



TEXAS TECH UNIVERSITY™

Department of Chemistry and Biochemistry



Chemical Safety at Texas Tech

Responses and Lessons Learned
Since January, 2010

Dominick Casadonte

Minnie Stevens Piper Professor and Immediate Past Chair

November 16, 2010



Disclaimer

The opinions expressed in this presentation are those of the presenter and not necessarily those of Texas Tech University nor any agency affiliated with Texas Tech University. While every attempt has been made to verify the accuracy of the statements made in this presentation, the presenter is solely responsible for its content.



Texas Tech University:

- **Founded:** 1923
- **Carnegie Foundation Classification:** doctoral research-extensive university
- **Degrees:** 150 undergraduate, 100 master's and 50 doctoral
- **11 Colleges + Law School and Graduate School**
- **Population:** 31,637 students (fall 2010)
- **Accredited:** by the Commission on Colleges of the Southern Association of Colleges (SACS)





Texas Tech Chemistry:

- **Buildings:** Two (1928 (Renovated 1988); 1968-1971)
- **Faculty:** 26
- **Graduate Students:** 105
- **Postdoctoral Research Associates:** 34
- **Technical Staff:** 9
- **Clerical Staff:** 10
- **Chemistry Undergraduate Majors:** 146
- **Biochemistry Undergraduate Majors:** 184
- **Total Funding (2009):** \$4,225,265
 - **Federal Grants:** \$ 1,939,044
 - **Non-Federal Grants:** \$ 1,532,962
 - **Co-PI:** \$ 753,259
- **Federal R&D Expenditures (2009):**
 - Ranked 94th





Texas Tech University:

1) Quality Enhancement Plan (2005, SACS): Ethics

- “Do the Right Thing” Campaign: www.depts.ttu.edu/provost/qep
- University-Wide Committee

2) Ethics in the Curriculum:

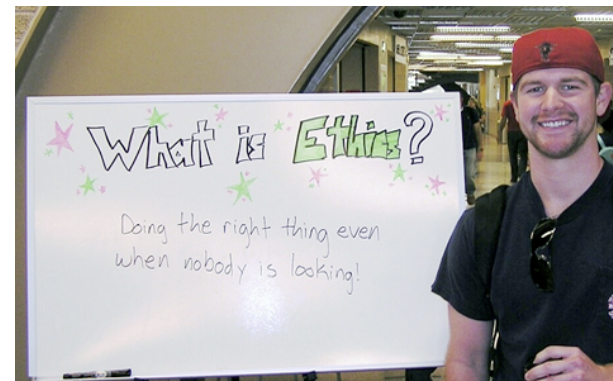
- PHIL 5125: Introduction to Research Ethics (Fall, 2010)
- University-Wide Committee

3) RCR:

- Hired Dr. Alice Young as AVPR for RCR (June, 2009)
- www.depts.ttu.edu/VPR/integrity/nsf-ethics-plan.php

4) Murdough Center for Engineering Professionalism/ National Institute for Engineering Ethics

- www.depts.ttu.edu/coe/centers/murdough.php





Texas Tech Chemistry:

- **Chemical Hygiene Plan:**

- Developed in 1998 by Safety Committee
 - Based on BYU Plan
 - One Copy Issued per Lab
- Later Updates by EH&S: Website

- **Chemical Inventories**

- Developed and Updated in all labs 1998 – 2003
 - Each lab responsible for inventory

- **MSD Sheets**

- Paper Copies in Labs/Stockrooms to 2003
- Computerized MSD from Suppliers + 2003



- **Safety Training:**

- All Academic Lab Classes:
 - Mandatory
- Research Labs:
 - Mandatory Once a Year (< 2003)
 - Last Mandatory: 2006
 - Faculty Responsible for Training after 2006



Texas Tech Chemistry:

- **Chemical Waste Disposal:**
 - Every Tuesday/Thursday (EH&S)
- **Chemical Safety Inspections**
 - Consistent Inspections Until ~ 2003
 - Push Back from Faculty, Staff, Graduate Students Resulted in Sporadic Inspections unless specific requests made > 2003





- January 7, 2010: Explosion in Energetic Materials Lab Injures Student
- Accident Picked Up in National Media:
 - C&EN, Jan. 25, page 7
 - C&EN, Feb. 1, pages 25-26
 - C&EN, July 23 (Online)
 - C&EN, Aug. 23, pages 34-37
- Feb. 11: Lab Reopened
- Feb 26: DHS Visit (Northeastern)
- March 19-23: Visit by Chemical Safety Board
- April 9: Internal Investigation Results Released
- May 25: DHS (ALERT) Visit





Texas Tech University:

- Working Group Established to Review Lab Safety Policies and Training
- University-Wide Research Safety Committee Established
- Outside Panel Commissioned to Review Safety Culture
- Research Programs Requiring Significant Monitoring Identified
- Search for Departmental Safety Officer Ongoing
- Safety Information to be Required in Tenure and Promotion Packages
- Safety Information to be Required in Theses and Dissertations





Texas Tech Chemistry: Completed

- Department Safety Committee Reorganized and Charged to Change Department Safety Culture: Weekly Meetings
- Regulatory Authority of Safety Committee Increased: Loss of Pay and/or Rekeying of Labs for Serious Lack of Compliance
- Solvent Reduction Below OSHA/State Limits in Each Lab
- Safety Inspections by EH&S, Dean, VPR
 - Labs can be Rekeyed or Shut Down if Seriously Non-Compliant





Texas Tech Chemistry: Completed

- All Continuing Researchers are Required to Undergo Mandatory Chemical (and other) Safety Training (September): Verification in Personnel File
- All New Researchers are Required to Undergo Safety Training Before They Can Chose a Research Mentor: Verification in Personnel File



- T.A.s Undergo Additional Safety Training. Walk Through By Faculty and Prep Chemist in Each Academic Lab. Loss of Pay and/or Assistantship if Graduate Student Lax. Three strikes rule. Time 1 = Written warning in personnel file. Time 2 = Loss of three days wages. Time 3 = Loss of Assistantship



Texas Tech Chemistry: Completed

- All Relevant PPE Required in Research Labs by Researchers
- No One Can Enter Labs Without PPE (Two workers in lab at a time now normative)
- Common University Chemical Inventory System Developed: Web-Based
- Safety Committee, in Conjunction with EH&S, Revamp CHP
- Each Lab Has Safety Guidelines Prominently Displayed





Texas Tech Chemistry: Completed

- Instrument Safety Training Required on All Instruments
- All Laboratories Have a Hazard Plan in Place
- Synthesis Labs Have Protocols and Procedure in Place, Code of Conduct, General Laboratory Rules. Reviewed and Signed by Students.
- Strengthened EH&S Lab Walk Through (Monthly and Random)





Texas Tech Chemistry: Ongoing

- Train at Least One Division Member in CPR and First Response Methodology to Aid Safety Officer
- List Rooms Under Alarm System with Types of Hazards for First Responders
- Common Departmental Scheme for Labeling All New Chemicals
- Annual Assessment of All Safety Plans
- Work to Improve Culture of Safety for All Academic Laboratories
- Develop “Carrots” for Superior Laboratory Safety Activities
- Develop Safety Course in Department and in Intro to Research





Texas Tech Chemistry: Energetic Materials

- Experimental Protocols for All Procedures in Place, Written by Students and Checked by Faculty and EH&S and Reviewed with Students.
- Instrumentation Protocols for All Procedures in Place, Written by Students and Checked by Faculty and EH&S and Reviewed with Students.
- All Appropriate Shielding in Place in Lab
- All Required PPE in Place in Lab and Required by All Students





Texas Tech Chemistry: Energetic Materials

- Group Code of Conduct and Operating Procedures in Place, and Provided to and Signed by Students
- Failure to Comply with Policies and Protocols Results in Immediate Dismissal from the Laboratory





- 1) Accidents at Public Universities are Public Events
 - Good Safety Doesn't Make Headlines: Lack of Safety Does!
- 2) Chemistry Labs are Dynamic:
 - The Safety Culture Must Be Vigilant and Can No Longer Be Complacent
- 3) Faculty: EH&S Relationships Must Be Changed
 - Communication is the Key!
 - Not Everyone Has the Same Idea of What Constitutes Safety in a Pluralistic Society: Dialogue Needed!



- 4)) A Stick is More Effective than a Carrot to Start
 - Consequences for Lack of Safety Need to Be In Place
 - We Need More Carrots!
- 5) Faculty Under Increasing Pressure to Get Results
 - What Mechanisms Will Allow For Change with this Reality?
 - Address Safety Concerns for Grant Funding???
- 6) Computerization of MSD and CHP Can Lead to Complacency



- 7) A Survey of the Current State of Academic Safety Practices
Needs to be Shared with the Community
- 8) We Need More Safety Videos, etc.
- 9) We Need Specific Protocols for Specific Lab Procedures
In a Common Database
- 10) We Need Templates for Common Safety Paperwork
- 11) We Need Active Participation by Industry and the Government



- 12) The University, College, Department, Faculty, Staff, Students
Must All Work Together for the Culture to Change:
Safety Really is EVERYONE' S Responsibility
- 13) It Saves Time and Resources to be Safe!
Safety Costs Money, but Saves Money (and Lives)
- 14) The Culture Must Change Through the Younger Generation
of Scientists
- 15) The “Nothing Ever Happened to Me” Mentality of
Safety Must Be Challenged and Changed.



TEXAS TECH UNIVERSITY™