RIT Internal Use Only

Chemical Hygiene Plan

RELATED REGULATORY STANDARD:

OSHA
29 CFR 1910.1450

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TABLE OF CONTENTS

Page

TABLE OF CONTENTS CONTINUED

APPENDICES

1. Introduction

The Occupational Health and Safety Administration (OSHA) General Industry Standard (29 CFR 1910.1450 Occupational Exposures to Hazardous Chemicals in Laboratories) requires that an employer establish a laboratory safety program for employees. This OSHA standard regulates laboratory workers engaged in non-manufacturing related work. The standard requires a Chemical Hygiene Plan (CHP) to be written to protect employees from chemical hazards and exposures associated with laboratories. The following Plan is based on this standard as established by OSHA and serves as Rochester Institute of Technology (RIT's) CHP.

This CHP outlines how RIT will comply with the two main goals of the standard: to ensure that laboratory employees are made aware of the health hazards associated with hazardous chemicals in their laboratory. Also, that performance provisions are designed to protect laboratory workers from potential hazards in their work area. This includes keeping exposures to hazardous chemicals below OSHA's Permissible Exposure Limits (PELs) 29 CFR 1910.1000 Subpart Z. The lab standard supersedes the requirements of all other OSHA health standards in 29 CFR 1910.1000 Subpart Z with the following exceptions:

- PELs must not be exceeded.
- Skin and eye contact must be avoided where prohibited by any OSHA heath standard.
- Medical surveillance and exposure monitoring requirements of OSHA regulated substances must be followed when an Action Level (AL) or PEL is routinely exceeded.

Since laboratories vary widely in mission and structure, it is impossible to design a set of rules that will cover all possible hazards and occurrences. This Plan identifies basic safety procedures, which have proven to cause the avoidance or reduction of accidents and injuries in laboratories. Specific information, safety manuals, procedures, and modification to the Plan's laboratory procedures should be written by a qualified individual associated with a given laboratory. The documentation will need to be reviewed by RIT's Environmental Health and Safety (EH&S) Department's Chemical Hygiene Officer or designee.

This program will be reviewed by RIT's EH&S Department and revised as necessary at least on an annual basis for effectiveness *(1910.1450(e)(4)).* The Plan will be reviewed and revised more frequently if it is determined that the measures taken under the plan do not adequately protect RIT employees. **Appendix J** contains the Document Change/Revision History Log which records each update and/or revision to this program. The program review will include elements such as a updating of workplace specific procedures to consider any problems or concerns that are identified.

The written Plan will be posted on the EH&S Department website and will be available in the EH&S Department Office for review by RIT employees and their authorized representatives. The Plan will also be available to the OSHA Assistant Secretary upon request.

2. Guidelines

This CHP provides RIT laboratories with the necessary information to understand requirements when working in laboratories and to obtain the means to ensure a safe work environment. This Plan will comprehensively address: how potential hazards will be evaluated and identified; how engineering and administrative controls are evaluated; and how safe work practices are being followed. Additional measures will be discussed in this Plan including: medical management-monitoring and testing; proper chemical disposal; use of standard laboratory procedures; and training requirements to prevent /minimize chemical exposures in laboratories.

The Review the Lab Standard/Hazard Communication Applicability Flowchart is located in **Appendix E** to determine if your laboratory meets the definition of a "Laboratory" per OSHA 1910.1450.

3. Responsibilities

A. RIT EH&S

The RIT EH&S Department is responsible for the overall administration of this Plan and serves as the program administrator. The following tasks are included in this scope of responsibility, but are not limited to:

1. Serve as RIT's Chemical Hygiene Officer (CHO). The CHO will be appointed by the Director of EH&S and this will be communicated to the RIT Lab/Studio Safety Committee.
2. Provide oversight, updates to the CHP and technical assistance in complying with the CHP.
3. Work with management, fellow Chemical Hygiene Coordinators, other employees, and students to develop and implement appropriate chemical hygiene policies and practices.
4. Monitor chemical inventories for chemicals that are particularly hazardous, including select carcinogens, reproductive hazards, and acutely toxic chemicals.
5. Ensure the development and implementation of chemical safety/laboratory inspections.
6. Oversee the collection and maintenance of Safety Data Sheets (SDSs) across the campus through CampusOptics.
7. Determine when conducting an exposure assessment is appropriate and the proper procedures around the assessment.

8. Determine when a complaint of possible overexposure should be referred for medical consultation.
9. Provide required information to the examining physician at the time of a medical consultation, when applicable.
10. Investigate all reported accidents that result in the exposure of personnel or the environment to hazardous chemicals.
11. Work with affected department(s) concerning the RIT hazardous materials procurement process.
12. Serve on the RIT Laboratory/Studio Safety Committee.
13. Review and evaluate this program:
    a. On an annual basis.
    b. When changes occur to governing regulatory sources that require revision.
    c. When changes occur to related company procedures that require a revision.
    d. When facility operational changes occur that requires a revision.
    e. When there is an accident or near miss that relates to this area of safety.
    f. Anytime procedures fail leading to an injury, accident, sufficient spill, or property damage.

B. Department Manager or Designee

The overall compliance with this program is the responsibility of the Department Manager or Chair for laboratories under their jurisdiction.

1. Request laboratory/studio safety training through the EH&S Department.
2. Ensure each employee/student under his or her supervision has received appropriate training.
3. Maintain compliance with the CHP.
4. Ensure the RIT hazardous materials procurement process is followed.
   Link: https://www.rit.edu/fa/grms/ehs/content/hazardous-material-procurement
5. Designate someone within their department to serve on the RIT Laboratory/Studio Safety Committee.

C. Laboratory Supervisors/Research Principal Investigator (PI)

The day-to-day aspects of the program are the responsibility of the Laboratory Supervisor in their laboratories. The Laboratory Supervisor/PI is responsible for ensuring compliance in their laboratory at all times.

1. Ensure each employee/student under his or her supervision has received appropriate training.
2. Appropriate training has been provided to **all** occupants of the laboratories.
3. Requesting laboratory/studio safety training through the EH&S Department.
4. Laboratory workers and others entering the laboratory know and follow RIT's CHP.
5. Proper laboratory personal protective equipment (PPE) is worn.
6. Unsafe acts, conditions or inadequate facilities are reported to the Department Manager.
7. Employee and student accidents, injuries, spills, or exposure to chemicals must be reported and documented on the appropriate form(s).
8. Ensure RIT EH&S is involved in reviews of new equipment, chemicals, and/or processes in the laboratory, when applicable.
9. Ensure the RIT hazardous materials procurement process is followed.
    a. Link: https://www.rit.edu/fa/grms/ehs/content/hazardous-material-procurement
10. Inform RIT EH&S prior to developing any chemicals in your laboratories that may be sent for use off RIT's campus.

D. Individual Lab Workers and Students

It is the responsibility of individual lab workers and students to adhere to the following policies while working in the labs at RIT:

1. Conduct each lab operation in accordance with laboratory standard operating procedures (SOPs) and this Plan.
2. Adhere to all departmental policies and procedures.
3. Develop and use good laboratory hygiene habits.
4. Wear appropriate PPE noted for laboratory operations.
5. Report unsafe acts, conditions, or inadequate facilities to your Lab Supervisor.
6. Fill out the appropriate documentation when an accident, injury, spill, or exposure occurs.
7. Complete all required EH&S training applicable to your laboratory operations, including annual lab/studio standard training.

E. Chemical Hygiene Coordinators (CHC)

Chemical Hygiene Coordinators (CHC) are selected by the colleges and/or departments and work alongside the CHO. Each CHC must be qualified by training or experience to provide guidance in the development and implementation of the provisions of the CHP. CHCs have authority to help the CHO administer and enforce the requirements of the Plan.

NOTE: A listing of RIT's Chemical Hygiene Coordinators is provided in **Appendix C** of this document.

F. RIT Laboratory Safety Committee

The RIT Lab/Studio Safety Committee functions as the Chemical Hygiene Committee per the OSHA standard 1910.1450(e)(3)(vii). The committee is compromised of the RIT CHO, the CHCs, and the Director of the EH&S Department, on an as needed basis. Periodically, topic-specific guests are invited to the committee meetings.

G. Contractor's Responsibilities

Contractors are required to develop and implement laboratory/chemical hygiene policy/procedures for their employees who must enter into or work in areas where exposure to hazardous materials cannot be controlled or avoided. This program must meet OSHA requirements. RIT will provide information (i.e. SDSs) to the contractor(s) so the proper PPE selection and laboratory SOPs can be developed and implemented by the contracting firm(s).

4. Standard Operating Procedures for Work with Laboratory Chemicals

A. General Safety Procedures

I. Basic Rules

For every chemical used, laboratory personnel must know and constantly be aware of:

a. The chemical's hazards, as determined from the SDS and other appropriate references that shall be made available to laboratory personnel.

b. Safeguards for using that chemical, including PPE that needs to be worn.

c. The location and proper use of emergency equipment such as eye washes and/or safety showers.

d. How and where to properly store the chemical when it is not in use.

e. Proper personal hygiene practices as outlined in this Plan and laboratory SOPs.

f. Proper methods of transporting chemicals.

g. Procedures for emergencies, including evacuation routes, spill cleanup procedures and proper waste disposal.

h. Follow the EH&S Department's Buddy System Requirements policy. See **Appendix G.**

i. Appropriate signage must be clearly posted outside of lab where an unattended procedure is in progress, which involves particularly hazardous chemicals.

II. Chemical Procurement, Use and Storage

These guidelines must be followed when procuring, using or storing chemicals:

a. Particularly hazardous chemicals that are anticipated to be used in a lab shall be reviewed and approved by EH&S, per Section 4.A.7. The Chemical Usage Questionnaire form found in **Appendix F** will be used to determine what control measures are being used and/or are needed. To reference the hazardous chemicals of concern that will be part of the chemical procurement process, please go to the link list on the RIT EH&S Lab/Studio Safety webpage (**https://www.rit.edu/fa/grms/ehs/content/labstudio-safety),** found on the bottom right side. The chemicals that will require an EH&S review include the: OSHA 13 carcinogens, OSHA Regulated Chemicals, Department of Homeland Security Chemicals of Interest, European Chemicals Agency, Department of Transportation, Drug Enforcement Administration chemicals and peroxide formers.

b. Particularly hazardous chemicals can be purchased by only EH&S "Approved Hazardous Materials Purchasers." For more information on this process, go to the Hazardous Materials Procurement webpage:

(1) https://www.rit.edu/fa/grms/ehs/content/hazardous-material-procurement

c. The chemicals shall be stored in their original container with its label. If the chemical is to be transferred into a new container, that container must be labeled as required. See Section 4.A.6 for labeling and other requirements.

d. Flammable liquids must be stored in approved containers. These containers must be stored in a flammable cabinet when not in use, see Section 5.B. Flammable liquids should not be stored in a laboratory refrigerator unless it is explosion-proof.

e. Minimal amounts of hazardous chemicals should be stored in the laboratory.

f. Use hazardous chemicals and all laboratory equipment only as directed or for their intended purpose.

g. Inspect equipment or apparatus for damage before adding a hazardous chemical. Do not use damaged equipment.

h. Do not store or use hazardous liquids above eye level.

i. Chemical inventories must be conducted on an annual basis. It is the responsibility of each department to maintain their chemical inventories. Unneeded chemicals as defined in Section 11 should be either taken to the local stockroom or inventoried and a list given to your Chemical Hygiene Coordinator who will send out an e-mail about the chemical availability. (See **Appendix C** for listing of Chemical Hygiene Coordinators.) If no other lab requests the chemicals within 30 days, they must be disposed of properly. Expired or obsolete chemicals must be disposed of properly.

j. To determine if chemicals that do not have specific expiration dates are "expired" (inherently waste-like) chemical containers will have been stored in a laboratory for 10 years or greater. CampusOptics will flag expired chemicals if an expiration date is entered as part of the chemical information. Departments should review their chemicals in CampusOptics on an ongoing basis to ensure that expired chemicals are disposed of or that the following steps are taken to determine if the containers may be kept:

   (1) Determine a business case/reason why the chemicals need to be kept while ensuring that they do not pose a safety concern i.e. time sensitive chemicals such as peroxide formers. **(See the RIT EH&S Lab/Studio Safety webpage for examples of time sensitive chemicals under the Management Requirement Section: https://www.rit.edu/fa/grms/ehs/content/labstudio-safety.)** Owning laboratories will need to ensure the quality of the chemical(s), that they will continue to meet their specifications past the 10-year timeframe.

   (2) The department will need to review results of the business case from 8a with RIT EH&S Department. During the review, a timeframe for the chemicals retention will be determined, if deemed needed. Upon EH&S approval, documentation of its continued storage/use will be kept by the applicable laboratory for future reference.

k. Storage trays or secondary containment should be used to minimize spills should a container break or leak.

III. Chemical Inventory

Chemical inventories are an integral part of laboratory safety and emergency preparedness and is effective in minimizing the overstock of hazardous chemicals. Laboratories should strive to minimize the quantities of chemicals in laboratories. Each individual laboratory shall maintain a working inventory of their chemicals through CampusOptics. Particularly hazardous chemicals need to be noted in the chemical inventory as such per Section 4.B.2 of this Plan (i.e. carcinogen). A subset of these hazardous chemicals will be reviewed by EH&S. From these reviews, the EH&S Department will work with users to ensure control measures are in place per Section 4.A.2.

New lab uses of particularly hazardous chemical(s) need to be identified by any of the following options: RIT's approved hazardous material purchaser(s), CHCs, end users, or a laboratory designee. Any of these people need to notify EH&S so that an evaluation can be performed as needed.

IV. Personal Hygiene

Limiting a chemical's ability to contact the body can reduce its ability to do harm. This requires proper use of PPE against the four routes of entry: inhalation, ingestion, injection, and eye/skin contact.

The following personal hygiene practices will help minimize chemical exposure:

a. Rinse with water for at least 15 minutes whenever a chemical has contacted the skin or eyes.
b. Wear appropriate eye protection at all times.
c. Use a laboratory fume hood when handling chemicals to prevent inhalation exposure.
d. Do not mouth pipette anything; use a mechanical pipette.
e. Wash hands and forearms thoroughly with soap and water before leaving the laboratory; do not wash with solvents.
f. Do not eat, drink, smoke, chew gum, or apply cosmetics/lip balm in the laboratory where hazardous chemicals are used.
g. Do not store food or beverages in the same refrigerators, cabinets or counter spaces as chemicals.
h. Avoid working alone in a laboratory. Individuals working in separate laboratories outside of working hours should make arrangement to check on each other periodically. Experiments known to be hazardous should not be undertaken by a worker who is alone in a laboratory. If working alone is necessary, special arrangements will need to be approved locally by lab supervisor or designee. (See Appendix G for further details)
i. Avoid practical jokes or other behavior that might confuse, startle or distract other workers.

j. Handle and store glassware with care to prevent damage.

k. Inspect glassware prior to use, and discard or repair damaged items.

l. Use mechanical means, such as a broom and dustpan, to pick up broken glass.

m. Appropriate, closed toe and closed heal, footwear is required in the laboratories. Some examples of inappropriate footwear includes: bare feet, open-toed shoes, sandals, crocs, sandals with socks, open backed shoes/sandals, and slippers.

n. Laboratory coats should be worn and buttoned whenever handling hazardous chemicals/agents.

o. Chemical resistant aprons may be required when working with certain chemicals. This will be decided by the laboratory supervisor and/or EH&S.

p. Remove contaminated clothing and gloves before leaving laboratory.

q. Avoid direct contact with any chemical. Keep chemicals off your hands, face, and clothing, including shoes. Never smell, inhale or taste a chemical in an attempt to identify it.

V. Housekeeping

Good housekeeping practices contribute greatly toward a safe and healthy working environment. Good housekeeping practices are required of all RIT personnel include:

a. Never block access to emergency equipment, safety showers, eyewashes and exits, even temporarily.

b. Keep all work areas, especially workbenches, clear of clutter and obstructions.

c. Place all chemicals in proper storage areas when not in use.

d. Properly label wastes and keep them in appropriate containers.

e. Promptly clean up all spills and dispose of the spilled and cleanup chemicals in accordance with Section 4.A.9.

f. Clean all working surfaces and floors regularly.

g. Do not store chemicals in aisles or stairwells, on desks or laboratory benches, on floors or in hallways.

h. Chemical(s) not used during a specific laboratory procedure should not be stored in a fume hood.

i. Dispose of broken glassware in a puncture resistant container that is clearly marked “glass only” to avoid injury.

VI. Labeling

Proper labeling of chemical containers is essential in maintaining a safe laboratory. For the purpose of the CHP and laboratory safety evaluations, chemical containers will be classified in the following manner:

a. Manufacturer/Distributor container.
    (1) Employees shall ensure that the manufacturer's label remains on the container and is not removed or defaced.
    (2) Employees shall ensure that labels or other forms of warning are legible, in English, and prominently displayed on the container.
    (3) The date of receipt should be written on the label. This will also help with determining the expiration of chemicals.
    (4) If a label is removed or defaced, a new label will be created indicating the content and hazard ratings of the material.
    (5) Employees who become newly aware of any significant information regarding the hazards of a chemical shall revise the labels for the chemical within three months of becoming aware of the new information.

b. Secondary Storage Containers.
    (1) If a chemical is to be transferred into a new container, that container must be labeled with a description of the contents, appropriate hazard warnings and expiration dates as applicable.
    (2) Employees are not required to label portable containers, into which hazardous chemicals are transferred from labeled containers, and which are intended only for the immediate use of the employee who performs the transfer.

VII. Prior Approval for Laboratory Procedures 1910.1450(e)(3)(v), 1910.1450(f)(4)(i)(C)

Laboratory personnel shall obtain prior approval from the CHO to proceed with a laboratory task whenever:

a. An EH&S review should be conducted for lab processes, if EH&S selected particularly hazardous chemicals are involved. A review should also be conducted if there are new and/or significant changes in meeting EH&S requirements (i.e. adding an exhaust hood, emergency eyebath or shower.) This should be done on an individual basis prior to the start of the procedure and as needed throughout the duration of a project. This type of review should also be done for non-routine hazardous procedures, such as those performed as part of a research project.

b. It is likely that exposures or hazardous reactions may occur.

c. There is a change in a routine procedure or test, even if it is very similar to prior practices. "Change in a procedure or test" means:

   (1) When there is an increase in use of a hazardous chemical of ≥ 1-liter per process for teaching/research laboratories.

   (2) For scale-up research types of processes, when new hazardous chemicals and/or a significant change in EH&S requirements are introduced into the process.

   (3) Substituting a hazardous chemical for any of the other hazardous chemicals in a procedure.

d. There is a failure of any equipment (i.e. exhaust fume hood) and/or accident, injury, exposure that creates significant EH&S concerns.

e. Procedures with particularly hazardous chemicals and situations are performed during times other than normal work hours (8am-5pm), when procedures are unattended, and/or when laboratory personnel perform procedures by themselves. The following notes the procedure that will be followed when working alone, in case of an emergency:

   (1) Determine a buddy system (see Section 11 for a definition);

   (2) Label all labware with their contents;

   (3) Have SDSs available in the vicinity of the process; and

   (4) Ensure contact information is readily available.

Prior approval may be required for certain unattended operations. The Chemical Usage Questionnaire form can be used to assist in this process; found in **Appendix F.**

VIII. Emergency Preparedness

The following items are essential for prompt response to emergencies and should be available in the laboratory:

a. Emergency procedures (See **Appendix H**)

b. Emergency Contact List (See **Appendix D**)

c. SDSs

d. Eyewash/safety shower, if applicable

e. Chemical spill kit

f. Copy of lab procedure

g. First aid kit for minor injuries

IX. Spills and Accidents

For accidents, injuries, or exposures while working in the lab, students need to complete the EH&S Student Accident Report Form. For RIT employees or student employees, fill out the Worker's Compensation Accident/Injury/Illness Report Form. Both forms are available under Procedure on this webpage: https://www.rit.edu/ehs/student-labstudioshop-accidents-injuries-or-exposures-program, the Teaching Assistant, Laboratory Supervisor or other designated individual will make certain the appropriate forms are completed.

For emergency spills that occur in the lab, follow your department's emergency spill procedure(s) and fill out the Spill Report Form if required/requested. An example spill form is found in **Appendix H**.

a. Incidental Releases vs. Emergency Releases

In the event of a spill, it must first be categorized as Incidental or Emergency in order to determine what steps will be necessary for cleanup.

Incidental Release:

Incidental releases refer to minor spills that pose **no** threat to human health, property or the environment. Incidental spills:

- are of a known chemical with low toxicity or a 3 or 4 rating for health, fire and reactivity on SDSs, and generally, but not necessarily, small in volume (less than 500-milliters or one pound). **Please note on Material Safety Data Sheets (MSDS) it would be a 0 or 1 rating;**
- do not disrupt routine operations;
- do not require any other special procedures beyond the immediate clean-up task;
- do not require an evacuation.

Trained laboratory personnel in the area where the spill occurs that have received training in the use of spill clean-up equipment may handle incidental spills.

Emergency Release:
If the release meets one or more of the following conditions, it shall constitute an emergency and require emergency response efforts:

- Over 500-milliters of a liquid or 1-pound of a solid for known chemicals or **any size of acutely toxic, radioactive or unidentified chemical or combination of chemicals** (i.e. strong oxidizers, phenol, reactive, peroxides, carcinogens, P and U listed waste);
- Human fluids, such as but not limited to blood, should ONLY be cleaned up by someone who has received Bloodborne Pathogens training. Refer to the RIT Bloodborne Pathogens Program;
- Mercury spills should only be cleaned up by a qualified employee, such as a stockroom lab technician or the Environmental Health & Safety Department.

In case of chemical spill emergencies, laboratory personnel shall immediately follow the procedures posted to report the spill to the appropriate personnel for emergency responses and spill cleanup. Fire pull stations are located in different areas of the building and shall be used to warn other laboratory personnel of an emergency that requires evacuation. Department personnel will contact Public Safety @ 585-475-3333 to help coordinate the appropriate clean up. Provide the SDS for the chemical(s) involved in the spill to the emergency response team.

b. General Guidelines and Cleanup Techniques for Chemical Releases

The following general guidelines shall be used when dealing with chemical releases:

- the employee(s) should be informed regarding the chemical in use;
- proper PPE is used;
- proper cleanup equipment is available;
- common sense is used;
- notify supervisor and/or Public Safety immediately if at any time conditions change such that the incidental release may become an emergency situation;
- prohibit eating, drinking and smoking where any hazardous substances are spilled;
- dispose of potentially contaminated clothing and PPE;
- tools and machines should go through a decontamination process if contaminated with hazardous substances;
- personnel shall wash and/or shower thoroughly following cleanup; and
- get directions from the supervisor or EH&S for proper disposal of the waste generated from the incidental release clean up.

The following are general spill cleanup techniques that may be used when dealing with chemical releases:

- Containment: Stop the leak. Often, stopping the leak in a can, drum or other container will contain a leaking hazardous chemical. This can be accomplished by: closing valves, discontinuing tank filling to stop tank overflow, transferring liquid from a leaking container to another container, emptying leaking containers, plugging openings, or uprighting containers.
- Confinement: Construct a barrier. To control run-off, it may be useful to confine a chemical by the construction of barriers (dams, dikes, or channels) and to prevent it from: spreading over a larger physical area; mixing with other chemicals; or entering drains, conduits or sewers that lead to surface water. The barriers are formed with chemically inert sorbents, such as diatomaceous earth, vermiculite, or amorphous silicate. Earth or sand bags can also be used. Ensure barrier chemical is compatible with released chemical.
- Remove ignition sources: Remove potential ignition sources when dealing with flammable vapors and gases.
- Ventilation: Ventilate the area of spill if possible.
- Pumping: Pump the spilled liquid chemicals into a container for treatment or disposal.
- Vacuuming: Use an approved vacuum to clean up the spilled chemicals.
- Neutralization: Elimination of the hazardous properties of spilled acids and bases by chemical reaction. **Caution: Before an attempt is made to contain a spill by neutralization, the exact chemistry of the spilled chemical must be known. Using the wrong neutralizer or the wrong concentration of neutralizer can produce very hazardous reactions.**
- Absorption: Absorb the spill on or within the pores of a sorbent. Some sorbents are generally non-reactive and can be used for various chemicals, including acids and bases. Examples of sorbents are straw, clay, vermiculite, activated carbon, and foamed plastic. Universal sorbents are now commercially available for chemicals including acids, caustics, solvents, coolants, etc. **Before using a sorbent on a spilled chemical, it must be ensured that the sorbent is compatible with the chemical and that no adverse chemical reaction will take place.** Sorbents should be applied to a spill carefully, from the outer edges to the center, to reduce the possibility of its spreading.
    - ⇒ When applying a sorbent to a flammable liquid, the following precautions should be taken:
        - ◊ use non-sparking tools to avoid starting a fire;
        - ◊ use caution when cleaning up and disposing of the chemicals, as the sorbent probably will not change the hazardous properties of the spilled chemical; &
        - ◊ follow the disposal procedures recommended for the specific hazardous chemicals.

X. Chemical Waste Disposal

Hazardous and non-hazardous waste generated at the laboratory shall be stored in a labeled, appropriate waste container in the laboratory.

Once hazardous waste containers are filled up (less than or equal to 55-gallons), the waste must be transferred within 3 calendar days from the satellite accumulation area to the 90-day area.

Hazardous chemical wastes are regulated by the Environmental Protection Agency (EPA) under the Resource Conservation and Recovery Act (RCRA) and its amendments. Federal and state regulations promulgated under RCRA classify waste as hazardous if it meets certain criteria as specified in the regulations. If a waste is classified as hazardous, disposal must be in accordance with the regulations. If hazardous wastes are generated in the laboratory, they shall be handled according to the following general guidelines:

a. Prior to generating any new types of chemical wastes, the CHC/appropriate person(s) shall contact EH&S regarding the methods for storing and disposal of the waste.

b. Use the appropriate sized container for accumulating waste.

c. Use the same type of container for waste as that in which the chemical was originally shipped.

d. Do not use corks or stoppers to close containers; use properly fitting screw-on lids with a chemically resistant liner.

e. Never fill containers to the top. Allow space in the container for expansion.

f. Keep containers closed except when filling or emptying.

g. Segregate and store wastes in accordance with laboratory procedures for storage of hazardous chemicals.

h. Do not mix hazardous and non-hazardous waste. This mixture will be regulated as hazardous.

i. Accumulate chlorinated and non-chlorinated solvent waste in separate containers.

j. Avoid mixing different hazardous wastes, even if they are compatible. They may each have different disposal methods.

k. Label all waste containers appropriately.

l. General rules to follow when disposing of hazardous waste:

   (1) Hazardous waste must be placed in a leak-proof container that is in good condition.

   (2) Label the container with the following wording "Hazardous Waste" and the name of the material(s) being placed in the container.
   (3) Keep the container closed at all times unless adding or removing waste.
   (4) Separate waste from incompatible material(s).
   (5) Empty contents of container as much as possible (no visible residual is to be seen) and recap the container for disposal. NOTE: Triple rinse the container if it contained an acutely hazardous waste.

(6) For waste that is water-soluble, use water to triple rinse the container. Place water rinse in an Aqueous Hazardous Waste container.
(7) If the contents are not water soluble, the waste container needs to be rinsed with acetone or ethanol. Solvent rinse is placed in an Organic Hazardous Waste container.
(8) If containers cannot be rendered RCRA empty, dispose of as hazardous waste (i.e. partially filled containers of expired chemicals).
(9) For non-clear waste containers (i.e. metal, opaque, plastic), write "Empty" on the side of the container when the contents is used up.
(10) All rinsed waste containers shall be disposed of properly.
(11) When a container is full or at most when 55-gallons of waste is stored at a location, transfer the waste to the designated waste 90-day storage area.

B. Specific Safety Procedures for Handling Chemicals

The following sections cover specific safety procedures for handling certain groups of chemicals such as toxic, particularly hazardous, flammable and combustible, reactive, corrosive, irritants, time sensitive chemicals and compressed gases.

General handling procedures for all chemicals discussed in Section 4.B:

1. Use chemicals in a laboratory fume hood except where there is only a very low risk of exposure e.g., use of minimal quantities in a closed system.
2. Wear appropriate PPE.
3. Use appropriate personal hygiene and housekeeping practices.
4. Be aware of the signs and symptoms of exposure to the chemical being used via an SDS.

I. Toxic Chemicals

Toxicity is a unique hazard because it can be applicable to all chemicals in the laboratory. Toxicity is the ability of a substance to cause damage to living tissue. Many chemicals used in the laboratory have exposure guidelines that can be found on the SDS. These include recommended limits, such as the regulatory limits established by OSHA, called Permissible Exposure Limits (PELs), American Conference of Governmental Industrial Hygienists' (ACGIH) Threshold Limit Values (TLVs), or other referenced exposure guidelines. When such limits exist, they will be used to determine the proper safety precautions, control measures, and safety apparel to be used when working with toxic chemicals.

II. Particularly Hazardous Chemicals

Particularly hazardous materials are classified as "select carcinogens", reproductive toxins, and substances that have a high degree of acute toxicity require special procedures and precautions.

In general, procedures for handling these particular hazardous chemicals should include:

- Establishing a designated area where the specific procedures will be carried out. These areas should be identified as areas of special hazard, and access should be restricted to personnel who are trained about the hazards and safe handling of the materials.
- Working with these materials in a closed system to reduce exposure risks. This includes the use of containment devices such as laboratory fume hoods, glove boxes and similar equipment. It is also recommended that rooms where "select carcinogens" are used and stored be kept at a slight negative air pressure as compared with other spaces in the facility.
- Developing procedures that include extra precautions on the part of lab workers in maintaining good personal hygiene. No food, beverages, or tobacco products should be permitted in the restricted areas, and workers should wash before leaving the facility.
- Developing procedures for the safe removal of contaminated waste. These should be consistent with the Institute's hazardous waste requirements, and must meet the requirements of the EPA, DEC, and other applicable regulations.
- Some particularly hazardous chemicals may require special decontamination or deactivation procedures. Review chemical specific SDSs or check with RIT's EH&S Department to identify if any special decontamination procedures are required. If they are required, this information should be included in the Chemical Usage Questionnaire **(Appendix F).** Ensure contaminated work surfaces are properly cleaned. Contaminated PPE and waste generated must be disposed of properly.
- Proper training needs to be provided to laboratory personnel who work with these chemical(s).

a. Allergens/Sensitizers

Examples: diazomethane, isocyanates, bichromates

A variety of substances can produce skin and lung hypersensitivity. One should prevent contact with allergens of unknown allergenic activity.

b. Embryotoxins

Examples: organomercurials, lead compounds, formamide

Because the period of greatest susceptibility to embryotoxins is the first 8-12 weeks of pregnancy, which includes a period when a person may not know they are pregnant, people of child bearing potential should take care to avoid skin contact with all chemicals.

- Wear the proper personal protective equipment when working with these types of chemicals.
- Ensure essential engineering controls (e.g. hoods, glove boxes) are operating at the required efficiency before starting any work.
- Review each use of these materials with the lab supervisor/EH&S and review whenever a procedural change is made.
- Store these substances, properly labeled, in an adequately ventilated area in an unbreakable secondary container.
- Notify supervisors of all incidents of exposure of spills; consult a qualified physician when appropriate.

c. Chemicals of Moderate, Chronic, or High Acute Toxicity

Examples: diisopropylflurophosphate, hydrofluoric acid, hydrogen cyanide

Work with chemicals of moderate chronic or high acute toxicity requires supplemental rules to be followed in addition to those mentioned for handling allergens and embryotoxins.

Minimize exposure to these chemicals by any route using all reasonable precautions. These precautions are appropriate for chemicals with moderate, chronic, or high acute toxicity used in significant quantities.

- Use and store these chemicals only in areas of restricted access with special warning signs.
- Use a hood (previously evaluated to confirm adequate performance with a face velocity of at least 100 linear feet per minute) or other containment device for procedures that may result in the generation of aerosols or vapors containing the chemical.
- Avoid skin contact by use of gloves and long sleeves (and other protective apparel as appropriate). Ensure PPE is not defective prior to donning it, conduct an inspection of the PPE).
- Wash hands and arms immediately after working with these chemicals.
- Maintain records for the amounts of these chemicals on hand, amounts used, and the names of the workers involved. This can be documented on the Chemical Usage Questionnaire **(Appendix F).**
- Assure that at least 2 people are present at all times if a compound in use is highly toxic or of unknown toxicity.
- Store breakable containers of these substances in chemically resistant trays; also work and mount apparatus above such trays or cover work and storage surfaces with removable, absorbent, plastic backed paper.
- Prepare for accidents and spills. If a major spill occurs outside the hood, evacuate the area and ensure that cleanup personnel wear suitable protective apparel and equipment.
- Decontaminate contaminated clothing or shoes. If possible, chemically decontaminate them by chemical conversion.
- Store contaminated waste in closed, suitably labeled, impervious containers (for liquids, in glass or plastic bottles half-filled with vermiculite).

d. Chemicals of High Chronic Toxicity

Examples: dimethylmercury, nickel carbonyl, benzo-a-pyrene, N-nitrosodiethylamine, other human carcinogens

Listed below are rules to be followed, in addition to those previously mentioned for work with chemicals of known high chronic toxicity (in quantities above a few milligrams to a few grams, depending on the chemical).

- Conduct all transfers and work with these chemicals in a "controlled area." This may include use of a restricted access hood, glove box, or portion of a lab that is designated for use of highly toxic chemicals. This will allow all people with access to be aware of the substances being used and necessary precautions needed to be followed.
- Prepare a plan for use and disposal of these chemicals and obtain the approval of the laboratory supervisor/EH&S.
- Protect vacuum pumps against contamination by scrubbers or HEPA filters and vent them into the hood.
- Decontaminate vacuum pumps or other contaminated equipment, including glassware, in the hood before removing them from the controlled area.
- Decontaminate the controlled area before normal work is resumed there.
- Ensure appropriate ventilation rate for a negative pressure glove box. This rate must be at least 2-volume changes/hour and pressure at least 0.5 inches of water. For a positive pressure glove box, thoroughly check for leaks before each use. In either case, trap the exit gases or filter them through a HEPA filter and then release them into the hood.
- Use chemical decontamination whenever possible; ensure that containers of contaminated waste (including washings from contaminated flasks) are transferred from the controlled area in a secondary container under the supervision of authorized personnel.
- Use a wet mop or vacuum cleaner equipped with a HEPA filter instead of dry sweeping if the toxic substance is a dry powder.
- Remove any protective apparel (placing it in an appropriate, labeled container) and thoroughly wash hands, forearms, face, and neck, before leaving a controlled area.
- Consult the CHO/EH&S to help with determining the requirements of regular medical surveillance if using toxicologically significant quantities of such a substance on a regular basis (e.g. 3 times a week).
- Assure that the controlled area is conspicuously marked with warning and restricted access signs and that all containers of these chemicals are appropriately labeled with identity and warning labels.
- Store containers of these chemicals only in a ventilated, limited access area in appropriately labeled, unbreakable, chemically resistant, secondary containers.
- Assure that contingency plans, equipment, and chemicals to minimize exposures of people and property in case of accident are available.

III. Flammable and Combustible Chemicals

Flammability is the measure of a solid, liquid or gas's ability to support combustion. A flammable chemical is capable of being easily ignited and burning at a rapid pace. The easier it is to start a chemical burning, the more flammable the chemical is deemed to be.

Handling flammable and combustible chemicals:

a. Use in a laboratory fume hood, away from ignition sources.

b. When transferring from one container to another, use a laboratory fume hood or a designated, properly ventilated area and use proper grounding/bonding procedures if necessary.

c. Extinguish all ignition sources in the area. Never use open flames or hot plates to directly heat flammables.

d. Spontaneously flammable chemicals should be handled in an inert liquid such as mineral oil.

e. Know the location of the nearest fire extinguisher and how to use it.

IV. Reactive Chemicals

Reactivity describes a substance's tendency to undergo chemical reaction either by itself or with other chemicals, releasing energy. Undesirable effects such as pressure buildup; temperature increase; explosion; or formation of noxious, toxic, or corrosive byproducts may occur because of the chemical's reactivity to heating, burning, direct contact with other chemicals, or other conditions in use or in storage. Reactive chemicals include explosives, pressure-generating chemicals, and water reactives.

Handling reactive chemicals:

1. Use in a laboratory fume hood to prevent the release of energy or hazardous fumes into the laboratory.
2. Remain aware of the chemical's incompatibilities.
3. Remain aware of the chemical's useful life.

V. Time Sensitive Chemicals

Time sensitive chemicals are those chemicals that, when stored for prolonged periods or under improper storage conditions, can develop hazards that were not present in the original formulation.

Handling time sensitive chemicals:

a. Must immediately be marked with an expiration date upon receipt and listed in the lab's chemical inventory. The container should also be marked with a date when it is opened.

b. Visually inspect bottles of time sensitive chemicals for expiration dates, crystal formation, discoloration of the liquid, and/or a "mossy" appearance around the cap.

c. If crystals are seen do not handle the container. Immediately call the Environmental Health and Safety Department at (475-2040).

d. All secondary containers must be labeled with hazard information from the original container and with the date of the chemical transfer. These transfer containers should not be ground glass stoppered bottles or bottles with metal foil lined caps.

e. See the RIT EH&S Lab/Studio Safety webpage for examples of time sensitive chemicals.

(1) **NOTE: Chloroform is a time sensitive chemical due to the potential to form phosgene and should be discarded after one year after opening.**

j. All peroxide formers (inorganic peroxides in aqueous solutions and organic solvents) must be tested and labeled per requirements developed by the EH&S Department/RIT Lab/Studio Safety Committee. (See the RIT Lab/Studio Safety webpage for the peroxide forming test procedure and labels that are to be placed on the chemical container(s).)

k. All time sensitive chemicals must be disposed of according to the timeframe noted in the RIT Time Sensitive Chemical listing (See the RIT Lab/Studio Safety webpage for the most current listing: https://www.rit.edu/fa/grms/ehs/content/labstudio-safety). Unopened/opened containers greater than 18 months old must be disposed of, no matter what. Once containers have been opened they must either:

(1) Be disposed of immediately once the noted timeframe is reached (i.e. 3 months or 12 month as flagged on the list) OR

(2) Be tested on a periodic basis for peroxides until the 18 month disposal timeframe is reached.

VI. Corrosive and Irritant Chemicals

Corrosive chemicals can burn or destructively attack living tissue when inhaled, ingested, or absorbed by the skin. Irritant chemicals can also cause similar reactions when in contact with living tissue, but usually to a lesser extent.

Handling of corrosive and irritant chemicals:

a. Use in a laboratory fume hood or area with sufficient ventilation to protect from hazardous fumes.

b. Be aware of the signs and symptoms of exposure.

c. Remain aware of the chemical's incompatibilities.

d. Know the location of the nearest safety shower and eyewash.

VII. Compressed Gas Cylinders

When handling and using compressed gas cylinders, the following procedures shall be followed:

a. Know the contents of a cylinder and be familiar with the properties of that gas. Users shall review SDSs before using any compressed gas.

b. Never use a cylinder that cannot be positively identified. Do not depend on color-coding for gas identification.

c. No one shall deface or remove any markings, labels, decals, tags or stencil marks, which have been applied/attached for the identification of a cylinder.

d. All cylinders must bear an identification tag stating the name of the gas or mixture and illustration of three conditions: full, in service, or empty.

e. Handle cylinders carefully and fasten them in secure manner at all times in an upright position.

f. Use cylinders only with matched connectors and proper Compressed Gas Association regulator. Never install cylinder adapters on a regulator.

g. The cylinder valve shall be positioned so that it is accessible at all times. The main valve MUST be closed when the cylinder is not in active use. NEVER use wrenches or pliers to open the main valve unless it is a specially designed key provided by the supplier. Most cylinders are equipped with a handwheel valve. If the valve is not operational, return to supplier labeled "inoperable".

h. NEVER crack open valves on unregulated cylinders. The main valve on a regulated cylinder should be opened slowly. Never face a gauge while opening a cylinder. Stand to the side in case of a malfunctioning valve.

i. With the cylinder valve open and the flow control valve in the closed position, set the desired delivery pressure by turning the delivery pressure adjusting screw clockwise until the desired pressure is reached. While the function of the regulator is to set and maintain a given gas delivery pressure, flow control is achieved by the use of the flow control valve located at the regulator outlet or by a supplementary needle valve.

j. Always turn off the cylinder by first closing the main cylinder valve and then the regulator. The pressure gauges should be brought back to zero.

k. When cylinders containing different gases are manifolded, one way or check valves should be placed in-line to prevent accidental gas mixtures due to pressure differences.

l. Cylinder manifolds shall be installed under the supervision of someone familiar with the proper practices with reference to their construction and use. All manifolds and parts used in methods of manifolding shall be used only for the gas or gases for which they are approved.

m. NEVER strike an electric arc on or direct a flame at a cylinder.

n. Always wear safety glasses when handling and using compressed gases.

o. Never refill a compressed gas cylinder. They shall be refilled by qualified agencies only. Do not transfer gas from one cylinder to another or mix different gases in a cylinder.

p. Do not repair or alternate cylinder or cylinder attachments.

q. Compressed gas cylinders/tanks, except those designed for use in a horizon position, should be stored in an upright position with the valve end up. Exception: compressed gas containers with a water volume of less than 1.3-gallons (5-Liters) are allowed to be stored in a horizontal position.

r. Store empty cylinders separate from full cylinders.

s. Cylinders not in use should be stored without the regulator attached. Remove the regulator and replace the cap.

t. Store cylinders in well ventilated areas protected from continuous dampness or corrosive vapors.

u. Secure ALL cylinders to a fixed object with chains or straps to prevent movement.

v. Store cylinders at least 20 feet away from flames and other ignition sources.

w. Compressed gas cylinders containing flammable or combustible gas shall not be stored near cylinders containing oxygen or other oxidizing gases.

C. Laboratory's Standard Operating Procedures

Laboratory Standard Operating Procedures (SOPs) require precautionary measures in order to execute each procedure safely. When new laboratory SOPs are developed, a written description of specific safety practices incorporating the applicable precautions described in this CHP must be included. This is especially important when hazardous conditions are present or when particularly hazardous chemicals are used. The employee must read and understand the procedure and its associated safety practices before proceeding. The procedure must be approved by the CHO. Any questions regarding the safe execution of a procedure must be addressed to the supervisor or the CHO before work begins. The Chemical Usage Questionnaire is to be used and is available in **Appendix F.**

5. Control Measures and Equipment

Chemical safety is achieved by continual awareness of chemical hazards and by keeping chemicals under control. Laboratory personnel shall be familiar with the precautions to be taken to prevent injuries and exposures from chemicals, including the proper use of engineering and administrative (workplace) controls and personal protective equipment. Laboratory supervisors should be aware of the proper functioning of their equipment and should arrange for regular inspection and maintenance of the equipment.

Each college's facility manager or designee will test each Local Exhaust Ventilation (LEV) source on an annual basis. Further details on LEV sources requiring testing are noted in Sections 1 and 2.

A. Engineering Controls

An engineering control is a method of controlling employee exposures by modifying the source or reducing the quantity of contaminants released into the environment, i.e. calibrated laboratory fume hoods.
Recirculation hoods and laminar flow hoods are not to be used for work involving hazardous chemicals.

I. General Ventilation Rules

Usually, general dilution ventilation is not sufficient to provide protection from chemical exposures; it is for this reason that work with chemicals should always be done in a laboratory fume hood.

Chemical fume hoods and other specialty ventilation devices must be located away from supply air (air conditioners, ducts), doors, and other openings that interfere with their operation.

Each laboratory should be provided with 6-12 air changes per hour as general laboratory ventilation. This follows good laboratory practices per "Prudent Practices in the Laboratory: Handling and Management of Chemical Hazards."

II. Laboratory Fume Hood

Laboratory fume hoods shall provide a minimum face velocity of 80 feet per minute (fpm) with the sash in the "safe operating position." The maximum face velocity should be 120 fpm. The "safe operating position" is the specific sash height at which a satisfactory face velocity is achieved. Further details can be found in ANSI /ASHRAE standard 110-2016, *Methods of Testing Performance of Laboratory Fume Hoods*.

The following safety precautions shall be observed when using a laboratory fume hood:

a. Fume hood sashes should be kept at the safe operating position at all times when in use, except when adjusting the equipment inside.

f. Verify sufficient inward airflow before using a hood. This can be done by checking the hood's airflow indicator if applicable. Or hold a Kimwipe at the hood sash and ensure inward movement of the Kimwipe towards the back of the hood.

g. Minimize equipment and chemical storage placed in the hood to avoid dead air spaces or eddies and to prevent blocking back baffles.

h. Equipment inside the hood should be placed at least six inches away from the sash to prevent airflow obstruction and air turbulence.

i. Equipment used in hoods should be placed securely on blocks to allow air to flow under and around the equipment.

j. Avoid rapid movements at the face of the hood, as they tend to create competing air currents and reduce the ability of the hood to contain air contaminants.

k. Lab personnel should be aware of the steps to be taken in the event of power failure or other causes of hood failure.

l. Fume hoods shall not be used to "dispose" of chemicals by evaporation.

m. Airflow at the hood shall be verified at least annually. An inspection sticker/form shall be posted on/near the hood whenever an inspection is performed. The RIT EH&S Department's "Hood Air Flow & Preventative Maintenance Form" can be used to document inspections. Contact EH&S to obtain a copy of this form.

n. If a hood is not working properly, the hood should not be used and posted with a sign "Do Not Use." Contact Facilities Management Services to aid in the repair. Once the repairs are complete and the hood is functional, the "Do Not Use" sign can be removed.

o. For operations involving heating or volatilizing perchloric acid, use a perchloric acid fume hood. These hoods contain water spray systems to wash down the interior of the hood, ducting, fan, and stack to prevent accumulation of explosive perchlorate crystalline material.

III. Other Protective Equipment

Other types of protective equipment may be used in laboratories may include the following: exhausted balance enclosures, elephant trunks, slot exhausts, canopy hoods, walk-in hoods, spray paint booths, glove boxes, biosafety cabinets, laminar flow hoods, toxic gas cabinets, and exhausted vacuum systems. These types of equipment must be check annually, at a minimum, to ensure they are working properly.

A resource that can be used for testing laboratory exhaust systems except for laminar flow hoods and biosafety cabinets is: ANSI/AIHA Z 9.5 American National Standard Laboratory Ventilation, 2012.

Glove boxes should be tested according to AGS (American Glove Box Society) 2007 Guide for glove boxes – Third Edition. AGS-G001-2007.

Biosafety cabinets can be certified and tested by the manufacturer or RIT approved company. Cabinets should be certified for performance upon installation using Standard #49, section 6 of the National Sanitation Foundation (NSF).

Contact RIT EH&S Department for further information on testing requirements if a standard is not listed.

B. Storage Containers and Cabinets

Certain chemicals, particularly flammable liquids, acids and bases, must be stored in special containers and/or cabinets in order to minimize their hazards. Storage of hazardous chemicals must be in accordance with provisions of OSHA and applicable life safety code.

I. Flammable Storage Cabinets

Flammable storage cabinets are used for storing flammable liquids in quantities of 10 gallons or greater. These cabinets should be properly used and maintained. The cabinets shall be used according to the manufacturer's instructions and the following safety practices:

- Store only flammable liquids in the cabinet.
- Do not store paper, cardboard or other combustible chemical in the cabinet.
- Do not overload the cabinet; the manufacturer establishes maximum quantity limits for each cabinet.

Here are some general guidelines around the proper storage of chemicals:

Chemical Category	Storage Consideration
Inorganic Acids	Store in an Acids or Corrosive Cabinet. Use secondary containment to separate from other types of acids and bases. (For example: organic acids, inorganic bases, oxidizing acids)
Organic Acids	Store in an Acids or Corrosive Cabinet and in secondary containment to separate from other types of acids and bases. If oxidizing acids are present move them to the flammables cabinet in secondary containment to separate from flammables.
Oxidizing Acids	Store in an Acids or Corrosive Cabinet. Use secondary containment to separate from other types of acids and bases. (For example: inorganic acids, inorganic bases) Remove ALL organic material from this cabinet.
Inorganic Bases	Store in a Bases or Corrosive Cabinet. Use secondary containment to separate from other types of acids and bases. (For example: inorganic acids, oxidizing acids)
Flammable and Combustible Liquids	Store in a Flammables Cabinet (Preferably a metal, commercially manufactured cabinet designed for storage of flammables) 60 gallons of Class 1 Flammables and/or Class 2 Combustibles OR 120 gallons of Class 3 Combustible liquids.
Flammable Metals	According to OSHA guidance, 29 CFR 1910.106(d)(7)(iv), "Materials which react with water will not be stored in the same room with flammable or combustible liquids." Based on this, even though you may have the metals in a separate flammable cabinet, they cannot be in the same room.
Reactives (Water & Explosive Materials)	Due to the varying characteristics of these materials contact EH&S for guidance.
Pyrophorics	Store away from heat/flames, oxidizers and water sources. They can be stored in flammable cabinets, or in glove boxes in inert atmospheres. (If they are not stored in an inert atmosphere, special care must be taken to ensure the integrity of the container as any leak could be detrimental.) Keep containers closed. Check the SDS for incompatibilities when storing pyrophorics.
Gases	Gas cylinders need to be secured by a chain or strap half to three quarters of the way up the cylinder to prevent them from falling.
Organic Peroxides	This material is an organic oxidizer. Store by itself in secondary containment to separate from other organic and inorganic chemicals.
Oxidizers	Store in secondary containment to separate from other organic and inorganic chemicals.
Toxic and Environmentally Hazardous Chemicals	Store in separate Toxics storage area OR in separate secondary containment in a Flammables Storage Cabinet.

C. Personal Protective Equipment (PPE)

Laboratory appropriate personal protective equipment (PPE) should be worn to minimize skin exposure to direct chemical contact. Examples of these types of PPE include: laboratory coats and chemical resistant gloves when working with chemicals. Laboratory personnel shall avoid wearing short-sleeved shirts, shorts or short skirts. Appropriate closed toe and heel footwear is required in the laboratories. Some examples of inappropriate footwear includes: bare feet, open-toes shoes, sandals, crocs, sandals with socks, open backed shoes/sandals, and slippers.

It is the responsibility of each employee to be certain that the appropriate personal protective equipment is worn as necessary.

I. Protective Apparel

Appropriate protective apparel is required for laboratory work and may include lab coats and aprons, gloves, eyewear, shoes/shoe coverings, and/or respirators. Protective apparel protects underlying clothing and skin from minor chemical splashes, and gives the wearer time before skin contact occurs. Protective apparel should meet performance requirements for strength, chemical and thermal resistance, flexibility and ease of cleaning.

Lab coats are mandatory in laboratories where any of the following types of chemicals are being worked with:

- Carcinogens
- Regulated OSHA chemicals
- Mutagens
- Teratogens
- Biohazards (Biosafety Level 2, 3, or 4)
- Radioactives
- Reproductive toxins
- Toxic chemicals
- Highly toxic chemicals
- Irritants
- Sensitizers
- Hepatotoxins
- Nephrotoxins
- Neurotoxins
- Chemicals affecting hematopoietic system
- Corrosives
- Chemicals that damage lungs, skin & mucous membranes

Contact the EH&S Department (475-2040) for further clarification about these chemicals and/or how it applies to your laboratories.

NOTE: Labs that do **not** work with the above chemicals can be reviewed separately by the EH&S Department and the affected colleges to determine what lab coat practice will be followed.

II. Protective Gloves

Appropriate protective gloves shall be worn whenever the potential exists for contact with corrosive, contact-hazard or toxic chemicals, or chemicals of unknown toxicity. Gloves shall be selected on the basis of their compatibility with the chemicals used, the particular hazard involved, and their suitability for the operation being conducted. Before use, gloves shall be inspected for discoloration, punctures and tears. Disposable gloves shall not be reused.

III. Protective Eyewear

Appropriate protective eyewear shall be worn in locations where chemicals are handled or stored. Based on the chemical and/or physical hazards present, the following types of eye protection may be used:

a. **Safety Glasses –** Mainly used for working with solid/liquid chemicals. NOTE: Although side shields offer some protection from chemicals that approach from the side, they do not provide complete protection from all splash scenarios.

b. **Goggles** - Form a liquid-proof seal around the eyes when working with liquid chemicals. Splash goggles with splash-proof sides should be considered used for protection from highly hazardous liquid chemicals, particularly corrosive types of chemicals.

c. **Face Shields** - Protect the face and throat from flying particles and splashed liquid. Should be worn in conjunction with safety glasses with side shields when working with highly hazardous chemicals, corrosives, or hot chemicals. The safety glasses protect the eyes in case a splash is from the side or beneath the shield.

d. **Specialized Eye Protection** - Some protective eyewear protects against specific chemical vapors, fumes and dusts, while others protect against intense light sources (e.g., lasers, ultraviolet light).

IV. Respirators

RIT is required to minimize employee exposure to airborne contaminants through the use of engineering controls; however, if such controls are not feasible or not sufficient to keep contaminant concentrations below regulatory limits, laboratory personnel shall be provided respiratory protection in accordance with the OSHA Respiratory Protection Standard 1910.134.

Should employees have any concerns regarding chemical inhalation hazards for a specific task, the CHO / EH&S shall be contacted to have the process reviewed. If necessary, an employee must receive proper authorization, medical evaluation, training, and fit testing prior to wearing a respirator.

D. Eyewash Stations / Safety Showers/Floor Drains and Cup Sinks

Wherever chemicals have the possibility of damaging the skin or eyes, an emergency supply of water must be available. In a laboratory where these types of chemicals are used, eyewash stations must be equipped. Eyewash stations and safety showers must be readily accessible (within 100 feet or 10 seconds with an unobstructed path) to all laboratory personnel. To ensure their continued usefulness, eyewashes/safety showers must be maintained in accordance with the following guidelines:

- Ensure that access to eyewash stations and/or safety showers is not restricted.
- Post signs identifying the location of each eyewash and/or safety shower.
- Eyewash stations need to be operated weekly and safety showers on a monthly basis, at a minimum, to ensure proper operation and water availability.

- Check eyewash stations weekly follow manufacturer's instruction to ensure that they are working properly.
- Promptly repair or replace malfunctioning eyewashes and/or safety showers.
- At a minimum, floor drains and cup sinks should be filled on a monthly basis to control the generation of potential odors.

E. Fire Extinguishers

Laboratories can be equipped with National Fire Protection Association (NFPA) approved fire extinguishers. Every extinguisher should be labeled for the class of fire for which it is effective. Fires are generally classified as:

Class A - involve burning paper, wood, rags and trash. Water extinguishers are most effective against this type of fire.

Class B - involve burning liquids such as hydrocarbons. Carbon dioxide or dry powder extinguishers are used against this type of fire.

Class C - involve live electrical equipment and is effectively extinguished using carbon dioxide or dry powder extinguishers.

Class D - involve flammable metals such as alkali metals, metal hydrides and metal alkyls. Extinguishers that consist of special granular formulations are effective against metal fires.

Designated personnel shall perform monthly visual inspection and yearly inspection by an outside service company will be done of fire extinguishers. Access to extinguishers shall never be blocked. Only trained personnel are allowed to use fire extinguishers.

6. Exposure Evaluations and Medical Consultations

A. Suspected Exposures to Hazardous Chemicals

There may be times when laboratory personnel suspect that they have been exposed to a hazardous chemical to a degree and in a manner that might have caused harm. The laboratory supervisor, and the CHO/EH&S shall be notified to initiate actions to formally evaluate suspect exposures.

I. Criteria for Reasonable Suspicion of Exposure

In the following cases, it may be determined that monitoring is necessary. This will be determined on a case by case basis. Monitoring will be conducted in accordance with the chemical specific regulations as needed.

a. All employee-reported incidents in which there is even a remote possibility of employee overexposure to a hazardous chemical shall be promptly investigated.

b. Events or circumstances that might reasonably constitute an exposure include:

(1) A hazardous chemical leaked, was spilled, or was otherwise rapidly released in an uncontrolled manner.

(2) A laboratory employee had direct skin or eye contact with a hazardous chemical.

c. A laboratory employee manifests signs or symptoms such as headache, rash, nausea, coughing, tearing, irritation or redness of eyes, irritation of nose or throat, dizziness, loss of motor dexterity or judgment, and:

(1) Some or all of the symptoms disappear when the person is taken away from the exposure area and breathes fresh air, and

(2) The symptoms reappear soon after the employee returns to work with the same hazardous chemicals.

d. Two or more persons in the same laboratory work area have similar complaints.

B. Exposure Evaluations

The CHO/EH&S will document all complaints of possible hazardous chemical exposure along with the decision of appropriate action. If no further evaluation is deemed necessary, the reason for that decision will be included in the documentation. If the decision is made to investigate, a formal exposure evaluation will be initiated.

The purpose of an exposure evaluation is to determine that there was, or was not, an exposure that might have caused harm to one or more employees and, if so, to identify the hazardous chemical(s) involved. The results of the exposure evaluation can be used with other information to make recommendations that will prevent or mitigate future exposures.

Other situations/conditions that may warrant an exposure monitoring/evaluation may include:

- Whenever there is reason to believe that the Action Level, Permissible Exposure Limit (PEL), Threshold Limit Value (TLV), or other applicable exposure guidelines are potentially exceeded.
- Medical information indicates sampling/evaluation is warranted.
- After changes in the work methods or engineering controls have been modified.

I. Steps of the Exposure Evaluation

Unless circumstances suggest other or additional steps, the following steps constitute the exposure evaluation, which will be conducted: (In cases of emergency, exposure evaluations will be conducted after the exposed employee(s) have been treated. Assistance from outside consultants may be needed for certain evaluation aspects.)

a. Interview the complainant and also the exposed individual, if not the same person.

b. List the essential information about the circumstances of the complaint on the optional Exposure Evaluation form which is located in **Appendix H.** (NOTE: This information can be retained via the Worker's Compensation Report process instead of using this form.) **Appendix H is used for students (Student Accident Report form).** Both processes will include collecting the following information, as needed:

(1) The date, time, and location.

(2) Name(s) of person(s) involved.

(3) Location description.

(4) The chemical(s) under suspicion.

(5) Other chemicals used by the exposed individual, if deemed necessary.

(6) Other chemicals stored/used in that area if this information is needed.

(7) Signs or symptoms exhibited or claimed by the exposed individual.

(8) Were control measures, such as laboratory fume hoods and personal protective equipment, used? If so, were they used properly?

(9) Were any air sampling or monitoring devices in place (before, during, after). If so, are their measurements consistent with exposure limits?

(a) Determine whether the victim's symptoms compare to the symptoms associated with the suspect chemicals as described in the SDS or other pertinent scientific literature.

(b) Recommend exposed individual seek medical evaluation if necessary.

(c) Monitor or sample the air in the area for suspect chemicals as needed.

(d) Determine whether the present control measures and safety procedures are adequate.

(e) If monitoring has been conducted and airborne concentrations are below occupational exposure guidelines, monitoring will be terminated unless otherwise directed by a chemical specific standard. (NOTE: Action Levels and/or PELs are the exposure guidelines referenced. Monitoring frequency requirements are noted in each specific OSHA regulated chemical standard.)

II. Notification of Monitoring Results

Employees shall be notified of the results of any monitoring within 15 days of receipt of those results unless otherwise specified in the OSHA chemical specific standards. The notification will be in writing/e-mail, either individually or by posting in an appropriate location accessible to employees.

C. Medical Consultation and Examination

NOTE: In emergency situations where injury or illness is obvious, the affected employee shall be provided immediate medical care.

When, from the results of the exposure evaluation, it is suspected or known that an employee was overexposed to a hazardous chemical(s), the employee shall be provided an opportunity to receive prompt medical attention. A medical consultation shall be provided by or under the direct supervision of a licensed physician for the purpose of determining the need for a medical examination. NOTE: When warranted, the employee shall be provided a medical examination by or under the direct supervision of a licensed physician who is experienced in evaluating and treating chemical overexposures. The physician will determine the details of medical consultations and examinations. The examination and consultations will be provided to the employee at no cost, without loss of pay and provided at a reasonable time and place.

I. All employees who work with hazardous chemicals shall be provided an opportunity to receive medical consultation and examination when:

   a. The employee develops signs or symptoms associated with a hazardous chemical to which the employee may have been exposed in the laboratory.

   b. Monitoring reveals an exposure level routinely above the Action Level, PEL, TLV or other applicable occupational exposure guidelines.

   c. There is a spill, leak, or other uncontrolled release resulting in the likelihood of exposure to hazardous chemicals.

II. At the time of the medical consultation, the physician shall be furnished with the following information:

   a. The identity of the hazardous chemical(s) to which the employee may have been exposed.

   b. The exposure conditions, including quantitative data, if available.

   c. The signs and symptoms of exposure the employee is experiencing, if any.

III. Following the medical consultation or examination, the examining physician shall provide RIT EH&S / CHO with a written opinion which shall include:

   a. Recommendations for follow-up, if any.

   b. A record of the results of the consultation and, if applicable, of the examination and any associated tests.

   c. Conclusions concerning any other medical condition noted that could put the employee at increased risk from exposure to hazardous chemicals in the workplace.

   d. A statement that the employee has been informed of the results of the consultation/examination and of any medical condition that may require further examination or treatment.

The examining physician will notify employees of the results of any medical consultation or examination with regard to any medical condition that exists or might exist as a result of overexposure to a hazardous chemical.

The written statements and medical records shall not reveal specific findings that are not related to an occupational exposure.

D. Documentation

All memos, notes, and reports related to a complaint of actual or possible exposure to hazardous chemicals are to be maintained as part of the record in accordance with **Section 7** of this Plan.

7. Records and Recordkeeping

EH&S shall maintain records of exposure monitoring results or assessments, exposure evaluation forms/documentation (See **Appendix H**), accident investigations and medical consultations and examinations for duration of employment plus thirty years (1910.1020(j)(1 and 2), 1910.1020(d)(1)(i), and 1910.1450(j)(1 & 2) and shall make them accessible to employees, their representatives and the Assistant Secretary upon request.

Chemical Usage Questionnaires shall be retained for 6 years from the date they are submitted. All other important documents related to the distribution and maintenance of SDSs, to the training of laboratory personnel, and to significant employee suggestions shall be retained for the lifetime of RIT. RIT shall also comply with the recordkeeping requirements of the EPA and other federal and state agencies that regulate hazardous waste.

8. Employee Training

A. All personnel that work in a laboratory are required to attend training at the time of an employee's initial assignment to an area and annually thereafter. Training covers the following topics:
   1. An understanding of the content and intent of the OSHA standard (29 CFR 1910.1450).
   2. The RIT Laboratory and CHP including its location and availability.
   3. The existence of standard operating procedures and their applicability to the laboratory.

Additional information provided per laboratory specific to the activities conducted in the laboratory should include:

- The Permissible Exposure Limits for OSHA regulated chemicals used in their lab or other recommended occupational exposure guidelines in the absence of an OSHA standard.
- What physical and chemical hazards they may encounter in the laboratory.
- Signs and symptoms associated with exposures to hazardous chemicals used in the laboratory.
- How to protect themselves from these hazards. This would include methods and observations that may be used to detect the presence or release of hazardous chemicals. (This may include monitoring that has been conducted, continuous monitoring devices, and/or visual appearance or odor of a chemical.)
- Where to find information about the use and hazards of chemicals such as: handling procedures, proper storage and disposal and where to find the SDSs. Additional literature and consulting advice concerning chemical hygiene is also available to laboratory personnel through the RIT EH&S Department. Laboratory personnel will be instructed to the availability and are encouraged to use all of these resources.
- The location and instructions on how to properly use emergency equipment, such as safety showers, and eyewashes.
- The location and types of personal protective equipment (PPE) available. Some general rules around the use of PPE will also be covered.

B. RIT's shipping and receiving personnel are trained via Hazard Communication to know about the hazards of chemicals, handling equipment, protective apparel and relevant regulations.

C. Additional retraining is required of all laboratory personnel when new exposure situations arise in the laboratory and will be provided through the laboratory supervisor, or the RIT EH&S Department, as applicable.

D. Appropriate documentation of laboratory standard training will be made available through the Center for Professional Development (CPD) with the help of the RIT EH&S Department.

E. Some of the full-time personnel of the laboratory should be trained in the proper use of emergency equipment and procedures.

9. Program Evaluation

On an annual basis, the RIT EH&S Department shall review the Chemical Hygiene Plan/program and requirements to ensure effectiveness and workability. Furthermore, all program points shall be reviewed in comparison to current State and Federal Regulations to ensure proper compliance. An optional tool that can be used to perform this evaluation is located in **Appendix I**.

Any changes to this written Plan shall be documented in the Document Changes/Revision History Log located in **Appendix J.**

10. Implementation and Disciplinary Actions

This program shall be managed through each department, with assistance from the RIT EH&S Department. The steps in the implementation of the program shall consist of:

A. EH&S will assist in identifying the hazards and exposures within the department.

B. The individual departments with assistance from EH&S will identify laboratory personnel subject to such exposures and ensure proper exposure monitoring occurs.

C. EH&S will help departments with completion/approval of chemical usage questionnaire(s), as applicable.

D. The individual departments will be responsible for obtaining PPE through purchasing when required. EH&S will assist by making the appropriate PPE determinations.

E. Employee training is required annually per **Section 8** of this program.

F. EH&S and other applicable departments will collaborate to determine appropriate engineering controls that are needed. This will in turn help eliminate/reduce exposures to hazardous materials.

G. Monitoring to ensure compliance with the program.

Failure to follow the guidelines established by this Plan shall result in retraining and/or disciplinary action in accordance with procedures established by the Human Resources Department and the Department Manager. *Simply, following what is outlined in this Laboratory and Chemical Hygiene Plan is an expectation of the job for laboratory personnel and failure to follow the plan will not be tolerated.*

11. Definitions

- *Buddy system* - A procedure that is established by each college for their associated laboratories where students, faculty, or staff are working with hazardous chemicals and/or situations. This process will ensure assistance is provided in case of an accident or emergency. This process is needed for after hours and non-routine business hours. Possible options for this process involve pairing of individuals within a lab or having individuals that are working on the same floor periodically check in on each other via walking by or calling each other on a periodic basis. See **Appendix G** for further information about the RIT Buddy System policy.

- *Chemical Hygiene Plan (CHP)* - A written program setting forth procedures, equipment, personal protective equipment, and work practices to protect students and employees from the health hazards associated with laboratory work.

- *Hazardous Chemical* - any chemical which is classified as a physical hazard or a health hazard, a simple asphyxiant, combustible dust, pyrophoric gas, or hazard not otherwise classified.

- *Incidental Spills* – Defined as less than 500-milliters (mls) of a known chemical with low toxicity that personnel are comfortable with and can manage safely. These spills should be cleaned up by the authorized Lab personnel, Professor or Main Stores Lab Technician. Please read and use the proper spill procedures as noted in the spill cleanup kit when addressing a caustic, acid or solvent chemical spill.

- *Laboratory* - A facility, using relatively small quantities of hazardous chemicals on a non-production basis in reactions, transfers, etc. Containers are easily manipulated by one person and multiple chemicals and/or chemical procedures are conducted. "Dry" laboratories such as computer labs are not covered by this policy. Protective practices and equipment is available and used to minimize the potential for exposure to laboratory workers to hazardous chemicals.

- *Particularly Hazardous Chemicals (Substances)* - Consists of select carcinogens, reproductive toxins, and chemicals with high acute toxicity (also known as "highly toxic").

- *Personal Protective Equipment (PPE)* – Any devices or clothing worn by employees/students to protect against hazards in the working environment. Examples include: gloves, goggles, face shields, and lab coats.

- *Standard Operating Procedures (SOPs)* - documents that outline the minimum mandatory practices that laboratory personnel must follow in order to safely work with a specific class of chemicals or type of hazard in the laboratory.

- *Time Sensitive Chemicals* – are any chemicals or chemical mixtures that develop additional hazards upon prolonged storage. Examples of these types of chemicals include peroxidizables (peroxide formers), polynitrated aromatics, chloroform, and anhydrous HF/Hydrogen Bromide.

- *Toxicity* - The potential for a substance to exert a harmful effect on humans or animals and a description of the effect and the conditions or concentrations under which the effect takes place.
- *Unneeded Chemicals* – are any chemicals or chemical mixtures which have not been used in a laboratory within the past 5 years and/or for which there are no future plans to use.

Appendices

Appendix A

29 CFR 1910.1450

See 29 CFR 1910 Laboratory standard (Occupational exposure to hazardous chemicals in laboratories):

http://www.osha.gov/pls/oshaweb/owadisp.show_document?p_table=STANDARDS&p_id=10106

for a copy of the latest standard

Appendix B

EH&S Departmental Contact Names

EH&S Departmental Contact List

Environmental Health and Safety

Cindy White, Laboratory Safety Program Manager
Bldg. 99 Suite 1280
(585) 475-4980

Mike Eveland, Environmental Programs Manager
Bldg. 99 Suite 1280
(585) 475-4230

Phil VanChieri, Health & Safety Programs Manager
Bldg. 99 Suite 1280
(585) 475-6270

Sarah Klein, Director, EH&S
Bldg. 99 Suite 1280
(585) 475-7092

Appendix C

Chemical Hygiene Coordinators

List of Coordinators

COLLEGE / AREA	CONTACT NAME	PHONE NUMBER
College of Science (COS) COS-Chemistry	Dave Lake Tom Allston David Kozlowski	(47)5-2937 / 208-7804 (c) (47)5-6034 / 519-6651 (c) (47)5-7116 / (716) 785-5343(c)
College of Health Sciences and Technology	Kim Corbett	(47)5-6039 / 328-1492 (home)
College of Science-Life Sciences	Emily Coon	(47)5-4041
College of Science- Physics	Scott Russell	(47)5-5172
College of Science-Center for Imaging Science	Eduardo Machado	(47)5-2170 /
College of Arts & Design (CAD) 7A	Will Tracey	(585) 492-2908 (c)
College of Arts & Design (CAD) 7B	Kevin Lamark	(47)5-2794 / (585) 301-0330 (c)
College of Engineering – Semiconductor Microsystems Fabrication Lab – Operations Manager	Stephen Polly	(47)5-6811/315-569-2477 (c)
Center for Integrated Manufacturing Studies (CIMS)/Golisano Institute of Sustainability (GIS)/ CIMS-Printing Applications Lab (PAL)	Ross Hisert	(47)5-5941 / (518) 488-7305 (c)
National Technical Institute for the Deaf (NTID)	Christopher Knigga	643-1285 (work) 635-8484 (text number)
College of Engineering Technology (CET)	Leslie Gregg Steve Praino Teresa Wolcott	(47)5-4521/ 362-7251 (c) (47)5-2680 (47)5-5589
Nanopower Research Labs	Ross Hisert	(47)5-5941 / (518)477-7305 (c)
Chemical Engineering	Paul Gregorius	(47)5-4196 / (585)322-2694 (c)
Biomedical Engineering	Ian Brooks	(585)485-3230 c
Electrical and MicroElectrical Engineering	Vince Antonicelli	(47)5-2121 / (585)259-6863 (c)
Mechanical Engineering	Jan Maneti	(47)5-7718 / 775-9459 (c)
Industrial and Systems Engineering	Robert Kraynik	(47)5-6573
CET Center for Electronics Manufacturing & Assembly	Jeffrey Lonneville	(47)5-4908 / 281-8690 (c)
SHED	Mike Buffalin	(47)5-6559/(949)636-7421 (c)
Battery Prototype Lab	Anthony Leggiero	(47)5-2734 / (315)480-5969 c

Appendix D

Emergency Contact List

In Case of Emergency:

REASON FOR CALL	AREA/PERSON TO CALL	PHONE NUMBER
Fire, Ambulance, General Emergencies	Public Safety	(47)5-3333 For Deaf Community (TTY) (47)5-6654
General Phone Number	Public Safety	(47)5-2853 For Deaf Community (TTY) (47)5-6654
Escorts, Motor Assistance	Public Safety	(47)5-2853
Parking Office		(47)5-2074
Sexual Assault Information Hotline		546-2777
Lost & Found	Public Safety	(47)5-2853
Spills, accidents, or exposures	Environmental, Health & Safety	(47)5-2040

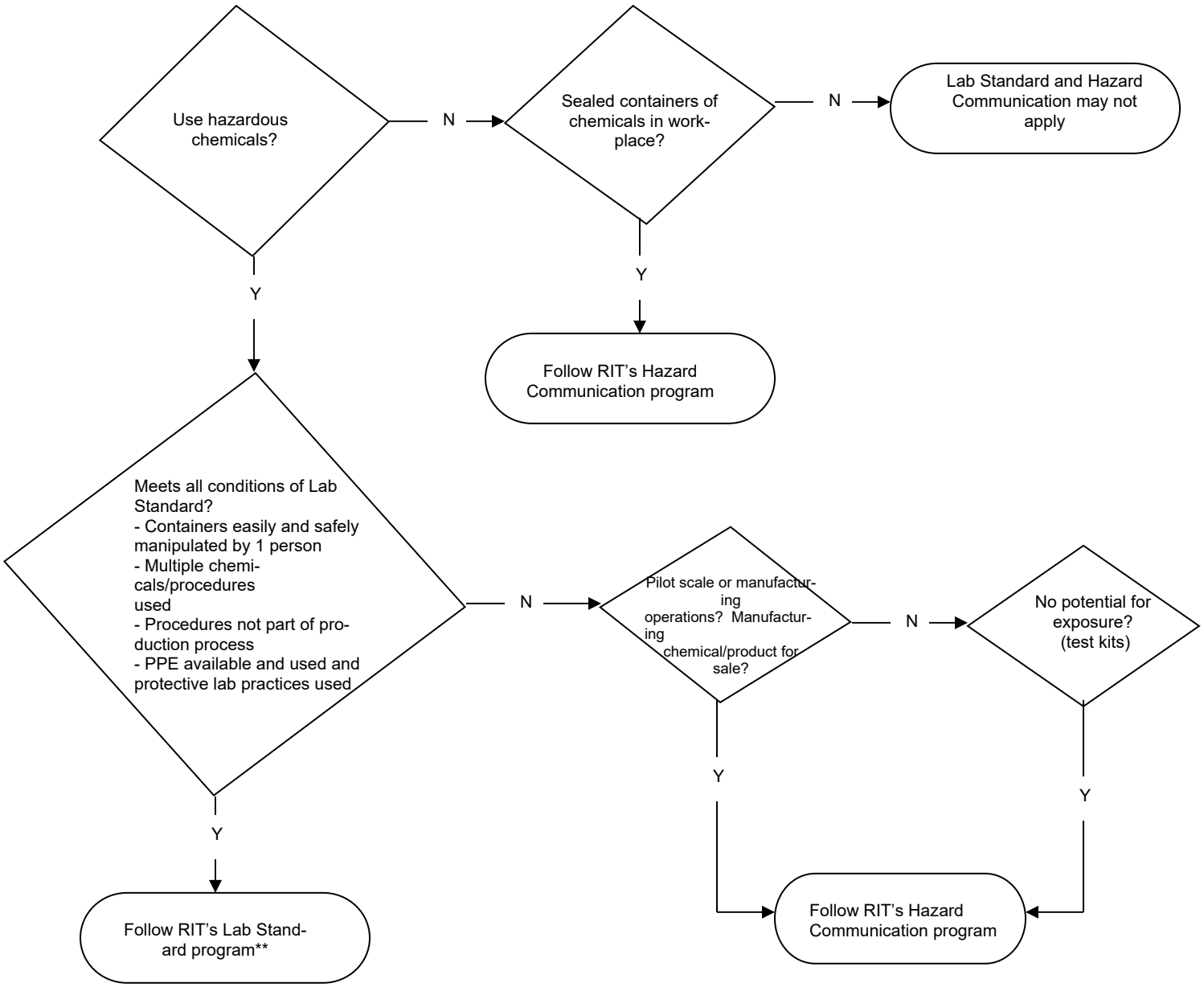
COLLEGE / AREA	CONTACT NAME	PHONE NUMBER
College of Engineering-EME Department	Vince Antonicelli	(47)5-2121 / (585)259-6863 (c)
College of Science (COS) COS-Chemistry	David Kozlowski Tom Allston	(47)5-5759 / 716-785-5343 (c) 519-6651 (c)
College of Science	Dave Lake	(47)5-5759 (work) 208-7804 (c) 494-1658 (h)
College of Health Sciences and Technology	Kim Corbett	(47)5-6039 / 328-1492 (h)
College of Arts & Design	Michael Dear Will Tracey	(47)5-2669 (585) 492-2908 (47)5-2794
College of Engineering- Microsystems Fabrication Lab Operations Manager	Tom Grimsley	(47)5-2912 / 314-2473 (c) 388-1569 (h)
College of Engineering-Mechanical Engineering	Jan Maneti	(47)5-7718 / 775-9459 (c)
Center for Integrated Manufacturing Studies (CIMS) & Golisano Institute for Sustainability (GIS)	Ross Hisert	(47)5-5941 / (518) 488-7305 (c)
National Technical Institute for the Deaf (NTID)	Chris Knigga	643-1285 (work) 635-8484 (text number)
College of Science-Center for Imaging Science	Eduardo Machado	(47)5-2170
College of Engineering and Technology (CET)	Leslie Gregg	(47)5-4521 / 362-7251 (c)
Chemical Engineering Biomedical Engineering	Paul Gregorius Ian Brooks	(47)5-4196 (585)485-3230 c
Nanopower Research Labs (NPRL)	Ross Hisert	(47)5-5941
SHED	Mike Buffalin	(47)5-6559/(949)636-7421 (c)
Battery Prototype Lab	Anthony Leggiero	(47)5-2734 / (315)480-5969 c

Appendix E

Lab Standard Hazard Communication Applicability Flowchart

Lab Standard / Hazard Communication Applicability

Intended to assist in determining whether a laboratory falls under the Lab Standard or Hazard Communication Standard*



* Other chemical specific regulations and requirements, such as the Toxic Substance Control Act (TSCA), Resource Conservation and Recovery Act (RCRA), and Process Safety Management (PSM), may still apply, but are outside of this scope of this program.

** RIT's Lab Standard program includes Hazard Communication responsibilities for laboratories that send chemicals outside of the laboratory.

Examples of Lab Standard operations: research and development operations, pilot areas that do not sell product or chemicals.

Examples of Hazard Communication operations: pilot operations that simulate production processes, quality control laboratories (perform procedures that assure reliability of a product or a process*****), laboratories synthesizing chemicals for sale, laboratories that sell product, manufacturing operations.

***OSHA Letter of Interpretation dated October 11, 1990.**

Appendix F

Chemical Usage Questionnaire Form

CHEMICAL USE QUESTIONNAIRE

Chemical Name & CAS #:							Date:	
Training taken (i.e. annual lab safety, bloodborne pathogens):								
Emergency Phone Number: 475-3333	**Requestor:**		**Phone:**	**Dept. Name:**	**Rm #:**	**Floor:**	**Bldg:**	**Hood:**
Number of Potential Users: (list names)								
Physical State of Chemical: Gas / Liquid / Solid			**Amount Used per Procedure:** mLs or L / g or Kg		**Frequency of Use:** x a day / x a week / x a month			
Temperature of Procedure: Ambient / °C / °F			**Storage of Chemical:** Exhausted Cabinet / Chemical Cabinet / Other:		**Amount of Chemical Stored:** Cylinders / mL or L / g or Kg			
How is the chemical used in the laboratory? (details of the process)	>							
What are the handling and disposal procedures?	>							
Is the chemical used in a posted regulated area in the lab? (signage and MSDS/SDS)	Yes ___ No ____		Comment, if needed.					

4. What personal protective equipment (PPE) is used for the operation?	**Gloves:**	**Eye Protection:**	**Protective Clothing:**	**Respirators:**
	Nitrile ____	Face shield ____	Lab Coats ____	Supplied Air ____
	Neoprene ____	Goggles ____	Aprons ____	Full face ____
	Latex ____	Glasses w/	Tyvek Suits ____	Half face ____
	N. rubber ____	side shields ____	Other types: ____	Disposable ____
	Other:			

What engineering controls are used?	**Exhaust Type:**	**Exhaust operational: (Y or N)**	**Date of Certification:**	**Flow Rate:**
	Certified hood			
	Balance enclosure			
	Local exhaust			
	Is emergency safety equipment in vicinity? Where are they located (i.e.. eye wash, safety shower, fire extinguisher):			

6. Are there applicable buddy system requirements? (if yes, indicate tier)	Yes ___ No ___	Comments:
	Tier 1 _____ **Tier 2 _____**	
	Tier 3 _____ **Tier 4 _____**	

***RIT EH&S must be notified of any changes that would increase employee exposure to these chemical(s).**

This section to be completed by RIT EH&S:									
Is representative exposure monitoring data available?			YES			NO			
Rational:									
Anticipate Exposure:		Comments:							
< AL									
>AL <PEL									
>PEL/TLV									
> STEL									
>Ceiling									
Approved by CHO:	Yes		No		**By:**		**Date:**		

Appendix G

Buddy System Requirements

Institute Buddy System

The Buddy System is designed to ensure the safety of individuals working alone in labs/studios after hours, especially when hazardous chemicals or situations are present. A hazardous chemical or situation is one that may pose a threat to human health or physical safety.

A Buddy is someone who meets the following requirements:

- Has taken applicable safety training for the area, when the buddy is in the room with the student or employee while he/she is working,
- Is preferably a RIT student, faculty or staff member,
- Is available and able to be in communication or in the room for the duration of the time the individual will be working alone, and
- Knows the number for RIT Public Safety and knows to call if a situation should arise, such as loss of contact with the individual working alone.

If the buddy will not be in the room with the individual working in the lab, the following information must be filled out on a sign-in sheet:

Date	Name of person working in the lab	Contact Info (Phone or email)	Time In	Time Out	Contact Info for Buddy (Phone or email)

Options for sign in sheets:

- Door Hanger
- Plastic sleeve outside of door on wall
- Designated sign-in area with sheet (See Above)
- Designated "Buddy System Area" sign
- Online form

Institute Buddy System

BUDDY SYSTEM PROCEDURES:

If your work requires a buddy, you must:

1. Identify which tier your work falls under, using the requirements in Table 1.
2. If you are not working directly with any of the hazards listed, you fall into Tier 4. A buddy is recommended.
3. Determine who your buddy will be and notify them of: the building and room number you will be in, the materials/equipment you will be working with, associated hazards, and the time period during which you will be working.
4. If the buddy is not required to be in the room with you (Tier 2 & 3), set up a communication schedule and check in with your buddy on a pre-established, periodic basis (via phone call, text, or email, etc.).
5. Ensure the buddy has your contact information and the contact information for Public Safety. Instruct your buddy to contact Public Safety immediately should a scheduled check-in be missed and you cannot be reached.
    a. RIT Public Safety ~ Phone: 585-475-3333 or Text: 585-205-8333
    b. Provide your name and location
    c. Contact your buddy prior to work to let them know you will be going into the lab/ studio area, and let them know when you leave the area.

Notes:

1. These are the minimum requirements for establishing a buddy system. Specific colleges/ departments may be more restrictive with their process.
2. If you will be in a machine shop, working directly with and identified hazard, you MUST have a buddy. If you will be in a shop, but not working directly with any hazards, a buddy is recommended but not required. Follow the Shop Safety Buddy System Procedures.

Attachments: Table 1. Breakdown of Tiers and Associated Risk.

Rev. Date: 1.31.2024

EHS Buddy System Requirements Based on Hazard

(Specific Requirements may be modified on a case by case basis by appropriate Supervision/Management.)

Risk Category	Chemical Safety	Biosafety	Laser/Radiation Safety	Buddy Requirements
Tier 1: Highly Hazardous	You will be working directly with any chemical that: • is an unstable explosive, is explosive (mass explosion hazard, severe projection hazard, or fire, blast or projection hazard), may mass explode in fire; • Is extremely flammable, heating may cause an explosion, catches fire spontaneously if exposed to air, is self-heating (may catch fire); • when in contact with water releases flammable gases which may ignite spontaneously, may intensify fire (oxidizer), may cause fire or explosion (strong oxidizer); and/or • is fatal or toxic in contact with skin, causes severe burns and eye damage, causes serious eye damage, or is fatal or toxic if inhaled. **Any chemical that is on OSHA's Particularly Hazardous Substances (PHSs) List, is rated NFPA 3-4, HMIS 3-4, or GHS 1-2 for any Hazard Category, or has an NFPA Specific Hazard Designation.**	You will be working with any agent classified as **Biohazard Level 3 or4**: bioagents that pose a significant threat to humans. **Examples:** HIV, anthrax, typhus, parasites such as Plasmodium falciparum and Trypanosoma cruzi, Ebola virus.	You will be working with **open beam Class IIIB and/or IV Laser(s)** or in an area labeled as a **Very High Radiation Area.**	**You must have a buddy in the lab/shop with you.** This buddy must be trained according to the particular hazards/area you will be working in. Ensure the buddy knows the proper procedures for contacting Public Safety in case of an emergency.
Tier 2: Moderately Hazardous	You will be working directly with any chemical that: • Is a fire or projection hazard, flammable or highly flammable, heating may cause fire or explosion, is self-heating in large quantities (may catch fire); • when in contact with water releases flammable gas, may intensify fire (oxidizer); • is harmful in contact with skin, causes serious eye irritation, is harmful if inhaled, may cause allergy or asthma symptoms or breathing difficulties if inhaled; and/or • may cause genetic defects or cancer, or causes damage to organs. **Any chemical that is rated NFPA 2, HMIS 2, or GHS 3 for any Hazard Category.**	You will be working with any agent classified as **Biohazard Level 2**: bioagents associated with human diseases. **Examples:** Hepatitis A, B, and C, Influenza A, salmonella, pathogenic *Escherichia coli*	You will be working in an area labeled as a **High Radiation Area.**	**Have a buddy on-site but not necessarily in the lab /shop with you.** You must have a predetermined communication schedule. Ensure the buddy knows the proper procedures for contacting Public Safety in case of an emergency.
Tier 3: Slightly Hazardous	You will be working directly with a chemical that: • is a combustible liquid, heating may cause fire; • may be harmful in contact with skin, causes skin irritation or mild skin irritation, may cause an allergic skin reaction, causes eye irritation; • may be harmful if inhaled, may cause respiratory irritation, may cause drowsiness or dizziness; and/or • is suspected of causing genetic defects or cancer, or may cause damage to organs. **Any chemical that is rated NFPA 1, HMIS 1, or GHS 4 for any Hazard Category.**	You will be working with any agent classified as **Biohazard Level 1**: At this level precautions against the biohazardous materials in question are minimal, most likely involving the use of gloves and possibly facial protection. **Examples:** Bacteria and viruses including *Bacillus subtilis*, *canine hepatitis*, varicella (chicken pox), as well as some cell cultures and non-infectious bacteria.	You will be working with sealed sources or low power (Class IIIa) open beam lasers.	**Have a buddy who can be off-site but with a predetermined communication schedule.** Ensure the buddy knows the proper procedures for contacting Public Safety in case of an emergency.
Tier 4: No associated hazards	You will not be working with **any** chemicals or only with minimal hazards. **Any chemical rated NFPA 0, HMIS 0, or GHS 5 for any Hazard Category.**	You will not be working with **any** biological agents.	You will not be working with **any** hazardous materials (Ex: Class I and II, IIA Lasers), or you will be working with **interlocked** equipment (interlocked SEMs, TEMs, or lasers).	**You are not required to have a buddy**, but it is suggested that you let someone know you are working in the lab/shop.

****NOTE:** The lists of examples are not exhaustive. Not all relevant hazards are mentioned, these are just some common Examples. Always check manufacturer's information or MSDS/SDS for more information about hazards associated with use.

*****NOTE:** A projection hazard is defined as a present risk of projectiles during an explosion

Contact information for Public Safety:

585-475-3333 (V/TTY) or RITPublicSafety (AIM)

Appendix H

Reference Materials

- Student Accident Report Form
- Example Spill Report Form
- Example Emergency Spill Procedure
- Optional Employee Exposure Evaluation Form

Environmental Health and Safety
Student Accident/Incident Report Form

Please complete this form within 24 hours of the event, or by the end of the next business day.
An *accident* is an event that results in an injury or exposure. An *incident* does not result in an injury, it can also be known as a "near miss."

Personal Information

Full Name of student (please print):

Last Name | First Name | M.I.

Courses Involved: | College where incident occurred:

Birth Date: | University ID Number: | Student Status (Circle/Highlight One): 1st Year 2nd Year 3rd Year 4th Year 5th Year Grad

Home address OR RIT Housing Address (Apt #/Bldg. # Rm. #):

Student's E-Mail Address: | Home Phone: ( ) | Student Phone: ( )

Event Information

Bldg./Rm # Where Event Occurred (Bldg. # Rm.#)	Type of Injury (e.g. cut, sprain, chemical splash)	Body Part Injured (e.g. hand, finger, head, arm, etc.)	Event Date (mm/dd/yyyy) / /

Statement of how event occurred, (cause and any tools or chemicals involved. Add concentration/type of chemical, if known).
_____
_____
_____

Was an office/lab first aid kit used? Yes_____ No_____

Was additional Medical Care Provided?
RIT Ambulance_____ Student Health_____ Other Ambulance/Emergency response Agency_____
Hospital (include name)_____Other (specify)_____

Was online Lab Safety Or Studio Safety training taken? Yes_____ No_____

Were MSDS(s)/SDS(s) available at time of exposure? Yes_____ No_____ N/A_____

Type of Engineering Controls used? Lab Hood _____ Exhaust Ventilation _____ N/A _____
Other (please note type) _____

Personal Protective Equipment used? If Yes note the types (e.g. safety glasses, gloves, lab coat) _____
_____

Witness and/or Instructor Information

Witness Comments:_____
_____
_____

	Last	First	M.I.	Phone#	E-Mail Address
Witness' Name:					
Instructor's Name:					

Student Signature

By signing this form, you (the student) acknowledge that the information above is current and true to the best of your knowledge.

Student Signature:_____ Date: / /

Public Safety Report - To Be Completed By EH&S ONLY

What type of event was this? ☐Accident ☐Incident (near miss) ☐Exposure

Public Safety Report #:	Officer That Completed the Report:	IH Monitoring Conducted? Yes_____ No_____	

After completion of this form, forward it to RIT Environmental Health and Safety Office; Dept. Head; Lab Supervisor and Chemical Hygiene Coordinator for the Dept/College or Building Facility Manager.

The student accident report form may also be downloaded from the RIT EH&S website.

Environmental Health and Safety

Spill Report

(To be completed immediately following incident)

Chemical ☐ Blood ☐ Report Date/Time (Date form is filled out) _____

Reporting Person Information			
Name (please print):			University ID Number*:*
Last	First	M.I.	
Phone:			RIT Address (Apt #/Bldg-Rm #):

Signature:

If an injury or exposure occurred as a result of, or during this spill, a student accident report form must also be filled out.

Chemical Information			
Bldg/Rm # where Spill Occurred	Location/Area if outside of a building	Quantity Released	Incident Date/Time

Chemical involved: (Product Name, Chemical Name, Formula) Be Specific

_____

Concentration:

_____

Statement of how the incident occurred. Include all relevant information.

_____

_____

_____

What measures, if any, were taken to contain the spill?

_____

_____

What actions were taken to clean up the spill?

_____

_____

_____

Who, if anyone, did you contact anyone regarding this spill?_____

Was Cleanup Provided? Yes_____ No_____ If yes, by whom? (TA/ RA or EH&S) _____

List any existing or potential hazards that either caused or resulted from the incident:

_____

_____

_____

After completion of this form, forward it to RIT Environmental Health and Safety Office; Dept Head; Lab Supervisor and Chemical Hygiene Coordinator for the Dept/College or Building Facility Manager.

The spill report form may also be downloaded from the RIT EH&S website.

Example Emergency Spill Procedure

Incidental Spills: Defined as are generally, but not necessarily, small in volume (less than 500-milliliters or one pound of a known chemical with low toxicity or a 0 or 1 rating for health, fire and reactivity) that personnel are comfortable with and can manage safely. These spills should be cleaned up by the authorized Lab personnel, Professor or a Stockroom Lab Technician. Please read and use the proper spill procedures as noted in the spill cleanup kit when addressing a caustic, acid or solvent chemical spill.

Always consult the MSDS/SDS and use the proper PPE when cleaning up a spill

Emergency Spills: Defined as over 500-milliliters of a liquid or 1-pound of a solid for known chemicals or **any size of acutely toxic, radioactive or unidentified chemical or combination of chemicals** (i.e. strong oxidizers, phenol, reactive, peroxide, carcinogen, P and U listed waste). Please evacuate the room and report the spill immediately to:

Stockroom Technician @ x_____ (8am-5pm Monday – Friday)
Public Safety @ x-333 (585) (475-3333) (After hours)
EH&S @ (585) (475-4230)
Professor/Lab Supervisor @ x-_____

Be prepared to give the chemical name, volume spilled, location (building and room), and any other pertinent information. Have a person knowledgeable of the incident and laboratory available to provide information to responding personnel.

If a spill requires the use of a respirator, or if you are unsure of the nature of the spill, do not expose yourself to the situation. Call EH&S and/or Public Safety.

If you are contaminated by the spill: Remove all clothing in contact with chemical and flush area with water (unless water reactive) for at least 15 minutes. If there is contact with eyes use an eye-wash station for a minimum of 15 minutes. While rinsing, have someone get to a phone immediately and contact Public Safety. If ingested, immediately review the SDS for emergency procedures. Inform the emergency responders of the type and amount of the chemical ingested and provide the SDS to them.

Human fluids: Situations involving human blood, urine or saliva should only be cleaned up by someone who has received Bloodborne Pathogen Training. Please contact either the Stockroom Lab Technician or Public Safety.

Mercury Spills: Should only be cleaned up by a Lab Technician or someone within EH&S.

If you have any questions about spill procedures noted above please do not hesitate to contact: Note the name of the contact person and their phone number here.

OPTIONAL EMPLOYEE EXPOSURE EVALUATION FORM

Date: ___/___/___ Time: _____a.m./p.m. Location: _____

Name(s) of person(s) involved: _____

_____

Location Description: _____

_____

_____

The chemical(s) under suspicion: _____

MSDS/SDS available? _____

Other chemicals used by the individual(s): _____

_____

_____

Other chemicals stored/used in that area: _____

_____

_____

Signs/Symptoms exhibited or claimed by the exposed individual(s):_____

_____

_____

_____

_____

Were control measures, such as laboratory hoods and personal protective equipment, used(list)? If so, were they used properly? _____

_____

_____

_____

_____

Were any air sampling or monitoring devices in place (before, during, after)? If so, are their measurements consistent with exposure limits? _____

_____

Signature of Reviewer _____ Date _____

Appendix I

Optional Program Evaluation Tool

Rochester Institute of Technology
OPTIONAL: LAB STANDARD/CHEMICAL HYGIENE PROGRAM ASSESSMENT

Area or Department Assessed:	Assessor:	Date:

Description of Requirement	Compliant?
A. Chemical Hygiene Plan (CHP)	
Has a CHP been written?	☐ Yes ☐ No
Are responsibilities listed in the CHP and assigned?	☐ Yes ☐ No
Are Standard Operating Procedures in place in laboratories where EH&S designated particularly hazardous chemicals are used?	☐ Yes ☐ No
Are controls in place to reduce exposure to hazardous chemicals (i.e. engineering controls, PPE including respirators when deemed necessary, work practices)	☐ Yes ☐ No
Are fume hoods and other protective equipment being evaluated to ensure adequate performance?	☐ Yes ☐ No
Are provisions in place for additional employee protection for EH&S designated particularly hazardous chemicals?	☐ Yes ☐ No
Are prior approvals of new hazardous operations being conducted that meet the definition per RIT's CHP (See Section 4.1.7 of RIT's CHP)?	☐ Yes ☐ No
B. Chemical Hygiene Officer (CHO)	
Has management designated a Chemical Hygiene Officer (CHO)?	☐ Yes ☐ No
Does management understand the responsibilities of the CHO and provide sufficient time, resources and authority?	☐ Yes ☐ No
C. Lab Standard Chemical Hygiene Training	
1. Have laboratory workers attended training class prior to working in the laboratory?	☐ Yes ☐ No
2. Have laboratory workers been informed of the hazardous chemicals in their laboratories and proper precautions to take to minimize exposure?	☐ Yes ☐ No
3. Have laboratory workers been informed and trained on the hazards in the laboratory?	☐ Yes ☐ No
D. Medical Consultation and Examinations	
Is medical consultation by a licensed physician available for all employees?	☐ Yes ☐ No
Are medical examinations available when employees who develop signs/symptoms associated with hazardous chemical(s), when exposure monitoring reveals the need for exams, and/or when spills/leaks/explosions occur?	☐ Yes ☐ No
Is the physician provided information about the exposure (chemical exposed to and under what conditions, signs/symptoms employee is experiencing)	☐ Yes ☐ No
Has a written opinion been provided to RIT by the physician based on the consult/exam?	☐ Yes ☐ No

Description of Requirement	Compliant?
E. Hazard Identification	
Are all manufacturer labels on incoming chemical containers left intact?	☐ Yes ☐ No
Are MSDSs/SDSs available and readily accessible for all hazardous chemicals?	☐ Yes ☐ No
Have in-house chemicals/mixtures been reviewed to determine if they meet the definition of hazardous? (This is for chemicals developed and used in the laboratory.)	☐ Yes ☐ No
Are chemicals produced as unknown byproducts labeled as hazardous and part of the CHP to ensure safe handling?	☐ Yes ☐ No
Are chemicals produced for users outside the laboratory following RIT's Hazard Communications Plan requirements?	☐ Yes ☐ No
F. Recordkeeping	
1. Is industrial hygiene monitoring information maintained related to employee exposure(s)?	☐ Yes ☐ No
2. Are medical consults and exams including tests and medical opinions maintained?	☐ Yes ☐ No

Appendix J

Document Changes/Revision History Log

Document Changes/Revision History Log

Date of Latest Review/Revision	Comments on Review/Revision and Affected Sections	Person(s) Making Review/Revision
8/08	Original	Judy Foster
9/08	Final review of original-version 1	Dave Armanini
11/08	Update contact names/numbers in appendices Update sections around footwear (4.1.4, 5.3) Changes throughout document-version 2,3, &4	Judy Foster
1-3/09	Update Plan to reflect Legal's comments-most sections contain changes-version 3	Judy Foster
9/09	Update sections 4.1.2 and 4.1.3 around chemical inventories-v4	Judy Foster
11/09	Update Section 5.2.1 to quantify when cabinets are required to be used-v5	Judy Foster
1/10	Update sections 4.1.2 chemical inventories-unneeded/expired/time sensitive chemicals, Add new Appendix I (listing of time sensitive chemicals), add time sensitive/unneeded chemical definitions-v6	Judy Foster
5/10	Finalize sections 4.1.2 chemical inventories-unneeded/expired/time sensitive chemicals, Remove Appendix I (listing of time sensitive chemicals), add time sensitive/unneeded chemical definitions, Update TOC & Appendices listing-v7	Judy Foster
6/10	Combine Template SOP form and Chemical Usage Questionnaire into one & references to SOP change to CUQ instead, change Time Sensitive Chemical section, update CUQ form-v8	Judy Foster
10/10	Update hazardous waste disposal (Section 4.1.10) Update Appendices C &D-v9	Judy Foster

Date of Latest Review/Revision	Comments on Review/Revision and Affected Sections	Person(s) Making Review/Revision
11-12/10	Update Sections 4.1.2 and 4.17 (Chemical Procurement Process) Update hazardous waste disposal (Section 4.1.10 - add further details about triple rinsing process for hazardous waste-v10	Judy Foster
1-2/11	Update Appendices C, D Time Sensitive Chemical section-v11	Judy Foster
3-4/11	Update section 4.2.5 around Time Sensitive Chemicals-disposal and testing requirements Update section 5.3.1-v12	Judy Foster
2-4/12	Update section 3.3 # 2 & 9 v13 Sections 4.1.2.8 and 8.1.4 were updated/added Updated Appendices E & H Update wording throughout CHP-v13	Judy Foster
10/12	Updated Appendices C, D-v14	Judy Foster
4/2013	Update title of plan to Chemical Hygiene Plan, section 9	Judy Foster
8/2013	Updated Appendices C, D v16	Judy Foster
4/2014	Updates throughout document. Replaced ChemTracker with new system-MSDSOnline, add the buddy system policy (App G)	Judy Foster
5/2014	Updated Appendices C & D	Judy Foster
4/2015	Updated Appendices C & D, Reviewed whole plan w/ minor word changes	Judy Foster
9/2015	Updated Appendices C & D	Judy Foster
	Updates throughout document	Judy Foster
4/2016	Updated Emergency contacts and Coordinators	Sandy DeCarlo
4/2017	Annual Review	Judy Foster
4/2018	Annual Review- add reference to the hazardous procurement process in appropriate sections of CHP-section 3. Updated student accident form.	Judy Foster

Date of Latest Review/Revision	Comments on Review/Revision and Affected Sections	Person(s) Making Review/Revision
8/2018	Updated Appendix C & D	Judy Foster
4/2019	Updated Appendix B, C, D & E. Added section 4.2.5 #6. Minor changes throughout the plan	Judy Foster
11/2019	Updated section 5.1.1 with general ventilation requirements	Judy Foster
1/2024	Annual Review Updated the general format to be consistent with other RIT Programs Updated the appendices for accurate contact information and RIT branding Minor changes throughout the plan	Peter Zellers