

Laboratory Safety Guidelines

LABORATORY DECOMMISSIONING

For assistance, please contact EHS at (905) 688-5550 x 7233, or visit our web site at <http://brocku.ca/hr-ehs/environment-health-safety>

1.0 Introduction

Laboratories and other research areas contain materials and equipment that can constitute a hazard for individuals unfamiliar with the properties, operations and technology.

Lab Supervisors or Principal Investigators (PIs), who leave employment at Brock, relocate to another Brock assigned space, or remodel an existing laboratory space must ensure that proper decommissioning takes place. Departments are responsible for excess costs incurred when the decommissioning process is **not** followed.

The process of decommissioning a laboratory can take significant time to complete and may require coordination of several departments (HR-EHS, FM, ITS, etc.), so advance planning and notification is necessary.

2.0 Scope

Any area owned or operated by Brock University where hazardous materials have been used must be decommissioned before it is vacated (or a supervisor departs) in a way that removes all hazards and encumbrances, and leaves the space completely safe for the next occupant or those performing maintenance, cleaning or renovations in the interim.

3.0 Roles and Responsibilities

3.1 Principal Investigators

- Are accountable for all items and materials in their area, including research samples, used chemicals, and materials or equipment purchased, created or inherited from former lab occupants.
- Are broadly responsible for the health and safety of all individuals who work in the environment (employees, students, volunteers, contractors and maintenance personnel) until it is fully de-commissioned.
- Must provide oversight, enforce regulations and University policies and set operational standards to protect workers/students and occupants.
- Are to develop and oversee a lab move &/or decommission plan, setting general standards for what is to stay and go and ensuring sufficient trained resources to accomplish the plan in a healthy, safe and legally compliant manner

3.2 Lab Supervisors

Individuals (often PI's) who directly supervise the operations of the lab or research area have "control of the workplace" and therefore also carry supervisory responsibility

- Must be legally "competent" i.e. know and understand the work and processes going on in the lab, any associated risks and the legislation that applies to the work
- Must take every precaution reasonable in the circumstances for the protection of a worker, and especially advise workers/students of danger, train them in safe work practices and implement the standards set out by the University, Faculty, Department and PI.
- Oversee the actual decommissioning process, creating standard operating procedures based on laws, standards, guidelines and operational priorities that minimize disruption while protecting individuals, the facilities and the environment,
- Provide instruction, training and supervision to individual workers

3.3 Lab Workers

- Employees, students or volunteers are expected to work in a healthy and safe manner, advise their supervisors of hazards or concerns, participate in training, follow directions and SOP's, wear and use appropriate protective equipment and avoid danger.

3.4 HR-EHS

- EHS staff act as internal consultants who provide guidance on regulations, safe work practices and due diligence and review operations and areas for safety.
- They also raise awareness, organize generalized education sessions plus provide assistance with more focused risk or location specific programs, procedures and training.
- The University Hazardous Materials Disposal system is overseen by HR-EHS.
- HR-EHS will oversee the work of the Environmental Contractor during major moves/relocations (a laboratory or more).

3.5 Facilities Management

- Arrange general housekeeping needs: Remove trash, debris, and general combustibles (e.g., paper, cardboard, etc.).
- Contract out or arrange for a thorough cleaning of all work surfaces following hazard specific decontamination of work surfaces (see "Special Wastes")
- Provide technical information and support to facilitate decommissioning or move.
- Manage electrical, gas and ventilation disconnects/hook-ups as required
- Participate in the final walkthrough and identify needed facility repairs or maintenance items (e.g., out-of-date or missing fire extinguishers, out-of-date inspections on fume hoods or biological safety cabinets, etc.).

3.6 Science Stores

- Coordinate and supervise the biweekly Hazardous Materials Disposal system.

- Arrange to purchase any transfer equipment that is routinely used for the movement of lab materials and products (e.g., cylinder carts, laboratory carts).
- Arrange for appropriate containers and labels for all hazardous materials transferred/shipped from Brock.
- Order purge gases (for glove boxes), PPE (for all staff involved in moving), spill kits and other relocation/decontamination related materials as requested, ideally well in advance of the move.

3.7 Surplus Asset Redeployment Supervisor

- Responsible for redeployment of assets that will not be moved to the new location (redeployment or disposal of equipment).
- May arrange disposal, redeployment (including temporary storage) or salvage of parts as appropriate, and as per Brock policy (http://www.brocku.ca/webfm_send/7748).

3.8 Environmental Contractor

Brock retains an Environmental Contractor who handles the bulk of Hazardous Waste Disposal from the campus, providing a pick-up, consolidation and transfer service on alternate Fridays throughout the year. Materials will only be picked up if properly contained, labeled and registered in advance.

3.9 Move Coordinator

The Move Co-ordinator can be a contracted individual, someone assigned by Facilities Management or an individual assigned by the PI, depending on the scale and scope of the move. They will plan and schedule moves making sure that all parties internal and external operate to Federal and Provincial Occupational Health and Safety, Transportation and Environmental Standards. They will involve all relevant Brock stakeholders in the planning and execution of the move.

The Move Co-ordinator will ensure that contractors meet Brock's insurance requirements (generally \$5M in commercial general liability insurance, and where hazardous materials are involved at least \$10M in Liability Insurance and an additional \$5,000,000.00 Environmental Impairment or Contractor's Pollution Liability Insurance).

4.0 General De-Commissioning Guidelines

4.1 Sorting and Labelling

- Contact EHS about the laboratory change and advise of move plans and schedule with respect to hazardous materials that are associated with the laboratory.
- Review all chemical containers (stocks, working solutions, used chemical collection containers) in the laboratory for appropriate labeling, container integrity, and seals/lids. Rectify all deficiencies.
- Consult with others in your department to determine if they have a need for usable stocks of chemicals that you no longer need. **DO NOT** leave chemicals for use by the next occupant.

4.2 Disposal

- Tag all used chemical collection containers and remaining unwanted chemical stocks and/or working solutions for collection by the Hazardous Waste Contractor. http://brocku.ca/webfm_send/18806 details the hazardous waste process that will be followed.
- **Never** dispose of unwanted chemicals via the sewer or trash,
- Transport outside of buildings (on any public roads including interior roads on the Brock Campus) is subject to dangerous goods/hazardous materials transport regulations, including current certification of the person preparing the shipment and registration of the transporter as a hazardous materials transporter. Movers must meet minimum environmental and insurance requirements and be approved by HR-EHS.

4.3 Inventory & Packing

- Individuals who pack, move or unpack hazardous materials must have up-to-date WHMIS training and either be competent under the Occupational Health and Safety Act to supervise their own work or be under the direct supervision of a competent supervisor (an individual familiar with the hazardous materials being relocated and with their supervisory responsibilities per this document, the University Occupational Health and Safety Policy and the Ontario Occupational Health and Safety Act).
- Prior to relocation inventory lists of all:
 - Chemical, Biological and Radiological Material to be relocated
 - Chemical, Biological and Radiological Material for disposal
 - Equipment to be relocated (including any special risks or needs, plus value if over \$100K for insurance purposes)
 - Equipment for disposal (to begin re-deployment process)
- The Move Coordinator will distribute the inventories to HR-EHS who will share them with the Office of Research Services, FM and other University stakeholders on a need-to-know basis in order to facilitate a smooth, efficient and fully compliant transfer, including having any permits (eg. Radiation, Biohazards, X-ray equipment, Laser) discontinued or modified, as appropriate.

5.0 Decommissioning Procedures

5.1 Packaging and Transportation of Hazardous Materials (General)

- Segregate chemicals that will be transported by compatibility. For compatibility guidance, see Reference 7.10.
- Information concerning chemical classes can be found in applicable Material Safety Data Sheets (MSDS).
- All individuals assembling chemicals for inventory and packing must have recent WHMIS training.
- All individuals packing chemicals for transit by vehicle must have, or do so under the direct supervision of persons who have, a current, valid Transportation of Dangerous Goods Certificate (i.e. training within the last 2 years)

5.3 Packing of Hazardous Materials for Movement Indoors

- Secondary containment is required – i.e. bottles inside leak proof containers
- Pack compatible chemicals into sturdy stackable plastic totes; bottles stored within sealed cans or containers may be packed in cardboard boxes.
- Provide cushioning around individual containers by filling voids with inert packing material (i.e., Bubble wrap, styrofoam, vermiculite, paper etc.).
 - Seal containers of reactive chemicals in 'zip lock' bags prior to packing.
 - "zip lock" seal all containers if packing with vermiculite
 - Use re-useable or recyclable packing material where practical
- Pack large containers on the bottom with smaller containers on top.
- Lecture bottles should be boxed valve end up.
- Complete a packing inventory for each tote. List each chemical by proper chemical name and size and number of containers of each.
 - Relatively nontoxic/ non-reactive/non-flammable chemicals that are similar in nature (i.e., buffers, media, some stock solutions) need not be inventoried separately if one general description can be applied to all.
- Totes should only be filled to a reasonable weight, ideally <13kg
- Lids must be closed tightly for safe transit and potential stacking. They will not be moved otherwise.
- Follow safe Manual Material Handling procedures at all times (see MMH Program at <http://www.brocku.ca/hr-ehs/environment-health-safety/health-safety>):
 - Ensure container is stable and supported before loading, ideally at waist height;
 - do not overfill or overload totes;
 - do not stack bins more than 3 high (or less if unstable);
 - ensure routes around lab are kept clear;
 - lift carefully using legs, not back;
 - use a cart where possible
 - set loaded bins down carefully without pinching fingers
- Prior to transport, review all totes and inventories to ensure that all containers are packed compatibly, the lids are closed, and the inventories are complete.
- Affix a copy of the packing inventory to the outside of the tote;

Trained (with WHMIS and Spill Response) internal or contract personnel are to carefully transport the materials to their new location using appropriate material handling and personal protective equipment (i.e., hand carts, cylinder carts etc.) to safely move the totes from the originating space to the new laboratory.

5.4 Packing and Transportation of Hazardous Materials to be moved Outdoors.

- Materials require tertiary containment in the form of a cart or truck that can contain all the liquid it carries, also equipped with spill response capability.
- Materials must be packed, labeled, manifested and moved according to Transportation of Dangerous Goods regulations

- Ideally to be packed and moved only by approved licensed, trained and equipped Hazardous Materials Contractors
- Contact HR-EHS to provide compliance guidance and to facilitate

5.5 Room Decommissioning

Following removal of all waste and viable stocks, decontaminate all work surfaces (including; counters, fume hoods, floors, sinks, biological safety cabinets, etc.) and storage areas (including refrigerators, freezers, etc.).

- Contract cleaners with experience in decommissioning laboratories or other forms of hazardous materials clean up (asbestos enclosure removal, mould remediation).
- Lab Supervisors are responsible for ensuring that areas where special hazards exist are cleaned as per the requirements of the laboratory spill procedures (i.e. clean areas where any residues would cause a problem if contacted with cleaning materials), inform the contractor of any restrictions (e.g. no ammonia cleaners in a laboratory where chlorine residues may be found).
- Decontaminate/clean equipment and appliances that will be scrapped or sent for storage or re-deployment prior to service by Maintenance and removal by Movers.
- Notify movers through the project manager regarding any equipment used where residues may cause a continued contamination problem (e.g., acid digestions, ethidium bromide preparation, etc.) and which should therefore be discarded rather than reused. Clearly label the appliance prior to pickup.
- Arrange with the Chair of the Department and the Surplus Assets Disposal and Redeployment staff to have equipment redeployed or discarded as per http://www.brocku.ca/webfm_send/18518
- Contact HR-EHS for a final walk-through. EHS will ensure that other appropriate personnel are involved in the walk through (can include; Biosafety Officers, the Radiation Safety Officer, FM Project Management, FM Operations, Custodial Services and future occupants (where they have been identified)).
- Existing placards/signage from doors, equipment, etc. will be reviewed for possible modification/removal by HR-EHS staff upon demonstration that decommissioning has been completed.

6.0 Special Handling Procedures

6.1 General Chemical Use Areas

- Clean all work surfaces and durable equipment used with chemical agents including fume hoods, storage locations, etc.

6.2 Gas Cylinders

- All Empty Gas Cylinders will be returned to the Gas Cylinder storage area (MC H 200) using cylinder carts.
- Full cylinders can be transported through the hallways on a cylinder cart designed for that purpose; to the new location.
- All cylinders must be capped while in transit and secured at their location.

- Personnel must never travel in the elevator (potential confined space) with cylinders. therefore a "loader" and a "receiver" are required to change floors.

6.3 Mercury

- Notify EHS if significant quantities (i.e. > thermometer) of mercury were used in the laboratory during the term of the current occupants.
- EHS staff will arrange for a mercury vapour survey of any suspect areas (i.e., storage areas, sinks, use areas, etc.).

6.4 Perchloric Acid

- Notify EHS if perchloric acid (> 50% concentration) was used in a fume hood.
- Perchloric Acid protocols will need to be developed for working with the ductwork of any perchloric acid hoods.

6.5 Air/Moisture Sensitive Materials

- These are materials normally stored in glove boxes under oxygen-starved conditions which may be due to the material being reactive in air (hazardous) or simply that it decomposes and changes chemical profile in air
- To move these chemicals technical support may be required, which can include assistance from EHS, FM or the manufacturer in the relocation of the glove boxes (take down, relocate and set up (including purging of oxygen)).
- PI's must assess the risk and assist in planning the relocation in such a manner as to ensure worker safety and product integrity, including ensuring availability of an adequate quantity of purge gas (order in advance from Science Stores).

6.6 Radioactive Materials

- If the laboratory has been used with open-source radioactive material:
- Tag all radioactive waste and transport it to the Intermediate Radiation Lab for disposal
- Consult the Radiation Safety Officer (RSO) in advance arrange to transfer any radioactive material to another laboratory
- Following removal of all radioactive waste and inventory,
 - decontaminate all areas where radioactive materials were used or stored (including counters, floors where waste containers were stored, sinks, fume hoods, biological safety cabinets, refrigerators, freezers, etc.);
 - verify the efficacy of the decontamination process with swipe surveys.
- Decontaminate all durable equipment used with radioactive material and verify the efficacy of the decontamination process with swipe surveys
- Survey results of decontaminated areas and equipment must be less than 200 dpm per 100 cm².
- Return all radiation laboratory documentation (survey logs, and other associated records) to the RSO.
- Return all dosimetry (badges and rings) to the RSO (for assignment to your new laboratory if required)

- Contact HR-EHS & the Radiation Safety Officer to complete a decommissioning review.
- At the time of the review, identify:
 - Any equipment which has been used with radioactive material that will be transferred to Inventory or another laboratory.
 - Radiation-producing devices (e.g., x-ray machine), radioactive material containing device (e.g., electron capture detector), or class IIIb or IV lasers (decommissioning records required by the Ministry of Labour) have been used in the laboratory
 - The intended disposition of lasers and radiation producing/ radioactive material containing devices (e.g., transfer to another Brock laboratory, transfer to anon-Brock facility, transfer to Brock Inventory, etc.) and the associated schedule. In some cases, oils, sealed sources, etc. may need to be removed from the equipment prior to transfer.
- Contact the HR-EHS and the Radiation Safety Officer to complete a final close-out audit after the move.

6.7 Biological Materials

If the laboratory has been involved in activities with biological materials (i.e. Recombinant DNA, human/plant/animal pathogens, diagnostic specimens, biologically derived toxins, blood, etc.):

- Decontaminate all waste materials and unwanted stocks, generally by autoclaving or dispose via Brock's infectious waste contractor.
- Any waste Biological materials that will not be autoclaved or otherwise decontaminated at Brock must be stored in a refrigerator.
- Material must be decontaminated or put into cold storage within 24 hours of generation.
- Dispose of decontaminated materials as normal waste.
 - Autoclaves used for decontamination must be periodically tested to ensure that they are working appropriately (at least once per week).
 - Chemicals used for decontamination must be effective on the target biological agent. Documentation from the supplier must be on file.
- Any transport of a viable biological agent requires that the person preparing the shipment must have current dangerous goods training and be familiar with IATA shipment requirements for any destinations requiring air transportation.
- Material must be packaged in accordance with TDGA/IATA specifications and accompanied by appropriate paperwork; and the transporter must be registered as a transporter of hazardous materials. Other transfer permitting requirements may also apply
- Decontaminate all durable equipment used with biological agents.
- Dispose of sharps containers. Ensure the containers are rigid, puncture-resistant, closed, sealed and labeled.

6.8 Animal Research Areas

- Contact Animal Care Staff for packing, moving, disposal and decontamination guidance if the laboratory has been involved with live animals.

7.0 References

- 7.1 Occupational Health and Safety Act
- 7.2 Workplace Hazardous Materials Information System Regulation
- 7.3 Occupational Health and Safety Regulations – Industrial
- 7.4 Transportation of Dangerous Goods Act and Regulations
- 7.5 Memorandum of Understanding between Brock University and the Tri-council Granting Agencies
- 7.6 Human Pathogens and Toxins Act
- 7.7 Nuclear Safety and Control Act
- 7.8 Brock University Occupational Health and Safety Policy
- 7.9 Brock Manual Material Handling Program and Guidelines
- 7.10 EPA Chemical Compatibility Chart (USA)

<http://www.uos.harvard.edu/ehs/environmental/EPAChemicalCompatibilityChart.pdf>