with respirator that is personally issued.

1.6 QUALITY ASSURANCE

- .1 Regulatory Requirements: comply with Federal, Provincial/Territorial and local requirements pertaining to asbestos, provided that in case of conflict among those requirements or with these specifications more stringent requirement applies. Comply with regulations in effect at time work is performed.

- .2 Health and Safety:

- .1 Safety Requirements: worker and visitor protection.

- .1 Protective equipment and clothing to be worn by workers while in Asbestos Work Area includes:

- .1 Powered air-purifying respirator equipped with P-100 particulate cartridges, personally issued to worker and marked as to efficiency and purpose, and acceptable to Authority having jurisdiction as suitable for type of asbestos and level of asbestos exposure in Asbestos Work Area. If disposable type filters are used, provide sufficient filters so that workers can install new filters following disposal of used filters and before re-entering contaminated areas. The respirator to be fitted so that there is an effective seal between the respirator and the worker's face, unless the respirator is equipped with a hood or helmet. The respirator is to be cleaned, disinfected and inspected after use on each shift, or more often if necessary, when issued for the exclusive use of one worker. The respirator is to have damaged or deteriorated parts replaced prior to being used by a worker; and, when not in use, to be stored in a convenient, clean and sanitary location. The employer is to establish written procedures regarding the selection, use and care of respirators, and a copy of the procedures to be provided to and reviewed with each worker who is required to wear a respirator. A worker not to be assigned to an operation requiring the use of a respirator unless he or she is physically able to perform the operation while using the respirator.

- .2 Disposable-type protective clothing that does not readily retain or permit penetration of asbestos fibres, consisting of full-body covering including head covering with snug-fitting cuffs at wrists, ankles, and neck, in order to prevent asbestos fibres from reaching the garments and skin under the protective clothing. It includes suitable footwear, and it to be repaired or replaced if torn.

- .2 Remove street clothes in clean change room and put on respirator with new filters or reusable filters that have been tested as satisfactory, clean coveralls and head covers before entering Decontamination Rooms or Asbestos Work Area. Store street clothes, uncontaminated footwear, towels, and similar uncontaminated articles in clean change room.

- .3 Eating, drinking, chewing, and smoking are not permitted in Asbestos Work Area.

- .4 Remove gross contamination from clothing before leaving work area then proceed to Decontamination Room and remove clothing except respirators. Place contaminated worksuits in receptacles for disposal with other

asbestos-contaminated materials. Leave reusable items except respirator in Decontamination Room. Still wearing the respirator proceed naked to showers. Using soap and water wash body and hair thoroughly. Clean outside of respirator with soap and water while showering; remove respirator; remove filters and wet them and dispose of filters in container provided for purpose; and wash and rinse inside of respirator. When not in use in work area, store work footwear in Decontamination Room. Upon completion of asbestos abatement, dispose of footwear as contaminated waste or clean thoroughly inside and out using soap and water before removing from work area or from Decontamination Room.

- .5 After showering and drying off, proceed to clean change room and dress in street clothes at end of each day's work, or in clean coveralls before eating, smoking, or drinking. If re-entering work area, follow procedures outlined in paragraphs above.
- .6 Enter unloading room from outside dressed in clean coveralls to remove waste containers and equipment from Holding Room of Container and Equipment Decontamination Enclosure system. Workers must not use this system as means to leave or enter work area.
- .7 Ensure workers are fully protected with respirators and protective clothing during preparation of system of enclosures prior to commencing actual asbestos abatement.
- .8 Provide and post in Clean Change Room and in Decontamination Room the procedures described in this Section.
- .9 Ensure that no person required to enter an Asbestos Work Area has facial hair that affects seal between respirator and face.
- .10 Visitor Protection:
 - .1 Provide protective clothing and approved respirators to Authorized Visitors to work areas.
 - .2 Instruct Authorized Visitors in the use of protective clothing, respirators and procedures.
 - .3 Instruct Authorized Visitors in proper procedures to be followed in entering into and exiting from Asbestos Work Area.

1.7 WASTE MANAGEMENT AND DISPOSAL

- .1 Remove from site and dispose of asbestos waste at appropriate landfill facilities.
- .2 Disposal of asbestos waste generated by removal activities must comply with Federal, Provincial and Municipal regulations. Dispose of asbestos waste in sealed double thickness 6 ml bags or leak proof drums. Label containers with appropriate warning labels.
- .3 Prepare waste manifests in accordance with TDGA requirements. Provide copies of waste manifests to the Departmental Representative. Transport containers by approved means to licenced landfill for burial.

1.8 EXISTING CONDITIONS

- .1 Reports and information pertaining to ACMs to be handled, removed, or otherwise disturbed and disposed of during this Project are appended into this specification.

- .2 Notify Departmental Representative(s) of friable material discovered during Work that is not apparent from drawings, specifications, or report pertaining to Work. Do not disturb such material until instructed by Departmental Representative(s).

1.9 SCHEDULING

- .1 Hours of Work: The asbestos abatement will commence at a date confirmed by Departmental Representative(s).
- .2 Abatement activities shall proceed upon acceptance of the Departmental Representative(s), incorporating preparation, removal and clean-up procedures, visual inspection and air clearance.
- .3 Allow sufficient time for pre-contamination, daily and final visual assessments by Departmental Representative(s). **The Contractor shall provide a minimum of twenty-four (24) hours notification for all pre-contamination and final visual inspection requests** to Departmental Representative(s).
- .4 Inform sub-trades of presence of friable asbestos-containing materials identified in Existing Conditions.
- .5 Submit to Departmental Representative copy of notifications prior to start of Work.

1.10 INSTRUCTIONS

- .1 Before beginning Work, provide to Departmental Representative satisfactory proof that asbestos workers have successfully completed the 16-hour Alberta Asbestos Worker Certification course. The training must include hazards of asbestos exposure, personal hygiene including dress and showers, entry and exit from Asbestos Work Area, aspects of work procedures including glove bag procedures, and in use, cleaning, and disposal of respirators and protective clothing.
- .2 Instruction and training related to respirators includes, at minimum:
 - .1 Proper fitting of equipment.
 - .2 Inspection and maintenance of equipment.
 - .3 Disinfecting of equipment.
 - .4 Limitations of equipment.
- .3 Instruction and training must be provided by competent, qualified person.
- .4 Supervisory personnel to complete required training as outlined in Section 1.10.1.

Part 2 Products

2.1 MATERIALS

- .1 Drop Sheets and Enclosure Sheeting:
 - .1 Polyethylene: minimum 0.15 mm thick unless otherwise specified; in sheet size to minimize joints.
 - .2 FR polyethylene: minimum 0.15 mm thick, woven fibre reinforced fabric bonded both sides with polyethylene.
- .2 Wetting agent: 50% polyoxyethylene ester and 50% polyoxyethylene ether, or other material approved by Departmental Representative, mixed with water in concentration to provide adequate penetration and wetting of asbestos-containing material.
- .3 Waste Containers: contain waste in two separate containers.

- .1 Inner container: 0.15 mm thick sealable polyethylene bag.
- .2 Outer container: sealable metal or fibre type where there are sharp objects included in waste material; otherwise outer container may be sealable metal or fibre type or second 0.15 mm thick sealable polyethylene bag.
- .3 Labelling requirements: affix preprinted cautionary asbestos warning, in both official languages, that is visible when ready for removal to disposal site.
- .4 Tape: fibreglass - reinforced duct tape suitable for sealing polyethylene under both dry conditions and wet conditions using amended water.
- .5 Slow - drying sealer: non-staining, clear, water - dispersible type that remains tacky on surface for at least 8 hours and designed for purpose of trapping residual asbestos fibres.
- .6 Encapsulants: Type 2 surface film forming type Class A water based conforming to CAN/CGSB-1.205 and approved by the Fire Commissioner of Canada.
- .7 Glove bag: acceptable materials include safe-T-strip products in configuration suitable for Work, or alternative material approved by addendum during tendering period in accordance with Instructions to Tenderers.

Part 3 Execution

3.1 SUPERVISION

- .1 Minimum of one Supervisor for every ten workers is required.
- .2 Approved Supervisor must remain within Asbestos Work Area during disturbance, removal, or other handling of asbestos-containing materials.

3.2 PREPARATION

- .1 Work Areas:
 - .1 Shut off and isolate air handling and ventilation systems to prevent fibre dispersal to other building areas during work phase. Seal and caulk joints and seams of active return air ducts within Asbestos Work Area.
 - .2 Construct enclosures at each of the locations at which rainwater leaders will be installed in the exterior block walls in accordance with the guidelines outlined in the Alberta Asbestos Abatement Manual.
 - .3 Establish negative pressure system and operate continuously from the start of abatement until final completion of work, including final cleanup. Provide continuous monitoring of pressure difference using automatic recording instrument.
 - .4 Cover floor and wall surfaces with polyethylene sheeting sealed with tape. Use one layer of FR polyethylene on floors. Cover floors first so that polyethylene extends at least 300 mm up walls then cover walls to overlap floor sheeting.
 - .5 Build airlocks at entrances to and exits from work areas so that work areas are always closed off by one curtained doorway when workers enter or exit.
 - .6 At each access to work areas install warning signs in both official languages in upper case "Helvetica Medium" letters reading as follows where number in parentheses indicates font size to be used: "CAUTION ASBESTOS HAZARD AREA (25 mm) NO

UNAUTHORIZED ENTRY (19 mm) WEAR ASSIGNED PROTECTIVE EQUIPMENT (19 mm) BREATHING ASBESTOS DUST MAY CAUSE SERIOUS BODILY HARM (7 mm)".

- .7 Where application of water is required for wetting asbestos-containing materials, shut off electrical power to area, provide 24 volt safety lighting and ground fault interrupter circuits on power source for electrical tools, in accordance with applicable CSA Standard. Ensure safe installation of electrical lines and equipment.
- .2 Worker Decontamination System:
 - .1 Worker Decontamination System includes Decontamination Room, Shower Room, and Clean Room, as follows:
 - .1 Decontamination Room: build Decontamination Room between Shower Room and work area[s], with two curtained doorways, one to Shower Room and one to work area[s]. Install waste receptor and storage facilities for workers' shoes and protective clothing to be reworn in work area[s]. Build Decontamination Room large enough to accommodate specified facilities, other equipment needed, and at least one worker allowing him /her sufficient space to undress comfortably.
 - .2 Shower Room: build Shower Room at one fixed location. Shower room will service each of the ten abatement locations. Provide one shower for every five workers. Provide constant supply of hot and cold or warm water. Drains to common sewers are available. Provide piping and connect to water sources and drains. Pump waste water through 5 micrometre filter system acceptable to Departmental Representative before directing into drains. Provide soap, clean towels, and appropriate containers for disposal of used respirator filters.
 - .3 Clean Room: build Clean Room between Decontamination Room and clean areas outside of enclosures, with two curtained doorways, one to outside of enclosures and one to Decontamination Room. Provide lockers or hangers and hooks for workers' street clothes and personal belongings. Provide storage for clean protective clothing and respiratory equipment. Install mirror to permit workers to fit respiratory equipment properly.
 - .4 Contractor may elect to build one remote central Worker Decontamination System to support the various enclosures along the exterior walls, as opposed to building Worker Decontamination Systems for each enclosure. If the contractor chooses this option, the contractor must prepare a site specific plan to the Department Representative for review outlining the proposed location of the remote Worker Decontamination System, designated routs, signage, drop sheeting and worker decontamination protocols for accessing the remote Worker Decontamination System.
- .3 Construction of Decontamination Enclosures:
 - .1 Build suitable framing for enclosures and line with polyethylene sheeting sealed with tape. Use one layer of FR polyethylene on floors.
 - .2 Build curtained doorways between enclosures so that when people move through or when waste containers and equipment are moved through doorway, one of two closures comprising doorway always remains closed.
- .4 Maintenance of Enclosures:
 - .1 Maintain enclosures in tidy condition.

- .2 Ensure that barriers and polyethylene linings are effectively sealed and taped. Repair damaged barriers and remedy defects immediately upon discovery.
- .3 Visually inspect enclosures at beginning and end of each working period.
- .4 Use smoke methods to test effectiveness of barriers when directed by Departmental Representative.
- .5 Do not begin Asbestos Abatement work until:
 - .1 Arrangements have been made for disposal of waste.
 - .2 Work areas and decontamination are effectively segregated.
 - .3 Tools, equipment, and materials waste containers are on hand.
 - .4 Arrangements have been made for building security.
 - .5 Warning signs are displayed where access to contaminated areas is possible.
 - .6 Notifications have been completed and other preparatory steps have been taken.

3.3 ASBESTOS REMOVAL

- .1 Before removing asbestos:
 - .1 Prepare the work areas.
- .2 Remove asbestos-containing material in small sections. As it is being removed pack material in sealable plastic bags 0.15 mm minimum thick and place in labelled containers for transport.
- .3 Seal filled containers. Clean external surfaces thoroughly by wet sponging. Remove from immediate working area to Staging Area. Clean external surfaces thoroughly again by wet-sponging before moving containers to Decontamination Room. Wash containers thoroughly in Decontamination Room, and store in Staging Area until transport.
- .4 Where Departmental Representative decides complete removal of asbestos-containing material is impossible due to obstructions such as crevices within block wall cavities, the presence of mortar preventing draining of vermiculite insulation and provides written direction, encapsulate material as follows:
 - .1 Apply surface film forming type sealer to provide 0.635 mm minimum dry film thickness over asbestos-contaminated surfaces. Apply using airless spray equipment to avoid blowing off fibres.
 - .2 Install fibreglass insulation into top and bottom openings of exposed cinderblock wall cavities.
 - .3 Apply expanding spray-foam to seal in the fibreglass insulation and to reduce the likelihood of further release of asbestos-containing vermiculite insulation from the block wall cavities.
- .5 After wire brushing and wet sponging to remove visible asbestos, wet clean entire work area including Decontamination Room, and equipment used in process. After inspection by Departmental Representative, apply continuous coat of slow-drying sealer to surfaces of work area. Allow at least 8 hours with no entry, activity, ventilation, or disturbance other than operation of negative pressure units during this period.

3.4 FINAL CLEANUP

- .1 Following cleaning specified in 3.3.5 above, and when air sampling shows that asbestos levels within the containments do not exceed 0.01 fibres/cc as determined by NIOSH 7400A methodology, proceed with final cleanup.

- .2 Remove polyethylene sheet by rolling it away from walls to centre of work area. Vacuum visible asbestos-containing particles observed during cleanup, immediately, using HEPA vacuum equipment.
- .3 Place polyethylene seals, tape, cleaning material, clothing, and other contaminated waste in plastic bags and sealed labelled waste containers for transport.
- .4 Include in clean-up enclosures, worker decontamination systems, and other contaminated enclosures.
- .5 Include in clean-up sealed waste containers and equipment used in Work and remove from work areas, via Container and Equipment Decontamination Enclosure System, at appropriate time in cleaning sequence.
- .6 Conduct final check to ensure that no dust or debris remains on surfaces as result of dismantling operations and carry out air-monitoring again to ensure that asbestos levels in building do not exceed 0.01 fibres/cc. Repeat cleaning using HEPA vacuum equipment, or wet cleaning methods where feasible, in conjunction with sampling until levels meet this criteria.
- .7 As work progresses, and to prevent exceeding available storage capacity on site, remove sealed and labelled containers containing asbestos waste and dispose of at a licensed landfill.

3.5 RE-ESTABLISHMENT OF OBJECTS AND SYSTEMS

- .1 When cleanup is complete:
 - .1 Re-establish objects and furniture moved to temporary locations in course of Work, in their former positions.
 - .2 Re-establish mechanical and electrical systems in proper working order. Install new filters.
 - .3 Repair or replace objects damaged in the course of Work, as directed by Departmental Representative.

3.6 AIR MONITORING

- .1 From beginning of Work until completion of cleaning operations, Departmental Representative will collect air samples on daily basis.
 - .1 Background area air samples will be collected prior to asbestos abatement activities to establish baseline airborne fibre levels. Area samples will be collected throughout the abatement process to monitor potential airborne fibre migration from within the asbestos abatement work areas into surrounding non-restricted work areas. Occupational samples will be collected throughout the abatement process to evaluate if workers inside the asbestos enclosures are wearing adequate respiratory protection, and that their work procedures minimize the generation of airborne fibre concentrations.
 - .2 Contractor will be responsible for wearing occupational air samples while working inside the enclosure in accordance with applicable Provincial Occupational Health and Safety Regulations.
- .2 Use results of air monitoring inside enclosures to establish type of respirators to be used. Workers may be required to wear sample pumps for up to full-shift periods.

- .1 If fibre levels are above safety factor of respirators in use, stop abatement, apply means of dust suppression, and use higher safety factor in respiratory protection for persons inside enclosure.
- .2 If air monitoring shows that areas outside the enclosures are contaminated, enclose, maintain and clean these areas, in same manner as that applicable to work areas.
- .3 Final air monitoring to be conducted as follows: After successful final visual inspection and application of lock-down agent has been applied to surfaces within enclosure, and appropriate setting period has passed, Departmental Representative will perform air monitoring within the enclosure.
 - .1 Final air monitoring results must show fibre levels of less than 0.01 f/cc.
 - .2 If air monitoring results show fibre levels in excess of 0.01 f/cc, re-clean enclosure and apply another acceptable coat of lock-down agent to surfaces.
 - .3 Repeat as necessary until fibre levels are less than 0.01 f/cc.

3.7 INSPECTION

- .1 Daily inspection services will be carried out by Departmental Representative(s) who will conduct a review of the Contractor's site specific asbestos work procedures to confirm that the identified asbestos-containing materials are included within the Contractor's scope of work and to ascertain that the abatement methods proposed by the Contractor comply with applicable regulations and guidelines and this specification.
- .2 During the asbestos abatement process, Departmental Representative(s) will conduct pre-contamination inspections, daily site inspections, and final visual inspections to assess contractor compliance and to evaluate contractor performance. The pre-contamination inspections will be conducted to review proper work area set-up and execution of the scope of work. The daily site inspections will be conducted to document the Contractor's work procedures and the proper operation of the asbestos control systems in place. The final visual inspections will be conducted to evaluate the removal of the asbestos-containing materials within the scope of work.
- .3 Departmental Representative(s) will inspect Work for:
 - .1 Adherence to specific procedures and materials.
 - .2 Final cleanliness and completion.
 - .3 No additional costs will be allowed by Contractor for additional labour or materials required to provide specified performance level.
- .4 When asbestos leakage from Asbestos Work Area has occurred, or is likely to occur, Departmental Representative(s) may order Work shutdown.
- .5 No additional costs will be allowed by Contractor for additional labour or materials required to provide specified performance level.

END OF SECTION

1. General

1.1 SECTION INCLUDES

- .1 This Section includes requirements for:
 - .1 removal,
 - .2 preparation for disposal,
 - .3 transportation,
 - .4 permanent disposal of lead-based paints.

1.2 REMOVAL CONTRACTOR QUALIFICATIONS

- .1 Use contractors experienced in hazardous materials abatement for removal, packaging and transportation arrangements for disposal of the building materials with lead based paints.

1.3 DISPOSAL CONTRACTOR QUALIFICATIONS

- .1 Handling and transportation of lead containing materials to be performed by a hazardous waste company registered as a carrier with Alberta Environment and Sustainable Resource Development. A listing of qualified companies may be obtained on-line at: <http://esrd.alberta.ca/waste/hazardous-waste-management/documents/HazardousWasteCarrierListing-Jun2014.pdf>
- .2 Carrier of hazardous wastes shall have successfully completed a Transportation of Dangerous Goods course acceptable to the authority having jurisdiction within the past three years.

1.4 REGULATORY REQUIREMENTS

- .1 Comply with the following:
 - .1 Canadian Environmental Protection Act (Canada)
 - .2 Environmental Contaminants Act (Canada)
 - .3 Environmental Protection and Enhancement Act (Alberta)
 - .4 Transportation of Dangerous Goods Act, 1992 (Canada)
 - .5 Dangerous Goods Transportation and Handling Act (Alberta) and regulations
 - .6 Other legislation and regulations which apply to the performance of the work of this section.

2. Products (Not Used)

3. Execution

3.1 REMOVAL PROCEDURE FOR LEAD BASED PAINTS

- .1 For painted surfaces in good condition (i.e. surfaces have no flaking paints) perform the following in conjunction with the asbestos removal procedures:
 - .1 Workers performing demolition, shall wear required personal protection equipment (PPE) including P100 half face negative air respirator, disposable coveralls, eye protection and impervious gloves.
 - .2 Carry out demolition work in accordance with CSA S350, unless otherwise specified.

- .3 Mist debris with water to prevent dust. Do not cause flooding, contaminated runoff or icing. Do not allow waste material, rubbish, and windblown debris to reach and contaminate adjacent properties.
- .4 Segregate lead painted components from the demolition debris.
- .5 Transport lead paint waste to landfill in a manner preventing lead paint dust from becoming airborne.
- .6 Each load shall be accompanied by a properly completed manifest satisfactory to the authority having jurisdiction.
- .7 Dispose of lead paint waste at a Class III landfill.
- .8 Contractor shall not allow lead containing components to be recycled or ground up.

3.3 TRANSPORTATION AND PERMANENT DISPOSAL

- .1 Transport waste in accordance with provincial and federal legislation and regulations.
- .2 Ensure all materials are properly packaged and labeled prior to transportation.
- .3 Transport hazardous waste materials in properly placarded vehicles equipped with a rain and windproof box.
- .4 Each load shall be accompanied by a properly completed Transportation of Dangerous Goods Regulation (TDGR) Waste Manifest. Provide the Province with a copy of each waste manifest.

END OF SECTION

Part 1 General

1.1 SECTION INCLUDES

- .1 Procedures and materials required for the safe handling, management and storage of polychlorinated biphenyl (PCB) material.

1.2 REFERENCES

- .1 American Board of Industrial Hygiene (ABIH)
- .2 Canadian Council of Ministers of the Environment (CCME)
 - .1 PN1205-1995, PCB Transformer Decontamination: Standards and Protocols.
- .3 Environment Canada SOR/92-507, Storage of PCB Material Regulations
 - .1 Canadian Environmental Protection Act, 1999 (CEPA).
- .4 Environment Canada
 - .1 Manual for Spills of Hazardous Materials-1985.
- .5 Alberta Occupational Health and Safety Act, Regulation, and Code (2009)
- .6 Transport Canada (TC)
 - .1 Transportation of Dangerous Goods Act, 1992 (TDGA).
- .7 Chlorobiphenyls Regulations (SOR/91-152; Amended SOR/2000-102)
 - .1 Regulations Respecting Mobile System for the Destruction and Treatment of Chlorobiphenyls that are Operated by or Under Contract with Federal Institutions (SOR/90-5; amended SOR/93-231 and SOR/2000-105).
 - .2 Regulations Respecting the Storage of Material Containing Chlorobiphenyls (PCBs) SOR/92-507, Amended SOR/2000-102).
 - .3 Regulations Respecting the Import and Export of Hazardous Wastes (SOR/92-637; Amended 94-459; SOR 94-684; SOR/2000-103).
 - .4 Waste Management - PCBs, R.R.O. Regulation 362/90.
 - .5 Mobile PCB Destruction Facilities, R.R.O. Regulation 352/90.
 - .6 Regulation 347, General Waste Management, as Amended.

1.3 SUBMITTALS

- .1 Provide submittals in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Prior to starting work, Contractor performing work of this section to provide:
 - .1 Workplace Safety and Insurance Board Clearance Certificate.
 - .2 Insurance certificates.
 - .3 Company Health and Safety Policy.
 - .4 Certificate of Approval for Transportation of PCB Waste and Location of Destruction Facility.
 - .5 WHMIS Training Certificates for Personnel.
 - .6 Material Safety Data Sheets for chemicals or material to be used.
- .3 Waste location and description including:

- .1 Building in which PCB waste is stored.
- .2 Size of property used for storage site.
- .3 Precise location of PCB waste at storage site.
- .4 Container storage method used.
- .5 Spill containment features in place at storage site.
- .6 Security measures in place at storage site.
- .7 Fire detection systems in place at storage site.

1.4 CONTROL SUBMITTALS

- .1 Co-ordinate procedural requirements with Section 01 45 00 - Quality Control.
- .2 Record keeping: maintain and make available for review by an environmental officer and/or Departmental Representative(s).
 - .1 Receipt of waste showing:
 - .1 Date of receipt of waste.
 - .2 Description of PCB waste including nameplate description, serial number, PCB registration number and quantity.
 - .3 Condition of PCB waste.
 - .4 Source of PCB waste.
 - .5 Name of carrier of PCB waste.
 - .6 Name of individual who accepted receipt of PCB waste.
 - .2 Removal of waste showing:
 - .1 Date of removal of PCB waste.
 - .2 Description of PCB waste including nameplate description, serial number, PCB registration number and quantity.
 - .3 Condition of PCB waste.
 - .4 Name of carrier of PCB waste.
 - .5 Destination of PCB waste.
 - .6 Name of individual authorizing transport of PCB waste.
 - .3 Submit records to Departmental Representative(s) as requested.

1.5 QUALITY ASSURANCE

- .1 Instruct personnel on dangers of PCB exposure, respirator use, decontamination and applicable Federal, Provincial and Municipal Regulations.
- .2 Complete work so that at no time do PCBs contaminate the site and/or environment.

1.6 SUPERVISION

- .1 Provide on site, a supervisor, with authority to oversee health and safety, remediation methods, scheduling, labour and equipment requirements.
- .2 One supervisor for every 10 workers is required.

1.7 DELIVERY, STORAGE AND HANDLING

- .1 Place materials defined as hazardous or toxic in designated containers.
- .2 Handle and dispose of hazardous materials in accordance with the CEPA, TDGA, Provincial and Municipal regulations.

- .3 Owners or operators of storage sites.
 - .1 Provide method for determining concentration of PCBs in particular waste at request of environment officer or Departmental Representative(s).
 - .2 Ensure personnel are familiar with and understand current PCB waste management procedures and use of personal protection equipment and clean-up techniques.
- .4 Disposal of PCB waste generated by removal activities must comply with Federal, Provincial and Municipal regulations.
 - .1 Dispose of PCB waste in leak proof drums.
 - .2 Containers must be labelled with appropriate warning labels.
- .5 Create manifests describing and listing waste created and transport containers by approved means to licenced facility for storage.
 - .1 For each bulk load of PCBs: identity PCB waste, earliest date of removal from service for disposal, and weight in kilograms of the PCB waste.
 - .2 For each PCB Article Container or PCB Container: unique identifying number, type of PCB waste (i.e., soil, debris, small capacitors), earliest date of removal from service for disposal, and weight in kilograms of PCB waste contained.
 - .3 For each PCB Article not in PCB Container or PCB Article Container: serial number if available, or other identification if there is no serial number, date of removal from service for disposal, and weight in kilograms of PCB waste in each PCB Article.

1.8 EXISTING CONDITIONS

- .1 Reports and information pertaining to PCB materials to be handled, removed, or otherwise disturbed and disposed of during this Project are appended into this specification.
- .2 Notify Departmental Representative(s) of PCB materials discovered during Work and not apparent from drawings, specifications, or report pertaining to Work. Do not disturb such material until instructed by Departmental Representative(s).

Part 2 Products

2.1 STORAGE GENERAL

- .1 Storage of PCB materials in accordance with CEPA SOR/92-507.

2.2 STORAGE ENCLOSURE

- .1 Isolate PCB control area by physical boundaries to prevent unauthorized entry of personnel.
- .2 Food, drink and smoking materials are not permitted in areas where PCBs are handled or PCB items are stored.
- .3 Room, building or structure with lockable entrance.
- .4 Temporary storage facility to be a fully enclosed block wall room within building with appropriate warning signs.
- .5 Woven mesh wire fence or other fence with similar characteristics at least 2.0 metres high, with lockable entrance.
- .6 Smoking is not permitted within 15 m of PCB control area.

- .1 Provide and post "No Smoking" signs as directed by the Departmental Representative(s).

2.3 STORAGE CONTAINERS

- .1 Exterior containers:
 - .1 Structurally-sound and weather-sealed to hold PCB solids, PCB light ballasts, drained PCB containers or drained PCB equipment.
- .2 PCB storage.
 - .1 Drums and containers:
 - .1 Designed with sufficient durability and strength to prevent PCB solids and liquids from being released into environment, affected by weather, or contaminated by external sources.
 - .2 Steel or other material approved by the Departmental Representative(s).
 - .2 Drums:
 - .1 Capacity no greater than 205 litres.
 - .2 Steel of minimum 1.52 mm thickness.
 - .3 Ensure removable steel lid securely attached and complete with PCB-resistant gasket.
 - .3 Drum Liners:
 - .1 6 mil clear polyethylene bag, 914 mm x 1524 mm, with opening at 914 mm end.

2.4 EMERGENCY RESPONSE EQUIPMENT AND SYSTEMS

- .1 Safety requirements in storage area:
 - .1 Heat and smoke sensory controls:
 - .1 Stops ventilation fan and closes intake and exhaust dampers of fan in event of fire inside building.
 - .2 Indoor fire alarm system:
 - .1 Fully operative and maintained, inspected and tested to National Fire Code of Canada.
 - .2 Portable fire extinguishers to be selected, installed, maintained, inspected and tested to National Fire Code of Canada.
 - .3 Automatic fire suppression system, as and when required to National Fire Code of Canada.
- .2 Storage site clean-up materials:
 - .1 Ensure availability at all time of sorbent or solvents, for clean-up of liquid or solids.
 - .2 Ensure availability at all times of inert absorbent in sufficient quantity to contain minor leakage.
 - .1 Place in bottom of each container holding PCB equipment or fluorescent lighting ballasts.
- .3 Respirators: Certified by the National Institute of Occupational Safety and Health (NIOSH) or other testing agency acceptable to Alberta Occupational Health and Safety.
 - .1 Use approved full-face organic vapour cartridge respirator for exposure to hot PCB.
 - .2 Vapour concentration greater than 5 mg/m³ or unknown concentrations.
 - .1 Self-contained breathing apparatus with full face piece operated in positive pressure mode.

- .2 Type C supplied-air respirator with full face piece operated in positive pressure of continuous flow mode and auxiliary self-contained breathing apparatus operated in positive pressure mode.

2.5 WARNING SIGNS AND LABELS

- .1 Label drums containing chlorobiphenyls with black and white serialized label, measuring 76 x 76 mm, as approved by the Departmental Representative(s) in accordance with the Dangerous Goods Transportation and Handling Act.
- .2 Label doors to storage sites, fencing and other security barriers enclosing storage sites with non-serialized, black and white, "ATTENTION PCB" label, measuring 150 x 150 mm as approved by the Departmental Representative(s) in accordance with Dangerous Goods Transportation and Handling Act.
- .3 Maintain signs and labels in clear and legible condition.

Part 3 Execution

3.1 GENERAL

- .1 Store PCB waste materials in drums with absorbant material in accordance with Environment Canada SOR/92-507.
- .2 Select PCB removal procedure to minimize contamination of work areas with PCB or other PCB-contaminated debris/waste. Handle PCBs such that no skin contact occurs.
- .3 As feasible, do not carry out PCB handling operations in confined spaces. Confined space means space having limited means of egress and inadequate cross ventilation.
- .4 Ensure that work operations or processes involving PCB or PCB-contaminated materials are conducted in accordance with Federal, Provincial and Municipal Regulations and applicable requirements of this Section, including but not limited to:
 - .1 Obtaining advance approval of PCB storage sites.
 - .2 Notify Departmental Representative(s) prior to beginning operations.
 - .3 Report leaks and spills to Departmental Representative(s).
 - .4 Maintain access log of employees working in PCB control area and provide copy to Departmental Representative(s) upon completion of operations.
 - .5 Inspect PCB and PCB-contaminated items and waste containers for leaks and forward copies of inspection reports to Departmental Representative(s).
 - .6 Maintain spill kit for emergency spills entitled "PCB Spill Kit".
 - .7 Maintain inspection, inventory and spill records.

3.2 ACCESS TO STORAGE SITE

- .1 Keep entrance to site locked or guarded.
- .2 Maintain register at site containing name, address, telephone number and place of business of each person who enters, or is authorized to enter site.
- .3 Permit only authorized personnel to enter site.

3.3 ACCESS TO STORED MATERIAL

- .1 Store materials and equipment to permit easy access for inspection.

3.4 STORAGE PRACTICES

- .1 Stack containers only if designed for stacking.
- .2 Stack liquid containers or drums no higher than 2 containers.
- .3 Separate stacked drums from each other with pallets.
- .4 Store material to prevent it catching fire.
- .5 Store material to prevent it being released.
- .6 Store PCB material together, and away from other stored materials.
- .7 Exterior:
 - .1 Cover PCB liquid containers with waterproof roof or cover extending beyond curbing or sides of container.
 - .2 Elevate PCB waste containers and PCB equipment on pallets or other suitable devices to reduce corrosion.
 - .3 Store transformers on skids.
- .8 Interior:
 - .1 Place on skids or pallets PCB equipment and containers of PCB material not permanently secured to floor or surface.

3.5 EMERGENCY RESPONSES

- .1 General:
 - .1 Immediately report to Departmental Representative(s) PCB spills on ground or in water, PCB spills in drip pans, or PCB leaks.
 - .2 Rope off area around edges of PCB leak or spill and post "PCB Spill Authorized Personnel Only" caution sign. Immediately transfer leaking items to drip pan or other container.
 - .3 Initiate cleanup of spills as soon as possible, but no later than 48 hours of its discovery. If misting, elevated temperatures or open flames are present, or if spill is situated in confined space, notify Departmental Representative(s). Mop up liquid with rags or other conventional absorbent. Properly contained and dispose of spent absorbent as solid PCB waste.
 - .4 Workers to evacuate site. When leaving, shut down water in use. Only personnel trained in use of, and wearing SCBA apparatus, will be allowed to re-enter site.
 - .5 Do not return to site until Owner's representative and Ministry of the Environment representatives have declared the area safe for re-entry.
- .2 Spill, leak, and disposal procedures:
 - .1 Permit access to only those wearing protective equipment and clothing.
 - .2 Issue poison warnings.
 - .3 Call local fire department or PCB Emergency Response Team.
 - .4 Avoid contact and inhalation.
 - .5 Remove ignition sources.
 - .6 Ventilate areas of spill or leak.
 - .7 Stop or reduce discharge if possible without risk.
 - .8 Collect spilled material for reclamation.
 - .9 Do not flush to sewer.

- .10 Use only inert sawdust or dry sand absorbents as approved by Departmental Representative(s).
- .11 Wipe contaminated area with rags and kerosene or 1,1,1-trichloroethane chloroethene VG solvent. Do not use acetone or toluene.
- .12 Notify environmental authorities to determine disposal and clean-up procedures.
- .3 Fire protection and emergency procedures plan for storage sites.
 - .1 Ensure most recent revision of plan is in effect.
 - .2 Develop plan in consultation with local fire department.
 - .3 Ensure employees authorized to enter PCB storage site are familiar with contents of fire protection and emergency procedures plan.
 - .4 Send one copy to local fire department.
 - .5 Display one copy at storage site in area accessible in fire or spill situation.
 - .6 Display one copy at storage site owner's place of business.
- .4 Respirators:
 - .1 Use when chlorobiphenyl concentrations are above permissible exposure levels.
 - .2 Use when entering tanks or closed vessels.
 - .3 Use in emergency situations.
- .5 Permissible exposure limit.
 - .1 0.5 milligram of chlorobiphenyl (54% chlorine) per cubic metre of air, averaged over 8 hours.
- .6 Fire protection:
 - .1 Wear totally encapsulated suit and self-contained breathing apparatus with full face piece operated in positive pressure mode.

3.6 SANITATION

- .1 Promptly wash liquid-contaminated skin with soap or mild detergent and water.
- .2 Prohibit eating and smoking in areas where liquid chlorobiphenyl (54% chlorine) is handled, processed or stored.
- .3 Wash hands thoroughly with soap or mild detergent and water after handling liquid chlorobiphenyl (54% chlorine).

3.7 FIELD QUALITY CONTROL

- .1 Owners or Operators of Storage Sites:
 - .1 At request of inspector, measure concentration of PCBs in accordance with Environment Canada SOR/92-507 - Storage of PCB Material Regulations.
 - .2 Inspect storage site daily and repair or replace, if necessary, PCB equipment, floors, drains, drainage systems, waterproof roofs or barriers, fire prevention apparatus, personnel protection equipment, security fences and materials used for clean-up at site.
 - .3 Immediately repair or replace drum, container or equipment found to be leaking PCBs.
 - .4 Immediately clean up contaminated area.
 - .5 Ensure controlled access to storage site to prevent entry by unauthorized persons.

END OF SECTION

Part 1 General

1.1 SUMMARY

- .1 Comply with requirements of this Section when performing following Work:
 - .1 Removal of mercury vapour-containing fluorescent light tubes.

1.2 REFERENCES

- .1 Alberta Occupational Health and Safety Act, Regulation and Code, (2009)
- .2 Department of Justice Canada
 - .1 Canadian Environmental Protection Act, 1999 (CEPA).
- .3 Environmental Contaminants Act (Canada)
- .4 Health Canada
 - .1 Workplace Hazardous Materials Information System (WHMIS), Material Safety Data Sheets (MSDS).
- .5 Department of Employment and Social Development Canada (EDSC)
 - .1 Canada Labour Code Part II, - SOR 86-304 - Occupational Health and Safety Regulations.
- .6 Transport Canada (TC)
 - .1 Transportation of Dangerous Goods Act, 1992 (TDGA).

1.3 INSTRUCTION AND TRAINING

- .1 Ensure that all workers likely to handle mercury-containing items are trained in the use of a Mercury Spill Kit and are trained in the handling of mercury.

1.4 DEFINITIONS

- .1 Authorized Visitors: Departmental Representative(s) or designated representative(s).
- .2 Competent person: individuals and/or Departmental Representative(s) capable of identifying existing mercury hazards in workplace taking corrective measures to eliminate them.
- .3 Dangerous Goods: product, substance, or organism specifically listed or meets hazard criteria established in Transportation of Dangerous Goods Regulations.
- .4 Hazardous Material: product, substance, or organism used for its original purpose; and is either dangerous goods or material that will cause adverse impact to environment or adversely affect health of persons, animals, or plant life when released into the environment.
- .5 Hazardous Waste: hazardous material no longer used for its original purpose and that is intended for recycling, treatment or disposal.

1.5 SUBMITTALS

- .1 Provide proof satisfactory to Departmental Representative(s) that suitable arrangements have been made to dispose of mercury materials in accordance with requirements of authority having jurisdiction.
- .2 Provide proof of Contractor's General and Environmental Liability Insurance.
- .3 Quality Control:
 - .1 Provide Departmental Representative(s) necessary permits for transportation and disposal of mercury waste and proof that mercury waste has been received and properly disposed.
 - .2 Provide proof satisfactory to Departmental Representative(s) that employees have had instruction on hazards of mercury exposure, respirator use, dress, and aspects of work procedures and protective measures.

1.6 QUALITY ASSURANCE

- .1 Regulatory Requirements: comply with Federal, Provincial/Territorial and local requirements pertaining to mercury, provided that in case of conflict among those requirements or with these specifications more stringent requirement applies. Comply with regulations in effect at time work is performed.
- .2 The Contractor must co-ordinate all work, supply personal protective equipment and take full responsibility for the conduct of personnel working on the site.
- .3 Health and Safety:
 - .1 Safety Requirements: worker and visitor protection.
 - .1 Protective equipment and clothing to be worn by workers and visitors in work Area include:
 - .1 Protective clothing to cover hands and prevent ingestion of mercury vapour and particulate during and following work activities. This protection must be durable enough to withstand construction / demolition activities.
 - .2 Eating, drinking, chewing, and smoking are not permitted in work area.
 - .3 Ensure workers wash hands and face when leaving work area.
 - .4 Visitor Protection:
 - .1 Provide approved respirators to Authorized Visitors to work areas.
 - .2 Instruct Authorized Visitors procedures to be followed in entering and exiting work area.

1.7 WASTE MANAGEMENT AND DISPOSAL

- .1 Handle and dispose of hazardous materials in accordance with CEPA, TDGA, Regional and Municipal regulations.
- .2 Disposal of mercury waste generated by removal activities must comply with Federal, Provincial and Municipal regulations. Dispose of mercury waste in sealed leak proof drums. Label containers with appropriate warning labels.
- .3 Provide manifests describing and listing waste created. Transport containers by approved means to licensed landfill for burial.

1.8 EXISTING CONDITIONS

- .1 Reports and information pertaining to mercury materials to be handled, removed, or otherwise disturbed and disposed of during this Project are appended into this specification.
- .2 Notify Departmental Representative(s) of mercury materials discovered during Work and not apparent from drawings, specifications, or report pertaining to Work. Do not disturb such material until instructed by Departmental Representative(s).

1.9 SCHEDULING

- .1 Not later than two days before beginning Work on this Project notify following in writing:
 - .1 Appropriate Regional or Zone Director of Medical Services Branch, Health Canada.
 - .2 Provincial Ministry of Labour.
 - .3 Disposal Authority.
- .2 Inform sub trades of presence of mercury-containing materials identified in Existing Conditions.
- .3 Provide Departmental Representative(s) copy of notifications prior to start of Work.
- .4 Hours of Work: The hazardous materials abatement will commence at a date confirmed by Departmental Representative(s).

1.10 OWNER'S INSTRUCTIONS

- .1 Provide Authority Having Jurisdiction satisfactory proof that every worker has had instruction and training in hazards of mercury exposure, in personal hygiene, in aspects of work procedures.
- .2 Instruction and training related to respirators includes, at minimum:
 - .1 Proper fitting of equipment.
 - .2 Inspection and maintenance of equipment.
 - .3 Disinfecting of equipment.
 - .4 Limitations of equipment.
- .3 Instruction and training must be provided by competent, qualified person.
- .4 Supervisory personnel to complete required training.

Part 2 Products

2.1 MATERIALS

- .1 Absorbent Material: Absorbent material which will create a quasi-solid product which can be swept or shovelled. Acceptable materials include:
 - .1 Calcium Poly-Sulphide; and
 - .2 Sulphur based absorbent materials.
- .2 Disposal Drums: refer to CAN/CGSB-43.150-97, steel drum (1A2), 205 litre capacity, minimum 1.2 millimetre thick sheet steel, fitted with removable steel lids, with lid gaskets meeting Transportation of Dangerous Goods Regulations and applicable provincial requirements.

- .1 Label containers with pre-printed bilingual cautionary Warning Mercury clearly visible when ready for removal to disposal site
- .3 Plastic Bags: refer to CAN/CGSB-43.150-97, minimum 150 micrometer thick sheet polyethylene. Bag seams must be sufficiently strong to resist pressure and shocks that occur under normal conditions of transport. Designed and manufactured to contain a maximum net mass of 50 kg.
- .4 Cardboard Containers: New or used cardboard boxes as approved by the Departmental Representative. Suitable for packaging of fluorescent light tubes to prevent breakage of tubes.
- .5 Mercury Spill Response Kit consisting of:
 - .1 HEPA vacuum dedicated for use with mercury spills.
 - .2 Air-purifying cartridge respirators with mercury absorbing cartridges and an end-of-life service indicator.
 - .3 Surgical gloves to prevent skin exposure when handling droplets of mercury.
 - .4 Neutralizing compound to clean spilled surfaces.

Part 3 Execution

3.1 SUPERVISION

- .1 One Supervisor for every ten workers is required.
- .2 Supervisor must remain within work area during disturbance, removal, or handling of mercury materials.

3.2 PREPARATION

- .1 Remove and store items to be salvaged or reused.
 - .1 Protect and wrap items and transport and store in area specified by Departmental Representative(s).
- .2 Do not start work until:
 - .1 Arrangements have been made for disposal of waste.
 - .2 Tools, equipment, and materials waste containers are on site.
 - .3 Arrangements have been made for building security.
 - .4 Notifications have been completed and preparatory steps have been taken.

3.3 PACKAGING OF FLUORESCENT TUBES

- .1 Carefully remove fluorescent light tubes from fixtures and place in cardboard containers.
- .2 Place tubes in containers as they are removed from fixtures. Ensure that tubes are packaged in a manner to prevent breakage.
- .3 Avoid rough handling of tubes to avoid breakage.
- .4 Store full containers in a designated location on site as directed by Departmental Representative(s).

3.4 PACKAGING OF OTHER MERCURY MATERIALS

- .1 Place polyethylene Drum Liner in Containment Drum. Pour a minimum of 100 mm layer of absorbent material. Place mercury items in Containment Drum in a manner to prevent breakage. When full or all items are placed in Drum, seal liner bag with duct tape and place label on outside of Containment Drum.
- .2 Avoid rough handling of mercury items to avoid breakage.
- .3 Store Containment Drums in a central location on site as directed by the Departmental Representative.
- .4 Ensure mercury-based or contaminated materials removed during work is treated, packaged, transported and disposed of as mercury waste.
- .5 Retain and dispose of all waste generated by this section, as hazardous waste, unless testing suitable to Departmental Representative shows otherwise. Obtain the Waste Generator Number from the Departmental Representative.
- .6 Complete the manifests for waste shipping as appropriate for the waste as classified, and in compliance with the provincial regulations. The Contractor is responsible to ensure completion of manifest for each load leaving the site. Provide the Departmental Representative with originating copies of all manifests (both hazardous and non-hazardous waste).

3.5 INSPECTION

- .1 Perform inspection to confirm compliance with specification and governing authority requirements. Deviations from these requirements not approved in writing by Departmental Representative(s) will result in work stoppage, at no cost to Departmental Representative(s).
- .2 Departmental Representative(s) will inspect work for:
 - .1 Adherence to specific procedures and materials.
 - .2 Final cleanliness and completion.
 - .3 No additional costs will be allowed by Contractor for additional labour or materials required to provide specified performance level.

END OF SECTION



May 2015

**PUBLIC WORKS AND GOVERNMENT
SERVICES CANADA**

**HAZARD ASSESSMENT FOR
BUILDING RENOVATION
Dairy and Metabolism Barn
Lethbridge Research Centre
Lethbridge, Alberta**

Submitted to:

Public Works and Government Services Canada
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Attention: Mr. Bruce Bartnik, Project Manager

REPORT



Report Number: 14-19082

Distribution:

2 copies - PWGSC
1 copy - Golder Associates Ltd.





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1.0 INTRODUCTION

In response to Public Works and Government Services Canada's (PWGSC) request on behalf of Agriculture and Agri-Food Canada (AAFC), Golder Associates Ltd. (Golder) was contracted to provide hazardous building materials consulting services in support of the potential future renovation of the Dairy and Metabolism Barn at the Lethbridge Research Centre near Lethbridge, Alberta. The assessment was conducted on January 13 and 14, 2015, and April 15, 2015, by Chad Goodman and Scott Bishop, Junior Occupational Hygienists, under the direction of Ben MacDonald, Occupational Hygienist.

We understand that PWGSC has requested the hazardous building materials assessment to verify that renovation of the structure does not unknowingly endanger workers to the hazards associated with potential disturbance of hazardous building materials.

2.0 SCOPE OF WORK

Golder conducted a survey for hazardous building materials in the Dairy and Metabolism Barn at the Lethbridge Research Centre. The assessment included, but was not limited to, the following:

- assessing the Dairy and Metabolism Barn on a room-by room basis to compile an inventory of hazardous building materials including asbestos-containing materials (ACM), lead-based paint, polychlorinated biphenyls (PCB) in fluorescent light ballasts, mercury in thermostats, mercury vapour in fluorescent light tubes or bulbs, ozone-depleting substances (ODS) in items or systems such as refrigerators and air conditioning units, radioactive materials in smoke detectors, and miscellaneous chemicals used in building maintenance;
- providing a written report outlining the findings of the assessment, comparison to applicable regulations and guidelines, including facility diagrams showing sample point locations; and
- conducting the assessment in accordance with the *Alberta Asbestos Abatement Manual* (October 2012) and following provincial occupational health and safety legislation. In case of a conflict between the plans or policies, the *Alberta Asbestos Abatement Manual* (October 2012) was followed when surveying.

3.0 REGULATIONS AND GUIDELINES

3.1 Federal Regulations

In federal jurisdictions, hazardous building materials are regulated by Human Resources and Skills Development Canada (HRSDC) under the Canada Labour Code, Part II. Specifically, Part X, Hazardous Substances, provides the direction for the control of exposure to potentially toxic substances in the workplace. Under this regulation, employers are required to:

- maintain a record of all hazardous materials;
- undertake a hazard investigation by a competent person;
- ensure materials are properly stored and handled;
- post warning signs;
- inform and educate employees regarding hazards; and
- control exposure through substitution, engineering or protective equipment.



In Canada, environmental matters generally fall under the Government of Canada's Canadian Environmental Protection Act, 1999, S.C. 1999 c. 33 (as amended up to 2003) and applicable regulations and guidelines.

Other specific applicable federal regulations are detailed below.

3.2 Provincial Regulations

The regulations, guidelines and codes relevant to the removal of hazardous building materials include the Alberta Occupational Health and Safety Code, Alberta Occupational Health and Safety (OHS) Asbestos Abatement Manual (October 2012), and the Alberta Environmental Protection and Enhancement Act.

3.2.1 Alberta Occupational Health and Safety Code

The Alberta Occupational Health and Safety Code is law which was passed to protect the health and safety of workers on the job. As such, the Code and the sections under the Code are enforceable by law. The Code places the onus on both the employer and the employee to ensure a safe working environment.

Part 4, Chemical Hazards, Biological Hazards and Harmful Substances, represents minimum requirements and specifies, among many other things, the general requirements for working with and around harmful substances. Control of worker exposure to airborne contaminants is detailed and the occupational exposure limits are specified in Schedule 1 of the Regulation.

Part 4 and Schedule 1, Table 2 in the Alberta Occupational Health and Safety Code outlines the general requirements to be followed when working with asbestos. It also defines occupational exposure limits (OEL) for a variety of airborne contaminants. The OEL for a particular contaminant represents conditions to which it is believed that nearly all workers may be exposed, day after day, without suffering from adverse health effects. Due to individual susceptibility, a small percentage of workers may experience discomfort at concentrations below the applicable OEL. An 8-hour OEL refers to the average concentration of a substance over an 8-hour period.

Sections 28 through 38 in Part 4 of the Alberta Occupational Health and Safety Code outline the requirements related to asbestos in facilities. Sections 31 to 35 specifically outline the limitations on the use of asbestos in buildings. The requirements of Sections 31 through 35 are summarized below:

- if asbestos fibres may be released in a building all necessary steps to correct this unsafe condition must be taken;
- asbestos products that have the potential for releasing fibres may not be installed;
- all materials containing crocidolite are banned from use;
- spray-applied asbestos products are banned from use;
- asbestos products, in general, must not be in a form or location where they could release airborne fibres and allow them to enter a ventilation system;
- buildings to be demolished are to have all materials with the potential of releasing asbestos fibres removed; and
- all materials with the potential of releasing asbestos fibres that may be impacted by a renovation must be either encapsulated, enclosed or removed.



Historically, materials containing less than 1% asbestos have not been considered “asbestos-containing materials” for the purposes of the OHS legislation. However, in recent years, it has become apparent that some materials, such as vermiculite, can release significant amounts of asbestos fibres, even when they contain low levels (less than 1%) of asbestos. In addition, since the requirements in Part 4 of the OHS Code are based on the ability of a material to release asbestos fibres when disturbed, this interpretation was not consistent with the legislation. As a result, the Asbestos Abatement Manual was revised to remove the definition of an asbestos-containing material as one that contains more than 1% by weight asbestos. However, this has now raised questions as to when an employer must comply with the asbestos requirements in the OHS Code.

The employer must comply with the asbestos requirements when:

- the individual material in question contains more than 1% asbestos (by weight);
- the material contains less than 1% asbestos, but it is known that a “restricted area” is likely to occur when it is disturbed (e.g. vermiculite); or
- the material contains less than 1% asbestos and there is a reasonable chance that asbestos fibres may be released when the material is disturbed, either due to the condition of the material or the work procedures that will be used (e.g. removal of friable stipple material, dry removal of drywall where the drywall mud contains low levels of asbestos).

Materials identified as containing less than 1% asbestos, such as drywall joint compounds and stipple coatings, may not have been uniformly mixed when they were applied and could contain asbestos in concentrations greater than 1% in sections. When dealing with large quantities of such materials, employers should take non-homogeneous mixtures into consideration for Asbestos Management Plans and abatement activities.

3.2.2 Alberta Asbestos Abatement Manual

The *Alberta Asbestos Abatement Manual* (October 2012) is a guide published by Alberta Occupational Health and Safety (OHS), a branch of the Department of Safe, Fair and Healthy Workplaces under the Ministry of Jobs, Skills, Training and Labour. The manual is used for determining compliance with the Occupational Health and Safety Code in the Province of Alberta. It covers basic information on asbestos, its health hazards, requirements for an employer to develop a code of practice regarding the storage, handling and disposal of substances listed in Schedule 1 of the Alberta OHS Code, requirements for worker protection, safe work practices, and the basic principles to follow for the safe abatement of ACM.

3.2.3 Alberta Environmental Protection and Enhancement Act

The Environmental Protection and Enhancement Act is law which was passed to protect and enhance the environment. As such, the Act and the regulations under the Act are enforceable by law. The Act places the onus on the owner, employer and employee to ensure no adverse effects are experienced in the environment.

The key waste regulation under the Environmental Protection and Enhancement Act (AEPEA) relating to hazardous building materials is the Waste Control Regulation (WCR), and Alberta’s hazardous waste and hazardous recyclables management programs. The WCR provides guidance for the proper handling, storage, transportation, treatment, recycling and disposal of hazardous wastes in the province. The regulation also outlines the materials and criteria to be used to characterize waste as hazardous.



Although asbestos is not considered to be a hazardous waste, Alberta Environment has published guidelines for the disposal of asbestos waste. Within the guidelines, criteria have been established for the handling, transportation and disposal of asbestos waste. Also within the guidelines, the types of landfills that can accept asbestos waste are outlined. The requirements for the disposal of asbestos waste in Alberta are re-defined in the document entitled *Guide for Disposal of Asbestos Waste* published by Environmental Protection Services, Alberta Environment (now known as Alberta Environment Sustainable Resource Development [ESRD]) in August, 1989.

3.3 Other Guidelines

Alberta Occupational Health and Safety (OHS) published a Bulletin in November of 2013¹ that refers to the *Canada Consumer Product Safety Act, Surface Coating Materials Regulations* (SOR/2005-109) for the total allowable amount of lead in paint. The regulation stipulates that the total amount of lead may not exceed 90 mg/kg (ppm or about 0.009%) in surface coatings. For the purposes of this assessment, lead based paint (LBP) is defined as a bulk sample of paint that has been found to exceed 90 mg/kg as analyzed by a laboratory or has detectable concentrations of lead in excess of the detection limit of 0.01 mg/cm² as analyzed by the XRF.

Lead based paint is a potential concern both as a source of direct exposure (inhalation or ingestion of dust or paint chips), and as a contributor to lead in interior dust and exterior soil. A risk assessment of potential occupational exposure to lead must consider not only the presence of lead (any amount) but also the activity or impact of activity on the paints containing lead. The *Lead at the Work Site* bulletin references recommended abatement methods as outlined in the Ontario Ministry of Labour guideline, *Lead on Construction Projects*².

The guideline addresses this issue by establishing three tiers of trigger tasks where employees conducting these activities are assumed to potentially exceed the exposure limits and must be protected accordingly. There are also requirements under the Environmental Protection and Enhancement Act to prevent the release of lead into the environment.

The PCB Regulation, SOR/2008-273 (with amendments including Regulation SOR/2010-57) was published to improve the protection of Canada's environment and the health of Canadians by minimizing the risks posed by the use, storage and release of polychlorinated biphenyls (PCBs) and also outlines the handling, storage and disposal of PCBs and PCB-containing equipment. The Regulation defines PCB-contaminated material as any material containing more than 50 parts per million (ppm) or 50 milligrams per kilogram (mg/kg) of PCBs. PCB content of ballasts can be evaluated through referencing the Environment Canada Report EPS 2/CC/2 (revised) August 1991, *Identification of Lamp Ballasts Containing PCBs*.

Radioactive material found in smoke detectors is regulated under the Nuclear Safety and Control Act (amended July 2013). Americium can be found in smoke detectors and is used to detect the presence of smoke or heat. The Nuclear Substances and Radiation Devices Regulation (SOR 2000-207) defines the disposal requirements of smoke detectors that contain a nuclear substance.

¹ Lead in the Workplace, CH071 – Chemical Hazards.

² Health & Safety Guideline – Lead on Construction Projects. Ontario Ministry of Labour. September 2004 <http://www.labour.gov.on.ca/english/hs/guidelines/lead/index.html>



In 1994, the federal government filed the Ozone-Depleting Substances Regulations to amend controls on production and consumption of chlorofluorocarbons (CFC), halons, tetrachloride and methyl-chloroform. The Federal Halocarbon Regulations, effective July 1, 1999, was filed to ensure uniformity with respect to the release, recovery and recycling of ODS and their halocarbon alternatives in refrigeration and air conditioning. The Canadian Environmental Protection Act (1999), Ozone-Depleting Substances Regulations, 1998, controls the import, manufacture, use, sale, and export of ODS. The regulation also requires that permits be obtained to import or export used, recovered, recycled, and reclaimed ODS

The transportation of hazardous wastes is governed under the Transportation of Dangerous Goods (TDG) Act and Regulations and the act and the regulations outlines the requirements for storage, handling, and transportation of hazardous waste.

4.0 ASSESSMENT AND SAMPLE COLLECTION METHODS

Site work was completed in general accordance with standards outlined by Alberta OHS.

4.1 Asbestos-Containing Materials

The non-destructive assessment was completed on an area-by-area and room-by-room basis to provide a complete inventory for the specified bays of the building. The systems to be reviewed included, but were not limited to:

- Structural – systems including fireproofing on beams, open and solid webbed joist systems, Q-deck;
- Mechanical – systems insulation including hot water and steam system, condensate system, chilled water system, glycol system, domestic hot and cold water, emergency generator exhaust, boiler units, heat exchangers, reboiler units, asbestos cement piping, wall joint compound, asbestos sheet products; and
- Architectural – systems including texture coats, sheet flooring, vinyl floor tile, acoustical spray-applied materials, condensation control applications, ceiling tile, wall board, drywall joint compound, asbestos sheet products.

A systematic sampling of identified suspect ACM was conducted as part of the assessment. The asbestos samples were analyzed for asbestos type and percentage content using polarized light microscopy in accordance with United States Environmental Protection Agency dispersion staining techniques (EPA/600/R-93/116) by Cardno-ATC Associates Inc., a National Voluntary Laboratory Accreditation Program (NVLAP) accredited laboratory. Analysis was conducted within the laboratory standard turnaround time (3 to 5 working days).

Detailed notes were taken with each sample including a room identifier, type of material, and sample location. A digital photograph was taken of each sampling location. Golder did not sample or assess building materials present on the exterior of the warehouse bays. Only reasonably accessible areas were included in the survey. Inaccessible areas (e.g., confined spaces, within fixed wall cavities or ceiling spaces) or areas requiring special lifting equipment to reach (e.g., high ceilings, high areas on exterior walls) were not assessed. Lifts were not available on site; Golder accessed only areas safely accessible through the use of a 6' step ladder. Gaskets were not assessed as sampling can cause damage that may compromise the integrity of the systems. Golder did not sample the interior of operational equipment and materials where the sampling would have affected the operation of equipment or integrity of the system (e.g., wiring, boilers, roofing systems). When sampling for ACM, room numbers or area identification names were taken from the existing floor plans to allow for continuity and accuracy of information compiled during the assessment. ACM were quantified as part of the assessment.



Golder drilled several 3/4" test holes into the cinderblock walls to assess for the presence of vermiculite insulation. The test holes were sealed with poly fill drywall mud.

4.2 Lead-Based Paint

Lead-paint chip samples were collected by removing paint chips from the substrate materials. Testing for lead-based paint was conducted by collecting bulk samples of finishes by scraping a small section of paint to obtain approximately 1 gram (g) of material. Each sample was individually placed in a plastic bag to prevent possible cross-contamination. The re-sealable bags were labelled with unique identification numbers.

The samples were sent to Paracel Laboratories Ltd., an accredited laboratory, under chain of custody to be analyzed for lead content by inductively-couple plasma optical emission spectrometry in accordance with the Ministry of Environment method E3470 (standard 3 to 5 day turnaround). Lead analysis results are reported in units of micrograms per gram ($\mu\text{g/g}$).

Miscellaneous lead-containing materials such as lead acid batteries, lead sheeting on roof drains, and lead packing in cast drain lines were documented when observed.

4.3 Polychlorinated Biphenyls

Fluorescent light fixtures were visually assessed to determine if they had the older style T-12 light tubes. If the T-12 tubes were observed, the light fixture was assumed to have PCB-containing ballasts. The high-efficiency light fixtures with the newer T-10, T-8, and T-5 style tubes were assumed to have non-PCB-containing ballasts. When T-12 tubes were observed and the ballasts could be assessed without impact to the light fixture, information was collected and compared to the criteria found in the Environment Canada Report EPS 2/CC/2 (revised) August 1991, *Identification of Lamp Ballasts Containing PCBs* to assess their likelihood of containing PCBs.

Transformer fluids or other non-liquid PCBs were not assessed as part of this project.

4.4 Other Hazardous Building Materials

The building was visually assessed for the presence of mercury-containing thermostats, mercury vapour in fluorescent light tubes, ozone-depleting substances (ODS) in items or systems such as refrigerators and air conditioning units, radioactive materials in smoke detectors, and miscellaneous building maintenance chemicals.

In 1994, the federal government filed the Ozone-Depleting Substances Regulations to amend controls on production and consumption of chlorofluorocarbons (CFC), halons, tetrachloride and methyl-chloroform. The Federal Halocarbon Regulations (August 2003) was filed to ensure uniformity with respect to the release, recovery and recycling of ODS and their halocarbon alternatives in refrigeration and air conditioning. The Canadian Environmental Protection Act (1999), Ozone-Depleting Substances and Halocarbon Regulations, Alberta Regulation 181/2000 (with amendments up to and including Alberta Regulation 132/2004), controls the import, manufacture, use, sale, and export of ODS. The regulation also requires that permits be obtained to import or export used, recovered, recycled, and reclaimed ODS.

Radioactive material found in smoke detectors is regulated under the Nuclear Safety and Control Act, Nuclear Substances and Radiation Device Regulation SOR/2000-207. Americium can be found in smoke detectors and is used to detect the presence of smoke and heat.



The transportation of hazardous wastes is governed under the Transportation of Dangerous Goods (TDG) Act and Regulations and the act and the regulations outlines the requirements for storage, handling, and transportation of hazardous waste.

5.0 RESULTS AND DISCUSSION

5.1 Asbestos-Containing Materials

A total of fifty-eight samples of suspect ACM were collected by Golder and submitted for analysis. Asbestos was identified in 16 of the samples. The analytical results are summarized in Table 1: Asbestos Analysis Results. Photographs of the identified ACM are provided in Appendix A. The laboratory report is provided in Appendix B. Floor plans showing sample locations are provided in Appendix C.

Table 1: Asbestos Analysis Results

Sample Number	Sample Description	Sample Location	Asbestos Detected No/Yes: Type
A-001a	Vinyl Floor Tile (9’x9’) Blue with Whites Streaks	Lunchroom	Yes: Chrysotile, 5.0%
A-001b	Black Mastic beneath Vinyl Floor Tile (9”x9”) Blue with Whites Streaks	Lunchroom	No
A-002	Plaster Ceiling	Lunchroom	No
A-003	Parging on Pipe Insulation	Lunchroom	Yes: Chrysotile, 60.0%
A-004	Plaster Ceiling	Hallway #1	No
A-005	Concrete Block Grout	Hallway #1	No
A-006	Canvas Pipe Wrap on Straight of Pipe	Men’s Washroom	No
A-007	Pipe Elbow Insulation	Women’s Washroom	Yes: Chrysotile, 60.0%
A-008	Drywall Joint Compound Wall	Women’s Washroom	No
A-009	Black Coating on Sink	Lunchroom	Yes: Chrysotile, 2.0%
A-010	Grey Window Putty	Lunchroom	Yes: Chrysotile, 5.0%
A-011a	Vinyl Floor Tile (9’x9’) Blue with Whites Streaks	Offices	Yes: Chrysotile, 5.0%
A-011b	Black Mastic Beneath Vinyl Floor Tile (9”x9”) Blue with Whites Streaks	Offices	No
A-012	Plaster with Texture Ceiling	Cattle Area #2	No
A-013	Plaster with Texture Ceiling	Cattle Area #2	No
A-014	Pipe Elbow Insulation	Cattle Area #2	No
A-015	Plaster with Ceiling Texture	Cattle Area #2	Yes: Chrysotile, 2.0%
A-016	Grey Firestop Material	Cattle Area #2	No
A-017	Pipe Elbow Insulation	Storage #2	Yes: Chrysotile, 50.0%



LRC - HAZARDOUS BUILDING MATERIALS ASSESSMENT

Sample Number	Sample Description	Sample Location	Asbestos Detected No/Yes: Type
A-018	Concrete Block Grout	Boiler Room	No
A-019	Pipe Elbow Insulation	Boiler Room	Yes: Chrysotile, 60.0%
A-020	Boiler Pipe Elbow Insulation	Boiler Room	Yes: Chrysotile, 60.0%
A-021	Canvas Wrap on Straight Pipe	Boiler Room	No
A-022	Plaster with Ceiling Texture	Hallway #2	No
A-023	Grey Firestop Material	Hallway #2	No
A-024	Grey Window Caulking	Cleaning Room	Yes: Chrysotile, 2.0%
A-025	Marble Coating on Concrete Block	Cleaning Room	No
A-026	Pale Green Vinyl Sheet Flooring	Cleaning Room	No
A-027	White Leveling Compound	Cleaning Room	No
A-028	Plaster with Ceiling Texture	Cattle Area #3	No
A-029	Plaster with Ceiling Texture	Cattle Area #3	No
A-030	Material on Overhead Door	Exterior & Roof	No
A-031	White Window Putty on Overhead Door	Exterior & Roof	No
A-032	Grey Firestop Material	Exterior & Roof	No
A-033	White Window Caulking	Exterior & Roof	Yes: Chrysotile, 2.0%
A-034	Concrete Block Cavity Insulation (Vermiculite)	Exterior & Roof	Yes: Actinolite, <1.0%
A-035	Concrete Block Cavity Insulation (Vermiculite)	Storage #1	Yes: Actinolite, <1.0%
A-036	Concrete Block Cavity Insulation (Vermiculite)	Food & Hay Storage	Yes: Actinolite, <1.0%
A-037	Duct Damper	Rooftop Mechanical	No
A-038	Black Caulking along Concrete Block and Flashing Connection Joint	Exterior & Roof	No
A-039	Tar and Gravel Roof Sample (Top Layer Only)	Exterior & Roof	No
A-040	White Caulking on Roof Penetration	Exterior & Roof	Yes: Chrysotile, 3.0%
A-041	Grey Caulking Along Concrete Block and Flashing Connection Joint	Exterior & Roof	No
A-042	White Putty on Skylight	Exterior & Roof	No
A-043	White Caulking on Flashing	Exterior & Roof	No



LRC - HAZARDOUS BUILDING MATERIALS ASSESSMENT

Sample Number	Sample Description	Sample Location	Asbestos Detected No/Yes: Type
A-044	Plaster with Ceiling Texture	Cattle Area #3	No
A-045	Plaster with Ceiling Texture	Cattle Area #3	No
A-046	Plaster with Ceiling Texture	Cattle Area #3	No
A-047	Plaster with Ceiling Texture	Hallway #2	No
A-048	Plaster with Ceiling Texture	Hallway #2	No
A-049a	Plaster Ceiling (Skim Coat)	Hallway #1	No
A-049b	Plaster Ceiling (Base Coat)	Hallway #1	No
A-050a	Plaster Ceiling (Skim Coat)	Hallway #1	No
A-050b	Plaster Ceiling (Base Coat)	Hallway #1	No
A-051a	Plaster Ceiling (Skim Coat)	Lunchroom	No
A-051b	Plaster Ceiling (Base Coat)	Lunchroom	No
A-052	Tar and Gravel Roof Sample	Northeast Section of Roof	No
A-053	Tar and Gravel Roof Sample	Northwest Section of Roof	No
A-054	Tar and Gravel Roof Sample	Central Section of Roof	No
A-055	Tar and Gravel Roof Sample	Central Section of Roof	No
A-056	Tar and Gravel Roof Sample	Southwest Section of Roof	No
A-057	Tar and Gravel Roof Sample	South Section of Roof	No
A-058	Tar and Gravel Roof Sample	Southeast Section of Roof	No

ACMs were observed to be in moderate or good condition at the time of the assessment.



5.2 Lead-Containing Paint

Ten bulk samples of paint suspected to be lead-containing were collected and submitted for analysis. Nine of the ten samples were found to be above the lead criteria of 90 mg/kg. A summary of the analytical results is provided in Table 2: Paint Analysis Results. The laboratory report is provided in Appendix B. Floor plans showing sample locations are provided in Appendix C.

Table 2: Paint Analysis Results

Sample Number	Location and Sample Description	Colour	Lead Concentration (µg/g)	Lead-Containing Paint ⁽¹⁾ (Yes/No)
L-001	Lunchroom - Plaster	Pale White	67	No
L-002	Laboratory – Wood Cupboards	Pale Green	1,990	Yes
L-003	Laboratory – Plaster on Ceiling	White Paint	924	Yes
L-004	Laboratory – Wood Door and Trim	Light Brown	1,160	Yes
L-005	Cattle Holding #2 – Concrete Block	Swamp Green and Yellow Spots	1,180	Yes
L-006	Boiler Room – Concrete Floor	Grey	2,550	Yes
L-007	Exterior and Roof – Concrete Floor	White	413	Yes
L-008	Exterior and Roof – Wood Overhead Door	Beige	19,200	Yes
L-009	Exterior and Roof – Metal Railing	Silver	1,470	Yes
L-010	Exterior and Roof - Ductwork	Dark Green	4,350	Yes

Note:

(1) based on U.S. HUD classification

5.3 Polychlorinated Biphenyls

Approximately 249 fluorescent light fixtures with the older T12 style tubes suspected to contain PCB ballasts were observed throughout the Dairy and Metabolism Barn at the time of the assessment. Prior to disposal, these ballasts should be inspected further to determine the presence of any PCBs.

5.4 Other Hazardous Building Materials

Four thermostats containing four mercury capsules were observed within the Dairy and Metabolism Barn at the time of the assessment.

Approximately 456 fluorescent light tubes and three high intensity discharge (HID) lamps containing mercury were observed in the Dairy and Metabolism Barn at the time of the assessment.

A total of 30 units containing ODS were identified throughout the Dairy and Metabolism Barn at the time of the assessment. Units included 16 fridges, 11 freezers, two air conditioning units and one water cooler.

Thirty-one smoke detectors suspected of containing radioactive components were observed within the facility at the time of the assessment.

Golder observed six emergency lights suspected to contain lead acid batteries throughout the Dairy and Metabolism Barn at the time of the assessment.



6.0 CONCLUSIONS AND RECOMMENDATIONS

6.1 Asbestos-Containing Materials

Based on the sample results, asbestos was identified in the materials listed below. The materials have been categorized by their recommended abatement methodology, in accordance with the Alberta Asbestos Abatement Manual.

The following asbestos-containing materials can be removed in accordance with low-risk asbestos abatement procedures:

- Blue vinyl floor tile (9"x9") with white streaks in the lunchroom and office area;
- Black coating under sink in lunchroom;
- Grey window putty in lunchroom;
- Grey window caulking in cleaning room;
- White caulking on exterior windows; and
- White caulking on roof penetration.

The following asbestos-containing materials can be removed in accordance with moderate-risk or glove-bag asbestos abatement procedures:

- Parging and pipe elbow insulation on piping throughout the building; and
- Plaster ceiling with textured finish in Cattle Area #2.

As requested by PWGSC, Golder returned to site on April 15, 2015 to collect additional plaster samples to delineate the extent of the asbestos-containing plaster ceiling in the building. Table 3 of the Alberta Asbestos Abatement Manual recommends a minimum number of bulk samples to be taken for homogenous materials, according to square footage. In order to potentially delineate the extent of the asbestos-containing plaster, Golder collected enough samples of plaster from the ceilings in the Entrance area (Offices, Lunchroom and Hallway #1), Hallway #2 and Cattle Area #3 to satisfy the minimum amount for the areas and to consider each area separately. All samples taken in the Entrance area, Hallway #2 and Cattle Area #3 were found to be non-asbestos containing. With a total of five negative samples in both the Entrance area and Cattle Area #3, and three negative samples in Hallway #2, the minimum bulk sample amounts for the respective square footages was satisfied in these areas, and the plaster in each area should be considered non-asbestos containing. Plaster ceilings in Cattle Area #2 should be considered asbestos-containing. If the plaster ceilings in Cattle Area #2 will be impacted during the planned, upcoming roofing renovations, the plaster ceiling should first be removed following moderate-risk abatement procedures, followed by roofing renovations as originally intended.

The loose-fill vermiculite insulation in cinderblock wall cavities should be removed in accordance with high-risk asbestos abatement procedures.

Prior to any renovation activities, ACM that may be impacted must be removed. The work should be completed by workers certified by Alberta Occupational Health and Safety. Throughout the abatement activities, appropriate air monitoring and inspections should be conducted by qualified personnel to document that the ACM are removed and disposed of appropriately.

Asbestos wastes associated with abatement activities must be disposed of in accordance with Alberta Environment. It is recommended that a proper scope of work and asbestos removal specifications be written to scope the complete and proper removal of the identified ACM.



If during the renovation activities suspect ACM not previously assessed is encountered, work should be stopped immediately, and sampling of the material should be conducted to confirm the presence of asbestos.

6.2 Lead-Containing Paint

Based on site observations and the analytical results, all painted surfaces with the exception of the white paint on plaster in the lunchroom should be considered lead-based.

Lead-containing surfaces with any amounts of lead that will be impacted through maintenance, renovation, or demolition activities in a manner likely to cause some level of airborne lead-containing dust or fumes, (i.e., welding, torch cutting, grinding, sanding or sandblasting) should be controlled through the development and implementation of an Exposure Control Plan. The exposure control plan should include safe work procedures to address the lead exposure hazard during the maintenance, renovation, or demolition activities. The safe work procedures should include procedures to minimize dust during construction and demolition, procedures for proper containment, collection, clean-up and disposal of debris to prevent contamination in other areas, the use of proper cleaning tools, selection and use of proper personal protective equipment, and other applicable procedures.

If the lead-based paint is to be abated and disposed, a Toxicity Characteristic Leaching Procedure (TCLP) test must be performed on the lead-based paint waste prior to disposal.

The Federal Regulation SOR/2005-149 (Export and Import of Hazardous Waste and Hazardous Recyclable Material Regulations) outlines the handling storage and disposal of lead-contaminated materials. The Federal Regulation SOR/2005-149 establishes the regulated limit for disposal of lead-contaminated materials at 5 mg/L as determined by using TCLP.

TCLP samples need to be submitted with a chain of custody and analyzed following EPA Method SW846/6020A – Toxicity Characterization Leachate Preparation (TCLP) for lead analysis. Results will be reported as milligrams of lead per litre of leachate solution (mg/L). The detection limit of the analytical method is reported at 0.05 mg/L. Results will be reported as milligrams per litre.

6.3 Polychlorinated Biphenyls

Approximately 249 fluorescent light fixtures suspected to contain PCB-containing ballasts were identified within the facility at the time of the assessment. Prior to disposal, these ballasts should be inspected further to determine the presence of PCBs.

If the ballasts are identified as PCB-containing, they must be properly removed and disposed of. Disposal of the ballasts must be conducted in accordance with federal and provincial regulations. As they are removed, PCB-containing ballasts must be placed in labelled drums located in a secure area. Once full, the drums must be manifested and transported to an approved destruction and disposal facility in accordance with provincial regulations.

6.4 Other Hazardous Building Materials

Approximately 456 fluorescent light tubes suspected to contain mercury-vapour were identified within the Dairy and Metabolism Barn at the time of the assessment. Mercury vapour in light tubes and elemental mercury in thermostats pose no risk to workers or occupants provided the light bulbs and capsules remain intact and undisturbed. It is recommended that at the time of renovation, all mercury-containing bulbs and capsules in thermostats be kept separate from all other waste to prevent damage to the materials. These materials may be recycled and reused by qualified personnel or may be disposed of in accordance with regulations specified by Alberta ESRD.



If the ozone depletion units are to be disposed of during renovation activities, the units should be decommissioned and the refrigerants in the identified units must be drained, recycled or destroyed by a competent individual with the appropriate trade qualifications. Servicing should be performed in accordance with Environment Canada, Environmental Code of Practice for Elimination of Fluorocarbon Emissions from Refrigeration and Air Conditioning Systems and manufacturer's specifications. Decommissioned equipment containing ODS must be handled in accordance with Environment Canada's Ozone-Depleting Substances Regulation, 1998.

7.0 ABATEMENT BUDGETS

Based on the assessments conducted, the following budget has been provided for the removal of the identified hazardous building materials. The budgets are exclusive of GST.

The budget is based on the current regulatory requirements for abatement and our estimates of prices for work that could be contracted for in today's marketplace. In all cases, pricing assumes that identified hazardous building materials will be abated without damage to the building structure. Our budget has been based on Golder assisting in the development of the specifications, tendering of the abatement work and providing site assessment and air monitoring during the abatement process. The estimated budget for complete removal of the hazardous building materials in the building is provided in the following table:

Estimated Abatement Budget: PWGSC Dairy and Metabolism Barn

Table with 3 columns: Item, Approximate Quantity, Estimated Cost. Rows include Low-Risk Abatement Items (e.g., Blue Vinyl Floor Tile, Black Coating), Moderate-Risk or Glove-Bag Abatement Items (e.g., Parging on Pipe Insulation), High-Risk Abatement Items (e.g., Loose-fill Vermiculite Insulation), and a Subtotal of \$261,550.00. Total (Exclusive of GST) is \$316,550.00.



8.0 SURVEY LIMITATIONS

This report has been prepared for the exclusive use of Public Works and Government Services Canada. Golder Associates Ltd. has no obligation, contractually or otherwise, to any third persons using or relying upon this report for any reason and therefore takes no responsibility for damage suffered by any third party as a result of actions taken or decisions made on the basis of information or conclusions of this report.

This report is based on data and information collected in association with the site inspections conducted by Golder Associates Ltd. as described herein and is based solely on site conditions encountered at the time of the site visit on January 13 and 14, and April 15, 2015. Conditions may vary beyond the locations tested, and may vary over time.

No assurance is made regarding changes in conditions or practices subsequent to the time of the inspections. It was beyond the scope of this assessment to conduct a risk assessment with respect to any discovered microbial contamination and the potential health risks that may be associated with fungal exposure for building occupants.

Because of the limitations stated above, the findings, observations and conclusions expressed by Golder Associates Ltd. in this report are not, and should not be, considered an opinion concerning compliance of any past or present owner or operator of the site with any federal, provincial or local laws or regulations.

Golder Associates Ltd. will not be responsible for any real or perceived decrease in a property value, its saleability or ability to gain financing through the reporting of information in this report.

Golder Associates Ltd.'s observations and/or any readings obtained will represent observed and/or measured conditions only at the date and time observed and/or measured.

Golder Associates Ltd.'s assessment reports present professional opinions and findings of a scientific and technical nature. While attempts were made to relate the data and findings to applicable environmental laws, regulations, or industry standards, the report shall not be construed to offer legal opinion or representations as to the requirements of, nor compliance with, environmental laws, rules, regulations or policies of federal, provincial, or local governmental agencies. Any use of the assessment report constitutes acceptance of the limits of Golder Associates Ltd.'s liability.

9.0 CLOSURE

If you have any questions or require further information, please feel free to contact the undersigned at (403) 299-5600. Thank you for the opportunity to be of service. We look forward to working with you again.

GOLDER ASSOCIATES LTD.

Ben MacDonald, B.Sc.
Occupational Hygienist, EHS Project Manager

Dave Ayriss, B.Sc., CIH, CRSP
Associate / Senior Occupational Hygienist

BG/BM/DA/km

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APPENDIX A

Site Photographs



Photograph 1: Samples A-003 and A-011, Asbestos-Containing Blue Vinyl Floor Tiles with White Streaks, Lunchroom and Offices



Photograph 2: Sample A-007, Asbestos-Containing Pipe Elbow Insulation, Women's Washroom



Photograph 3: Sample A-009, Asbestos-Containing Black Coating under Sink, Lunchroom



Photograph 4: Sample A-009, Asbestos-Containing Grey Window Putty, Lunchroom



Photograph 5: Sample A-015, Asbestos-Containing Plaster Ceiling with Texture Finish, Cattle Area #2



Photograph 6: Sample A-017, Asbestos-Containing Pipe Elbow Insulation, Storage #2



Photograph 7: Sample A-019, Asbestos-Containing Pipe Elbow Insulation, Boiler Room



Photograph 8: Sample A-020, Asbestos-Containing Boiler Pipe Insulation, Boiler Room



Photograph 9: Sample A-024, Asbestos-Containing Grey Window Caulking, Cleaning Room



Photograph 10: Sample A-033, Asbestos-Containing White Window Caulking, Exterior



Photograph 11: Sample A-040, Asbestos-Containing White Caulking on Roof Wall Penetration, Exterior Wall



Photograph 12: Sample A-036, Cinderblock Walls Filled with Asbestos-Containing Vermiculite Insulation



APPENDIX B

Laboratory Reports

Certificate of Analysis

Report Date: 21-Jan-2015

Order Date: 15-Jan-2015

 Client: **Golder Associates Ltd. (Calgary)**

Client PO: GA15-0044

Project Description: 14-19082

Sample Results

Lead				Matrix: Paint
				Sample Date: 13-Jan-15
Parcel ID	Client ID	Units	MDL	Result
1503208-01	L-001 Pale White Paint on Plaster, Room 1 - Lunchroom	ug/g	20	67
1503208-02	L-002 Pale Green Paint on Wood Cupboards, Room 6	ug/g	20	1990
1503208-03	L-003 White Paint on Plaster Ceiling, Room 6	ug/g	20	924
1503208-04	L-004 Light Brown Paint on Wood Door and Trim, Room 6	ug/g	20	1160
1503208-05	L-005 Swamp Green and Yellow Spots Paint on Concrete B	ug/g	20	1180
1503208-06	L-006 Grey Paint on Concrete Floor, Room 13	ug/g	20	2550
1503208-07	L-007 White Paint on Concrete Block, Room 18	ug/g	20	413
1503208-08	L-008 Beige Paint on Wood Overhead Door, Room 18	ug/g	20	19200
1503208-09	L-009 Silver Paint on Metal Railing, Room 18	ug/g	20	1470
1503208-10	L-010 Dark Green Paint on Ductwork, Room 18	ug/g	20	4350

Laboratory Internal QA/QC

Analvte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
Matrix Blank									
Lead	ND	20	ug/g						
Matrix Duplicate									
Lead	134	20	ug/g	131			1.9	30	
Matrix Spike									
Lead	476		ug/L	235	96.4	70-130			

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 Analysis Date: 1/19/2015
 Collected: 1/13/2015

Project: 14 - 19082

Test Report: Asbestos Analysis of Bulk Materials via EPA 600/R-93/116 Method using Polarized Light Microscopy

Sample	Description	Appearance	Non-Asbestos		Asbestos
			% Fibrous	% Non-Fibrous	% Type
A-001-Floor Tile 651500137-0001	ROOM 1 - LUNCH ROOM - VFT - 9" X 9" BLUE WITH WHITE STREAKS AND BLACK MASTIC	Blue Non-Fibrous Homogeneous		95% Non-fibrous (other)	5% Chrysotile
A-001-Mastic 651500137-0001A	ROOM 1 - LUNCH ROOM - VFT - 9" X 9" BLUE WITH WHITE STREAKS AND BLACK MASTIC	Black Non-Fibrous Homogeneous		100% Non-fibrous (other)	None Detected
A-002 651500137-0002	ROOM 1 - LUNCH ROOM - PLASTER CEILING	Gray/White Non-Fibrous Homogeneous		3% Quartz 97% Non-fibrous (other)	None Detected
A-003 651500137-0003	ROOM 1 - LUNCH ROOM - PIPE INSULATION - PARGING ON T	Gray Fibrous Homogeneous		40% Non-fibrous (other)	60% Chrysotile
A-004 651500137-0004	ROOM 2 - HALLWAY #1 - PLASTER CEILING	White Non-Fibrous Homogeneous		100% Non-fibrous (other)	None Detected
A-005 651500137-0005	ROOM 2 - HALLWAY #1 - CONCRETE BLOCK GROUT	Gray Non-Fibrous Homogeneous		5% Quartz 95% Non-fibrous (other)	None Detected

Analyst(s)

Kate Fee (45)

Jefferson Salvador, Laboratory Manager
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Samples analyzed by EMSL Canada Inc. Calgary, AB

Initial report from 01/23/2015 11:32:53

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Test Report: Asbestos Analysis of Bulk Materials via EPA 600/R-93/116 Method using Polarized Light Microscopy

Sample	Description	Appearance	Non-Asbestos		Asbestos
			% Fibrous	% Non-Fibrous	% Type
A-006 651500137-0006	ROOM 3 - MEN'S WASHROOM - CANVAS PIPE WRAP ON STRAIGHT OF PIPE	Yellow Fibrous Homogeneous	60% Cellulose 10% Min. Wool	30% Non-fibrous (other)	None Detected
A-007 651500137-0007	ROOM 4 - WOMEN'S WASHROOM - PIPE ELBOW INSULATION	Gray Fibrous Homogeneous		40% Non-fibrous (other)	60% Chrysotile
A-008 651500137-0008	ROOM 4 - WOMEN'S WASHROOM - DRYWALL JOINT COMPOUND WALL	Beige Non-Fibrous Homogeneous		100% Non-fibrous (other)	None Detected
A-009 651500137-0009	ROOM 1 - LUNCHROOM - BLACK SINK COATING	Black Non-Fibrous Homogeneous		98% Non-fibrous (other)	2% Chrysotile
A-010 651500137-0010	ROOM 1 - LUNCHROOM - GREY WINDOW PATTY	Gray Non-Fibrous Homogeneous		98% Non-fibrous (other)	2% Chrysotile
A-011-Floor Tile 651500137-0011	ROOM 5 - OFFICES - VFT - 9" X 9" BLUE WITH WHITE STREAKS AND BLACK MASTIC	Blue Non-Fibrous Homogeneous		95% Non-fibrous (other)	5% Chrysotile

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 Analysis Date: 1/19/2015
 Collected: 1/13/2015

Project: 14 - 19082

Test Report: Asbestos Analysis of Bulk Materials via EPA 600/R-93/116 Method using Polarized Light Microscopy

Sample	Description	Appearance	Non-Asbestos		Asbestos
			% Fibrous	% Non-Fibrous	% Type
A-011-Mastic 651500137-0011A	ROOM 5 - OFFICES - VFT - 9" X 9" BLUE WITH WHITE STREAKS AND BLACK MASTIC	Black Non-Fibrous Homogeneous		100% Non-fibrous (other)	None Detected
A-012 651500137-0012	ROOM 8 - CATTLE AREA #2 - PLASTER WITH TEXTURE CEILING	Beige Non-Fibrous Homogeneous		3% Quartz 97% Non-fibrous (other)	None Detected
A-013 651500137-0013	ROOM 8 - CATTLE AREA #2 - PLASTER WITH TEXTURE CEILING	Beige Non-Fibrous Homogeneous		3% Quartz 97% Non-fibrous (other)	None Detected
A-014 651500137-0014	ROOM 8 - CATTLE AREA #2 - PIPE ELBOW INSULATION	Beige Fibrous Homogeneous	50% Cellulose 10% Min. Wool	40% Non-fibrous (other)	None Detected
A-015 651500137-0015	ROOM 8 - CATTLE AREA #2 - PLASTER WITH TEXTURE CEILING	Gray Non-Fibrous Homogeneous		2% Quartz 96% Non-fibrous (other)	2% Chrysotile
A-016 651500137-0016	ROOM 8 - CATTLE AREA #2 - GREY FIRESTOP MATERIAL	Gray Non-Fibrous Homogeneous		100% Non-fibrous (other)	None Detected

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Project: 14 - 19082

Test Report: Asbestos Analysis of Bulk Materials via EPA 600/R-93/116 Method using Polarized Light Microscopy

Sample	Description	Appearance	Non-Asbestos		Asbestos
			% Fibrous	% Non-Fibrous	% Type
A-017 651500137-0017	ROOM 11 - STORAGE #2 - PIPE ELBOW INSULATION	Gray Fibrous Homogeneous		50% Non-fibrous (other)	50% Chrysotile
A-018 651500137-0018	ROOM 13 - BOILER ROOM - CONCRETE BLOCK GROUT	Gray Non-Fibrous Homogeneous		3% Quartz 97% Non-fibrous (other)	None Detected
A-019 651500137-0019	ROOM 13 - BOILER ROOM - PIPE ELBOW INSULATION	Gray Fibrous Homogeneous		40% Non-fibrous (other)	60% Chrysotile
A-020 651500137-0020	ROOM 13 - BOILER ROOM - BOILER PIPE ELBOW INSULATION	Gray Fibrous Homogeneous		40% Non-fibrous (other)	60% Chrysotile
A-021 651500137-0021	ROOM 13 - BOILER ROOM - CANVAS WRAP ON STRAIGHT PIPE	Beige Fibrous Homogeneous	50% Cellulose 10% Min. Wool	40% Non-fibrous (other)	None Detected
A-022 651500137-0022	ROOM 14 - HALLWAY #2 - PLASTER WITH TEXTURE CEILING	Beige Non-Fibrous Homogeneous		3% Quartz 97% Non-fibrous (other)	None Detected

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Project: 14 - 19082

Test Report: Asbestos Analysis of Bulk Materials via EPA 600/R-93/116 Method using Polarized Light Microscopy

Sample	Description	Appearance	Non-Asbestos		Asbestos
			% Fibrous	% Non-Fibrous	% Type
A-023 651500137-0023	ROOM 14 - HALLWAY #2 - GREY FIRESTOP MATERIAL	Gray Non-Fibrous Homogeneous		100% Non-fibrous (other)	None Detected
A-024 651500137-0024	ROOM 15 - CLEANING ROOM - GREY WINDOW CAULKING	Beige Non-Fibrous Homogeneous		98% Non-fibrous (other)	2% Chrysotile
A-025 651500137-0025	ROOM 15 - CLEANING ROOM - MARBLE COATING ON CONCRETE BLOCK	Beige Non-Fibrous Homogeneous		100% Non-fibrous (other)	None Detected
A-026 651500137-0026	ROOM 15 - CLEANING ROOM - VSF - PALE GREEN	Green Non-Fibrous Homogeneous		100% Non-fibrous (other)	None Detected
A-027 651500137-0027	ROOM 15 - CLEANING ROOM - WHITE LEVELING COMPOUND	White Non-Fibrous Homogeneous		2% Quartz 98% Non-fibrous (other)	None Detected
A-028 651500137-0028	ROOM 16 - CATTLE AREA #3 - PLASTER WITH TEXTURE CEILING	Beige Non-Fibrous Homogeneous		3% Quartz 97% Non-fibrous (other)	None Detected

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 Analysis Date: 1/19/2015
 Collected: 1/13/2015

Project: 14 - 19082

Test Report: Asbestos Analysis of Bulk Materials via EPA 600/R-93/116 Method using Polarized Light Microscopy

Sample	Description	Appearance	Non-Asbestos		Asbestos
			% Fibrous	% Non-Fibrous	% Type
A-029 651500137-0029	ROOM 16 - CATTLE AREA #3 - PLASTER WITH TEXTURE CEILING	Beige Non-Fibrous Homogeneous		3% Quartz 97% Non-fibrous (other)	None Detected
A-030 651500137-0030	ROOM 18 - EXTERIOR + ROOF - MATERIAL ON OVERHEAD DOOR	Beige Non-Fibrous Homogeneous		100% Non-fibrous (other)	None Detected
A-031 651500137-0031	ROOM 18 - EXTERIOR + ROOF - WHITE WINDOW PUTTY ON OVERHEAD DOOR	White Non-Fibrous Homogeneous	2% Wollastonite	98% Non-fibrous (other)	None Detected
A-032 651500137-0032	ROOM 18 - EXTERIOR + ROOF - GREY FIRESTOP MATERIAL	Gray Fibrous Homogeneous	2% Cellulose	98% Non-fibrous (other)	None Detected
A-033 651500137-0033	ROOM 18 - EXTERIOR + ROOF - WHITE WINDOW CAULKING	White Non-Fibrous Homogeneous		98% Non-fibrous (other)	2% Chrysotile

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 Analysis Date: 1/19/2015
 Collected: 1/13/2015

Project: 14 - 19082

Test Report: Asbestos Analysis of Bulk Materials via EPA 600/R-93/116 Method using Polarized Light Microscopy

Sample	Description	Appearance	Non-Asbestos		Asbestos
			% Fibrous	% Non-Fibrous	% Type
A-034 651500137-0034	ROOM 18 - EXTERIOR + ROOF - CONCRETE BLOCK CAVITY INSULATION	Brown/Various Fibrous Homogeneous		100% Non-fibrous (other)	<1% Actinolite
A-035 651500137-0035	ROOM 10 - STORAGE #1 - CONCRETE BLOCK CAVITY INSULATION	Brown/Various Fibrous Homogeneous		100% Non-fibrous (other)	<1% Actinolite
A-036 651500137-0036	ROOM 17 - FOOD + HAY STORAGE - CONCRETE BLOCK CAVITY INSULATION	Brown/Various Fibrous Homogeneous		100% Non-fibrous (other)	<1% Actinolite
A-037 651500137-0037	ROOM 19 - ROOFTOP MECHANICAL - DUCT DAMPNER	Brown Fibrous Homogeneous	75% Cellulose	25% Non-fibrous (other)	None Detected
A-038 651500137-0038	ROOM 18 - EXTERIOR + ROOF - BLACK CAULKING ALONG CONCRETE BLOCK + FLASHING CONNECTION JOINT	Black Non-Fibrous Homogeneous	2% Cellulose	98% Non-fibrous (other)	None Detected

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Analysis Date: 1/19/2015
Collected: 1/13/2015

Project: 14 - 19082

Test Report: Asbestos Analysis of Bulk Materials via EPA 600/R-93/116 Method using Polarized Light Microscopy

Sample	Description	Appearance	Non-Asbestos		Asbestos
			% Fibrous	% Non-Fibrous	% Type
A-039 651500137-0039	ROOM 18 - EXTERIOR + ROOF - TAR + GRAVEL ROOF SAMPLE, TOP + MIDDLE AREA	Gray Fibrous Homogeneous	10% Cellulose	90% Non-fibrous (other)	None Detected
A-040 651500137-0040	ROOM 18 - EXTERIOR + ROOF - WHITE CAULKING ON ROOF PENETRATION	Gray Fibrous Homogeneous		97% Non-fibrous (other)	3% Chrysotile
A-041 651500137-0041	ROOM 18 - EXTERIOR + ROOF - GREY CAULKING ON ROOF PENETRATION	Gray Non-Fibrous Homogeneous		100% Non-fibrous (other)	None Detected
A-042 651500137-0042	ROOM 18 - EXTERIOR + ROOF - GREY CAULKING ALONG CONCRETE BLOCK + FLASHING CONNECTION JOINT	White Non-Fibrous Homogeneous		100% Non-fibrous (other)	None Detected

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Analysis Date: 1/19/2015
Collected: 1/13/2015

Project: 14 - 19082

Test Report: Asbestos Analysis of Bulk Materials via EPA 600/R-93/116 Method using Polarized Light Microscopy

Sample	Description	Appearance	Non-Asbestos		Asbestos
			% Fibrous	% Non-Fibrous	% Type
A-043 651500137-0043	ROOM 18 - EXTERIOR + ROOF - WHITE PUTTY ON SKYLIGHTWHITE CAULKING ON FLASHING	White Non-Fibrous Homogeneous		100% Non-fibrous (other)	None Detected

Analyst(s)

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 Analysis Date: 4/20/2015
 Collected: 4/15/2015

Project: 14 - 19082

Test Report: Asbestos Analysis of Bulk Materials via EPA 600/R-93/116 Method using Polarized Light Microscopy

Sample	Description	Appearance	Non-Asbestos		Asbestos
			% Fibrous	% Non-Fibrous	% Type
A-44 651501087-0001	CATTLE AREA 3 - PLASTER CEILING	Gray Non-Fibrous Homogeneous		10% Quartz 90% Non-fibrous (other)	None Detected
A-45 651501087-0002	CATTLE AREA 3 - PLASTER CEILING	Gray Non-Fibrous Homogeneous		10% Quartz 90% Non-fibrous (other)	None Detected
A-46 651501087-0003	CATTLE AREA 3 - PLASTER CEILING	Gray Non-Fibrous Homogeneous		10% Quartz 90% Non-fibrous (other)	None Detected
A-47 651501087-0004	HALLWAY 2 - PLASTER CEILING	Gray Non-Fibrous Homogeneous		10% Quartz 90% Non-fibrous (other)	None Detected
A-48 651501087-0005	HALLWAY 2 - PLASTER CEILING	Gray Non-Fibrous Homogeneous		10% Quartz 90% Non-fibrous (other)	None Detected
A-49-Skim Coat 651501087-0006	HALLWAY 1 - PLASTER CEILING	White Non-Fibrous Homogeneous		100% Non-fibrous (other)	None Detected
A-49-Base Coat 651501087-0006A	HALLWAY 1 - PLASTER CEILING	Gray Non-Fibrous Homogeneous		5% Quartz 95% Non-fibrous (other)	None Detected
A-50-Skim Coat 651501087-0007	HALLWAY 1 - PLASTER CEILING	White Non-Fibrous Homogeneous		100% Non-fibrous (other)	None Detected

Analyst(s)

Kate Fee (18)

Jefferson Salvador, Laboratory Manager
or other approved signatory

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Samples analyzed by EMSL Canada Inc. Calgary, AB

Initial report from 04/24/2015 10:59:56

**EMSL Canada Inc.**

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Phone/Fax: 403-879-1149 / (403) 879-1152

<http://www.EMSL.com>CalgaryLab@EMSL.com

EMSL Canada Or 651501087

CustomerID: 55EHPL50

CustomerPO: GA15-0264

ProjectID:

Attn: **Scott Bishop**
Golder Associates, Ltd.
102, 2535 - 3 Avenue SE
Calgary, AB T2A 7W5

Phone: (403) 299-5600
 Fax: (403) 299-5606
 Received: 04/17/15 11:18 AM
 Analysis Date: 4/20/2015
 Collected: 4/15/2015

Project: 14 - 19082

Test Report: Asbestos Analysis of Bulk Materials via EPA 600/R-93/116 Method using Polarized Light Microscopy

Sample	Description	Appearance	Non-Asbestos		Asbestos
			% Fibrous	% Non-Fibrous	% Type
A-50-Base Coat 651501087-0007A	HALLWAY 1 - PLASTER CEILING	Gray Non-Fibrous Homogeneous		5% Quartz 95% Non-fibrous (other)	None Detected
A-51-Skim Coat 651501087-0008	LUNCH ROOM - PLASTER CEILING	White Non-Fibrous Homogeneous		100% Non-fibrous (other)	None Detected
A-51-Base Coat 651501087-0008A	LUNCH ROOM - PLASTER CEILING	Gray Non-Fibrous Homogeneous		5% Quartz 95% Non-fibrous (other)	None Detected
A-52 651501087-0009	NORTHEAST SECTION OF ROOF - TAR + GRAVEL ROOF MATERIAL	Brown/Black Fibrous Homogeneous	75% Cellulose	25% Non-fibrous (other)	None Detected
A-53 651501087-0010	NORTHEAST SECTION OF ROOF - TAR + GRAVEL ROOF MATERIAL	Brown/Black Fibrous Homogeneous	75% Cellulose	25% Non-fibrous (other)	None Detected
A-54 651501087-0011	CENTRAL SECTION OF ROOF - TAR + GRAVEL ROOF MATERIAL	Brown/Black Fibrous Homogeneous	75% Cellulose	25% Non-fibrous (other)	None Detected
A-55 651501087-0012	CENTRAL SECTION OF ROOF - TAR + GRAVEL ROOF MATERIAL	Black Fibrous Homogeneous	25% Cellulose	75% Non-fibrous (other)	None Detected

Analyst(s)

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Jefferson Salvador, Laboratory Manager
 or other approved signatory

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Samples analyzed by EMSL Canada Inc. Calgary, AB

Initial report from 04/24/2015 10:59:56



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Phone: (403) 299-5600
Fax: (403) 299-5606
Received: 04/17/15 11:18 AM
Analysis Date: 4/20/2015
Collected: 4/15/2015

Project: 14 - 19082

Test Report: Asbestos Analysis of Bulk Materials via EPA 600/R-93/116 Method using Polarized Light Microscopy

Sample	Description	Appearance	Non-Asbestos		Asbestos
			% Fibrous	% Non-Fibrous	% Type
A-56 651501087-0013	SOUTHWEST SECTION OF ROOF - TAR + GRAVEL ROOF MATERIAL	Brown/Black Fibrous Homogeneous	75% Cellulose	25% Non-fibrous (other)	None Detected
A-57 651501087-0014	SOUTH SECTION OF ROOF - TAR + GRAVEL ROOF MATERIAL	Brown/Black Fibrous Homogeneous	75% Cellulose	25% Non-fibrous (other)	None Detected
A-58 651501087-0015	SOUTHEAST SECTION OF ROOF - TAR + GRAVEL ROOF MATERIAL	Brown/Black Fibrous Homogeneous	75% Cellulose	25% Non-fibrous (other)	None Detected

Analyst(s)

Kate Fee (18)



Jefferson Salvador, Laboratory Manager
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Samples analyzed by EMSL Canada Inc. Calgary, AB

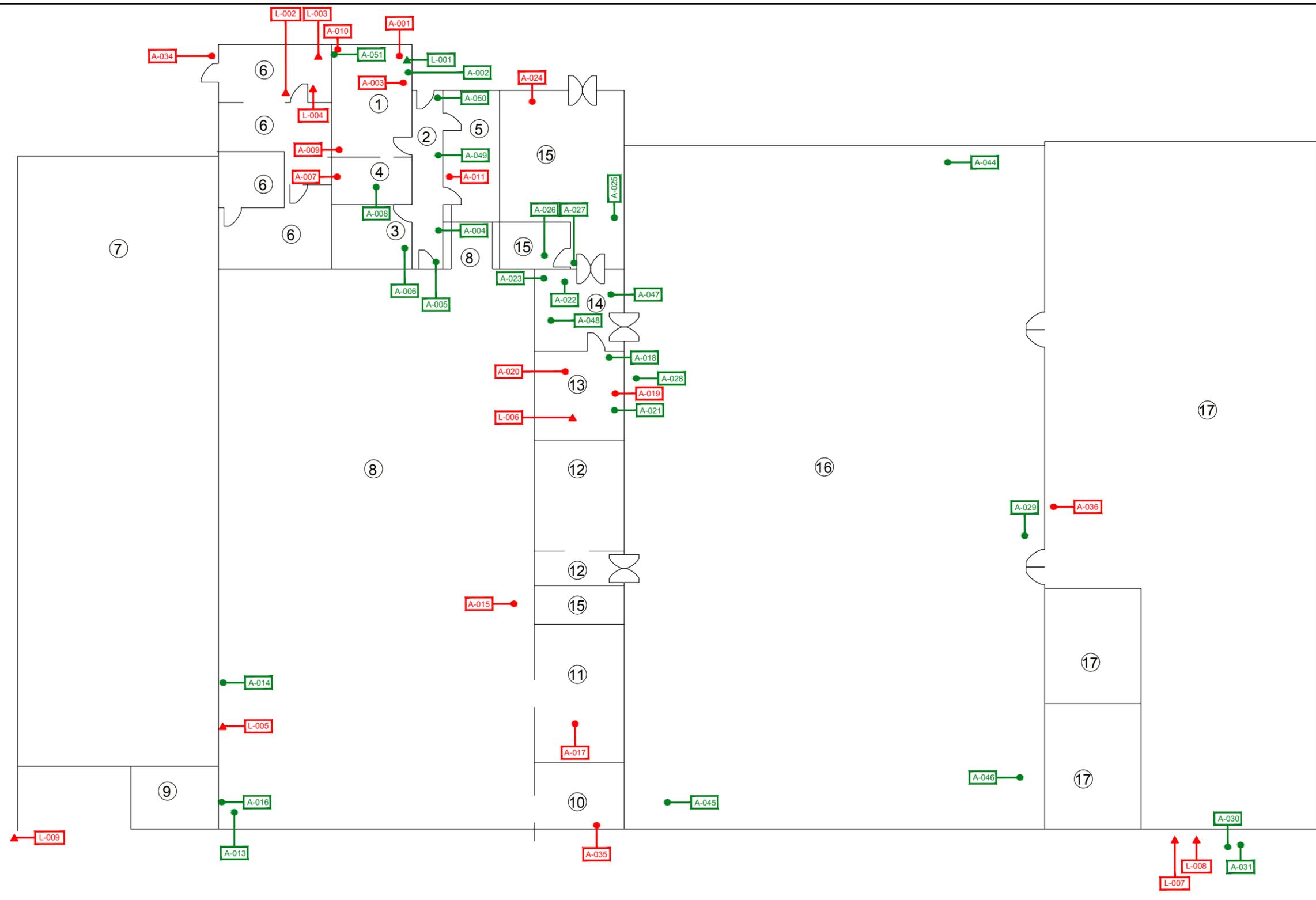
Initial report from 04/24/2015 10:59:56



APPENDIX C

Floor Plans

Path: \\golder\gpc\CAL\MKCAD\Public\CityandGovernment\Servers\leth\lethbridge_PWGCS\#R.071094.001\100-HG-001.dwg | File Name: 1419082_1000-HG-001.dwg



DRAFT

LEGEND

	A-#	ASBESTOS CONTAINING SAMPLE
	A-#	NON-ASBESTOS CONTAINING SAMPLE
	L-#	POSITIVE LEAD SAMPLE
	L-#	NEGATIVE LEAD SAMPLE

NOTES
DIGITIZED FROM FIELD NOTES.

SCHEMATIC, NOT TO SCALE

CLIENT
PUBLIC WORKS AND GOVERNMENT
SERVICES CANADA

PROJECT
LRC DAIRY AND METABOLISM BARN
LETHBRIDGE RESEARCH CENTRE
LETHBRIDGE, ALBERTA PWGCS #R.071094.001

CONSULTANT
YYYY-MM-DD 2015-02-02

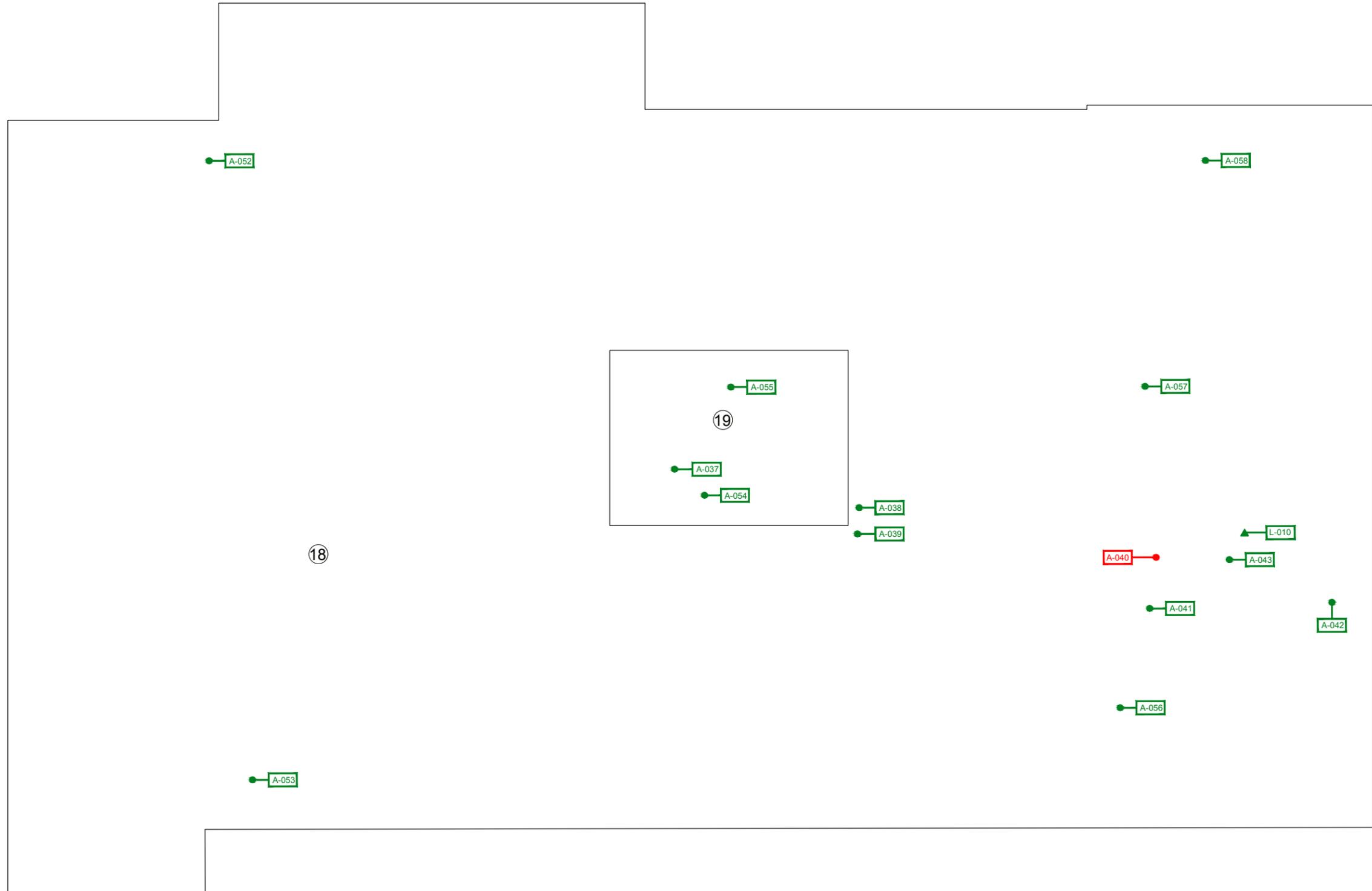
TITLE
**BUILDING #86
MAIN FLOOR**

PREPARED	YW
DESIGN	CG
REVIEW	
APPROVED	

PROJECT No.	CONTROL	Rev.	FIGURE
1419082	1000-HG-0001	A	1

IF THIS MEASUREMENT DOES NOT MATCH WHAT IS SHOWN, THE SHEET SIZE HAS BEEN MODIFIED FROM: ANSI B

28 mm



Path: \\golder_gp\CAL\MKCAD\Public\CityandGovernmentServices\Lethbridge_PWGCS_#071094.001\199_PROJECTS\1419082_02_PRODUCTION\1000\DWG... | File Name: 1419082_1000-HG-0002.dwg

LEGEND

	A-#	ASBESTOS CONTAINING SAMPLE
	A-#	NON-ASBESTOS CONTAINING SAMPLE
	L-#	POSITIVE LEAD SAMPLE
	L-#	NEGATIVE LEAD SAMPLE

NOTES
DIGITIZED FROM FIELD NOTES.

DRAFT

CLIENT
PUBLIC WORKS AND GOVERNMENT
SERVICES CANADA

CONSULTANT	YYYY-MM-DD	2015-02-02
	PREPARED	YW
	DESIGN	CG
	REVIEW	
	APPROVED	



PROJECT
LRC DAIRY AND METABOLISM BARN
LETHBRIDGE RESEARCH CENTRE
LETHBRIDGE, ALBERTA PWGCS #R.071094.001

TITLE
**BUILDING #86
ROOF**

PROJECT No.	CONTROL	Rev.	FIGURE
1419082	1000-HG-0002	A	2

SCHEMATIC, NOT TO SCALE

28 mm IF THIS MEASUREMENT DOES NOT MATCH WHAT IS SHOWN, THE SHEET SIZE HAS BEEN MODIFIED FROM: ANSI B

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