

# **Laboratory Safety and Hazardous Waste Management**

University Chemical Hygiene Officer

**Stefan Wawzyniecki**

# Overview

OSHA, The Occupational Safety and Health Administration, is responsible for **ALL** workers' SAFETY.

29 CFR 1910.1450, “Occupational exposure to hazardous chemicals in laboratories”, addresses the issue of laboratory safety. This section of the law is referred to as OSHA’s “Laboratory Standard”.

# **OSHA Lab Standard Components**

- ◆ **Scope and application of the law**
- ◆ **Definitions**
- ◆ **Permissible Exposure Limits**
- ◆ **Employee Exposure Determination**
- ◆ **Chemical Hygiene Plan**
- ◆ **Employee Information and Training**
- ◆ **Medical Consultation and Medical Examinations**

# OSHA Lab Standard Components

- ◆ Hazard Identification
- ◆ Use of Respirators
- ◆ Record keeping
- ◆ Date

*Can be accessed from the **EH&S**  
homepage:*

<http://www.ehs.uconn.edu>

# Application and Scope of OSHA Laboratory Standard

Gives guidance to all laboratory workers that are using defined hazardous chemicals which are found under

**29 CFR 1910, subpart Z.**

in an **“investigative”** application.

# Where OSHA Laboratory Standard Does Not Apply

**DOES NOT** apply to the use of hazardous chemicals that do not meet the requirements of “Laboratory Use”.(next slide)

**DOES NOT** apply to the laboratory use of hazardous chemicals which provide no potential for employee exposure.

- Chemically impregnated test media where results are achieved by a colorimetric comparison.
- Commercially prepared test kits where all the reagents needed are contained in the kit.

# “Laboratory Use” of a Hazardous Chemical

Use of hazardous chemicals in which all of the following conditions are met:

- Chemical work is carried out on a “Laboratory Scale”
  - » Laboratory Scale: Work with substances in which the containers used in the reactions, transfers, and other handlings can be safely manipulated by ONE PERSON.
- The procedures are NOT part of a production process.
- Multiple chemical procedures and/or chemicals are used.
- Protective laboratory practices and equipment are available and in common use to minimize the potential for employee chemical exposure.

# **Employee Exposure Determination within the OSHA Lab Standard**

**Provisions are described within OSHA's Laboratory Standard for Monitoring (Initial, Periodic, and Termination) of Employees to Hazardous Chemicals (contact X1110 for more information of when this would be performed) along with means of reporting to affected individuals the monitoring results.**

# The Chemical Hygiene Plan

A written program developed and implemented by UCONN which includes:

Procedures relevant to safety and health when laboratory work involves hazardous chemicals.

Ways to determine and implement control measures to reduce hazardous chemical exposure.

# The Chemical Hygiene Plan

- Requirements of the fume hood and protective equipment used are functioning properly.
- Provision for employer information and training.
- Any circumstances under which a particular laboratory operation, procedure, or activity shall require prior approval from the employer before implementation.

# The Chemical Hygiene Plan

- Provisions for Medical consultations and medical examinations
- Designation of personnel responsible for implementation Of the Chemical Hygiene Plan including assignment of a Chemical Hygiene Officer, or Committee.
- Provision for additional employee protection for work with particularly hazardous substances.

# The Chemical Hygiene Plan

can be accessed on **UCONN's EH&S**  
*Home Page via the Internet at:*

<http://www.ehs.uconn.edu>

# Chemical Hygiene Officer Role and Responsibilities

- ◆ A qualified person designated by the employer.
- ◆ Provides technical guidance in development and implementation of the provisions of the Chemical Hygiene Plan.
- ◆ Stefan Wawzyniecki, Jr., CIH  
486- 1110

# Training and Information under the OSHA Laboratory Standard

- ◆ By Training and Information, employees are to be apprised of any hazardous chemical in the work area
  - **At the time of employee's initial assignment to area**
  - **Prior to assignments involving new exposures situations**
- ◆ Frequency of refresher training shall be determined by the employer.

# **Training and Information under the OSHA Laboratory Standard**

- ◆ **In addition to lecture-based training, and on-site consultative sessions, the University offers CD-ROM based Lab Safety training at the EH & S office, in Chemistry, Life Sciences, IMS, Pharmacy, Nutritional Sciences.**
- ◆ **Should be part of refresher training, or orientation.**

# **Information Availability under The OSHA Laboratory Standard**

**Employees shall be informed of:**

**The contents of the OSHA Lab  
Standard.**

**The location and availability of the  
employer's Chemical Hygiene Plan.**

**The PELs for OSHA regulated  
substances or recommended  
exposure limits for other hazardous  
chemicals not covered under OSHA.**

# Information Availability under The OSHA Laboratory Standard

Employees shall be informed of:

**Signs and symptoms of overexposure  
to chemicals (from MSDS)**

**Location and availability of references  
material involving hazardous  
chemicals, but not limited MSDSs.**

All this information can be accessed  
from the EH&S homepage

***<http://www.ehs.uconn.edu>***

# Medical Examinations and Treatments

The opportunity to receive medical attention, including any follow-up examinations when determined to be necessary, under the following circumstances:

- when an employee develops sign or symptoms of chemical overexposure
- when exposure monitoring reveals levels above the action level , or PEL
- when a spill, leak, explosion, or other occurrence results in the likelihood of a hazardous exposure, the employee shall be provided the opportunity for a medical consultation.

# **Medical Examinations and Treatments**

**All examinations and consultations shall be performed or under direct supervision of a licensed physician, at no cost to the employee, without loss of pay, and at a reasonable time and place.**

# **Role and Responsibility of Consulting Physician**

**If a medical examination is performed, the physician receives from the employer:**

- Identity of the hazardous chemical that the employee was exposed to.**
- Description of the condition in which the employee was exposed.**
- Description of the sign and symptoms**

# **Role and Responsibility of Consulting Physician**

**After examination, a written opinion from the Physician to the employer including:**

**Recommendations for further medical follow-up.**

**Results of the medical exams and tests.**

**Any medical condition revealed in the testing that may place the employee in an increased risk as a result to a hazardous chemical**

**A statement that the employee has been informed of the results of the tests and any medical condition that may require further examination.**

# Role and Responsibility of Consulting Physician

The physician's written opinion shall **NOT** reveal specific findings of the employee's diagnosis unrelated to occupational exposures.

# Safe Handling Practices

Before performing any work in a laboratory setting, the most important things that a laboratory worker should **understand** are the properties, characteristics, hazards, and handling precautions associated with the chemical or chemicals to be used.

Although the Chemical Hygiene Officer is responsible for the Chemical Hygiene Plan and insuring all safety measures are in place in the laboratory, it is the **responsibility** of

**EVERY LABORATORY WORKER**

to abide by those measures, and if any questions arise, please contact **EH&S** at ext. 1110

# **HAZARD IDENTIFICATION**

**It is important to be able to adequately assess all laboratory situations for potential hazards. Being able to identify a chemical's specific hazards by using reference materials readily available in the laboratory is the first step in preventing a harmful situation.**

**Material Safety Data Sheets are an important tool in hazard identification.**

# HAZARD IDENTIFICATION

## Material Safety Data Sheets

Required to be supplied by the Chemical Manufacturer, should be updated as new information becomes available , and readily available for all chemicals being used in the lab.

# **HAZARD IDENTIFICATION**

## **Material Safety Data Sheets**

**Contain information on the chemical identity; physical, chemical, and health hazards; target organs/health effects; precautionary measures for safe handling (PPE) and use; emergency and first aid measures.**

**All warning labels placed on chemicals in the laboratory should be based on the MSDS.**



# Section 4

## Reactivity Hazard Data

### SECTION 4 - REACTIVITY HAZARD DATA

**STABILITY**  
 Stable  
 Unstable

Conditions  
To Avoid

Incompatibility  
(Materials to Avoid)

Hazardous  
Decomposition Products

**HAZARDOUS POLYMERIZATION**  
 May Occur  
 Will Not Occur

Conditions  
To Avoid

### SECTION 5 - HEALTH HAZARD DATA

**PRIMARY ROUTES OF ENTRY**  
 Inhalation  
 Skin Absorption  
 Ingestion  
 Not Hazardous

**CARCINOGEN LISTED IN**  
 NTP  
 IARC Monograph  
 OSHA  
 Not Listed

**HEALTH HAZARDS**  
Acute  
Chronic

Signs and Symptoms  
of Exposure

Medical Conditions  
Generally Aggravated by Exposure

**EMERGENCY FIRST AID PROCEDURES** - Seek medical assistance for further treatment, observation and support if necessary.

Eye Contact

Skin Contact

Inhalation

Ingestion

### SECTION 6 - CONTROL AND PROTECTIVE MEASURES

Respiratory Protection  
(Specify Type)

Protective Gloves

Eye Protection

**VENTILATION TO BE USED**

Local Exhaust  
 Mechanical (general)  
 Special  
 Other (specify)

Other Protective  
Clothing and Equipment

Hygienic Work  
Practices

### SECTION 7 - PRECAUTIONS FOR SAFE HANDLING AND USE / LEAK PROCEDURES

Steps to be Taken if Material  
Is Spilled Or Released

Waste Disposal  
Methods

Precautions to be Taken  
in Handling and Storage

Other Precautions and/or Special Hazards

NFPA Rating\* Health \_\_\_ Flammability \_\_\_ Reactivity \_\_\_ Special \_\_\_

HMIS Rating\* Health \_\_\_ Flammability \_\_\_ Reactivity \_\_\_ Personal Protection \_\_\_

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# Section 5

## Health Hazard Data

# Section 6

## Control and Protective Measures

# Section 7

## Precautions for Safe Handling and Use / Leak Procedures

# MSDS Location at UCONN

MSDSs for most **CHEMICALS** used in laboratories at UCONN can be found on the Internet via the **EH&S** home page

*<http://www.ehs.uconn.edu>*

The Chemical Hygiene Plan is also available at this location

# **TOXICOLOGICAL TERMINOLOGY FOUND ON A MSDS**

**If you have trouble  
interpreting an MSDS,  
please contact EH&S  
at 6- 1110 for  
clarification.**

# TOXICOLOGICAL TERMINOLOGY FOUND ON A MSDS

**Four** Routes of Exposure of by  
which a Chemical can enter the  
body :

- 1** - Inhalation
- 2** - Ingestion
- 3** - Skin (or eye) Absorption
- 4** - Injection

# **Chemical Hazards**

**Divided up into two categories:  
Physical or Health**

## **Physical Hazard :**

**A characteristic of a chemical that necessarily does not manifest itself when that chemical is exposed to an individual.**

# Chemical Hazards

## Physical Hazards:

Explosive

Fire

Pyrophoric

Combustible

Flammable

Oxidizer

Reactive

Water Reactive

Unstable

# Chemical Hazards

## Health Hazard:

A characteristic of a chemical that exposure to which, may cause an acute or chronic health effect.

## Health Hazards:

Irritants

Corrosives

# Chemical Hazards

Health Hazard:

Target Organ Chemicals

Sensitizers

Reproductive Hazards

Mutagens

Teratogens

Carcinogens

# Parameters that Affect Toxicity:

- 1) Routes of Entry
- 2) Physical Condition
- 3) Dose
- 4) Duration
- 5) Frequency
- 6) Combined Effects
- 7) Stress
- 8) Sensitivity
- 9) Individual Variation

# **MSDS Signs and Symptoms of Chemical Exposure**

- ◆ **Behavior Change**
- ◆ **Breathing Difficulty**
- ◆ **Change in Complexion  
/ Skin Color**
- ◆ **Coughing**
- ◆ **Drooling**
- ◆ **Fatigue / weakness**
- ◆ **Irritation of eyes / nose  
/ throat / skin**
- ◆ **Headache**
- ◆ **Nausea**
- ◆ **Sweating**
- ◆ **Tightness of chest**
- ◆ **Breathing difficulty**
- ◆ **Coordination  
difficulty**
- ◆ **Dizziness**
- ◆ **Diarrhea**
- ◆ **Irritability**
- ◆ **Light-headedness**
- ◆ **Sneezing**

# **MSDS Exposure Limits**

## **PEL (Permissible Exposure Limits):**

**Permissible concentration in air of a substance to which workers may be repeated exposed eight hours a day, forty hours a week, for a thirty year working lifetime. This limit is enforced by OSHA.**

## **TWA (Time Weighted Average):**

**An allowable concentration for an eight hour day, forty hour week, working lifetime.**

# **MSDS Exposure Limits**

## **STEL (Short Term Exposure Limit):**

**A maximum concentration for a continuous fifteen minute period.**

**Allowed four per day, with a minimum of sixty minutes between each fifteen period.**

## **C (Ceiling):**

**A maximum concentration that is **NOT** to be instantaneously exceeded.**

# **MSDS Exposure Limits**

**IDLH (Immediately Dangerous to Life and Health):**

**Atmospheric concentration of any toxic, corrosive, or asphyxiant substance that poses an immediate threat to life or would cause irreversible or delayed adverse health effects or would interfere with with an individual's ability to escape from a dangerous atmosphere.**

# **MSDS Exposure Limits**

**TLV (Threshold Limit Values):**

**Not enforced by OSHA, these are TWAs, STELs and Ceilings as recommended by the**

**American Conference of Governmental Hygienists or National Institute for Occupational Safety and Health.**

# Laboratory Practices

- 1) Before working in a Laboratory, review and know the Emergency Evacuation Route out of it, and also the building.**
- 2) Know where all the safety equipment (fume hoods, eyewash stations, showers, spill response kits, etc.) is located and it is working properly.**
- 3) Always protect yourself- wear the proper personal protective equipment that is prescribed by the MSDS (safety glasses with side shields, gloves, lab coat)**

# Laboratory Practices-Chemical Use

- 1) Before using any new chemicals, review and understand the MSDS for hazards associated with it.
- 2) Have a plan for using the chemicals, including proper disposal of wastes generated.
- 3) After opening, record date opened on label.
- 4) Store chemicals in proper location - **Not Fume Hoods** - with compatible chemicals.

# Laboratory Practices-Chemical Use

- 5) If a hazardous chemical is spilled, tell supervisor, and contact UCFD (911).**
- 6) For particularly hazardous chemicals -**
  - establish a designated work area**
  - use a containment device**
  - wear double gloves.**
  - if a spill, fire, explosion, or injury occurs, contact the UCFD.**
- 7) Orientation-Periodic Safety meetings- Training**

# EPA (RCRA)

## Hazardous Waste Regulations

- ◆ **EPA ID #**
- ◆ **LQG**
- ◆ **< 90 day Facility**
- ◆ **Waste Profiles**
- ◆ **Waste Minimization**
- ◆ **Waste Determination**

# Mercury Spills

**EH&S (x3115 D.Shannon)** has a vacuum pump to clean up (major) Mercury Spills.

Close off room where spill occurred, post **NO ENTRY**, and Call **EH&S** immediately. (Evenings, weekends, call **UCFD 911**)

# **Hazardous Waste Containers must:**

- 1) Be labeled "*Hazardous Waste*" with the respective hazard warning word. (Toxic, Corrosive, Ignitable, Reactive)**
- 2) Have the contents itemized by % composition. Use complete names, not formulae, structures, nor abbrevs.**
- 3) Have tightly fitting cap which are only removed to make additions.**

# **Hazardous Waste Containers must:**

- 4) hold compatible chemicals.**
- 5) be stored by hazard category,  
and segregated from incompatible  
chemicals**
- 6) be stored off the floor and in a  
secure designated location.**

**Hazardous Chemicals are**

**NOT to be poured down  
Storm or Sink Drains.**

**This is a violation of  
Connecticut DEP laws.**

**There are Chemicals that can be disposed of in regular trash or the sanitary sewer system.**

**These are identified in UCONN's Chemical Hygiene Plan.**

**located at:**

**<http://www.ehs.uconn.edu>**

**REMEMBER!**

**It is illegal to intentionally  
dispose of Hazardous  
Wastes down drains, or  
into dumpsters.**

**If unsure of the proper  
disposal method  
for a Chemical or  
Waste,  
*first* contact **EH&S**  
(ext. 1110/3115)  
for assistance.**

# Chemical Waste Pick-ups

- ◆ Call x3613 (office) or  
x3115 (Denis Shannon)
- ◆ Visit Web Page

# Chemical Inventory

- ◆ **Electronic or Paper**
- ◆ **Containers labeled, & in good shape**
- ◆ **For chemicals with limited shelf life, include dates of receipt, opening, and expiration**
- ◆ **Review at least annually- document!**
- ◆ **Storage by classification**

# Laboratory Accident and First Aid Information

- 1) Test plumbed eyewashes weekly, and keep a log.**
- 2) Remove Chemical reagents bottles from work area of Facilities personnel who might be working in the Laboratory.**

# Laboratory Accident and First Aid Information

- 3) Stock first aid kits with Band-Aids, 4x4 gauzes, rolled bandages and ace bandages. No creams, ointments, etc... Report to Student Health Services after first aid.**
- 4) For serious injuries and true emergencies call 911**

# Laboratory Accident and First Aid Information

- 5) For bleeding and wound care:
  - a) Wear clean gloves
  - b) Cover area with gauze
  - c) Apply pressure to bleeding - have person sit or lie down
  - d) Call **911** if wound is large, or if the person is *dizzy* or *weak*

# Laboratory Accident and First Aid Information

## 7) Burns

**a) Heat** - cool water for 5 minutes  
report to SHS, or if large burn area

**call 911**

**b) Chemical** - cool water 15 minutes,  
report to SHS, or if large area

**call 911**

# Laboratory Accident and First Aid Information

## **8) Eye splash -Chemical**

**Flush with luke warm running water for at least 15 minutes before going to Emergency Room or SHS.**

## **9) Eye- dust, metal, paint or wood chips** **Cover or close eye - report to SHS**

# Chemical Health & Safety Consultation

- ◆ E-Mail Addresses:

- Stefan.W @uconn.edu

- Denis.Shannon@uconn.edu

# Chemical Health & Safety Consultation

## ◆ Electronic Mailing List

- [LISTSERV@UCONNVM.UCONN.EDU](mailto:LISTSERV@UCONNVM.UCONN.EDU)
- SUBSCRIBE LABSAF-L
- [LABSAF-L@UCONNVM.UCONN.EDU](mailto:LABSAF-L@UCONNVM.UCONN.EDU)

# QUIZ!!!!!!

- ◆ The University's Lab Safety & HazWaste programs are part of the
  - ◆ A. *Chemical Hygiene Plan*
  - ◆ B. *Student Handbook*
  - ◆ C. *Hazard Communication Program*

# QUIZ

- ◆ If you generate H.W., you must do ALL except which of the following:
  - ◆ A. *Label it “Hazardous Waste”*
  - ◆ B. *Keep it capped & in a designated area*
  - ◆ C. *Place on floor for pick-up by EH & S*
  - ◆ D. *Label with chemical name(s)*

# QUIZ

- ◆ In the event of a chemical spill, a fire, or a major injury in your lab, you should first
  - ◆ A. *Call the Chancellor's office*
  - ◆ B. *Call 911*
  - ◆ C. *Call Environmental Health & Safety*