

In this issue of the Environmental Health and Safety (EHS) Listserv, May 20, 2011:

1. A Tragedy
 2. NEW web-based training: Lockout/Tagout, General Electrical Safety
 3. Track Out – Wash Out
 4. Revised Safe Operating Procedures
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1. A Tragedy

Recently a Yale student, working on her senior project, died while using a piece of machine-shop equipment. The young woman was found at 2:30 a.m., strangled to death from her hair becoming tangled in a lathe at the Sterling Chemistry Lab. A lathe is a circular vise that rotates objects at a high rate of speed and shapes them with a drill bit or a blade.

On its website, the Yale's chemistry department says it maintains a state-of-the-art machine shop in which students, faculty and staff can build or modify research instruments. Before this tragedy occurred, the Yale University required undergraduates to complete one safety class before gaining access to the laboratory's machines, which were then available to them around the clock. Yale confirmed that the deceased young woman had completed the required safety course and was taking a second one at the time of her death.

Yale University has had programs in place to train students before they use power equipment. After this tragedy, Yale's president, Richard C. Levin, initiated a "thorough review of the safety policies and practices of laboratories, machine shops, and other facilities with power equipment that is accessed and operated by undergraduates." In addition, Levin stated, "Yale College (sic) will limit undergraduate access to facilities with power equipment to hours that will be specified and monitors will be present at these times in all such locations."

Specific machines in use in shop and laboratory settings at UNL differ from college to college and department to department. But all these areas share basic hazards and require vigilant oversight. First we will look at machine safety:

- Machines should be equipped with all the necessary safeguards. AND safeguards should not be modified/disabled/removed.
- The area should be well lit so workers can see what they're doing when working with machines and where they're going when moving about the area.
- There should be adequate space between machines and materials.
- Walkways should be clearly marked to separate the walkway from machine work area.
- Floors should be made of, or coated with, a nonslip material.
- There should be a good general ventilation system and a local exhaust system for any processes that produce dusts, mists, fumes, or vapors.

Next we will look at human components of machine safety: training, PPE, and preparing for fires and medical emergencies. According to studies by several major universities, the incidence and severity of injuries can be reduced by hands-on machinery operation training, coupled with proficiency demonstration. Training for machine operators should include at a minimum:

- Hazards specific to machines being operated
- Machine operation, including safeguards and emergency stops
- Lockout/tagout procedures and rules
- Personal Protective Equipment (PPE)
- Machine area housekeeping and storage rules
- Slip, trip, and fall considerations
- Maintenance schedules and authorizations
- Procedures for reporting malfunctions and handling/requesting repairs
- Emergency response, including fires and first aid and reporting of injuries and “near misses”

PPE for machine operators usually includes:

- Eye and face protection (safety glasses with side shields or goggles as well as a face shield when there's a risk of flying particles)
- Hearing protection when noise levels exceed regulatory limits
- Head protection if there is a risk of materials or other objects falling from above. Hair restraint to avoid user's hair inadvertently getting caught in moving parts.
- Foot protection to keep feet and toes safe from falling materials or machine movement. At a minimum, wear shoes not sandals.

Gloves should be worn to protect hands when handling materials, but machine operators must understand that gloves should not generally be worn when operating machinery. Gloves can interfere with precise grip or get caught at pinch points or at the point of operation, which can cause crushed fingers or amputations.

Emergency considerations:

- There should be someone on site to assist if an accident occurs and you cannot assist yourself.
- Call 911 or UNLPD (402-472-2222 or 22222 from a campus phone) for assistance in a medical emergency.
- Take the web-based EHS **Emergency Preparedness** training that covers a variety of topics, including fire. Take **Lockout/Tagout for Machines & Equipment** training (see next section).
- Post event, report injuries, large or small, to your supervisor and complete a “First Report” form. If you are not injured but almost were, report the “near miss” to your supervisor as an awareness/training opportunity.

Machines are” hard workers”, but they cannot THINK. Employees and students must think, and be fully aware while operating machinery to minimize the chances of a tragedy such as the recent Yale student death.

EHS provides a number of Safe Operating Procedures (SOPs) for use of the campus community in establishing shop/laboratory machine safety procedures and training, as well as safe operating procedures related to other aspects of potential workplace hazards. We recommend you begin with the “category’ menu that you see first. Review all the SOPs in your area of work (laboratory, landscape, ag safety, shops, etc.) and hazard types you are aware of in your workplace (chemical safety, laser safety, hearing conservation, etc.). Then click on the “View alphabetical list” link to the right in order to look over the entire list and determine if other SOPs you may not have considered apply to your work area. **A handy tool to aggregate this information is the EHS Virtual Manual.** You may also request EHS consultation by calling us at 402-472-4925 or emailing your request to ehs@unl.edu.

Several areas across a wide range of UNL colleges and departments which contain machine-shop equipment for faculty, graduate, and/or undergraduate use, have requirements for training and proficiency demonstration prior to use. In addition, many of these shop/laboratory areas have established hours of operation when a monitor is available on-site.

One the top ten workplace injuries is: body parts being caught in or crushed by equipment. Injury statistics show that the same types of incidents continue to occur over and over again. If your laboratory of shop contains machinery, have you done all you need to do to be safe while you work or conduct your research?

Resources:

- **Emergency Preparedness** web-based training
<http://ehs.unl.edu/onlinetraining/>
- EHS SOPs <http://ehs.unl.edu/sop/>
- Shops SOPs <http://ehs.unl.edu/sop/#shops>
- Foot Protection Evaluation and Checklist SOP http://ehs.unl.edu/sop/s-foot_protection.pdf
- EHS Virtual Manual <https://scsapps.unl.edu/VirtualManual/>
- Yale University Limits Access To Power Equipment After Student Death (ABC News/US online) <http://abcnews.go.com/US/yale-university-limits-access-equipment-student-death/story?id=13372558>
- Yale Student Dies in Lab Accident (UPI online)
http://www.upi.com/Top_News/US/2011/04/13/Yale-student-dies-in-lab-accident/UPI-25981302719620/

2. NEW Web-based Training: Lockout/Tagout, General Electrical Safety

EHS recently made available online two new web-based training courses, **General Electrical Safety Awareness** and **Lockout/Tagout (LO/TO) for Machines and**

Equipment. General Electrical Safety Awareness is an “awareness level” training for anyone who is at slightly greater risk of occupational exposure to hazardous electrical energy as a function of their assigned job tasks/research.

An example at UNL would be custodians, carpenters, painters, **some laboratory workers**, agricultural and landscaper workers, and others who work near or may inadvertently encounter live electrical systems while conducting their work or research tasks. In addition, this training may be useful to all employees since electrical shocks in the home account for thousands of deaths and injuries per year.

Lockout/Tagout (LO/TO) for Machines and Equipment training is designed for those who **operate**, service, or repair equipment or machines that are associated with hazardous energy which must be controlled with LO/TO procedures/devices during maintenance, service, or repair. When guarding is not functional or in place, LO/TO is REQUIRED.

Machinery/Equipment is characterized by **one or more forms of energy to accomplish work, such as cutting, pressing, boring, forming, shaping**, moving matter (e.g., pumps), and so on. Examples of equipment and machines that may be encountered at UNL and are subject to LO/TO include, but are not limited to: gas, water and steam lines; HVAC equipment including air handlers and boilers; kitchen equipment such as slicers, mixers, dishwashers, trash compactors, cardboard balers and garbage disposals; **woodworking and metalworking machines**; printing presses, **laboratory equipment such as centrifuges, cage washers, autoclaves and high powered lasers**; conveyors; motor vehicles; hydraulic lifts; elevators, etc.

Resources:

- **General Electrical Safety Awareness** web-based training
<http://ehs.unl.edu/onlinetraining/>
- **Lockout/Tagout (LO/TO) for Machines and Equipment** web-based training
<http://ehs.unl.edu/onlinetraining/>

3. Track Out – Wash Out

Everyone wants to protect the environment from pollution, but we may not be aware of how that translates into our daily lives. UNL is required by regulation to maintain a stormwater pollution prevention plan.

Stormwater is water that originates during precipitation events, such as rain or snow. As rain or melted snow flow over impervious surfaces like cement, hard ground, etc., it can pickup pollutants such as animal waste, oil and other fluids that have leaked from automobiles, salts used for de-icing, pesticide residues, and sediments from un-stabilized ground, among others. All of these pollutants, as well as others, have an adverse impact on the body of water into which the stormwater eventually flows.

One common, often unrecognized, pollutant in streams is sediment, commonly called “mud” or “dirt”. Sediment degrades aquatic habitat through increased turbidity (level of water cloudiness) and reduced oxygen levels. Reduced oxygen levels may result in the die-off of certain fish or other species that live in water, as well as die-off of selected underwater plants.

One source of sediment is construction areas. In construction areas various pieces of motorized equipment move within, and often out of, the construction area continually. Such movement can easily track mud and perhaps other construction debris from the construction site onto the surrounding streets, parking lots, and so on. This is called “track out.”

Once mud, dirt and/or debris are tracked to an impervious surface such as a street, rainfall can wash these pollutants into nearby storm sewers and ultimately streams and lakes. This is called “wash out. “

To control polluted stormwater runoff, contractors employ best management practices (BMPs). Contractors must **ensure** equipment is clean before leaving the construction site and/or periodically clean the affected streets/parking lots, and so on of tracked mud/dirt/debris.

If you see “track out” problems as you move about the UNL campus, please notify Environmental Health & Safety at 402-472-4925 right away.

If you have questions about “Track Out – Wash Out” or other stormwater concerns or topics, you may contact James Lange, Environmental Specialist, at 402-472-2212 or jlange4@unl.edu.

Resources:

- Construction Site NPDES Permits http://ehs.unl.edu/sop/s-construction_site%20npdes_permits.pdf
- Stormwater – Elicit Discharge, Detection and Elimination (IDDE) http://ehs.unl.edu/sop/s-stormwater_IDDE.pdf
- Vehicle / Equipment Washing http://ehs.unl.edu/sop/s-vehicle-equip_washing.pdf

4. New and Revised Safe Operating Procedures

- Door Posting for Potentially Hazardous Locations http://ehs.unl.edu/sop/s-door_posting.pdf
- Foot Protection Evaluation and Checklist http://ehs.unl.edu/sop/s-foot_protection.pdf
- Safety Protocol: Sealed Sources http://ehs.unl.edu/sop/s-sealed_sources.pdf
- Security of Radioactive Materials at UNL http://ehs.unl.edu/sop/s-security_radmaterials.pdf

Remember...SAFETY IS AN ATTITUDE!

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