

PART 1 - GENERAL

1.1 REFERENCES

- .1 American Conference of Governmental Industrial Hygienists (ACGIH), Bioaerosols Assessment and Control.
- .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.
- .4 Safe Work Manitoba
 - .1 Investigation, Assessment and Remediation of Mould in Workplaces, June 2015.
- .5 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.
- .6 United States Environmental Protection Agency (EPA), Mould Remediation in Schools and Commercial Buildings.

1.2 DEFINITIONS

- .1 Authorized Visitors: Engineers, Consultants or designated representatives, and representatives of regulatory agencies.
- .2 Cleaning solution: detergent solution
- .3 Competent person: individuals 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.
- .4 Contractor: remediation contractor providing demolition and removal services as defined in specifications.
- .5 Critical barrier or enclosure: minimum of two separate layers of 0.15 mm fibre reinforced polyethylene sheeting (FRPS) taped securely and separately over windows, doorways, diffusers, grilles and any other openings between work area and uncontaminated areas outside of work area including outside of building.
- .6 Curtained doorway: arrangement of closures to allow ingress and egress from one room to another. Typically constructed as follows: Place two overlapping sheets (minimum overlap of 1 metre or width of doorway) of FRPS over existing or temporarily framed doorway, securing each along top of doorway, securing vertical edge of one sheet along one vertical side of doorway and securing vertical edge of other sheet along opposite vertical side of doorway. Reinforce free edges of FRPS, with fibre reinforced adhesive tape and weight bottom

edge to ensure proper closing. Space curtained doorways minimum of 2 metres apart.

- .7 Decontamination Room: enclosure located between Mould Contaminated Work Area and uncontaminated area for decontamination of equipment and workers, typically consisting of two curtained doorways at least 2 metres apart.
- .8 Fibre Reinforced Polyethylene Sheet (FRPS): rip-proof polyethylene sheeting with fibre reinforced adhesive tape added along edges.
- .9 HEPA vacuum: High Efficiency Particulate Air filtered vacuum equipment with filter system capable of collecting and retaining particles greater than 0.3 microns at 99.97% efficiency.
- .10 HVAC: heating ventilating which serve occupied areas. Includes but is not limited to air handling units, duct work, terminal boxes and grills.
- .11 Mould Contaminated Work Area (MCWA): specific area or location where actual work is being performed or such other area of facility which it has been determined may be hazardous to public health as result of mould remediation.
- .12 Negative pressure: maintain Mould Contaminated Work Area at negative pressure relative to surrounding space to prevent contaminants from leaving contaminated area. Use exhaust fan with HEPA filter to maintain Mould Contaminated Work Area at lower pressure than surrounding areas. Maintain pressure differential of 5 to 7 Pa . Air flow movement can be verified with smoke pencil.
- .13 Occupied Area: areas of building or work site that are outside Mould Contaminated Work Area.
- .14 PPE: Personnel Protective Equipment.
- .15 Sprayer: garden reservoir type sprayer or airless spray equipment capable of producing mist or fine spray; with minimum of six litres capacity for work.

1.3 REGULATORY REQUIREMENTS

- .1 Comply with all regulations in effect at time work is performed. In case of conflict among these requirements or with these specifications more stringent requirement applies. If no regulations exist, follow guidelines most widely accepted by recognized professional organizations such as occupational hygienists, health professionals or environmental engineers as listed in paragraph 1.2 References.

1.4 ACTION AND INFORMATIONAL SUBMITTALS

- .1 Submit control submittals in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Submit proof satisfactory to Departmental Representative that employees have had instruction on potential hazards of mould exposure, use of personal respirator and protective clothing, entry and exit from work areas and aspects of work procedures and protective

measures.

- .3 Submit proof of attendance in form of certificate that supervisory personnel have been trained in mould remediation course, approved by Departmental Representative. Minimum of one supervisor for every ten trained workers.
- .4 Submit proof of qualifications of both remediation supervisor and subcontractors including relevant job experience to project.
- .5 Submit layout of proposed enclosures and decontamination facilities to Departmental Representative for review.
- .6 Submit Provincial and/or local requirements for Notice of Project form.
- .7 Submit proof of Contractors Liability Insurance for dealing with hazardous materials.
- .8 Submit fitting record by construction safety advisor to Departmental Representative that employees have prior respirator fitting and testing. Workers must be fit tested (irritant smoke test) with respirator that is personally issued.
- .9 Submit Workers Compensation Board status and transcription of insurance.

1.5 CLOSEOUT SUBMITTALS

- .1 Maintain general log provide to permanent record of project. Maintain logs, including negative pressure records and other required documentation as part of permanent project file.
- .2 Daily log must be available for inspection upon request by Departmental Representative.
- .3 Visitor log must be available for inspection upon request by Departmental Representative.

1.6 INSTRUCTION AND TRAINING

- .1 Before commencing work, provide Departmental Representative proof that workers have had instruction and training in potential health hazards of mould exposure, handling of hazardous materials, in personal hygiene including protective clothing, entry and exit from Mould Contaminated Work Area, use of disposal procedures including building materials, respirators and protective clothing.
- .2 Instruction and training related to use of personal respirators:
 - .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 designated construction safety advisor.
- .4 Supervisory personnel to complete required training in mould

remediation.

1.7 WORKER PROTECTION

- .1 Provide tight-fitting full-face dual cartridge negative air purifying respirator equipped with HEPA filter cartridges to be worn. Disposable respirators not allowed.
- .2 Gloves that extend to middle of forearm.
- .3 Use mould-impervious polyethylene coated disposable head and foot coverings, and body suit made of breathable material. Seal gaps, such as those around ankles and wrists, with fibre reinforced adhesive tape.
- .4 Procedures for entering Mould Contaminated Work Area. Each worker to:
 - .1 Remove street clothes in Decontamination Room and put on respirator with new filters or reusable filters, clean disposable protective clothing and head covers before entering Mould Contaminated Work Area. Store street clothes, uncontaminated footwear and towels in Decontamination Room.
 - .2 Ensure that no person required to enter Mould Contaminated Work Area has facial hair that affects seal between respirator and face.
 - .3 Eating, drinking and chewing are not permitted in Mould Contaminated Work Area. Drinking is permitted in Decontamination Area.
- .5 Procedures for exiting Mould Contaminated Work Area. Workers to:
 - .1 Remove gross contamination from clothing before leaving work area then proceed to Decontamination Room and remove disposable protective clothing except respirators. Place contaminated work-suits in closed containers for disposal with mould contaminated materials.
 - .2 Clean outside of respirator with cleaning solution. Remove respirator, remove and dispose of filters in container provided for purpose. Wash and rinse inside of respirator.
 - .3 When not in use in work area, store reusable work footwear in Decontamination Room. Upon completion of mould remediation, clean footwear thoroughly inside and out using cleaning solution before removing from Mould Contaminated Work Area or from Decontamination Room.
 - .4 Proceed to decontamination room and change into street clothes at end of each day's work.
 - .5 If re-entering work area, follow entering and exiting procedures.
- .6 Workers: to be fully protected with respirators and protective equipment clothing during preparation of erecting enclosure prior to commencing actual mould remediation.
- .7 Post in Decontamination room procedures specified, in both official languages.

1.8 VISITOR
PROTECTION

- .1 Protective clothing and approved respirators to be worn by Authorized Visitors to Mould Contaminated Work Area.
- .2 Instruct Authorized Visitors in proper use of protective clothing, respirators, and procedures.
- .3 Instruct Authorized Visitors proper procedures to be followed in entering into and exiting from Mould Contaminated Work Area.

1.9 SITE
CONDITIONS

- .1 Inform sub-trades of presence of mould-contaminated materials and potential health hazards of mould exposure.
- .2 Submit to Departmental Representative copy of notifications prior to start of work.

1.10 REQUIREMENT
FOR CONTRACTOR TO
HIRE SERVICES OF 3rd PARTY
INDEPENDENT
INSPECTION AGENCY

- .1 Requirement for Contractor to hire and pay for the services of a qualified Independent Inspection Agency to the satisfaction of the Departmental Representative, to oversee Mould Abatement procedures, workmanship and testing:
 - .1 The agency is to oversee the work of the Mould Abatement sub-contractor.
 - .2 The agency must have documented experience performing microbial investigations, assessments and air clearance testing, and shall have knowledge of mould remediation activities.
 - .3 The agency shall provide site visits, testing and associated reporting sufficient to allow for typical milestone inspections necessary to comply with this Section and all current regulations. Reports are to be submitted to the Departmental Representative.
 - .4 It is the Contractor's responsibility to arrange, schedule and pay for all required services of the Independent Agency.
 - .5 It is the Contractor's responsibility to pay for these services and all air clearance testing in accordance with Section 01 29 83 – Payment Procedures for Testing Laboratory Services.

1.11 HOURS OF WORK

- .1 Typical work schedule - perform work during normal working hours.
- .2 Be available to work continuously from beginning to end of project.

PART 2 - PRODUCTS

2.1 MATERIALS

- .1 Drop Sheets: fibre reinforced polyethylene 0.15 mm thick woven fibre reinforced fabric bonded both sides with polyethylene.
- .2 Disposal bags: dust-tight 0.15 mm clear polyethylene waste bags.
- .3 Wetting Agent: water to mist mould-containing material.

- .4 Cleaning solution: detergent solution for damp wipe and/or mop.
- .5 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.
- .6 Provide materials such as polyethylene sheeting, lumber, nails and other hardware necessary to construct and dismantle decontamination enclosures and barriers that isolate Mould Work Area as appropriate for work.

2.2 TOOLS AND EQUIPMENT

- .1 Tools and equipment: suitable for use with microbial contamination and must be able to withstand de-contamination.
- .2 Personnel protective equipment (protective clothing, personal respiratory filter cartridges, HEPA air filters, etc.) provide in sufficient quantities for duration of project.
- .3 Exhaust air fan systems: equipped with HEPA filters and be capable of providing sufficient exhaust air to create a minimum pressure differential of 5 to 7 Pa and to allow sufficient flow of air through area.
- .4 Pressure differential automatic recording instrument provide: to ensure exhaust air devices provide minimum pressure differential required between Mould Contaminated Work Area and uncontaminated areas. Install equipment in critical barrier between Mould Contaminated Work Area and uncontaminated areas and gap seal with fibre reinforced adhesive tape.
- .5 Vacuum cleaners: HEPA filters.
- .6 Ladders and/or scaffolds: adequate length, strength and sufficient quantity to support work schedule.

PART 3 - EXECUTION

3.1 GENERAL

- .1 Mould remediation is not to take place until all refrigeration equipment has been de-commissioned and removed at the existing Walk-in Freezer Box.
- .2 Work of the mould remediation sub-contractor is to include the dismantling and disposal of the existing Walk-in Freezer box.

3.2 PREPARATION OF MOULD CONTAMINATED WORK AREA

- .1 Independent Inspection Agency with experience performing microbial investigations shall be engaged by the Contractor prior to mould remediation activities and shall provide oversight of these activities until remediation is complete.

- .2 Mould Contaminated Work Area and areas adjacent and around: unoccupied.
- .3 One supervisor for every ten trained mould remediation workers is required.
- .4 Approved supervisor must remain within Mould Contaminated Work Area during disturbance, removal, or other handling of mould-contaminated materials.
- .5 Turn off HVAC systems serving Mould Contaminated Work Area prior to starting remediation work to prevent contamination and dust dispersal to other areas of building.
- .6 Clean movable objects within proposed Mould Contaminated Work Area using HEPA filtered vacuum, damp wipe surfaces and remove such objects from Mould Contaminated Work Area to a secure and clean area.
- .7 Clean fixed objects within proposed work area using HEPA filtered vacuum, damp wipe surfaces and enclose with 2 separate layers of 0.15 mm fibre reinforced polyethylene sheeting securely sealed with fibre reinforced adhesive tape.
- .8 Remove visible dust from surfaces in work area where dust is likely to be disturbed during course of mould remediation work. Use HEPA vacuum and damp wipe area.
- .9 Do not use compressed air to clean up or remove dust from surfaces.
- .10 Seal off windows, doorways, ducts, grilles, diffusers, electrical outlets and openings between work area and uncontaminated areas to prevent spread of dirt and spores with 2 separate layers of 0.15 mm (fibre reinforced polyethylene sheeting securely held in place by fibre reinforced adhesive tape.
- .11 Erect critical barriers around perimeter of Mould Contaminated Work Area before remediation using two separate layers of 0.15 mm fibre reinforced polyethylene sheeting extending from floor, full height above. Seal gaps due to ductwork, piping conduits with 2 separate layers of 0.15 mm fibre reinforced polyethylene sheeting. Erect steel or wooden stud frame and fibre reinforced polyethylene sheeting attached to it if required. Frame openings greater than 3 square metres with 38 x 89 mm studs spaced 400 mm on center. Barriers must be constructed without disturbing contaminated materials.
- .12 Seal floor and wall surfaces within enclosure 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.
- .13 Build worker Decontamination Room at exits from work area.
- .14 Put negative pressure system in operation and operate continuously from time first fibre reinforced polyethylene is installed to seal openings

until final completion of work including final clean-up. Provide continuous monitoring of pressure differential using automatic recording instrument.

- .15 After Mould Contaminated Work Area enclosure is completed, remove HVAC filters, pack in sealed plastic bags 0.15 mm minimum thickness and treat as contaminated waste. Remove objects that might interfere with mould removal, as directed by Departmental Representative. Use HEPA vacuum during fixture removal to reduce dust dispersal.
- .16 Before beginning mould remediation work, at each access to Mould Contaminated Work Area, 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 MOULD HAZARD AREA (25 mm) / NO UNAUTHORIZED ENTRY (19 mm) / WEAR ASSIGNED PROTECTIVE EQUIPMENT (19 mm) / BREATHING MOULD DUST MAY CAUSE SERIOUS BODILY HARM (7 mm)'.

3.3 PREPARATION OF WORKER DECONTAMINATION ENCLOSURE SYSTEM

- .1 Establish worker decontamination enclosure system between Mould Contaminated Work Area and uncontaminated area. Access to Mould Contaminated work area through this enclosure.
- .2 Access to Decontamination Room through double flap curtained openings.
- .3 Decontamination Room: build Decontamination Room between Mould Contaminated Work Area, with two curtained doorways, one to Mould Contaminated Work Area and one to uncontaminated area. Install waste receptor and storage facilities for workers' shoes and protective clothing to be re-worn in Decontamination Room. Decontamination Room: large enough to accommodate specified facilities, equipment needed, and at least one worker allowing sufficient space to change clothes comfortably. Provide storage for clean protective clothing and respiratory equipment. Install mirror to permit workers to fit respiratory equipment properly.
- .4 No personnel permitted to leave Decontamination Room unless first decontaminated by changing, wet cleaning or HEPA vacuuming to remove dust and mould spores. No contaminated materials or persons to enter uncontaminated area.

3.4 MAINTENANCE OF ENCLOSURES

- .1 Maintain enclosures in tidy condition.
- .2 Ensure that barriers and fibre reinforced polyethylene linings are effectively sealed with duct tape at beginning of each working period. Repair damaged barriers and remedy defects immediately upon discovery.
- .3 Use smoke methods to test effectiveness of barriers. Provide additional testing when directed by Departmental Representative.

3.5 MICROBIAL
REMEDIATION WORK
AREA

- .1 Commence mould remediation work when:
 - .1 Mould Contaminated Work Area and decontamination enclosures are effectively segregated from parts of building required to remain in use. Enclosures are to be inspected and deemed acceptable by Independent Testing Agency and Departmental Representative.
 - .2 Tools, equipment and materials waste containers are on site.
 - .3 Building security has been set up.
 - .4 Warning signs as specified are displayed where access to contaminated areas is possible.
 - .5 Notifications have been completed and preparatory steps have been taken.
- .2 Authorized supervisor employed by contractor and qualified in microbial contamination remediation to be on job site to ensure establishment and maintenance of negative pressure enclosure and proper work practices throughout project.
- .3 Do not begin remediation work until authorized by Departmental Representative.
- .4 Use sprayer low-velocity, fine mist to mist where materials containing mould are to be cut and or scraped. Perform work to reduce dust creation to lowest levels practicable.
- .5 Remove microbially contaminated materials including all drywall at walls and ceilings and all insulation from framing at walls and ceiling in designated locations as indicated. Removal to include visibly contaminated material.
- .6 Remove contaminated material in small sections within enclosure. Pack material in sealable plastic bags 0.15 mm minimum thickness and place in containers for disposal.
- .7 Non-porous and semi-porous materials that are identified as contaminated can be cleaned using HEPA-filtered vacuuming and damp wiping with detergent solution and reused depending on depth to which microbial growth has penetrated substrate. Wood is to be discarded if fungal growth has affected its soundness.
- .8 Where designed waste container is not used, remove sealed containers containing mould waste and dispose following specified procedures.
- .9 During mould remediation, should the Departmental Representative or Independent Inspection Agency suspect contamination of areas outside enclosed Mould Contaminated Work Area, contractor to stop remediation work and immediately decontaminate these affected areas. Eliminate causes of such contamination. Unprotected individuals prohibited from entering these contaminated areas until air and swab sampling and visual inspections determine areas are free of contamination.

3.6 REPAIR AND CLEAN-UP

- .1 During mould remediation and immediately after completion of mould remediation, clean enclosure starting within top of enclosure and working down to floors. Clean both enclosed area and Decontamination Room using HEPA vacuum and by damp mopping with cleaning solution.
- .2 HEPA vacuum inside layer of polyethylene sheeting within work area and damp wiped prior to removal. Removal of this layer is not to occur until after mould remediation and decontamination activities are completed and work area has been inspected by Independent Agency.
- .3 Perform restoration of designated Mould Contaminated Work as specified.
- .4 Remove inside layer of fibre reinforced polyethylene sheeting by rolling it away from walls to centre of work area. Vacuum visible debris during cleanup, immediately, using HEPA vacuum.
- .5 HEPA vacuum, minimum of twelve hours after inside layer of fibre reinforced polyethylene sheeting has been removed, second layer of polyethylene sheeting and damp wipe.
- .6 Include Decontamination Room in similar clean-up.
- .7 Remove non-essential fibre reinforced polyethylene sheetings and visible accumulations of material and debris.
- .8 Dispose of used fibre reinforced polyethylene sheets, used fibre reinforced adhesive tape, cleaning material, clothing, and contaminated waste.
- .9 Include sealed waste containers and equipment used in Mould Contaminated Work Area in cleanup and removed from work areas, via Decontamination Room.
- .10 Carry out final visual inspection check to ensure that no dust or debris remains on surfaces as result of dismantling operations.
- .11 Air Clearance Sampling:
 - .1 Perform final clearance air sampling acceptable by Departmental Representative prior to re-occupancy. Repeat cleaning using HEPA vacuum equipment, or damp cleaning methods, in conjunction with sampling until levels meet acceptable criteria.
 - .2 It is the Contractor's responsibility to pay for all air clearance testing in accordance with Section 01 29 83 – Payment Procedures for Testing Laboratory Services.
- .12 Upon notification that final tests are acceptable remove remaining critical barriers. HEPA vacuum surfaces behind containment barriers, including walls, floors, ceiling tiles, windows, doors and other surfaces. HEPA vacuum adjacent interior spaces within 3 metres of former location of containment barriers.

3.7 WASTE DISPOSAL

- .1 Place debris and microbial infected 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 and place in waste containers for transport.
- .2 Cover large items that have heavy mould growth with two layers of polyethylene sheeting and sealed with fibre reinforced adhesive tape before they are removed from cleaned work area.
- .3 Clean outside of bags and/or waste containers with damp cloth and cleaning solution or HEPA vacuumed prior to their transport to uncontaminated areas of building.
- .4 Remove waste bags and/or containers from site and dispose in accordance with current regulations.

3.8 FINAL CLEARANCE

- .1 Independent Inspection Agency Representative to conduct thorough visual inspection to detect visible accumulations of dust or bulk materials remaining in work area.
- .2 If dust, debris, microbial contamination or residue has been detected, repeat cleaning at area until meets approval.