

## Summary of Chemical Engineering Safety Audit and Inspection Issues and Violations – 2011

This document summarizes the most frequent safety issues and violations that were identified in self audits and inspections conducted in the School of Chemical Engineering laboratories during May – July 2011. Items that are shown in **bold face** are requirements of Purdue's HazCom/Right to Know Program that is mandated by OSHA. OSHA can audit chemical engineering at any time for compliance with Haz Com requirements.

### Safety Documentation

- **MSDS Books** – MSDS books are required for every lab and should be organized so MSDSs are easy to locate. MSDSs must be up-to-date (<5 years old). MSDSs are required for chemicals, catalysts, gases, biological materials, etc. – essentially everything that we work with in our labs – both hazardous and non-hazardous.
- Hazard Assessment Certification – Assessment by Location (Appendix A3, <https://www.purdue.edu/rem/home/files/forms.htm#hmm>) is preferred, however by task is often needed. Hazard assessments must be dated within the last 12 months, signed by PI and posted at the lab entrance. The hazard assessment should be updated whenever a new hazard type is introduced to the lab.
- **Chemical Inventory (HCP-4)** – The Chemical Inventory (<https://www.purdue.edu/rem/home/files/forms.htm#hmm>) should coincide with the MSDS book and must be dated within the last 12 months.
- **Employee Exposure Record (HCP-5)** – The Employee Exposure Record (<https://www.purdue.edu/rem/home/files/forms.htm#hmm>) is missing from >75% of ChE labs. The title of this document is misleading. This document is intended to list the chemicals that a researcher works with. This is potentially a daunting task. REM has agreed that the approach shown in the attached example fulfills our OSHA requirement. HCP-5 must be dated within the last 12 months.

### PPE

- Safety Glasses – Safety glasses must be worn when you are in a ChE laboratory. Get in the habit of putting your safety glasses on before or immediately after you enter a laboratory and taking them off only when you leave. A postdoctoral candidate was blinded at Purdue in 2008 after repeated reminders that he needed to wear safety glasses. Prescription glasses must be safety glasses (have shatter proof lenses) and have side shields. Prescription safety glasses are available from most eye wear providers and should be paid for by the PI. Safety glass use has improved in the school since 2010.
- Gloves – Chemical resistant gloves must be removed before you exit the lab so that door knobs and other surfaces do not become contaminated. In 2010, a ChE colleague sustained a chemical burn to his eye because a non-laboratory door knob was contaminated.
- Dust Masks and Respirators – Inhalation hazards are spelled out on MSDSs. Labs with inhalation hazards must have a Respiratory Protection Plan and the hazard and PPE requirement should be documented on the Hazards Assessment. If inhalation hazards are identified, contact Lila Albin in REM to review the hazards and identify the appropriate respiratory protection and procedures

for using the chemical. Do not purchase off the shelf dust masks and respirators and assume that you have adequate protection and fit.

- Lab Coats – Lab coats should not be laundered at home or at a commercial laundromat. Lab coats contaminated with hazardous chemicals should be disposed of with REM and new lab coats should be purchased.

### Chemicals

- Segregation – Chemicals should be segregated by class and flammables should be kept in a hood or cabinet that is designed for flammable storage. Waste containers should be segregated and stored in a location that is dedicated to waste.
- **Labeling** – Anything containing a chemical(s) must be labeled. If you use acronyms or codes in labels, a key must be readily available. Free labels (various types) are available in the Forney shipping and receiving area. The OSHA fine for a labeling violation is \$32,500/day/incident.
- Closed Containers – Open chemical containers are not allowed and sealing with Parafilm is not acceptable. Similar to labeling, the OSHA fine for an open chemical container violation is \$32,500/day/incident.
- HPLC Waste - All containers used for collecting HPLC waste must have a sealed cap. It is no longer acceptable to seal the container with parafilm or aluminum foil. REM has developed a useful web page that describes this new requirement and offers acceptable alternatives: <http://www.purdue.edu/rem/hmm/hplcwaste.htm>.
- Mercury Thermometers – We want all mercury thermometers to be turned into REM and replaced with non-mercury thermometers in AY2012. Information is available at: <https://www.purdue.edu/rem/hmm/mercinfo.htm>.
- Flammables should only be stored in explosion proof refrigerators. Contact the safety committee if you are unsure if your refrigerator is explosion proof.
- Chemicals should not be stored in offices.

### Gas Cylinders

- Inventory – The inventory of flammable and hazardous gases in our laboratories should be minimized. Outdoor cylinder storage at Forney is underway and should be available in late fall 2011.
- Segregation – Flammable gas (i.e. hydrogen) should be stored at least 20 feet away from oxidizing gas (i.e. oxygen).
- Securing – Every gas cylinder must be separately secured. Securing multiple cylinders with the same chain or strap is not permitted. Small gas cylinders cannot be stored unsecured in a chemical cabinet.
- Teflon Tape – Teflon tape should not be used with CGA fittings associated with gas cylinders.

### Lasers

- Seating should not be available that puts a users eyes at or near the level of a laser beam.

### Gas Detectors

- Hydrogen and Hydrogen Mixtures – A hydrogen detector safety guideline for ChE laboratories was communicated in October 2011.
- Other Flammable Gases – The need for flammable gas detectors should be evaluated whenever flammable gases are in use.
- Carbon Monoxide, Hydrogen Sulfide and Gas Mixtures Containing CO or H<sub>2</sub>S - The need for carbon monoxide or hydrogen sulfide detectors should be evaluated whenever carbon monoxide, hydrogen sulfide or a gas mixture containing CO or H<sub>2</sub>S is in use.
- Liquid Nitrogen – An oxygen sensor guideline for labs that use large quantities of liquid nitrogen will be developed in AY 2012.

### Facilities

- GFCIs – Child proof outlet plugs should be installed in outlets that are adjacent to sinks. Plugs are available from Linda Davis. Avoid using outlets near a water source.

### Emergency Preparedness

- The Building Emergency Plan (BEP) for Forney has been removed from the ChE Safety web page. The Forney BEP is available from Linda Davis. If you work in Potter, contact the Building Deputy, Phil Quallio, to access the Potter BEP. The BEP describes the procedures to follow in the event of a building evacuation or shelter-in-place emergency.

