



TEXAS TECH UNIVERSITY SYSTEM™

Office of Audit Services

Texas Tech University
Report on Laboratory Safety

February 14, 2014
Project #2014027



TEXAS TECH UNIVERSITY SYSTEM™

Office of Audit Services

February 14, 2014

Robert V. Duncan, Ph.D.
Vice President for Research
Texas Tech University

Lawrence Schovanec, Ph.D.
Provost and Senior Vice President of Academic Affairs
Texas Tech University

Dear Dr. Duncan and Dr. Schovanec:

We have completed our audit of laboratory safety at Texas Tech University (University). This engagement is included in our annual audit plan for the year ending August 31, 2014. The audit was conducted in accordance with generally accepted government auditing standards and in conformance with the International Standards for the Professional Practice of Internal Auditing (Standards). The objectives of this engagement were to report on the status of prior recommendations resulting from a 2010 incident and to evaluate the governance of laboratory safety training and inspections.

Overall, the University has taken steps to improve laboratory safety, campus-wide safety awareness, and safety training. However, there continue to be significant opportunities for improvements in the University's governance processes and laboratory safety oversight.

Management concurs with the recommendations made in this report. Management has dedicated themselves to creating a continuous quality improvement program and has initiated a process of identifying personnel and financial resources necessary to address the noted opportunities. Management's response is included, beginning on page 7 of this report. Management is responsible for implementing a course of action to address the recommendations.

Our Standards require that we monitor audit issues to ensure that management action plans have been effectively implemented. Based on your estimated implementation dates, we will contact you to schedule the follow-up procedures. Our follow-up procedures may consist of reviewing compliance-related policies, procedures, or other materials developed while implementing the plan. In addition, we may perform limited procedures to ensure the plan is working as intended.

Our recommendations are provided to assist the management of Texas Tech University in enhancing its operations and managing its risks. We appreciate the courtesies and considerations extended to us during our engagement. If you have any questions or if we can be of further assistance, please do not hesitate to contact our office.

Sincerely,

A handwritten signature in blue ink, appearing to read "Kim Turner".

Kimberly F. Turner, CPA
Chief Audit Executive

EXECUTIVE SUMMARY

BACKGROUND

In January 2010, Texas Tech University (University) experienced a serious laboratory accident. Following this incident, the University initiated actions to examine both the incident and how the University manages laboratory safety in general. The University both conducted an internal review and obtained an external peer review of laboratory safety processes. The Chemical Safety Board (CSB), an independent federal agency charged with investigating industrial chemical accidents, also conducted an investigation.

These efforts resulted in a number of recommendations for improvement. The CSB issued four recommendations, two directly to the University and two to external entities. Former University President, Dr. Guy Bailey, added to these recommendations through a series of self-imposed recommendations. Lastly, the external reviewers provided the University with a number of additional best-practice enhancements. Through all of these initiatives, the University sought to become exemplary in our campus climate and culture around laboratory safety.

OBJECTIVES AND METHODOLOGY

Based on an engagement risk assessment, the objectives of this audit were to report on the status of prior recommendations resulting from the 2010 incident and to evaluate the governance of laboratory safety training and inspections. To achieve our objectives, we reviewed published investigative reports and associated management action plans. We conducted extensive interviews with personnel involved in laboratory safety processes and oversight. We also reviewed and observed Environmental Health and Safety's (EH&S's) laboratory safety inspection processes.

CONCLUSIONS AND RECOMMENDATIONS

The University has taken steps to improve laboratory safety, campus-wide safety awareness, and safety training. However, significant opportunities remain for the University to achieve the exemplary status it seeks. Specifically, the Vice President for Research and the Provost and Senior Vice President (Provost) should:

- Take steps to achieve final resolution and CSB approval of remediation on all outstanding CSB recommendations.
- Define and execute the near-miss and incident tracking, reporting, and education systems.
- Ensure all outstanding self-imposed recommendations are completed.
- Formally establish, document, and communicate to the University community the role and authority of the Institutional Lab Safety Committee.
- Firmly establish EH&S's role and authority within the University's research enterprise.
- Establish a process to ensure principal investigators properly train laboratory personnel prior to granting laboratory access.
- Reexamine the laboratory safety inspection processes and develop a consistent methodology for conducting inspections.
- Improve EH&S communication and corrective action follow-up processes.

SYNOPSIS OF MANAGEMENT'S RESPONSE

Management concurs with the recommendations made in this report. Management is dedicated to creating a continuous quality improvement program and has initiated a process of identifying

EXECUTIVE SUMMARY (continued)

personnel and financial resources necessary to address the noted opportunities. Management's response is included, beginning on page 7 of this report.

RISK MANAGEMENT PROCESSES

The Committee of Sponsoring Organizations of the Treadway Commission (COSO), which is a widely recognized authority on internal controls and risk management processes, defines enterprise risk management (ERM) as a framework or process for management to use to effectively manage uncertainty and the associated risks and opportunities, thereby enhancing management's ability to build value for its stakeholders. ERM provides a holistic and integrated view of the risks that could cause an organization to fail to meet its goals and objectives.

Under the Audit Committee Charter adopted by the Texas Tech Board of Regents, Audit Services is required to provide periodic assessments of risk management processes across the Texas Tech University System. During this engagement, the Vice President for Research and EH&S offices provided our office information on laboratory safety risk management activities. The decentralized nature of laboratory safety oversight at the University has resulted in lack of ownership in comprehensive risk management practices including risk identification, review, and mitigation. The recommendations included in this audit report will help provide a collaborative framework for risk management by clarifying the responsibilities, authority, and oversight related to laboratory safety. This framework will provide a basis for the research enterprise to formalize its risk management activities.

REPORT DISTRIBUTION

Audit Committee, Texas Tech Board of Regents
Mr. Kent Hance
Mr. Jim Brunjes
Dr. John E. Opperman
Dr. M. Duane Nellis
Ms. Noel Sloan
Dr. Alice Young
Mr. Cliff Harris
Dr. Dimitri Pappas

DETAILED RECOMMENDATIONS

Prior Recommendations

Status of Chemical Safety Board Recommendations

Following the 2010 incident, the CSB investigation culminated in four recommendations. Two recommendations are the direct responsibility of the University and two were directed to outside entities. At the time of the investigation, the University provided the CSB with proposals that, if implemented, would satisfy the recommendations and the CSB would consider the recommendations closed.

To date, the University has not completed actions and reported the final disposition of the recommendations to the CSB. The University has not communicated with the CSB since May 2012. The former Vice President for Research had taken ownership of communication with the CSB. When he left the University, remaining personnel were unsure who had been delegated the tasks of implementing the recommendations and communicating with the CSB.

The Vice President for Research should establish clear roles and responsibilities for ensuring the recommendations are expeditiously implemented and administratively closed by the CSB.

Near-Miss Reporting Process

EH&S worked to develop a root cause analysis and tracking process for laboratory incidents. This process covers accidents but not near-misses. As part of the CSB investigative report, CSB recommended the University create a near-miss reporting system that “can be used as an educational resource for researchers, a basis for continuous safety system improvement, and a metric for the university to assess its safety progress.” While EH&S has created reporting forms for near-misses, the Chemical Hygiene Plan does not contain details on how this form or how the near-miss program as a whole will be utilized. The University has not taken steps to discern the differences between incidents and near-misses nor to leverage the continuous improvement and training opportunities a robust reporting process can provide.

The Vice President for Research should strengthen incident and near-miss reporting and tracking processes to align with CSB recommendations. Additionally, near-miss reporting, tracking, and education processes should be better defined in University policies and procedures.

Status of Self-imposed Recommendations

Former President Guy Bailey enacted a series of self-imposed recommendations based on the results of the CSB investigation. Additionally, the University created an internal working group and engaged an external peer review team to evaluate the laboratory safety program. Each of these efforts resulted in public reports and documents identifying weaknesses and recommendations for improvement. Implementation of all of these recommendations has not occurred for various reasons, including significant turnover in executive management, lack of cooperation, and lack of funding.

For example, the 2011 external peer review noted a need to “initiate a survey and assess labs for appropriate eyewashes and design a corrective action plan.” According to EH&S, the Department of Chemistry was reviewed and some eyewash stations were installed, but some principal investigators refused the stations. Additionally, EH&S stated the eyewash review was not conducted outside of Chemistry due to a lack of capital improvement funds.

DETAILED RECOMMENDATIONS (continued)

The University has significant risk exposure should another incident occur that was previously identified, could have been detected, or was preventable had previous recommendations been implemented. The Vice President for Research and Provost should establish a comprehensive tracking and reporting system to ensure all previously identified issues and recommendations are adequately addressed. Decisions not to implement certain recommendations or install and implement identified safety improvements should be clearly documented and approved by executive management.

Laboratory Safety Governance

Role and Authority of the Institutional Lab Safety Committee

Based on recommendations from the CSB, the University established an Institutional Lab Safety Committee. The Institutional Lab Safety Committee's charge is to "improve the safety culture in research facilities" and to "focus on both human health protection and hazardous risk reduction by establishing policies and procedures in accordance with current practices."

The Institutional Lab Safety Committee has not fully deployed its charge or fully established its oversight authority. Additionally, stakeholders across the University have not completely embraced the role and authority of the Committee.

The Vice President for Research, Provost, and faculty Chairperson of the Institutional Lab Safety Committee should work to establish the role, responsibilities, and authority of the Committee, which should be clearly defined through the mission, vision, and established bylaws. Based on that charge, the Institutional Lab Safety Committee should work with EH&S to establish processes and reporting tools so the Committee can effectively carry out its oversight responsibilities. Lastly, the Committee should work with the Vice President for Research and Provost to determine the best methodology to communicate the Committee's charge to management, faculty and staff throughout the University.

Role and Authority of Environmental Health & Safety

EH&S's vision is to "provide the highest level of safety, health and environmental support" and to "stimulate awareness of issues." The culture of the EH&S department is to support the research staff rather than hold people accountable in their safety roles. For example, the University Chemical Hygiene Officer, a staff member in EH&S, has the authority to remove individuals from labs for not complying with established policies or failing to take appropriate safety training. However, the University Chemical Hygiene Officer stated it is the department-level safety officers' or individual principal investigators' responsibility to take any such actions against research support staff. Furthermore, EH&S personnel stated it was a department or college-level decision to lock a principal investigator out of his/her laboratory until the laboratory is brought in-line with policies and considered a safe working environment. Thus, there is a risk that a laboratory could continue to operate unsafely while the correct party to lock down the laboratory is identified.

The Vice President for Research and Provost should firmly establish the role, responsibilities, and authority for EH&S to not only continue to support the research enterprise of the University, but to hold individuals accountable for compliance. EH&S should utilize their reporting responsibilities to the Institutional Lab Safety Committee to further not only the discussions on safety issues but to embrace the enforcement role the Committee can provide. The goal is to help principal investigators, and research personnel

DETAILED RECOMMENDATIONS (continued)

as a whole, understand that compliance with safety policies is a central element in the research culture at the University.

Laboratory Safety Observations

Training

The Chemical Hygiene Plan states the principal investigator is responsible for developing a Lab Safety Plan for their laboratory and ensuring that everyone who has access to the laboratory is properly trained. The Chemical Hygiene Plan does not detail how that is to be documented or how the University Chemical Hygiene Officer can be assured training occurs.

EH&S has developed a university-wide online laboratory safety training, but the system lacks the ability to identify who should receive the training and thereby follow up to ensure all applicable personnel take the necessary training.

The Vice President for Research and Provost should establish processes to identify and ensure delivery of laboratory safety training. In discussions with the Chairperson of the Institutional Lab Safety Committee, he identified utilizing the laboratory key issuance process to have principal investigators attest that the individual they are approving for laboratory access has received both the University and laboratory specific training. Additionally, EH&S has initiated a review of Human Resource's learning management system to determine if it could be leveraged for tracking the University-wide training process. We agree with these efforts and encourage their continued exploration and implementation.

Laboratory Safety Inspections

EH&S's goal is to inspect each laboratory annually. Currently, the University has labs that EH&S has not inspected in over 18 months. EH&S does not have a plan to become current with the annual laboratory inspection goal. Additionally, EH&S's methodology is to inspect the lab that has gone the longest since the previous inspection. EH&S's processes do not consider individual laboratory risks or the history of previous violations in determining how often an inspection is warranted.

The Vice President for Research and the Director of Environmental Health and Safety should establish a consistent methodology for conducting laboratory safety inspections. The methodology should consider risk factors and an evaluation of the appropriate timeline for reviewing individual laboratories. EH&S should evaluate its yearly metric and effectively deploy action plans to timely review all laboratories.

Communication and Corrective Actions

EH&S communicates the results of laboratory safety inspections to the relevant principal investigator. Currently, EH&S does not provide any reporting of significant or egregious issues to the Institutional Lab Safety Committee or applicable departmental management.

After this engagement began, EH&S deployed processes to track previous issues for repeated concerns and now documents their follow-up activities. We commend management for being proactive and encourage them to continue to refine the follow-up process to ensure safety violations are appropriately corrected.

DETAILED RECOMMENDATIONS (continued)

The Vice President for Research and Provost should establish the reporting, communication, and follow-up roles of EH&S. In doing so, EH&S should have clear reporting expectations to not only principal investigators but to the Institutional Lab Safety Committee. In serious or consistent violations of safety protocols, EH&S should alert department and/or college management to the concerns noted. Lastly, working in concert with the Institutional Lab Safety Committee, EH&S should continue to refine their process to follow up on violations identified during safety reviews.

MANAGEMENT'S ACTION PLAN



February 10, 2014

Kimberly F. Turner, CPA
Chief Audit Executive
Office of Audit Services
Box 41104
Lubbock, Texas 79409-1104

Dear Ms. Turner,

We appreciate your close cooperation with Texas Tech University through the Office of Research in this audit process. We are dedicated to continuous quality improvement in laboratory and studio safety at Texas Tech University, and this audit process is of great value to us as we do so. We have also initiated the process of determining the budget revisions that will be necessary to complete the implementation of these changes in the most efficient way. We appreciate the close support of the Research Office senior staff, especially Alice Young and Katy Henderson, in the detailed preparation of our plans. Please find our more detailed response attached to this letter below. It is structured with each finding from the draft audit in boldface, followed by the management response in plain text. Please contact us if you have any questions or concerns, or if we may simply provide more information in this regard.

Sincerely,

A handwritten signature in black ink, appearing to read 'Robert V. Duncan'.

Robert V. Duncan, Ph.D.
Vice President for Research

A handwritten signature in black ink, appearing to read 'Lawrence Schovanec'.

Lawrence Schovanec, Ph.D.
Provost and Sr. Vice President of Academic Affairs

Enclosures

Box 41075 | Lubbock, Texas 79409-1075 | T 806.742.3905 | F 806.742.3947 | www.research.ttu.edu

An EEO/Affirmative Action Institution

MANAGEMENT'S ACTION PLAN (continued)

Detailed Reply to the Lab Safety Draft Audit

I. As noted in this draft Audit Report (Executive Summary, page 2),

The decentralized nature of laboratory safety oversight at the University has resulted in a lack of ownership in comprehensive risk management practices including risk identification, review, and mitigation. The recommendations included in this audit report will help provide a collaborative framework for risk management by clarifying the responsibilities, authority, and oversight related to laboratory safety. This framework will provide a basis for the research enterprise to formalize its risk management activities."

We fully agree that the development of a collaborative framework to clarify responsibilities, authority and oversight is critically important. This must be done by every division of the University that develops and operates laboratories and studios. The Vice President for Research (VPR) and the Provost and Senior Vice President for Academic Affairs (PSVPAA) will work closely together with the Staff and Faculty of TTU to continue to build a culture of continuous safety improvement. The VPR will provide expanded tools, compliance reports, and safety consultation to faculty and faculty administrators. The VPR will also continue to work collaboratively with the PSVPAA to clarify the responsibilities, authority, and oversight expectations throughout our many specific efforts to assure laboratory and studio safety. We will also establish expectations that all staff and faculty members at TTU provide the necessary effort and subsequent compliance information to confirm that the changes listed below are implemented in a timely manner. This process will be primarily managed through a close collaboration between the Institutional Laboratory Safety Committee (ILSC) and the Department of Environmental Health and Safety (EH&S) with the full executive support of the VPR and the PSVPAA Offices.

II. Status of Chemical Safety Board (CSB) Recommendations

The Vice President for Research should establish clear roles and responsibilities for ensuring the recommendations are expeditiously implemented and administratively closed by the CSB.

VPR Duncan will assume responsibility for this process and for the subsequent reports to the CSB.

III. Near-Miss Reporting Process

The Vice President for Research should strengthen incident and near-miss reporting and tracking processes to align with CSB recommendations. Additionally, near-miss reporting, tracking, and education processes should be better defined in University policies and procedures.

Commonly accepted standards and methods for near miss reporting in university laboratories have not yet been developed in any academic institution within the United States to our knowledge. The CSB has tasked Texas Tech with the development of such a system. We are prepared to invest the resources and effort necessary to achieve this outcome. The development and management of this process will become a direct responsibility of the ES&H Director. The Institutional Laboratory Safety Committee (ILSC) has already started to develop a near-miss reporting system that is appropriate to university laboratories and studios. Because such a system is unprecedented in academic laboratories, the ILSC is in the early stages of planning how to assure full staff and faculty participation in near-miss reporting. It is already apparent that an effective TTU reporting system will require considerable application development by Information Technology, as well as actions in the academic line and in the facilities and operations line to ensure that use of the system by faculty, students, and staff becomes an expectation in academic and support units. Summary reports will be provided on near-miss reporting at least once per long semester by the ES&H Director.

Two immediate steps will be accomplished by the end of Spring 2014. These are: 1) to revise the EH&S website to include near miss reports on TTU incident report forms, and 2) to publicize the availability and intent of these reports to faculty, staff, and unit heads (chairs, deans, administrative directors). A

Page 1 of 5

MANAGEMENT'S ACTION PLAN (continued)

Detailed Reply to the Lab Safety Draft Audit

third identified step is ongoing: The revised Chemical Hygiene Plan (CHP) clarifies the requirement that faculty who direct laboratories and studios must develop individualized safety plans. During Spring 2014, ILSC will take the next necessary step, which is to publicize goals and templates for Laboratory Safety Plans and to begin to provide, on at least a quarterly basis, department chairs and college deans with lists of faculty and research staff who have or have not submitted Laboratory Safety Plans to the ILSC. The ILSC will coordinate these reports with EH&S, who will provide them to the VPR. The ILSC and EH&S will also track incident and near miss reports provided in the current system, match them to Lab Safety Plans, and ask chairs to meet with faculty and researchers to modify the Lab Safety Plans in light of such reports. The ILSC will then use the safety plans and available incident/near-miss reports to move forward with the near-miss reporting system plans.

IV. Status of Self-imposed Recommendations

The Vice President for Research should establish a comprehensive tracking and reporting system to ensure all previously identified issues and recommendations are adequately addressed. The University has significant risk exposure should another incident occur that was previously identified, could have been detected, or was preventable had previous recommendations been implemented.

Decisions to not implement certain recommendations or install and implement identified safety improvements should be clearly documented and approved by executive management.

This comprehensive tracking and reporting system will be developed under the leadership of the VPR and maintained and revised as necessary by the ES&H Director. Any decisions not to implement prior recommendations or to not install or implement specific safety improvements will be carefully reviewed by the VPR and the PSVPAA. Any such decision will be fully documented, to include the rationale for the decision, in a memorandum to record signed by the VPR. The VPR will work with the PSVPAA to 1) include safety in annual evaluations, 2) establish expectations about faculty responses to lab surveys, lab safety plans, and training and chemical inventory requirements, and 3) achieve thoughtful adoption of appropriate recommendations from the upcoming NAS/NRC report on safety in academic laboratories (<http://www8.nationalacademies.org/cp/projectview.aspx?key=49533>).

V. Laboratory Safety Governance

V. A. Role and Authority of the Institutional Lab Safety Committee (ILSC)

The Vice President for Research and the faculty Chairperson of the Institutional Lab Safety Committee should work to establish the role, responsibilities, and authority of the Committee, which should be clearly defined through the mission, vision, and established bylaws. Based on that charge, the Institutional Lab Safety Committee should work with EH&S to establish processes and reporting tools so the Committee can effectively carry out its oversight responsibilities. Lastly, the Committee should work with the Vice President for Research to determine the best methodology to communicate the Committee's charge to management, faculty and staff throughout the University.

The VPR assumes the direct responsibility to assure that the roles, responsibilities, and the authority of the ILSC are established, formalized, and reported as described above. One of the key goals for the ILSC is for it to serve as a faculty-led regulatory body for chemical hazard protocols. The ILSC will need to review chemical hazard protocols and lab/studio safety plans, and when appropriate to approve them across the campus. This is a large task that will take several years to complete, because there is no requirement currently that faculty and staff submit such protocols at TTU, and because the requirement to submit lab/studio safety plans was newly introduced in Fall 2013.

During Spring 2014, the VPR will fully empower the ILSC to issue and publicize goals and templates for Laboratory Safety Plans, and to begin to provide, on at least a quarterly basis, department chairs and college deans with lists of faculty and research staff who have or have not submitted Laboratory Safety

Page 2 of 5

MANAGEMENT'S ACTION PLAN (continued)

Detailed Reply to the Lab Safety Draft Audit

Plans to the ILSC. Working with those plans and with the Chemical Inventories, the ILSC will identify those labs/studios that require protocols and begin the review and approval process. In order to enact these protocol and safety plan reviews and approvals, the ILSC will also require the authority and a mechanism of enforcement of these plans within research and teaching laboratories and studios. This will involve tying the purchase of certain potentially hazardous chemicals, as determined from their associated Material Safety Data Sheets (MSDS), to prior protocol approval to work with these hazardous materials. The ILSC will have the authority to recommend to the VPR and TTU's line management that laboratories/studios with repeat safety offenses suspend operations until such time as the safety concerns are rectified and a responsive leadership structure is in place. This ILSC will have the authority to set any retraining criteria for faculty, staff, and students, and the authority to set criteria and a timeline for the return a new or suspended laboratory or studio to operational status. The ILSC was created as a faculty-led committee, in order to ensure that the necessary expertise and a full knowledge of current research best practices exists within the committee. On that basis, the ILSC will develop a protocol system that is both safe and functional, based upon their pragmatic knowledge of laboratory operations. Coordination between the VPR and PSVPAA is required to develop resources to support the work of the committee over the 12-month academic year, and between the ILSC and PSVPAA to develop expectations that faculty will maintain their online chemical inventories and laboratory safety plans, and that laboratory and studio work with hazardous materials and processes will not be conducted without protocol review.

V. B. Role and Authority of Environmental Health & Safety

The Vice President for Research should firmly establish the role, responsibilities, and authority for EH&S to not only continue to support the research enterprise of the University, but to hold individuals accountable for compliance. EH&S should utilize their reporting responsibilities to the Institutional Lab Safety Committee to further not only the discussions on safety issues but to embrace the enforcement role the Committee can provide. The goal is to help principal investigators, and research personnel as a whole, understand that compliance with safety policies is a central element in the research culture at the University.

It is critical that our planning and actions include faculty, staff and administrators responsible for teaching laboratories. We will clarify the roles and expectations of the departmental chemical hygiene officers (DCHOs) and other appropriate departmental and college leadership through operational guidelines issued from the ES&H Office. The enforcement provisions will be made in accord with existing policy. In particular, Section 21 of the current TTU CHP

(<http://www.depts.ttu.edu/ehs/Web/Docs/CHP%2002.19.13.pdf>) identifies roles for personnel in the reporting lines of both the VPR and the PSVPAA in the closure of laboratories and studios.

The VPR and PSVPAA will collaborate to communicate with the faculty member in charge of lab/studio 1) their responsibilities and roles and 2) the roles, responsibilities and authority of EH&S and the ILSC.

VI. Laboratory Safety Observations

VI. A. Training

The Vice President for Research should establish processes to identify and ensure delivery of laboratory safety training. In discussions with the Chairperson of the Institutional Lab Safety Committee, he identified utilizing the laboratory key issuance process to have principal investigators attest that the individual they are approving for laboratory access has received both the University and laboratory specific training. Additionally, EH&S has initiated a review of Human Resource's learning management system to determine if it could be leveraged for tracking the University-wide

MANAGEMENT'S ACTION PLAN (continued)

Detailed Reply to the Lab Safety Draft Audit

training process. We agree with these efforts and encourage their continued exploration and implementation.

Faculty members are responsible for identifying the work to be done in any laboratory or studio facility, including TTU sanctioned operations in the field. In consultation with EH&S, the faculty member in charge of the laboratory / studio is responsible for setting the training requirements for all TTU personnel engaged within the activity. The VPR and Provost will collaborate to assure that faculty new to TTU, and faculty who are beginning a new program of studio or laboratory work, consult with EH&S before opening or substantially modifying a laboratory or studio protocol. In this consultation, EH&S will be asked 1) to assess whether faculty members have the necessary knowledge, training, and infrastructure to lead the proposed work and 2) to assist the faculty member in identifying the training requirements for their staff, students, and collaborators.

It is likely that the expansion of SUMTotal capabilities currently being undertaken by Human Resources and Information Technologies will provide a mechanism to monitor training within the next 6 months. An additional mechanism to ensure faculty and student training may be to require EH&S to certify that a faculty member is prepared and trained before keys are issued to laboratory or studio space; this will require additional EH&S effort in coordination with Facilities Management, and we will explore this possibility.

VI. B. Laboratory Safety Inspections

The Vice President for Research and the Director of Environmental Health and Safety should establish a consistent methodology for conducting laboratory safety inspections. The methodology should consider risk factors and an evaluation of the appropriate timeline for reviewing individual laboratories. EH&S should evaluate its yearly metric and effectively deploy action plans to timely review all laboratories.

As the EH&S Department informed Audit personnel during this project, EH&S is currently in the process of developing a hazard-based survey program. The first steps include the development of Chemical Inventories and Lab/Studio Safety Plans. Because faculty members have been slow to enter their inventories, OVPR has this year committed over \$300K to the Chemical Gateway program, scheduled to run for the next 2 years. ILSC and EH&S have developed high hazard Safe Operating Procedures (SOPs) and templates for the lab/studio safety plans; the resources and collaboration to get these in place are described above. The VPR has tasked current EH&S personnel with developing hazard criteria and an assessment matrix within the Spring, 2014 semester, with a goal of having this ready at the same time that the first safety plans and chemical inventories are available. As a planned first step, EH&S has developed a faculty self-assessment tool that ILSC will ask the VPR and PSVPAA to communicate to faculty before the mid-term break in Spring 2014 semester. To accomplish a more timely review of all laboratories and studios, EH&S needs to increase the frequency of lab/studio surveys.

VI. C. Communication and Corrective Actions

The Vice President for Research should establish the reporting, communication, and follow-up roles of EH&S. In doing so, EH&S should have clear reporting expectations to not only principal investigators but to the Institutional Lab Safety Committee. In serious or consistent violations of safety protocols, EH&S should alert department and/or college management to the concerns noted. Lastly, working in concert with the Institutional Lab Safety Committee, EH&S should continue to refine their process to follow up on violations identified during safety reviews.

The VPR and PSVPAA will work collaboratively to communicate the responsibilities and authority of the EH&S and the ILSC staff to faculty and academic leaders who develop and supervise laboratory and studio space. All noted violations will be considered open items until they are adequately closed-out per

Page 4 of 5

MANAGEMENT'S ACTION PLAN (continued)

Detailed Reply to the Lab Safety Draft Audit

the assessment of ES&H. Arrangements for a more extensive response in situations where repeat violations are encountered have been discussed above, and may include suspension of laboratory operations if such are recommended by the ILSC and approved by the VPR.

Page 5 of 5

BASIS OF TESTING

SCOPE

This audit was conducted in accordance with generally accepted government auditing standards. Those standards require that we plan and perform the audit to obtain sufficient, appropriate evidence to provide a reasonable basis for our findings and conclusions based on our audit objectives. We believe that the evidence obtained provides a reasonable basis for our findings and conclusions based on our audit objectives.

Additionally, this audit was performed in conformance with The Institute of Internal Auditors' International Standards for the Professional Practice of Internal Auditing (Standards). Our audit scope was based on Standard 2120.A1 which states the internal audit activity must evaluate risk exposures relating to the organization's governance, operations, and information systems.

STANDARDS

Texas Tech University Operating Policy 60.01, *University Health and Safety Programs*

Texas Tech University Operating Policy 60.17, *Chemical Hygiene Plan*

Report of the Working Group on Laboratory Safety - July 19, 2010

Lab Safety Program Peer Review report - May 16, 2011

U.S. Chemical Safety and Hazard Investigation Board's incident report - October 19, 2011

Memo to the Texas Tech University Community from Dr. Guy Bailey - October 19, 2011