UVM Laboratory Safety
Officers’ Meeting
17 April 2018

©Bill Watterson
I'M SORRY, I CAN'T HEAR YOU

OVER THE SOUND OF HOW AWESOME SCIENCE IS
Update - Lab Audits

43 Lab Audits
October 2017 – April 2018

Most labs are on triennial schedule in accordance with UVM Laboratory Health & Safety Policy
Update - Lab Audits

Most Common Deficiencies
1. Lab self-inspections not conducted.
2. Laboratory Registry and Online Inventory (HCOC) not updated within the last 6 months with new employees, critical equipment needs, and new chemicals.
3. Safety training courses not completed.
4. Eyewashes not being flushed monthly.
5. Chemical containers not labeled with English name, hazards, date opened, and responsible party.
6. Hazard assessments not available - e.g. chemical use and planning form or other specific specific assessments.
# Update - Lab Incidents

<table>
<thead>
<tr>
<th>SUMMARY</th>
<th>LESSON(S)</th>
</tr>
</thead>
</table>
| **Discovery** - Oxalyl chloride spilled when a 100 mL container broke. The researcher placed sodium bicarbonate on the spill, placed the nearby hoods in "purge" mode, and exited the lab. | • Plan for the unexpected.  
• Understand controls that are available and use them. |
| **Stafford** - A researcher was exposed to chemical vapors while treating biological wastes for disposal when she included material that another researcher had not disposed of appropriately. The researcher sought medical attention for respiratory irritation, was treated, and sent home. | • Unlabeled materials can injure others.  
• Follow procedures. |
| **Hills** - Comparative anatomy course using animals preserved in formaldehyde and phenol set up in an old lab that has no ventilation. This resulted in odors & chemical exposures. Lab & RM&S assessed exposures and identified controls (lack thereof) and relocated lab to MLS. | • Risk assessments are location specific. |
| **Discovery** - A water condenser hose separated from the condenser causing water to flood three lab rooms on the first floor of Discovery and one electrical room in the basement. A reaction was running over several days in a hood, and the condenser tube must have dislodged sometime overnight. | • Your actions affect others, especially in shared research spaces.  
• Create & follow SOPs for tasks such as attaching water using wire ties or clamps.  
• Assess ALL risks (not only hazmat). |
Update - Respiratory Protection Program

- New version of written program will be available soon.
- Allows for voluntary use of respirators with only:
  1. Respirator Request & Hazard Assessment,
  2. On-line training, and
  3. No medical questionnaire & follow up or fit testing.
- All respirator use requires an assessment.
Agenda

• Uncontaminated Lab Waste
• Waste Reduction Through Glove Recycling
• Lab Freezer Preservation
• Risk Assessment
• Reminders & Questions
Lab Safety Partner Award

Presented to
Vicci LeTourneau

In recognition of
Long Time Excellence in Safety

On this the 17th day of April, 2018

Francis Churchill, Associate Director
Risk Management & Safety
Uncontaminated Lab Waste Audit

Jeff Rogers & Eva Hoskin
Risk Management & Safety
safety@uvm.edu
In 2017 UVM:

- Generated 590 laboratory waste boxes
- Boxes are trucked 80 miles (1.75 hours) to Coventry
- Each box costs $6.29 or ~$3,700 annually

How do we decrease the amount UVM generates?
Audit Protocol

• Visited laboratories on Monday and Wednesday mornings

• Boxes were sampled from STEM, Marsh Life Science, Jeffords, HSRF, Stafford and Given

• Sample size was 30 boxes
What Goes In The Uncontaminated Lab Waste Box?

Uncontaminated broken glass and "pointy things" (items that might puncture a plastic bag) should be placed in the Uncontaminated Laboratory Waste & Broken Glass Box. Examples of items that should be disposed in these boxes include any of the following that are not contaminated with hazardous chemicals, biologicals or radioactive materials:

- broken glass
- serological pipettes
- pipette tips
- glass pasteur pipettes
- empty syringes (NO NEEDLES)
- empty conical tubes
- empty eppendorf tubes
- empty vials

As a reminder, uncontaminated gloves, paper towels, plastic wrap and small boxes can be placed into regular lab trash and recycling and do not need to be disposed of in the uncontaminated laboratory waste boxes.
A Typical Box
Two Main Discoveries:

1) Recyclable materials in waste boxes
   – One third of all boxes had recyclable material in them!

   - Cardboard
   - Paper
   - Plastic (Recyclable)
   - Metal (Foil)
Findings Continued

2) Regular trash items
   – Items that can go in the regular custodial waste baskets were found in 70% of laboratory waste boxes
     • Brown paper towels
     • Gloves
     • Plastic
     • Misc. lab items
Paper towels

Gloves
Opportunities:

• Raise awareness about the boxes – where they go, how much they cost
• Review safety website information on proper disposal
• Receive input and ideas on waste reductions – safety@uvm.edu
• Teach new colleagues on proper use
An Example:

- **Gloves** – regular trash
- **Cardboard** – recycle
- **Empty plastic containers** – rinse and reuse for lab waste
- **Plastic wrap** – regular trash
- **Paper** – recycle
Waste Box Reminders

USE ONLY THE BLACK BAGS PROVIDED.
Uncontaminated lab waste boxes found inside of the biohazardous waste storage shed.

Health Sciences Research Facility
Uncontaminated waste box used as a shipping container
Doing what we can to protect our environment.
Take the Next Step in Your Waste Reduction Journey

Travis Verret – Chemistry Lab Coordinator
Corey Berman – Waste & Recycling Program Supervisor
Apparel and gloves are worn in your facility.

Used products are collected and shipped to our recycling centers.

Used products are sorted and processed into plastic pellets or nitrile powder.

Materials are molded into new eco-responsible plastic products and durable goods.
22% of average lab waste in the USA is from gloves
NOTICE!

Improper recycling will ruin the program for everyone!

- NO latex gloves or other glove brands
- NO cardboard
- NO trash

ONLY Kimberly-Clark Nitrile gloves
ALLOWED plastic bag liner
Department of Risk Management and Safety
Lab Safety Partner Award

Presented to

Lee Corbett

In recognition of

Excellence in Safety

On this the 17th day of April, 2018

Francis Churchill, Associate Director
Risk Management & Safety

Department of Risk Management and Safety
Lab Safety Partner Award

Presented to
Ralph Tursini
In recognition of
Excellence in safety

On this the 17th day of April, 2018

Francis Churchill, Associate Director
Risk Management & Safety
The Importance of Thawing Freezers Annually

Lee Diamond
Risk Management & Safety
Freezer emergency Jeffords: Door removed since ice prevented it from closing anymore.

NEVER CHOP at the ice.
Laboratory Freezers

Research freezers and refrigerators are critical to supporting research at UVM. Any loss of temperature control can damage research materials, sometimes delaying or even ending a research project and jeopardizing your research funding.

Proper use and preventive maintenance is important to keep your unit functioning properly and to protect your research materials.

Preventive Maintenance

Defrosting Your Ultra Low Temperature Freezer

Preparing for Trouble

Preventive Maintenance: Freezers

The operator should perform routine cleaning and maintenance. For maximum performance and efficiency, it is recommended that the unit be checked and calibrated periodically by a qualified service technician.

The following is a condensed list of suggested preventive maintenance requirements. Refer to the owner’s manual for specific details for each piece of equipment. Cleaning and calibration adjustment intervals are dependent on use, environmental conditions, and accuracy required.

Defrosting your Ultra Low Temperature Freezer

Read your owner’s manual and follow the steps recommended by the freezer manufacturer.

The recommendations below are only basic guidelines.

- Remove all contents and transfer to alternate ULT.
- Following the manufacturer’s instructions, turn the unit off and disconnect from power.
- Turn off the battery switch (back-up battery).
- Check owner’s manual to determine whether the unit has a drain.

Whenever possible, move ULTs to a location with a floor drain. This provides a safe path for the water to drain. If ice is allowed to melt in a lab without a floor drain (or other precautions), areas located below the lab may receive water damage.

- For chest freezers, open the lid and remove the sub-lids. If there is ice build-up on the sub-lids, place on towels.
  - If there is no drain, place towels on the chamber floor and along the hinge.
  - If there is a drain, place a pan under the drain and open the drain.
- For upright freezers, open the outer and all inner doors.
  - If there is no drain, place towels inside each compartment.
  - If there is a drain, place towels under the drain and screw the drain.

- Allow the ice to melt and become loose. Loose ice can be placed in a sink or pan to melt. DO NOT REMOVE ICE USING A SCREW DRIVER, ICE PICK, OR SIMILAR DEVICE.

Contamination, decontaminate per biowaste management guidelines.

Use secondary bin to catch water as ice thaws in an upright freezer.

Safety staff can supply cotton rags to help absorb water in the freezer.

Department of Risk Management and Safety
Use secondary bins to catch water and ice on every shelf.

Risk Management & Safety has reusable cotton cloths to help soak up water.
Unattended defrosting causes another unnecessary emergency response. PI retiring / lab renovation.
Given emergency at 3:00pm. Freezer door was removed because it could no longer close.
No aisle space to move freezer out of "freezer room".
Emergency Physical Plant
Assistance Required
Moved to Given loading dock and placed near a drain.

Took 2 days to fully thaw.
Chemicals and samples embedded into ice creates labels that are unreadable.

This can create unnecessary “unknown” chemicals.
Never defrost unattended or overnight unless the appliance is situated over a drain. Check periodically as it thaws.
Annual Task

“Defrost freezers & refrigerators”
reminder on Lab Self-Inspection Checklist
Lab Safety Partner Award

Presented to
Ann Kroll Lerner & Honors College

In recognition of
Excellence in Safety

On this the 17th day of April, 2018

Francis Churchill, Associate Director
Risk Management & Safety
Lab Safety Partner Award

Presented to
Courtney Giles
In recognition of
Excellence in safety

On this the 17th day of April, 2018

Francis Churchill, Associate Director
Risk Management & Safety
A Case Study in the Laboratory Safety Hazard Assessment/Control Process

From Bench to Barn

Jeff LaBossiere
Risk Management & Safety
With HELP from Sarah Roy
The Process

1. Identify the Hazard (what is it?)
2. Assess the Hazard (How is it being used? / Observations)
3. Control the Hazard (reduce exposure risk)
4. Re-Assess the Control
5. Document the Process (SOP)

Communicate (Training)
Identify the Hazard

**Cryptosporidium Parvum**

- Zoonotic, Intestinal Parasite
- Size – 4-6 microns
- Infectious Dose – 5-10 oocysts
- Transmission – Ingestion/Fecal, Oral route
- Transmitted from calves to humans
- Incubation period – 7-10 days
- Infection - can last up to 14 days in healthy hosts
- Treatment - Nitazoxanide
Identify the Hazard: Reference Sources

- Biosafety in Microbiological & Biomedical Laboratories (BMBL) – CDC/NIH
- Pathogen Safety Data Sheets (PSDS) – Public Health Canada
- Colleagues: Cornell University, Oregon State University
- Principal Investigator Interview
Identify the Hazard:
Chemical Use Planning Form

I. Laboratory Information:

Laboratory Supervisor: [Name]
Department: [Department]
Building: [Building]
Room: [Room]

II. Hazard Identification:

a) Identify the Hazardous Chemical or Hazard Group:

1. List chemical name and CAS number if a single chemical is covered by this form:
   - Chemical name: [Name]
   - CAS number: [Number]

2. If the hazard is not covered by the HCS list, list the names of those chemicals:
   - List:

b) Maximum quantity to be used or stored in the next year:

- < 1 L or 100 g
- 1 L to 1000 g
- 1 kg to 5 kg
- 5 kg to 20 L or 5 kg to 20 L
- > 20 L or 5 kg

III. Chemical Safety Information and Training:

a) What Chemical Safety information is available for these chemicals? (check all that apply):

- SDS/MSDS
- Location:
- Technical Literature:
- Location:
- Chemical labels with hazard warnings:

REMINDER: All lab personnel must be aware of specific safety information for any hazardous material. That training must be documented.

b) Chemical Safety First Aid/Emergency Response Considerations:

Are there first aid or emergency response procedures necessary for all of these chemicals beyond rinsing with water?

REMINDER: All lab personnel must be aware of emergency response procedures for hazardous materials. That training must be documented.

IV. Safety Controls and Equipment:

a) Administrative Controls:

- Yes
- No

b) Engineering Controls:

- Yes
- No

- Smoke hood
- Glove box
- Biological safety cabinet
- Snorkel or other local exhaust

- Safety shields
- Other

- Eye protection
- Goggles
- Face shield
- Face shield

- Respiratory protection
- Disposable particulate
- Cartridge
- PAPR
- Other

- Hand protection
- Disposable gloves
- Latex gloves
- Non-latex gloves

- Protective gloves
- Material
- Thickness

- Cut resistant
- Thermal protective:
- Other

- Respiratory protection
- Disposable particulate
- Cartridge
- PAPR
- Other

- Emergency Response Equipment:

- Yes
- No

- Emergency shower
- Eyewash
- Spill control equipment
- Emergency exits
- Emergency contact information

V. Medical Monitoring and Exposure Assessment:

- Yes
- No

- OSHA requires medical monitoring for workers who use respirators and/or for other chemicals.

- Yes
- No

- Yes
- No

- Yes
- No

- Yes
- No

VI. Storage Considerations:

a) Where will these materials be stored?

- Flammable
- Combustible
- Corrosive
- Reactive
- Organic Peroxide
- Oxidizer
- Shock sensitive
- Other

b) Do these materials require secondary containment?

- Yes
- No

- Yes
- No

- Yes
- No

- Yes
- No

- Yes
- No

- Yes
- No
Assess the Hazard

How/where is the hazardous material being used?

- Epithelial Cell Infection (cell culture)
- Mouse Infection (mouse gavage)
- Calf Infection (large animal model)
Assess the Hazard: Epithelial Cell Infection (cell culture)

Control the Hazard: Epithelial Cell Infection (cell culture)
Assess the Hazard: Mouse Infection (Gavage)

Infected with ~ 10,000 oocysts

Control the Hazard: Mouse Infection (Gavage)
Assess the Hazard: Calf Infection

Control the Hazard: Calf Infection
Risk/Hazard Assessment

[Diagram showing a pyramid with different levels labeled BSL-1 to BSL-4, indicating low-risk to high-risk microbes]
## Risk/Hazard Assessment

<table>
<thead>
<tr>
<th>Likelihood of Occurrence</th>
<th>Negligible (1)</th>
<th>Slight (2)</th>
<th>Moderate (3)</th>
<th>High (4)</th>
<th>Very high (5)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Very Unlikely (A)</td>
<td>LOW</td>
<td>LOW</td>
<td>LOW</td>
<td>LOW</td>
<td>MEDIUM</td>
</tr>
<tr>
<td>Unlikely (B)</td>
<td>LOW</td>
<td>LOW</td>
<td>LOW</td>
<td>MEDIUM</td>
<td>MEDIUM</td>
</tr>
<tr>
<td>Possible (C)</td>
<td>LOW</td>
<td>LOW</td>
<td>MEDIUM</td>
<td>MEDIUM</td>
<td>HIGH</td>
</tr>
<tr>
<td>Likely (D)</td>
<td>LOW</td>
<td>MEDIUM</td>
<td>MEDIUM</td>
<td>HIGH</td>
<td>HIGH</td>
</tr>
<tr>
<td>Very Likely (E)</td>
<td>LOW</td>
<td>MEDIUM</td>
<td>HIGH</td>
<td>HIGH</td>
<td>HIGH</td>
</tr>
</tbody>
</table>
Standard Operation Procedure (SOP)

**Laboratory Safety Standard Operating Procedure for Safe use of Biological hazards**

**Cryptococcus parapsilosis—Soy straw**

**Notes:**
1. Gates Foundation: Using pharmacokinetic and efficacy studies of nivolumab and atezolizumab to standardize the cell culture model of cryptococcosis.

**Current Revision Date:** 08/33.11

**Background and Description of Risks in Laboratory Personnel:**
- **1.** Describe how and where this material was obtained, strain (is it attenuated or more virulent?) of the material and related disease.
- **2.** Describe the route of toxic action (in vitro or in vivo).
- **3.** Explain how risk of exposure from these routes will be reduced or eliminated (use engineering controls, personal protective equipment or administrative controls).

**Cryptococcus parapsilosis causes infection by both oral and respiratory transmission. Ingestion of as few as 10-15 spores can cause human disease.** *(Cryptococcosis)* **cryptococcosis** **are not believed to be spread through saliva via respiratory-salivary route or via skin contact. It is conceivable that infection could occur spontaneously (this has not been reported).**

**Hazardous Substances:**
- **Mycotoxins**
- **Mycophenolic acid**
- **Morpholino**

**Contaminants:**
- **BSL-2:** Manipulation of known or potentially infected clinical samples and cultures of laboratory-adapted strains. (BSL-2)

**BSL-2:** Work with animals infected with the same strain. (BSL-2)

**BSL-3:**Centrifugation, homogenization, vortexing or stirring, changing of animal cages, animal surgery, cell sorting, opening, pooling fluids, scoring, housing animals, housing pregnant, female mice or rats. Use for procedures that may produce aerosols, or involve high concentrations of large volumes.

**Exposure Control:**
- **BSL-2:** Flush eyes, mouth or nose for 15 minutes at fresh water. Wash with soap and water for 15 minutes.

**Hazardous Substances:**
- **BSL-3:** Centrifuge VACCINE Infectious Disease Lab. Directly at 2°C and 4°C for immediate assistance.

**BSL-4:** Report at exposure or rear mice to:
- **1.** Your immediate supervisor
- **2.** The Chief of the BSL-4 Laboratory
- **3.** The BSL-4 Laboratory Director
- **4.** The BSL-4 Laboratory Manager

**BSL-2:** Personal Protective Equipment (PPE)
- **BSL-3:** PPE:** Lab coat, hair net, lab coat, laboratory gloves, apron, lab coat or gown, ASTM level 3 or 4.
Train on the SOP
Questions?
Thank You!

Questions?

safety@uvm.edu
Lab Safety Partner Award

Presented to
Janet Eileen Schwarz

In recognition of
Excellence in Safety AND the best fudge around!

On this the 17th day of April, 2018

Francis Churchill, Associate Director
Risk Management & Safety
Reminders

- 2018 Refresher Training
- Summer researchers
- CITI trainings

UVM Risk Management & Safety
Orientation/Training Checklist for New Laboratory Workers
Employee's Name: ________________________________ Date checklist started: __ ____________
Completed: __ ____________
Trainer (PI/Supervisor/Designated Trainer): __________________

I. General (www.uvm.edu/safety)
- Review Safety Website: www.uvm.edu/safety
- Complete all required safety trainings: www.uvm.edu/safety/lab/safetytrainings
- Complete Safety tour inside and outside of the lab including fire extinguishers, fire alarms, egress & exits, & safety equipment (PPE, doors, eyewash, chemical spill kit, telephone, cylinder restraints, disinfectants, etc.)
- Review emergency response procedures specific to each lab, reporting procedures for accidents and injuries, and emergency phone numbers. (http://www.uvm.edu/safety/lab/prep-emergencies)
- Review lab-specific and building-specific safety features (e.g. close lab doors, evacuation map & meeting site, gas shut-off).
- Review the contents of Laboratory Safety Notebook and the Monthly Self-Inspection Checklist.
- Review the locations of Safety Data Sheets (SDSs).

II. Chemical Safety (http://www.uvm.edu/safety/lab/chemical-safety)
- Review or complete chemical hazard assessments, including Chemical Use Planning Forms, for the chemicals you will be handling in the laboratory.
- Understand what controls are required to minimize potential exposure to chemicals and other hazards in this lab. (http://www.uvm.edu/safety/lab/identify-and-control-hazards)
  - Engineering Controls: Fume hoods, biosafety cabinets, glove boxes, Schlenk line, fume exhaust, etc.
  - Administrative Controls: Standard Operating Procedures and lab-specific protocols
  - Proper Personal Protective Equipment: Lab coat, gloves, eye and face protection, respirator*
  *Must complete a request for Respirator Use Form and receive approval and instruction before using a respirator.
- Review procedures for operating equipment (e.g. power tools, autoclave, NMR, ovens, engineering controls). Do not operate unfamiliar equipment or materials without proper training and approval.
- Review proper labeling, segregation, and storage for all chemicals used in this lab.
- Review chemical waste procedures including labeling, storage, and disposal.

III. Biosafety and Bloodborne Pathogens (http://www.uvm.edu/safety/lab/biological-safety)
- Review and sign-off on all laboratory infectious agents Standard Operating Procedures (SOPs).
- Understand how to use the proper controls in order to minimize any potential biological exposures (i.e. flame, fume, fume hood, engineering controls).
- Review biohazardous waste procedures including labeling, storage, and disposal.
- Disinfection of liquid waste,
- Proper set-up of aspiration flasks,
- Biohazard box disposal.
- All employees who work with human or primate blood, blood products or other potentially infectious materials must:
  - be designated "at risk" with Infectious Materials Risk Designation Form,
  - be offered the Hepatitis B vaccine with the HBV Vaccination Consent/Dissent Form,
  - review the UVM Exposure Control Plan. (http://www.uvm.edu/safety/lab/bloodborne-pathogens)

IV. Other Laboratory Hazards
- Receive and document necessary training for any highly hazardous material or process, including lasers, time sensitive chemicals, highly toxic or reactive chemicals, pressurized devices, etc.
- Review safe handling procedures for gas cylinders (how to check for leaks, proper restraining & transport, etc).
- Review safe operating and handling procedures for thermal hazards (e.g. Liquid Nitrogen, ovens, kilns, autoclaves, hot plates, Bunsen burners, etc).
- Review proper disposal procedures for other wastes including sharps, broken glass, uncontaminated lab waste, batteries, and light bulbs.
- I understand that this checklist is intended as a safety-training guide for my laboratory; it may not be a comprehensive list of all the training I may need to be safe from the hazards in my specific laboratory.

Employee's Signature: ________________________________ Date Completed: __ ____________
Revised 05/16
Thank You!
safety@uvm.edu