Department of MI&I
Chemical Hygiene Plan & Exposure Control Plan

2019 Annual Review
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THE OHIO STATE UNIVERSITY
WEXNER MEDICAL CENTER
Why is Lab Safety Important?

2010 Missouri Lab Explosion. Four injured. Explosion of anaerobic growth chamber. Lack of understanding of operation of growth chamber. Unfamiliar with how valves should be set resulting in explosion. Lab was destroyed.
Why is Lab Safety Important?

2013 UF lab fire – second degree burns.
Small lab fire from a Bunsen burner.
The Foundation

- OSHA-29CFR1910.1450 The Laboratory Standard
- In effect since 1990
- Took the Hazard Communications “Right to Know” laws and applied them to labs
- Burden on researchers to document practicing safe science
- Covers use of hazardous chemicals in the labs
- Chemical Hygiene Plan
CHP Importance?

• This is the document that OSU EHS will use as a basis for the lab’s chemical safety program

• Source of all chemical and emergency procedures training for lab staff

• PPE determination and documentation

• Record keeping
Topics Covered

- Lab Accidents, Safety Resources and Lessons Learned
- General Lab Safety
- Chemical Hygiene Plan (CHP)
- Standard Operating Procedures (SOPs)
- Hazardous Chemicals
- Personal Protective Equipment (PPE)
- Safety Equipment
- Containment Devices (fume hoods, etc.)
- Waste Handling
- Emergency Procedures & Accident Reporting
- Bloodborne Pathogens Exposure Control Plan
A recent CDC report ranks Educational Services as #2 in injuries resulting from incidents involving hazardous chemical substances (1,562 persons injured). Human error was the leading contributing factor of these injuries. There were 1,092 student injuries (70% of 1,562 injuries). This report documents the significant incidents happening at academic institutions and shows the high risks to students when incidents occur. (Hill Jr., Journal of Chemical Health & Safety. 2016)

**Laboratory safety attitudes and practices: A comparison of academic, government, and industry researchers** (Schröder et al., 2015, J Chem Health and Safety). This publication on the comparison of academic, government, and industry researchers illustrates a better safety behavior by industry researchers. The study is based on a survey on laboratory safety, and self-reported PPE compliance behavior was used as the measure. The same study illuminates the positive impact that PIs in academic research laboratories have on student PPE compliance behavior. Moreover, if PIs or their designated laboratory supervisor are actively engaged in promoting research safety, a significant reduction in lab-related accident was observed.
Lab Safety Resources

U.S. Chemical Safety Board (CSB)

- **Video entitled "Experimenting with danger".** The 24-minute video focuses on three serious laboratory accidents: the death of a lab research assistant in 2008 in a flash fire at the University of California Los Angeles (UCLA); a death by accidental poisoning of a highly regarded Dartmouth College professor in 1997; and a 2010 explosion at Texas Tech University (TTU) that severely injured a graduate student, who lost three fingers in the blast and suffered eye damage.

The University of California

- **The UC Center for Laboratory Safety.** This center was created to improve the practice of laboratory safety through the performance of scientific research and implementation of best safety practices in the laboratory. The Center will operate under the oversight of the UC Center for Laboratory Safety Advisory Board with technical support from the UCLA Office of Environment, Health and Safety and the UCLA School of Public Health – Department of Environmental Health Sciences.

https://www.osha.gov/SLTC/laboratories/safetyculture.html
<table>
<thead>
<tr>
<th>Category</th>
<th>Title</th>
<th>Duration</th>
<th>Year</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gas Safety</td>
<td>MEMs Oscillator Sensitivity to Helium (Helium kills iPhones)</td>
<td>21 min</td>
<td>2018</td>
</tr>
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<td>Risk Assessment</td>
<td>Why Should We Do Laboratory Chemical Risk Assessments?</td>
<td>2 min</td>
<td>2018</td>
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<td></td>
<td>DCHAS Laboratory Risk Assessment</td>
<td>2:12 min</td>
<td>2018</td>
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<td>Accidents</td>
<td>Experimenting with Danger</td>
<td>24 min</td>
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<td>Animal Biosafety</td>
<td>Working Safety in Animal Biosafety Levels 1</td>
<td>11 min</td>
<td></td>
</tr>
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<td></td>
<td>Working Safety in Animal Biosafety Levels 2</td>
<td>20 min</td>
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<tr>
<td></td>
<td>Working Safety in Animal Biosafety Levels 3</td>
<td>23 min</td>
<td></td>
</tr>
<tr>
<td>Autoclave Safety</td>
<td>Autoclave Safety Animation</td>
<td>9 min</td>
<td>2011</td>
</tr>
<tr>
<td>Biosafety</td>
<td>Responding to a Biological Spill</td>
<td>4:44 min</td>
<td>2014</td>
</tr>
<tr>
<td></td>
<td>Management of Biomedical Waste in Florida</td>
<td>23 min</td>
<td>2012</td>
</tr>
<tr>
<td>Biosafety Cabinet</td>
<td>Biological Safety Cabinets: How They Work to Protect You</td>
<td>5 min</td>
<td>2015</td>
</tr>
<tr>
<td></td>
<td>Biosafety: BSL-2 spill management in biosafety cabinet (BSC)</td>
<td>2 min</td>
<td>2014</td>
</tr>
<tr>
<td></td>
<td>Working safely in a Class II cabinet</td>
<td>18 min</td>
<td>2013</td>
</tr>
<tr>
<td></td>
<td>Working Safely in your Biological Safety Cabinet Video</td>
<td>Biosafety Cabinets</td>
<td>16 min</td>
</tr>
<tr>
<td></td>
<td>Biosafety Cabinet (BSC): Virus Culturing Practices (cell &amp; tissue cultures)</td>
<td>3 min</td>
<td>2011</td>
</tr>
<tr>
<td></td>
<td>Biosafety cabinet (BSC): Demonstration of airflow using a smoke pencil</td>
<td>3 min</td>
<td>2011</td>
</tr>
<tr>
<td>Bunsen Burner Safety</td>
<td>How to Light a Bunsen Burner</td>
<td>4 min</td>
<td>2010</td>
</tr>
</tbody>
</table>
# UC Center for Laboratory Safety: Lessons Learned

## Biohazards

<table>
<thead>
<tr>
<th>Title</th>
<th>Hits</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bone Marrow from Infected Mouse Splashes Into Researcher’s Eye</td>
<td>6830</td>
</tr>
<tr>
<td>Contaminated Glass in Sink Cuts Technician’s Finger</td>
<td>7179</td>
</tr>
<tr>
<td>Student Cuts Himself with Scalpel When Sectioning Human Tissue</td>
<td>7664</td>
</tr>
<tr>
<td>Researcher Sustained Laceration to Leg and Was Exposed to a Bloodborne Pathogen</td>
<td>7027</td>
</tr>
<tr>
<td>Bone Sliver Penetrates Researcher’s Hand and Exposes Him to HIV</td>
<td>7080</td>
</tr>
</tbody>
</table>

## Chemicals

<table>
<thead>
<tr>
<th>Title</th>
<th>Hits</th>
</tr>
</thead>
<tbody>
<tr>
<td>Student Sustains Cold Burns When Retrieving vial from Liquid Nitrogen</td>
<td>127</td>
</tr>
<tr>
<td>Student Sustains Cold Burns When Touching Liquid Nitrogen</td>
<td>1044</td>
</tr>
<tr>
<td>Caustic Solution Splashes into Eye</td>
<td>8458</td>
</tr>
<tr>
<td>Trizol Splashes on Researcher’s Face, Chest, and Neck during RNA Extraction</td>
<td>12769</td>
</tr>
<tr>
<td>Unattended Experiment Causes Exposure to Nitric Acid</td>
<td>8134</td>
</tr>
<tr>
<td>Three Researchers Exposed to Barium Oxide During Spill Clean-Up</td>
<td>7313</td>
</tr>
<tr>
<td>Hydrofluoric Acid Exposure to Eyes</td>
<td>8160</td>
</tr>
<tr>
<td>Lysis Buffer Splashed into Researcher’s Eye</td>
<td>7775</td>
</tr>
<tr>
<td>Cesium Chloride Splash to Eye Due to Ill-Fitting Safety Glasses</td>
<td>7292</td>
</tr>
</tbody>
</table>
UC Lessons Learned: Bone Sliver Penetrates Researcher’s Hand and Exposes Him to HIV

What Happened?
A researcher was preparing to remove bone marrow from a humanized mouse which had been infected with HIV six weeks prior to the experiment. The researcher was working inside a biosafety cabinet and wore appropriate BSL2+ PPE including a disposable gown and double gloves. During the procedure the bone splintered and a small sliver penetrated the researcher’s finger. The researcher removed the bone sliver from his hand causing the finger to bleed. He immediately removed his gloves and washed the affected area. The researcher was escorted to Occupational Health and Safety by his PI within 10 minutes of the incident.

What Was The Cause?
The researcher was holding the bone between his fingers and applied too much force when attempting to flush out the bone marrow, which caused the bone to splinter.

What Corrective Actions Were Taken?
Review bone marrow extraction procedure and update SOP if necessary.

How Can Incidents Like This Be Prevented?
After 10 min sterilization in ethanol bones turn brittle and splinter easily.
• Use forceps to hold the bone in place and never hold it with your fingers; this method prevents splinters to penetrate your hand; it also prevents accidental needlesticks when flushing out the bone marrow with a syringe

Resources
> Bone marrow isolation and resuspension

QUICK ACTION TIPS
Minimize exposure to biohazards:
1. Expose the wound
2. Express the wound
3. Flush the wound under running water for 5 min while expressing
4. Cover the wound and seek medical attention
5. Report the incident to your supervisor

HIV
• Human immunodeficiency virus
• Causes progressive failure of the immune system (AIDS)
• No cure
UC Lessons Learned: Student Sustains Cold Burns when Touching Liquid Nitrogen

What Happened?
A researcher inserted metal racks into a liquid nitrogen tank when her right hand came into contact with the chemical; she sustained cold burns to her index, middle and ring fingers. The researcher reported the incident immediately to her PI, and went to the emergency room for medical attention. At the time of the incident the researcher was wearing appropriate PPE including a pair of latex gloves underneath the cryogenic gloves; however, the chemical had penetrated the gloves upon submersion.

What Was The Cause?
The cryogenic gloves worn by the researcher appeared to be intact. Cryogenic gloves are meant to handle cold items and protect to temperatures as low as -162°C (-260°F). However, they are not meant to be submerged into liquid nitrogen which has a temperature of -196 °C (-321 °F). In addition, if the gloves were used for other purposes where they get wet, the problem can be compounded. Not all cryogenic gloves are water-resistant.

What Corrective Actions Were Taken?
• Review the correct use of cryogenic gloves and modify SOP for handling cryogenic chemicals
• Review modified SOP with lab members

How Can Incidents Like This Be Prevented?
• Make sure to use all equipment according to their specifications

Resources
> Cryogenic Liquids

QUICK ACTION TIPS
Contact with cryogenic materials can rapidly freeze and destroy skin tissues. If exposed:
1. Contact a physician immediately
2. Remove all clothing that may restrict circulation to the frozen area
3. Flush affected area with tepid, not hot, water. The water temperature should be barely above body temperature; do not use dry heat
4. Do not rub frozen body parts, before or after warming
5. Keep person warm and rested
6. Cover thawed body part with dry sterile gauze and large, bulky protective clothing
7. Report the incident to your supervisor

Liquid Nitrogen
• A jet of cryogen vapors can freeze the skin or eyes faster than liquid contact
• Liquid-to-gas expansion ratio of nitrogen is ~700.1 at 20 °C (68 °F), which can generate great force
• 2006 incident at Texas A&M University: defective pressure-relief devices resulted in explosion of liquid nitrogen tank and propelled the tank through the ceiling
• Might act as an asphyxiant in confined spaces
Best Line of Defense = Risk Assessment

Formal process for figuring out the potential risks associated with a particular job and devising ways to control or eliminate them before an exposure, injury or accident occurs.

“Occupational Detective Work” - What can go wrong, how it might happen, what would result if it happened, how likely is it to occur, and most importantly, how we can prevent it from happening?”

General Lab Safety

- Safe working protects everyone: you, other lab workers, custodians, visitors
- It is the responsibility of all personnel within the laboratory to maintain a clean and safe lab environment
- Food and drinks are excluded from the laboratory areas
- Wash hands often
- Clean up after yourself, return equipment/reagents/supplies to original location
- Do not block exits or safety equipment
- Wear appropriate PPE
- No open-toed shoes (sandals, flip-flops, crocs)
- Do not perform hazardous procedures alone
General Lab Safety Do’s and Don’ts

DO clean up after using chemicals or equipment.
DO leave the lab cleaner than you found it.
Chemical Hygiene Plan (CHP)

• What is a CHP? A manual of SOPs and regulations designed to aid in the protection of laboratory personnel from chemical related health hazards.

• Contents:
  - Laboratory locations – buildings and rooms
  - Standard Operating Procedures (SOPs)
  - Location of safety equipment
  - Chemical inventory (EHS HP Assist)
  - Training records

• Hardcopy Location: BRT 760X

• PI is the Chemical Hygiene Officer in the Lab:
  - Detailed training and ongoing safety education
  - PPE (availability and appropriate usage)
  - Equipment
  - Routine lab inspection

• Desiginee: (typically the lab manager) oversees implementation

• All lab personnel MUST review the CHP annually as required by OSU EHS
Standard Operating Procedures (SOP)

- Lab specific dangerous chemicals
- Gel electrophoresis
- Centrifugation
- Compressed gases
- Cryogenic liquids

Saved on Shared Drive (or accessible in 760X SOP Binders)
Hazardous Chemicals

- **Definition**: Any chemical that has the potential to cause serious harm or death without proper training, unsafe work practices, or misuse.

- **Inventory**: Performed annually. PI’s and Lab Managers have access to inventory through EHS Assist.

- **Procurement**: Check inventory prior to purchase.

- **Storage**: Areas must be clearly marked (door/cabinet signs). Store below eye-level. Store like materials with like. Clearly label containers.

- **Transportation**: Secondary container with absorbent material. Take care when transporting - use a cart to prevent dropping.

- **Required PPE**: Lab coat, gloves, eye protection/face shield, fume hood

- **Disposal**: Must be labeled with EHS yellow tag and picked up by EHS for disposal - NEVER dump down sink or throw in trash.
Potential Chemical Hazards

Damage to clothing and possibly skin

Leaking container

Illegible label

Source – Safety First “Creating an Effective Lab Safety Program”
<table>
<thead>
<tr>
<th>Inventory #</th>
<th>PI</th>
<th>CAS #</th>
<th>Chemical Description</th>
<th># of Containers</th>
<th>Container Amount</th>
<th>Container Units</th>
<th>Physical State</th>
<th>Room</th>
<th>Storage Location</th>
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</thead>
<tbody>
<tr>
<td>0300428</td>
<td>MI&amp;I-Inventory</td>
<td>152-11-4</td>
<td>(+/-)-Verapamil hydrochloride</td>
<td>2</td>
<td>1</td>
<td>grams</td>
<td>Solid</td>
<td>760H</td>
<td>Stoddley</td>
</tr>
<tr>
<td>0300303</td>
<td>MI&amp;I-Inventory</td>
<td>989-51-5</td>
<td>(-)-Epigallocatechin Gallate</td>
<td>1</td>
<td>50</td>
<td>milligrams</td>
<td>Solid</td>
<td>750G</td>
<td>Amer</td>
</tr>
<tr>
<td>0314492</td>
<td>MI&amp;I-Inventory</td>
<td>5989-54-8</td>
<td>(S)-(+) LIMONENE</td>
<td>1</td>
<td>10</td>
<td>milliliters</td>
<td>Liquid</td>
<td>750D</td>
<td>Ahmer</td>
</tr>
<tr>
<td>0172928</td>
<td>MI&amp;I-Inventory</td>
<td></td>
<td>0.5% Trypsin-EDTA</td>
<td>1</td>
<td>1</td>
<td>milliliters</td>
<td>Liquid</td>
<td>760B</td>
<td>Wozniak</td>
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<tr>
<td>0300518</td>
<td>MI&amp;I-Inventory</td>
<td></td>
<td>1 molar tris buffer EDTA</td>
<td>3</td>
<td>6.5</td>
<td>milliliters</td>
<td>Liquid</td>
<td>750G</td>
<td>Amer</td>
</tr>
<tr>
<td>0257891</td>
<td>MI&amp;I-Inventory</td>
<td>57-55-5</td>
<td>1,2-Propanediol, 95%</td>
<td>1</td>
<td>500</td>
<td>milliliters</td>
<td>Liquid</td>
<td>750D</td>
<td>Ahmer</td>
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<tr>
<td>0221405</td>
<td>MI&amp;I-Inventory</td>
<td>109-70-6</td>
<td>1-Bromo-3-chloropropane</td>
<td>1</td>
<td>200</td>
<td>milliliters</td>
<td>Liquid</td>
<td>750D</td>
<td>Ahmer</td>
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<tr>
<td>0221680</td>
<td>MI&amp;I-Inventory</td>
<td>71-23-8</td>
<td>1-propanol</td>
<td>1</td>
<td>4</td>
<td>Liter</td>
<td>Liquid</td>
<td>736C</td>
<td>Rajaram</td>
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<tr>
<td>0221576</td>
<td>MI&amp;I-Inventory</td>
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<td>10% Bleach</td>
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<td>500</td>
<td>milliliters</td>
<td>Liquid</td>
<td>736A</td>
<td>Rajaram</td>
</tr>
<tr>
<td>0321676</td>
<td>MI&amp;I-Inventory</td>
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<td>10% buffered Formalin</td>
<td>1</td>
<td>4</td>
<td>Liter</td>
<td>Liquid</td>
<td>750D</td>
<td>Ahmer</td>
</tr>
</tbody>
</table>
Globally Harmonized System (GHS)

• Universal system with a logical approach to:
  - Defining hazards of chemicals
  - Creating classification processes
  - Communicating hazard information in a uniform way on labels and safety data sheets

• 3 major hazard groups = physical, health and environmental hazards
Safety Data Sheets (SDS)

- Can be obtained online from chemical company or through OSU EHS website: [http://ehs.osu.edu/ResBioSafety/StandardOP.aspx](http://ehs.osu.edu/ResBioSafety/StandardOP.aspx)
- Primary source of information regarding a substance/chemical
- Universal format containing 16 distinct sections:

<table>
<thead>
<tr>
<th>Identification of substance</th>
<th>Firefighting Measures</th>
<th>Physical/Chemical Properties</th>
<th>Disposal Considerations</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hazard(s) Identification</td>
<td>Accidental Release Measures</td>
<td>Stability/Reactivity</td>
<td>Transport Information</td>
</tr>
<tr>
<td>Composition of Ingredients</td>
<td>Handling and Storage</td>
<td>Toxicological Information</td>
<td>Regulatory Information</td>
</tr>
<tr>
<td>First Aid Measures</td>
<td>Exposure Controls</td>
<td>Ecological Information</td>
<td>Other Information</td>
</tr>
</tbody>
</table>

- Lab personnel need to be familiar with the SDS of chemicals used in their work
From OSU EHS Website: “Any chemical labeled with the GHS signal word of Danger on the SDS, or having specific handling procedures, must have a laboratory specific SOP.”
MI&I Hazardous Chemicals

Chemicals are labeled according to GHS Signal Word

<table>
<thead>
<tr>
<th>GHS Signal Word</th>
<th>Label</th>
</tr>
</thead>
<tbody>
<tr>
<td>Non Hazardous</td>
<td><img src="image" alt="Green" /></td>
</tr>
<tr>
<td>Warning</td>
<td><img src="image" alt="Yellow" /></td>
</tr>
<tr>
<td>Danger</td>
<td><img src="image" alt="Red" /></td>
</tr>
</tbody>
</table>
Categories of Chemicals

- Flammables:
  - Ethanol, Methanol, Ether, Acetone, Glacial Acetic Acid
  - Store in flammable cabinet

- Corrosives:
  - Concentrated acids: such as hydrochloric, nitric, sulfuric, and acetic
  - Concentrated alkalis: sodium/potassium/ammonium hydroxide
  - Store in corrosives cabinet. Separate acid/base >2L

- Reactive:
  - Sodium Azide: reacts with heavy metal and heat to form explosive compounds

- Carcinogens/Reproductive Toxins:
  - Ethidium Bromide
  - Acrylamide: Polymerized acrylamide is not regulated. Unpolymerized liquid is a hazardous chemical
  - Formaldehyde, Phenol, Chloroform
Hazardous Chemicals - Overview

To determine a chemical’s hazard(s):

- Consult the container label(s)
- Check the SDS
- Read the SOP
Personal Protective Equipment (PPE)

- Labs are BioSafety Level 2 (BSL-2) areas
- The parts of the body most frequently subject to injury in the laboratory are the eyes, skin, respiratory and digestive tracts.
- Minimum PPE to wear while working at the bench: gloves & lab coat
- Review SOP/SDS for appropriate assay/chemical specific required PPE
- Replace damaged or contaminated PPE
- Home-laundering of lab PPE is prohibited: Please utilize department lab-coat cleaning service.
- Remove PPE before leaving lab area: not to be worn in elevators or Administrative areas
- Do not touch door handles with gloves
Be familiar with the locations of lab safety equipment and exits
Fire Safety

To operate an extinguisher:

1. Pull the pin
2. Aim nozzle at base of fire
3. Squeeze the handle
4. Sweep nozzle side to side

https://www.redrivermutual.com
Fume Hoods

- **When to use?** While working with chemicals that produce unpleasant and/or hazardous fumes.

- **Airflow** – Air is drawn from the front of the fume hood to the baffles located in the back. Debris, such as foil and paper can easily get sucked into the baffles and block airflow.

- **Sash** – Keep at the lowest possible position and use the sash as a shield; keep closed when not in use. When left open, a single fume hood can consume as much energy as 3.5 households every day.

- **Inspect** – Check the air flow indicators before use. Properly functioning velocity = 80-120 feet per minute.

- **Not for storage** – Large numbers of chemical bottles or other items within the hood can dramatically impair airflow velocity. Items should not be left to evaporate in the fume hood – vapors may be exhausted into the atmosphere untreated. To maintain airflow, <30% of the working surface should be occupied.

- **Incompatible items** – For example, flammable solvents (alcohols, toluene, hexane, etc) should not be used/stored with concentrated acids (sulfuric or hydrochloric acids).
Fume Hoods

Safe

Hazardous
Biological Safety Cabinet (BSC)

• **When to use?** When a sterile environment is required. Ideal for tissue culture work or sterile-drying of non-solvent materials.

• Continuous flames are not permitted for use in BSCs.

• Use sign-up sheets. Make sure hood is working before use – check Magnehelic gauge. Do not use if airflow is at zero.

• To maintain proper airflow (sterility)
  – Keep hands at least 4” inside from the grill area
  – Limit materials inside hood
  – One person working in the hood at a time
  – Limit swift hand movements
  – Keep doors closed and traffic to a minimum

• Remove materials and waste and wipe hood with 70% EtOH when done working
Laminar Flow Hood

• **When to use?** Most ideal for preparing media/pouring plates or for dissections/necropsies

• Provides partial sterility to materials inside but does not provide protection to lab worker

• Not ideal for tissue culture work or for work with organic solvents

• Leave it clean and empty when done working
Chemical Waste

All chemical waste will be picked up by Environmental Health and Safety. Submit disposal requests at ehs.osu.edu/service-requests

*Natural uranium and thorium must be segregated from other chemical waste. Payment must be received prior to pick-up.

CHEMICALLY CONTAMINATED DEBRIS
Examples: Gloves, pipette tips, weigh boats, tubes, vials, bench pads, EMPTY chemical bottles, and plasticware.

Liquid Chemical Waste
Label with specific description of contents.

Opened and Unopened, Unwanted Chemicals in Original Manufactures Containers with Original Labels
Leave as is.
Chemicals will be placed in the Chemical Redistribution Program or disposed of as chemical waste.

Flammable solvents only.
Label with specific description of contents. Limited availability.

The Ohio State University
Be safe today and remain a Buckeye tomorrow.
Electrophoresis Gels and Buffer Solutions

LAB DEBRIS AND GELS CONTAINING MUTAGENIC DYES OR POLYACRYLAMIDE GELS


Gels and contaminated solids: Label with specific description of contents.

Waste liquids and buffer solutions: Label with specific description of contents.

LAB DEBRIS AND AGAROSE GELS CONTAINING NON-MUTAGENIC DYES

*Non-Mutagenic dye examples: SYBR® Safe, GelRed, GelGreen, EvaGreen

Agarose gels and solids: as long as they are absent of free liquids Remove all labels from containers Discard in general trash.

Waste liquids and buffer solutions: Label with specific description of contents.

*Ethidium Bromide waste must be segregated from other electrophoresis agarose gels and buffer solutions. Acrylamide gels may be disposed of with Ethidium Bromide gels.*
Laboratory Glass

All biohazardous and chemical waste will be picked up by Environmental Health and Safety. Submit disposal requests at ehs.osu.edu/service-requests

*Limit weight of each box to 30lbs or less.

**Broken and Intact Chemically Contaminated Glass**

Label as chemically contaminated lab glass.

**Broken & Intact Biohazardous Glass**

Place biohazardous glass in primary container prior to placing in bio-box.

Optional

Intact glassware only:
- Triple rinsed – Collect rinsate
- Labels defaced
- Caps removed
- Recycling picked up by custodians

*Heat resistant glassware cannot be recycled.*

**Glass Slides**

Biologically contaminated:
- Chemically or non-contaminated:
  - Label as chemically contaminated lab glass.

Seal and label with building name, room number, PI, and Infectious Waste Request number.

**Non-contaminated, Clean Broken Glass and Clean Heat Resistant Glass**

Heat resistant glass examples:
- Pyrex and Kimax

Seal and label as non-contaminated or clean broken glass. Picked up by custodians.
Sharps

All biohazardous and chemical waste will be picked up by Environmental Health and Safety. Submit disposal requests at ehs.osu.edu/service-requests

*For your safety, DO NOT recap needles

CONTAMINATED WITH REGULATED WASTE, BIOHAZARDOUS MATERIAL, OR ANY BSL2 AGENT

- Syringes with needles
- Scalpel/razor blades
- Glass blood vials
- Glass Pasteur pipettes

**Container requirements:**
- Rigid
- Non-breakable and puncture resistant
- Impervious to moisture and leak proof
- Contain a self closing lid
- Red in color with a universal biohazard label
- FDA-cleared

When full close/lock lid for disposal.

CONTAMINATED WITH RESIDUAL CHEMICALS

- Syringes with needles
- Scalpel/razor blades
- Glass blood vials
- Glass Pasteur pipettes

**Container requirements:**
- Leak proof
- Rigid
- Sealable
- Puncture resistant
- Labeled

THE OHIO STATE UNIVERSITY

Be safe today and remain a Buckeye tomorrow.
General Biohazardous Waste

DISPOSABLE CONTAMINATED BIOHAZARDOUS MATERIALS
Examples: Culture dishes, petri dishes, tubes, vials, PPE, tissue and other solid material potentially contaminated with biohazardous material

Seal and label with building name, room number, PI, and Infectious Waste Request number.

CONTAMINATED ITEMS THAT CAN PUNCTURE BIO BOXES
Examples: Serological pipettes, inoculation loops, spreaders, swabs, and sticks

Place items in a lined primary container or bundle together in a smaller bio-bag before placing in bio-box.

Seal and label with building name, room number, PI, and Infectious Waste Request number.

BIOHAZARDOUS LIQUID WASTE
Examples: Liquid media and cultures, human blood, body fluids

Labeled as biohazardous waste. Fill 2/3 full for disposal.

Two red liners are required in bio-boxes containing liquid waste. Seal and label with building name, room number, PI, and Infectious Waste Request number.

All biohazardous waste will be picked up by Environmental Health and Safety. Submit disposal requests at ehs.osu.edu/service-requests

*Limit weight of each box to 30lbs or less.
Emergency Procedures - Spill Response

For spills involving hazardous chemicals:

- **Small spill <1 gal**: cleaned by personnel >> wear PPE >> post spill sign >> absorb chemical with absorbent >> neutralize chemical if needed >> collect in labeled bag >> contact EHS for pickup

- **Large spill >1 gal**: evacuate all personnel >> if inside fume hood, shut sash >> post spill sign >> contact EHS

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**Biological Spills**

How you respond to a biological spill depends on:

- Hazards of the material spilled
- Quantity of material spilled
- How much aerosol was produced by the spill
- Location of spill (inside or outside of biosafety cabinet)

- Follow the written spill clean-up procedures that are specific to the hazards of the materials you are using
- Always wear the PPE deemed appropriate by your PI/department
- Biological spills must be cleaned by lab personnel or EHS Emergency Response Team if necessary. Custodial staff are not responsible for cleaning up biological spills.
- All materials and equipment used in containment and clean-up of a biological spill must be properly disposed of or properly disinfected before being re-used.
- For spills outside of a biosafety cabinet, notify the PI or supervisor and EHS.
Emergency Procedures - Exposure Response

**Exposure Incidents and Reporting**

An exposure incident is a specific eye, mouth, inhalation, or other mucous membrane, non-intact skin, or parenteral contact with blood or other potentially infectious materials that result from the performance of an employee’s job duties.

<table>
<thead>
<tr>
<th>Initiate first-aid immediately</th>
<th>Seek Medical Attention</th>
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<tbody>
<tr>
<td>• Using soap and water, vigorously wash contaminated skin for 10 minutes</td>
<td>• Notify PI/manager/supervisor immediately if available</td>
</tr>
<tr>
<td>• Flush splashes to nose, mouth, or skin with water for 15 minutes</td>
<td>• Seek medical attention ASAP at University Health Services during normal business hours or OSU-WMC Emergency Department after hours</td>
</tr>
<tr>
<td>• Irrigate contaminated eyes for 15 minutes using sterile water or saline</td>
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• Complete and Employee Accident Report
• If incident involved a “sharp” such as a needle or scalpel, you must also complete the “Sharps Injury from Needlestick Report”
• If the incident involved rDNA or biohazards, the rDNA/Biohazard Incident Report form must be completed and submitted to the Office of Responsible Research Practices

Bloodborne Pathogens
Online Training

**Exposure Control Plan (ECP)**

Employers must prepare an **Exposure Control Plan** (ECP). The ECP is the employer’s written program that outlines the protective measures an employer will take to eliminate or minimize employee exposure to blood and other potentially infectious materials.

**A site-specific ECP:**
- Must be prepared by employer (i.e., Principal Investigator, lab manager, or lab supervisor)
- Identifies jobs and tasks with occupational exposure to blood or other potentially infectious materials
- Must be accessible to employees
- Must be reviewed and updated at least annually, but more often as necessary to reflect changes in tasks, procedures, or assignments which affect exposure or implementation of the plan
- Must solicit input from employees with direct patient care in identifying, evaluating, and selecting engineering and work practice controls
- Documents annual consideration and implementation of safer medical devices designed to eliminate or minimize exposure
The exposure control plan describes how an employer will:

- Use universal precautions
- Use effective engineering controls
- Use work practice controls
- Provide and ensure use of PPE
- Offer Hepatitis B vaccinations to employees at risk
- Provide medical surveillance of employees at risk
- Use biohazard signs and labels to identify biohazards
- Use housekeeping controls (e.g., decontamination)
- Provide post-exposure medical evaluation and follow-up
- Maintain records
- Train employees
HAVE A PLAN!
Be accountable for what you do
Know what you are working with
Think about what could happen – What if…?
Be prepared to respond

Thank You!