WPI On-Line Training

Laboratory Safety

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Safety Resources

- EOS Website: www.wpi.edu/Admin/Safety

Safety Resources

- EOS Website: "Laboratory Safety" Section
- Chemical Hygiene Plan
- Hazardous Waste Management Plan
- Hazard Communication Program
- Spill Response Plan
- Medical Waste Disposal Plan
- Lab Inspection Form

Safety Resources

- EOS Website: "Related Resources" Section
- Material Safety Data Sheets (MSDS's)
- Evaluate hazards and assess risks by reading an MSDS for the material you are working with, especially before using it for the first time.
- Print a copy of the MSDS and keep it available in the lab
- Send a copy to the EOS Office for the campus master file

Safety Resources

- MSDS sections include the following:

  - Chemical characteristics
  - Physical and health hazards
  - Protective equipment requirements
  - Storage and handling procedures
  - Spill response actions
  - Disposal guidelines

Safety Resources

- WPI Chemical Hygiene Plan components:

  - Standard operating procedures
  - Exposure monitoring
  - Procedures for reducing exposures
  - Maintenance and inspection procedures
  - Lab worker training
  - Medical consultation program
  - Emergency procedures

Safety Resources

EOS Staff Members:

- David Messier, Manager (far right)
- David Adams, Radiation Safety Officer (2nd from right)
- Paula Moravek, Bio Safety Officer (2nd from left)
- Roger Steele, Laser Safety Officer and Assistant Radiation Safety Officer (far left)

Principles of Chemical Hygiene

- Never underestimate potential risk
- Determine exposure limits (refer to MSDS)
- Minimize exposure by using adequate ventilation and appropriate personal protective equipment
- Protect your health – remain vigilant at all times in the laboratory

Basic Hygiene Practices

- Do not work alone if procedures are hazardous
- Do not eat, drink, smoke, or apply cosmetics in a laboratory
- Do not store food in a chemical storage refrigerator
- Make sure all chemical containers are properly labeled
- Confine long hair and loose clothing
- Always remove gloves and wash hands before leaving the lab

Routes of Exposure

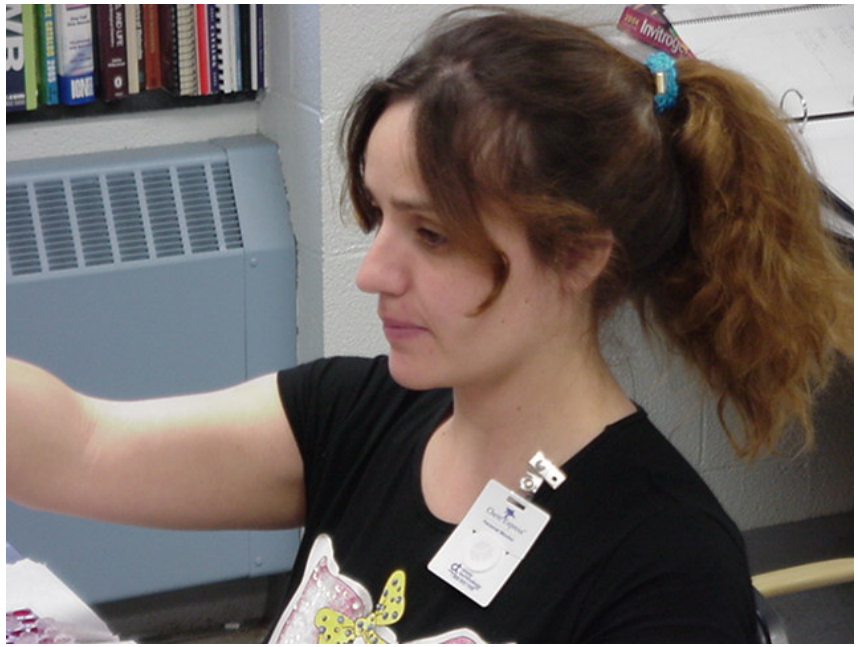
- Injection
- Ingestion
- Inhalation
- Skin and eye contact

Symptoms of Exposure

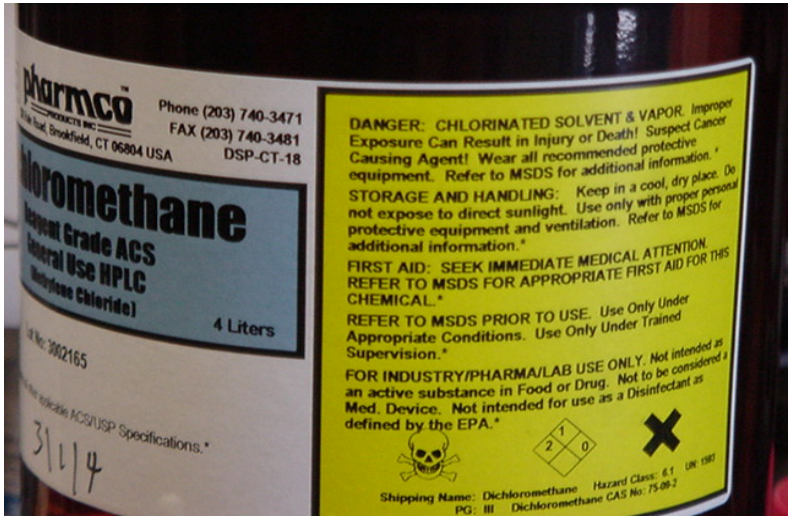
- Short-term health effects (acute):
  - dizziness
  - headache
  - nausea
  - skin irritation
- Long-term health effects (chronic):
  - internal organ damage
  - cancer

Exposure Monitoring

- Levels established by regulatory agencies
- Check MSDS for PEL
- PEL – Permissible Exposure Level
- Medical oversight info in Sec. 8 of the Chemical Hygiene Plan



Importance of Labels



- Identify the material
- Name and emergency info of the manufacturer
- Special storage and handling instructions
- Physical and health hazards info
- First aid, spill and fire response info

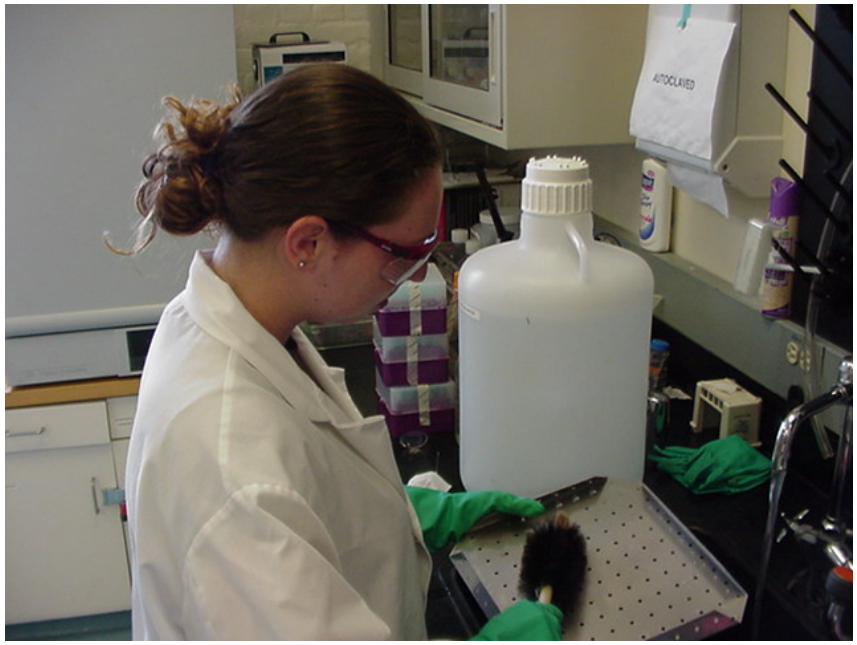
Laboratory Housekeeping

- Keep work surfaces clean and uncluttered
- Dispose of sharps properly
- Keep access to the following clear at all times:
  - Stairways, hallways and exits
  - Utility controls and shutoffs
  - Fire extinguishers
  - Emergency eye wash units and showers

Fume Hoods

- Do not store items that could alter air flow
- Keep closed when not in use
- Lower the sash as low as possible
- Report malfunctions promptly for repair

Personal Protective Equipment



- What is needed is determined by the potential hazard
- Check the MSDS and container label
- Eye protection
- Hand protection
- Lab coat
- Protect your skin – no sandals or shorts

Misc. Lab Hazards

- Open flames – (bunsen burners)
- Hot equipment – (ovens and furnaces)
- Moving equipment – (centrifuges)
- Improper handling of lab glassware
- Compressed gas cylinders
- Cryogenic material – (liquid nitrogen)

Incompatible Chemicals

- Flammables and Oxidizers
- Acids and Bases
- Organic Solvents and Corrosives
- Acids and Cyanides
- Corrosives and Reactives

- Refer to MSDS for compatibility information; store and use according to the recommendations of the manufacturer

Laboratory Security

- All doors must be kept locked when no one is present in the lab
- Keep track of chemicals by maintaining an inventory; send a copy to the EOS Office
- Be vigilant about suspicious persons in the building
- If you are the last one out, make sure that all doors are locked
- Do not hesitate to call Campus Police at x 5555, if needed

Regulatory Agencies

- Governmental agencies regulate activities in labs at three different authority levels (partial list):

Local: Worcester Fire Dept.
Office of Code Enforcement

State: Dept. of Public Health
Dept. of Environmental Protection

Federal: Dept. of Transportation
Environmental Protection Agency
Occupational Safety & Health Admin.

Regulatory Agencies

- Regulations provide protection for all persons that work in a lab with chemicals
- Regulations require employers to provide safe working conditions for all workers
- Regulatory agencies conduct periodic, unannounced site inspections to assure compliance
- Health and safety regulations, compliance measures, and WPI policies, are important components of a comprehensive lab safety program

Lab Inspections

- Lab inspections should be an integral part of every lab's protocols
- Inspections should be done regularly by lab personnel, overseen by the person responsible for the lab
- Inspection items should include:

  - chemical storage areas
  - compressed gas cylinders
  - eye wash and shower units
  - exits
  - fume hoods
  - fire extinguishers

- Call EOS at x 5216 for more information

Other Lab Safety Considerations

- Universal Waste (lamps, batteries, etc)
- Shipment of hazardous materials from WPI to another facility (regulated by DOT)
- Special lab policies at the EOS website:
  - Minors in Labs
  - Lab Use by Outside Groups
  - Medical Waste Disposal Guidelines
  - Animal Lab Safety Policy

- Contact EOS website for more details

Biological Safety

- Bio Safety Officer: Paula Moravek
- EOS website: Bio Safety section
- Institutional Bio Safety Committee:

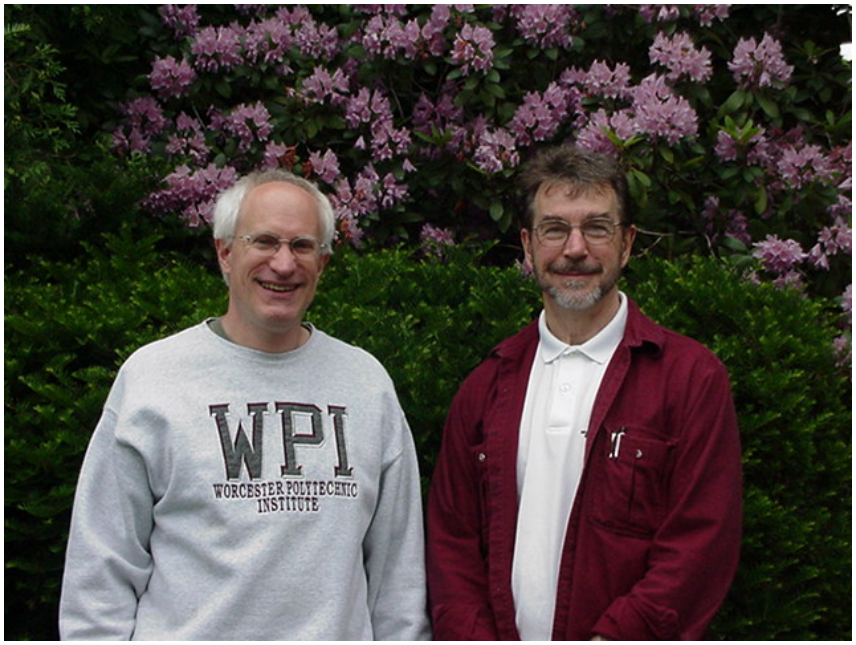
  - rDNA experimental review
  - Select Agents compliance & inventory

Biological Safety

- Autoclave safety
- Biohazard disposal
- Blood borne pathogens
- Bio Safety Level determination
- Sharps disposal
- Web page links
- Call Paula at x 5401 for more information

Radiation Safety

- Radiation Safety Officer: Dave Adams (left)
- Asst. Radiation Safety Officer: Roger Steele (right)
- Specialized training required for all authorized isotope users
- Visit the EOS website, Radiation Safety section for information
- Call Dave at x 5432 for more information



Laser Safety

- Laser Safety Officer: Roger Steele
- Campus laser inventory
- Lab inspections and protocol review
- Training
- Medical surveillance (eye exams)
- Call Roger at x 5256 for more information

Hazardous Waste Management

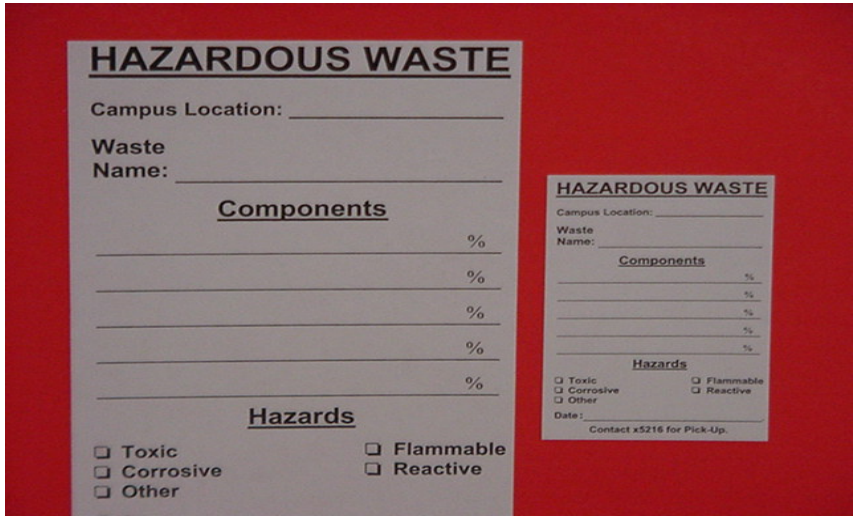
- The EOS website contains a complete hazardous waste management plan in the “Laboratory Safety” section.
- The plan contains everything you need to know about safely and legally managing laboratory hazardous waste.
- Waste determination: is my lab waste a regulated hazardous waste?

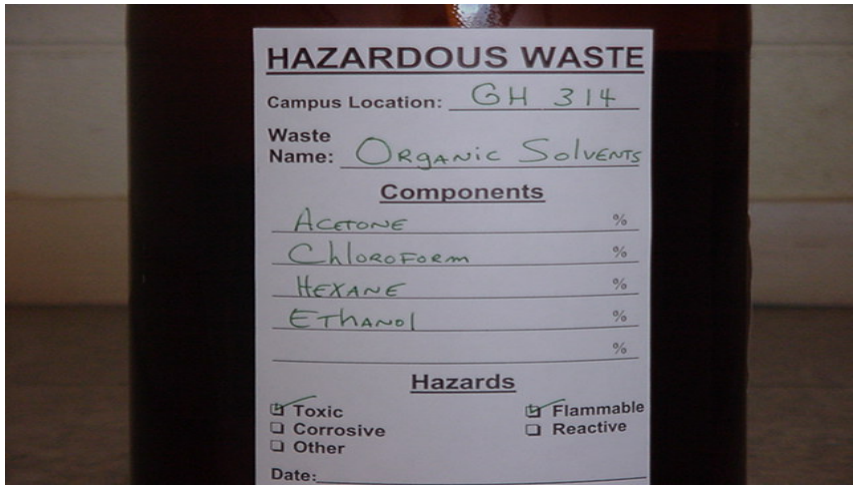
Hazardous Waste: Managing Waste Containers

- **Hazardous waste containers must:**

- have a screw cap
- be kept closed, unless waste is being added
- be compatible with the waste
- be in good condition
- be stored in secondary containment
- be located in a secure location, near the point of generation

Hazardous Waste: Labels





- **Hazardous Waste labels must have:**
- the words Hazardous Waste
- full chemical names
- the hazard (s) of the waste
- the date placed on the label, only when it is ready to be picked up and removed from the lab

Hazardous Waste: Pick Up

- There are three ways to arrange to have your waste picked up and removed:
- call x 5216
- email to **dmessier@wpi.edu**
- use the pickup request form on the main page of the EOS website
- Provide your name, location, and the quantity and type of waste to be removed
- All waste will be picked up in less than three days and moved to the main accumulation area in Goddard Hall

Hazardous Waste: General

- A supply of free labels and containers is available in Goddard Hall, room 114
- Accumulation areas must be inspected weekly
- “No Smoking” and “Hazardous Waste Storage Area” signs must be located near the point of generation
- Spill control material must be available in the area where waste is generated
- Emergency contact information must be in the lab; near the phone is a good place to post it

Emergency Response: Planning

- What's the worst thing that could happen in your lab?

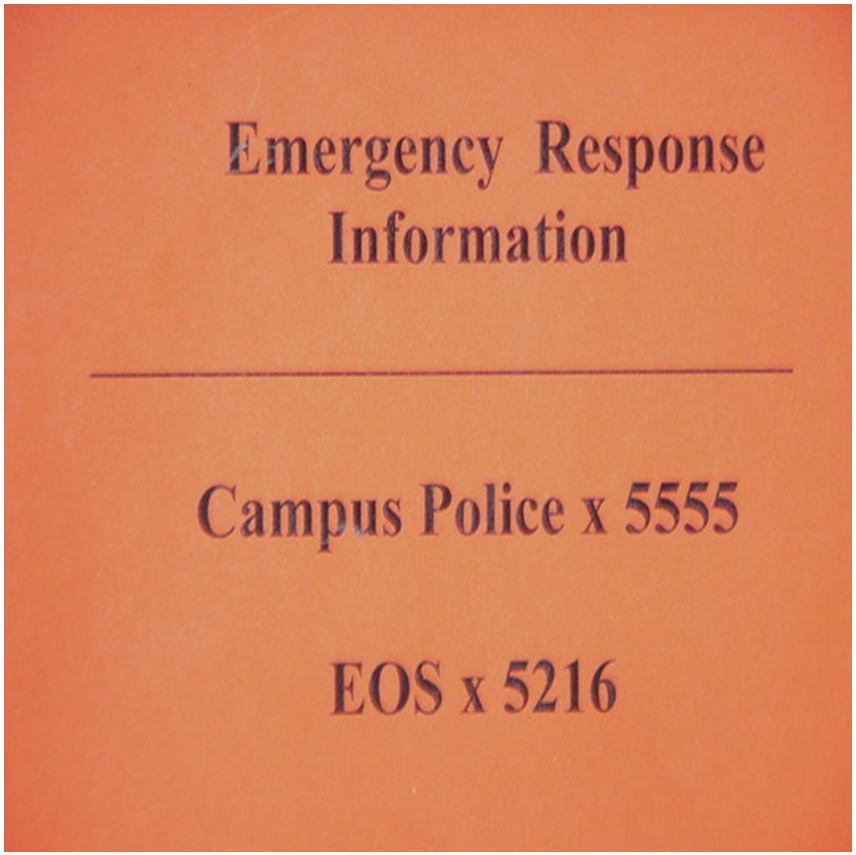
  - Solvent fire?
  - Acid spill?
  - Gas cylinder leak?
  - Needle stick?
  - Chemical splash to the face?
  - Hand laceration from broken glass?

Emergency Response: Preparation

- Are all exits accessible?
- Is there enough spill control material?
- When was the last time the fire extinguisher was inspected?
- Is the eye wash flushed every week?
- Is the safety information card on the lab door up to date?
- What would happen if……?
- Be ready……..be prepared to act

Handling Chemical Emergencies

- Know who to call
- 24/7 coverage is available at Campus Police: x 5555
- Know how to control a spill, and how to use spill control products
- Know proper equipment shutdown
- Know two evacuation routes



First Aid for Chemicals on the Skin

- Flush area with water for 15 minutes
- Remove clothing and jewelry, as needed
- Seek additional medical attention promptly
- Bring an MSDS to the medical provider, if possible

First Aid for Chemicals in the Eyes

- Don’t rub the eyes
- Hold eyelids open and flush with water for 15 minutes
- Be careful not to contaminate the other eye
- Seek additional medical attention promptly
- Bring an MSDS to the medical provider, if possible

Emergency Response: Chemical Spill

- Small spill: Can I handle it with spill material and personal protective equipment?
- Six trained and equipped responders on campus to assist with the cleanup of a small spill
- Goddard Hall: Jack Ferraro and Paula Moravek
- Salisbury Lab: Jes Caron and Lisa Wall
- Kaven Hall: Don Pellegrino
- Olin Hall: Roger Steele

Emergency Response: Chemical Spill

- Large spill: evacuate the lab
- Assist others, if it is safe to do so
- Notify other building occupants as you leave
- Notify Campus Police: x 5555, or use the fire alarm pull station, if necessary
- Provide Campus Police with accurate, detailed information about the spill
- Meet Campus Police outside the building and provide appropriate information

Emergency Response: Fire Prevention

- Limit the amount of flammable solvent to one days supply at the lab bench
- Store flammable solvents in flammable storage cabinets
- No open flames near flammable vapors
- Install flash arrestors on flammable gas cylinders
- Check bunsen burner rubber tubing regularly
- Clean up all spills promptly

Emergency Response: Fire Response

- In the event of a fire, evacuate immediately; seconds count
- Activate the building fire alarm by using the pull station on your way out
- This activates the building fire alarm system, and also notifies Campus Police
- Campus Police notifies the Worcester Fire Dept., and dispatches an officer to the building
- Meet the emergency responders when they arrive, and provide details of the fire situation

Safety Websites

- The EOS website, “Related Resources” section, has many links to useful government, university and MSDS websites.

- Visit it at:

www.wpi.edu/Admin/Safety/Resources.html

EOS Contact Information

- Office Location: Higgins Carriage House, second floor
- Phone: 831-5216 Fax: 831-5768

- Dave Messier, x5216, dmessier@wpi.edu
- Dave Adams, x5432, dadams@wpi.edu
- Paula Moravek,x5401,pmoravek@wpi.edu
- Roger Steele, x 5256, rsteele@wpi.edu