



IMS Safety Manual

**Institute of Materials Science
University of Connecticut**

Prepared by the
IMS Safety Committee
January 1991
Revisions:
01/2009
07/2015
02/2019
10/2021

TABLE OF CONTENTS

Table of Contents	1
Emergency Information	2
Introduction	3
IMS Safety Committee	4
IMS Laboratory Safety Reporting Policy	5
IMS Laboratory Access	6
<i>Required Safety Exams</i>	
<i>Access Request Form</i>	
<i>Special Access IMS Laboratories</i>	
Fire Safety and Emergency Procedures	7
<i>To Report a Fire</i>	
<i>Fire Alarm Instructions</i>	
<i>Fire Extinguishers</i>	
First Aid and Emergency Response	9
<i>Basic Instructions</i>	
<i>Thermal Burns</i>	
<i>Chemical Burns</i>	
<i>Chemical Eye Injury</i>	
General Laboratory Safety	10
<i>OSHA Laboratory Standards</i>	
<i>Chemical Labeling</i>	
<i>Chemical Safety Practices</i>	
<i>Safety Data Sheets (SDS)</i>	
<i>Laboratory Equipment</i>	
<i>Remember to Consult with your Advisor</i>	
Chemical Spills and Storage	17
<i>Major Spills</i>	
<i>Incidental Releases</i>	
<i>Chemical Storage</i>	
Hazardous Waste	20
<i>Waste Container Management</i>	
<i>Chemical Waste Disposal</i>	
<i>Biological Waste Disposal</i>	
<i>Radioactive Waste Disposal</i>	
Radiation Safety	22
<i>Radiation Safety Office Requirements</i>	
<i>Individual User Responsibility</i>	
Laser Safety	23
<i>Key Points to Laser Safety</i>	
<i>Laser Safety Program</i>	
<i>Laser Classifications</i>	
<i>Laser Safety Protection Measures</i>	
Compressed Gas & Cryogenic Safety	25
<i>Compressed Gas Cylinders</i>	
<i>Cryogenic Safety</i>	
Electrical Safety	27
Charter of the IMS Safety Committee	29

EMERGENCY INFORMATION

For a true emergency:

DIAL 911 To report a fire, injury, or suspicious people in your area. You will be connected to a Public Safety Dispatcher. Be prepared to provide the type of emergency, the location of the emergency, and any other information that will assist the emergency personnel. Wait and meet the emergency team at the front door.

Red Pull Station Pulling down the handle on a Red Pull Station will send a fire alarm to the Fire Department Dispatch center and vacates the building. Meet the Firemen at the front door to tell them the location of your emergency.

For a maintenance emergency:

DIAL 6-3113 (860-486-3113) Emergency maintenance to report a water leak, electrical outage, non-working fume hood, etc. after normal working hours. During working hours see Josh Strecker in room IMS-121 (860-486-2496; joshua.strecker@uconn.edu)

Environmental Health and Safety Office (EH&S):

DIAL 6-3613 (860-486-3613) Environmental Health & Safety Office (EH&S) for information on how to handle and/or dispose of chemical, biological, or radioactive materials. The University's Chemical Safety Manager is Brent Lewchik. For up to date information visit the EH&S website at: www.ehs.uconn.edu (*please bookmark this website on your computer for future reference*)

IMS building safety contact:

DIAL 6-2496 (860-486-2496) Joshua Strecker
IMS Building Manager
Email: joshua.strecker@uconn.edu
Cell: 860-622-1296

INTRODUCTION

Safety is the first issue that you should consider when entering any laboratory. Safety training with the University Environmental Health and Safety Office for use of chemicals and equipment, safe procedures, proper waste disposal methods, using radiation sources of all types, and use of biological materials is mandatory. When you join a research group you should familiarize yourself with the safety aspects of the lab, the locations of all safety equipment, and think about safe procedures. You are responsible for learning safe procedures for doing experiments. Your faculty advisor and fellow graduate students will help train you in carrying out experiments and in special safety concerns of the types of research being done in your labs.

Safety is a key concern of all Faculty Members, Staff Members and Students in the Institute of Materials Science (IMS). You should fully understand your responsibilities as regards safety in labs. When in doubt about a procedure or specific experiments it is your responsibility to ask questions to get answers to these questions. You should not work alone in a laboratory. You should not use equipment for which you have not been trained.

This Safety Manual was developed for you and every other researcher in IMS. You should read and study this manual and keep it in a place where you can constantly refer to this information. We want you to enjoy your research efforts in a safe environment with safe procedures that will protect you and all members of the Institute of Materials Science.

After you study this Manual, you will need to pass a short quiz based on this material. After passing you will be given an access card to the building and to your laboratories. You must follow all safety rules and practices of IMS and the labs in which you work. Failure to follow safe procedures and rules of the University of Connecticut and IMS will lead to your removal from your lab and the building.

We hope you enjoy your stay at UCONN and at IMS. Please help in making IMS a model environment for safe laboratory practices. Your suggestions about safety and other aspects of labs at IMS are welcome at any time.

A handwritten signature in blue ink that reads "Steven L. Suib". The signature is written in a cursive style and is positioned above a horizontal line.

Steven L. Suib, Director

IMS SAFETY COMMITTEE

<u>Contact Name:</u>	<u>Room Number:</u>	<u>Phone Extension:</u>
Joshua Strecker (<i>Chair</i>)	IMS-121	6-2496
Nicholas Eddy	IMS-011	6-6394
Daniela Morales Acosta	IMS-018A	6-1824
Dennis Ndaya	IMS-217	6-4075
Capri Price	IMS-314	6-5158
JoAnne Ronzello	IMS-319	6-5594

IMS LABORATORY SAFETY REPORTING POLICY

The IMS Safety Committee, in concert with the Director of IMS, established the following IMS policy with regard to the proper reporting procedures for safety violations and safety hazards. Any unsafe practices or problems should be reported immediately – if it is an individual engaging in an unsafe procedure, point out the problem to that individual. If the individual persists in the unsafe practice, bring the problem to the individual's faculty advisor's attention. If there is still no resolution of the problem, please contact any member of the IMS Safety Committee (see list in this manual or posted on the Safety Bulletin Board outside room IMS-121 and posted on each floor) or the Chairman of the IMS Safety Committee (Josh Strecker, room IMS-121).

If you are uncomfortable with reporting to their faculty advisor a continued violation of safety procedures by a colleague, please feel free to report directly to the Chairman of the IMS Safety Committee.

The chain of responsibility for laboratory safety in IMS begins with the individual experimenter (graduate student, post-doc, etc.), then the faculty advisor or facility supervisor and ends ultimately with the Director of IMS.

Remember: safety is everyone's concern.

IMS LABORATORY ACCESS

REQUIRED SAFETY EXAMS:

IMS Safety Exam:

Contact Josh Strecker (Joshua.strecker@uconn.edu), IMS Building Manager to schedule the IMS safety exam.

Laboratory Safety and Chemical Waste Management:

- This training is provided through EH&S. You can register for the exam here: <https://ehs.uconn.edu/training/> by clicking on “Launch HuskySMS” and selecting the appropriate training.
- There is an initial training for those new to laboratory work at the university. There is then a refresher course annually.

ACCESS REQUEST FORM:

A signed IMS Building Access Request form is needed to gain entry into any IMS laboratories. The form can be downloaded from the IMS website here <https://www.ims.uconn.edu/wp-content/uploads/sites/190/2018/12/IMS-Building-Access-Form-1.pdf>. Hard copies of the form are also available in front of IMS-121. Completed forms should be submitted to Josh Strecker in room IMS-121.

SPECIAL ACCESS IMS LABORATORIES:

Foundry:

The IMS Casting Facility, room IMS-015, exists for the fabrication of alloys (arc melting, vacuum induction melting, and casting), welding and heat treatment. Certain precautions are necessary when making use of the above facilities and access is gained via the facility supervisor, Dr. Hal Brody (Harold.brody@uconn.edu).

X-Ray Laboratories:

IMS has a state-of-the-art X-Ray facility used mainly for X-Ray diffraction research. Because of the potential radiation hazard from the primary beam, X-Ray scattering, or leakage, access to these laboratories are permitted only after discussion and testing with the facility supervisor, Dr. Daniela Morales Acosta (Daniela.morales@uconn.edu) and completion of the EH&S online training found here <https://ehs.uconn.edu/training/> by clicking on “Launch HuskySMS” and selecting the appropriate training.

FIRE SAFETY AND EMERGENCY PROCEDURES

If you are faced with a fire emergency, the “pre-planning” you do now will prepare you to cope with it successfully. IN CASE OF FIRE, REMEMBER, TIME IS PRECIOUS. DO NOT PANIC. Immediate action is necessary to avoid being trapped by gases, smoke, or heat.

TO REPORT A FIRE:

1. DIAL 911 or pull the handle on a RED PULL STATION
(Familiarize yourself with the locations of the nearest RED PULL STATION in the hallways).
2. Using the phone say, “I want to report a fire.”
3. Give your name and the location of the fire (Institute of Materials Science). Speak slowly and distinctly.
4. Wait to answer any questions. Don’t hang up until you are sure you have been understood.
5. Meet the Fire Department outside and report to the Fire Officer-in-Charge and provide the following information:
 - a. Location of the incident (Floor number, Room number).
 - b. If anyone is trapped or injured.
 - c. What happened.
 - d. Chemicals involved, if known.
 - e. Type of hazard: flammability, reactivity, toxicity, biological, radiological.
 - f. Your recommendation on how the situation can be stabilized.

FIRE ALARM INSTRUCTIONS:

When a FIRE ALARM sounds, a FIRE ALERT situation exists. This means a smoke/heat sensor or pull station has triggered an alarm.

- All personnel must evacuate the building until such time as an all clear is given by the Fire Department.
- DO NOT USE ELEVATORS.
- The IMS meeting place is the grassy area next to the Parking Garage, not in front of the building.
- If you are conducting an experiment when an emergency evacuation occurs:
 - o Shut down or stabilize the experiment in a safe manner.
 - o Evacuate the building.
- If the experiment cannot be shut down without creating a hazard, follow this procedure:
 - o Report to the Fire Officer-in-Charge.
 - o Describe the experiment, the location, relative hazard, and estimate the time factor before the situation becomes dangerous.
 - o If possible, you will be permitted to return to the experiment by the Fire Department.

FIRE EXTINGUISHERS:

There are several fire extinguishers of type A, B, C, D appropriate for the work carried on in the IMS. If you feel a different class of extinguisher should be available for a particular reaction you are doing, call the Fire Department on their routine call number 486-4925.

Various types of Fire Extinguishers available:

- “A” – Ordinary Combustibles. Fire in paper, wood, drapes, and upholstery require an extinguisher labeled “A”.
- “B” – Flammable Liquids. Fires in fuel oil, gasoline, paint, grease in a frying pan, solvents, and other flammable liquids require an extinguisher labeled “B”.
- “C” – Electrical equipment. Fires started in wiring, overheated fuse boxes, conductors, and other electrical sources require an extinguishers labeled “C”.
- “D” – Metals. Certain metals such as magnesium and sodium require special dry powder extinguisher labeled “D”.

****Combination A, B, C Fire Extinguishers are available in the IMS Hallways ****

How to use a Fire Extinguisher:

Extinguishers come in dry chemical, foam, carbon dioxide, water, or halon types.

1. Pull the pin.
2. Aim the extinguisher nozzle (horn or hose) at the base of the fire.
3. Squeeze or press the handle.
4. Sweep from side to side at the base of the fire. Watch for re-flash. Discharge the contents of the extinguisher. Foam and water extinguishers require slightly different action. Read the instructions.

Ultimately it is not your responsibility to fight a fire. Leave that up to the professionals.

FIRST AID AND EMERGENCY RESPONSE

DIAL 911 – For any medical emergency. In the event of an injury, it is most important to summon professional assistance immediately.

The following instructions are intended only as guidelines for untrained people in providing assistance to the victim during the first few minutes, until professional help arrives.

BASIC INSTRUCTIONS:

1. Effect rescue only if absolutely necessary to prevent the victim from further injury. Otherwise, do not move the victim or allow him/her to move until the injuries have been assessed by the Fire Department.
2. Ensure adequate breathing (give mouth-to-mouth or mouth-to-nose resuscitation if necessary – only if you are trained).
3. Check for circulation; if absent begin Cardio-Pulmonary Resuscitation (CPR) if you are trained to do so.
4. Control severe bleeding by use of direct pressure.

THERMAL BURNS:

1. Submerge the burned area in cold water (except for third-degree burns). This will significantly reduce both swelling and pain. A third-degree burn is one in which tissue damage has occurred.
2. Apply a dry sterile dressing.
3. Do not break any blisters.
4. Do not use any commercial sprays or ointments.
5. Seek medical attention.

CHEMICAL BURNS:

Do not handle dry ice with bare hands. Use insulated gloves.

Rapidly escaping gas from gas cylinders may produce rapid cooling.

Spilled liquid nitrogen can produce the equivalent of a third degree burn.

1. Flush the affected area with copious amounts of water for 5 to 15 minutes.
2. If you and/or your clothing have been splashed with corrosive or toxic chemicals, use a safety shower immediately. Quickly remove all contaminated clothing. Don't be a victim of false modesty and risk severe injury.
3. Seek medical attention.

CHEMICAL EYE INJURY:

1. Use the closest eye wash station and flush the eye with copious amounts of water for at least 15 minutes.
2. There is an eye wash station in the middle of the hall on every floor (e.g. outside rooms 9, 126, 216, and 316) in IMS as well as in most labs at the sink.
3. Seek prompt medical attention.

GENERAL LABORATORY SAFETY

OSHA LABORATORY STANDARDS:

The Occupational Exposure to Hazardous Chemicals in Laboratories standard (29 CFR 1910.1450), more commonly referred to as the OSHA Laboratory Standard, applies to employees working in laboratories where containers used for reactions, transfers, and other handling of substances are designed to be easily and safely manipulated by one person. It does not apply to laboratories whose purpose is to conduct or simulate procedures used as part of a production process.

The OSHA Laboratory Standard requires that the University of Connecticut develop a Chemical Hygiene Plan to protect workers from the diverse hazards encountered in laboratories. The Chemical Hygiene Plan addresses standard operating procedures, hazard control measures, information and training, chemical labeling and storage practices, hazardous waste management, emergency procedures and first aid. It also describes the roles and responsibilities of employees working in labs with hazardous chemicals. A copy of the Chemical Hygiene Plan (CHP) is available at <http://www.ehs.uconn.edu/Chemical/chemplan.pdf>. Employees and students working in IMS laboratories must read the Chemical Hygiene Plan to become familiarized with University expectations.

CHEMICAL LABELING:

All chemicals used in laboratories must be properly labeled. Chemicals in their original containers must be labeled with, at a minimum, the chemical name and appropriate hazard warnings. Additional information including product identifier, signal word, hazard statement(s), pictogram(s), precautionary statement(s), and the name, address, and telephone number of the chemical manufacturer, importer, or other responsible party may also be displayed.

Original containers:

New chemicals must have labels that are written in English (other languages may also be included if necessary), legible and prominently displayed on the container. Lab personnel are responsible for ensuring that labels on incoming containers of hazardous chemicals are not removed or defaced. Original labels on older bottles that have faded or been removed must be replaced.

Secondary containers:

Secondary containers (e.g. beakers, flasks, jars, spray bottles, etc.) must be properly labeled with the chemical name(s) and hazard class(s). The full name(s) of the hazard class(s) (e.g. Flammable, Corrosive, Reproductive toxin, etc.) can be written out on the secondary container or the corresponding OSHA GHS pictogram can be affixed to the container. A list of approved OSHA GHS pictograms for both health and physical hazards is listed below:

Hazard Symbol	Pictogram	Examples
Exclamation Mark		<ul style="list-style-type: none"> ▪ Irritant ▪ Skin Sensitizer ▪ Acute Toxicity (Harmful) ▪ Narcotic Effects ▪ Respiratory tract irritant ▪ Hazardous to ozone layer (Non-Mandatory)
Corrosion		<ul style="list-style-type: none"> ▪ Skin corrosion/burns ▪ Eye damage ▪ Corrosive to metals
Skull and Crossbones		<ul style="list-style-type: none"> ▪ Acute toxicity (fatal or toxic)
Health Hazard		<ul style="list-style-type: none"> ▪ Carcinogen ▪ Mutagenicity ▪ Reproductive toxicity ▪ Respiratory sensitizer ▪ Target organ toxicity ▪ Aspiration toxicity
Exploding Bomb		<ul style="list-style-type: none"> ▪ Explosive ▪ Self-reactive ▪ Organic peroxide
Flame		<ul style="list-style-type: none"> ▪ Flammable ▪ Pyrophoric ▪ Self-heating ▪ Emits flammable gas ▪ Self-reactive ▪ Organic peroxide
Flame Over Circle		<ul style="list-style-type: none"> ▪ Oxidizers
Gas Cylinder		<ul style="list-style-type: none"> ▪ Gases under pressure

CHEMICAL SAFETY PRACTICES:

Safe work practices must be followed in IMS laboratories to protect researcher health and safety. The following lab practices must be followed by all employees and students working in IMS laboratories.

General Requirements:

- Unauthorized individuals are not allowed in laboratories. Access is limited to authorized University faculty, staff, students and visitors with legitimate reasons for being in such a laboratory. Authorized individuals must be properly trained, made aware of the hazards present in the lab, and be provided appropriate personal protective equipment.
- Individuals under 18 years old are not allowed in laboratories that contain hazards unless they are University of Connecticut students or registered participants in a University-sanctioned project or program. Authorized individuals under 18 years old must be supervised at all times while working in laboratories.
- Pets are not allowed in laboratories, with some exceptions for police dogs and service animals (e.g. guide dogs). The only live vertebrate animals allowed in laboratories are those to be used in teaching and research and must be approved prior to entry by the Institutional Animal Care and Use Committee (IACUC).
- Review the safety data sheet(s) for all chemicals necessary prior to use
- Substitute or reduce the quantities of hazardous chemicals being used if possible
- Review the CHP and laboratory-specific standard operating procedures and work practices
- Identify and understand how to properly use emergency equipment
- Know procedures for emergencies, including evacuation routes, spill clean-up procedures, etc.
- Wear appropriate personal protective equipment (PPE) as specified in the Workplace Hazard Assessment Form, safety data sheets, or equipment specifications
- Inspect equipment and PPE for damage prior to use. Replace or repair damaged equipment or personal protective equipment.
- Use fume hoods when working with hazardous chemicals
- Label all hazardous chemicals in secondary containers (e.g. a beaker, flask, vial, jar, etc.) with the chemical name and hazard class
- Use all chemicals and equipment for their intended purpose
- Report accidents, spills or other emergencies to the PI/Laboratory Supervisor as soon as possible

Personal Hygiene:

- Do not drink, eat, smoke, or apply cosmetics in active lab areas.
- Do not store food, beverages, tobacco, or cosmetic products in active lab areas.
- Never touch, smell, inhale or taste a hazardous chemical.
- Do not reuse disposable gloves.
- Do not use mouth suction to pipet. Use a pipet bulb or similar device.
- Secure loose-fitting jewelry.
- Tie back long hair.
- Wash hands thoroughly with soap and water after handling chemicals and prior to exiting the lab.

- Wash affected areas promptly whenever a chemical has come in contact with the skin.
- Remove contaminated clothing and gloves before leaving laboratory.
- Contaminated clothing and other reusable personal protective equipment must be laundered by an approved vendor.

Housekeeping:

- Access to emergency equipment, showers, eyewashes, and exits must remain unobstructed
- Aisles, hallways, and stairs must be kept clear of all chemicals and equipment
- Lab benches, shelving, and equipment must be kept clean and orderly and in a sanitary condition
- Lab equipment must be inspected, maintained and repaired (if necessary)
- Floors must remain clean and dry
- All chemicals must be placed in assigned storage areas at the end of each day
- Spills must be cleaned up immediately
- Hazardous waste must be labeled and managed properly
- Electrical cords must not have damaged insulation, exposed wires or missing ground pins
- Electrical cords must not run through doors, walls or partitions, under rugs, or above drop ceilings; they are not tied in knots, draped overhead, or attached to building structures.

SAFETY DATA SHEETS (SDS):

Lab personnel are responsible for reading safety data sheets to ensure proper handling, storage and disposal. Safety data sheets can be obtained through the website located on the UConn Laboratory Safety Information Card, the EHS website, manufacturer's websites or other reliable sources. In addition, IMS maintains a "Chemical Properties Reference Library" in the IMS Reading Room. There is also a SDS reference file maintained in the black binders in the IMS Reading Room.

Safety data sheets (SDS) are printed or electronic documents that provide health and safety-related information on chemicals. Manufacturers or importers of chemicals are required to obtain or develop a SDS for each hazardous chemical they produce or import. Principal Investigators/Lab Supervisors are responsible for ensuring that SDSs are available for every chemical in the laboratory and readily accessible to employees. Printed or electronic copies of safety data sheets are acceptable. If safety data sheets will be stored on a computer, they must be on a computer that is accessible to everyone in the lab. The format of SDSs, including section numbers, headings and descriptions, are located in the table below:

Section	Section Heading	Description
1	Identification	Product identifier; manufacturer or distributor name, address, phone number; emergency phone number; recommended use; restrictions on use.
2	Hazard(s) identification	All hazards regarding the chemical; required label elements
3	Composition/ information on ingredients	Information on chemical ingredients; trade secret claims
4	First-aid measures	Important symptoms/ effects, acute, delayed; required treatment
5	Fire-fighting measures	Suitable extinguishing techniques, equipment; chemical hazards from fire
6	Accidental release measures	Emergency procedures; protective equipment; proper methods of containment and cleanup
7	Handling and storage	Lists precautions for safe handling and storage, including incompatibilities
8	Exposure controls/personal protection	Includes OSHA's Permissible Exposure Limits (PELs); Threshold Limit Values (TLVs); appropriate engineering controls; personal protective equipment (PPE)
9	Physical and chemical properties	Lists the chemical's characteristics
10	Stability and reactivity	Chemical stability and possibility of hazardous reactions
11	Toxicological information	Routes of exposure; related symptoms, acute and chronic effects; numerical measures of toxicity
12	Ecological information	Since other Agencies regulate this information, OSHA will not be enforcing Sections 12.
13	Disposal considerations	Since other Agencies regulate this information, OSHA will not be enforcing Sections 13.
14	Transport information	Since other Agencies regulate this information, OSHA will not be enforcing Sections 14.
15	Regulatory information	Since other Agencies regulate this information, OSHA will not be enforcing Sections 15.
16	Other information	Includes the date of preparation or last revision

LABORATORY EQUIPMENT:

Eye Protection:

Safety glasses should be worn at all times in active lab areas. Face shields or approved standing shields should be used for any operation having the potential for explosion. Know where your nearest eyewash station is located. Most labs have eyewashes at the sink. You should run water through them weekly to ensure they are clean and ready in the case of an emergency.

Safety Showers/Eyewash/First Aid Kits:

The safety showers/eyewash stations in IMS, located on the center of each floor, are tested three times a year to insure they will work properly when needed. First aid kits are located near the center building pillar and maintained by Josh Strecker.

Refrigerators:

Food or drink should not be stored in any refrigerator within an active lab area. Domestic (household-type) refrigerators should never be used for the storage of volatile or unstable chemicals. Special explosion-proof refrigerators, where all internal electrical contacts have been eliminated, are the appropriate vehicle for chemical storage. Stored materials should be reviewed periodically, and old chemicals discarded.

Guards:

All mechanical equipment should be adequately furnished with guards that prevent access to electrical connections or moving parts (such as the belts and pulleys of a vacuum pump).

Chemical Handling Equipment:

Use gas cylinder carts whenever transporting gas cylinders from the loading dock to your lab or from lab to lab. Clamp securely any and all cylinders in the lab (see section on Compressed Gas & Cryogenic Safety). Use safety bottle carriers whenever carrying reagent chemicals from one laboratory to another.

Fume Hoods:

Fume hoods are the most important engineering control used to protect employees from exposure to hazardous chemicals. All procedures or operations that may generate irritating and/or hazardous air contaminants should be conducted inside a fume hood. Environmental Health & Safety (EHS) inspects all constant velocity and variable air volume fume hoods annually to ensure proper flow rates. The parameters used to assess proper flow rates are listed in the table below.

Hood Sticker	Flow Rate (feet/minute)	Recommended Action
Green	80-120	Safe to use
Yellow	51-79 or 121-199	Potential for use depends on the operations and chemicals involved
Red	≤50 or ≥200	DO NOT USE

EHS initiates work orders through Facilities Operations for all fume hoods that receive yellow or red stickers. Facilities Operations will contact EHS to recheck the hoods once repairs have taken place. Researchers should not use fume hoods until EHS re-inspects and assures proper function.

The following work practices must be followed while working in fume hoods:

- Keep all apparatus and chemicals at least 6 inches back from the face of the hood
- Do not store chemicals or apparatus in the hood.
- Keep the hood sash closed as much as possible. Never exceed 18 inches.
- Do not use the hood to volatilize chemicals
- Keep the slots in the hood baffles free of obstruction
- Never use electrical outlets inside the hood. Run all equipment cords to outlets outside of the hood.
- If you know the procedure you are planning will generate a very heavy emission of fumes, or vapors, check the capacity of the hood you plan to use. It may be safer to perform your procedure in a larger, higher capacity, hood.
- Contact EHS (486-3613) if you suspect your hood is not working properly

REMEMBER TO CONSULT WITH YOUR ADVISOR:

When working with hazardous materials:

Students should consult with their advisor when planning any experiment in which hazardous materials are used and/or produced.

To plan for possible interruptions to your experiments:

Frequently, a laboratory procedure is carried out continuously or overnight. It is essential to plan for possible interruptions in utility services such as electricity, water, and inert gas. A frequent hazard is the failure of the cooling water supply. Be sure all hoses are securely fastened with a wire tie or clamp. In addition, commercial devices are available that monitor water flow so that its failure will automatically turn off electrical connections and the water supply. Any reaction that is left unattended for any length of time should be clearly labeled as to the nature of the reaction and its components, the possible hazards (e.g., release of poisonous vapors), the name of the experimenter, and a phone number where he/she may be reached at all times. Reactions should not be left unattended for any length of time.

When working alone in the laboratory is unavoidable:

Generally, it is wise to avoid working alone in the laboratory. However, if it is necessary, arrangements should be made with colleagues in other labs to cross check each other periodically after normal working hours. Extremely hazardous experiments should never be undertaken by a worker alone in a laboratory. The University of Connecticut's Laboratory Safety Committee recommends that the UConn Fire Department be notified if any lab is performing an experiment that is unattended after hours, or especially, if it is a highly reactive experiment. Further information on the University's Working Alone Policy can be found here:

<https://policy.uconn.edu/2012/07/30/working-alone-policy/>

For more information on University General Policies, Procedures, and Forms:

<https://ehs.uconn.edu/ppp/>

CHEMICAL SPILLS AND STORAGE

MAJOR SPILLS:

Chemical spills are events that cannot be handled safely without the assistance of emergency personnel (e.g. spilled chemicals with high toxicity, high flammability, a noxious odor, a large quantity, etc.). This may include incidents where a person is impaired, injured or contaminated.

1. Relocate to a safe location
2. Close door to lab.
3. Call 911
4. If safe to do so, post “NO ENTRY” sign(s) or other warning information on the door(s)
5. Report spill to Principal Investigator/Lab Supervisor
6. Do not re-enter area until instructed to do so by the fire department or other emergency personnel

INCIDENTAL RELEASES:

Incidental releases are small spills that do not meet the criteria of a major spill and can be dealt with by laboratory personnel. Incidental releases should present little to no risk of exposure to researchers and can be absorbed, neutralized, or otherwise controlled at the time of release by employees.

1. Ensure risk of exposure is minimal. If a danger exists, follow the procedure for major spills.
2. Wear appropriate personal protective equipment
3. Use the spill supply kit in the lab to control the source and confine the spill to a small area.
4. Place spill debris in an appropriate container, tightly seal or close container and properly label the waste.
5. Place the waste in the Satellite Accumulation Area and contact EH&S for a pick-up.
6. Report spill to Principal Investigator/Lab Supervisor

CHEMICAL STORAGE:

Chemicals must be stored according to compatibility and hazard class. Lab personnel are required to review safety data sheets (SDS's) to obtain information on proper storage, stability and incompatibilities. Incompatible chemicals must not be stored alphabetically or in close proximity of one another.

Hazard Classes:

If feasible, each hazard class should be stored in a separate cabinet or location in the lab. If separate cabinets are not feasible, chemicals of different hazard classes, in some cases, can be segregated by placing them on separate shelves in secondary containment bins within individual cabinets. More information can be found on the EH&S website at <http://www.ehs.uconn.edu/Chemical/chemplan.pdf>. Chemicals should be segregated into, at a minimum, the following hazard classes:

- Corrosive Acids- Inorganic
- Corrosive Acids- Organic
- Corrosive Bases- Inorganic
- Corrosive Bases- Organic
- Explosives
- General Stock Chemicals
- Flammable Liquids
- Flammable Solids
- Oxidizers
- Water-Reactive

Storage Requirements:

- Flammable chemicals must be stored in an approved storage cabinet or refrigerator
- No more than 10 gallons of flammable liquids can be stored outside of a rated flammable storage cabinet
- Corrosive liquids must be stored below eye level (i.e. approximately 5 feet)
- Limited quantities of hazardous chemicals should be stored on benches, floors or in fume hoods
- If storage of hazardous chemicals on floors must occur, secondary containment is required
- Acutely toxic chemicals must be stored in dedicated cabinets
- Chemical shelving must be firmly secured to walls
- Chemicals must not be stored on top of cabinets
- Heavier chemicals must be stored on lower shelves
- Chemicals must be stored away from heat, direct sunlight and ignition sources

Shelf Storage Pattern Examples:

Inorganic Chemicals		Organic Chemicals	
Sulfur, Phosphorous Arsenic, Phosphorous Pentoxide	Arsenates, Cyanates, Cyanates (store away from any water)	Alcohols, Glycols, Amines, Amides, Imines, Imides (store flammables in a dedicated cabinet)	Phenols, Cresols
Halides, Sulfates, Sulfites, Thiosulfates, Phosphates, Halogens, Acetates	Sulfides, Selenides, Phosphides, Carbides, Nitrides	Hydrocarbons, Esthers, Aldehydes (store flammables in a dedicated cabinet)	Peroxides, Azides, Hydroperoxides
Amides, Nitrates (not Ammonium Borates, Nitrate), Nitrites, Azides (store Ammonium Nitrate away from all other substances)	Borates, Chromates, Manganates, Permanganates	Ethers, Ketones, Halogenated Hydrocarbons, Ethylene Oxide	Acids, Anhydrides (store certain organic Acids in an Acid cabinet)
Metals, Hydrides (store away from any water and store flammable solids in a flammable cabinet)	Chloraes, Perchlorates, Chlorites, Perchloric Acid, Peroxides, Hypochlorites, Hydrogen Peroxide	Epoxy Compounds, Isocyanates	Miscellaneous

Hydroxides, Oxides, Silicates, Carbonates, Carbon	Miscellaneous	Sulfides, Polysulfides, etc.	Miscellaneous
Acids, except Nitric (Acids are best stored in a dedicated cabinet)		Alcohols, Glycols, Hydrocarbons, Esters, Ketones, etc. (store flammables in a dedicated cabinet)	
Nitric Acid (store away from other Acids unless your Acid cabinet provides a separate compartment for it)		Store severe poisons in a poisons cabinet	
<i>Avoid using the floor</i>			

For more information on University Policies, Procedures, and Forms for Chemical Safety:
<https://ehs.uconn.edu/chemical-health-and-safety/>

HAZARDOUS WASTE

Hazardous wastes are discarded solids, liquids or gases with properties that are dangerous or potentially harmful to human health or the environment. The principal investigator or lab supervisor is responsible for assuring that the policies and guidelines outlined in the University Chemical Waste Disposal Manual (<http://www.ehs.uconn.edu/Chemical/ChemWasteDisp.pdf>) are followed by all personnel working in IMS labs.

WASTE CONTAINER MANAGEMENT:

- Package all chemical waste in a sturdy container. EHS provides 20 liter containers.
- All waste containers must be marked with the words “Hazardous Waste”. EHS provides “Hazardous Waste” stickers and tags.
- Use full chemical names to describe the waste. Do not use formulas or abbreviations.
- Containers must remain closed unless waste is being added to the container. Containers must have a tight-fitting cap (i.e., no corks, rubber stoppers or open funnels).
- Incompatible materials must not be mixed in the same container.
- Incompatible materials must not be stored in the same secondary containment bin.
 - o Acid and base wastes should be stored separately
 - o Acid wastes should be stored separately from cyanides and sulfides
 - o Oxidizing chemical wastes should be stored separately from reducing agents and organic compounds.
 - o Water-reactive materials should be stored separately from aqueous solutions.

CHEMICAL WASTE DISPOSAL:

- Complete a “Hazardous Waste” tag (shown next page) or sticker. Make sure the chemical names, percentages and other information are completely legible.
- Use full chemical names to describe the waste.
- For chemical waste pick-up fill out the “Chemical Waste Pickup Form” found here: <https://ehs.uconn.edu/regulated-waste-management/>.
 - o When submitted, this form is sent on to EH&S who will come and pickup your waste every Monday, Wednesday, and Friday.
 - o Make sure your waste is properly marked and labeled before making the request.

BIOLOGICAL WASTE DISPOSAL:

- Disposable sharps (e.g. syringes with or without needles, needles, scalpels, razor blades, etc.) are to be collected in approved sharps containers.
- Sharps containers are available through the Biological Health & Safety website.
- When sharps containers are almost full, IMS personnel must complete a “Biological Waste Pickup Form” found here: <https://ehs.uconn.edu/regulated-waste-management/>.
 - o The submitted form is sent on to EH&S who will come and pickup your waste.
 - o Boxes must be prepared, sealed and labeled for the pickup.

RADIOACTIVE WASTE:

- Every authorized user is responsible for the safe handling and proper disposal of his/her radioactive waste products prior to a waste pick-up by EHS Radiation Safety.

- There are several types of radioactive waste so individuals should contact the Radiation Safety Office, 860-486-3613, to determine proper disposal method for each.
- For radioactive waste pick-up fill out the "Radioactive Waste Pickup Form" found here: <https://ehs.uconn.edu/regulated-waste-management/>.
 - o When submitted, this form is sent on to EH&S who will come and pickup your waste every Wednesday.

CHEMICAL WASTE DISPOSAL TAG EXAMPLE:



Hazardous Waste

UConn - Environmental Health & Safety
Chemical Waste Disposal Tag
www.ehs.uconn.edu

LIST CONTENTS
-Use Full Chemical Names
-No Formulas or Abbreviations

1)	<u>Toluene</u>	% <u>20</u>
2)	<u>Acetone</u>	% <u>40</u>
3)	<u>Methanol</u>	% <u>10</u>
4)	<u>Benzene</u>	% <u>10</u>
5)	<u>Xylene</u>	% <u>20</u>
6)	_____	% _____
7)	_____	% _____
8)	_____	% _____

Total Volume/Mass 100

Building Gard North Rm. 121
Dept. IMS Phone 6-2496
Name (Print) Josh Strecker

RADIATION SAFETY

Ionizing radiation from radioactive material or devices and non-ionizing radiation from lasers can be potentially hazardous unless used with strict adherence to State and Federal regulations and the UConn safety policies and procedures. The safety policies and procedures which govern all uses of ionizing radiation are concerned with minimizing exposure to levels far below those which might cause any adverse somatic or genetic effects. The regulations and UConn policy regarding laser use are primarily set to preventing inadvertent eye exposure to the laser beams. Refer to the Environmental Health and Safety (EHS) website for information and all applicable Radiation and Laser Safety Program requirements.

RADIATION SAFETY OFFICE REQUIREMENTS:

The Radiation Safety office requires a usage permit issued by the Radiation Safety Committee for any proposed use of radioactive materials. Radiation-producing devices require registration with the State of Connecticut DEEP and Class 3B and 4 lasers require approved Standard Operating Procedures through the Radiation Safety office. Prior to ordering any ionizing radiation-producing materials or devices, as well as prior to installation of a laser, you shall contact the University's Radiation Safety Office at 6-3613. The Radiation Safety office is also responsible for tracking uranium and thorium compounds. Laboratory workers shall inform Radiation Safety of intended purchases of these compounds.

INDIVIDUAL USER RESPONSIBILITY:

Each individual who is an authorized user of radioactive materials, or radiation producing equipment, is responsible for:

1. Following the authorization and safety protocols and procedures for the particular use.
2. Successful completion of required EHS training.
3. Keeping his/her exposure to radiation as low as possible, and below the maximum permissible exposure levels.
4. Wearing the prescribed monitoring equipment such as dosimeter badges or utilizing area monitoring badges if issued.
5. Performing appropriate radiation surveys during and after work with a radiation source.
6. Keeping radiation exposures as low as reasonably achievable (ALARA) by:
 - a. Utilizing time, distance, and shielding protection factors for all sources.
 - b. Following established protocols and safety procedures.
 - c. Using appropriate protective clothing.
 - d. Labeling radiation sources and areas where sources are used.
 - e. Reporting radiation incidents such as uncontrolled contamination or injury involving radioactive materials to the Principle Investigator and the Radiation Safety Officer.
 - f. Properly securing radiation sources when not in use.
7. Maintaining laboratory security and controlling laboratory access by unauthorized individuals.

For more information on University Policies, Procedures, and Forms for Radiation Safety:

<https://ehs.uconn.edu/radiation-safety/>

LASER SAFETY

In addition, IMS has a number of laboratories that are conducting research using lasers (Light Amplification by Stimulated Emission of Radiation). These laboratories are generally not under the control of a technician and, therefore, it is extremely important for individuals to acquaint themselves with the hazards associated with the particular laser they will be using.

KEY POINTS TO LASER SAFETY:

They key points to laser safety involve the optical hazards of laser beams. The power coming out of a laser is measured in watts, but it is the watts per unit area that are important. This can be illustrated by the fact that on a sunny day the watts that hit the palm of your hand may feel very nice, but use a magnifying glass to focus the same amount of watts on your palm and you will understand the difference between watts and watts per square centimeter. Laser beams have very small divergence angles, which means that the intensity is confined in a very narrow cone. You can quickly walk into a beam that you don't know is there until it hits you in the eye. The actual damage to your eye depends on what the wavelength of the light is. There are lasers that operate all the way from the far infrared into the ultraviolet. Far infrared light, (light between 1.4 and a thousand microns) is absorbed by the cornea of your eye. It doesn't actually penetrate through the eye and hit your retina. You will have some damage to the cornea. Also short ultraviolet with wavelengths between 100 and 350 nanometers, which is the visible, and in the near infrared out to 1.4 microns, passes through the lens and is focused on the back of the retina. This is the most dangerous case of all because you get high intensity on the back of your eye.

LASER SAFETY PROGRAM:

The University of Connecticut has a Laser Safety Program in place necessitating approved Standard Operating Procedures (SOPs), various training, safety controls, appropriate eyewear, and operational requirements intended to ensure the safe use and operation of Class 3B and 4 lasers. The laser information included in this safety guide is not intended to supplant the requirements of the University Laser Safety Program but to provide a brief overview of lasers and their associated potential harmful effects. It is required for research personnel to contact the EHS Laser Safety Officer (LSO) 6-3613 prior to the acquisition and/or initial use of Class 3B and 4 lasers at the University of Connecticut.

LASER CLASSIFICATIONS:

In order to assess the risks from any particular laser, a set of laser classifications has been established by the Bureau of Radiological Health. There are four different classes of lasers and the higher the class, the more dangerous the laser.

Class 1 Laser:

A Class 1 laser is incapable of admitting any kind of hazardous laser radiation for any viewing or normal operating conditions. Such a laser typically would be a continuous wave (CW) laser in the visible range putting out 0.5 microwatts.

Class 2 Laser:

A Class 2 laser has sufficient power to produce retinal injury after extended exposure periods, but not enough to cause accidental injury. An example of a Class 2 laser is a CW visible laser

with an output of less than a milliwatt. A 0.5 milliwatt helium-neon laser will fall into this category. If you stare at it for a long time, you can damage your retina.

Class 3 Laser:

Class 3 lasers have two categories. A 3R laser can cause retinal damage if you stare at it long enough; you will not receive damage to your eye from short-term accidental exposure. A class 3B laser is more dangerous. You can have some redness and temporary soreness in your eye. Any laser with an output over 5 milliwatt to 500 milliwatt is a Class 3B laser.

Class 4 Laser:

Class 4 lasers produce hazardous direct, diffuse, or specularly reflected beams. Not only are they dangerous when the beam is reflected off of a shiny piece of metal or mirror, but also when a beam is diffusely scattered. These lasers also have potential fire and skin burn hazards. Greater than 500 milliwatt CW argon, krypton, and dye lasers are examples of Class 4 lasers. You can receive accidental retinal damage from this type of laser.

LASER SAFETY PROTECTION MEASURES:

The primary means of protection is to physically prevent exposure. Barriers or blocks may be used to physically intercept or terminate the primary beam and any reflected or secondary beams. Entrance to a laser facility by unauthorized personnel or unexpected entry should be prevented by safety interlocks while the laser is in operation or by administrative controls. A warning light shall be placed at the entrance. Protective eyewear appropriate to the laser system in use shall be worn when utilizing Class 3B or 4 lasers. The filters in the protective goggles should be matched to the wavelength of the laser's emissions. Since some lasers emit radiation at more than one wavelength, it may be necessary to have filters covering each range of frequencies. It would be desirable to have the filters in the protective eyewear attenuate only narrow wavelength regions spanning those emitted by the laser while allowing adequate visible light through so that normal vision is not impaired.

For more information on University Policies, Procedures, and Forms for Laser Safety:

<https://ehs.uconn.edu/radiation-safety/>

COMPRESSED GAS & CRYOGENIC SAFETY

COMPRESSED GAS CYLINDERS:

Compressed gasses have a multitude of uses in research laboratories. Understanding the properties of the gas as well as the proper handling of the equipment is important in creating a safe laboratory environment. Nearly all accidents involving compressed gases are a result of not following established methods for safe handling and proper use of these products. A standard cylinder is approximately 152 cm (60 in) tall, 23 cm (9 in) in diameter, and can be as much as 80 kg (175 lbs.), and the cylinders can contain up to 2200 psi of pressure. Should the valve connection on top of the cylinder be broken off, the cylinder would correspond to a rocket capable of punching a hole through most laboratory walls and would represent a major danger to all occupants in an area where such an incident occurred. The contents of cylinders also frequently represent inherent hazards. These pressure-independent hazards associated with the contents include flammability, toxicity, corrosiveness, excessive reactivity, and potential asphyxiation if the volume of air displaced by the contents of a cylinder is sufficient. Obviously, measures need to be taken to insure that the integrity of the cylinder is totally maintained. Compressed gas cylinders can be used safely if due care is taken with them and the accessories and systems with which they may be combined. Some simple gas cylinders safety rules are:

1. Cylinder caps should always be on a cylinder while in storage and at any time it is being moved.
2. When moving gas cylinders, they should be strapped to a properly designed wheeled cart to insure stability.
3. Compressed gas cylinders of all sizes must be supported by straps, chains, or a suitable stand to prevent them from falling over at all times. Never store or leave cylinders near a source of heat. Cylinders should be stored in an upright position (i.e. with the valve stem up), keep flammable and oxidizers separate.
4. Never attempt to repair, alter, or change cylinder valves. Wrenches should not be used on valves equipped with a hand wheel. Damaged valves should be immediately reported to Nancy Kellerann in purchasing (room 101) for a replacement cylinder.
5. Storage of cylinders in a laboratory at a given time should be restricted to those in actual use or attached to a system ready for use. If this is not feasible, the actual number of cylinders present should be maintained at an absolute minimum.
6. Promptly remove the regulator from empty cylinders and replace the protective cap at once; mark the cylinder "MT" in large letters (on the tag) and remove to the loading dock. This will avoid demurrage (storage) costs and storage hazards.
7. Be sure to use the appropriate regulator on each cylinder. Adaptors or home-made modifications are prohibited.
8. Always use a trap to prevent back-siphonage of chemicals into the cylinder.
9. Never bleed a cylinder completely. Maintain a slight pressure to keep contaminants

CRYOGENIC SAFETY:

Cryogenic materials are characterized by extreme low temperatures, such as dry ice (solidified carbon dioxide-boiling point- 78.5 degrees C) and liquid nitrogen (boiling point- 192.8 degrees C). Cryogenic materials such as these are commonly used as cooling baths for apparatus and experimental samples thus special safety precautions should be observed.

1. Avoid contact with the skin as these cryogenics will cause severe burns and possible frost bite.
2. Use gloves and eye protection when handling cryogenics.
3. When cooling a warm object, pour the liquid or immerse the warm object into the liquid slowly to avoid splashing caused by vigorous boiling.
4. Use only approved metal/glass dewars to transport cryogenics. Note: glass dewars should have a secondary containment jacket to safeguard them in the event of implosion.
5. Dewars should be equipped with a loosely fitted cap to prevent spillage during transports and prevent pressure build up. Note: If liquid nitrogen ever has a blue tint then the liquid should be replaced immediately. The blue tint indicates liquid oxygen and it is potentially explosive, it should be treated as a hazard.

ELECTRICAL SAFETY

The hazards associated with the use of electricity include electrical shock, electrical arc flash/blast as well as fires caused by shorts and overloaded circuits or wiring. In addition, sparks from electrical equipment can serve as an ignition source for flammable or explosive vapors or combustible materials. Most incidents are a result of unsafe work practices, improper equipment use, and faulty equipment. Adherence to the following rules and procedures can significantly reduce the electrical hazards one might encounter in the laboratory and ensure compliance with OSHA regulations:

1. Know the location of electrical panels and disconnect switches in or near the laboratory so that power can be quickly shut down in the event of a fire or electrical accident. To enhance safety, post the location of the electrical panel on the equipment it services.
2. Never obstruct electrical panels and disconnect switches. These should be clearly labeled to indicate what equipment or power source they control. The National Electric code requires a minimum 3-foot clearance must be maintained around electrical panels at all times to permit ready and safe operation and maintenance of such equipment.
3. Do not overload circuits or wiring. Overloading can lead to overheated wires and arcing, which can cause fires and electrical injuries.
4. Inspect all electrical equipment (hot plates, heaters, stirrers, ovens, extension cords, etc.) before you use them to ensure that cords and plugs are in good condition – not worn, twisted, frayed, abraded, corroded, or with exposed wires or missing ground pins. Live parts must be effectively insulated or physically guarded. Equipment with damaged or defective cords or plugs should be taken out of service immediately and repaired by qualified personnel.
5. Ensure that all electrical outlets have a grounding connection requiring a three-pronged plug. All electrical equipment should have three-pronged, grounded plugs or be double insulated.
6. Electrical outlets, wiring, and other electrical equipment integral to the building may only be serviced and repaired by Facilities Operations, qualified trades personnel, or other qualified electricians. See Josh Strecker (room 121) for assistance.
7. Work on electrical equipment must be done only after the power has been disconnected. On cord and plug connected equipment, the power cord must be unplugged and under the exclusive control of the person performing the work so that the equipment cannot be accidentally turned on by someone else. On hard-wired equipment, the main disconnect device or circuit breaker must be shut off and locked and tagged with a special padlock and tag. Service and/or repair work on hard-wired equipment may only be carried out by authorized individuals who have received Lockout/Tagout training (available through the University Department of Environmental Health and Safety).
8. Limit the use of extension cords – they are for temporary, short-term use only. In all other cases, request the installation of a new electrical outlet. Do not use extension cords as a substitution for fixed receptacle outlets. Long-term use of extension cords is a violation of OSHA regulations. The long-term use of multi-outlet power strips is also illegal, except for use with computer equipment. Do not use more than one multiplex outlet plugged into a single wall outlet.

9. Ensure that all extension cords used are carefully placed, visible, and not subject to damage. Cords must not run through doors, walls or partitions, under rugs, or above dropped ceilings. They must not be tied in knots, draped overhead, or attached to walls.
10. Ensure that the wire size of an extension cord is adequate for the current to be carried. Failure to do so can lead to electrical fires. Cords used for 110-120 volt service should be UL listed with a polarized three prong plug. Extension cords must never be linked together – use the proper length extension cord needed for the application.
11. Keep corrosive chemicals and organic solvents away from electrical cords – these can easily erode the insulation on wires.
12. Keep flammable materials away from electrical equipment.
13. Keep electrical equipment away from wet or damp locations or potential water spillage, unless specifically rated for use under such conditions.
14. Never handle electrical equipment when hands, feet or body are wet or perspiring or when standing on a wet floor.
15. In the event of an electrical fire, leave the area, call 911, and pull the nearest fire alarm. Do not use water on an electrical fire. The appropriate fire extinguisher is labeled “C” or “ABC”. If safe, and possible, shut down the main power source.
16. In an electrical emergency, if a person received an electrical shock, do not touch the equipment, cord or person. Call 911 so that the Fire Department can treat the injured person and evaluate the situation. If safe, and possible, shut down the main power source.

For more information on the UConn EH&S Electrical Safety Policy:

<http://media.ehs.uconn.edu/Occupational/Electrical/ElectricalSafetyProgram.pdf>

CHARTER OF THE IMS SAFETY COMMITTEE

1. There shall be a Safety Committee composed of IMS faculty, staff, and students.
2. The Committee shall assist the IMS staff in establishing safe laboratory practices and will conduct periodic inspections of the various IMS facilities for the purpose of uncovering unsafe practices and increasing general awareness of the importance of laboratory safety.
3. In the course of regular laboratory inspections the Committee shall issue reports of said inspections to the facility supervisors and to the Director's office. Within two weeks of the issuance of such a report the facility supervisor or other responsible person shall respond to the Committee concerning each unsafe practice by:
 - a. Indicating in writing that the practice has been corrected, or
 - b. Meeting with one or more Committee members to discuss the offending practice and to arrive at a mutually acceptable course of action. Record will be made of such agreement.When feasible, the Committee itself may initiate corrective action.
4. In addition to regular inspections the Committee may make spot inspections by random selection or at the request of concerned persons. Such inspections may be subject to report.
5. In the event that a facility supervisor fails to respond appropriately to findings by the Committee of unsafe practices, the matter shall be brought specifically to the Director's attention. Noteworthy positive actions will also be brought to the Director's attention. To ensure the safety of IMS staff and other persons frequenting the IMS facility, the Director can:
 - a. Close an unsafe facility until the offending situation is corrected, or
 - b. Bar specific individuals from the use of IMS facilities.
6. In the course of identifying safe as well as unsafe practices, the Committee will assemble a Manual of Laboratory Safety identifying both general and specific practices. This Manual will be updated from time to time, and will be a required furnishing of each laboratory. All IMS faculty, staff and students will be expected to be familiar with its contents.
7. It is recognized that the Committee is not expert in all manners of laboratory practice. For this reason it shall endeavor to be guided in its judgment by what seems to be prudent practice. Clearly, the Committee cannot define a precise midpoint separating safe from unsafe. Thus, a judgment that an unsafe condition exists may be qualitative in nature; however, in the absence of an irrefutable rebuttal such judgment will constitute IMS policy.