Laboratory Safety

Jackie Kerr, CHMM
Associate Director of Laboratory Safety
Harvard Environmental Health & Safety (EHS)
Environmental Health and Safety (EHS)

- We support Harvard University’s mission of teaching and research by promoting a culture of safety, health, environmental protection, and emergency preparedness. Our customers include students, faculty, and staff, as well as the broader community and environment around us.

- EHS is part of Harvard Campus Services and we service the entire University, but have staff assigned to cover each school, where needed.
EHS Laboratory Safety Services

- Technical assistance and consultations to research labs
- Laboratory safety inspections
- Chemical safety expertise (e.g. storing, handling)
- Hazardous waste management
- Industrial hygiene/laboratory ventilation
- Physical hazard safety in the labs
- Regulatory guidance and compliance (OSHA, EPA, BPH, etc)
- Promoting a culture of safety
  - Safety Committee meetings
  - Advise on appropriate PPE and how to use
  - Accident/injury investigation
**GHS Pictogram**

- **Oxidizers**
- **Flammables, Self Reactives, Pyrophonic, Self-Heating, Emits Flammable Gas, Organic Peroxides**
- **Explosives, Self Reactives, Organic Peroxides**
- **Acutely Toxic (severe)**
- **Burns Skin, Damages Eyes, Corrosive to Metals**
- **Gases Under Pressure**
- **Carcinogen, Respiratory Sensitizer, Reproductive Toxicity, Target Organ Toxicity, Mutagenicity Aspiration Toxicity**
- **Toxic to aquatic environment**
- **Acutely toxic(harmful), Irritant to skin, eyes or respiratory tract, Skin sensitizer, Hazardous to the Ozone layer.**

**BIOSAFETY LEVEL**

- **BSL-1**
  - Low risk to personnel and the environment
- **BSL-2**
  - Moderate risk to personnel and the environment
- **BSL-3**
  - Serious disease for human, animal or plant (not spread by casual contact)
- **BSL-4**
  - Very serious disease for human, animal or plant (often untreatable)
Examples of regulatory bodies/agencies we ensure compliance with:

- OSHA
- United States Environmental Protection Agency
- MassDEP
- Boston Public Health Commission
- Harvard University
- Boston Fire Department
- NIH
Team Approach

LAB SAFETY ADVISOR – HASSAN RONE

- Lead subject matter expert as it pertains to chemical and general lab safety at HSPH
- Inspects laboratories at least once per year to ensure a safe and compliant work environment, but works with them regularly on safe practices
- Strives to ensure strong partnerships with the labs so that researchers look to EHS for guidance and support and don’t view us as the “safety police”

BIOSAFETY OFFICER – ERIC ROUSE

- Lead subject matter expert as it pertains to biosafety at HSPH
- Works with Committee on Microbiological Safety (COMS) to ensure compliance and safety in research labs as it pertains to biological hazards
- Assists the LSA all on inspections where COMS regulated materials are used/stored.
Lab inspections

Our laboratory inspection checklist consists of 15 sections, covering various areas of lab related safety. Questions range from regulatory requirements, local policy requirements, training requirements, or lab best practices.

Each lab has a designated Lab Safety Officer (LSO) appointed by the PI to be the liaison between the lab and EHS. The LSA and BSO typically conduct the annual inspection with the LSO.

The LSO also assists with attending safety committee meetings, monitoring training compliance within the lab, orientation of new lab staff to safety equipment, reaching out to EHS with safety needs, etc.
Areas covered in inspection

- Bio-Documentation
- Bio-Equipment
- Bio-Practices
- Bio-Waste

- Chem-Documentation
- Chem-Equipment
- Chem-Practices
- Chem-Waste

- Electrical Safety
- Emergency Preparedness
- General Equipment
- General Practices

- PPE
- Rad-Equipment*
- Training

* EHS has a Radiation Safety Services (RSS) group who perform work specific to radioactive material use, but do not attend the formal lab inspections.
Common findings

- Lack of, or outdated, documentation
- Improper chemical labeling
- Improper chemical storage
- Improper hazardous waste management
- Chemical inventory not up to date/door placarding issues
- Improper or lack of PPE usage
7. Chemicals (Solids and Liquids)

1. Researchers work with the following chemicals in this room:

<table>
<thead>
<tr>
<th>Chemical</th>
<th>CAS</th>
<th>NFPA</th>
<th>Category</th>
<th>Amount</th>
</tr>
</thead>
<tbody>
<tr>
<td>1-Bromo-3-chloropropane</td>
<td>109-70-6</td>
<td>2 - 0 - 0 -</td>
<td>Irritant, Poison</td>
<td>0.400 L</td>
</tr>
<tr>
<td>1,2-Phenylendiamine</td>
<td>95-54-5</td>
<td>3 - 1 - 0 -</td>
<td>Combustible Material: Class 3B, Irritant, Poison, Sensitizer</td>
<td>100.000 g</td>
</tr>
<tr>
<td>1,4-Diazabicyclooctane (or 1,4-Diazabicyclo[2.2.2]octane or DABC or Triethylendiamine)</td>
<td>280-57-9</td>
<td>3 - 2 - 0 -</td>
<td>Combustible Material: Class 3A, INHALATION Potential Moderate, Irritant, Poison</td>
<td>25.000 g</td>
</tr>
<tr>
<td>2-Mercaptoethanol (beta-Mercaptoethanol)</td>
<td>60-24-2</td>
<td>3 - 2 - 1 -</td>
<td>Combustible Material: Class 3A, INHALATION Potential Moderate, Irritant, Poison</td>
<td>0.025 g</td>
</tr>
<tr>
<td>2-Propanol-DB</td>
<td>22739-76-0</td>
<td>2 - 3 - 0 -</td>
<td></td>
<td>5.000 L</td>
</tr>
<tr>
<td>4`,6-Diamidino-2-phenylindole dihydrochloride (or DAPI)</td>
<td>28718-90-3</td>
<td>0 - 0 - 0 -</td>
<td></td>
<td>0.010 g</td>
</tr>
<tr>
<td>8-Hydroxyquinaline (or 8-Quinolinol or 8-Hydroxy-chinolin)</td>
<td>148-24-3</td>
<td>2 - 0 - 0 -</td>
<td></td>
<td>25.000 g</td>
</tr>
<tr>
<td>Acetic acid (glacial)</td>
<td>64-19-7</td>
<td>3 - 2 - 0 -</td>
<td>Acid: Organic, Combustible Liquid: Class 2, Corrosive, INHALATION Potential Moderate</td>
<td>0.100 g</td>
</tr>
<tr>
<td>Acetone</td>
<td>67-64-1</td>
<td>2 - 3 - 0 -</td>
<td>Flammable Liquid: Class 1B, INHALATION Potential Moderate, Irritant, Volatile Organic Compound (VOC)</td>
<td>1.000 L</td>
</tr>
<tr>
<td>Adenine hemisulfate (or Adenine sulfate)</td>
<td>321-30-2</td>
<td>1 - 1 - 0 -</td>
<td></td>
<td>5.000 g</td>
</tr>
<tr>
<td>Agarose</td>
<td>9012-36-6</td>
<td>1 - 1 - 0 -</td>
<td>Not a Hazardous Substance</td>
<td>335.000 g</td>
</tr>
<tr>
<td>Ammonium ferrous sulfate hexahydrate (or Ferrous ammonium sulfate, hexahydrate)</td>
<td>7783-85-9</td>
<td>2 - 0 - 0 -</td>
<td></td>
<td>50.000 g</td>
</tr>
<tr>
<td>Ampicillin (or Ampicillin anhydride)</td>
<td>69-53-4</td>
<td>2 - 1 - 0 -</td>
<td></td>
<td>5.000 g</td>
</tr>
<tr>
<td>Artemisinin</td>
<td>63968-64-9</td>
<td>0 - 0 - 0 -</td>
<td></td>
<td>0.100 g</td>
</tr>
<tr>
<td>Brefeldin A</td>
<td>20350-15-6</td>
<td>1 - 1 - 0 -</td>
<td>Combustible Material: Class 3B, Irritant</td>
<td>0.005 g</td>
</tr>
<tr>
<td>Bromophenol Blue</td>
<td>115-39-9</td>
<td>1 - 1 - 0 -</td>
<td></td>
<td>5.000 g</td>
</tr>
<tr>
<td>Carbencillin disodium (or Carbencillin disodium salt)</td>
<td>4800-94-6</td>
<td>1 - 1 - 0 -</td>
<td></td>
<td>15.000 g</td>
</tr>
<tr>
<td>Chloramphenicol</td>
<td>56-75-7</td>
<td>2 - 0 - 0 -</td>
<td>CARCINOGEN: IARC Group 2A, Probable Human, CARCINOGEN: NTP Reasonably Anticipated Human</td>
<td>25.000 g</td>
</tr>
</tbody>
</table>
Assessment and Inspection Management System (AIMS)

All findings are entered into AIMS and a report is generated for the PI and Lab Safety Officer listing out corrective actions to be closed out and any other items of note.
Corrective Actions and follow-up

Labs have 30 days to close out corrective actions in AIMS.

LSA monitors compliance as it pertains to labs closing out corrective actions.

LSA will coordinate with various parties as needed to support the labs. LSA/BSO/EHS are partners with the labs to ensure safe and compliant research. We not only work with the labs, but also facilities, Research Operations Managers (ROMs), Directors of Administration, COMS, etc. as needed.
Serious non-compliance or safety concerns

- In the event of a time sensitive safety concern or finding, the PI and Associate Director of Lab Safety are notified right away, along with Research Operations Manager (ROM), for swift resolution.

- In the very rare event of egregious or perpetual non-compliance or safety concern, or a regulatory inspection (e.g. OSHA), requiring school level involvement, EHS would work with Delia Wolf-Christian of ORARC.

- Delia serves as HSPH’s university appointed Environmental and Safety Compliance Officer (ESCO). ESCO’s represent their respective schools as needed for EHS initiatives and compliance related programs/policies/etc.
Day to day as an LSA

LSA’s typically have 1-2 inspections per week, on average. These require coordination with the labs, preparation, report writing and follow-up.

Outside the annual inspection process, LSA’s are routinely in touch with the lab community to assist with things such as hazards assessments, SOP writing and reviewing, attending meetings related to lab safety, preparing for and presenting at safety committee meetings (HSPH's meeting is monthly), providing or assisting with safety related trainings, safety documentation assistance, regulatory reviews, injury or incident investigations, assisting with lab moves, closeouts, move-ins, or renovations, and so on.
Other EHS services

- Industrial hygiene
- Radiation Safety Services
- Respiratory Protection
- Controlled substance compliance
- Occupational Safety
- Fire/Life Safety
- Electrical Safety
- Construction Safety
- Accident/injury investigation
- Emergency Management
- Training
- Hazardous materials shipping
- Building and facility safety
- Safety management systems
- Operations and compliance support
- Permitting
- And more!
THANK YOU

JACKIE KERR, CHMM
JACKIE_KERR@HARVARD.EDU
EHS.HARVARD.EDU