

Laboratory Safety Handbook

July, 2008

McMaster University Hamilton, Ontario

TABLE OF CONTENTS

	Page
McMaster University's Health and Safety Policy	
1.0 Introduction	1
2.0 Disclaimer	1
3.0 Purpose of Manual	1
3.1 Mandatory Reading	2
3.2 Workplace Specific Training	2
4.0 Responsibilities and Liabilities	2
4.1 Responsibilities and Rights	2
4.2 Faculty and Staff as Supervisors	2
4.3 Summary of Responsibilities	3
4.4 Employer Responsibilities	3
4.5 Supervisor Responsibilities	3
4.6 Worker Responsibilities	3
5.0 Reporting Hazards, Incidents and Injuries	3
6.0 Steps in Resolution of a Health and Safety Concern	4
6.1 The Right to Refuse Unsafe Work	6
7.0 Workers Compensation	6
8.0 Joint Health and Safety Committees (JHSC)	6
8.1 Rights and Responsibilities of Joint Health & Safety Committees	6
8.2 Workplace Inspections	7
9.0 Guidelines for Working in Laboratories	7
10.0 Universal Precautions	8
11.0 WHMIS (Workplace Hazardous Materials Information Systems)	8
11.1 WHMIS Symbols	8
12.0 MSDS (Material Safety Data Sheets)	10
12.1 Availability of MSDS	10
13.0 Laboratory Safety Equipment	11
13.1 Fume Hoods	11
13.2 Fume Hood Operation Guidelines	12
14.0 Showers and Eye Wash Stations	12
15.0 Routes of Entry into the Body	12
16.0 PPE (Personal Protective Equipment)	13
16.1 Gloves	13

TABLE OF CONTENTS		Page
16.2	Eye Protection	13
16.3	Lab Coats	13
16.4	Hearing Protection	13
16.5	Ergonomic Protection	14
17.0	Electrical Safety	14
17.1	Static Electricity and Sparks: Bonding and Grounding	14
18.0	Fire Safety	16
18.1	Fire Extinguishers	16
18.2	Fire Proof Blankets	16
19.0	Standard Operating Procedures (SOPs)	17
20.0	Guidelines for Storage of Chemicals	17
21.0	Compatible Chemical Groups	17
21.1	Inorganic Chemicals	17
21.2	Organic Chemicals	17
22.0	Guidelines for Storage of Incompatible Chemicals	18
23.0	Guidelines for Storage of Unstable Chemicals—Peroxide Formers	19
24.0	Highly Toxic, Carcinogenic or Mutagenic Chemicals	20
25.0	Corrosives	20
26.0	Flammable and Combustible Liquids	20
27.0	Water Reactives	20
28.0	Perchloric Acid	21
29.0	Explosives	21
30.0	Declaration of Chemical Weapons	21
31.0	Designated Substances	21
32.0	Compressed Gases	22
32.1	Guidelines for Handling Compressed Gases	22
32.2	Cryogenics	22
33.0	Hydrogen Fluoride	23
34.0	Radiation Safety	23
34.1	Radioactive Materials	23
35.0	X-Ray Generators	24
36.0	Microwaves	24
36.1	Magnetic Fields	24
37.0	Laser Safety	24
38.0	PROCEDURES FOR WASTE DISPOSAL	24
38.1	Hazardous Waste	24
38.2	Hazardous Waste Disposal	25

TABLE OF CONTENTS		Page
39.0	Contaminated Broken Glass Disposal (Chemical)	26
40.0	Equipment Disposal	26
41.0	Biomedical Waste	26
41.2	Biomedical Waste Disposal	26
42.0	Procedure for Lab Equipment Modifications and Vacating Laboratories	27
43.0	SPECIFIC EMERGENCY PROCEDURES	28
43.1	Medical Emergencies	28
43.2	In Case of Fire	28
43.3	Clothing on Fire	29
44.0	Chemical Spills	29
44.1	Chemical Spills on Body	29
44.2	Chemical Spills in Eyes	29
45.0	Chemical Spills, Indoors	30
45.1	If Unable or Unsafe to Clean Up a Spill	30
46.0	Chemical Spills, Outdoors	30
47.0	Mercury Spill	30
48.0	Radioactive Spills	30
49.0	EMERGENCY TELEPHONE NUMBERS	31

McMaster University's Workplace and Environmental Health and Safety Policy

McMaster University is committed to provide and maintain healthy and safe working and learning environments for all employees, students, volunteers and visitors. This is achieved by observing best practices which meet or exceed the standards to comply with legislative requirements as contained in the Ontario Occupational Health and Safety Act, Environmental Protection Act, Nuclear Safety and Control Act and other statutes, their regulations, and the policy and procedures established by the University. To support this commitment both McMaster University and its employees are responsible jointly to implement and maintain an Internal Responsibility System directed at promoting health and safety, preventing incidents involving occupational injuries and illnesses or adverse effects upon the natural environment.

The University is responsible for the provision of information, training, equipment and resources to support the Internal Responsibility System and ensure compliance with all relevant statutes, this policy and internal health and safety programs. Managers and Supervisors are accountable for the safety of workers within their area, for compliance with statutory and University requirements, and are required to support Joint Health and Safety Committees. Employees are required to work in compliance with statutory and University requirements, and to report unsafe conditions to their supervisors.

Contractors and subcontractors undertaking to perform work for McMaster University must, as part of their contract, comply with all relevant workplace and environmental health and safety statutes and meet or exceed the University's Workplace & Environmental Health and Safety Program requirements.

In addition to the above stated managerial responsibilities, Deans, Directors, Chairs, Research Supervisors and other Managers are also accountable for the safety of students, volunteers and visitors who work and/or study within their area of jurisdiction. Students are required by University policy to comply with all University health, safety and environmental programs.

Implementation:

The authority and responsibility for the administration of procedures and programs to provide the implementation of this policy is assigned to the Office of the Vice President, Administration.

The Risk Management Support Group is responsible for facilitating the development, implementation and auditing of the Health and Safety Programs effective under this policy. This is achieved through the implementation of a risk management system that is directed at supporting the Internal Responsibility System through the application of best practices for the management of occupational, environmental, public health and safety related risks.

The Office of the Vice President, Administration will provide reports to the University Board of Governors concerning the status and effectiveness of the Workplace and Environmental Health and Safety System and any notices of violation issued to the University regarding breaches of workplace health and safety or environmental protection statutes.

1.0 INTRODUCTION

Safety standards at McMaster University are designed to eliminate the risks inherent in the use of dangerous materials and potentially dangerous procedures or practices. All laboratories can be inherently dangerous places and the attitudes and actions of those who work in the laboratory determine their own safety and that of their colleagues and ultimately that of the community.

Different safety procedures and training are set for different levels of risk. High levels of risk require more stringent procedures than lower levels of risks. Changes are therefore made in setting safety procedures and training so as not to impede much needed research while keeping risks of those involved to a safe minimum. Laboratory equipment and design has become more sophisticated and safer, but safe operation still depends on properly trained and genuinely concerned personnel, who are **safety conscious at all times**.

Throughout this manual, proper training and knowledge of equipment and materials is stressed. With the WHMIS legislation, suppliers are required to provide Material Safety Data Sheets and these should always be consulted prior to working with a new material. Always assure that a **knowledgeable** and **competent person** trains you in the safe use of specific equipment. All training must be documented. All job specific hazards must be reviewed. Standard Operating Procedures (SOPs) must be identified and followed. Consult **RMM# 324: Job Hazards Analysis and RMM# 301: Standard Operating Procedures (SOPs) Programs** for details.

This manual is by no means all encompassing and any omission is not an excuse for unsafe practices. If you have questions about how to undertake a task or project safely, contact your supervisor. The individual supervisors must identify, and supplement this manual with safe procedures and training specific to the needs of their laboratory safety programs, when the safety subject is not adequately covered by this manual. Your Joint Health and Safety Committee (JHSC) members serve as an additional resource.

We trust that this handbook will help you to work safely and develop effective safety programs. We welcome any suggestions you have to improve both the handbook and McMaster University's health and safety programs as outlined in the **Risk Management Manual (RMM)**.

Further copies of this manual may be obtained from Environmental and Occupational Health Support Services (EOHSS), Faculty of Health Science (FHSc.) Safety Office in addition to <http://www.workingatmcmaster.ca> and following the links to the Risk Management Manual (RMM).

2.0 DISCLAIMER

The Lab Safety Manual is intended to provide basic rules for safe work practices in a laboratory. The procedures may be supplemented with Standard Operating Procedures (SOP) where applicable. Roles, responsibilities, specific procedures and additional information are also outlined in McMaster University's Risk Management Manual (RMM) and are referenced below.

In all cases the individual supervisor is ultimately responsible for teaching safe work practices and standard operating procedures and must insist upon the use of such proper procedures to eliminate unnecessary hazards.

3.0 PURPOSE OF MANUAL

- To define health & safety responsibilities and accountabilities within the University Community
- To outline specific procedures and programs, where applicable
- To explain basic emergency procedures
- To provide information and standards in the form of established Safety Guidelines in laboratories.

This manual may be supplemented as new information becomes available or as new legal standards are developed.

3.1 MANDATORY READING

Every person working or intending to work in a laboratory must read this document. This should be signed off and documentation kept in the site specific training record.

3.2 WORKPLACE SPECIFIC TRAINING

A supervisor must ensure that staff under his/her jurisdiction have been thoroughly trained and informed to carry out their duties in a safe manner. The specific training conducted by the supervisor includes hazard identification, electrical safety, and the storage, handling, use and disposal of chemicals. Additional health and safety training is available through EOHSS and FHSc. Contact ext. 24352 or ext. 24956 and/or consult workingatmcmaster.ca and follow the links regarding health and safety training.

4.0 RESPONSIBILITIES AND LIABILITIES

Everyone actively engaged in laboratory work is responsible for safety performance as part of the Internal Responsibility System. All laboratory personnel must meet the legal requirements of various environmental and health and safety statutes. It is expected that adherence to this manual is a good starting point for establishing an acceptable laboratory safety program.

More detailed and specific safety procedures and practices may be necessary. Everyone is encouraged to develop and use practices which exceed the basic information in this manual. Any deviation from this manual must be to establish safer practices. Everyone should be able to justify that reasonable care and deliberation has been exercised before the implementation of any changes. By not using recommended practices in these manual or safer alternatives, there is a greater potential for harm, and individual liability may increase.

4.1 RESPONSIBILITIES AND RIGHTS

Under the Occupational Health and Safety Act (OHSA) and Regulations, supervisors must make their employees aware of dangerous or potential hazards. **Employees have a responsibility** to report to their supervisors the existence of hazardous conditions which are contrary to good health and safety practices, or which contravene any requirements of the Act or applicable Regulations. It is the **supervisor's responsibility** to ensure that corrective action is taken at once.

It is the unconditional right of all members of the University to bring **without prejudice**, health and safety concerns to their supervisors, or to Human Resources [Environmental and Occupational Health Support Services (EOHSS)], Faculty of Health Science (FHSc.) Safety Office, or to the Joint Health and Safety Committees (JHSCs). If possible, the supervisor, in every case, must be informed of a concern before a complaint is taken elsewhere.

It is the responsibility of each member of the McMaster Community to know all emergency procedures, location and use of safety equipment and exit routes in case of an emergency. Consult your supervisor for more information.

4.2 FACULTY AND STAFF AS SUPERVISORS

- In the Occupational Health and Safety Act (Section 27) a supervisor is defined as a person who has charge of a workplace, or authority over a worker.

A faculty member is a supervisor under certain circumstances, particularly when an employee directly or indirectly reports to the faculty member. Research technicians, departmental technicians, students hired and paid to provide service, clerical and administrative staff are some examples of employees for which the faculty member may be the supervisor.

The Occupational Health and Safety Act of Ontario (OHSA) legally require that the supervisor be held accountable for supervisory compliance to legal obligations. Although supervisors may delegate safety tasks, supervisors are still held accountable for ensuring that the tasks are adequately performed.

4.3 SUMMARY OF RESPONSIBILITIES

The following is a summary of responsibilities according to the Occupational Health and Safety Act (OHSA). Please refer to the OHSA for specific wording.

4.4 EMPLOYER (MCMASTER UNIVERSITY)

- OHSA, Section 25, 26
- the equipment, materials and protective devices provided by the employer are in good condition
- provide information, instruction and supervision to a worker to protect the health and safety of the worker
- appoint a competent supervisor
- acquaint a worker or a person in authority over a worker with any hazard in the work
- take every reasonable precaution in the circumstances to protect the worker
- prepare and review a written health and safety policy at least annually and post this in the workplace

4.5 SUPERVISORS

- OHSA, Section 27
- ensures a worker works in a manner required by the Act and Regulations and with the proper protective devices
- ensures a worker uses or wears the equipment, protective devices or clothing required
- advise the worker of any potential or actual danger to the health and safety of the worker
- provide the worker with written instructions (standard operating procedures) about measures and procedures for protection
- take every reasonable precaution in the circumstances to protect the worker

4.6 WORKERS

- OHSA, Section 28
- work in compliance of the Act and applicable Regulations
- wear any equipment, protective devices or clothing that the employer requires
- report any defect in protective gear that may endanger him/herself or someone else
- report any contravention of this Act, applicable Regulations or any hazards
- shall not remove or alter any protective device
- operate or use any equipment in such a manner as to endanger him/herself or someone else
- shall not engage in any prank, contest, feat of strength, unnecessary running or rough and boisterous conduct

5.0 REPORTING HAZARDS, INCIDENTS AND INJURIES

Every hazardous situation and incident, whether or not it results in injury or is a “near miss” occurrence should be reported to your supervisor or department director/chair as soon as possible. In case of an injury, the employee must complete a McMaster Incident/Injury Form. Whether incident or injury occurred, the supervisor or department director/chair must then immediately advise Human Resources (EOHSS) and, where applicable the Faculty of Health Science (FHSc.) Safety Office of the hazard or accident by completing a McMaster University’s Injury/Incident Report **within 24 hours**. This information is required for completion, where applicable, by Employee Health Services of a **Form 7** to the Workplace Safety and Insurance Board (WSIB). In those circumstances where the employee has no immediate supervisor, or when the supervisor is absent, then the

employee must report the details of the hazard or accident to his/her supervisor's supervisor. If not available, the employee must initiate this contact with Human Resources (EOHSS) or where applicable, FHSc. Safety Office. Further information can be found in **RMM # 1000: Reporting and Investigating Injury/Incident/Occupational Disease Program.**

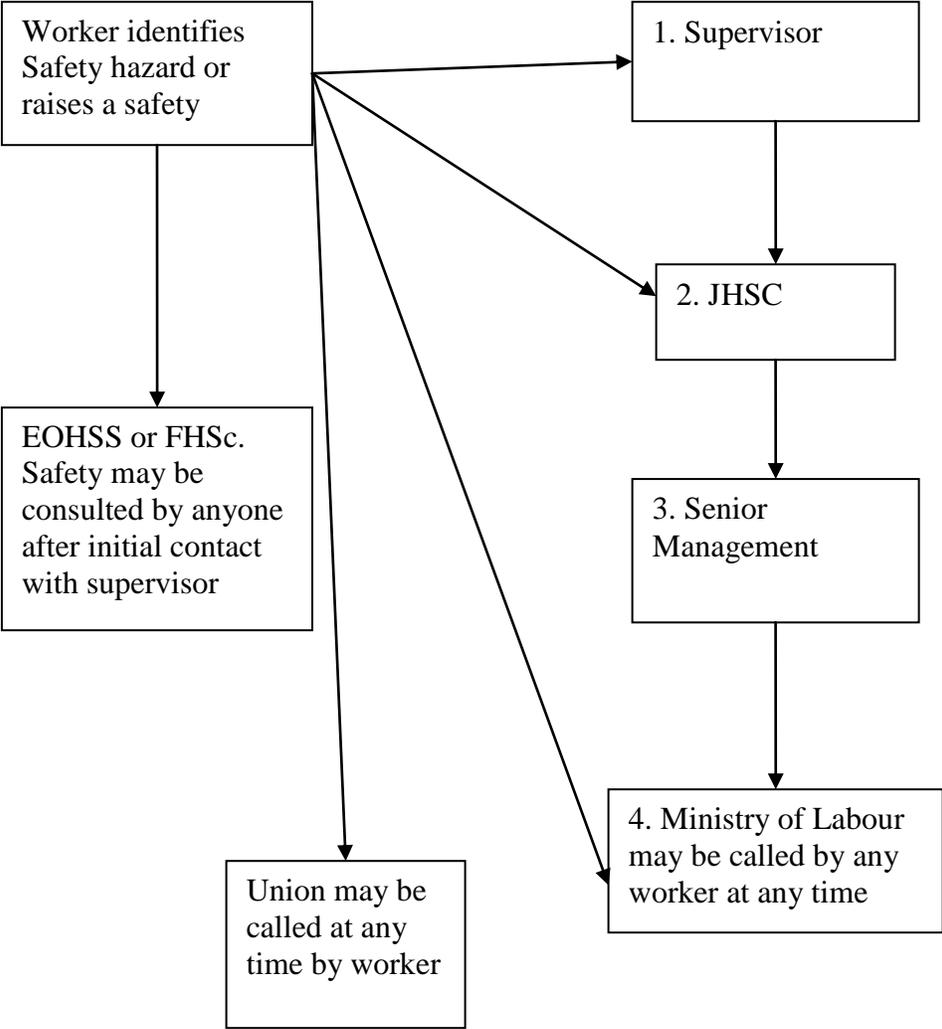
6.0 STEPS IN THE RESOLUTION OF A HEALTH & SAFETY CONCERN

1. **First Response** - this should be **with the supervisor**
2. **Second Response** - if no satisfactory resolution is achieved with the supervisor, the concern should be brought to the attention of the JHSC
3. **Third Response** - at times the involvement of senior administration may be necessary.
 - The Department of Environmental and Occupational Health & Safety (EOHSS) or Faculty of Health Science (FHSc) Safety Office may be consulted at any time after the problem has been discussed with the supervisor.
4. **Last Response** - The underlying principle of the Occupational Health and Safety Act of Ontario is that of an **internal responsibility system.** Therefore, the Ministry of Labour should only be consulted if all other attempts (1, 2 & 3) have failed to bring satisfactory resolution to a health and safety problem.

Supervisors and workers share the responsibility for the "workers" safety. In all cases, if a hazard or unsafe situation is identified, the worker must inform the supervisor as quickly as possible. The preferred method of resolution is between the supervisor and the worker; however the issue, if unresolved may require discussion at the JHSC.

If the concern is relevant to the department or faculty, the supervisor should bring this concern to the attention of the particular faculty administration (i.e. Chair or Dean). A worker should raise this type of concern with their JHSC representative, if their supervisor has not adequately resolved the concern. Again, it is expected that the committee will decide if the concern is to be forwarded to the employer.

6.0 STEPS IN THE RESOLUTION OF A HEALTH & SAFETY CONCERN



6.1 RIGHT TO REFUSE UNSAFE WORK

Under the provisions of OHSA, workers have the right to refuse work which they have reason to believe may endanger the health or safety of themselves or another worker. There are strict guidelines to be followed in this instance by all workplace parties. Further information can be found in Section 43 of the OHSA and in Risk Management Manual (RMM) # 114: **OHSA Work Refusals Program**.

7.0 WORKERS' COMPENSATION

If an employee has received a work-related injury or has developed an occupational disease, the costs for medical aid and for the lost time resulting from the injury will be covered by the Workplace Safety and Insurance Board of Ontario (WSIB). EOHSS, Employee Health Services (EHS), and where applicable FHSc. Safety Office must be informed immediately if an injury, which required medical aid, has occurred. For more detailed information regarding workers' compensation, consult **RMM # 902: WSIB/LTD Management Program**.

8.0 JOINT HEALTH & SAFETY COMMITTEES (JHSC)

The Faculty Health and Safety Committee is an **advisory** group of worker and management representatives. Both the Faculty of Engineering Joint Health and Safety Committee and the Faculty of Science Joint Health and Safety Committee are the legally required committees for their respective faculties. McMaster University has more than 20 legal committees. Within each department of the Faculties of Science and Engineering there is a safety sub-committee. The names of the committees and their members should be posted outside the main departmental and faculty office. On each committee at least half of the representatives must represent "workers" [OHSA, Section 8 (5)]. The names and work locations of JHSC Members must be posted on the Health and Safety Boards. Consult **RMM # 319: Health and Safety Board Maintenance Program**.

8.1 JHSC RIGHTS AND RESPONSIBILITIES

1. Conduct inspections to identify workplace situations that may be a source of danger to workers
2. Obtain information from the employer respecting the identification of potential and/or existing hazards of materials, processes, or equipment. Information can be requested on the health and safety practices of other, similar industries
3. Make recommendations to the employer for the improvement of the health and safety of workers
4. Investigate work refusals
5. Certified worker members investigate serious accidents and situations where a worker is killed or critically injured at a workplace and shall report the findings to the Ministry of Labour
6. Obtain information from the Workplace Safety and Insurance Board (WSIB) respecting the number of workplace fatalities, lost workdays and other relevant statistics
7. Recommend to the employer and workers the establishment, maintenance and monitoring of programs, measures and procedures respecting health and safety of workers
8. Be consulted about and have a designated member representing workers present at the beginning of testing
9. The committee must meet at least once every three months
10. The committee must maintain and keep minutes of meetings. Minutes must be posted on the Health and Safety Boards.
11. May accompany a Ministry of Labour Inspector

The employer has a general duty to co-operate with the committee and assist it to carry out its responsibilities.

For a complete explanation of the function and role of the committee see "A Guide for Joint Health and Safety Committees and Representatives in the Workplace" published by the Ontario Ministry of Labour. This information is available through links on the website, www.working@mcmaster.ca/eohss. See also **RMM # 104: Central Joint Health and Safety Committee and # 105: McMaster University Joint Health and Safety Committees**.

8.2 WORKPLACE INSPECTIONS

Regular inspections of the workplace help to identify hazards and prevent accidents. It is the JHSC responsibility to schedule and have worker members conduct regular inspections. The OHS Act requires that worker members inspect the physical condition of the workplace at least once per month. If not practical, the workplace must be inspected at least once per year, with at least part of the workplace inspected each month. Other workers and the employer must give the JHSC Member(s) information and assistance to carry out these inspections. Managers and Supervisors are also responsible for inspections. Inspection forms can be obtained through the health and safety link of McMaster University's website. Additional information is available in **RMM # 302: Safety Audits and Inspections**.

9.0 GUIDELINES FOR WORKING IN LABORATORIES

Always be prepared and informed. Know the safety rules, emergency procedures and standard operating procedures. Know your emergency exit route.

According to the Ontario Fire Code all laboratory doors are fire doors and must be kept closed at all times. Never block emergency exits, emergency equipment or electrical panels.

Do not use extension cords in laboratories on a permanent basis.

Store flammables in approved flammable safety cabinets. Fume hoods are not to be used for storage.

Before starting an experiment using chemicals, make sure you consult and understand the information presented in the Material Safety Data Sheets (MSDS) as well as other resources, including your supervisor.

Know the location of emergency equipment in your area and how to use it.

Wear the appropriate personal protective equipment for the level of hazard. Open toed shoes are not permitted. Long hair, loose clothing and dangling jewelry should be constrained.

There is to be no mouth pipetting.

Eating and drinking is only allowed in designated clean areas away from hazardous materials and radioactive sources. Food and drinks are not to be stored in the laboratory or laboratory refrigerators. Laboratory glassware and utensils that have been used for laboratory operations should never be used to consume food or drink.

Working alone especially at off hours is discouraged; always check with your supervisor if specific procedures require a buddy system. Check the standard operating procedures in your department regarding "**working alone**" during off hours. Consult **Risk Management Manual (RMM) # 304: Persons Working Alone Program**.

Post suitable warning signs if a hazardous situation is present. Include your name and extension where you can be reached. Communicate with fellow researchers and advise of experiments in progress. Experiments should only be left unattended when it is safe to do so.

Reagents and samples must be labeled as required by WHMIS legislation.

Work involving hazardous materials must be done under a fume hood or other containment facility. Keep an updated inventory of all material.

Practice good housekeeping - promptly clean up glassware and dismantle equipment when no longer needed. All lab benches should be kept clear of clutter. Clean up spills immediately.

No rough-housing or pranks in laboratories. Always report unsafe conditions and accidents promptly to supervisor.

10.0 UNIVERSAL PRECAUTIONS

Applies to all blood, body fluids, body tissues or extracts.

1. Gloves should be worn when coming in contact with blood or body fluids.
2. Wash hands when contaminated and immediately after gloves are removed.
3. Take precautions to prevent injuries by sharp instruments.

DO NOT RECAP NEEDLES

4. Use only mechanical pipetting devices.
5. Use biological safety cabinet or fume hood whenever procedures such as blending, sonicating or vigorous mixing may generate aerosols.
6. Decontaminate work surfaces daily and after a spill. Use 1 in 10 dilution of household bleach, 70% ethanol or alternative germicide. Dispose of pathogenic waste in the proper containment.
7. Remove all lab coats and other protective clothing before leaving the lab.
8. Decontaminate all equipment prior to repair or relocation.
9. Hepatitis B vaccine or other relevant vaccinations are recommended.

While doing tissue culture or working with bacteria or viruses, consult the Biosafety Office at ext. 24956 for grant approval, training and audits.

11.0 WHMIS (WORKPLACE HAZARDOUS MATERIALS INFORMATION SYSTEM)

Anyone working with or in proximity to hazardous materials must attend a WHMIS training session prior to commencement of work. Training is available through EOHSS and, where applicable, FHSc. Safety Office.

This is Canada wide legislation and all workers that work with or are in the proximity of hazardous materials must have WHMIS training. WHMIS is also known as the "right to know" legislation. Workers are entitled to know the dangers of the materials they use on the job and how to protect themselves from these dangers by reading the labels and the MSDS (Material Safety Data Sheet).

WHMIS contains three major components: Labels, Material Safety Data Sheets (MSDS) and Training.

It is the responsibility of all workers to label materials and to follow the WHMIS Regulations.

Additional information can be obtained in the Ministry of Labour publication of WHMIS: A Guide to the Legislation (May, 1989). A link to this document is available through EOHSS and FHSc. Safety Office websites. Consult **RMM# 501: Hazardous Materials Management Systems (WHMIS) Program.**

11.1 WHMIS SYMBOLS

Within WHMIS, chemicals are put into 6 different classes to identify their hazards. Within these classes, there are symbols identified with each class. Within class D, there are three hazard symbols.

Class A



Compressed Gas

Gas cylinder is under pressure and may explode if heated or damaged
Sudden release of high pressure gas streams may puncture skin and cause fatal embolism

Transport and handle with care
Ensure cylinder is properly secured
Store away from heat or fire sources
Use appropriate regulator

Class B



Flammable and Combustible Material

May burn or explode when heated
Burns readily at room temperature

Store away from Class C (oxidizing) materials
Store away from heat, sparks and flame

Class C



Oxidizing Material

Can cause other materials to burn or explode by providing oxygen
May burn skin and eyes on contact

Store away from Class B (flammable and combustible)
Store away from heat, sources of ignition
Wear recommended personal protective equipment

Class D



Division 1 - Poisonous and Infectious Material, Immediate and Serious Toxic Effects

May cause immediate death or serious injury if inhaled, ingested, absorbed or injected into the body

Avoid inhalation, skin, eye contact
Wear recommended personal protective equipment
Wash hands after use



Division 2 - Poisonous and Infectious Material Other Toxic Effects

May cause death or permanent injury following repeated or long term exposure
May irritate eyes, skin and breathing and may lead to long term lung problems and skin sensitivity
May cause liver or kidney damage, cancer, birth defects or sterility

Avoid inhalation, skin and eye contact
Wear recommended personal protective equipment
Wash hands after use



Division 3 - Poisonous and Infectious Material, Biohazardous Infectious Material

Contact with microbiological agents (bacteria, viruses, fungi and their toxins) may cause illness or death

Wear recommended personal protective equipment
Work in designated areas only
Disinfect area after handling
Wash hands after handling

CLASS E

Corrosive material



Will burn eyes and skin on contact
Will burn respiratory tract if inhaled

Store acids and bases separately
Avoid inhalation and skin contact
Wear the recommended personal protective equipment

CLASS F

Dangerously reactive material



May be unstable, reacting dangerously to jarring, compression, heat or light exposure
May burn, explode or produce dangerous gases when mixed with incompatible materials

Store away from heat sources
Avoid shock and friction
Wear the recommended personal protective equipment

12.0 MATERIAL SAFETY DATA SHEETS (MSDS)

Before working with any hazardous material read the Material Safety Data Sheet (MSDS) carefully. MSDS are available for every controlled substance under WHMIS. The MSDS contains a minimum of nine categories of information. They are: hazardous ingredients; preparation information; physical data; fire or explosion hazard; reactivity data, toxicological properties; preventative measures and first aid measures.

12.1 AVAILABILITY OF MATERIAL SAFETY DATA SHEETS

Sections 38(1)(a) and (b) of the OHSA state the employer is required to make copies of MSDS readily available to workers, and to joint health and safety committee, if any, or to a health and safety representative. As a rule, readily available means located close to workers, in a physical copy form (i.e. printed on paper), and accessible to workers during the shift.

MSDS have to be updated if new information becomes available, for example, as the result of further testing of the product [Section 29 (1) of the Regulation]. The MSDS should be updated as soon as reasonably practical after the new information becomes available.

In all cases, MSDS shall be updated every three years which helps to ensure any new health effects are identified and made known to workers. If the employer has a supplier MSDS that has expired, that is, more than 3 years old, but the controlled product is still used in the workplace, the employer is obligated to try and obtain a current data sheet from the supplier. The obligation is on the employer to ensure the currency of the data sheet, because under

the federal Controlled Products Regulation, the supplier is not obligated to send an updated or revised data sheet to previous customers. If the employer is not able to obtain an up-to-date supplier MSDS from the supplier, the employer is expected to make reasonable efforts to update the data sheet. Reasonable efforts mean, for example, consulting the Canadian Centre for Occupational Health and Safety (CCOHS) for assistance.

Under Section 38. (6) of the OHSA,

An employer who makes a material safety data sheet readily accessible on a computer terminal at a workplace,

- a) shall take all reasonable steps necessary to keep the terminal in working order;
- b) shall give a worker upon request a copy of the material safety data sheet; and
- c) shall teach all workers who work with or in proximity to hazardous materials, the health and safety representative, if any, at the workplace and the members of the committee how to retrieve the material safety data sheet on the computer terminal.”

The employer is permitted to make data sheets available to workers by means of a computer terminal, if the employer,

- a) Takes all reasonable steps to keep the computer terminal in working order;
- b) Provides a paper copy of the MSDS if requested by an employee; and
- c) Provides training on how to access computer-stored data sheets, to all workers working with or in proximity to controlled products, and to members of the joint health and safety committee or a health and safety representative [OHSA: Section 38 (5)]

Note: For those areas providing MSDS by computer terminal only, an alternate means must be established to ensure accessibility in emergency situations (e.g. power outages). Alternate means could include the use of power generators, accessibility to a battery-powered laptop, etc. Employees must be trained on the alternate means of accessing MSDS sheets in the event of an emergency.

Additional information can be obtained in the Ministry of Labour publication of WHMIS: A Guide to the Legislation (May, 1989). A link to this document is available through EOHSS and FHSc. Safety Office websites.

MSDS are available through the following websites:

Environmental & Occupational Health Support Services Website

<http://www.workingatmcmaster.ca/eohss/> and following the links

From Ministry of Labour Ontario Website: http://www.labour.gov.on.ca/english/hs/whmis/whmis_4c.html

From Canadian Centre of Occupational Health and Safety Centre (CCOHS):

<http://ccinfoweb.ccohs.ca/msds/search.html>

13.0 LABORATORY SAFETY EQUIPMENT

13.1 FUME HOODS

Properly functioning fume hoods are an important safety device in a laboratory. In emergency situations such as fires, gaseous emissions or spills in a fume hood always pull the sash down completely and ensure hood fans are turned on.

On campus fume hood maintenance is the responsibility of Facility Services. Fume hoods are checked annually for: exhaust volume, motor speed and condition of ventilation system. Off site, hospital-hosted areas are responsible for maintenance of fume hoods in their locations.

Fume hoods are maintained to operate within the original design specifications. Contact the emergency numbers posted beside the main telephone in your area in the event of a major spill or fume hood malfunction. Many fume

hoods operate with a Ventalert (battery) system. Similar to smoke detectors, the battery will sound an alarm/beep when running low. Before operating the fume hood, the battery must be sufficient and the Ventalert turned on.

In case of malfunction on campus call:

- Ext. 24740 during normal working hours
- Ext. 88 after hours, and state if immediate emergency service is required.

For hospital hosted buildings, contact FHSc Safety Office at ext 25956 for information about annual testing and maintenance for your specific facility.

13.2 FUME HOOD OPERATION GUIDELINES

All work involving hazardous or malodorous materials should be done in operating fume hoods. Visually inspect the baffles before using the hood to be sure the slots are open and unobstructed. Do not use the hood if the exhaust system is not in operation. A tissue taped to the sash or inside the hood provides a good indicator of air flow.

Fume hoods are not meant for storage. Use flammable safety cabinet for storage of flammables.

Keep all chemicals and equipment 6 inches (15 centimeters) behind the sash during experiments. Do not raise sash above operating height. Keep the sash clean and clear.

If possible, set up equipment a couple of inches (5 centimeters) above the working surface of the hood to maintain efficient air flow. Ensure that equipment is stable.

Keep the sash completely lowered any time no "hands-on" part of an experiment is in progress. Close the sash completely whenever the hood is on and unattended.

All electrical devices should be connected outside of the hood to avoid sparks which may ignite a flammable or explosive chemical.

The hood is **not a substitute** for personal protective equipment. Wear gloves, aprons, goggles, etc. as appropriate. Do not put your head inside the hood at any time. Clean all chemical residues from the hood chamber after each use.

14.0 SHOWERS AND EYE WASH STATIONS

Know where the showers and eye wash stations are located before starting your work. Consult your supervisor on the specific instructions on how to use them. Eyewashes and showers must be tested according to the posted schedule.

15.0 ROUTES OF ENTRY

Inhalation is the most common route of entry of hazardous materials into the body. Remember that odours may not be detectable at a level which can harm you. Other routes into the body are through skin absorption, splashes to mucous membranes, ingestion and injection.

Ingestion of toxic materials may occur as a result of eating or drinking in a contaminated work area or by mouth pipetting. Food and drink are not permitted in laboratories. Mouth pipetting is not permitted.

Hazardous material can be absorbed through the skin, mucous membranes and by punctures to the body. Recapping needles is not permitted.

16.0 PERSONAL PROTECTIVE EQUIPMENT

For any work in a laboratory a lab coat, eye protection, gloves and proper footwear is recommended. Closed toed shoes are a minimum safety requirement. Consult **RMM# 320: Personal Protective Equipment Program and RMM # 312: Foot Protection Program**. Personal protective equipment suitable for the operation as specified by the supervisor must be worn. All users of respiratory equipment (e.g. masks) must be trained and fit-tested before use. Fit testing is available through EOHSS and FHSc. Safety Office.

The supervisors are responsible for supplying the required personal protective equipment. Scientific Stores can provide the required equipment including: disposable lab coats, rubber aprons, vinyl, latex, neoprene, nitrile and rubber gloves, insulating gloves, safety glasses and safety goggles, face shields and ear plugs. For specialized personal protective needs consult safety supply companies. It is the individual's responsibility to maintain personal protective equipment in good condition.

16.1 GLOVES

Gloves can protect your hands from many hazards and there are many different types of protective gloves available. Gloves should be chosen carefully to offer the best protection for specific procedures and chemicals. Nitrile and neoprene gloves offer good protection against chemicals but know that different glove materials have different chemical permeabilities and this should be checked with the manufacturer before choosing a specific glove type.

Always check the integrity of your gloves before starting work. Remove gloves, before leaving the laboratory. Always wash hands after removing gloves. Consult **RMM# 321: Hand Protection Program**.

16.2 EYE PROTECTION

In most laboratories eye protection is a requirement. Best practices recommend that contact lenses not be worn while working in a laboratory with chemicals. Depending on the protection required during a specific procedure regular safety glasses, chemical safety goggles or a full face shield may be necessary. Follow your supervisor's established procedural guidelines. Consult **RMM # 310: Eye Protection Program**.

16.3 LAB COATS

Lab coats provide additional protection and it is recommended that they be worn at all times in a lab especially when working with chemicals. Lab coats should not be worn outside of the laboratory, except when going from one lab to another.

Contaminated lab coats should not be washed at home.

On campus: there are several options available for laundering lab coats, including those contaminated with biological wastes. Information is available on www.workingatmcmaster.ca/eohss website, or contact ext. 24967 for information.

For FHSc areas, lab coats go to Mohawk Laundry Service. Contact FHSc Safety Office at ext. 24956 for information.

16.4 HEARING PROTECTION

When noise levels reach 82dBA, a full noise survey shall be undertaken and recommendations from the survey implemented. Hearing protection is to be used as a last resort. Consult **RMM# 403: Noise Control and Hearing Protection Program**.

16.5 ERGONOMIC PROTECTION

The risk for the development of musculoskeletal injuries (also referred to as MSDs) increases with repetitive and/or sustained posture. Work station design, equipment and tools are important in minimizing risk. Ergonomic training and assessments are available through EOHSS and FHSc. Safety Office. Consult **RMM # 405: Ergonomic Program**.

17.0 ELECTRICAL SAFETY

All electrical equipment, 50 volts or greater capacity, must be approved by an agency acceptable within Ontario. Therefore, CSA, OH, ULC, approval must be sought from the electrical authorities.

- All electrical apparatus must be properly grounded.
- Any two-pin device must be CSA approved.
- Never remove the ground pin of a 3 pronged plug.
- Minimize the use of extension cords on a permanent basis. Ask Facility Services to install more outlets.
- Only qualified and trained people should repair or modify electrical or electronic equipment.
- Electrical equipment must have spark protection in areas where there is a danger of fire or explosion.
- Do not use portable space heaters in proximity of combustible and flammable material.
- Circuit breaker panels must be easily accessible and clearly marked. Familiarize yourself with their location.
- Frayed wires or cords must not be used.
- Do not use electric wires as supports and never pull on live wires.
- Ensure that all wires are dry before plugging into circuits.
- All electrically energized equipment when immersed in liquids must have ground fault interrupters.
- Do not enter areas, or restart equipment that are locked, or tagged out. Consult **RMM# 306: Lock Out-Tag-Out Program**.

17.1 STATIC ELECTRICITY AND SPARKS

Common sources of sparks and static electricity are:

- decanting of organic liquids from one metal container to another.
- plastic aprons
- metal clamps, nipples or wires used with non-conducting hoses
- gases released quickly from cylinders under high pressure
- switches and thermostats
- electrical contacts (light switches & thermocouples, refrigerators) may produce sparks.

The following information has been reproduced with permission from the Canadian Centre for Occupational Health and Safety (CCOHS) [2008] from OSH Answers: How Do I Work Safely with Flammable and Combustible Liquids? (Static Electricity), http://www.ccohs.ca/oshanswers/prevention/flammable_static.html?print April 8, 1999 retrieved April 18, 2008.

Static electricity is the electric charge generated when there is friction between two things made of different materials or substances...Electric charges can build up on an object or liquid when certain liquids (e.g. petroleum solvents, fuels) move in contact with other materials. This can occur when liquids are poured, pumped, filtered, agitated, stirred or flow through pipes. This buildup of electrical charge is called static electricity. Even when liquids are transported or handled in non-conductive containers, something rubbing the outside of the surface of the

container may cause a static charge to build up in the liquid. The amount of charge that develops depends, in part; on how much liquid is involved and how fast it is flowing or is being agitated or stirred.

To decide if static electricity is likely to be a hazard, you must consider several factors:

- Can a static electric charge be generated under the operating conditions?
- Can the charge accumulate?
- If it discharges, will it cause a spark?
- Is there an ignitable mixture (e.g. solvent vapour or dust in the air) in the area where a static electricity discharge can occur?
- Will the discharge generate an incendive spark, i.e. a spark that has enough energy to ignite the mixture in air?
- If the answer to the above five questions is yes where a solvent or fuel is used, then static electricity can be a fire/explosive hazard. It means that the spark can ignite a vapour/air mixture that is in its flammable range, the concentration range between the upper and the lower flammable limits.

Why is it important to bond and ground containers?

Transferring a liquid from one metal container to another may result in static electrical sparks. To prevent the buildup of static electricity and prevent sparks from causing a fire, it is important to bond metal dispensing and receiving containers together before pouring. Bonding is done by making an electrical connection from one metal container to another. This ensures this will be no difference in electrical potential between the two containers, and therefore, no sparks will be formed.

The best way to bond containers is to securely attach a special metal bonding strap or wire to both containers. Some liquid transfer pumps have self-bonding hoses. Bonding can also be done by keeping a solid metal-to-metal contact between the containers themselves or between a metal container and a conducting nozzle. These latter two methods are usually not reliable because a good electrical contact is often hard to make and maintain during the entire transfer...

Do all kinds of containers have to be bonded or grounded?

You only need to bond those containers that conduct electricity, such as those made from metal or special, conductive plastics.

If a container is made from a material that does not conduct electricity, such as polyethylene plastic or glass, bonding and grounding is not necessary: in fact grounding the container will not have any effect.

Are there special precautions to take when filling non-conductive containers?

Even if a liquid is conductive, filling or handling plastic or other non-conducting containers can be hazardous. The splashing and turbulence of the liquid in the container can cause a static electric charge to build up in the liquid or on conductive parts on the container that are not grounded. A spark with enough energy to ignite a vapour/air mixture in its flammable range (an incendive discharge) can originate from the liquid or from the container.

For medium size containers (5-60 U.S. gallons or about 19-227 L), it is advisable to ground any metal parts on the container (and nearby conductive surfaces that the container may come in contact) and fill the container from the bottom through a long, grounded metal pipe. This will reduce the amount of static charge produced and the generated charge to relax (dissipate) through the metal pipe.

When filling non-conducting portable containers, the NFPA recommends that a grounded dip pipe or grounded wire be in the liquid in the container while it is being filled. Any metal parts of the container and metal funnel, if one is used, should also be grounded. When filling containers with low conductivity liquids (i.e. ones with conductivity less than 50 Pico Siemens, pS), one should keep the grounded dip rod in the liquid for around 30 seconds after the filling is completed...

The above information has been reproduced with permission from the Canadian Centre for Occupational Health and Safety (CCOHS) [2008] from OSH Answers: How Do I Work Safely with Flammable and Combustible Liquids? (Static Electricity), http://www.ccohs.ca/oshanswers/prevention/flammable_static.html?print April 8, 1999 retrieved April 18, 2008. Additional information about bonding and grounding can be found on this website.

It is important that regular inspections are made of bonding and grounding connections. When bonding and grounding are required, users must refer to the MSDS and follow site specific SOPS for step by step procedures.

18.0 FIRE SAFETY

Every member of McMaster University is responsible for knowing the location of the nearest fire extinguisher, the fire alarm, and the nearest fire escape. Everyone should become familiar with the use of a fire extinguisher. Fire Safety training is mandatory and is available through EOHSS and FHSc. Safety Office. Consult **RMM# 1201: Fire Safety Plan**

18.1 FIRE EXTINGUISHERS

Fire extinguishers need to be appropriate to the local risks as identified after a risk assessment. As a guide:

CLASS A fires involve ordinary combustible materials such as wood, cloth, paper, rubber and many plastics.

CLASS B fires involve flammable liquids and gases, oils, greases, tars, oil-base paints, lacquers and some plastics.

CLASS C fires involve Class A and/or B materials in the presence of live electrical equipment, motors, switches and wires.

CLASS D fires involve combustible metals such as magnesium, titanium, sodium, potassium, zirconium, lithium and any other finely-divided metals which are oxidizable.

Each person must attend fire safety training which is available through EOHSS and FHSc. Safety Office. Inquire from your supervisor as to required frequency of training.

Extinguishers located in FHSc locations are checked by the host institution. For additional information contact FHSc Safety Office at ext. 24956.

Extinguishers need to be replaced/refilled even if a small amount is used. On campus, contact ext. 24740. For FHSc locations, contact ext. 24956.

18.2 FIREPROOF BLANKETS

Fireproof blankets, usually made of 100% wool, are used to wrap a burning victim to smother a fire. Do not wrap a standing person, because of a chimney effect; lay the victim down to extinguish the fire. The blanket should be removed once the fire is out in order to disperse the heat and thus minimize tissue damage. These blankets may also be used to keep injured persons warm.

19.0 STANDARD OPERATING PROCEDURES (SOPS)

Standard Operating Procedures (SOPs) are required for all work assignments and projects that have the potential to cause critical injury and/or occupational illness or environmental impairment and are also required, but not limited to hazards associated with Job Hazard Analyses (JHAs). SOPs are written procedures required by the OSHA under specific regulations and by McMaster University's programs and policies that define the techniques, processes and best practices required to prevent injury, illness or damage to property and/or environment. Additional details and SOP templates can be found in **RMM# 301: Standard Operating Procedures (SOP'S) Program.**

20.0 GUIDELINES FOR STORAGE OF CHEMICALS

- Choose an area away from offices and emergency exits, if possible.
- Only authorized personnel should have access to chemical storage area.
- Ventilation should be at the ceiling and at the floor level to prevent buildup of vapours heavier than air. The area must be temperature controlled.
- Store according to chemical compatibilities, not in alphabetical order.
- Incompatible chemicals should not be stored in close proximity to each other.
- Separate the following groups from each other: OXIDIZERS , WATER REACTIVES FLAMMABLES, ACIDS, CAUSTICS (BASES)
- Ensure all containers are in good condition and properly labeled
- Fume hoods are not meant for chemical storage

21.0 COMPATIBLE CHEMICAL GROUPS

21.1 INORGANIC

1. metals, hydrides
2. halides, sulfates, sulfites, thiosulfates, phosphates, halogens
3. amides, nitrates· * (except ammonium nitrate), nitrites u, azides **, nitric acid
4. hydroxides, oxides, silicates, carbonates, carbon
5. sulfides, selenides, phosphides, carbides, nitrides
6. chlorates, perchlorates**, perchloric acid**, hypochlorites, peroxides**, hydrogen peroxide
7. arsenates, cyanides, cyanates
8. borates, chromates, manganates, permanganates
9. acids (except nitric)
10. sulfur, phosphorus, arsenic, phosphorus pentoxide**

21.2 ORGANIC

1. acids, anhydrides, peracids
2. alcohols, glycols, amines, amides, imines, imides
3. hydrocarbons, esters, aldehydes
4. ethers**, ketones, ketenes, halogenated hydrocarbons, ethylene oxide
5. epoxy compounds, isocyanates
6. peroxides, hydroperoxides, azides**
7. sulfides, polysulfides, nitriles
8. phenols, cresols

****These chemicals deserve special attention due to their potential instability.**

22.0 GUIDELINES FOR STORAGE OF INCOMPATIBLE CHEMICALS

The previously outlined storage scheme may not suffice to prevent the mixing of incompatible chemicals. Even chemicals of the same classification may form highly hazardous combinations. So always inform yourself by reading the label and the Material Safety Data Sheet carefully. For compatibility data more specialized literature may have to be consulted.

The following is a list of some of the common **incompatible** chemicals. This list is by no means complete. Consult the MSDS and/or speak with the supervisor for additional clarification.

Chemical	Is Incompatible With
Acetic Acid	Chromic acid, nitric acid, hydroxyl compounds, ethylene glycol, perchloric acid, peroxides, permanganates
Acetone	Concentrated nitric and sulfuric acid mixtures, chlorinated solvent/alkali mixtures
Acetylene	Chlorine, bromine, copper, fluorine, silver, mercury
Alkali & alkaline earth metals (such as powdered aluminum, or magnesium, calcium, lithium, sodium, potassium)	Water, carbon tetrachloride or other chlorinated hydrocarbons, carbon dioxide, halogens
Ammonia (anhydrous)	Mercury (in manometers, for example), chlorine, calcium hypo-chlorite, iodine, bromine, hydro-fluoric acid (anhydrous)
Ammonium nitrate	Acids, powdered metals, flammable liquids, chlorates, nitrites, sulfur, finely divided organic or combustible materials
Aniline	Nitric acid, hydrogen peroxide
Arsenical materials	Any reducing agent
Azides	Acids
Bromine	See chlorine
Calcium oxide	Water
Carbon (activated)	Calcium hypochlorite, all oxidizing agents
Carbon tetrachloride	Sodium
Chlorates	Ammonium salts, acids, powdered metals, sulfur, finely divided organic or combustible materials
Chromic acid & chromium trioxide	Acetic acid, naphthalene, camphor, glycerol, alcohol, flammable liquids in general
Chlorine	Ammonia, acetylene, butadiene, butane, methane, propane (or other petroleum gases), hydrogen, sodium carbide, benzene, finely divided metals, turpentine
Chlorine dioxide	Ammonia, methane, phosphine, hydrogen sulfide
Chloroform	Strong bases, ketones and strong base, alkaline metals, aluminum, strong oxidizers
Copper	Acetylene, hydrogen peroxide
Cumene hydro peroxide	Acids (organic or inorganic)
Cyanides	Acids
Flammable liquids	Ammonium nitrate, chromic acid, hydrogen peroxide, halogens
Fluorine	Everything
Hydrocarbons (such as butane, propane, benzene)	Fluorine, chlorine, bromine, chromic acid, sodium peroxide
Hydrocyanic acid	Nitric acid, alkali

Hydrofluoric acid (anhydrous)	Ammonia (aqueous or anhydrous)
Hydrogen peroxide	Copper, chromium, iron, most metals or their salts, alcohols, acetone, organic materials, aniline, nitro methane, combustible materials
Hydrogen sulfide	Fuming nitric acid. oxidizing gases
Hypochlorites	Acids, activated carbon
Iodine	Acetylene, ammonia (aqueous or anhydrous). Hydrogen
Mercury	Acetylene, fulminic acid, ammonia
Nitrates	Sulfuric acid
Nitric acid (concentrated)	Acetic acid, aniline, chromic acid, hydrocyanic acid, hydrogen sulfide, flammable liquids, flammable gases, copper, brass, any heavy metals
Nitrites	Acids
Nitroparaffins	Inorganic bases, amines
Oxalic acid	Silver, mercury
Oxygen	Oils, grease, hydrogen; flammable liquids, solids or gases
Perchloric acid	Acetic anhydride, bismuth and its alloys, alcohol, paper, wood, grease, oils
Peroxides, organic	Acids (organic or mineral), avoid friction, store cold
Phosphorus (white)	Air, oxygen, alkalies, reducing agents
Potassium	Carbon tetrachloride, carbon dioxide, water
Potassium chlorate	Sulfuric and other acids
Potassium perchlorate (see also chlorates)	Sulfuric and other acids
Potassium permanganate	Glycerol, ethylene glycol, benzaldehyde, sulfuric acid
Selenides	Reducing agents
Silver	Acetylene, oxalic acid, tartaric acid, ammonium compounds, fulminic acid
Sodium	Carbon tetrachloride, carbon dioxide, water
Sodium nitrite	Ammonium nitrate and other ammonium salts
Sodium peroxide	Ethyl or methyl alcohol, glacial acetic acid, acetic anhydride, benzaldehyde, carbon disulfide, glycerin, ethylene glycol, ethyl acetate, methyl acetate, furfural
Sulfides	Acids
Sulfuric acid	Potassium chlorate, potassium perchlorate, potassium permanganate (similar compounds of light metals, such as sodium, lithium)
Tellurides	Reducing agents

23.0 GUIDELINES FOR STORAGE OF UNSTABLE CHEMICALS-- PEROXIDE FORMERS

Many chemicals, most notably ethers, may form explosive decomposition products.

Ethers, Liquid Paraffins and Olefins form peroxides especially in the presence of air and light. Some common examples include isopropyl ether, diethyl ether, tetrahydrofuran and dioxane. Since most of these products have been packaged in an air atmosphere, peroxides can form even if the containers have not been opened.

- Always date chemicals when received, upon opening and when expired.
- Unopened containers of ethers should be discarded after one year, unless inhibitors have been added. Once opened, ethers should only be kept for 6 months maximum.

- Buy only necessary quantities.
- Never replace unused chemicals in the original container.
- Store in cool, dry, well ventilated areas.
- Keep away from sources of heat and shock. Avoid friction and impact.
- Ensure ethers are free of peroxides before distilling.

NOTE: There are specific tests available to check for the presence of peroxides. Test paper for peroxides is available in the A. Bourns Science Store.

Always check the MSDS and review site specific SOP for the use and storage of chemicals.

24.0 HIGHLY TOXIC, CARCINOGENIC OR MUTAGENIC CHEMICALS

It is recommended that these be stored under lock and key with limited access to authorized personnel only.

25.0 CORROSIVES

- If possible store in acid resistant cabinets or on polyethylene trays.
- Never store on high shelves.
- Keep away from heat sources to reduce evaporation rate and damage to expensive metal equipment.
- Keep away from metal containers.

26.0 FLAMMABLE AND COMBUSTIBLE LIQUIDS

- Flammable liquids are liquids with a Flashpoint below 37.8 C; Combustible liquids are liquids with a Flashpoint at or above 37.8 C. Both must be stored in FM or UL approved metal storage cabinets.
- Store only quantities actually needed.
- Keep cabinet doors closed at all times.
- Flammable liquids should only be stored in explosion-proof refrigerators if they must be kept cool.
- Be aware of grounding and bonding requirements. See Section 7.1 of this manual.
- Additional information on storage can be located in Part 4 of the Ontario Fire Code, Reg. 213-07

27.0 WATER REACTIVES

Protect water reactive chemicals from exposure to moisture or accidental contact with water.
Do not store water reactive substances under the sink!

28.0 PERCHLORIC ACID (Concentrated. 70%)

- Store on glass or ceramic trays that have enough volume to hold contents of bottle in case it breaks.
- Separate perchloric acid from sulfuric acid, organic material, and metals.
- Keep perchloric acid in storage area free from dust. Perchloric acid is a powerful oxidizing agent and reacts violently with dust.
- Only use fume hoods designated by your area for use of perchloric acid.
- Perchloric acid should only be used in wash-down fume hoods of non-combustible construction.

Organic chemicals and perchloric acid must never be used in the same fume hood.

Before working with perchloric acid, inform yourself well of its properties.

29.0 EXPLOSIVES

Contact EOHSS at ext. 24352 for information.

30.0 DECLARATION OF CHEMICAL WEAPONS

The Federal Department of Foreign and International Trade require McMaster University to declare the identity and use of toxic chemicals or precursors covered by the Chemical Weapons Convention (Bill C 87). Toxic chemicals and their precursors are classified into three SCHEDULES according to their utility for chemical weapons production. For specific information, including the written documentation required for declaration, consult www.workingatmcmaster.ca and follow the links to health and safety, Declaration of Chemical Weapons. Additional information is available on the Department of Foreign Affairs website. Consult **RMM# 503: Control Program for Substances Regulated Under the Chemical Weapons Convention Program**. Specific information can also be obtained by contacting EOHSS at ext. 23314.

31.0 DESIGNATED SUBSTANCES

The following substances, if present in any amount in your laboratory, cause a legally required written assessment to determine the risk of exposure and health effects is made. A draft of the assessment should be discussed by the local Joint Health and Safety Committee. The use, handling, storage and exposure to these chemicals are strictly regulated by the Ontario Ministry of Labour. (See Designated Substances Regulations). Prior to working with any of these substances the appropriate regulation must be consulted. Consult **RMM# 500 Designated Substances Control Program** for details. Additional resources include the JHSC, EOHSS, and FHSc Safety Office.

ACRYLONITRILE
ARSENIC
ASBESTOS, including Construction Projects
BENZENE
COKE OVEN EMISSIONS
ISOCYANATES

ETHYLENE OXIDE
LEAD
MERCURY
SILICA (crystalline, but not amorphous)
VINYL CHLORIDE

32.0 COMPRESSED GASES

"Compressed Gases" is a generic term and includes compressed gases, liquified compressed gases and cryogenic liquified gases. Different hazards are associated with compressed gases depending on their physical and toxicological properties. Always read the labels carefully and check the Material Safety Data Sheets for a particular type of gas. Individuals working with compressed gases must take Gas Cylinder Training available through EOHSS.

Consult **RMM# 504: Compressed and Liquified Gases Safety Program**

32.1 GUIDELINES FOR HANDLING COMPRESSED GASES

The following is **not** a comprehensive outline of procedure involving the handling of compressed gases. Consult **RMM# 504: Compressed and Liquified Gases Safety Program**

The following general precautions must be followed when dealing with compressed gases.

- Cylinders of compressed gases must be properly secured at all times.
- The valve protection cap must always be on when cylinder is not connected to a regulator.
- Do not store full and empty cylinders together. Serious suck-back can occur when an empty cylinder is attached to a pressurized system.
- Move cylinders only with a suitable cart.
- Never tamper with safety devices in valves or cylinders - do not use Teflon tape on regulators.
- Never attempt to lift or move cylinder by holding onto the collar at the top of the cylinder. The collar is not welded onto the cylinder and may dislodge.
- Compressed gas cylinders are potential rockets! Never drop a cylinder and prevent any violent collision with another object.
- The cylinder delivery pressure shall be set to zero before the main cylinder valve is closed.
- When returning empty cylinders close the valve before shipment - leave some positive pressure in the cylinder.
- Replace any valve outlet and protective caps originally shipped with cylinder. Mark "empty" or "M/T" with chalk and store in designated area for return.
- Return cylinders which are of no further use **promptly** to supplier even if only partially used.
- Never use a flame or subject any part of a compressed gas cylinder to high temperatures.
- Bond and ground all cylinders, lines and equipment used with **flammable** compressed gases.
- Use only in well ventilated areas - do not vent through window!
- Toxic, flammable and corrosive gases must be handled in a properly **functioning hood**.
- Purchase smallest quantity necessary in **reusable** cylinders.
- When discharging gas into a liquid, a trap or suitable check valve must be used to prevent liquid from re-entering the cylinder or regulator.
- Never interchange regulators intended to be used for different gases!
- Do not lubricate the high pressure side of an oxygen cylinder or cylinder containing other oxidizing agent.

32.2. CRYOGENS

There are specific hazards associated with Cryogenics (e.g. liquid nitrogen):

- Asphyxiation due to displacement of oxygen (does not apply to liquid air and oxygen).
- Cracking of materials from cold.
- Frost bite.
- Explosion due to pressure build-up (i.e. in a cold tap).
- Condensation of oxygen and fuel (e.g. hydrocarbons) resulting in explosive mixtures.

The following guidelines are recommended when handling Cryogenics:

- Always wear a full face shield, impervious gloves and proper protective clothing.
- Use cryogenics only in approved containers that are capable of with-standing the extreme cold without becoming brittle.
- Use and store in well ventilated areas.
- Properly label cryogenic material.
- Keep reactive cryogenics away from sparks and flames.

33.0 HYDROGEN FLUORIDE

Most fluorides produce hydrogen fluoride (HF) when coming into contact with moisture and produce similar burns and health effects. Both liquid and vapour can cause severe burns which may or may not be immediately painful or visible. HF enters the body through skin and eyes, inhalation and ingestion. HF will penetrate the skin and attack underlying tissues. Systemic toxin that may result in severe hypocalcaemia, hypomagnesaemia, hyperkalemia, metabolic acidosis, cardiac dysrhythmias and death. HF may produce severe ocular and dermal injury as well as acute life threatening systemic toxicity with minimal external tissue damage. All users must attend HF training prior to using HF. Consult **RMM# 309: Appendix 1: HF Emergency Protocol.**

34.0 RADIATION SAFETY

Under the Radiation Protection Regulations of the Canadian Nuclear Safety Commission (CNSC), every licensee is required to implement a Radiation Safety Program that meets specified requirements. At McMaster University, the responsibility for establishing and continually reviewing the radiation safety program is delegated by the Office of the President to the Health Physics Advisory Committee (HPAC). The Health Physics Department is responsible for implementing the radiation safety program on a daily basis.

The radiation safety program for laboratories at McMaster University is described in document RMM # 700-# 702. The Health Physics Manual also contains policies, practices, and relevant safety information.

For more information contact Health Physics at, extension 24226. Also, consult **RMM# 700: Radiation Safety Program for University Laboratories.** See also, **RMM# 701: X-Ray Safety Program;** **RMM# 702: Non Ionizing Radiation Safety Program.**

34.1 RADIOACTIVE MATERIALS

No work with radioactive material may be conducted until the individual has been trained in the safe handling of radioisotopes by Health Physics, and provided operational training by the supervisor. Any work with radioactive materials must be approved by Health Physics before work begins.

Training must be in accordance with the requirements of the Canadian Nuclear Safety Commission (CNSC) and approved by the Senior Health Physicist. Training may be extended to include a follow up in the lab by Health Physics for any radioactive material work that may present significant internal or external radiological risks.

Consult **RMM# 502: Hazardous Waste Management Program: Radioisotope Disposal Procedures**

35.0 X-RAYS - GENERATORS

X-ray machines fall under provincial jurisdiction of either; the Ontario Ministry of Labour for non-medical x-ray machines, or the Ontario Ministry of Health and Long-Term Care for medical x-ray machines. At McMaster University all x-ray sources are controlled by the HPAC. The installation and use of each x-ray machine must be approved by Health Physics and the appropriate provincial ministry before the machine is used. The X-ray Safety Program is described in document RMM 701 and is available from the Health Physics Department.

All users of x-ray machines must be trained in x-ray safety by Health Physics and operational safety by the supervisor before they are authorized to operate x-ray equipment.

Consult **RMM # 701: X-Ray Safety Program**.

36.0 MICROWAVES

- Do not attempt to operate microwave ovens with the door open.
- Do not tamper with or defeat safety interlocks.
- Ensure that seals around door are clean and undamaged.
- Loosen lids on containers to relieve pressure buildup during heating process.
- Do not use metal containers in microwaves.

36.1 MAGNETIC FIELDS

Consult **RMM# 702: Non Ionizing Radiation Safety Program** for specifics.

37.0 LASER SAFETY

To comply with the requirements of ANSI standard Z136.1, users of Class 3B and 4 lasers must attend training available through EOHS. Also, Consult **RMM # 703 Laser Safety Program**.

38.0 PROCEDURES FOR WASTE DISPOSAL

38.1 HAZARDOUS WASTE

Hazardous wastes include but are not limited to the following substances: toxic agents, flammable material, oils, and other petroleum products, corrosive substances, explosives, oxidizers, and organic peroxides, compressed gases, pesticides and herbicides, pyrophoric materials, bio hazardous agents, radioactive materials, contaminated soils and sharps (needles, blades). The Environmental Protection Act Section 6 (1) provides that: No person shall discharge into the natural environment any contaminant, and no person responsible for a source of contaminant shall permit the discharge into the natural environment of any contaminant from the source of contaminant, in any amount, concentration or level in excess of that prescribed by the regulations.

Individuals authorized to use hazardous materials shall follow all procedures for the safe handling, use, storage, separation and disposal of hazardous materials; review the Material Safety Data Sheets (MSDS) for hazardous

materials used in their work environments; use required personal protective equipment (PPE) and clothing when handling hazardous materials; and follow all procedures directed at minimizing the production of hazardous waste. Individuals who handle hazardous waste must attend the WHMIS Core training.

The following **is not** a comprehensive outline of procedure involving the handling of hazardous waste. Consult **RMM# 501: Hazardous Materials Management Systems** including **WHMIS** for details around safe use of, storage and disposal of hazardous materials. See also **RMM # 502: Hazardous Waste Management Program**

38.2 HAZARDOUS WASTE DISPOSAL

All Campus Locations:

- Wear personal protective equipment when handling waste (goggles, lab coat and gloves)
- Choose proper containment to match volume and type of waste with a tightly fitting lid. Do not completely fill any bottle more than 80%
- Do not mix incompatible waste chemicals
- Keep halogenated and non halogenated wastes separate
- Label the waste bottle with the yellow McMaster University waste label prior to putting the waste into the container. Fill out the label completely and assure proper attachment onto the waste container
- Every container must be clearly labeled
- Complete Chemical Waste Disposal Record Form and send it by fax to 905 540-9085 or email to waste@mcmaster.ca

EOHSS shall manage the pick up and removal of all non radioactive hazardous wastes from various locations on campus. Waste is picked up from your location every Tuesday following receipt of the Chemical Waste Disposal Record. Contact ext. 24967 for assistance.

All Faculties of Health Sciences Locations:

- Wear personal protective equipment when handling waste (goggles, lab coat and gloves)
- Choose proper containment to match volume and type of waste. Do not completely fill solvent bottles
- Do not mix incompatible waste chemicals
- Keep halogenated and non halogenated wastes separate
- Every container must be clearly labeled
- Complete chemical Waste Disposal Record form to accompany waste bottles to disposal area
- Transport waste and inventory form using safety carriers or special cart (cart with lip around the sides) and deliver to safety technician during specified times. Waste is not to be left unattended.

Call FHSc Safety Office at ext. 24956 for specific day and time of disposal.

Consult **RMM # 502: Hazardous Waste Management Program** for specific information on Disposal of:

- **Liquid Wastes**
- **Solid Wastes**
- **Special Wastes (e.g. flammable solids, compressed gases...)**
- **Biomedical and Infectious Wastes**
- **Biomedical Waste Disposal Procedures and Pick Up**
- **Radioisotope Disposal Procedures**
- **Contaminated Broken Glassware**
- **Disposal Legends**
- **Template for Hazardous Waste Disposal Record**

39.0 Contaminated Broken Glassware (Chemical Only)

Broken glass containing residue but not enough of a substance either solid or liquid where it will come off or flow out /off of the broken glass:

- pack broken glassware in box lined with plastic bag
- close bag and tape box with packing tape
- fill in appropriate paper work and label box appropriately for chemical waste

Radioactive Broken Glassware: Call Health Physics at ext. 24226

Biological Broken Glassware: Call Bio Safety Office at ext. 23453

Consult **RMM # 502: Hazardous Waste Management Program** for specific information.

40.0 EQUIPMENT DISPOSAL

Hazardous chemicals must be removed from equipment before the disposal of the equipment. Some examples of hazardous materials within equipment are heavy metal particulates, polychlorinated biphenyls (PCB's), mercury, oils, chlorofluorocarbons, compressed gas (es), or pressurized containers. Some test equipment have internal standards such as radioisotope reference standards, that must be removed before disposal.

Equipment cavities, sufficiently large to entrap children, must be left open by complete removal of hinged or fastened doors or coverings.

All equipment which was in contact with BSL 2 agents must be decontaminated and the process recorded in writing. Contact Biosafety Office at ext. 24956 for assistance.

41.0 BIOMEDICAL WASTE

Biomedical waste, as defined by the Ministry of Environment, is limited to human anatomical waste, consisting of tissues, organs and body parts, not including teeth, hair and nails; animal waste; and non animal waste including sharps including needles, needles attached to syringes and blades; or broken glass or other materials which are capable of causing punctures or cuts and which have come into contact with human blood or body fluids, contact with animal blood or animal fluids and other waste contaminated with biological material i.e. dressings, swabs, plastic ware. Consult 425 e Guideline C-4: The Management of Biomedical Waste in Ontario, Ministry of Environment also available at <http://www.ene.gov.on.ca/envision/gp/425e.htm>

Consult RMM # 502: Hazardous Waste Management Program for specific information.

41.2 BIOMEDICAL WASTE DISPOSAL

Any research or work involving biomedical material must be approved by FHSc Safety Office for BioSafety

All Campus Locations:

Call EOHSS at ext. 24967 for assistance and information on pick up times. Consult **RMM# 502: Hazardous Waste Management Program** for specific details including how to prepare biomedical waste boxes

- Biomedical waste cannot be stored longer than four days

- Disposal of biomedical waste will be in yellow or red bags, a biomedical waste box or appropriate sharps container. Double bag to minimize spillage during transport
- Biomedical waste boxes are provided in two sizes. Place the double bagged waste into the appropriate size box.
- Label the box with: Generator's Name, Building, Room Number and Date. (Life Science Building (LSB) residents must log waste entry into register located in B110)
- All animals, such as mice, must be disposed of using the Animal Utilization Protocol of the Animal Review Ethics Board, and must be returned to the Central Animal Facility (CAF). All insects must be euthanized before disposal. Animals must be segregated from other biomedical waste; bag separately.
- Individuals are responsible for cleaning up spills/leaks from their biomedical waste containers

FHSc Locations:

- Dispose biomedical waste into red bags or appropriate sharp containers
- Double bag biomedical waste before placing into biomedical waste box
- Biomedical waste must be moved to central waste station
- Biomedical waste boxes must be closed and labeled according to posted directions
- All animals must be disposed of as per the instructions of the Animal Review Ethics Board A system for monitoring radioactivity in animals is in place under the Radiation Program Protocols
- Individuals are responsible for cleaning up spills/leaks from their biomedical waste containers

Any waste generated under the Public Health Agency of Canada Laboratory Biosafety Guidelines needs to be disposed of as directed by the McMaster University Biosafety Committee on a building by building basis. Contact ext. 24956 for assistance. Consult **RMM # 600: Biosafety Program and Appendix 3: Request for Biohazard Approval.**

42.0 PROCEDURE FOR MODIFYING LAB EQUIPMENT AND/OR PERMANENTLY VACATING LABORATORIES

Objective: The laboratory space, when vacated, must be left in a safe and tidy condition.

Responsibilities: It is the responsibility of the laboratory supervisor or designates to ensure that the objective is met. The Departmental Chair or designate will ensure that the objective has been completed.

The Dean of the faculty reserves the right to withhold the allocation of the space until the space has been left in a safe and tidy condition.

Scope: All faculty members, graduate students, visiting scholars, technicians, employees, visitors and any other persons who use laboratory spaces are included within this procedure. Each Faculty has a Vacating Laboratory Procedure Form that must be completed and signed before leaving the University.

Lab Equipment Modifications: Equipment modifications may require pre status and CSA/ESA Approval. Consult **RMM # 325: Process and Equipment Purchases and/or Modifications.**

43.0 SPECIFIC EMERGENCY PROCEDURES

43.1 MEDICAL EMERGENCY

On McMaster University campus, call Security at 88 for assistance or if medical aid is required. Report all incidents to your supervisor and to Human Resources (EOHSS) as quickly as possible. Completed Injury/Incident Reports must be submitted to EOHSS and where applicable to FHSc. Safety Office within 24 hours of its occurrence.

McMaster staff in hospital hosted buildings is to follow the emergency protocols of their host buildings. In general, this refers to the colour code system of identifying emergency situations. Emergency numbers of Hamilton Health Sciences buildings (5555), St Joseph's Hospital (7777) and 911 for all rented locations. Emergency Numbers are located in Section 49, page 30 (last page of this manual).

43.2 IN CASE OF A FIRE

The **RMM# 1201: Fire Safety Plan** provides instruction and direction during a fire emergency for all persons working, studying, or visiting campus buildings.

In Case of a Fire:

- Immediately vacate the building VIA the nearest Exit Route. **DO NOT USE ELEVATORS!**
- Everyone is responsible for knowing the location of the nearest fire extinguisher, the fire alarm, and the nearest fire escape.
- The safety of all people in the vicinity of a fire is of foremost importance. **But do not endanger yourself!**
- In the event of a fire in your work area shout "FIRE" and pull the nearest fire alarm.
- Do not attempt to extinguish a fire unless you are confident it can be done in a prompt and safe manner, utilizing a hand held fire extinguisher. Use the appropriate fire extinguisher for the specific type of fire. Most labs are equipped with Class A, B and C extinguishers. Do not attempt to extinguish Class D fires which involve combustible metals such as magnesium, titanium, sodium, potassium, zirconium, lithium, and any other finely divided metals which are oxidizable. Use a fire sand bucket for Class D fires.
- Do not attempt to fight a major fire on your own.
- **If possible, leave fume hoods on, close fume hood sashes, make sure the room is evacuated, close but do not lock the door and exit the building using the stairs.**

FOR MCMASTER CAMPUS, PHONE 88, GIVE LOCATION AND DETAILS. FOR HEALTH SCIENCE CENTRE, PHONE 5555. WHEN CALLING, REPORT A FIRE, GIVE NAME, EXACT LOCATION AND BUILDING. FOR ALL OTHER SITES, FOLLOW EMERGENCY PROTOCOL OF THE BUILDING.

- Report all incidents to your supervisor. **Completed Injury/Incident Reports must be submitted to EOHSS and where applicable to FHSc Safety Office within 24 hours of its occurrence.**

43.3 CLOTHING ON FIRE

Douse with water from safety shower immediately **OR** Roll on floor and scream for help **OR**

Wrap with fire blanket to smother flame (a coat or other non-flammable fiber may be used if blanket is unavailable). Do not wrap a standing person, rather, lay the victim down to extinguish the fire. The blanket should be removed once the fire is out to disperse the heat. **DO NOT USE A FIRE EXTINGUISHER ON PEOPLE**

44.0 CHEMICAL SPILLS

Use of proper personal protective equipment (PPE) and following the procedures outlined in Material Safety Data Sheets (MSDS) will help to prevent injury. Every lab should have a spill kit to handle spills along with written spill procedures which have been trained to lab users. Know the emergency and medical procedures outlined in the MSDS and follow the area specific spills procedure *before* working with chemicals.

In all cases of chemical spills, notify your supervisor, and complete a McMaster Injury/Incident Form and send to EOHSS and where applicable to FHSc. Safety Office within 24 hours of its occurrence.

Consult **RMM# 1202: Spills to the Environment-Emergency Response and Reporting Program**

44.1 ON BODY

- Wash thoroughly with water or use emergency shower immediately for 15 minutes, remove contaminated clothing.
- (Avoid modesty). Prevent further contamination of other body parts, especially face and eyes.
- On Campus, call 88 if medical aid required. Provide Material Safety Data Sheet to attending physician.
- There are specific procedures with Hydrogen Fluoride (HF). Contact security (on campus-#88; MUMC-#5555, DTC-# 911, etc) and follow HF Protocols as per McMaster University's **RMM # 309: Appendix 1: HF Emergency Protocol.**

44.2 IN EYE

- Best practices recommend contact lenses not to be worn in the lab. If chemical is splashed in eyes, remove contact lenses immediately
- Flush eyes with water for at least 20 minutes. Hold eye open during flushing - ask for assistance.
- Approved self-contained eye wash stations must meet requirements for 15 minutes flushing capacity and have water source changes as recommended by the manufacturer.
- There are specific procedures with Hydrogen Fluoride (HF). Contact security (on campus-#88; MUMC-#5555, DTC-# 911, etc) and follow HF Protocols as per McMaster University's **RMM # 309: Appendix 1: HF Emergency Protocol.**

45.0 CHEMICAL SPILLS, INDOORS

STOP, THINK! Carefully plan cleanup steps ---> get assistance to check your plan. If safe to do:

1. Eliminate all ignition sources if flammable material is involved.
2. Dike, block or contain size or spread of spill by using appropriate absorbing material (sand, vermiculite, commercial absorbent, spill pillows, etc.)
3. Carefully remove other materials, containers, equipment from path of liquid/solid spills.
4. Turn on fume hoods to capture or direct flow of gases/vapours.
5. Carry out cleanup. Dispose of cleanup material as hazardous waste.

45.1 IF UNSAFE OR UNABLE TO CLEAN UP SPILL

1. On campus, call Security at 88 for assistance or push the panic alarm where available. Fire alarm should only be pulled if situation is out of control.
2. Evacuate to safe location and prevent others from entry by posting warning signs.
3. Follow instructions of security officers until security defers the matter to University Officials.

For FHSc and off site spills, follow the procedure as outlined for those areas. For Hamilton Health Sciences locations, contact 5555. For St. Joseph Hospital, contact 7777.

46.0 CHEMICAL SPILLS, OUTDOORS

Contain spill rapidly by diking with suitable material (spill stockings, sand, vermiculite, etc.). Prevent chemical from contaminating ground water and sewer system. Immediately contact Security (88) and EOHSS at ext. 24352 for assistance. Assure that spill site is not left unattended.

47.0 MERCURY SPILL

Mercury vapours are highly toxic. Clean up immediately.

- Small amounts may be picked up with an aspirator bulb, medicine dropper or a mercury sponge.
- Place in container, cover with water and seal it.
- Mercury Spill Kits may be used where available. Mercury Spill Kits can be purchased from various safety and chemical suppliers. A Mercury Vacuum is available in ABB 107. Retrieve the key from Secretary in ABB 156 or through Security at 88
- Once larger droplets are removed wash surface with mercury neutralizing solution such as 20% calcium sulphide or saturated sodium thiosulphate.
- If mercury has broken up into many globules, sprinkle sulphur powder, or commercial product over the area, leave for several hours before clean-up.
- Waste must be properly sealed and labeled with hazardous waste label.

N.B. If a larger spill of mercury (i.e. a broken manometer) is involved area must be evacuated, closed off and warning signs posted.

48.0 RADIOACTIVE SPILL

MAJOR RADIOACTIVE SPILL and **MINOR RADIOACTIVE SPILL** procedures are posted in each radioisotope laboratory. Radioisotope users are required to read and understand the written procedures. If clarification is required or if the posted procedures do not appear to be suitable for a particular radiation situation please consult with Health Physics at EXTENSION 24226.

49.0 TELEPHONE NUMBERS

On Campus Security/Emergencies, dial ext. 88. Report all hazards, incidents and injuries to your supervisor and to Environmental and Occupational Health Support Services (EOHSS) and, where applicable, Faculty of Health Science Safety Office (FHSc) as soon as possible using the McMaster University's Injury/Incident Form. Remember to dial 9 before the extension number listed below.

McMaster University Emergency/Security (see below for FHSC Locations)	88
McMaster University Security: (Inquiries/Non Emergency)	24281
McMaster University: Facility Services (Physical Plant) for <ul style="list-style-type: none"> • Heat; ventilation concerns • Fire Extinguisher and Replacement • Work orders for immediate repairs 	24740
Environmental & Occupational Health Support Services (EOHSS): Health & Safety, Main Campus	24352
Faculty of Health Science, Health & Safety Office	24956
Bio Safety Office	24956
Health Physics	24226 or 23365 or 24099
Hazardous Waste Pick Up: McMaster University	24352
Hazardous Waste Pick Up: Faculty of Health Sciences	24956
Biomedical Waste Pick Up: McMaster University	24352
Biomedical Waste Pick Up: Faculty of Health Sciences	24956
Broken Glassware: Contaminated Radioactive (Health Physics)	24226
Biomedical (FHSc Safety Office)	24956
McMaster University Student Health Services , MUSC B101	27700
Poison Control Centre	1 800 268-9017
Ministry Of Environment	1 800 268-6060
Emergency	911

On McMaster University campus, call Security at 88 for assistance or if medical aid is required. Report all incidents to your supervisor and to Human Resources (EOHSS) as quickly as possible. Completed Injury/Incident Reports must be submitted to EOHSS and where applicable to FHSc Safety Office within 24 hours of its occurrence.

McMaster staff in hospital hosted buildings is to follow the emergency protocols of their host buildings. In general, this refers to the colour code system of identifying emergency situations.

Emergency contacts are as follows:

McMaster University Medical Centre	ext. 5555
Henderson Hospital and Juravinski Cancer Centre	ext. 5555
Chedoke Hospital	ext. 5555
Hamilton General Hospital	ext. 5555
St. Joseph Hospital and its affiliates, including St. Peters	ext. 7777
All other offsite locations	dial 911

