

Part 1 General

1.1 RELATED REQUIREMENTS

- .1 Section 02 61 33 Hazardous Designated Substances Report

1.2 REFERENCE STANDARDS

- .1 American Conference of Governmental Industrial Hygienists (ACGIH), Bioaerosols Assessment and Control 2019.
- .2 Health Canada/Workplace Hazardous Materials Information System (WHMIS)
 - .1 Material Safety Data Sheets (MSDS).
- .3 New York City Department of Health - Bureau of Environmental and Occupational Disease Epidemiology's Guidelines on the Assessment and Remediation of Fungi in Indoor Environment [2000]
- .4 United States Department of Labor Occupational Safety and Health Administration (OSHA)
 - .1 29 CFR 1910.134 - Respiratory Protection.
 - .2 29 CFR 1910.1200 - Hazard Communication.
- .5 United States Environmental Protection Agency (EPA), Mould Remediation in Schools and Commercial Buildings, 2001.

1.3 DEFINITIONS

- .1 Authorized Visitors: Parks Canada Agency individual(s) (or designated representative), and representative(s) of regulatory agencies.
- .2 Competent person: Designated representative who can demonstrate that mould remediation training has been obtained, is capable of identifying existing microbial hazards in workplace and selecting appropriate control strategy for microbial exposure.
- .3 Contractor: remediation contractor providing removal services as defined in specification.
- .4 Fibre reinforced polyethylene sheet (FRPS): rip-proof fibre reinforced polyethylene sheet sheeting with added fibre reinforced adhesive tape along edges.
- .5 HEPA vacuum: High Efficiency Particulate Air filtered vacuum equipment with filter system capable of collecting and retaining particles greater than 0.3 microns in any direction at 99.97% efficiency.
- .6 HVAC: heating ventilating and air-conditioning system[s] which serve occupied areas. Includes but is not limited to air handling units, duct work, terminal boxes and vents. Mould Contaminated Work Area: specific area or location where actual work is being performed or such other areas of a facility where it has been determined that it may be hazardous to public health as result of mould clean up.
- .9 Occupied Area: areas of building or work site that is outside of Mould Contaminated Work Area.
- .10 PPE: Personnel Protection Equipment.

- .11 Sprayer: garden reservoir type sprayer or airless spray equipment capable of producing mist or fine spray. Must have a minimum of six litres capacity for work. Water is not available to the Contractor.

1.4 REGULATORY REQUIREMENTS

- .1 Follow guidelines most widely accepted by recognized professional organizations such as occupational hygienists, health professionals or environmental engineers as listed in paragraph 1.2 Referenced Standards.

1.5 CLOSEOUT SUBMITTALS

- .1 Maintain general log to provide permanent record of project. Maintain logs and other required documentation as part of permanent project file.

1.6 INSTRUCTION AND TRAINING

- .1 Before commencing work, provide to Designated Representative satisfactory proof that every worker has had instruction and training in potential health hazards of mould exposure, handling of hazardous materials, and in use of disposable respirators and protective clothing. This training can be performed as part of program to comply with requirements of the Canada Occupational Safety and Health Regulations, Part X, Hazardous Substances & the Hazardous Products Act.
- .2 Instruction and training must be provided by designated construction safety advisor.

1.7 WORKER PROTECTION

- .1 Non-powered disposable filter-type respirator of type N95 (NIOSH approved) or equivalent, suitable for protection against mould and acceptable to Federal Authority having jurisdiction.
- .2 Gloves and eye protection.
- .3 Disposable paper (Tyvek) coveralls are recommended.
- .4 No person required to enter Mould Contaminated Work Area to have facial hair that affects seal between respirator and face.
- .5 Eating, drinking and chewing are not permitted in Mould Contaminated Work Area.
- .6 Before leaving Mould Contaminated Work Area, dispose of protective clothing as waste as specified.
- .7 Ensure workers wash hands and face after leaving Mould Contaminated Work Area.

1.8 HOURS OF WORK

- .1 Typical work schedule - perform work involving mould remediation during normal working hours. Work to be conducted outside normal working hours requires approval

from the Designated Representative. Be available to work continuously from beginning to end of project.

Part 2 Products

2.1 MATERIALS

- .1 Cleaning solution: D/2 biological Solutions, or an QAC equivalent, following approval by the Designated representative.
- .2 Inhibitor application products: D/2 Biological Solutions or an approved QAC equivalent, following approval by Designated representative.
- .3 Drop Sheets: 0.15 mm thick woven fibre reinforced fabric bonded both sides with fibre reinforced polyethylene sheet.
- .4 Disposal bags: dust-tight 0.15 mm clear polyethylene waste bags.
- .5 Wetting Agent: water or other liquid (including the cleaner a listed above) to mist mould-containing material. Water must be contaminant-free, fresh water.
- .6 Cleaning/inhibitor solution: solution for damp wipe/scrap and mop. It is advised to use the least amount of water as possible, with care to not damage historic brick or other substrate.
- .7 Fibre reinforced adhesive tape: used in sealing joints of fibre reinforced polyethylene sheets and for attachment of fibre reinforced polyethylene sheet to finished and unfinished surfaces. Fibre reinforced adhesive tape must be capable of adhering under both dry and wet conditions.
- .8 Materials: provide materials such as fibre reinforced polyethylene sheeting, lumber, nails, and hardware necessary to construct and dismantle barriers that isolate Mould Contaminated Work Area.

2.2 TOOLS AND EQUIPMENT

- .1 Tools and equipment: must be suitable for use with microbial contamination and must be able to withstand de-contamination. Tools must be approved by Departmental Representative and may include (but not limited to), nylon brushes with soft bristles, clothes and sponges. Use industrial grade brushes with a large contact surface. Use of brushes with metal or hard plastic bristles is prohibited. Clothes should be absorbent, have good tear resistance and minimal lint. For example, Kymberly Clark Wypall X60 (white not blue to prevent issue with lint) or a similar equivalent. Use high quality sponges, resistant to abrasion, that does not leave fragments on the surface and is not abrasive.
- .2 Personnel protective equipment (protective clothing, disposable respirators): provided in sufficient quantities for duration of project as noted in Section 1.7.
- .3 Vacuum cleaners: equipped with HEPA filters.
- .4 Ladders and/or scaffolds: adequate length, strength and sufficient quantity to support work schedule.
- .5 Manual pump sprayer (garden insecticide or fertilizer sprayer) to apply the cleaning solution to the surface and rinse with clean water. The sprayer content should be clearly identified with a visual label to prevent mix up and confusion.

Part 3 Execution

Note: Sequencing of work must be done in such a way to ensure no additional contamination occurs as a result of the work. Refer to specification section 02 87 10 and 02 87 11 for additional work. Work plan must be approved by Departmental Representative

3.1 PREPARATION OF MOULD WORK AREA

- .1 Contractor shall be responsible for protecting all existing and adjacent materials, such as doors, windows, flashings, roofing, and other existing materials that are not intended to be treated..
- .2 Clean movable objects within proposed Mould contaminated Work Area using HEPA filtered vacuum equipment, damp wipe surfaces and remove such objects from Mould Contaminated Work Area to secure and clean area.
- .3 If there is heavy contamination requiring more than a damp wipe and vacuuming, clean surface with D/2 biological solution or approved equivalent. Rinse the cleaning solution with a damp wipe with clean water.
- .4 Remove visible dust from surfaces in Mould Contaminated Work Area where dust is likely to be disturbed during course of work. Use HEPA vacuum and damp wipe area.
- .5 Do not use compressed air to clean up or remove dust from surfaces.
- .6 Seal floor and wall surfaces which are not to be removed as microbial waste with minimum of 2 separate layers of 0.15 mm polyethylene sheeting. Cover floors first so that fibre reinforced polyethylene extends at least 300 mm and fold up against enclosure wall, overlap vertical fibre reinforced polyethylene sheet with floor fold up.
- .7 Use 0.15 mm fibre reinforced polyethylene drop sheets tightly sealed with fibre reinforced adhesive tape over flooring in Mould Contaminated Work Areas.

3.2 MICROBIAL WORK AREA (CLEANING)

- .1 Note that the removal procedures are targeting moulds and mildew (microbial) and another microorganism group, bryophytes which include moss, lichen and algae. To remove bryophytes (and release roots) will require brushing of the surface with D/2 biological solution or approved equivalent; damp clothes will not be enough in these cases.
- .2 All the surfaces are to be cleaned with a Hepa filter vacuum cleaner first. This would be the first step to get rid quickly of all the light contamination. It would also remove dust, dirt and other contaminants that could slow down the other steps of the cleaning process. Brush the surface while vacuuming with a dry paint brush.
- .3 Clean microbially contaminated materials in designated locations. The application of the product to follow the manufacturer's instructions with additional instruction from Designated Representative.
- .4 Prior to the application of the mould cleaning product, mock-up of an area 1m x 1m in locations approved by the Departmental Representative to be carried out prior to proceeding to finalize the technique. Mock-up locations include: The Coal Shed (painted brick), the Guardroom (brick rendered with concrete/plaster), Jail Cell (painted brick), Main Magazine (painted brick), and Lower Battery (Casemate #4, east end).
- .5 Non-porous and semi-porous surfaces: In areas where the contamination is less severe and not adhered to the surface, clean with a Hepa filter vacuum and a dry soft brush. Damp wipe the surface with a cloth and D/2 biological solution or approved equivalent. In area where the contamination is more severe and well adhered to the surface, spray D/2 solution biological solution or approved equivalent on the surface with a manual pump sprayer. Leave 10-15 minutes for the solution to act. Do not let the surface dry,

spray again if needed. Brush the surface with a soft bristle brush to remove the biological contaminants. Reapply D/2 biological solution or approved equivalent as needed while brushing. The surface should be rinsed with a mist of clean water applied with a manual pump sprayer. Clothes should be used to absorb the runoff of cleaning solution, rinsed off moulds and soluble dirt, as the brushing and rinsing happens. Once saturated, the clothes should be disposed of, in order to prevent further contamination of the surface. Sponges could also be used for the same purpose as clothes. If using sponges, you will need buckets to empty the absorbed runoff and buckets filled with a clean water/D/2 biological solution mix to constantly rinse the sponges. This is to prevent the contamination of the surface with a dirty sponge. The sponge should be wringed out before it is used on the surface again. Any water used is to be kept at a minimum so as to not introduce additional moisture into the structure.

- .6 Porous surfaces: In areas where the contamination is less severe and not adhered to the surface, clean with a Hepa filter vacuum and a dry soft brush. Damp wipe the surface with a cloth and D/2 biological solution or approved equivalent. In area where the contamination is more severe and well adhered to the surface, spray D/2 solution biological solution or approved equivalent on the surface with a manual pump sprayer. Leave 10-15 minutes for the solution to act. Do not let the surface dry, spray again if needed. Brush the surface with a soft bristle brush to remove the biological contaminants. Reapply D/2 biological solution or approved equivalent as needed while brushing. The surface should be rinsed with a mist of clean water applied with a manual pump sprayer. When working on porous surfaces, it is critical to prevent the contaminants to migrate into the surface, so great care should be putted into absorbing the cleaning runoff. Clothes should be used to absorb the runoff, as the brushing and rinsing happens. Once saturated, the clothes should be disposed of, in order to prevent further contamination of the surface. Sponges could also be used for the same purpose as clothes. If using sponges, you will need buckets to empty the absorbed runoff and buckets filled with a clean water/D/2 biological solution mix to constantly rinse the sponges. This is to prevent the contamination of the surface with a dirty sponge. The sponge should be wringed out before it is used on the surface again. Any water used is to be kept at a minimum so as to not introduce additional moisture into the structure.
- .7 Dispose of contaminated building materials as specified. Unused D/2 biological solution product to be returned to the Departmental Representative.
- .8 During cleaning, should the Designated Representative suspect additional contamination of areas outside Mould Contaminated Work Area, contractor to stop work and immediately decontaminate these affected areas. Unprotected individuals are prohibited from entering contaminated areas until a visual inspection determines areas are free from contamination.
- .9 Notify Designated Representative of mould contaminated material discovered during work and not apparent (previously identified). Do not disturb such material pending instruction from the Designated Representative.

3.3 REPAIR AND CLEAN-UP

- .1 Clean, frequently during work and immediately after completion of work, Mould Contaminated Work Area using a HEPA vacuum or by damp mopping with cleaning solution.
- .2 Leave areas dry and visibly free from contamination, debris and dust.
- .3 Perform final thorough clean-up of work areas and adjacent areas affected by work using HEPA vacuum and damp mopping with cleaning solution.

3.4 WASTE DISPOSAL

- .1 Place dust and mould-containing waste in doubled-bagged dust-tight 0.15 mm clear polyethylene waste bags. Treat drop sheets and disposable protective clothing as waste; fold these items to contain dust, and place in plastic bags. Securely seal bags.
- .2 Clean exterior of each waste-filled bag using damp cloths and cleaning solution or HEPA vacuum prior to removal from Mould Contaminated Work Area.
- .3 Lead based paint which may be present in the HEPA vacuum, as a result of pre-cleaning surfaces, will require proper disposal. Refer to the *Hazardous Building Materials Report*, prepared by Englobe and dated February 2021 for concentrations of lead-based paints to determine appropriate disposal options.
- .4 Remove waste bags from site and dispose. There is no special requirements for disposal of mouldy materials, as such they can be disposed of in landfill.
- .5 Cloths, rags and brushes that were used with the D/2 biological solution or approved equivalent can be disposed of with no special requirement. Although D/2 biological solution or approved equivalent pose low health or environmental hazard level, if quantity in liquid form needs to be disposed of, it will have to be disposed of as industrial waste in accordance to provincial and federal regulations.

3.5 RE-ESTABLISHMENT OF OBJECTS AND SYSTEMS

- .1 Relocate objects moved to temporary locations to their proper positions. Ensure objects are cleaned before been moved into cleaned areas.
- .2 Remount objects removed to former positions.
- .3 Re-establish mechanical and electrical systems to proper working order.

3.6 FINAL CLEARANCE

- .1 Designated Representative to conduct thorough visual inspection to detect visible accumulations of dust or bulk materials remaining in work area. Should dust, debris, microbial contamination, or residue be detected repeat cleaning until area meets approval.

END OF SECTION