SCOPE OF WORK FOR LABORATORY FUME HOOD, ASSOCIATED EXHAUST SYSTEMS AND PLUMBING SYSTEMS DECONTAMINATION

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1.0 FUME HOOD SYSTEMS DECONTAMINATION AND CLEANING

Fume hoods, associated ventilation exhaust systems and plumbing components can potentially be contaminated with biological material, chemicals or radioisotopes. The equipment must be assessed, cleaned or decontaminated in order to protect workers working on the equipment and to ensure waste materials are managed in an environmentally safe manner.

The specialized contractor(s) selected to complete fume hood assessment and decontamination must have trained personnel, adequate equipment, general liability insurance and a minimum of 5 year of experience in similar chemical cleanup operations and laboratory decommissioning. Depending on the type of work to be performed and the location, training may include, but is not necessarily limited to, WHMIS, 40 hours HAZWOPER and yearly refreshers, TDG, CPR, First Aid, Confined Space Entry procedures, Lock Out / Tag Out procedures, respiratory protection or other work related training. All work must be completed in accordance with the applicable environmental and occupational health and safety acts and regulations. The general contractor is responsible for public and workers safety at the work site during the fume hood and exhaust systems decontamination project.

1.1 Scope of work

The scope of work for cleaning the fume hoods, associated ventilation exhaust systems and plumbing components involves the following tasks:

- Initial site inspection and assessment by a qualified professional to dictate if major modifications to the current scope of work or further actions are needed;
- Preparation of a detailed Work Plan and a project specific Health & Safety Plan for submission to the University's project manager for review and approval prior to project start-up;
- Cleaning of fume hoods, associated ventilation exhaust systems and plumbing components, as per section 2.0 below unless otherwise indicated; and
- Offsite disposal and/or recycling of waste generated under this scope of work.

1.2 Contaminants of concerns

Before initiating fume hood cleaning all attempts must be done to identify the potential contaminants of concerns and adjust procedures and safety equipment accordingly. The Project Manager or Project Coordinator must consult with the Principal Investigators, laboratory managers and the Office of Risk Management to review the current and historical chemical use and inventory for the laboratories. If there is any uncertainties, the worst case scenario must be applied.

Several types of hazardous materials may have been used in the fume hood systems. It is difficult to determine with certainty all the hazardous materials that have been used historically. Hazards can be divided in four general categories:

- Hazardous Chemicals (poisonous),
- Hazardous Chemicals (potentially explosive and shock sensitive),
- Biohazards, and
- Radioactive Chemicals.

2.0 PROCEDURES

Work areas must be secured and adequately prepared by installing polyethylene barriers at each entrance. Warning signs must be posted before the entrances, prohibiting access to persons not trained and directly associated with this project.

Some coordination with the general contractor will be required as a certain amount of work for setting up, removal of furniture and equipment must be completed by the general contractor prior to commencement of fume hood, exhaust systems and plumbing components cleaning work. Remaining surfaces, walls, floors, fixed furniture and equipment should be protected by polyethylene or must be adequately decontaminated and cleaned by the contractor upon completion of the project.

2.1 Fume Hoods, Associated Exhaust Systems and Plumbing components Cleaning Procedures

The recommended overall sequence is 1) initial visual assessment, 2) wetting the entire system, 3) removal of system components for access purposes, if required (while continuing to wet), 4) decontamination of the components, 5) final testing to confirm that the materials are "non-hazardous" and 6) off-site disposal or recycling. If alternative methods and/or procedures are proposed, it must be detailed in the Work Plan and submitted for review and approval by the University before project start-up, as discussed in paragraph 1.1.

1. Visually inspect (non-intrusive) the facility's duct work to ensure that the ventilation duct work (from the fume hoods to the ceiling at the vertical rises adjacent to the south/southeast wall) is physically separated from any other inlet duct work.
2. Visually inspect (non-intrusive) fume hoods and exhaust ducts internal portions at the access points near the beginning of the system (i.e. at the hoods), exhaust fans and mechanical room for signs of corrosion and/or whitish crystalline deposits.
3. Use an adequate method of wetting internal surfaces for a minimum of 24 hours prior to proceeding with any work on the fume hoods and associated duct systems. The reason for this initial wetting is for safety, not for decontamination and washing. Optional wetting methods include:
    a. Steaming the system, or
    b. Introducing a fine mist in the fume hood while exhaust fan is running, or
    c. Any other wetting method which will ensure water contact with all internal surfaces for a prolonged period.
4. Create access points where the exhaust duct systems will be cut, if required. All intrusive work (e.g. drilling, sawing, and cutting) on the duct systems must be done with continuous wetting of the drilling or cutting tool.
5. The system must be continuously wetted, avoiding vibration, friction, beating, shocks and shaking as much as possible.
6. Regular monitoring for relevant chemicals using direct-read instruments or colorimetric detection tubes must be performed during all wetting stages (items 2, 3 and 4).
7. Non-sparking tools and ground fault circuit interrupters (GFCIs) are required for working on and disassembling the fume hoods and exhaust ducts systems components.
8. Adequate catch basins, dikes and other water recovery methods are required throughout the project to avoid wastewater escaping from the work area, causing damage to the property or discharging to the environment.
9. Do not dismantle joints, cut into the ducts away from joints, elbows, accessories or any other section with potentially higher accumulation of dangerous chemicals (e.g. perchlorates).

10. The degree of risk associated with the fume hoods and associated exhaust ducts systems are as follow. Cleaning operations and waste management must be completed and segregated accordingly:
    a. High Risk – Fume hoods themselves and first 2.5m sections of associated exhaust ducts systems from fume hood exhaust point.
    b. Medium Risk – Associated exhaust ducts systems between 2.5m and 5.0m from fume hood exhaust point.
    c. Low Risk - Associated exhaust ducts systems beyond 5.0m from fume hood exhaust point.
11. Disassembled waste parts, if any, must be thoroughly washed and decontaminated. The objective is to dispose of waste parts as a non-hazardous waste with an aim to recycle materials as much as possible. Submerged all the disassembled parts in a decontamination water bath, and hold it there until all chemicals have been dissolved, as required. Use clean cold water, without detergents or other.
12. Rinse decontaminated parts in clean cold water, without detergents or other chemicals.
13. A representative number of cleaned fume hood surfaces and rinse water samples should be collected in third party laboratory supplied sterile containers and sent to a CALA (Canadian Association for Laboratory Accreditation) certified laboratory for analysis to determine chemical concentrations.
14. As a precautionary measure, while awaiting laboratory results, the fume hood and disassembled parts should be sealed in polyethylene to maintain moisture for subsequent handling and disposal.
15. When tests results confirm that no chemical residue exists, a "notice of decontamination" form must be attached to the equipment and the contractor must arrange for disposal or recycling of all solid and liquid waste generated from this scope of work.
16. Sections of disassembled parts which cannot be decontaminated to acceptable levels must be kept moist and disposed as hazardous waste.
17. Hazardous waste materials must be disposed in accordance with the requirements of Ontario Regulation 347, as amended.
18. All workers must be provided with suitable personal protective equipment (PPE) for this type of work, including but not limited to, ballistic gear, chemical protection and respiratory protective equipment.
19. Protection against potential exposure have to be provided during wetting and the early stage of water flushing (items 2, 3 and 4), including calcium gluconate topical gel, also known as Hydrofluoric Acid Antidote Gel, if required. Protection against certain specific chemicals may be removed if monitoring confirms exposure levels are well below the applicable criteria.
20. Roofs are considered restricted spaces on the University campus. As such, no one is allowed on the roofs without proper authorisation. In the event that roof or penthouse access is required, contractors have to comply with the University's Roof Access Procedure.

2.2 Drain Piping and Plumbing Systems

Assessment of the fume hoods plumbing system piping, drain lines, sink traps and wastewater systems by an experienced professional, to determine potential impact of sodium azide, lead and mercury discharge, should be completed. The assessment will dictate if any further actions are needed, such as additional testing or remediation.

3.0 DOCUMENTATION

1. Site inspections, observations, photographs and recommendations from specialized contractors, professionals or consultants for fume hood and plumbing systems initial inspections and assessments must be recorded in field logs, copy of which must be provided to the University's project manager.
2. A copy of all laboratory analytical certificates must be provided to the University's project manager and kept on file by the contractor for the duration of the project.
3. Hazardous waste disposal services provider must prepare manifest documents and the University's project manager (or a designated alternate) must sign it to confirm waste type and quantities. Provider must leave Copy 1 & 2. Copy 2 will be retained at the University for filing and Copy 1 will be sent to the Ministry of Environment (MOE). Section C (Receiver Information) of the remaining 4 pages of the Manifest Document will be completed upon reception by the receiver site. Copy 3 must be sent to the MOE and Copy 6 to the University.
4. All certificates of recycling and certificates of disposal must be provided to the University's project manager and kept on file by the contractor for the duration of the project.
5. Before contractors and subcontractors are permitted to work at the University, they must present proof of good standing with the Workplace Safety and Insurance Board (WSIB).
6. Contractors shall provide proof of training of employee's qualifications to the University's Health and Safety Representative upon request. Training certificates must be kept on site by the contractor and accessible at all time.
7. The contractor is to provide proof of annual fit testing when the task requires the use of a respirator.