

**In this issue of the Environmental Health and Safety (EHS) Listserv, October 23, 2014:**

1. Harvest Safety
  2. Promoting an Academic Safety Culture, Recommendation #2
  3. Safety Event on 10/29/2014
  4. Fire Safety: Hotplates and Bunsen Burners
  5. Lessons Learned: University of Minnesota Explosion
  6. New/Revised Safe Operating Procedures, Revised Hearing Conservation Program (HCP) and HCP Web-based Training
- 

## **1. Harvest Safety**

Harvest is an intense time due to the quantity of work to be accomplished and the time frame in which it must be done. That urgency is likely why there are more accidents during harvest than at other times. Approximately 49% of farm fatalities are transportation-related and 23% involve crushing, entanglement, and blunt force trauma. Maintaining awareness of and avoiding potential hazards is key to avoiding injury. Some of the more common causes of serious farm injuries or fatalities include the following:

- Tractor rollovers. Rollovers have been known to occur when a tractor is operating on slopes, over culverts, too close to the edge of the road, and in extremely muddy conditions. One of the most important avoidance techniques is to operate only tractors with rollover protection structures (ROPs). Before operating a tractor, make sure the ROPs is in good condition. Avoid steep banks and slopes, Keep front-end mounted equipment low when moving. Drive at appropriate speeds, and slow down when pulling rear-mounted equipment. Lastly, use seat belts!
- Missing or bypassed guards on machinery is another common cause of injury and death, as clothing or body parts can become entangled in moving parts, such as augers and PTOs. Make sure that moving parts are properly guarded. Before servicing a moving part, make sure it is isolated from its energy source and has come to a complete stop. Do not position any part of the body in a manner that entanglement is possible. Do not take short-cuts!
- Other common causes of farm injury and fatality include becoming crushed or trapped between two pieces of equipment, or accidental run-off or contact with equipment or commodities. For example, positioning the body between a wagon or trailer and a transport vehicle while attempting to hook-up can cause injury if a person becomes crushed between the two. When more than one person is working in a location, accidental run-over or contact with ancillary equipment (e.g., combine heads) or commodity (dropped hay bales, dumping grain, etc.) may lead to injury due to a lack of awareness of everyone's position at all times. Take time to do these types of tasks safely

and make sure to maintain visual and audible contact with co-workers at all times.

- Never place yourself in a position that you could become engulfed in moving grain. Engulfment has led to many farm fatalities, and is not only limited to grain bins.

During the harvest season, get sufficient rest so as to avoid fatigue. Make sure your equipment is properly serviced and in good working condition, with appropriate guards in place. Avoid working in inclement weather or conditions. Operate only equipment that you have mastered and conduct only tasks for which you are adequately competent. Make an emergency plan ahead of time, and maintain a means of emergency communication. Other harvest safety tips can be found in the resources listed below.

## Resources

- EHS **Harvest Safety** SOP [http://ehs.unl.edu/sop/s-harvest\\_safety.pdf](http://ehs.unl.edu/sop/s-harvest_safety.pdf)
- EHS **Ag Safety** SOPs <http://ehs.unl.edu/sop/ag-safety>
- OSHA Quick Card “Protecting Farmworkers from Tractor and Harvester Hazards” <https://www.osha.gov/Publications/OSHA3706.pdf>
- OSHA Quick Card “Backing Up Farm Vehicles and Equipment Safety” <https://www.osha.gov/Publications/OSHA3733.pdf>
- Harvest Safety Tips <http://www.nationwide.com/pre-harvest-safety.jsp>

## 2. Promoting an Academic Safety Culture, Recommendation #2

Recently the National Research Council (NRC), the principal operating arm of the National Academy of Sciences and the National Academy of Engineering, completed work on a publication titled “**Safe Science: Promoting a Culture of Safety in Academic Chemical Research.**” The recommendations within this report apply beyond chemical laboratories/research.

The shift away from mere compliance and toward promoting a strong, positive safety culture has already yielded benefits in other industries. The hope is that the NRC recommendations help move academic research in a similar fashion - toward the adoption of a culture of safety that goes beyond inspections, standard operating procedures, and safety plans, all with the ultimate goal of protecting the lives and health of the campus community.

Recommendations from this report will be reviewed one-by-one in each successive issue of the EHS listserv. The second recommendation is:

*The provost or chief academic officer, in collaboration with faculty governance, should incorporate fostering a strong, positive safety culture as an element in the criteria for promotion, tenure, and salary decisions for faculty.*

A strong, positive safety culture encourages all workers to place the highest priority on best practices and to raise concerns to colleagues and supervisors, including principal investigators. It is not enough to provide safe equipment, systems, and procedures if the culture of the organization does not encourage and support working safely.

The government and public demand the utmost priority be given to safety in all laboratories operating in the United States. Safety is a priority at UNL. Make sure it is a priority in your individual work location, laboratory or otherwise. To this end, consider adopting the following as your personal ethic:

- **Value safety:** Safety is an integral part of what one does, its automatic, and it does not change its priorities- it is never questioned and never compromised.
- **Work safely:** One continues to learn about safety, learns to recognize hazards, assesses the risks of hazards, manages the risks of hazards, and prepares to handle emergencies.
- **Prevent at-risk behavior:** One does not cut corners or bypass safety measures and shares this information with others, as needed.
- **Promote safety:** One encourages and acknowledges others for working safely.
- **Accept responsibility for safety:** One takes steps to work safely, setting a positive example for others, and being accountable for safety.

## Resources

- NRC free download/read online: "**Safe Science: Promoting a Culture of Safety in Academic Chemical Research (2014)**"  
[http://www.nap.edu/catalog.php?record\\_id=18706&utm\\_expId=4418042-5.krRTDpXJQISoXLpdo-1Ynw.0&utm\\_referrer=http%3A%2F%2Fwww8.nationalacademies.org%2Fonpinews%2Fnewsitem.aspx%3FRecordID%3D18706](http://www.nap.edu/catalog.php?record_id=18706&utm_expId=4418042-5.krRTDpXJQISoXLpdo-1Ynw.0&utm_referrer=http%3A%2F%2Fwww8.nationalacademies.org%2Fonpinews%2Fnewsitem.aspx%3FRecordID%3D18706)
- American Chemical Society, Safety Practices and Recommendations (Publications):  
<http://www.acs.org/content/acs/en/about/governance/committees/chemicalsafety/safetypractices.html>
- American Chemical Society, pages 3-6, "**Increasing Safety Awareness: An Academic Imperative**":  
<http://www.acs.org/content/dam/acsorg/about/governance/committees/training/cptnewsletter/committee-on-professional-training-summer-2014.pdf>
- American Chemical Society "**Identifying and Evaluating Hazards in Research Laboratories**"  
<http://www.acs.org/content/dam/acsorg/about/governance/committees/chemicalsafety/identifying-and-evaluating-hazards-in-research-laboratories-draft.pdf>
- EHS **Job Safety Assessment** SOP <http://ehs.unl.edu/sop/s-JSA.pdf>
- EHS **Chemical Hazard Assessment and Risk Minimization** SOP  
[http://ehs.unl.edu/sop/s-chemical\\_haz\\_assessment\\_risk\\_min.pdf](http://ehs.unl.edu/sop/s-chemical_haz_assessment_risk_min.pdf)

- EHS Virtual Manual: <https://scsapps.unl.edu/VirtualManual/>

### 3. Safety Event on 10/29/2014

If you are a researcher at UNL, attend the colloquium, “**DISASTER! Protect Yourself & Your Research.**” Presenter Mark Robertson is the UNL Emergency Preparedness Coordinator. Natural and man-made disasters can result in loss of property, life, data, and access to critical research facilities. Learn new skills to help you pre-plan and mitigate adverse consequences, both short- and long-term of such disasters. The colloquium, including an interactive component, will be from 10:00 a.m. – noon in the East Campus Union and repeated at 3:30 – 5:30 p.m. in Hamilton Hall, Room 102. Preregistration is not required.

### 4. Fire Safety: Hotplates and Bunsen Burners

October has been designated National Fire Prevention Month by the National Fire Protection Association (NFPA). The purpose of National Fire Prevention Month is to raise awareness of fire safety and fire prevention strategies. In recognition of this, we are highlighting hotplates and Bunsen burners in this issue of the EHS listserv.

Many research & teaching laboratories use hot plates. Spontaneous and unexpected heating of hotplates has been the cause of laboratory fires and explosions. Over a ten year period at Northwestern University there were 1-3 hotplate related incidents each year involving fire and explosion. Some issues found:

- Hotplates manufactured from the 1960's - 1980's may still be in active use. Older hotplates with relay heater switches can spontaneously heat in the OFF position.
- Newer hotplates with TRIAC or microprocessor-controlled heater switches may spontaneously heat in the OFF position due to liquid exposure to the electronics.
- Hotplates in disrepair may be in use.
- Hotplates/stirrer combinations, in use when only stirring is required, generally stay plugged in even when inactive.

Following are some mitigation strategies to prevent hotplate fires/explosion:

- Discard old hotplates and hotplates in disrepair.
- Where only stirring is required, acquire and use a stirrer instead of a hotplate/stirrer combination.
- As with all equipment, check the equipment, including the electrical cord and plug, for integrity prior to use. Follow manufacturer instructions for use and maintenance.

- Do not use hotplates in close proximity to oil baths, combustible or flammable materials. Check above, below and on all sides for possible hazards.
- Select hotplates with hermetically sealed housing to protect the electronics from liquids and grease.
- Look for hotplates with two independent temperature control circuits which switch off heating in case of an “over temperature” situation.

Bunsen burners produce an open flame for heating and sterilization in research applications, utilizing gas readily available in the lab. Here are some procedures for safe use:

- PLACE Bunsen burner away from overhead shelving, equipment, light fixtures and remove all combustible materials and excess chemicals in the area.
- TIE-BACK long hair. Eliminate loose clothing, dangling jewelry, etc.
- INSPECT hose for cracks, holes, pinch-point, and other defects. Replace hoses that are defective. Seat the hose securely on the gas valve and on the burner itself.
- NOTIFY others in the laboratory when the burner will be in use.
- UTILIZE a sparker/lighter with an extended nozzle. Do not use a match to ignite the burner. Do NOT turn on the gas until the igniter is available.
- ADJUST the flame by turning the collar to regulate air flow and produce a flame appropriate for the experiment (typically a medium blue flame).
- NEVER leave open flames unattended. Shut off gas when leaving the room or when use is complete.
- ALLOW the burner to cool before handling and MAKE SURE the main gas valve is off before leaving the laboratory.

## Resources

- Northwestern University Research **“Safety Issues of Hotplate Heating Controls”**  
<http://www.research.northwestern.edu/ors/forms/CSHEMA%20Hotplate%20Poster%202014.pdf>
- University of Pennsylvania Safety Alert: Lab Fire Caused by Hot Plate  
<http://www.ehrs.upenn.edu/programs/labsafety/alerts/hotplatefire.html>
- Massachusetts Institute of Technology Safety Topic: Bunsen Burners and Hotplates  
<http://web.mit.edu/cohengroup/safety/burner%20and%20hotplates%20safety062911.pdf>
- University of California Laboratory Hot Plate Safety  
<http://safety.ucanr.org/files/152250.pdf>
- EHS **Fire Safety – General Prevention and Extinguishers** SOP  
[http://ehs.unl.edu/sop/s-fire\\_safety.pdf](http://ehs.unl.edu/sop/s-fire_safety.pdf)

## 5. Lessons Learned: University of Minnesota Explosion

On June 17, 2014, an explosion occurred in a chemistry lab at the University of Minnesota, resulting in the injury of a graduate student. The student was conducting a synthesis based on previously published methods with some alteration, specifically using the solvent polyethylene glycol (PEG). On the second day of the reaction, a reaction that had been run at least ten times previously, the graduate student noticed while walking by that the thermometer on the apparatus was askew. The student reached into the chemical fume hood but before they could touch anything the experiment exploded. The student was not wearing any personal protective equipment. The explosion destroyed the experimental apparatus and hood, leaving the student with an injured eardrum and second-degree burns and glass injuries to their arm and side.

The incident investigation concluded that the explosion was from formation of hydrazoic acid, which could have formed from reaction between the PEG and sodium azide, overheating of sodium azide, or from water formed from wet PEG reacting with sodium azide. MOST important is the root cause of the incident: insufficient recognition of the reaction's hazards and complacency from performing the reaction several times without incident. The researchers modifying the protocol did not appear to understand how changes to protocol might change the risks of the synthesis.

Recommendations resulting from this incident included the following:

- Update risk assessment procedures.
- Warn researchers not to assume journals include complete risk control information.
- Encourage researchers to perform complete risk assessments on all potentially hazardous experiments.
- Develop additional tools and training to help researchers assess the severity of consequences, probability of occurrence and capacity of controls.

### Resources:

- EHS **Chemical Safety** SOPs <http://ehs.unl.edu/sop/chemical-safety>
- The Safety Zone by C&EN "Explosion injures University of Minnesota graduate student" <http://cenblog.org/the-safety-zone/2014/06/explosion-injures-university-of-minnesota-graduate-student/>
- The Safety Zone by C&EN "More details on the University of Minnesota explosion and response" <http://cenblog.org/the-safety-zone/2014/07/more-details-on-the-university-of-minnesota-explosion-and-response/>
- EHS Listserv Risk Assessment series (July, August, September and November 1<sup>st</sup> 2012 issues) <http://ehs.unl.edu/listserv-past-issues>

## 6. New/Revised Safe Operating Procedures, Revised Hearing Conservation Program (HCP) & HCP Web-based Training

- **Biosafety Cabinets SOP** <http://ehs.unl.edu/sop/s-bio-cabinet.PDF>  
Updated to add information related to decontamination prior to moving the cabinet and alternatives to open flames in the cabinet
- **Cleaning Up Spills of Bloodborne Pathogens SOP**  
<http://ehs.unl.edu/sop/s-cleanbbp.pdf>  
Updated to address use of absorbent powder in spill clean-up procedure
- **Hearing Conservation Program**  
[http://ehs.unl.edu/programdocuments/Hearing\\_Conservation\\_Program.pdf](http://ehs.unl.edu/programdocuments/Hearing_Conservation_Program.pdf)  
Minor language update
- **Hearing Conservation Program web-based training**  
[http://ehs.unl.edu/programdocuments/Hearing\\_Conservation\\_Program.pdf](http://ehs.unl.edu/programdocuments/Hearing_Conservation_Program.pdf)  
Revised to include impact noise
- **Hearing Conservation SOP**  
[http://ehs.unl.edu/programdocuments/Hearing\\_Conservation\\_Program.pdf](http://ehs.unl.edu/programdocuments/Hearing_Conservation_Program.pdf)  
Minor language update
- **Laboratory Decommissioning SOP** [http://ehs.unl.edu/sop/s-lab\\_decom.pdf](http://ehs.unl.edu/sop/s-lab_decom.pdf)  
Updated to provide guidance on decontamination of biosafety cabinets when moving a lab or leaving the university
- **NEW Pathogen Inventories SOP** [http://ehs.unl.edu/sop/s-bio-pathogen\\_inventories.pdf](http://ehs.unl.edu/sop/s-bio-pathogen_inventories.pdf)  
This new SOP contains relevant information for faculty and staff with collections of pathogenic agent being actively used or in long-term storage.
- **Personal Hearing Protection Devices SOP** [http://ehs.unl.edu/sop/s-hearing\\_protection.pdf](http://ehs.unl.edu/sop/s-hearing_protection.pdf)  
Added information that there may be specialty hearing protectors prescribed for certain UNL employees exposed to impulse noises.

**Remember...SAFETY IS AN ATTITUDE!**

### **Environmental Health and Safety**

University of Nebraska-Lincoln  
3630 East Campus Loop  
Lincoln, NE 68583-0824  
(402) 472-4925  
<http://ehs.unl.edu>