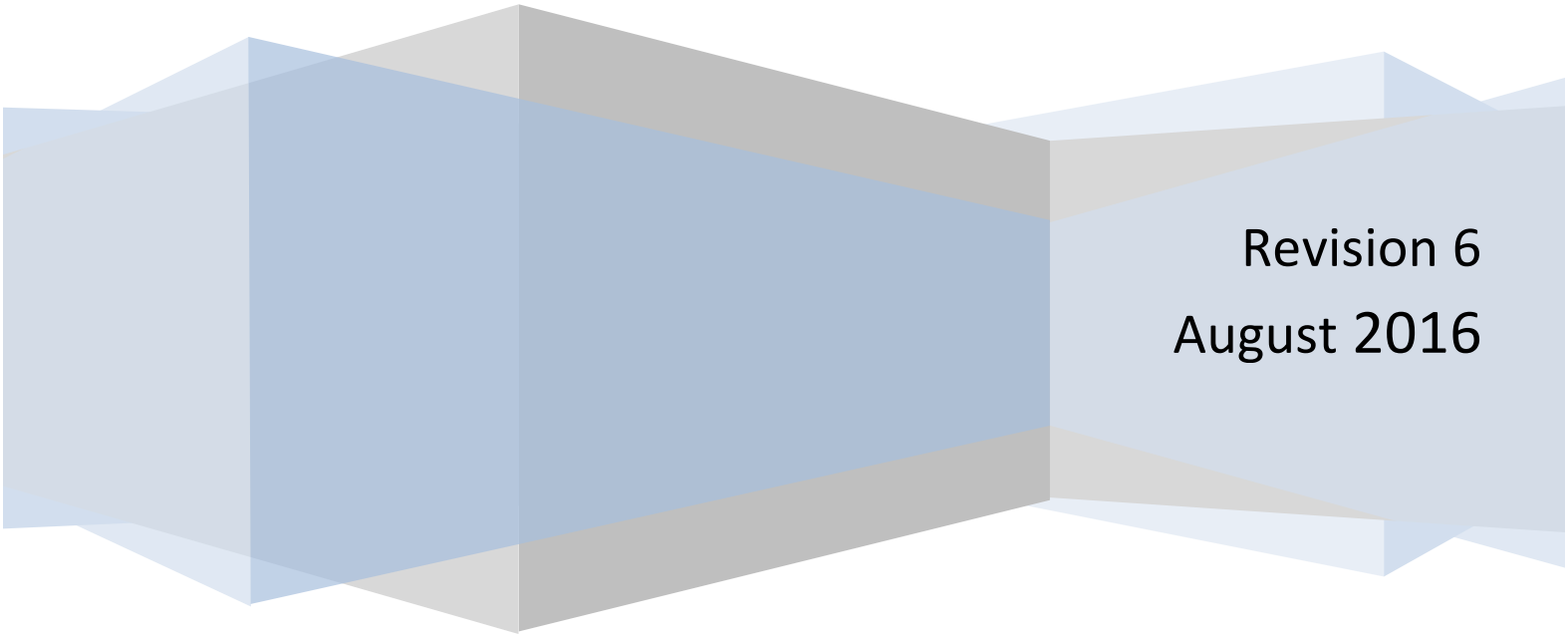
THOMAS J. WATSON SCHOOL OF ENGINEERING
AND APPLIED SCIENCE

Laboratory Use and Safety Protocols

Engineering & Science

Binghamton University



Revision 6

August 2016

Table of Contents

Scope

The OSHA/PESH Laboratory Safety Standard (29CFR1910.1450) requires the University to develop and implement a Chemical Hygiene Plan to protect laboratory employees from occupational exposures to hazardous chemicals in laboratories. In addition to the Lab Standard, laboratory operations are also regulated by EPA and NFPA life and fire safety standards.

This document is a reference manual covering the basic operational policies for use of laboratories in the Thomas J. Watson School of Engineering and Science. These policies apply to all individuals working in laboratories having any of the following attributes: use chemicals, generate hazardous waste, work with animals, involve biosafety, use cryogenics, lasers or radioactive materials, involve electrical or mechanical engineering, bioengineering, or material science.

Spaces dedicated to the exclusive use of computers, offices, and conference rooms are not considered laboratories unless any of the above attributes apply.

These policies apply equally to all users (faculty, staff, students, and guests) and govern both safety and lab use rules. All users are expected to have read and understood these policies and procedures. Watson School facilities house expensive and fragile equipment. They also house chemicals that pose significant hazards if handled incorrectly. This manual attempts to document acceptable operating behavior for use of the facilities. It is impossible, however, to define a policy for every imaginable situation. Rules and policies are no substitute for common sense. Users violating the operating and safety rules or endangering themselves or other users will have their access restricted, suspended, or revoked at the discretion of the Dean of the Watson School. User suggestions and feedback on the facility are welcome at all times. Please feel free to direct your comments to one or more of the following: Chris Chase (Equipment and Operations Manager), Ron Miles (Associate Dean), Pete Partell (Associate Dean), or one of the department chairs: Nagen Nagarur, Bruce Murray, Steve Zahorian, Kanad Ghose, or Kaiming Ye.

In all cases regarding personal protective equipment (PPE), use of such appropriate personal protective equipment is required. Note that "Laboratory Spaces" carry different rules than "Computational Spaces" (which equate to student desk areas). Students may eat/drink in computational spaces.

Before access to a Lab is granted, all users must understand the language, rules, procedures and consequences of working in the facility.

Facility Conduct Expectations

It is the responsibility of all users and staff to act in a professional, courteous and safe manner at all times while in the facility. Safety is a main concern in all Watson laboratory activities. All operations must be undertaken with the safety of both the individual user and other users as the primary consideration. Users violating the operating and safety rules or endangering themselves or other users will have their access restricted, suspended, or revoked at the discretion of the Dean of the Watson School. Suspensions may be for several days, a week, or permanently. Ignorance of the rules, lack of common sense, language difficulties, carelessness, and being short on time are not excuses for unsafe

behavior. If a user is not certain on what the proper procedure is for a task, it is better to stop and ask staff or management than to guess.

Rules on chemical use are based on basic chemical knowledge, the properties of individual chemicals, and common sense. Additionally, a large volume of state and federal law covers chemical use in the workplace and disposal of waste. These rules are required to maintain safety with multiple users of the facility. In spite of rules, the primary responsibility for safety rest with the individual user. Each and every chemical in the facility must have an accompanying MSDS (Material Safety Data Sheet) on file with EH&S, as well as the Watson facility manager. MSDS's can always be obtained from the chemical manufacturer source or purchasing source, as well as on http://www.siri.org/msds/index.php.

The following link describes the University policies and procedures for security and safety:

http://bingdev.binghamton.edu/administration/procedures/800series/index.htm

Responsibilities

1) In keeping with University policies and procedures for security and safety, Principal Investigators, faculty and **laboratory supervisors are ultimately responsible for laboratory safety** in their respective research or teaching laboratories. They must be able to provide evidence that lab appropriate training is both available and completed by individuals they supervise and anyone working in their lab areas.

2) All faculty, staff members, and students working in Watson School laboratories must attend laboratory safety training offered by the Environmental Health and Safety Office each year to first obtain and then to retain their access to that laboratory.

Watson User Communication

The main point of communication from the Watson school to current users concerning equipment status, facility closures, etc, is through an online management system known as Facility Online Manager (FOM). Additionally, the staff uses email as the main means of communication with individual users. All users must supply the lab manager with a functional email address that they actively check for messages. Users should give this information to the lab manager and update it if their email changes.

Computer Abuse

Computer abuse is a violation of university policy, and may subject the abuser to various disciplinary actions from the management, the campus judicial system, and legal authorities. Abuse of the computers (and Zero clients) will have the same results as violations of safety rules. Computer system abuse includes but is not limited to:

- Using computer systems or networks without proper authorization, or for unauthorized purposes, including using or attempting to use an account not issued to you;

- Tampering with or obstructing the operation of the Watson computer systems or networks, or attempting to do so;
- Inspecting, modifying, distributing, or copying software or other data without authorization, or attempting to do so;
- Supplying false or misleading information or identification in order to access Watson's computer systems or attempting to do so.

A longer description of computer abuse may be found at http://its.binghamton.edu/policies/acceptable-use .

In an emergency dial 911 from any campus phone. From a cell phone dial 607-777-2393.

General Facility Policies

Access Cards

Lab access is controlled through each user's Binghamton University identification card. Access to the lab is provided for the sole use of the person on the ID card. Guests of Binghamton University need to be accompanied by BU personnel (approved to work in such areas) when entering and using laboratory facilities. Key and Card access will be granted after proof of completion of required training and appropriate permissions from Department Chairs and faculty supervisors are submitted on the Key/Card Access form to Mary Jo Kopyar, Watson School Dean's Office, who will facilitate the granting of laboratory access.

Sharing of an ID card or permitting unauthorized access to the facility is not allowed. Your card is essentially your documentation that you have received the required orientation and safety training. Non-authorized persons are thus prohibited from accompanying, observing or helping others at work. Lending an access card to someone else is a serious violation. Each user must swipe their badge prior to entering the lab. No "tailgating" or following someone in without swiping is allowed. Violations of this policy will be monitored and may result in restricting access to the facility.

Shoes

Shoes must be worn that fully enclose the heel and top of foot. **Sandals, open weave shoes, or shoes that expose the top of the foot are not allowed in any labs**.

The shoes must be clean and dry when you enter the facility. During the winter months this can be a challenge. Even after drying off, these shoes will track in salt and other contaminants into the facility. During the times that winter weather is a factor, users need to bring a change of shoes that are not worn outside to prevent contamination of certain sensitive laboratories such as the cleanroom with water and salt.

Pants

Pants must run from the shirt to the ankles. Shorts or short pants are not allowed in laboratories.

Shirts

The shirt should run from the top of the arms to the pants. Tank tops, halter tops, and spaghetti strap tops are discouraged. It is advised that loose clothing, neckties, etc. be secured to prevent accidental trapping as well.

Safety Glasses

Safety glasses must be worn at all times in chemical or laser labs while actively working with such materials. When working with lasers, the Laser sign outside the lab must be lit. The Watson School does not provide safety glasses to users. Safety glasses must meet the ANSI Z87 standard. Glasses that meet this standard will be marked with Z87. Safety glasses may be removed only when using optical microscopes. Safety glasses are not a substitute for face shields when working with chemicals.

Allowed / Prohibited Items

To maintain a safe working environment, certain items are not allowed in the lab spaces. Common items that are prohibited in **ALL labs containing chemistry** are food, drinks, gum, cough drops, mints, chewing tobacco, smoking, etc. Allowed items include cell phones, cameras, PDA's, laptops. A list cannot cover everything, so if a user is not positive an item is allowed, they should check with staff before bringing it into the facility. The term "Labs" is used ubiquitously; in this case, it refers to all chemistry-containing labs. Computer labs or other areas not containing chemistry are not subject to this regulation, however eating and drinking in most lab areas is discouraged. There are/will be areas provided to eat and drink. Let's keep our work areas clean and neat!

Facility Billing

Users are charged by the hour for the use of **certain** (to be determined) equipment. Charges help pay for consumables and maintenance costs. All FOM accounts are billed every month. Payment of the balance is due in 30 days. Failure to pay will result in revocation of laboratory privileges.

Equipment Policies

Access to the laboratories does not of itself permit use of any particular instrument. With few exceptions, the equipment in the facility is hands-on equipment for the users. Each major instrument is under the charge of a staff member or principle investigator (PI), referred to as the equipment manager. Each PI will train users on their instrument(s). When the equipment manager is satisfied, the user will be authorized to use the system without further supervision via FOM. Much of the equipment in the facility is highly complex and delicate. Each instrument necessarily has rules and operational procedures which

are set by the PI's to assure the continued operation of the instrument. Violation of these procedures or carelessness in operation can result in damage to the equipment, down-time and considerable expense. Consequently, careless or damaging use of equipment will result in suspension of user privileges, either for a specific instrument or the facility as a whole.

Equipment Training Requirements

Each piece of equipment at the facility is under the responsibility of one or more PI's. These PI's are generally responsible for tool maintenance, training, and process development. The staff, with facility management, determines the equipment policies regarding allowed and prohibited operations on the tool. Each tool has instructions for user operation of the tool. These instructions may vary from a single sheet posted at the tool, to a more detailed manual, or a supplement to the operating manual provided by the original equipment manufacturer (OEM).

Before using any piece of equipment, users must be trained by faculty or staff that are authorized to train on that equipment. **Users cannot be trained by other users**, or by staff not authorized to train on the tool. If you are ever uncertain, check with the primary staff member in charge of the tool. It does not matter how much experience a user has with similar equipment. It is important to understand the difference between a staff member demonstrating how they are running the tool, and official tool training. Again, if a user is uncertain at any time, they should check with the staff member to determine if they are being trained on tool operation. Once a user is authorized to use a piece of equipment, the user will receive notification from the facility via email.

Equipment Interlocks

The Watson School uses a computer-based system, called FOM, to control equipment access and to also record equipment usage charges. Users will need a FOM account to access the system. During orientation, use of the FOM system will be demonstrated. FOM does not actually turn on any instrument, but it does enable/disable the instruments. Users may be logged onto several instruments at once and they may log off them individually. Users must remember to log off, or they will generate large equipment charges. When leaving, users should make sure that they are not still logged onto an instrument. The FOM status screen can also be accessed from the Watson web site at http://www2.binghamton.edu/watson/.

Users must log in to FOM with their own individual account when logging into instruments. "Group" use is not acceptable. Some tools may still utilize paper log sheets. Be sure to write complete information legibly to avoid erroneous charges.

Equipment Scheduling

Equipment is reserved through the FOM web based system accessible from the internet at http://128.226.71.79:8080/fom/. An FOM account is required to make reservations on the system. Uncancelled reservations will result in the user's account being billed for the entire reserved time.

Laboratory Audits

Personnel from the Binghamton University office of Environmental Health and Safety (EHS) will perform audits of each laboratory each semester. The process is described at http://www2.binghamton.edu/ehs/lab-safety/index.html. In addition to audits initiated by EHS, Watson School staff may request EHS audits of laboratories based on their own routine observations. Failure to correct violations identified in the audit will result in closure of the laboratory in accordance with University Policies.

Facility Hazards

Laboratory Hazards

Hazards in the laboratory fall into two general categories. First, the facility uses a variety of compressed gases, some of which are oxidizers, corrosive or flammable. These hazards, however, can and have been minimized by the proper use of engineering controls, such as use of proper equipment, proper confinement, ventilation, purges, safety valves, etc., and by procedural controls implemented by the staff.

The second, more troublesome category of hazard, concerns wet chemicals, i.e. the acids, bases and solvents commonly used in labs. It is precisely because they are considered "ordinary" by many users that they present a serious hazard. The chemicals commonly used in the facility can cause severe burns, tissue damage, organ damage, asphyxiation, and genetic damage if improperly used. These chemicals can enter the body by inhalation, ingestion, or absorption (either directly through the skin or through gloves) and may have either long or short-term health consequences. In addition, improper use of solvents can result in a major fire. "Ordinary" chemicals are thus definitely not hazard free. Users are expected to treat all chemicals with appropriate respect, and to be aware of all possible reactions which may be created, either intentionally or by accident.

Chemical Safety Information

Sources of Chemical Information

The Materials Safety Data Sheet (MSDS) is a convenient, condensed source for information on the properties of any chemical. The MSDS is a federally mandated document which must be supplied by the manufacturer or seller of a chemical. It contains in summary form, the chemical composition, the physical and chemical properties, toxicology data, and instructions for handling, spill control, and waste disposal. Users should read the MSDS for every chemical that they handle.
You may search most chemicals at http://www.siri.org/msds/index.php.

Terminology

The following terms are often encountered when reading about the properties of chemicals and the toxicity of chemicals, for example, on the Material Safety Data Sheets. Simple definitions are included here to help understand the properties of common chemicals when referring to the MSDS or other references. This is not intended to be a complete reference on Toxicology or Chemical Safety.

Chemical Properties Terms

Pyrophoric chemicals spontaneously ignite in air. No source of ignition (spark) is needed as they react spontaneously when exposed to oxygen. Silane is an example of a pyrophoric gas. 2% silane in argon, under normal conditions, is not pyrophoric.
Flash point is the minimum temperature of a liquid at which it gives off sufficient vapor to form an ignitable mixture with air. Liquids with a flash point near room temperature can be ignited very easily during use.
Exothermic Reaction is a reaction which produces heat (releases energy).

Types of Exposure

Acute Exposure as used in toxicology refers to a short term exposure. It has nothing to do with either the severity of the exposure or the severity of the effect. The type of exposure occurring during an accidental chemical spill is properly described as an acute exposure.
Chronic Exposure as used in toxicology refers to a long term exposure. Again, it has nothing to do with the severity of the exposure, the severity of the consequences, or the duration of the consequences. Chronic exposures can be the result of chemicals in the workplace, the home, or the environment. Chronic exposures are usually the result of carelessness, ignorance, or neglect, and not the result of an accident.
Local Exposure refers to exposure limited to a small area of skin or mucous membrane.
Systemic Exposure means exposure of the whole body or system, through adsorption, ingestion, or inhalation.

Types of Effects

Acute Effects refers to the duration of the symptoms. Acute means symptoms lasting a few hours or days. Again, it has nothing to do with the severity of the effects.
Chronic Effects are long term effects, manifested by prolonged duration and continuing injury.
Local Effects occur in a small area, at the place of contact.
Systemic Effects occur throughout the body, or at least away from the point of contact.
Allergies and Hypersensitivity are reactions by particular individuals to particular chemicals, caused by heredity or prior overexposure. Hypersensitive individuals should avoid exposure to the offending agents.

Exposure Levels

TLV - Threshold limit value. This is actually TLV-TWA (time weighted average) but is commonly called

just TLV. It is the (averaged) level to which a person can be exposed 8 hours a day, 5 days a week forever, without adverse health effects. These levels are set by ACGIH (governmental and industrial hygienists), and adopted into law by OSHA (Occupational Safety and Health Administration). This level is most relevant to chronic (long term) exposure to chemicals in the work place. Short term exposures in excess of TLV are thus not necessarily hazardous. This value is not particularly relevant to the laboratory situation. It is sometimes used as a guideline, however, since short term exposure to < TLV should be very safe.

IDLH - Immediately Dangerous to Life and Health. This level represents the maximum value for which a 30 minute exposure will result in no irreversible or escape impairing effects, i.e. the maximum level which will not cause you to pass out or sustain irreversible organ damage. It is the value most appropriate to sudden, one time accidental exposures.

STEL - Short Term Exposure Limit- Actually TLV-STEL. Maximum concentration to which you can be exposed for 15 minutes, up to 4 times a day without adverse effects.

PEL - Permissible Exposure Limit- The statutory equivalent of TLV.

LD50 - The dose at which 50 % of those exposed will die. Separate levels apply to various modes of exposure (inhalation, dermal, etc.). Usually expressed in terms of mg per kg of body weight; often measured for mice and rats, for obvious reasons. All these levels are approximate, with considerable inconsistency between various sources. It is obvious that one cannot do well controlled experiments on human subjects. It is thus wise to be conservative in estimates using these numbers.

Toxic Effects

Carcinogen - A substance producing or inciting cancerous growth.

Mutagen — A substance capable of inducing mutations.

Teratogen - A substance causing damage or death to a fetus.

Chemical Authorization

Specific Chemical Hazards (HF, carcinogen, etc)

Here is an overview of some specific or unique hazards from some chemicals commonly used throughout the facility. Users should review the MSDS for these and any other materials they work with.

Acetone, Isopropanol, and other Flammable Solvents

Solvents are widely used throughout the facility. They are very flammable solvents with low flash points, (i.e. can be ignited at a low ambient temperature). Because of this it presents a significant fire hazard. A spill of a gallon bottle of acetone could cause a catastrophic fire or explosion. Solvents should also be handled with care in the hoods and not used near hot plates. Spilled solvent can be ignited by the hot plates. The resulting fire could easily be drawn up into the exhaust ducts, again with catastrophic consequences. Spilled solvents can react explosively with chemical oxidizers present, e.g., peroxides, nitric acid. Spilled solvents should be contained immediately with spill

control pillows. Environmental Health and Safety should be called for emergency response and to assist in clean up.

Hydrofluoric Acid

Hydrofluoric acid, HF, presents **a particularly significant hazard for personal injury**. It is used in the lab in its pure form, diluted, and as the active component of BOE, Buffered Oxide Etch. It is used for etching silicon dioxide and particularly for stripping the native oxide prior to further processing. HF, however, is a very hazardous chemical, much more so than any of the other acids. Its danger comes from its effect on flesh. At the concentrations used in the laboratory, an HF "burn" is initially painless. The person may not even know that they have gotten a splatter on their hands, arms, face, or in their gloves. The acid however will silently eat away at the flesh. The fluoride ion is not consumed in this process and is soluble in tissue, so the damage penetrates deeper and deeper, until it comes to the bone where the excruciating pain begins. At that point though, it is too late to reverse the considerable tissue damage. At some point, it enters the blood stream scavenging Ca' ions, and totally messing up the ionic chemistry of the nervous system. If left untreated, serious injury or death will result.

Simple washing of an HF splash is not sufficient to prevent damage. It does not wash off; it is already dissolving flesh and will continue to do so until medical attention specific to HF burns is given (including deep injections to neutralize the penetrated acid). Be sure that medical personnel know that it is an HF burn and know that it requires specific treatment different from a common acid burn. The recommended first aid for HF exposure is to rinse for 5 minutes and then immediately apply the **Calcium Gluconate** liberally to the affected area. Calcium Gluconate is not a normally supplied item. Researchers are responsible for purchasing and supplying it in their own areas where HF is present.

HF etches silicon dioxide very well. Therefore, it also etches glass. It must not be kept in a glass bottle, used in a glass beaker or disposed in a glass waste bottle. Plastic labware is available for this purpose. HF, like all other chemicals, must only be used in the chemical hoods. Clearly it is not acceptable to take a beaker of acid out of the hood to strip a sample just prior to loading in a vacuum system.

Peroxides

Extreme care should be used in mixing solutions containing peroxides.

All peroxides are highly oxidizing materials. Considerable energy can be released in their reactions with common materials. Some peroxide compounds are unstable, and can explode. The Hydrogen Peroxide in the facility is over 10 X more concentrated than the solution used in the medical field and has a high contact risk. Extreme care should be used in mixing solutions containing peroxides. Peroxides are incompatible with all forms of organic solvents and flammable materials.

Users should be careful when disposing of pure hydrogen peroxide solutions in waste bottles. The waste should only go into waste bottles explicitly listed as accepting pure hydrogen peroxide. Adding pure hydrogen peroxide to an ammonium hydroxide / hydrogen peroxide or hydrochloric acid / hydrogen peroxide waste bottle can lead to rapid heating and breakdown of the peroxide, which can

result in the waste bottle being over pressurized and rupturing.

Liquid Cryogens

Special care should be taken with cryogenic liquids such as liquid nitrogen. Proper PPE including face shield and cryogenic gloves (specially insulated for protection) are required.

Pregnancy

All users are expected to read the MSDS of every chemical that they use in the lab. Users who believe themselves to be pregnant are encouraged to review the MSDS and discuss it with their personal physician in order to make an informed decision for themselves regarding chemical safety and pregnancy.

Wet Chemical Use

Chemical Supplies

Chemicals, and the ordering of such chemicals, are the responsibility of the PI's and researchers. Chemicals that have been ordered will be stored in the Chemical Storage Room. Contact the Equipment and Operations Manager to retrieve all chemicals from the storage room, and provide an MSDS (printed and electronic) to retrieve chemicals (unless an MSDS has previously been provided).

Empty, clean, triple rinsed, uncapped bottles (both glass and plastic) go into the yellow waste container in the corner process area (not in a normal waste basket). Do not cap them. The bottles must have no chemical or liquid residue in them. All bottles are to be triple rinsed and marked "triple rinsed" before being placed into the waste container. Custodians are not chemical waste handlers. Violations of this procedure carry severe penalties.

Personal Protective Equipment

General Chemistry Hoods

Personal Protective Equipment (PPE) should not be worn except in the immediate area of the chemical hood or area of primary use. Wearing the PPE around the lab will lead to transferring chemical residues into non-chemical areas of the facility.

Chemical Hood Procedures

Chemical Containers

Labware should be made of the appropriate material and just large enough to easily work with the samples to be processed. Do not use containers that are too large for the samples, as this will use more chemicals than needed and create more waste to dispose. Disposal costs for chemicals are often much more than the original chemical costs, so users should try to minimize wasteful use of the chemicals.

For most materials plastic, Teflon, or glass containers are acceptable. If the solution is to be heated, only a glass container should be used. If using a hydrofluoric acid containing solution, use a plastic or Teflon container since the chemical will attack glass. All containers are required to have covers on them. The U.S. Environmental Protection Agency (EPA) defines any uncovered container not in current use as an illegal disposal of the chemical by evaporation. Even if the user never plans on walking away from the container, lab policy requires that they have a lid for it. This policy is required for all containers, including containers of water.

Container Labels

All chemical containers are **required to have labels on them that clearly identify the contents**. Many solvents and caustics look the same as water, so everything, including water, must be clearly labeled. Post-it notes are available at each hood for the labels. The label must be clearly printed with the full chemical name, the user's full name, and the date. The label should be attached to the chemical container itself and not the lid or hood in front of the chemical if possible. If the label is attached to the lid, when the lid is removed it can be confusing which container contains which chemical. All containers are required to be labeled regardless of whether the user is going to be present the entire time or not. The label should be present on the container before the chemical is poured. Experiments where the lab user leaves the experiment unattended MUST be labeled as to active status and anticipated duration**. Unlabeled, unattended activities may be shut down at the lab manager's discretion in the interest of safety**. Such instruments requiring such labeling include, but are not limited to, hotplates, ultrasonic baths, ovens, etc.

Working with Chemicals

Users should be sure to understand the risks of all the materials they work with inside the hoods. The MSDS can be used to understand the properties and hazards of these materials. Here are a few specific things to keep in mind when working in the hoods:

- Be careful when pouring chemicals, as this is the most common time for spills or accidents.
- Be sure to take time and be careful with the chemicals. Not only will this help in producing good research, but it will also make the process safer.
- Avoid distractions while working at the hood. Do not take or make phone calls or engage in distracting conversations with other users. It is very easy to contaminate your cell phone with chemicals from gloves that you've used. Focus on the work that is being performed.

Waste Handling

Many different types of waste need special handling at the facility. In addition to chemicals, glass,

batteries, sharps, and other items need special handling while disposing.

Sharps

Any trash that is sharp, such as a razor blade, needle, or other type of blade should be deposited into the red sharps container located in the lab. They must not be placed into the normal trash cans to prevent injury to the cleaning staff. It is the responsibility of the lab occupant to supply sharps containers.

Chemical Waste

At Binghamton University, including the Watson school, **no waste is to be poured down any drain**. Properly following Federal laws regarding waste handling is critically important, both to help keep our planet healthy, as well as to prevent large fines from being given to the facility due to pollution violations.

Emergency Response

The facility can have many different types of emergencies. Although it is not possible to plan ahead for every type of possible emergency, the following sections cover the main types of emergencies that may occur with the appropriate response for each.

Emergency Phones

In an emergency dial 911 from any campus phone or, if using a cell phone or non-campus phone, dial 777-2393. This will connect you to the campus police. They can assist in sending police, an ambulance, or EH&S to assist with a chemical spill or exposure. When calling in an emergency, it is important to clearly communicate the type of emergency to the dispatcher. For medical emergencies it can be helpful to clearly indicate whether the medical emergency is chemically related or not. For example, the emergency response for someone having a heart attack is different than for a person who has had a large acid exposure.

Chemical Exposures

Any major chemical exposure should be reacted to immediately by using the chemical safety shower. All clothing should be removed as soon as possible to assist in getting the chemical off of the body. Modesty should not prevent users from doing this. Other users should use the emergency phones to contact EH&S and request medical assistance for a chemical exposure. The injured person should fully rinse the affected area for 15 minutes and then seek medical treatment. If the exposure was to a hydrofluoric acid containing solution, the rinsing should only be for 5 minutes followed by liberal application of Calcium Gluconate Gel to the affected area, followed by medical treatment. Users affected by chemical burns should not worry about any chemical spill, but instead should take care of

themselves and allow someone else to deal with the spill. After seeking medical attention for the exposure, the user should contact the facility management, to inform them of the incident.

Chemical Spills

Users are primarily responsible for cleaning up any minor chemical spill they caused, using safe and approved procedures. Each lab is provided with a Spill Bucket containing the necessary items required to clean up most small spills. Training on the cleaning of chemical spills is covered in the lab safety training. Users should request assistance from Environmental Health and Safety and the staff for any significant spill. For major chemical spills, spills releasing significant hazardous fumes, and for any unanticipated chemical reaction, users must evacuate the area of the laboratory and call 911 and ask for assistance.

In all cases except for the smallest incidental spills, users should notify lab management after the situation is resolved.

Incident Reporting

In addition to normal emergency response, all accidents involving chemicals and all accidents involving personal injury must be reported to the facility management in writing as soon as possible after the incident. Explanations should include the nature of the event, the procedures being followed or not followed at the time, and actions required to prevent future similar incidents. The lab manager can supply a form appropriate for this. In addition, for cases involving personal injury to employees, the university may require additional documentation.

Watson's Most Common Safety Violations

The five most common violations in Engineering and Science are:

1. Re-use of disposable gloves. Nitrile gloves are <u>one-time</u> use only.
2. Inappropriate attire, such as shorts and sandals.
3. Incorrect or lack of use of PPE (personal protective equipment).
4. Un-inspected eyewash stations.
5. Doors/sashes to hoods left open when not in use.

6. Appendix A – Training Record

Thomas J Watson School of Engineering and Applied Science at Engineering & Science, Binghamton University

Laboratory Training Record

I have read and understood the language, rules, procedures and consequences of working in laboratories at Engineering and Science at ITC as written in this manual. I understand that failure to follow the rules and procedures may result in injury to me or others, and/or damages to equipment or other property, and that I may be liable for injury or damage so incurred. Failure to follow the rules and procedures of the facility may result in the removal of my lab access. Please print out this page, sign/date it, and return to Chris Chase, Equipment and Operations Manager, ES2419.

_____

Print Name

_____ _____

Signature Lab numbers you will work in

_____ _____

Email Date

_____ _____

Faculty/PI name B Number