Developing Safety Guidelines for Acutely Toxic Chemicals

Purpose: Develop a reference document that can be used by a Principle Investigator or a designee to assist in the development of Safety Operating Procedures (SOP) for acutely toxic chemicals.

The following elements below should be included when developing safety guidelines for acutely toxic chemicals:

A. Hazard Summary

These guidelines are intended to provide general guidance on how to safely work with acutely toxic chemicals.

- Toxic chemicals are defined as those with an LD50 value for oral exposure in rats of 50-500 mg/kg, for skin contact in rabbits of 200-100 mg/kg, or for inhalation exposure in rats of 200-2000 ppm/air.

- Highly toxic chemicals are defined as those with an LD50 value for oral exposure in rats of less than 50500 mg/kg, for skin contact in rabbits of less than 200100 mg/kg, or for inhalation exposure in rats of less than 2002000 ppm/air.

- An acutely toxic chemical causes damage in a relatively short time after a single concentrated dose. Irritation, burns, illness, or death may result. These substances may cause severe inflammation, shock, collapse or even sudden death when inhaled in high concentrations.

Examples include: Hydrogen Cyanide, Hydrogen Sulfide, Nitrogen Dioxide, Carbon Monoxide, Ammonia

- Highly toxic gases are a chemical that has a median lethal concentration in air of 200ppm by volume or less of gas or vapor, or 2mg/L or less of mist, fume, or dust, when administered by continuous inhalation for 1 hour. Examples: nitrogen dioxide, cyanogen, phosgene, fluorine, nitric oxide, chlorine pentafluoride, arsenic, chlorine trifluoride, sulfur tetrafluoride, and hydrogen selenide.
B. **Special Handling Procedures and Storage Requirements**

Handling processes should be designed to minimize the potential for splash, splatter, or other likely scenarios for accidental contact. The handling of these materials needs to be conducted in a fume hood. If the process does not permit the handling of such materials in a fume hood, the lab personnel should contact Environmental Health and Safety at x4-4036 for review the adequacy of ventilation measures.

- For use of highly toxic materials, a designated area shall be established where limited access, special procedures, knowledge, and work skills are required. A designated area can be the entire laboratory, a specific laboratory workbench, or a laboratory hood. Designated areas must be clearly marked with signs that identify the chemical hazard and include an appropriate warning; for example: **WARNING! HYDROFLUORIC ACID WORK AREA – HIGHLY TOXIC MATERIAL.**

- Upon leaving the designated area, remove any personal protective equipment worn and wash hands, forearms, face, and neck.

- After each use (or day), wipe down the immediate work area and equipment to prevent accumulation of chemical residue.

- At the end of each project, thoroughly decontaminate the designated area before resuming normal laboratory work in the area.

C. **Personal Protective Equipment**
At minimum, safety glasses, lab coat, long pants, and closed toed shoes are to be worn when entering laboratories having hazardous chemicals.

If the use of an N95, half mask, or full face respirator is requested, the individual and/or their supervisor must first contact Environmental Health & Safety for a consultation to determine if respirator use is necessary. If EH&S determines the use of a respirator is necessary, the individual must participate in the University’s respirator program. This includes a medical evaluation; respirator fit test, and training.

• Eye protection in the form of safety glasses must be worn at all times when handling acutely toxic chemicals. Ordinary prescription glasses do not provide adequate protection. Adequate safety glasses must meet the requirements of the Practice for Occupational and Educational Eye and Face Protection (ANSI Z.87.1 1989) and must be equipped with side shields. Safety glasses with side shields do not provide adequate protection from splashes, therefore, when the potential for splash hazard exists other eye protection and/or face protection must be worn.

• Disposable nitrile gloves provide adequate protection against accidental hand contact with small quantities of most laboratory chemicals. However, the handling of some acutely toxic chemicals will require chemical resistant gloves. Lab workers should review the MSDS for the acutely toxic agents.

D. **Spill and Accident Procedures**

If there is a spill involving an extremely hazardous chemical, emergency responders should be contacted immediately. Dial 911 during and after normal business hours to contact the local emergency responders for your area and provide detail information to the emergency responders including chemical name, volume, hazards, spill location, and any injuries incurred.

Building occupants can be notified of a building evacuation through the activation of a fire alarm pull station.

**Personnel:** If lab personnel is exposed to an extremely hazardous chemical, call 911 immediately. Remove any contaminated clothing, and IMMEDIATELY flush contaminated skin with water for at least 15 minutes following any skin contact. For eye
exposures, IMMEDIATELY flush eyes with water for at least 15 minutes. Consult MSDS for guidance on appropriate first aid. Where medical attention is required, ensure to bring along MSDS(s) of chemical(s) to aid medical staff in proper diagnosis and treatment.

Fire and Emergency Evacuation Procedures:

In case of fire or emergency situation, call 911 and or use emergency blue phone immediately to notify the fire emergency services and campus police.

- Immediately evacuate the building via the nearest exit when the fire alarm is activated.
- If unable to evacuate due to a disability, shelter in the area of rescue / refuge, typically a stairwell landing, and wait for assistance from drill volunteers or emergency responders.
- Instruct visitors and students to evacuate and assist them in locating the nearest exit.
- Do not use elevators to exit the building during an evacuation as they may become inoperable.
- Carry only those personal belongings that are within the immediate vicinity.
- Close doors to limit the potential spread of smoke and fire.
- Terminate all hazardous operations and power off equipment.
- Close all hazardous materials containers.
- Remain outside of the building until the building is released for reentry.
- Do not restrict or impede the evacuation.
- Convene in the designated grassy gathering area and await instruction from emergency responders or drill volunteers. Avoid parking lots.
- Report fire alarm deficiencies, (e.g., trouble hearing the alarm) to facilities personnel for repair.
- Notify evacuation drill volunteers or emergency responders of persons sheltering in the areas of rescue/ refuge.
- Never assume that an alarm is a “false alarm”. Treat all fire alarm activations as emergencies. Get out of the building!

Laboratory Incident Reporting
The Laboratory/Studio and Field Incident Report form is to be completed by the Lab Manager/Teaching Assistant/Instructor for any incident that occurs in any University of South Florida affiliated teaching or research laboratory/studio or field research project.
An incident means any unplanned event within the scope of a procedure that causes, or has the potential to cause, an injury or illness and/or damage to equipment, buildings, or the natural environment. Please fill out the online Laboratory/Studio and Field Incident Report form below and submit to Environmental Health & Safety within 24 hours of the incident. Due to medical privacy concerns, no personal identifying information of the person involved in the incident shall be entered or submitted with the form.

http://usfweb2.usf.edu/eh&s/labsafety/LabIncident.html

E. Waste Disposal
All chemical waste generated within USF System laboratories are considered hazardous waste and must be disposed of as hazardous waste in accordance with USF Hazardous Waste Management Procedure, the EPA, and the DEP. The USF Hazardous Waste Management Procedure can be found using the following link, http://compass.custhelp.com/app/answers/detail/a_id/1118/kw/hazardous%20waste.

• The EPA has designated certain chemical wastes as "acutely hazardous" and placed special restrictions on their accumulation and disposal. These "P-Listed" wastes and their empty containers must be disposed of as hazardous waste through the EH&S Hazardous Waste Program. Please label even empty containers of P-Listed wastes as "Hazardous Waste" and dispose of through the normal hazardous waste processes.

F. Minimum Training Requirements
All individuals working with chemicals in USF laboratories must take EH&S’s Laboratory & Research Safety Training. To register for Laboratory & Research Training, please use the following link, http://usfweb2.usf.edu/eh&s/labsafety/tmaterials.html.

Depending on the type of extremely hazardous chemicals you will be working with in your lab, additional safety training may be required by the PI, EH&S, or an authorizing unit such as the Biosafety or Radiation Safety programs.

G. Approval Required
In some instances, prior approval may be required to use an extremely hazardous chemical within the lab. Please consult with PI regarding need for prior approval.