THE UNIVERSITY OF THE INCARNATE WORD

CHEMICAL SAFETY HANDBOOK

Rev. 2020

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1.0 Purpose

The purpose of this handbook is to provide a written document which complies with regulations set forth by the Occupational Safety & Health Administration (OSHA) Hazard Communication Standard to align with the United Nations Global Harmonization System (GHS).

1.1 Objective

The objective of this Chemical Safety Handbook is to serve as the written Hazard Communication Plan and Chemical Hygiene Plan for: The University of the Incarnate Word (UIW), Incarnate Word High School and Saint Anthony's Catholic High School. This document will provide safety guidelines to those employees who work with or are exposed to hazardous chemicals in the routine course of their job duties. This handbook provides general information to employees and students in the use and handling of hazardous chemicals. Topics addressed include information on Safety Data Sheets (SDSs), container labeling requirements, safe handling, use, storage and disposal of hazardous chemicals, and employee training programs. Additionally, this handbook provides definitions of hazardous chemicals, factors affecting chemical action on the body, emergency procedures, proper personal protective equipment (PPE), first aid, and employee 'rights to understand' applying the Global Harmonization System.

The Chemical Safety Handbook is not intended to be an extensive or fully comprehensive manual, but rather a guide for knowledgeable faculty, staff, and students. Additional information regarding hazards associated with specific hazardous chemicals should be obtained through consultation with Environmental Health Safety and Risk Management's (EHSRM) Chemical Hygiene Officer and the Director of Environmental Health Safety and Risk Management. All faculty and staff with exposure to hazardous chemicals must be familiar with the requirements set forth in this manual and comply with the rules under the Occupational Safety & Health Administration (OSHA) Hazard Communication Standard. All occupational operations conducted in UIW facilities must be performed in accordance with the applicable requirements of this handbook.

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1.2 Responsibilities

The OSHA Hazard Communication Standard is intended to address the issue of classifying the potential hazards of chemicals, and communicating information concerning hazards (e.g. development and implementation of employee training programs regarding hazards of chemicals), protective measures and appropriate protective measures to employees (e.g. lists of hazardous chemicals present and labeling of containers of chemicals in the workplace), and to preempt any legislative or regulatory enactments of a state, or political subdivision of a state, pertaining to this subject.

1.3 Employee Rights

- Access to copies of SDSs
- Access to their chemical exposures
- The employee must receive training on chemical hazards
- The employee must have access to appropriate PPE and associated training

1.4 Chemical Hygiene Officer

The Chemical Hygiene Officer (CHO) is an employee who has been designated by the employer. The CHO must be qualified by training or experience to provide technical guidance in the development and implementation of the provision of the Chemical Hygiene Plan. In accordance with OSHA standards, the CHO will be appointed by the Director of EHSRM.

1.5 Chemical Hygiene Officer Responsibilities

a) Notify employees of their rights under OSHA
b) Compile and maintain workplace chemical list
c) Train all exposed employees regarding the hazards associated with the chemicals in use
d) Provide an available paper or electronic database of SDS
e) Provide training to emergency response personnel
f) Conduct annual laboratory safety evaluations

1.6 Responsibilities of Principal Investigator or Responsible Supervisor

Individuals must follow all guidelines, policies and regulations presented in this handbook.

a) Comply with and enforce all UIW standards, policies, procedures and referenced material regarding the use, handling, containment and disposal of all hazardous chemicals as outlined in this handbook.
b) Provide timely request for any activity that introduces new hazards or hazardous materials.
c) Clearly inform supervisors when a new activity may introduce new hazards or materials.
d) Ensure staff and students are trained and aware of all hazards, safe handling and disposal of hazardous chemicals.
e) Ensure appropriate PPE are supplied to staff and students and ensure they are trained on the appropriate use of PPE.
f) Ensuring safety equipment is available in the laboratory and used when necessary.
g) Complete necessary documentation to report potential over exposures and injuries
h) Report all hazardous material spills as soon as possible to University Police and EHSRM.

1.7 Responsibilities for Students, Employees and Volunteers:

a) Comply with all established safety procedures and policies.
b) Maintain awareness of the potential risks associated with assigned duties.
c) Attend required training classes.
d) Take all necessary safety precautions pertinent to their job duties.
e) Wear appropriate PPE.
f) Inform their immediate supervisor or the EHSRM Office of any unsafe conditions.
g) Inform their immediate supervisor of any injuries or exposures.
h) Report to their immediate supervisor of any change in their health status if there is a possibility it may be work-related.

1.8 Reporting a Safety Concern

- All safety concerns should be brought to the attention of your immediate supervisor or the EHSRM Office at 210-805-3068 or 210-829-6035.
- The Occupational Safety and Health Act of 1970 gives employees the right to file complaints about workplace safety and health hazards. The Act also gives complainants the right to request that their names not be revealed to their employers.

1.9 Imminently Dangerous to Life and Health

If conditions are observed that could result in imminent danger to life, health, or facilities, corrective actions will be taken to immediately shut down all operations.

2.0 Safety Data Sheets (SDS)

2.1 Definition

Safety Data Sheets (SDSs) are documents containing hazard and safe handling information that is prepared in accordance with the requirements of the Hazard Communication Standard. The Hazard Communication Standard (HCS) (29 CFR 1910.1200(g)), revised in 2012, requires that the chemical manufacturer, distributor, or importer provide Safety Data Sheets (SDSs) for each hazardous chemical to downstream users to communicate information on these hazards. Suppliers of hazardous chemicals are required to supply a SDS. A current SDS is one that contains the most recent significant hazard information for the hazardous chemicals as determined by the chemicals manufacturer. An appropriate SDS is one which conforms to the most current requirements set forth by OSHA standards.

2.2 Requirements

Each work area is responsible for ensuring that all personnel have access to a paper or electronic copy of the SDS for all hazardous chemicals used and stored in their immediate area during all work shifts.

2.3 Components of a SDS (16 sections)

All SDSs must contain:

- Identification
- Hazard(s) Identification
- Composition/Information on Ingredients
- First-Aid Measures
- Fire-Fighting Measures
- Accidental Release Measures
- Handling and Storage
- Exposure Controls/Personal Protection
- Physical and Chemical Properties
- Stability and Reactivity
- Toxilogical Information
- Ecological Information (non-mandatory)
- Disposal Considerations (non-mandatory)
- Transport Information (non-mandatory)
- Regulatory Information (non-mandatory)
- Other Information

2.4 How to obtain a SDS

- Certain areas may decide to keep SDSs in binders. This is a good choice where employees do not have access to computer-based SDS.
- If all employees have access to the internet you can obtain SDSs through the EHSRM website at http://www.uiw.edu/safety/ or a Google search.

Example SDS

SAFETY DATA SHEET
Solvent Wipe #120

Printed: 05/25/2011
Revision: 09/12/2009

1. Product and Company Identification

Product Code: SOLVENT #120
Product Name: Solvent Wipe #120
Reference #: AVS 1241014
Company Name: Standardized Sanitation Systems,Inc
141 Middlesex Turnpike
Burlington, MA 01803

Emergency Contact: Emergency (404)422-2071
Information: (617)273-2020

Product Category: Solvents

2. Hazards Identification

Flammable Liquids, Category 2
Serious Eye Damage/Eye Irritation, Category 2A
Target Organ Systemic Toxicity (single exposure), Category 3

Danger **Warning**

GHS Hazard Phrases:
H225: Highly flammable liquid and vapor
H319: Causes serious eye irritation
H335: May cause respiratory irritation.

GHS Precaution Phrases:
P233: Keep container tightly closed.
P210: Keep away from {heat/sparks/open flames/hot surfaces}. - No smoking.
P280: Wear protective gloves/clothing and eye/face protection as specified by the manufacturer/supplier or the competent authority.
P240: Ground/bond container and receiving equipment - if the explosive is electrostatically sensitive.
P241: Use explosion-proof electrical/ventilating/lighting/... equipment ... other specified by the manufacturer/supplier or the competent authority. - if dust clouds can occur.
P243: Take precautionary measures against static discharge.
P242: Use only non-sparking tools.
P264: Wash hands thoroughly after handling.
P271: Use only outdoors or in a well-ventilated area.
P261: Avoid breathing dust/fume/gas/mist/vapours/spray.

GHS Response Phrases:
P370+378: In case of fire, use ... for extinction ... appropriate media specified by the manufacturer/supplier or the competent authority - if water increases risk.
P303+361+353: IF ON SKIN (or hair): Remove/take off immediately all contaminated clothing. Rinse skin with water/shower.
P305+351+338: IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.
P337+313: If eye irritation persists, get medical advice/attention.
P309+311: Call a POISON CENTER or doctor/physician if exposed or you feel unwell.
P304+340: IF INHALED: Remove victim to fresh air and keep at rest in a position comfortable for breathing.

GHS Storage and Disposal Phrases:
P403+235: Store in cool/well-ventilated place.
P501: Dispose of contents/container to ... (in accordance with local/regional/national/international regulation).
P405: Store locked up.
P403+233: Store container tightly closed in well-ventilated place - if product is as volatile as to generate hazardous atmosphere.

GHS format

3.0 Container labeling and Postings

3.1 Requirements

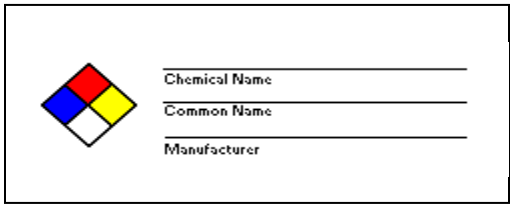
All containers of hazardous materials must be labeled at all times. If, for any reason these labels are removed or become illegible, the containers must be re-labeled.

3.2 Labeling of Secondary Containers

When transfers are made from the stock bottles to secondary containers, these secondary containers must be properly labeled. Examples of secondary containers include but are not limited to glass or plastic bottles, squirt bottles, test tubes, Erlenmeyer flasks, and beakers. It is important to note here that **all** containers must be properly labeled even if they do not contain hazardous materials. Secondary containers which have greater that 1% of a hazardous chemical or greater that 0.1% of a highly toxic or acutely hazardous chemical by volume must be labeled as follows:

1. Chemical Name
2. Hazard Warning
3. Date received/prepared

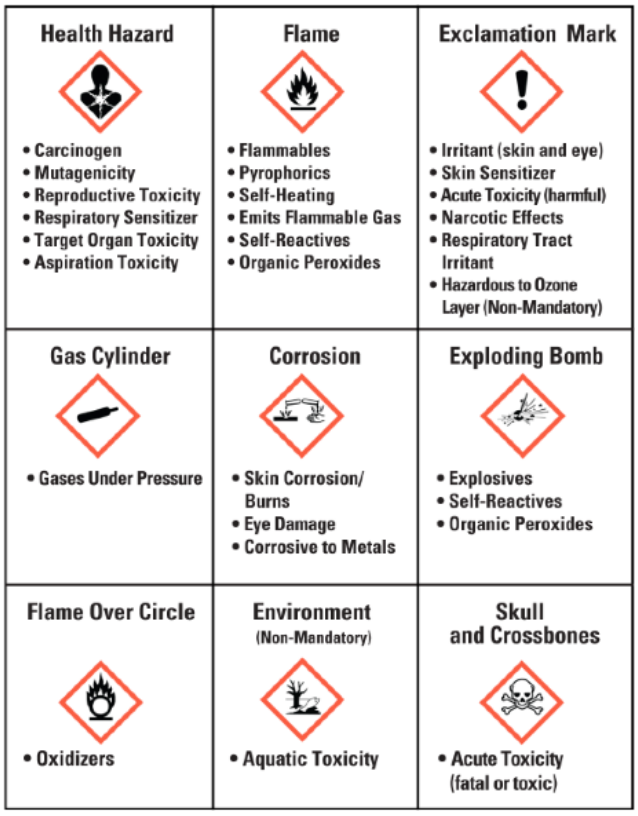
The hazard warning may be displayed in written or visual format. All labels must be written in English as the primary language.



Example of NFPA 704 Labels

3.3 Postings

Examples of Laboratory postage.



4.0 Health and Chemical Hazards

4.1 Definitions

A hazardous chemical is defined as an element, compound, or mixture of elements or compounds that a physical hazard or health hazard as defined by OSHA standard
29 CFR Section 1910. 1200 (c) or a hazardous substance as defined by the OSHA standard in
29 CFR Section 1910.1200 (d) (3) or by OSHA's written interpretations.

4.2 Health Hazards

Chemicals which can cause damage, reversible or irreversible, to the human body are considered to be health hazards. Health hazards are defined as those chemicals for which there is statistically significant evidence based on at least one study conducted in accordance with established scientific principles that acute or chronic health effects may occur in exposed employees. The term "health hazard" includes chemicals which are carcinogens, toxic or highly toxic agents, reproductive toxins, irritants, corrosives, sensitizers, hepatotoxins, nephrotoxins, and neurotoxins, agents which act on the hematopoietic system and agents which damage the lungs, skin, eyes, or mucous membranes. These categories are discussed below.

4.2.1 Toxicity

Toxicology is the study of the adverse effects of chemicals on living organisms. The toxicity of a specific substance depends on a number of factors. The primary ones are as follows:

- The quantity of material involved
- The rate and extent to which a chemical is absorbed into the bloodstream
- The rate and extent to which the chemical is metabolized and whether or not the metabolites are toxic
- The rate and extent to which the chemical and its metabolites are removed from the body

Other factors also influence the effect that a given chemical has on the body. How the chemical enters the body, the amount of the chemical in the body, and the acute and/or chronic toxicity of the chemical which contributes to its hazard. The major routes of chemical access to the body are the lungs (inhalation), the skin (topical absorption), and the gastrointestinal tract (ingestion).

4.2.2 Routes of Exposure

Inhalation is by far the most important route of chemical entry. Any chemical that becomes airborne can be inhaled either as a dust or a vapor. For a given chemical the total quantity absorbed through the respiratory tract depends on its concentration in the air, the duration and frequency of exposure, and the rate of breathing.

The skin is not highly permeable to most chemicals and provides a relatively good barrier to protect it from toxics in the environment. However, some chemicals can be absorbed through the skin in sufficient quantities to produce systemic effects. The health of the skin also influences chemical penetration. Skin that is diseased or abraded offers direct access into the body. The absorption of toxic materials through the skin varies under a number of circumstances. Contact with water increases the hydration of the skin and increases it permeability.

The gastrointestinal tract is rarely a route for occupational poisoning. However, accidental ingestions have occurred. Swallowing of particles cleared by the respiratory tract can contribute to the route of poisoning.

4.2.3 Target Organ Toxicity

Metabolic and excretory processes work to keep the body free of foreign substances. The liver and kidney help protect the body against poisoning and aid in removing poisonous substances. However, some toxic substances are accumulated in these same organs. **Hepatotoxins**, such as carbon tetrachloride act principally to damage the liver. **Nephrotoxins**, including halogenated hydrocarbons and uranium, cause damage to the kidneys. As the bloodstream circulates toxic chemicals throughout the body, every organ is in contact with the material. Many poisons show a selective affinity for the cells of a particular organ and produce specific effects on them. Poisons affecting the nervous system are called **neurotoxins**. An example of a neurotoxin is tetrodotoxin. Those affecting the circulatory system are **hemotoxins,** such as snake venom. **Reproductive toxins** such as toluene are agents which interfere with normal reproductive capabilities. **Mutagens** such as ethidium bromide are substances which cause genetic damage. Chemicals which cause defects of fetal development are called **teratogens**. Examples of teratogens include lead and ethylene oxide.

4.2.4 Dose

The amount of chemical which enters the body also influences the effect. To help quantitate the relationship between dose and response and to provide guidelines for use, the American Conference of Governmental Hygienists (ACGIH) publishes a book of Threshold Limit Values (TVL) for many common industrial chemicals. These TLVs are exposure levels to which it is felt a healthy working population can be exposed for forty hours a week with no ill effects. OSHA's Permissible Limits (PELs) are based on the TLVs. Chemical fume hoods should be provided in laboratories where work is being done with volatile chemicals having a TLV less than 50 ppm.

4.2.5 Acute and Chronic Exposures

Expressions of toxicity can be divided into those having acute and those having chronic effects. Acute exposures involve short-term (usually high) concentrations resulting in illness, irritation, or death. Chronic effects are characterized by symptoms or disease following frequent exposure over a long time period. Symptoms of chronic poisoning are frequently different from those seen in acute poisoning by the same agent. For example, acute poisoning by benzene results in damage to the central nervous system, while chronic exposure affects blood cell production capacity of the bone marrow.

4.2.6 Highly Toxic Chemicals

A chemical is considered highly toxic if it falls into any of the following categories:

- A chemical which has a LD50 (dose at which 50% of the test animals die) of 50 mg or less per kilogram of body weight when administered orally in albino rats.
- A chemical which has an LD50 of 200 mg or less per kilogram of body weight when administered by continuous contact for 24 hours (or less if death occurs) with the bare skin of albino rabbits.

- A chemical which has an LC50 (the concentration in air at which 50% of the test animals die) of 200 parts per million (ppm) by volume or less of gas or vapor, or 2 mg per liter or less if mist, fume, or dust, when administered by continuous inhalation for one hour (or less if death occurs) in albino rats.

4.2.7 Toxic Chemicals
A chemical is considered toxic if it falls into any of the categories below.

- A chemical with an LD50 between 50 mg and 500 mg per kilogram body weight when administered orally to albino rats.
- A chemical with an LD50 between 200 mg and 1000 mg per kilogram body weight when administered by continuous contact with the skin of albino rats for 24 hours.
- A chemical with an LC50 in air between 200 and 2000 ppm by volume, or between 2mg and 20 mg per liter of dust, mist or fume when administered by inhalation for one hour to albino rats.

4.2.8 Corrosive Chemicals- A chemical is defined as corrosive if it causes visible destruction of or irreversible alteration in, living tissue by chemical action at the site of contact.

4.2.9 Irritants- A chemical which causes a reversible inflammatory effect on living tissue particularly the skin, eyes, nose or respiratory system is an irritant.

4.2.10 Sensitizers- A sensitizer is a material which causes an allergic reaction of the skin or respiratory system.

4.2.11 Carcinogens- Chemical carcinogens are defined as substances with the ability to cause tumors. A chemical is considered to be a carcinogen under the Hazard Communication Standard if:

- It has been evaluated by the International Agency for Research on Cancer (IARC), and found to be a carcinogen or potential carcinogen.
- It is listed as a carcinogen or potential carcinogen in the Annual Report on Carcinogens published by the National Toxicology Program (NTP).
- It is regulated by OSHA as a carcinogen.

4.3 Physical Hazards
Physical hazards are defined as those chemicals for which there is scientifically valid evidence that it is a combustible liquid, a flammable, compressed gas, explosive, an organic peroxide, oxidizer, pyrophoric, an unstable (reactive), or water-reactive.

4.3.1 Flammable Materials
Liquids with a flashpoint below 100 F or 30 C, solids which burn vigorously when ignited, gases which form flammable mixtures with air, and aerosols which will form a flame projecting from a valve in the presence of an ignition source are all defined as flammable materials under the Hazard Communication Standard. The flash point of a liquid is the temperature at which sufficient vapors are given off by the liquid to form an ignitable mixture with air. Many common solvents have flash points well below room temperature.

4.3.2 Combustible Liquids. Liquids with a flash point between 100 F or 38 C and 200 F or 93C are defied as combustible liquids.

4.3.3 Compressed Gases. A compressed gas is defined as a gas or mixture of gases which has a pressure exceeding 40 psi (pounds per square inch) at 70 F

4.3.4 Oxidizers- Oxidizers cause or promote fire in organic materials either by themselves or by releasing oxygen. In addition, strong oxidizers are also corrosives.

4.3.5 Explosives- A chemical which causes a sudden, almost instantaneous release of gas, pressure, and heat when subjected to sudden shock, pressure or high temperature is considered to be an explosive.

4.3.6 Organic Peroxide Formers- Organic peroxide formers are chemicals which contain an oxygen-oxygen bond; these chemicals are strong oxidizers and may be explosive. Benzoyl peroxide is an example of an organic peroxide former. In addition, many common laboratory compounds may deteriorate becoming contaminated with peroxides over time. A common example is ether.

4.3.7 Pyrophorics- Pyrophoric materials are ones which ignite spontaneously on contact with air.

4.3.8 Reactive Chemicals- Reactive, or unstable, chemicals are materials which will polymerize, decompose (but not explosively), or condense under conditions of temperature, shock or pressure.

4.3.9 Water Reactive Chemicals- Water reactive chemicals react with water to release a gas that is either flammable or a health hazard. Lithium and sodium are examples of water reactive chemicals.

The Table below shows some commonly-used chemicals which have physical hazards:

Physical Hazards	Examples
Flammables – liquids with a flash point below 100 F (38C), solids which burn vigorously when ignited, gases which form flammable mixtures with air, and aerosols which will form a flame projecting from a valve in the presence of an ignition source.	Ethanol, Acetone, Cyclohexane, Methanol
Compressed Gases- A gas or mixture of gases which have a pressure exceeding 40 psi (pounds per square inch) at 70 F.	Nitrogen, Carbon Dioxide, Oxygen
Organic peroxides- chemicals that contain an oxygen-oxygen bond; are strong oxidizers and may become explosive.	Diethyl Ether, Benzoyl Peroxide.
Pyrophorics- chemicals that ignite spontaneously on contact with air.	Barium alloys, Phosphorus, Titanium Trichloride
Water reactive- react with water to release a gas that is either flammable or a health hazard.	Lithium, Sodium, Magnesium Metal
Combustible liquids- liquids with a flash point between 100F and 200F (38C-93C).	Acetic Acid, Acetic Anhydride, Isoamyl Alcohol
Explosives- chemicals that cause a sudden, almost instantaneous release of pressure, gas and heat when subjected to sudden shock, pressure or high temperature.	Ammonium Perchlorate, Picric Acid
Unstable (reactive) - will polymerize, decompose (but not explosively) or condense under conditions of temperature, shock, or pressure.	Methyl Methacrylate

4.4 Safe Handling

All hazardous materials should be handled in the safest manner possible. Always carry large bottles with one hand securing the bottom of the bottle. When weighing out hazardous chemicals in dry form, always work away from any drafts, and wear the appropriate personal protective equipment (gloves, lab coat, mask, etc.). When pouring volatile organic chemicals, always work in a chemical fume hood and wear the appropriate PPE (safety goggles, face shield) to minimize splashes to the eyes, nose or mouth. As with all hazardous materials, please refer to the Safety Data Sheet (SDS) for safe handling guidelines.

4.5 Storage and Segregation

Proper chemical storage within the laboratory is an essential part of any chemical safety program. Adhering to appropriate segregation of hazardous chemicals will lessen the risk of fire, accidental mixing during emergencies, and ultimately minimize employee exposure to hazardous chemicals. The following storage and chemical segregation requirements are mandatory for UIW facilities:

- Make sure that all chemical components and mixtures are accurately labeled.
- Date all new chemicals with the date received and date opened.
- Flammable liquids should be stored in flammable liquid storage cabinets. Where feasible, these cabinets should be vented.
- Acids, bases and flammable materials should be stored separately. In the event of an accident, the violent chemical reactions that can occur when certain compounds in these classes are mixed could exacerbate the situation.
- If acids are stored in an acid storage cabinet, the cabinet should be vented.
- Acids and all corrosives shall not be stored under sinks. Storage space underneath sinks is strictly for cleaning supplies.
- Strong oxidizers, such a perchloric acid, should be stored away from organic materials to reduce the risk of fire, and away from reducing agents to reduce the risk of violent reactions.
- Cyanides and sulfides should be stored well separated from acidic compounds. The poisonous gases, hydrogen cyanide and hydrogen sulfide, are released when these compounds react with acids.
- Toxics should be stored in a separate cabinet. Toxic chemicals that are also volatile should be stored in a vented flammable cabinet.
- Do not store hazardous liquid chemicals above eye level to avoid spilling liquids in the eyes.

- Do not store glass containers on the floor.

- Store acids and bases on the lowest possible shelves.

- Do not indiscriminately store chemicals in alphabetical order. This can lead to incompatible chemicals being stored next to each other. Dry chemicals that pose no hazards may be stored alphabetically on a shelf.

- Periodically inspect storage areas. Note signs of leakage and corrosion. Make arrangements to dispose of outdated materials or those no longer needed by the laboratory.

- Use secondary containment (shallow plastic tubs) for storage of hazardous liquid chemicals to contain accidental leaks and spills.

4.6 Transporting Hazardous Chemicals within UIW

The following standard shall apply to all persons at any location considered part of The University of the Incarnate Word.

An acid container shall be any container impervious to attack by the material being transported but not made of glass, and be large enough to contain all of the material in case of breakage original container.

Approved safety cans (for storage of liquids such as flammables, acids, or corrosives) shall be any container, of not more than 5 gallons capacity, having a spring-closing lid and spout cover and so designed that it will safety relieve internal pressure when subjected to fire exposure.

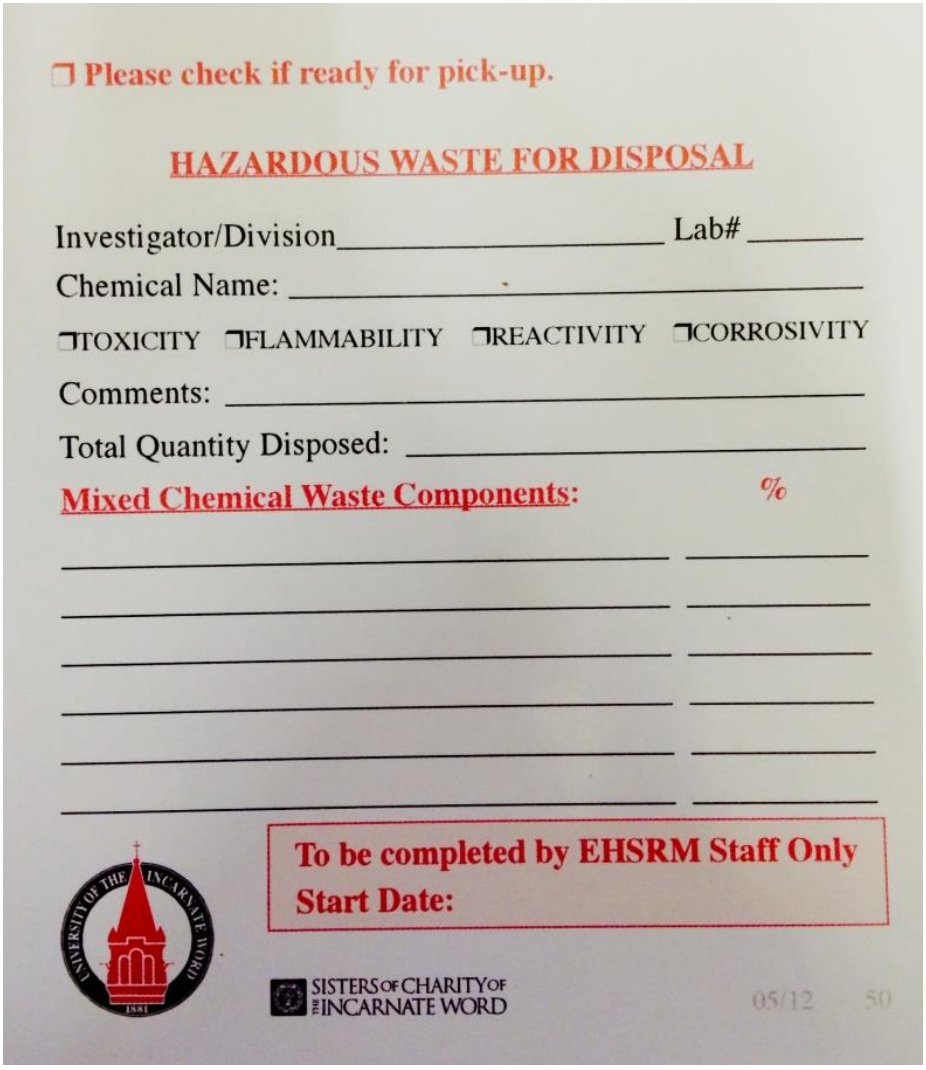
Flammable liquids shall be dispensed into and transported in approved safety cans only.
Non-flammable liquids shall be dispensed into glass containers. Glass containers with manufactures seal unbroken may be used to transport flammable liquids.

The transfer of material from one container to another which, at normal temperatures, gives off toxic vapors, in quantities of one pint or less, shall be performed inside a chemical fume hood. Quantities greater than one pint shall be transferred only with leak-proof systems in well ventilated areas.

If a package of material is damaged so that there is probability of escape of the contents, the EHSRM Office shall be notified by the discoverer of the condition prior to acceptance or disposal of the material.

5.0 Chemical Waste Disposal Procedures

EHSRM will dispose of all chemical waste in accordance with all federal, state and local environmental regulations. UIW does not allow the disposal of any chemical waste down the drain. Once a waste has been identified as a hazardous waste it shall be properly labeled; all information on tag needs to be completed and chemical name abbreviations shall not be used. Hazardous Waste for Disposal Tags are provided by EHSRM. [see Figure 5-1]



❒ Please check if ready for pick-up.

HAZARDOUS WASTE FOR DISPOSAL

Investigator/Division_____ Lab# _____

Chemical Name: _____

❒TOXICITY ❒FLAMMABILITY ❒REACTIVITY ❒CORROSIVITY

Comments: _____

Total Quantity Disposed: _____

Mixed Chemical Waste Components: %

_____ _____

_____ _____

_____ _____

_____ _____

_____ _____

_____ _____

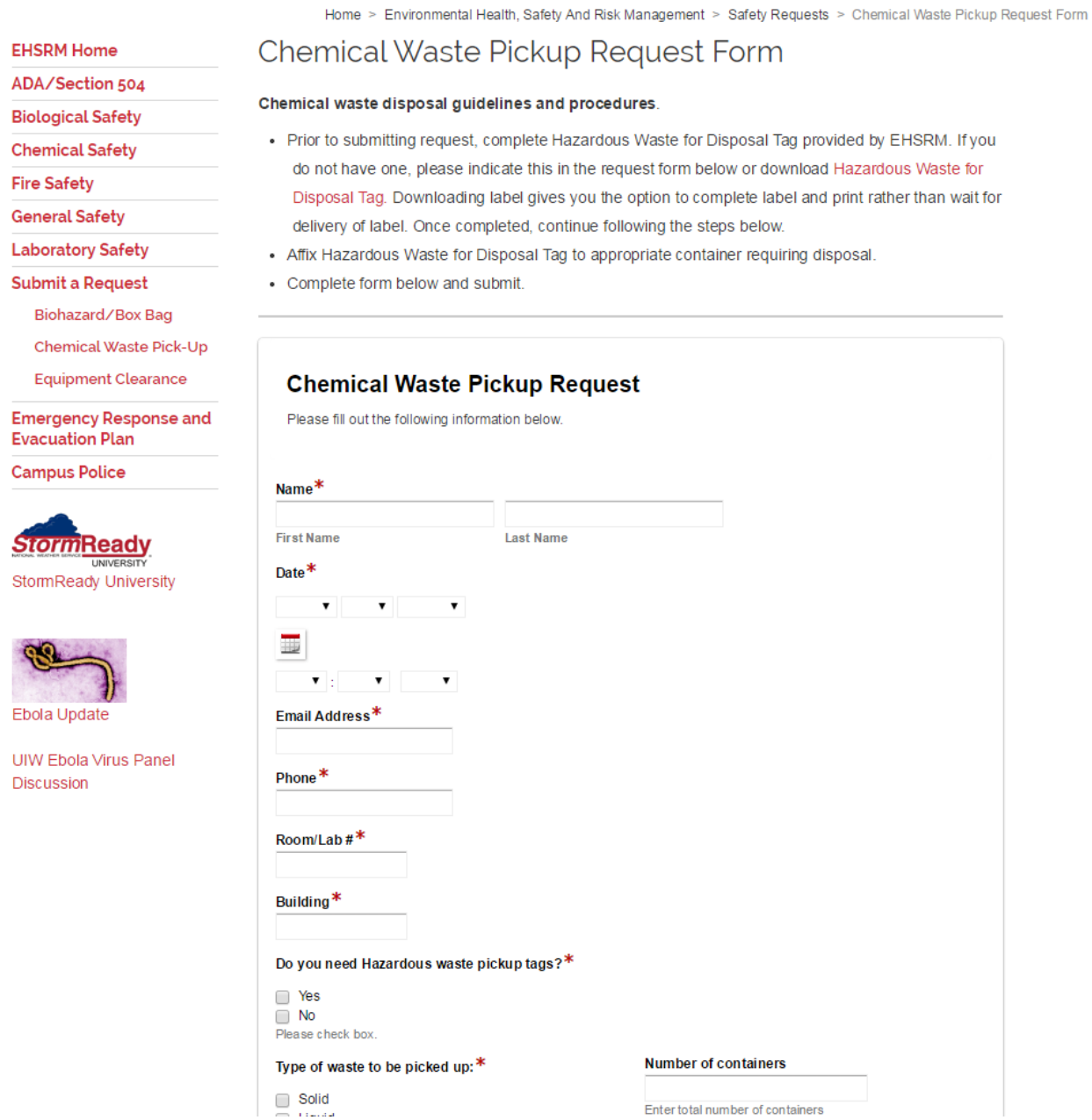
To be completed by EHSRM Staff Only
Start Date:

SISTERS OF CHARITY OF THE INCARNATE WORD

05/12 50

5-1

When Hazardous Waste for Disposal Tag is completed refer to http://www.uiw.edu/safety/ and click on Chemical Waste Pick-up Request and submit. [See Figure 5-2]



Home > Environmental Health, Safety And Risk Management > Safety Requests > Chemical Waste Pickup Request Form

EHSRM Home
ADA/Section 504
Biological Safety
Chemical Safety
Fire Safety
General Safety
Laboratory Safety
Submit a Request
Biohazard/Box Bag
Chemical Waste Pick-Up
Equipment Clearance
Emergency Response and Evacuation Plan
Campus Police

StormReady University

Ebola Update

UIW Ebola Virus Panel Discussion

Chemical Waste Pickup Request Form

Chemical waste disposal guidelines and procedures.

- Prior to submitting request, complete Hazardous Waste for Disposal Tag provided by EHSRM. If you do not have one, please indicate this in the request form below or download Hazardous Waste for Disposal Tag. Downloading label gives you the option to complete label and print rather than wait for delivery of label. Once completed, continue following the steps below.
- Affix Hazardous Waste for Disposal Tag to appropriate container requiring disposal.
- Complete form below and submit.

Chemical Waste Pickup Request

Please fill out the following information below.

Name*
First Name Last Name

Date*

Email Address*

Phone*

Room/Lab #*

Building*

Do you need Hazardous waste pickup tags?*
Yes
No
Please check box.

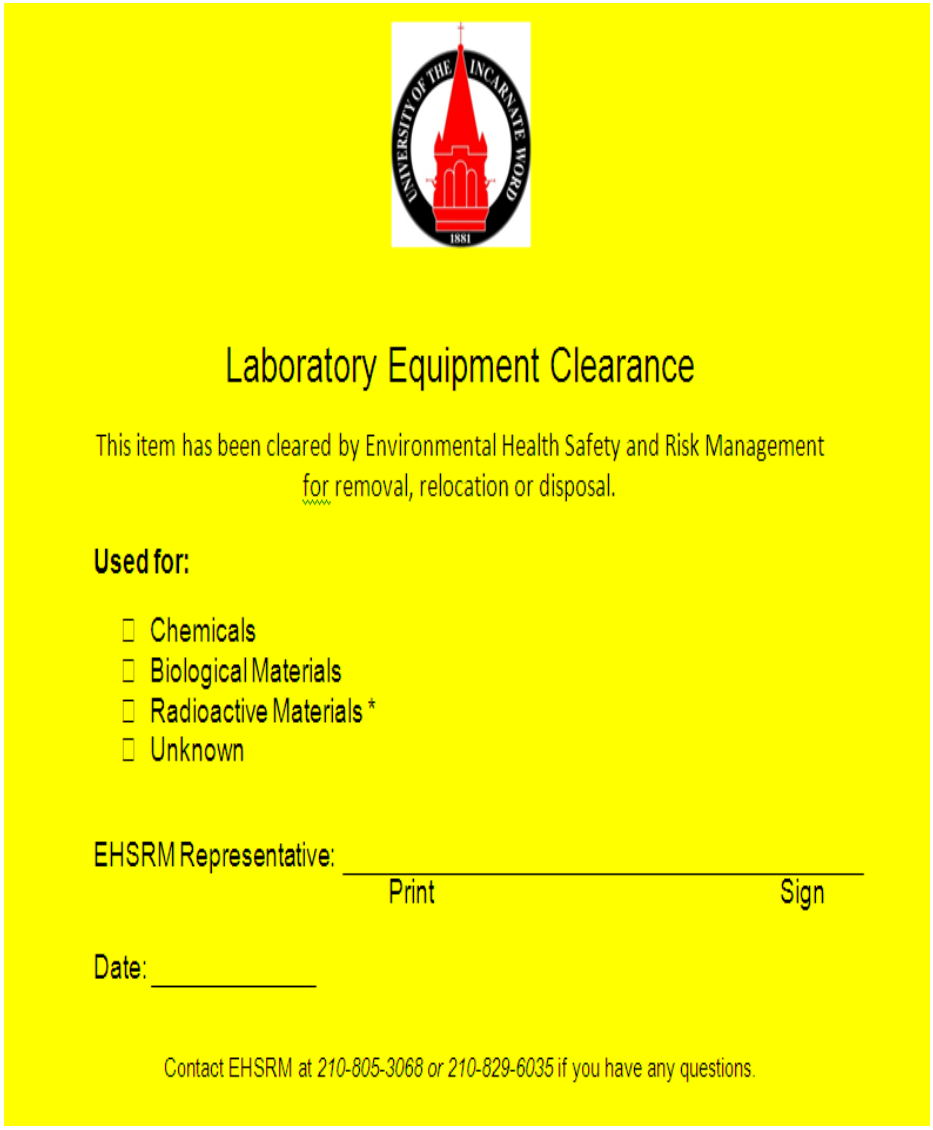
Type of waste to be picked up:*
Solid

Number of containers
Enter total number of containers

5-2

6.0 Laboratory Equipment Clearance Procedures

All laboratory equipment and potentially contaminated laboratory furniture must be "cleared" and tagged by Environmental Health Safety and Risk Management prior to removal, relocation or disposal. Please note, this is **only** for laboratory-related items. [See Fig 6.1]



Laboratory Equipment Clearance

This item has been cleared by Environmental Health Safety and Risk Management for removal, relocation or disposal.

Used for:

- ☐ Chemicals
- ☐ Biological Materials
- ☐ Radioactive Materials *
- ☐ Unknown

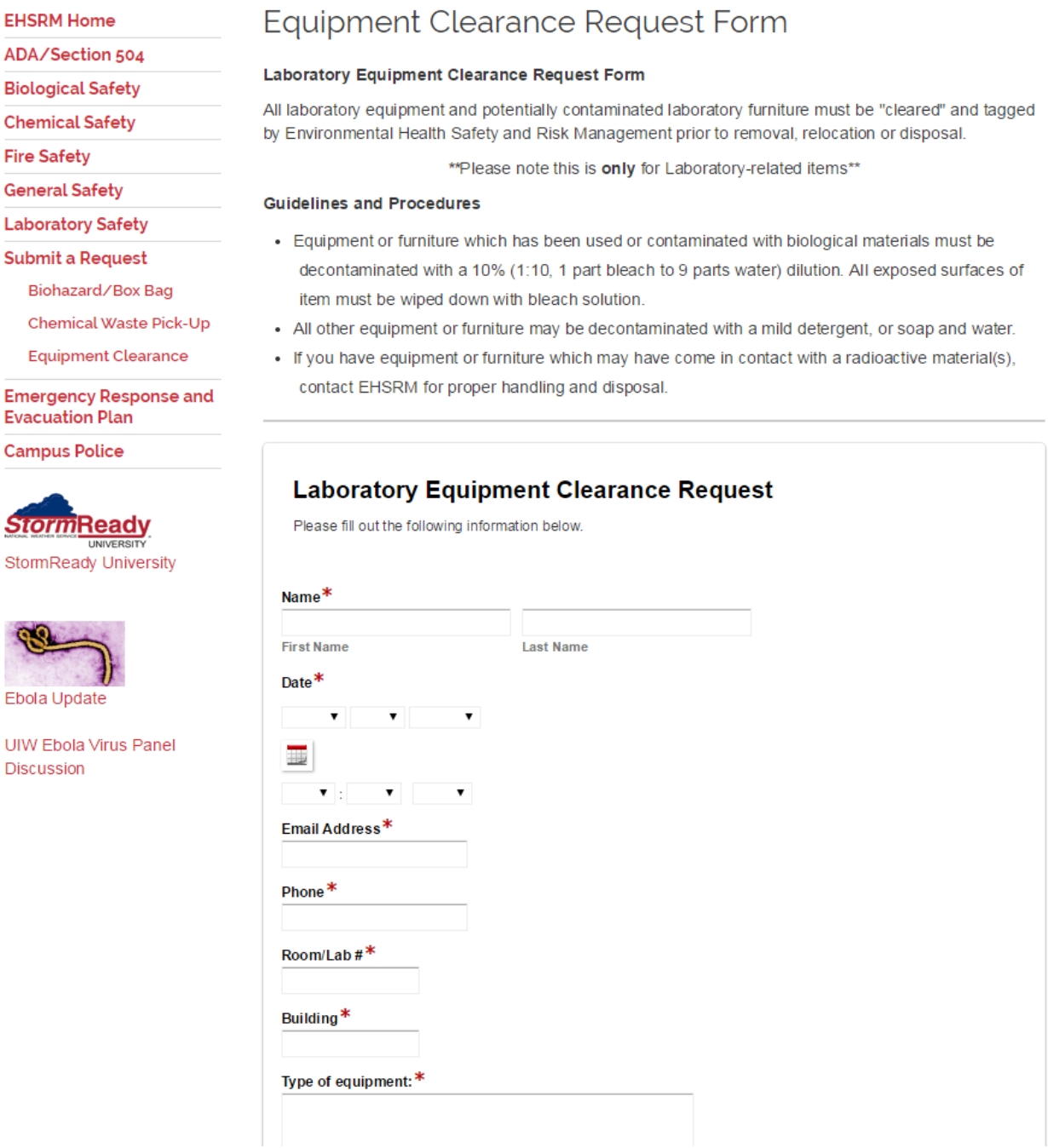
EHSRM Representative: _____
Print Sign

Date: _____

Contact EHSRM at *210-805-3068 or 210-829-6035* if you have any questions.

6.1

Equipment or furniture which has been used or contaminated with biological materials must be decontaminated with a 10% (1:10, 1 part bleach to 9 parts water) dilution. All exposed surfaces of item must be wiped down with bleach solution. All other equipment or furniture may be decontaminated with a mild detergent, or soap and water. If you have equipment or furniture which may have come in contact with a radioactive material(s), contact EHSRM for proper handling and disposal. Laboratory Equipment Clearance requests are submitted at http://www.uiw.edu/safety/index.htm [See Figure 6.2]



EHSRM Home
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Emergency Response and Evacuation Plan
Campus Police

StormReady University

Ebola Update

UIW Ebola Virus Panel Discussion

Equipment Clearance Request Form

Laboratory Equipment Clearance Request Form

All laboratory equipment and potentially contaminated laboratory furniture must be "cleared" and tagged by Environmental Health Safety and Risk Management prior to removal, relocation or disposal.

Please note this is **only for Laboratory-related items**

Guidelines and Procedures

- Equipment or furniture which has been used or contaminated with biological materials must be decontaminated with a 10% (1:10, 1 part bleach to 9 parts water) dilution. All exposed surfaces of item must be wiped down with bleach solution.
- All other equipment or furniture may be decontaminated with a mild detergent, or soap and water.
- If you have equipment or furniture which may have come in contact with a radioactive material(s), contact EHSRM for proper handling and disposal.

Laboratory Equipment Clearance Request

Please fill out the following information below.

Name*
First Name Last Name

Date*

Email Address*

Phone*

Room/Lab #*

Building*

Type of equipment:*

6.2

7.0 Compressed Gases and Liquid Nitrogen Safety

7.1 Background

The use of compressed gases and liquid nitrogen presents many safety issues for laboratory staff and support personnel. This chapter will identify the hazards associated with compressed gases and liquid nitrogen, discuss the regulations issued by the OSHA and NFPA regarding gas cylinder storage and handling, outline safety features for approved cylinders and cryogenic containers, and provide users with guidelines regarding safe use of these materials at UIW.

7.1.1 Compressed Gases

Compressed gases are used frequently by UIW employees for a variety of reasons. Laboratory personnel work with oxygen, nitrogen, and carbon dioxide during experimental procedures. Facilities Management personnel also require use of several compressed gases during the course of their job duties. Proper training on safe handling and use is critical for all employees and students who work with or around these materials.

a) Hazards: The hazards associated with compressed gases include physical hazards such as explosion or rupture of cylinders, and health hazards such as oxygen displacement or the toxic effects of certain gases.

b) Regulatory requirements: The Compressed Gas Association (CGA) has several publications regarding safe handling of compressed gases. OSHA also has regulations regarding compressed gases, as outlined in 29 CFR 1910.101.

c) Inspection of cylinders:

1. All compressed gas cylinders should be visually inspected upon arrival to laboratories.
2. Verify the contents of the cylinders. All cylinders must be labeled at all times.
3. Label all cylinders as to whether they are full, empty, or in use.
4. If a leak is detected, do not attempt to repair. Contact the supplier.

d) Storage of cylinders:

1. Secure cylinders at all times to prevent tipping, falling or rolling. Straps or chains connected to a wall bracket or other fixed surface, or by using a cylinder stand. Straps and chains must be at 2/3 of the height of the cylinder.
2. Store cylinders in a cool, dry, well-ventilated, fire-resistant area.
3. Do not store cylinders in public corridors or stairwells.
4. Cylinders should be segregated by hazard:
    - Oxidizers must be stored separately from flammable gases.
    - Empty cylinders should be stored separately from filled cylinders.
5. Do not exceed the limitations on the number of cylinders allowed in a laboratory as set forth by the NFPA:
    i. Three 10” x 50” flammable gas (acetylene, butane, hydrogen, vinyl chloride ethylene oxide) or oxygen cylinders.
    ii. Three 4” x 15” cylinders of toxic gases (arsine, chlorine, fluorine, hydrogen cyanide, nitric oxide).

e) Handling of cylinders:

1. Close valves for cylinders when not in use. Valves of empty cylinders must also be closed.
2. Cylinders (filled, partially filled, or empty) shall be transported using an approved cart or carrying device and must be securely fastened to the moving device so that accidental dislodgement does not occur.
3. Valves must be removed and protective caps secured in place prior to moving cylinders.
4. Valves should be closed prior to moving cylinders.
5. Empty cylinders should be removed from laboratories promptly.

7.2 Liquid Nitrogen

This section discusses the potential hazards associated with cryogenic fluids, and outlines safety guidelines for handling, storage and transportation of liquid nitrogen. **Hazards:** The hazards associated with liquid nitrogen include the extremely low temperature (-320F), asphyxiation (oxygen displacement), and explosion or rupture of containers.
Regulatory requirements: The Compressed Gas Association (CGA) has several publications regarding safe handling of liquid nitrogen. *NFPA 55, Standard for the Storage, Use, and Handling of Compressed Gases and Cryogenic Fluids*, outlines requirements for storage, use and handling of these materials.

7.2.1 Inspection and labeling of cryogenic containers and liquid nitrogen cylinders:

1. Visually inspect all containers upon arrival.
2. Inspect all valves, including vent valve, liquid valve, pressure relief valve, and rupture disk.
3. All cylinders or containers must be properly labeled at all times. Department of Transportation (DOT) marking must be affixed to all cylinders.
4. Label all cylinders as to whether they are full, empty, or in use.
5. Portable cryogenic containers shall be marked in accordance with CGA C-7, *Guide to the Preparation of Precautionary Labeling and Marking of Compressed Gas Containers*.
6. All DOT-4L/TC-4LM liquid cylinders shall have product identification visible from all directions with minimum 51 mm (2 in.) high letters.
7. Visible hazard identification signs shall be provided in accordance with NFPA 704, *Standard System for the Identification of the Hazards of Materials for Emergency Response*, at entrances to buildings or areas in which cryogenic fluids are stored, handled, or used.
8. Container inlet and outlet connections, liquid-level limit controls, valves, and pressure gauges shall be identified by one of the following methods:
    - A permanent tag or label identifying their function.
    - A schematic drawing that indicates their function and designates whether they are connected to the vapor or liquid space of the container.
    - When a schematic drawing is provided, it shall be attached to the container and maintained in a legible condition.
    - Hissing sounds from a liquid nitrogen cylinder is normal. Pressure build-up will be released through a pressure relief device.

- If a leak or spill is detected, do not attempt to repair. Contact the supplier for assistance.

Storage of cryogenic containers:

- Approved cryogenic containers shall be designed to hold low temperature, liquefied gases and made of materials that can withstand the rapid changes and extreme differences in temperature encountered in working with liquefied gases. They shall be built to withstand normal operating pressures and shall be either open or protected by a vent or other pressure-relieving device that permits vapors to escape. Only vent tubes and stoppers supplied with these containers shall be used.
- Store containers in a cool, dry, well-ventilated area. Oxygen monitors can be installed in areas where ventilation is not adequate.
- Do not store containers or cylinders in public corridors or stairwells.

7.2.2 Handling and dispensing of liquid nitrogen and cryogenic liquids

- Always use appropriate safety equipment, including cryogenic gloves, face shield and eye protection.
- Containers (filled, partially filled, or empty) shall always be stored in the upright position.
- Liquid nitrogen and other liquefied gases shall be dispensed into and transported in approved cryogenic containers only. Use only approved containers or dewars. Do not use open pail-type containers.
- Empty cylinders should be removed from laboratories promptly. Contact supplier for removal of empty liquid nitrogen cylinders.
- Cryogenic containers transported on laboratory carts shall be secured to the cart to prevent accidental tip-over.

8.0 Autoclaves

Autoclaving usually is considered to be the method of choice for decontaminating cultures, laboratory glassware, pipettes, syringes, or other small items known to be contaminated with infectious agents. The location of the autoclave within the laboratory minimizes storage and transport problems. It provides a technically proved treatment method for rendering infectious material safe. Autoclaves must be loaded carefully to allow the steam to penetrate the wrapping, since the steam has to contact the pathogens in order to destroy the hazard. The length of time required for sterilization of biological material is determined by the quantity of the load, the volume of liquid in the load, and the density of the material. Safe work practices when utilizing an autoclave include the following:

1. Read the operating manual carefully and post the operation procedures near the autoclave.
2. Release pressure slowly and open the door only slightly to allow the steam to escape before unloading.
3. Wear insulated gloves when unloading the material.

9.0 Evaluation of Special Chemical Hazards

9.1 Background

The purpose of this chapter is to provide information to Principal Investigators regarding special chemical hazards. Most laboratories work with hazardous chemicals and the activities are performed in accordance with institutional policies. To cover the specific needs of a particular laboratory, the principal investigator is responsible for preparing a safety protocol for the proposed research program involving highly hazardous chemicals prior to its beginning. These protocols should be reviewed with laboratory personnel on an annual basis. In addition, the Dean of the School of Mathematics, Science & Engineering, Director of EHSRM and Chemical Hygiene Officer will review all protocols involving work with carcinogenic, highly toxic, or acutely hazardous chemicals every **three** years to determine whether the principal investigator is required to submit any changes regarding research activities.

9.2 Carcinogens

OSHA publishes a list of known carcinogens that are strictly regulated. The regulations on each are specific and detailed. Their use involves a long list of requirements concerning recordkeeping, posting, monitoring, facilities, training, contamination control and medical surveillance. The following chemicals are on the OSHA's list:

1,2-Dibromo-3-chloropropane	Beta-Propiolactone
1,3-Butadiene	Bis-Chloromethyl Ether
2-Acetylaminofluorene	Cadmium
3,3'-Dichlorobenzidine	Coke oven emissions
4-Aminodiphenyl	Ethylene Oxide
4-Dimethylaminoazobenzene	Ethyleneinine
4-Nitrobiphenyl	Formaldehyde
Acrylonitrile	Inorganic Arsenic
Alpha-Naphthylamine	Methyl Chloromethyl Ether
Asbestos	Methylene Chloride
Benzidine	Methylenedianiline
Beta-Naphthylamine	N-Nitrosodimethylamine
	Vinyl Chloride

Although only a limited number of chemicals are carcinogens, they are found among all chemical classes and may present a number of hazards separate from their toxicity.

Thus in any research laboratory where workers handle a wide variety of chemicals some are likely to be carcinogenic. Institutional policies take cognizance of the following considerations:

- Carcinogens can be controlled using established laboratory procedures.
- Emphasis should be placed on engineering controls and good work practices.
- Carcinogens must be viewed individually and the biological, chemical and physical properties of each compound must be considered.

These guidelines below should be taken into consideration for all laboratories using carcinogens and other highly toxic chemicals:

1) Access to laboratories is limited to technical staff assigned to the research program and the necessary support staff.
2) Work should be performed in a suitable safety cabinet or other containment device depending on the nature of the experiment.
3) A glove box, Class II biological safety cabinet or chemical fume hood should be used for handling pure carcinogens, including the preparation of stock solutions for in vitro procedures or for work with concentrated carcinogen solutions.
4) Work with organic solvents and toxic or corrosive chemicals, including neutralization procedures should be done in a fume hood.
5) A hand washing facility must be available.
6) Vacuum service must be protected with an absorbent trap to prevent accidental contamination of the system.
7) Carcinogens should be stored in a clearly posted storage area preferably separated from other laboratory chemicals.
8) Stock bottles should be labeled with the full chemical name or a widely recognized substitute and should bear the warning "Potential Cancer Hazard" (NIH Guidelines), "Cancer Suspect Agent" (29CFR1910.1017, (l)) or "Chemical Carcinogen".
9) Work surfaces should be protected with absorbent, plastic-backed bench paper.

9.2.1 Asphyxiants

Chemical asphyxiants prevent or interfere with the uptake and transformation of oxygen. Examples include carbon monoxide which prevents oxygen transportation, and hydrogen cyanide which inhibits enzyme systems and interferes with the transportation of oxygen to the tissues. At sufficiently high concentrations, both chemicals can result in immediate collapse and death.

9.2.2 Narcotics

Narcotics affect the central nervous system causing symptoms that range from mild anesthesia reactions to loss of consciousness and death at high doses. Examples include acetone, methyl ethyl ketone, and chloroform.

9.2.3 Heavy metals and their compounds

Heavy metals are relatively harmless in the metallic state, but their fumes, dust, and soluble compounds are well-known toxins. Some are carcinogenic. Others are nephrotoxins, hepatotoxins, or neurotoxins. The most common heavy metals are arsenic, beryllium, cadmium, chromium, lead, mercury, nickel, and silver. Acute toxic effects from exposure to heavy metals result from inhalation and ingestion of dusts or inhalation of fumes. Metal fumes are generally more hazardous than dusts because the particles in fumes can enter the bloodstream easier. Bronchitis, chemical pneumonia, and pulmonary edema may result. Beryllium and cadmium are two of the most toxic metals when inhaled. Symptoms include nausea, vomiting, abdominal pain, and diarrhea. Chronic exposure to heavy metals may lead to long-term effects. For example, chronic exposure to lead may damage the nervous system, brain and kidneys. Exposure to mercury over a long period can permanently damage the liver, kidney, and brain. Chronic inhalation of cadmium can cause emphysema and kidney damage. Carcinogenic effects have been shown from exposure to

chromium, nickel, arsenic, cadmium, and beryllium. Prenatal effects have been observed from exposure to methyl mercury. In addition, some lead compounds are embryotoxic. Some metals and their compounds can be absorbed through the skin. Mercury metal, and tetraethyl lead for example can enter the bloodstream through this route. Nickel, arsenic, chromium, and beryllium cannot penetrate the skin but they can damage the skin or cause allergic-type reactions.

9.2.4 Cyanides

The simple metallic cyanides are highly toxic by ingestion. Cyanides are readily absorbed through the skin, mucous membranes, and by inhalation. Alkali salts are toxic by ingestion. Even small amounts of sodium and potassium cyanide are highly toxic and death may occur within minutes from ingestion. Inhalation of toxic fumes from hydrogen cyanide gas may result in death in a few seconds. Symptoms of poisoning include dizziness, headaches, tightness in the chest, palpitation of the heart, and difficulty in breathing.

9.2.5 Nerve Agents

Nerve agents are the most toxic of the known chemical agents. They are hazards in their liquid and vapor states and can cause death within minutes after exposure. Nerve agents inhibit acetyl cholinesterase in tissue, and their effects are caused by the resulting excess acetylcholine. Nerve agents are considered major military threat agents.

9.3 Work with Carcinogenic, Highly Toxic, or Acutely Hazardous Chemicals

All principal investigators who wish to work with chemical carcinogens, highly toxic, or acutely hazardous chemicals at UIW will bring proposals to the EHSRM Office where additional review/approval steps will be taken depending on the site, the responsible division and the status of current site licensing.

Additionally, **Acrylamide; Chloroform; Ethidium Bromide; Formaldehyde; and Trypan Blue Stain:** a reference source is provided to all principal investigators for the 5 most commonly used carcinogens in a molecular laboratory. This appendix contains useful safety information normally found on the SDS for each chemical listed as well as emergency response and first aid treatment for these specific chemicals and is meant to be used as a reference source for laboratory personnel.

9.4 Chemical Carcinogens Lists

The International Agency for Research on Cancer (IARC), the National Toxicology Program (NTP), and the Occupational Safety and Health Administration (OSHA) each have compiled lists of carcinogenic chemicals. These lists are not meant to be all-inclusive but rather, serve as a source for principal investigators in determining which chemicals may require approval for use and storage in the laboratory.

10.0 Monitoring of Hazardous Chemical Exposures

10.1 Hazard Determination

Before working with any chemical it is important to determine the hazards inherent in handling the material. Information about a chemical can be accessed by reading the container label or SDS. Other sources of information are available in determining safe exposure levels for healthy workers. One such resource is the American Conference of Governmental Hygienist (ACGIH) book of Threshold Limit Value (TLV) and Biological Exposure Indices (BEIs) for many common industrial chemicals. This document is used as a guide for the evaluation of workplace exposures to chemical substances and physical agents. TLVs are exposure levels to which a healthy worker can safely be exposed for 40 hours a week with no ill effects. Threshold limit values (TLVs) are used by OSHA in establishing Permissible Exposure Limits (PELs) to protect workers against the health effects of exposure to hazardous substances. PELs are regulatory limits on the amount or concentration of a substance in the air. They may also contain a skin designation. OSHA PELs are based on an 8-hour time weighted average (TWA) exposure.

10.2 Recommendation for Chemical Exposure Assessments

The following paragraph outlines several scenarios which would justify performing individual monitoring for chemical exposures:

1. Any procedures involving volatile or otherwise hazardous chemicals that are NOT performed in a chemical fume hood or ducted biological safety cabinet.
2. Other means of protection (respiratory) is not available to lab worker.
3. If any of the OSHA-regulated chemicals is being used. For a list of these chemicals, refer to 29 CFR 1910 Subpart Z – Toxic and Hazardous Substances.
4. Employee raises concerns.

10.3 Performing Chemical Exposure Assessments

EHSRM will perform personal monitoring on request for a variety of hazardous chemicals, including but not limited to chloroform, formaldehyde, xylene, isofluorane, and methylene chloride. An 8-hr time weighted average (TWA) and a 15-minute short term exposure limit (STEL) will be determined during an average 8-hour work day while a hazardous chemical is in use. Badges will be analyzed by an accredited laboratory and results will be reported to the requesting employee and supervisor. Call EHSRM at 210-805-3068 or 210-829-6035 to make arrangements for personal monitoring.

11.0 Hazardous Chemical Inventory

A chemical inventory is required for each workplace area.

Each Principal Investigator or Responsible Supervisor is required to update their chemical inventory annually. A copy of each chemical inventory must be submitted to the EHSRM office by December 31st of each year.

The EHSRM office will maintain copies of all chemical inventories in electronic or paper form. All chemical inventories will be maintained for 30 years and made available to employees and regulatory agencies.

If you have any questions on how to complete your chemical inventory please contact the EHSRM office at 210-805-3068 or 210-829-6035.

12.0 Laboratory Hygiene and Personal Protective Equipment

12.1 Personal Hygiene, Habits, and Practices

Personal hygiene in the laboratory is directed mainly toward the prevention of occupationally acquired disease or physical injury. However, it can raise the quality of laboratory work by reducing possibilities for contamination of experimental material. Habitual adherence to good practices provides a margin of safety in situations where the hazard may be unrecognized. The history of occupational injury is full of examples of hazards unrecognized until too late. The following guidelines are standard operating procedures.

1. Food, candy, gum, beverages, and tobacco for human consumption shall not be stored or consumed inside the laboratory or animal rooms.
2. Drinking fountains outside the laboratory should be the sole source of drinking water.
3. Refrigerators in laboratories are for experimental materials only. Food for human consumption shall be stored only in refrigerators specifically designated for that purpose.
4. Do not use laboratory equipment for food preparation. Do not use empty food containers for laboratory materials or samples.
5. Smoking is not permitted in laboratories or animal rooms.
6. Shaving or brushing teeth is not permitted in laboratories. Toothbrushes, razors, toiletry supplies, and cosmetics should only be used in designated areas outside the laboratory after thoroughly washing the hands and face or showering.
7. Facial hairs are discouraged in areas where there is the potential for airborne hazardous material. Facial hair retains particulates more persistently than clean-shaven skin. A clean-shaven face is essential to the adequate fit of a face mask or respirator when the work requires respiratory protection.

8. Keep hands away from the mouth, nose, eyes, face and hair when working in the laboratory.
9. Books and journals should be used only in clean areas if possible.
10. Personal handkerchiefs should not be used in the laboratory. Disposable tissues should be available in laboratories and change rooms.
11. Shorts and sandals are prohibited from being worn in all UIW laboratories.

12.2 Laboratory Housekeeping

All UIW laboratories must be managed and well maintained as a safe work environment. General housekeeping is important when it comes to safety. Aramark (i.e. housekeeping) staff provides limited services such as emptying the regular trash receptacles. Therefore, it is the responsibility of the Principal Investigator and lab workers to practice good housekeeping techniques on a regular basis. The following guidelines will keep laboratories organized and provide a safe workplace:

1. Keep laboratory benches clear of un-needed clutter.
2. Keep all hazardous chemical containers clearly labeled and stored in approved areas such as underneath fume hoods, in flammable storage cabinets.
3. Keep large boxes of supplies off of floors and bench tops.
4. Perform routine clean-outs to remove all unwanted chemicals, equipment, or supplies. Broken or unwanted pieces of equipment must be cleared through the EHSRM office prior to relocation. Unwanted, expired, or spent chemicals must be disposed of appropriately.
5. Ensure all waste materials (chemical, biological, and radiological) are disposed of according to federal, state and institutional policies.
6. Promptly clean up spills. Hazardous material spills must be reported to University Police and EHSRM.

12.3 Availability of Personal Protective Equipment (PPE)

A variety of PPE is available which when correctly used helps protect laboratory workers from hazards in the work environment. PPE must be provided by the responsible supervisor/Principal Investigator, who is also responsible to enforce the use of PPE by participating students. At a minimum, all employees who work with hazardous chemicals in any laboratory at UIW are required to wear the following:

a) Closed toe shoes (no sandals).
b) Long pants or skirts (no shorts).
c) Lab coat, apron or gown.
d) Safety glasses.
e) Gloves (latex, nitrile, vinyl, or other appropriate gloves).

Additional PPE may be necessary, depending on the procedures and exposure risks involved. Always refer to the SDS for recommended PPE for specific chemicals. It is the responsibility of each worker to wear the appropriate PPE when necessary and to talk with your supervisor if questions arise regarding additional PPE that may be needed. The EHSRM office will perform exposure assessments as a means to determine additional PPE requirements.

12.4 Training for Personal Protective Equipment (PPE)

Training on use and maintenance of PPE is the responsibility of the PI/supervisor. Use of most PPE requires very minimal instruction and maintenance. However, specialized equipment such as respirators requires additional training including a medical evaluation, fit test and instruction on how to don and remove a respirator, and routine cleaning as well as choosing the right type of filter. A fit test will identify the proper size for the worker, and ensure that the respirator will provide maximum protection from exposure to hazardous materials. Do not wear any respirator, such as an N95, half-face, or full-face respirator, without completing a fit test. Under the UIW Respiratory Protection Program, the EHSRM office will assist all employees who are required to wear a respirator as part of his or her job duties.

12.5 UIW Policy on Wearing Gloves

It is mandatory for gloves be worn during situations where exposure to hazardous materials (chemical, biological, radiological) is imminent. Protection of the employees from hazards is top priority. Additionally, one should regularly change gloves when contamination has occurred. One should always take steps to avoid spread of contamination. Therefore, gloves must always be removed upon exit from any laboratory or other areas where hazardous materials are used, processed, or stored. Please dispose of all used gloves in the approved medical waste containers. It is extremely important that all public areas are kept clean at all times. It is everyone's responsibility to eliminate unnecessary contamination throughout UIW property. Gloves will not be worn while doing the following activities.

- Upon exiting laboratories
- Opening any doors (labs, restrooms, stairwells, lecture halls, etc.)
- Walking through public hallways
- Using elevators
- Using telephones
- Using water fountains
- When transporting hazardous materials through the public corridors use secondary containment such as a clean plastic tub or a cart as a means to safely move these materials from one area to another.

Lab carts should have a lip to protect containers from tipping over during transport. Do not carry samples or hazardous materials directly in your hands. Secondary containment not only provides protection for the worker, but also provides a means of containment in case of accidental spills or breakage. Non-compliance with this policy should be reported to the EHSRM office.

13.0 Chemical Spills

If you come across a hazardous material spill or believe it might be a hazardous spill first identify what type of spill is it. Hazardous material spills are divided into two major types:

1. **Small Spill**- A hazardous material spill of less than 1 liter in volume of an agent that you are properly equipped and trained to safely handle appropriately.

2. **Major Spill-** A hazardous material spill greater than 1 liter in volume or an agent spill that you are not adequately equipped or trained to safely handle appropriately.

Small Spill:

1. Inform supervisor and others in the area about the spill.

2. Restrict further access to the area.

3. Do not enter the spill area alone.

4. Use proper personal protective equipment appropriate for the spill agent.

5. Neutralize or secure the spill using absorbent material.

6. Dispose of the spill-cleanup material as hazardous waste.

7. Do not attempt to clean, disinfect, or absorb spill materials without proper emergency response training and equipment.

8. If you are injured call **911** and seek medical attention immediately. Call University Police at **210-829-6030.**

Major Spill:

1. Inform the supervisor and others in the area about the spill.

2. Contact University Police at **210-829-6030** who will then contact EHSRM.

3. Restrict further access to the area and secure the area.

4. Do not attempt to clean, neutralize, or disinfect major spills.

5. Await emergency response from the University Police department and the EHSRM office.

6. Remain outside the spill area to report to responders on the spill agent.

7. If you are injured, immediately call 911 and seek medical attention. Call University Police at **210-829-6030**.

14.0 Hazard Communication

Hazard Communication Training is required for all UIW faculty, staff, and students. Laboratory Safety Training is offered by EHSRM. This general training session covers topics related to the various categories of hazardous materials present here at UIW. In addition to awareness of the various hazardous chemicals used at UIW, employees and students are notified of the biological and physical hazards that are encountered as well.

Under the University's Hazard Communication plan; faculty, staff and students have certain responsibilities with respect to hazard communication. Principal Investigators and Responsible Supervisors are ultimately responsible for determining who among their staff requires Laboratory Safety Training. New faculty is also required to complete this training. Principal Investigators are responsible for training staff and students concerning the hazards of the specific chemicals in their laboratories. Principal Investigators are also responsible for ensuring compliance with the labeling requirements. Staff and students are responsible for only using chemicals for which they are adequately trained. They are expected to identify hazardous chemicals in the workplace by using the chemical lists provided in the handbook or by determining if the chemical falls under any of the hazard categories as discussed in this manual. UIW staff is expected to consult references, including Safety Data Sheets (SDSs) to determine hazard characteristics and handling procedures. All UIW staff and students are expected to follow their supervisor's instructions regarding the use of hazardous chemicals and to observe the guideline stated in this document.

14.1 Laboratory Specific Training Plan

Supplemental site specific training, shall be given by the Principal Investigator or Responsible Supervisor for all employees and work-study's who work with hazardous chemicals. Documentation shall be maintained for 5 years. This training session should cover interpretation of SDSs, safe handling, storage, and disposal procedures for specific chemicals used in their immediate area.

Additionally, emergency response procedures and first aid treatment should be discussed.

14.2 Incidental Training

Incidental training may be required, depending on specific requests by Principal Investigators, or as a result of deficient laboratory safety protocols outlined in the Chemical Safety Manual.

14.3 Record Keeping

All chemical training records will be maintained in the EHSRM office. Documentation for any safety training should also be kept in the laboratories or departmental offices.

15.0 Hazardous Chemical Waste Management

15.1 Responsibilities

The hazardous waste management program at UIW is designed to provide safe, effective and economical disposal of chemical waste generated by the institution in compliance with the Resource Conservation and Recovery Act (RCRA), Clean Water Act (CWA) and Clean Air Act (CAA). The following sections cover the basis for the program, the legal definitions of hazardous chemical waste and the system developed to manage hazardous waste on campus.

The EHSRM office and Deans of all affected schools/colleges are responsible for overseeing the day to day operations of the hazardous waste program. This includes supervising staff, procedures and facilities; conducting inspections of campus laboratories and work areas; and evaluating the methods used for hazardous waste management. Principal Investigators are responsible for all activities in their laboratories. They train their staff and ensure that hazardous materials are identified, collected and stored properly and that appropriate records are kept. Individual laboratory workers are responsible for the day-to-day activities in the program. They follow the directions of the principal investigator, collect waste and keep records. Facilities Management workers are responsible for proper collection and storage of the wastes created in their operations. They are also responsible for performing the necessary maintenance on systems vital to the safe operation of the waste handling facilities. University Police provide security and ensure that access to the hazardous waste facilities is controlled. They also serve a central role in emergency situations.

15.2 Legislative Background and Requirements

The Resource Conservation and Recovery Act of 1976 (RCRA) and the Hazardous and Solid Waste Amendments of 1984 (HSWA) were passed by Congress to provide the legislative basis for resource and hazardous waste management in the United States. The Environmental Protection Agency (EPA) is the federal agency responsible for the administration and enforcement of RCRA. In Texas, EPA has delegated authority for administrating and enforcing RCRA regulations to the Texas Commission on Environmental Quality (TCEQ). This delegation does not exclude the EPA from interceding with its own enforcement should it find that TCEQ is not properly carrying out the implementation of the regulations. RCRA and the TCEQ regulations provide for the cradle-to-grave management of hazardous waste and regulate the operation of waste disposal operations. The regulations are designed to provide for the protection of public health and the environment. They set forth very stringent requirements for generators, transporters and processors of hazardous waste. UIW may be subject to inspections by TCEQ, San Antonio Water System (SAWS), DOT and OSHA to ensure the university is operating under the conditions of the appropriate entity. As part of these inspections, waste generating areas on campus including laboratories and shops are subject to inspection by these entities.

15.3 Definitions of Hazardous Waste

For regulatory purposes a hazardous chemical is one that poses a danger to human health or the environment because of physical or toxicological properties. The RCRA regulations define hazardous waste in terms of four specific hazard characteristics, ignitability, corrosivity, reactivity and toxicity. In addition, the EPA has compiled two lists, one of acutely hazardous material (the "P" list) and one of toxic waste (the "U" list). To determine if a waste is hazardous, it should be

first checked against the EPA lists. P and U listed waste are indicated in lists provided at the end of this chapter. If the chemical is not on the P or U lists, it must then be examined to determine if it meets any of the criteria indicated below:

1. **Ignitability**
   a) Liquids with a flash point of less that 60C (140F).
   b) Solids that may ignite readily through friction, absorption of moisture or spontaneous chemical change.
   c) Ignitable compressed gases.
   d) Oxidizers.
2. **Corrosivity** – any aqueous solution with a pH less than of equal to 2 or greater than or equal to 12.5 or any material that will corrode steel (1/4" per year).
3. **Reactivity** – this includes material with any one of the following characteristics:
   a) Normally unstable and undergoes violent change without detonating.
   b) Reacts violently with water, or forms a potentially explosive mixture with water.
   c) Forms toxic gases, vapors or fumes when mixed with water.
   d) May explode upon heating, or by physical shock, or from decomposition.
4. **Toxic Characteristic Leaching Procedure (TCLP)** – any waste which contains any of the elements or compounds in concentrations equal to or greater than the maximum concentrations given in the list for toxic characteristic constituents and regulatory levels.

Compliance must also be maintained with San Antonio Water System (SAWS). UIW Industrial Wastewater Permit specifies what cannot be put down the sanitary sewer. It prohibits the introduction of wastes with a pH less than 5.5 or greater than 10.5 or wastewater having any other corrosive property capable of causing damage or hazard to structures, equipment, and/or personnel of the water treatment facility. It is most important that toxic or reactive materials not be put into the sanitary sewer system. This includes materials such as sodium azide, chromic acid and perchloric acid.

Many laboratory chemicals used at UIW are known to be toxic but are not on the EPA regulated hazardous waste lists nor do they meet the other guidelines stipulated. Chemicals that are known or suspected of being toxic, carcinogenic, mutagenic or teratogenic should be handled as hazardous waste. In these cases, the principal investigator must assess the risk associated with the material and determine an acceptable disposal method. Information on toxicity can be found in the Registry of Toxic Effects of Chemical Substances (RTECS), published by the National Institute for Occupational Safety and Health (NIOSH).

15.3.1 Pharmaceutical Waste

Some pharmaceutical items can be characterized as non-RCRA hazardous materials. RCRA listed or characteristic hazardous pharmaceutical waste cannot be disposed of through sewers, landfills, or through regulated medical waste. It must be treated as hazardous chemicals and shipped to a RCRA facility.

15.3.2 Controlled Substances

Controlled substances are regulated through the Drug Enforcement Agency (DEA) and users must register with that agency. Controlled substances cannot be treated as hazardous chemicals with respect to disposal, and therefore must not be discarded as hazardous waste. Disposal of all expired or unused controlled substances must be done through University Police. A DEA Form 41, Registrant's Inventory of Drugs Surrendered must be filled out to surrender all Schedule I, II, III, IV or V controlled substances for disposal. EHSRM and University Police will retain all documentation for disposal of controlled substances and scheduling information.

15.4 Disposal Methods

15.4.1 Sanitary Sewer

The only acceptable amounts of hazardous waste to be put down the drain are those commonly associated with washing of laboratory glassware. Never pour any chemicals down the drains.

15.4.2 Ordinary Trash

Under no circumstances can any chemical be discarded in the regular trash. Containers that are empty and have no more than 2.5 cm of chemical residue remaining on the bottom of the container can be triple rinsed. The original label must be marked out and placed outside the laboratory for disposal by the housekeeping staff. Empty containers of acutely hazardous chemicals must be triple rinsed with an appropriate solvent prior to disposal. The waste solvent must be disposed of as hazardous waste. An alternative is to dispose of the container as hazardous waste. Please contact EHSRM for help in handling this waste. When work is to be done with highly toxic materials which pose a significant threat to human health or the environment contact prior to beginning the work so appropriate disposal plans can be arranged.

Disposal of hazardous chemical waste that meets any of the definitions of "hazardous" will be picked up by Veolia Environmental Services for disposal by incineration or other treatment. Guidelines for proper collection, labeling, and storing waste prior to pick-up are given later in this chapter. For the safety of both laboratory personnel and safety staff it is vital that the guidelines be stringently enforced and strictly followed.

15.4.3 Selection of Waste Containers and Packaging

It is the responsibility of each laboratory to provide suitable containers for the collection of its waste. If there are any questions please consult with EHSRM to prevent costly errors. If outdated reagents are to be discarded it is appropriate to leave them in their original containers. This is especially true for solid chemicals and small quantities of toxic chemicals.

In selecting a waste container, the compatibility of the waste with the container should be the primary concern. Unbreakable containers should be used whenever feasible. Large quantities of flammable liquids should be collected in 2.5 or 5 gallon safety cans. Polyethylene cans are best because of their high resistance to many types of chemicals. It is best not to fill these containers more than 2/3 full. This allows for easier transfer. The five gallon plastic jugs and metal cans in which some solvents are purchased are suitable for one time collection of waste. Use these containers only for the same solvents which they originally held. Continued re-use of these containers is discouraged because they tend to develop leaks with time. Except for safety cans

purchased for the collection of solvent waste suitable for bulk disposal, waste containers cannot be returned to the laboratories. Do not mix chemicals unless they are mixed in the experiment. Always provide secondary containment when storing chemical waste.
All laboratories must adhere to the following statements regarding hazardous chemical waste:

- All containers must be tightly closed with an appropriate cap. Aluminum foil or parafilm are not acceptable caps.
- Evaporation of chemical waste inside of a chemical fume hood is not permitted.
- All chemical waste containers must be labeled as follows:
  - Investigator Name and Lab number
  - Start Date
  - Chemical Name
  - Chemical Characteristics
  - Total Quantities Disposed
  - Components

All containers must be clean on the outside with no evidence of spills or leaks. Dirty or leaking containers may not be picked up.

Chemically contaminated lab waste (paper towels, diaper pads, etc.) will be treated as hazardous waste. The material should be double bagged and tightly sealed preferably with a knot and labeled appropriately. Do not put broken glass or other sharp items into plastic bags. These must be placed in a sharps container for disposal.

15.4.4 Labeling Hazardous Waste Containers

All containers must have a hazardous waste tag attached to it. Incorrect labels must be defaced.

16.0 Fire Extinguishers and Safety Showers

Principal Investigators or Responsible Supervisors are required to instruct new personnel in the location of fire extinguishers, safety showers, and eyewashes before they begin research in the laboratory. All laboratories should be outfitted with fire extinguishers. All fire extinguishers should be mounted on a wall in an area free of clutter or stored in a fire extinguisher cabinet. Research personnel should be familiar with the location, use, and classification of the extinguishers in their laboratory.

UIW does not require personnel to extinguish fires that occur in their work areas. It is not recommended that faculty, staff or students use fire extinguishers unless they have attended a
Fire Extinguisher Training Session. Any time a fire extinguisher is used, no matter for how brief a period, it should be inspected and recharged.

Every laboratory where the use of materials that are either corrosive or that otherwise present a significant skin/eye contact or absorption hazard must have access to an unobstructed safety shower and eyewash facility that meets the requirements of OSHA regulations (29 CFR 1910.151(c). If an eyewash or safety shower needs to be tested or repaired, call the Department of Facilities Management and give the operator the location of the defective equipment.

17.0 Record Keeping

17.1 Record Keeping Requirements for Laboratories. All laboratories using hazardous chemicals are required to keep copies of records as follows:

17.1.2 Chemical Safety Handbook. All labs shall have a copy of the most current version of the Chemical Safety Handbook accessible to all lab personnel.

17.1.3 Safety Data Sheets (SDS). SDSs will be made available to all employees electronically or by hard copy if electronic access is unavailable. SDS will be available until the chemical is no longer stored at UIW.

17.1.4 Chemical Inventory. Chemical inventories are required to be updated annually. Copies of chemical inventories will be kept in the lab for 30 years.

17.1.5 Laboratory Safety Evaluations. Records of safety evaluations performed by
EHSRM will be kept on file for a minimum of 5 years. Records of self-evaluations should also be maintained in the laboratory.

17.1.6 Employee Training. Copies of all training records will be kept by laboratory director and EHSRM. Training provided by EHSRM office will be documented in the form of a training certificate, with the name of the employee, title of training class, date of attendance, and topics of discussion. This documentation will be maintained in the laboratory. Principal Investigators or Responsible Supervisors are required to maintain training records for 5 years.

17.1.7 Chemical Exposure Assessments. Results from these assessments will be posted in a conspicuous place in the laboratory. A copy of the results will also be kept in the Chemical Safety Handbook. These records will be kept permanently.

17.2 Record Keeping Requirements for EHSRM Office.

17.2.1 Hazard Communication Program. All Hazard Communication Standards will be kept on file for 5 years beyond supersede date.

17.2.2 Chemical Safety Handbooks. Revisions of the Chemical Safety Handbook will be kept on file for 5 years past supersede date.

17.2.3 Safety Data Sheets (SDS). *To Be Determined*

17.2.4 Chemical Inventories. Annual chemical inventory updates will be kept in the EHSRM office for 30 years.

17.2.5 Laboratory Safety Evaluations. Safety evaluations will be kept on file for 5 years after all deficiencies have been corrected.

17.2.6 Employee Training. Training records will be kept on file for 5 years.

17.2.7 Chemical Exposure Assessments. All chemical exposure assessments will be kept permanently.

17.2.8 Incident Reports. All reports generated by EHSRM regarding spills/injuries at UIW will be kept for 10 years.

17.2.9 Records of Terminated Principal Investigators. Records of terminated Principal Investigators (PI's) Includes correspondence related to safety issues, surveys performed in their laboratories, spills/injuries that may have occurred, and shall be kept for 10 years past termination date.

18.0 Contacts and Emergency Numbers

Sam McDaniel
Director of Environmental Health Safety and Risk Management
Phone Number: **210-829-6035**

Andrew Fohn
EHS Manager, Chemical Hygiene Officer, CHMM
Environmental Health, Safety and Risk Management
Phone Number: **210-283-6961**

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