Development of a Policy to Improve Oversight of Extremely Hazardous Chemicals

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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.
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.
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.
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.
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.