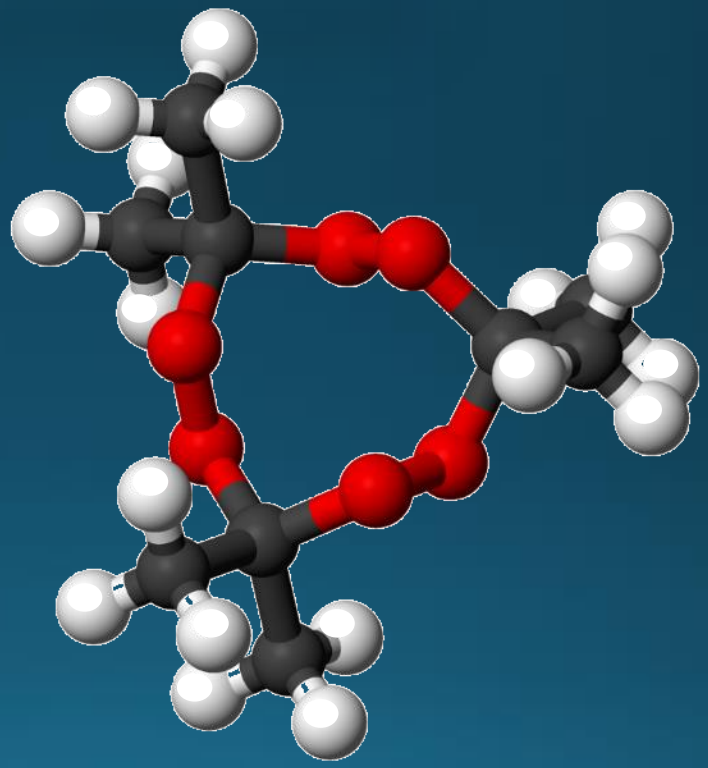
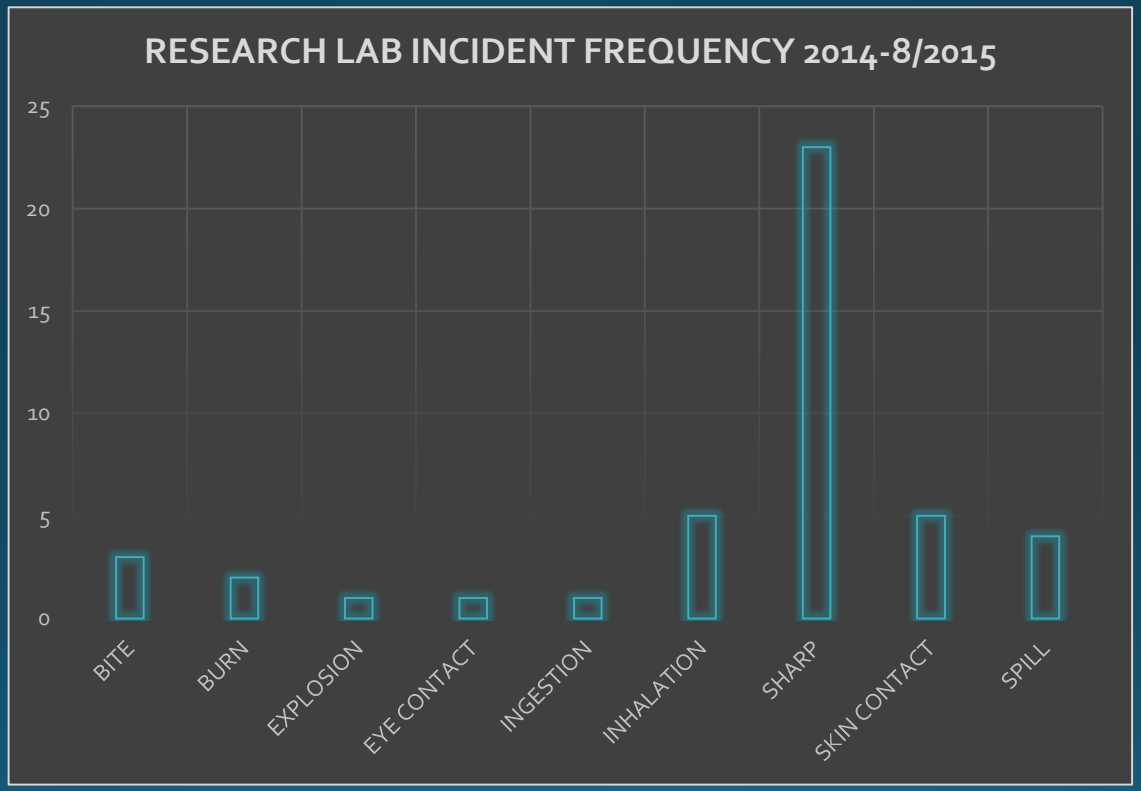
Laboratory Safety

5
Focus Areas
&
Chemical Compatibility

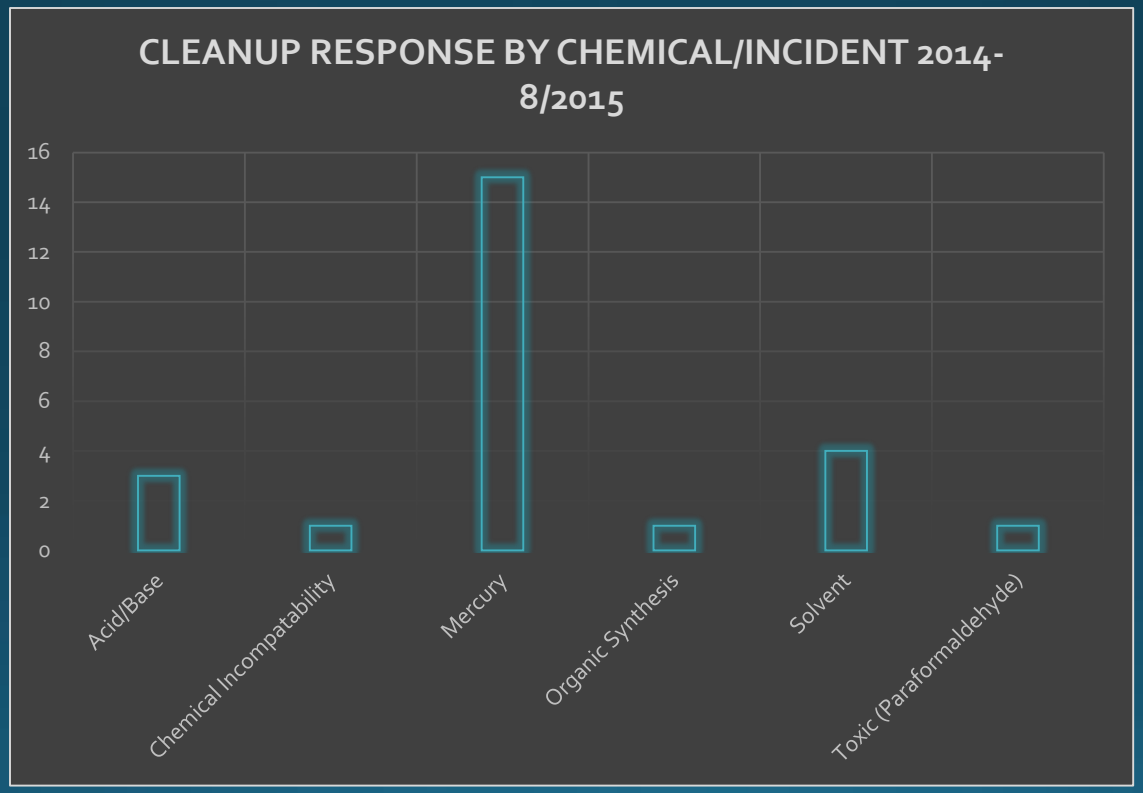
(just a little, with a focus on REDOX)



Frequency


RESEARCH LAB INCIDENT FREQUENCY 2014-8/2015
25
20
15
10
5
0
BITE
BURN
EXPLOSION
EYE CONTACT
INGESTION
INHALATION
SHARP
SKIN CONTACT
SPILL

Frequency


CLEANUP RESPONSE BY CHEMICAL/INCIDENT 2014-8/2015
16
14
12
10
8
6
4
2
0
Acid/Base
Chemical Incompatability
Mercury
Organic Synthesis
Solvent
Toxic (Paraformaldehyde)

Severity

Severity

5 Focus Areas…

1. Evaluate procedures for handling glassware, needles, scalpels, microtomes, and other sharp objects.

Cuts or punctures from broken glassware, needles, scalpels, microtomes and other sharp objects are the most common research lab injury. Please identify potential sharps hazards and provide cut and puncture resistant gloves or contact ORA or EHS to identify additional options to prevent injury from sharps and broken glass.

5 Focus Areas…

2. Replace mercury containing devices.

Mercury spills are the most frequent chemical release contaminating WSU research labs. Mercury spill cleanups interrupt research. Mercury spill cleanup and waste disposal is expensive. While some research may require the use of mercury, we encourage substituting other types of equipment and materials whenever possible. Please contact EHS to exchange mercury thermometers for alcohol thermometers and to explore the replacement of mercury monometers.

5 Focus Areas…

3. Remove unnecessary equipment and containers from fume hoods to minimize negative impacts on air flow.

Storing unnecessary equipment and containers in fume hoods affects the air flow, potentially resulting in employee exposure to hazardous air contaminants. Please limit the equipment and chemicals in fume hoods to those necessary to support work. Remove and appropriately store equipment or chemicals not actively involved in work. Please do not store materials in fume hoods within 6 inches of the sash opening. Please close the sash when not actively manipulating materials within the hood.

5 Focus Areas…

4. Maintain access to emergency equipment (e.g. eyewashes, emergency showers, fire sprinklers, fire extinguishers).

Please do not store materials where they prevent access or proper function of emergency equipment. Eighteen (18) inches clearance is required below fire sprinklers (minimum).

5 Focus Areas…

5. Store chemical waste in appropriate, properly labeled containers.

Increasingly, chemical wastes that generate gasses have contributed to waste container explosions (e.g. Nital- Nitric Acid and Alcohol etchants). Please store wastes generating gasses in containers with vented lids. It may be necessary to leave the lid cracked until the material is no longer generating gas, with the container placed in secondary containment.

Chemical Compatibility…

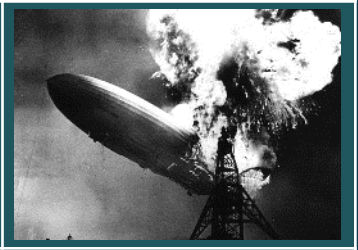
A brief oxidation and reduction chemistry discussion, because of the previously mentioned explosion and recently observed storage practices….

Chemical Compatibility…

Oxidizers	
The Obvious:	Oxygen, and Halogens… e.g. Fluorine, Chlorine, Bromine…
Chemical names ending with "ate":	Nitrate (e.g. Nitric Acid), Perchlorate (Perchloric Acid) Permanganate, (really anything starting with "per" and ending with "ate.")
Chemical names ending with "ite":	Sodium Hypochlorite, Sodium Chlorite, Sodium Nitrites, ("ites" have less oxygen than "ates" but are still oxidizers)
Peroxides:	Hydrogen Peroxide, Sodium Su-peroxide, Magnesium Peroxide, Zinc Peroxide… Note, most organic peroxides are shock sensitive explosives e.g. TATP

Oxidizers should ***NOT*** be stored with *flammables*…

Chemical Compatibility…

Reducers (reducing agents)		
The Obvious:	Hydrogen H_2, Hydrogen gas is a reducing agent when it reacts with non-metals, and an oxidizing agent when it reacts with metals	
Metals (especially those in the upper left hand corner of the periodic table but others too):	Lithium, Sodium, Magnesium, Aluminum…	
Anything with the H^- ion:	Lithium Hydride, Sodium Hydride, Calcium Hydride, Lithium Aluminum Hydride…	
Hydrogenated inorganic molecules (excluding strong oxidizers e.g. O, F, Cl)	Hydrazine, Diborane, Sodium Borohydride, Phosphines, Silanes…	

Reducers should ***NOT*** be stored with *flammables*…