

# Development of a Policy to Improve Oversight of Extremely Hazardous Chemicals



**BEN OWENS**  
**EH&S DEPARTMENT**  
**UNIVERSITY OF NEVADA, RENO**

American Chemical Society  
Indianapolis, September 9, 2013

# All Hazardous Materials are Not Equal



**Attitudes about hazardous materials differ and are not necessarily based on actual risk.**

- Radioactive Materials – fear, respect, or at least acceptance of strict regulations (it's always been that way).
- Biological Agents – less regulated but more voluntary guidelines.
  - rDNA: research community acknowledged potential risks and developed voluntary safe work practices.
  - Anthrax letters and dual use potential have increased concern and regulation.
- Chemicals – commonly used with much less concern.
  - Everyone thinks they are qualified to use hazardous chemicals.

# Institutional Oversight of Hazardous Materials



- **Radioactive Materials**
  - NRC regulations require license and approval by institutional RSO or RSC to acquire and use RAM.
- **Biological Agents**
  - NIH Guidelines require IBC to approve rDNA work.
    - ✦ IBC purview commonly expanded to include all biological agents.
    - ✦ Select agent acquisition and use requires prior approval by Select Agent Program and institutional Responsible Official.
- **Hazardous Chemicals**
  - Institutional oversight not specifically required by regulation.
    - ✦ OSHA: CHO provides guidance in development and implementation of CHP.
  - At UNR, no notification or approval is required to acquire or use any chemical.

# How to Improve Laboratory Safety Program?



- Implement review of hazardous chemicals use.
- Which chemicals?
  - Limit review to “high risk” chemicals.
- Who?
  - EH&S – an obvious choice but not preferred.
  - Laboratory Safety Committee – the preferred choice.
- How?
  - Much harder problem – more on this.

# UNR Laboratory Safety Committee



- Composed of 5 faculty members from major laboratory-based colleges and departments:
  - College of Science: Chemistry (committee chair), Physics
  - College of Engineering: Chemical and Materials Engineering
  - Medical School: Biochemistry, Microbiology
    - ✦ Includes chairs of the Radiation Safety Committee and Institutional Biosafety Committee.
    - ✦ Chemical Hygiene/Biosafety Officer a member of the committee but without voting rights.
- Oversight of laboratories and chemical hygiene issues, and policy development.
  - IBC and RSC continue to provide specific oversight of biosafety and radiation safety issues.

# Major Events Along the Way



- **Recognized lack of review of hazardous chemicals.**
  - Committee initially reluctant to develop policy.
    - ✦ Lack of regulatory requirement; perceived as bureaucratic burden; anticipated strong resistance from campus community.
- **Does EH&S provide training on explosives safety?**
  - Engineering group planning synthesis of triacetone triperoxide.
    - ✦ Led to decision to develop policy for extremely hazardous chemicals.
- **UCLA Laboratory Fatality**
  - LSC concern regarding legal liability and regulatory requirements; provided additional justification for policy.
- **UC Agreement**
  - Seen by LSC as “raising the bar” on accepted lab safety practices, and perhaps, regulatory expectation.

# Initial Development of an Institutional Policy



- Policy would require review of hazardous chemical use.
- Limit policy to highest hazard chemicals.
  - Extreme acute hazards – health and physical.
    - ✦ Greatest concern; greater acceptance by researchers.
    - ✦ Manageable work load.
- Use of these chemicals would require submittal of an extremely hazardous chemical (EHC) use form to be reviewed by the committee.
  - Modeled after biological agent use protocol used by IBC.
    - ✦ Completion of form to describe use, hazards, safety measures, and incident response procedures.

# Which Chemicals Should Be Included?



Through multiple discussions and written drafts we decided on the following chemical hazard categories:

- **Acutely Toxic Chemicals (dermal)**
  - Dimethyl mercury
- **Acutely Toxic Gases**
  - $LC_{50} < 100$  ppm, 4 hours
- **Acutely Toxic Vapors**
  - $LC_{50} < 0.5$  mg/L, with consideration of VP
- **Explosive Chemicals**
  - Synthesis of any explosive chemical, or any reaction involving an explosive chemical.
- **Pyrophoric Chemicals**
  - No listing by pyrophoric hazard level; wanted to limit to those chemicals that rapidly ignite at RT.

# Initial Faculty Review



- The committee solicited input from chairs of science and engineering departments:
  - Few comments provided; ChE and ME no significant issues.
  - Chemistry Dept. provided comments but few on the policy itself.
    - ✦ Concerned with PI certification acknowledging responsibility for safety of laboratory personnel.
    - ✦ Instead of policy have EH&S provide training on working safely with EHCs.
- PI statement revised to remove PI acknowledgement of responsibility for the safety of personnel.
  - Significant point of contention that would prevent acceptance.
  - Didn't want to reduce workers' responsibility to work according to procedures and safe work practices.

# Faculty Review – Round 2



- The committee solicited input from the Chemistry Dept. faculty.
  - What chemicals were of most concern and should be included?
    - ✦ Especially guidance on reactive chemicals – explosive and pyrophoric.
  - Overall thoughts and acceptance of the policy.
- Only received response from chair of dept. safety committee. Concerns included:
  - PI liability associated with EHC use form.
    - ✦ May give the impression that PI is exposing personnel to high risk.
    - ✦ Naming of chemicals as *extremely* hazardous – misleading since many routinely used.
    - ✦ Creation of additional liability?
  - Review process would create a bottleneck for research.
  - Committee lacks expertise to review proposed work – PI/researchers know best.
  - Sufficient procedures already in place to ensure safety.
- No specific comments regarding chemicals to be included in policy.

# Back to the Drawing Board



- To increase acceptance of the policy, the requirement for approval of EHC use forms was removed.
  - Forms would still be reviewed, with follow up by EH&S as needed.
  - Criteria triggering submittal of a form was not changed.
- Removed threshold for explosive chemicals. Any reaction or synthesis would require submittal of EHC use form.
- Continued refinement of example lists of explosive and pyrophoric chemicals.

# UCLA Agreement and Additional Changes



- In the committee's opinion, the requirements contained in the Agreement would be viewed as expected laboratory safety practice.
  - List of chemicals requiring SOPs incorporated into policy.
- EHC use form traded for SOP.
  - EHCs defined in policy require submittal of SOP to EH&S.
    - ✦ SOPs for EHCs must be submitted within 6 months after policy implemented.
  - Chemicals listed in Agreement require SOP, but not required to be submitted.

# Going Forward



- **Faculty Review – Round 3**
  - Committee has requested that EH&S solicit review of the draft policy by faculty from laboratory departments.
    - ✦ Chairs and Deans.
- **Address comments received.**
- **Submit to higher administration for approval as university policy.**
  - Effect of new Provost and Vice President for Research?

# Thoughts and Conclusions



- UNR laboratory safety culture generally good but many faculty members don't recognize need to improve.
- Many faculty members don't fully recognize their role as laboratory supervisor and the associated responsibilities.
  - Concerned with liability associated with acknowledging responsibility for the safety of others.
- Researchers expect and are allowed latitude regarding use of hazardous chemicals due to recognized (or assumed) expertise.

# Thoughts and Conclusions (cont.)



- Implementing new requirements not directly supported by regulation is difficult.
- Academia and shared governance
  - Developing new policy can be a lengthy process.
  - Without faculty involvement and consensus success is unlikely.
    - ✦ Requires diplomacy and compromise.
    - ✦ In our experience faculty members were reluctant to participate in policy development.
- At UNR, UCLA fatality and resulting regulatory and legal action raised awareness but has not yet resulted in changes to the laboratory safety program.

# Acknowledgement



- **UNR Laboratory Safety Committee Members**
  - Thomas Bell, Ph.D., LSC Chair, Professor, Chemistry Dept.
  - William Courchesne, Ph.D., Associate Professor, Microbiology Dept., IBC Chair
  - Qizhen Li, Ph.D., Associate Professor, Chemical and Materials Engineering Dept.
  - Paul Neill, Ph.D., Professor, Physics Dept., RSC Chair
    - ✦ Ronald Phenauf, Professor, Physics Dept., RSC Chair (ex-member)
  - Claus Tittiger, Ph.D., Professor, Biochemistry and Molecular Biology Dept.