TEXAS TECH UNIVERSITY
Vice President *for* Research™

19 July 2010

TO: **Dr. Bob Smith, Provost and Senior Vice President**

Dr. Taylor Eighmy, Vice President for Research

FROM: **Dr. Alice Young, Faculty Fellow for Research, OVPR**

RE: **REPORT OF THE WORKING GROUP ON LABORATORY SAFETY**

BACKGROUND

On 9 February 2010, Provost Smith and Vice President Eighmy established a Working Group on Laboratory Safety, charged as follows:

> Additionally, a working group has been established by us to completely reexamine how we manage laboratory safety, the culture of safety awareness, and safety training compliance. The group presently includes Ronald Phillips, Randy Nix and Dr. Alice Young. We are asking Dr. Young to lead this reexamination effort; she will be inviting additional members from across the community to participate. This effort will happen in parallel with and be informed by the U.S. Chemical Safety Board investigation. The effort will include looking at best practices at peer institutions and perhaps involve outside expert consultation. We envision that practices and procedures may be changed or potentially improved and that operating policies may be modified or developed. Further, we anticipate that this focus on laboratory safety will also become incorporated as a key element of our "responsible conduct of research" training program being developed by Dr. Young within the Office of the Vice President for Research.

MEMBERS OF THE WORKING GROUP

Dr. Todd Anderson, Professor, TIEHH
Dr. Javad Hashemi, Associate Dean, Research, WCoE
Randy Nix, Executive Director, TTU Environmental Health and Safety
Ronald Phillips, University Counsel

Dr. John Zak, Associate Dean, Research, CA&S
Dr. Alice Young (Chair), Faculty Fellow, OVPR

The Working Group met 3 March, 16 April, and 7 May 2010, and distributed materials and feedback by e-mail. CSB recommendations were not available to the Working Group, as the CSB investigation is ongoing. Members of the Working Group reviewed the FM Global Feb 2010 Risk Report (provided by the Office of Risk Management) and collected information from units at TTU and other public research-intensive institutions about the following topics:

1. Processes used at comparable Big-12 institutions for chemical storage, inventory and procurement
2. Strategies that researchers and departmental & college administrators can use to monitor and enhance safety practices w/in laboratories and departments
3. Strategies for opening laboratories to new investigators and for closing laboratories when investigators leave
4. Roles and resources of departmental chemical hygiene coordinators, whose appointment and duties are specified by OP 60.17 (http://www.depts.ttu.edu/opmanual/OP60.17.pdf)
5. Strategies to identify laboratories and/or programs of research that may need higher levels of oversight by departmental, college, or EHS staff
6. Strategies to maintain training levels in labs/research groups and to involve undergraduate and graduate students in safety culture
7. Communication among investigators and among departments – especially w/ respect to best practices
8. Training and resources used by researchers, laboratories, departments, and other units that have established effective safety cultures and practices
9. Effective operating policies used at comparable institutions

REPORT AND RECOMMENDATIONS

The Working Group found considerable attention to laboratory safety practices by TTU investigators and administrators, and also considerable diversity in safety culture and resources. We have organized our report and recommendations in three overlapping areas:

1) Activities to promote a culture of safety in the institution,
2) Activities to promote a culture of safety in colleges, departments, and research sites
3) Activities to promote a culture of safety among investigators and their trainees

TTU has current Operating Procedures that address laboratory safety, and administrative and faculty response to the January 2010 accident in the Energetic Materials program demonstrates rapid and transparent work to correct problems once they are identified. The Working Group attempted to identify “best practices” used at TTU or sister institutions that may strengthen and maintain our safety culture. Throughout, we use the phrase “research sites”, rather than

laboratories, to emphasize that safety concerns arise not only in traditional wet labs or around large equipment, but are common to a large range of venues, including studios, agricultural sites, anthropological digs, geological formations, etc., where TTU faculty, trainees, and staff conduct scholarship and creative activity.

1) **Activities to promote a culture of safety in the institution.** The Working Group identified a number of activities that will allow TTU to identify potential risks of research and maintain an aware and proactive safety culture.
   ~~a)~~ ***Establish a University-wide Research Safety Committee*** charged with promotion of a proactive safety culture, composed of high-ranking administrators and research-active faculty. Such an ongoing committee could initiate and oversee many of the following recommendations. This Committee should work with TTU EH&S on an ongoing basis to review and revise Operating Procedures to address safety issues.
   b) Obtain external peer consultation about our safety culture. In order to bring information about national trends in research safety to Texas Tech, we recommend that the OVPR and PSVP convene a 3- to 4-member external peer consultant group during the 10-11 academic year to review TTU research safety culture and provide suggestions about potential activities that TTU might undertake to enhance our culture. Members of this group might visit campus at least twice, with the first visit aimed at data gathering and the second visit timed to coincide with a campus wide "Safety Forum" in order to increase on-campus dialogue with TTU researchers about best practices in safety and safety culture.
   c) Establish a yearly campus-wide TTU "Safety Forum" to highlight best practices and new developments in research safety. Such a forum should be organized by EH&S in collaboration with the IBC and college and departmental safety committees. The topics should change yearly, and include challenges posed by new TTU research initiatives and what can be learned from high profile accidents (our January 2010 accident has been the focus of similar campus discussions at other institutions).
   d) Examine our chemical procurement and inventory practices. The Working Group recommends a review and cost-study of procurement and inventory practices and/or formation of a high-level working group to evaluate whether changes in purchasing, inventory, and storage are needed, and to work with EH&S to establish and institution-wide inventory of hazardous materials. The working group should include representatives from Purchasing, EH&S, college/department administration, and research-active faculty.
   e) Expand materials provided by EH&S. EH&S is currently conducting a review of the University Chemical Hygiene Plan (scheduled to be completed this summer). They have identified practices in place at two Big 12 schools (Universities of Kansas and Missouri) that may provide useful models for expanded training materials, safety manuals for research sites, and information provided to new faculty.
   f) Identify research programs that may require "greater than usual" monitoring. The January 2010 accident in the Department of Chemistry & Biochemistry highlights 1) a

need for "prospective" risk assessment around new programs of research and 2) a reason to consider ranking laboratories in terms of risk and need for oversight. The Working Group recommends development of policies to

i) Departments, Colleges and Centers should inform EH&S about the scope of work that will be conducted by new faculty. This will allow EH&S to make contact with a faculty member, often before s/he arrives on campus, to provide guidance and consultation about construction, renovation, storage, etc., as appropriate to the research program.

ii) Maintain regular contact between EH&S and departmental and college chemical hygiene officers. Such contact should include strategies to identify research programs or laboratories that either conduct especially hazardous work and/or repeatedly are cited in departmental or EH&S inspections – and to monitor those labs more stringently and more frequently than others, with reports to both faculty and departmental and college administrators. Such contact may include face-to-face meetings, an electronic bulletin board, and other tactics as our programs develop.

iii) Establish procedures that allow appropriate monitoring of especially risky activities. For example, the University of Kansas has adopted a system to categorize labs according to hazard and risk (1 low, 4 high). Such a system would allow TTU to identify laboratories, studios and research sites and procedures that require especial surveillance and training.

iv) Clarify that faculty are responsible for alerting and seeking input from departmental chemical hygiene officers and EH&S when they begin a new program of research

g) Establish procedures for opening and closing research sites and studios. Such procedures are needed to ensure that sites have necessary safety features (such as solvent storage cabinets in laboratories and painting studios) before work begins, and to ensure that chemicals and other hazards are removed when a site closes. It may be appropriate to require successful "close-out" of a site before a degree is awarded (in the case of degree candidates) or as part of the employment exit process.

2) Activities to promote a culture of safety for departments, colleges, and research sites. Colleges and Centers should adopt and use practices that highlight and reinforce an effective safety culture. Examples of such practices are the college-wide effort to examine laboratory safety undertaken in 2008 by the College of Engineering, and the extensive safety materials posted on the website of the TTU Center for Pulsed Power & Power Electronics (http://www.p3e.ttu.edu; click "Employee Information, then "Safety Guidelines"). Faculty and students should be educated and required to implement lab safety practices. These individuals should be rewarded for outstanding efforts and held accountable for deficiencies. The PSVP and VPR should work with Deans and Center directors to

a) Increase administrative expectations and support for proactive culture of safety. Departmental chairs and Center directors are responsible for safe operations of laboratories, studios, and other research sites. They or their delegates need to visit research sites and to ask about, celebrate, and reward a safety culture. Discussion and

modeling of effective tactics at high-level venues (Provost's Council, annual meetings of College faculty, departmental or college retreats) may expand and sustain effective practices.

b) ***Clarify responsibilities and time-lines for correction of deficiencies identified by EH&S inspections, Risk Management assessments, and departmental chemical hygiene officers.*** EH&S can close a lab when they identify an immediate risk to "life or limb" – less severe deficiencies may be corrected under current practices.

c) ***Monitor and reward training in responsible and safe conduct of research.*** EH&S provides on-line and face-to-face safety training for staff, faculty, and students – and each TTU unit needs to ensure that its members take this training. Activities currently used by one or more TTU colleges should be exported to other units – by targeted discussions at regular administrative meetings, links on webpages, and descriptions in information targeted to faculty and students. These include
   - ***i)*** Regular (*e.g.,* annual or semi-annual) discussion and comparison of written safety guidelines among departments – accompanied by standard and easily accessible webpage design for such guidelines.
   - ***ii)*** Expectation that faculty will provide new group members (students, volunteers, collaborators) with high expectations for safety training and behavior. As with the "White Coat" ceremonies used by medical schools to welcome each new class, formal practices to introduce group members to the culture of research can set the tone for our safety culture. Tactics might include a formal safety acknowledgement statement for all students, formal studio or laboratory orientation, individual copies of safety protocols, etc.
   - ***iii)*** Combining safety training with training in responsible conduct of research – both in on-line modules and in face-to-face sessions under development to meet NSF and NIH requirements.
   - ***iv)*** The Working Group notes that modeling such behavior for new faculty may be particularly important – as they may not have encountered effective practices at their former institutions.

d) ***Explore creation of degree or certificate programs in laboratory safety***. One example would be a Professional Science Masters degree focused on laboratory safety. EH&S has identified only 5 undergraduate and 25 graduate programs that provide a degree in Industrial Hygiene, and TTU's difficulty in filling our open EH&S position (which requires a certified industrial hygienist) illustrates the demand. Creative combination of laboratory safety and popular topics such as sustainability might serve the research and teaching missions of TTU.

3) Activities to promote a culture of safety among investigators and their trainees.
Members of the Working Group noted that safety begins with the individual – and that TTU has a responsibility to promote activities that foster safe practices. The following suggestions aim to provide appropriate training, foster awareness of safe practices, and encourage discussion of concerns and responsible research.

a) ***Develop or expand roles of ombuds to include safety.*** Because raising concerns about safety or other responsible research practices poses risks to the individual, the Working Group suggests the need for ombuds to whom trainees or other university members can bring concerns. Such individuals need high-level authority to ask questions and change procedures, without invoking the sometimes cumbersome requirements of a personnel or misconduct action

b) ***Include explicit discussions of safety and a safety culture in current forums for student and faculty orientation and development.*** Several units, including CUR, HHMI, and many departments already do this, and current practices should be expanded to the Tenure Academy.

c) ***Add safety information to FARs and T&P dossiers.*** Individuals may pay particular attention to areas in which we are evaluated. In this spirit, the Working Group recommends that the format of TTU Faculty Annual Reports and Tenure and Promotion dossiers be expanded to include sections that include information about activities
   - ***i)*** To establish and maintain safe working protocols at all sites where scholarship, research and creative activities occur.
   - ***ii)*** To ensure that all students and collaborators receive safety and responsible research training appropriate to the discipline

d) ***Add safety information to syllabi.*** The recommended format for TTU syllabi for laboratory-, field-, and studio-based courses should include explicit information about safety training and safe practices.

e) ***Add safety information to reports, theses and dissertations.*** The recommended format for undergraduate research projects (e.g., laboratory reports, Honors projects, CUR projects, etc.), master's theses, and doctoral dissertations should include explicit information about written safety protocols, compliance with regulatory requirements, and training of both the candidate and her/his research assistants.

f) ***Update training materials.*** Because students are likely to question safety training that is presented in "out-of-date" formats, units should update their training materials on a regular basis.

g) ***Provide easy-to-access templates.*** Units and/or the OVPR should provide templates for safety training materials on clearly identified web-links. These could include sample contracts for incoming students, examples of written safety protocols (especially important to illustrate the level of detail that can be useful), etc.