

**Annual Safety and Health Report
University of Tennessee, Knoxville
FY 2022**

Prepared by:

**Sandra Prior, UTK EHS Director
Environmental Health and Safety**

**THE UNIVERSITY OF TENNESSEE SYSTEM
OUTLINE FOR CY 2022 ANNUAL SAFETY AND HEALTH REPORT**

The University of Tennessee's Safety and Health Plan, approved by the Board of Trustees and registered with TOSHA, requires that each campus or unit submit an annual report on safety and health activities. The purpose of this annual report is to provide an overview of safety and health activities at each campus and unit of the University of Tennessee.

TOPICS FOR REPORT:

1. Program Objectives for CY 2022

The following are the program objectives for the calendar year 2022 and a report on the progress made toward these objectives.

- a. Continue on pace to add additional identified positions to your organizational chart for FY23 year. (carry over from 2021 goals).

We had new vacant positions in the Environmental Health & Safety Department that carried over from CY21. In CY22 we were able to fill 6 exempt and 7 non-exempt positions. The positions that EHS filled were the Program Leader, Fire & Life Safety, Program Leader, Industrial Worker Safety, Program Leader, Environmental Programs, a Communications & Media Specialist, Financial Associate 3, Environmental Compliance Coordinator, Lab Safety Specialist – Chemical, Laboratory Safety Technician – Chemical, Sr. Lab Safety Specialist – Biological, Lab Safety Specialist – Biological, Hazardous Waste Specialist, Supervisor, Industrial Worker Safety, and an Industrial Worker Safety Technician. These 13 hires took place over FY22 and FY23 budget years.

- b. Construct a campus-wide fire drill program to deliver a minimum of 85% of all planned fire drills.
 - i. In the first part of the calendar year, Fire and Life Safety was significantly understrength. The Program Leader was hired in January and the two specialist and technician positions were hired in June and August. In the later part of 2022, we initiated efforts to create a systematic approach to conducting fire drills in a structured and coordinated approach. Multiple customers expressed concern on how fire drills were conducted prior to 1/1/2022 with frequently unannounced drills interrupting classes, exams, and research. We restructured the fire drill process to take into account and FLS team members began in early 2023 having regular conversations with Dr. Bill Dunne and Dr. Larry McKay to prevent a repeat of the negative impacts from the earlier "version" of fire drills.
 - ii. We conducted fire drills for the Office of Sorority and Fraternity Life and the Early Education facility. Student Life/Housing performed the drills at the residence halls. We will attempt to conduct drills in a minimum of 85% of our buildings starting in the new calendar year.

- c. Implement strategic risk reduction principles to reduce safety risks and environmental vulnerabilities.
 - i. Strategic risk reduction principles are designed to mitigate various risks by identifying root causes and providing a framework for action. A risk management strategy encompasses all activities designed to control the likelihood of risk leading to a 'Top Level Event', as well as mitigating the severity of consequences if a "Top Level Event" occurs. UTK EHS risk reduction strategy follows a few core principles and associated sustainable 2022 actions that took place:
 - o Identify risks and their root causes to gain complete visibility.
 - o Actioned through various methods in 2022 including expansion of our lab and campus safety reviews (audits)
 - o Review / audit follow-up and mitigation tracking
 - o Data analysis of prior years to establish baseline metrics.
 - ii. Assess each risk for probability, severity, and potential impact to help prioritize responses.
 - o In 2022, the EHS department began incorporating the LSS risk-matrix for prioritizing work of all EHS Programs across campus.
 - iii. Determine the best approach for managing a reasoned and actionable response.
 - o In 2022, EHS developed a closer working relationship with Facility Services and other campus partners.
 - o Began nurturing relationships with external agencies to ensure effective and efficient responses to Top Level events.
 - iv. Track progress against plans to ensure that teams stay on track and risk reduction strategies are effectively executed.
 - v. Monitor, review, and revise, to ensure Continuous Improvement
 - o The recurring Strategy Development process begins each year by assessing current systemic maturity and determining where to focus on the upcoming year to achieve the most impact.
- d. Sustain/improve lab safety review and findings mitigation process, with emphasis on LS-CHP completion, chemical inventory management, and hazardous waste management.
 - i. Preserving the collaborative communication, inspection checklist, findings follow-up, and escalation procedures established in 2021 (and codified in LS-002) to ensure expectation/process continuity.
 - ii. LS-CHPs were audited during the inspection process to ensure that critical sections were understood and completed as required, including the lab hazard profile, PHS SOPs, PPE assessment/assurance, site-specific training, and spill containment procedure. Incomplete LS-CHPs were noted as a 'minor finding.' When necessary, LSS staff assisted with training the PI/staff on LS-CHP requirements and providing supporting resources. If the LS-CHP was not completed in the indicated timeframe, the minor finding was escalated as indicated in LS-002. This resulted in a 98% completion rate within the calendar year (up from ~30-40% in 2019 when LSS was formed).
 - iii. Chemical inventory dates were checked and the inventories qualitatively assessed* prior to the lab safety review. If a lab's

inventory was outdated or noticeably (i.e. obviously) inaccurate, this was noted as a 'minor finding' and escalated until resolved as indicated. Sixty-five (65) outdated chemical inventories were updated, with a closure rate of 100%. *Note: The submitted/updated inventories submitted by the lab were regarded as accurate. LSS does not currently have the capacity to systematically conduct comprehensive QA/QC audits of chemical inventories.

- iv. Hazardous waste management:
 - a) Chemical waste management checks were conducted during routine lab safety reviews including labeling, storage, compatibility, containment, signage, and training.
 - b) Additionally, a secondary mechanism was established to conduct periodic, unannounced checks of chemical waste management (in response to TDEC citations). For this, a standalone 'hazwaste' inspection checklist was established in iAuditor (checklist as described in a) above). Both LSS and ENV were able to access and use this checklist. Any findings were formally noted and communicated to the PI. Follow-ups and escalation were conducted as described in LS-002.

In combination, these two approaches accounted for > 100 findings to be communicated, corrected, and closed in 2022. Additionally, the approach described in b) was carried into 2023 (POC is Billy Garner) and has led to a continued reduction in findings/findings frequency.

- e. Provide technical support to the Zeanah Engineering Complex:
 - i. Developing safety programs and acquiring state permits for two neutron generators and linear accelerator in Zeanah Engineering Building. Two of the devices will be installed and desired operational in Spring 2022. The second neutron generator will be acquired and installed during fall 2022.
 - ii. In 2022, EH&S-Radiation Safety submitted and received conditional approval from the state for operation of three neutron generators, a linear accelerator, and an industrial radiography x-ray source for use in the Zeanah Engineering Building. Those permits were not fully issued due to the delay in construction completion in the radiological shielded facility in Zeanah Engineering Complex. We supported the development of safety procedures for the safe use of radioactive sources related to research on radiation detector development and radiochemistry for researchers in the building. We assisted faculty in the design and construction of a shielded enclosure for an x-ray generating device and supported the move of academic teaching laboratory activities into the building.

With the delays related to construction completion in that building, the objective is carried over to 2023.

2. Other Significant Accomplishments

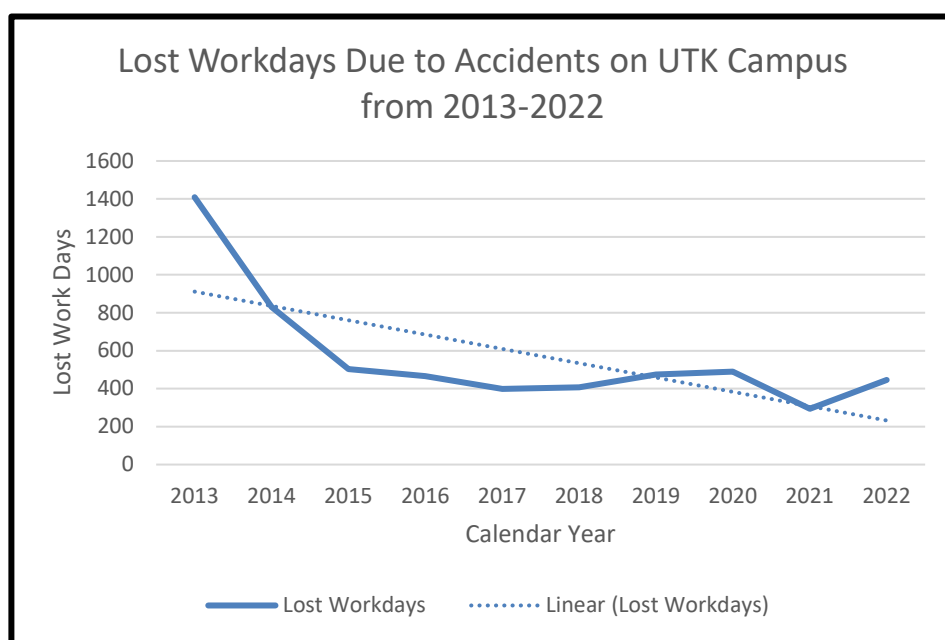
- a. Provide any other significant accomplishments by the safety program.
 - i. Revamped incident investigation processes
 - ii. Re-engaged alignment efforts with SORM to review all significant injuries and events on campus (near misses, etc.)

- iii. Began monthly reconciliation of OSHA 300-log which resulted in approximately a 30% reduction of named incidents.
 - iv. Began engaging Knoxville and Knox County agencies for a more collaborative working relationship.
- b. Provided below is a summary of UTK hazardous waste disposed in CY 2022:
- i. The university is comprised of five hazardous waste locations, each with its own EPA identification number. These locations are:
 - i. Main Campus – designated as a Large Quantity Generator of hazardous waste and a Small Quantity Handler of Universal Waste.
 - ii. Facilities Services – designated as a Very Small Quantity Generator and a Small Quantity Handler of Universal Waste. There was no waste disposed in 2022.
 - iii. Institute for Advanced Materials & Manufacturing
 - iv. IAMM) – designated as a Large Quantity Generator (LQG) and a Small Quantity Handler of Universal Waste. They will continue to be an LQG going forward. The total amount of hazardous waste disposed in 2022 was 5,328 lbs.
 - v. Graduate School of Medicine – re-designated as a Small Quantity Generator due to generation of P-Listed waste year to year and Small Quantity Handler of Universal Waste. The total amount of waste disposed in 2022 was 640 lbs.
 - vi. Graphic Arts – designated as a Very Small Quantity Generator and a Small Quantity Handler of Universal Waste. There was no waste disposed in 2022.
 - ii. The total amount of hazardous waste shipped from the main campus in CY2022 was 45,042 which is an increase of 2,690 LBS or 6.351%.
 - iii. The increases in hazardous waste were in the waste category of lab packs. The significant rise in lab packs was due to the volume of old chemistry labs that have started to purge the old chemical inventories as different PI's have retired.

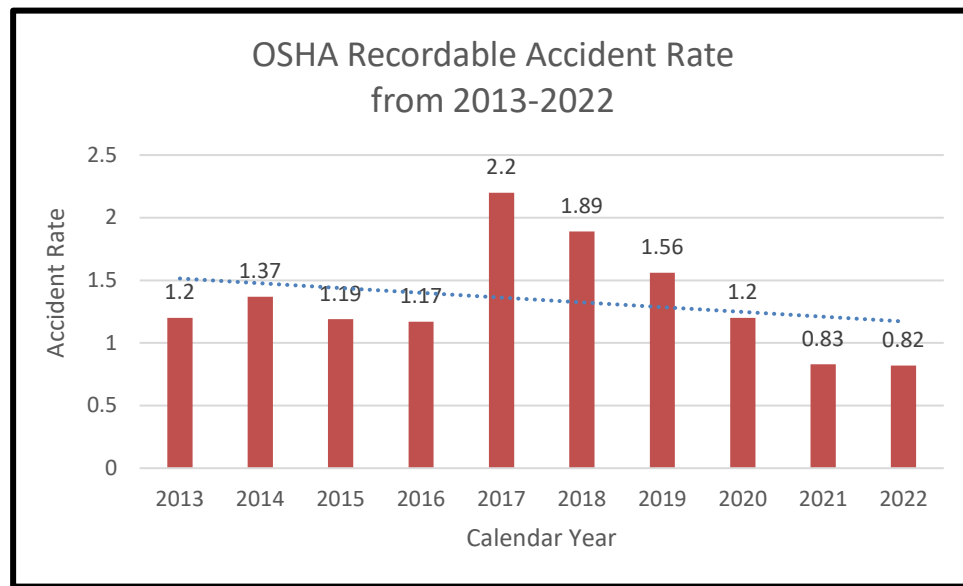
1. Accident/Incident Rate Analysis

Analyze accident/incident severity rates and/or numbers and compare with previous years.

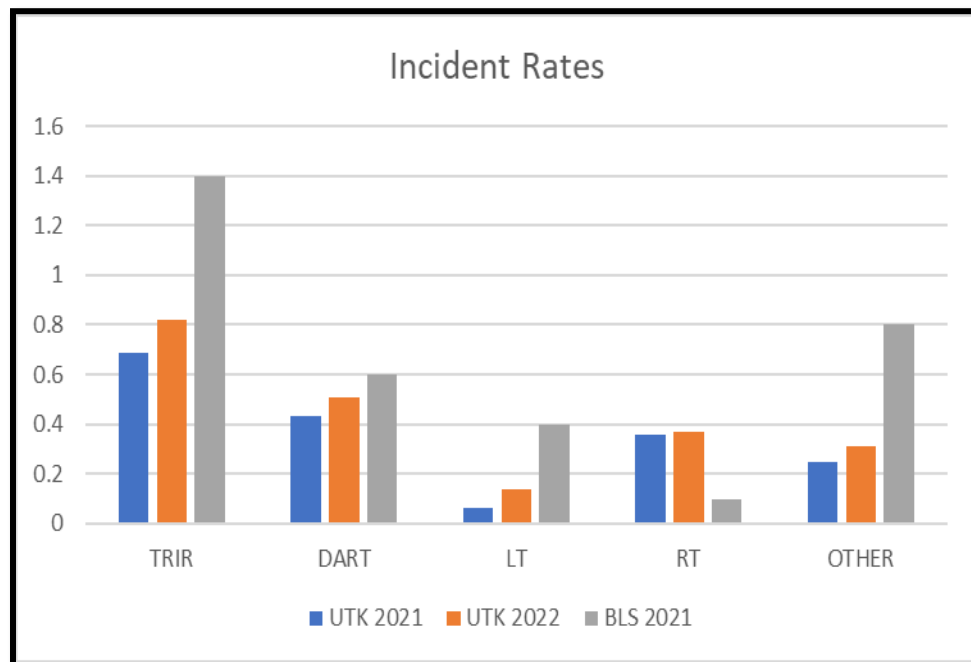
The chart below illustrates the number of lost workdays due to on-the-job accidents over the past 10 years. Calendar year 2022 had an increase in lost workdays since 2021, from 294 to 446, resulting in a 34% increase. This may be attributable to effects of the second year of COVID-19 post-pandemic recovery in which many employees were returning to work on campus and campus activities and research were increasing. The university also experienced an increase in restricted days from 880 restricted workdays in 2021 to 1338 in 2022. Overall, the university continues trending downward for lost workdays over the past 10 years.



The chart below illustrates the trend in OSHA recordable accidents per 100 employees for the Knoxville campus. The University of Tennessee Knoxville had an incident rate of 0.82 for calendar year 2022, which is approximately consistent with the 2021 incident rate of 0.83. We calculate the rate by multiplying the 64 OSHA recordable accidents by 200,000 and dividing by the 15,661,382 hours worked in 2022. The Bureau of Labor Statistics reports that the average incident rate for educational facilities is 1.9. Overall, the university is trending slightly downward for lost workdays over the past 10 years despite a spike in the rate in 2017.



Incidence Rates for 2021 and 2022 with peer comparison to BLS 2021 stats for NAICS 6113 Colleges, Universities and Professional Schools



2. **Significant Accidents and Incidents**

- a. Fire in South Carrick Hall on 7/8/2022. An unknown electrical failure occurred in Trash Chute room 711 in S Carrick causing a single fire sprinkler head to activate and controlled the fire. While there were attendees from a summer camp in the building, there were no injuries. Student Housing relocated occupants of

the building while the electrical system was de-energized; the system remained out of service with extensive repair work occurring until UTK students arrived on campus for move-in day(s) in early August. The cause was determined to be electrical originating in the 7th Floor Electrical Room.

- b. On 07/28/2022, an employee entered a trench via ladder and used a sledgehammer to widen an opening in a concrete vertical pipe so that another pipe could fit inside of it. After removing an area of the opening, the employee exited the trench via ladder and went and stood beside the work truck. Subsequently, the employee got into the work truck and shut the door with the air conditioning on. He was found unresponsive approximately 20 minutes later by his co-worker. The fatality was determined to be no work related however it spurred an uptick in Heat-Safety Awareness throughout Facilities Services.
- c. A work-related injury occurred at Alumni Memorial on the ground floor where an employee was cleaning the exterior side of a glass exit door. The employee stepped backwards to assess the cleaning task and fell from the ledge of a step and fell to the concrete. The fall resulted in a fractured hip.
- d. Needlestick injuries with exposure to *Toxoplasma gondii* (#105). This one was notable as two people experienced needlesticks doing the same procedure and post-exposure treatment and monitoring was very expensive (\$10K/individual).
 - i. **Summary:** Veterinary students were bleeding mallard ducks that had been infected with *Toxoplasma gondii* protozoa in JRTU. The first incident occurred when the needle was in the wing vein and the blood draw had begun. Soon after the draw began, the duck flapped its wing and the needle slipped out of the vein. In an attempt to place the needle back in the vein, the non-dominant hand was in the line of fire and a needlestick occurred. The second incident occurred soon thereafter under the same conditions and with the same outcome. There may have been an element of distraction in the second incident due to the concern over the well-being of the first injured student.
 - ii. **CAPA:** 1) Develop a process that will increase awareness of risks to foster mindful placement of the needle and the non-dominant hand. Emphasize the hazards of rushing, complacency, fatigue, and distraction. 2) Implement a restraint system for birds ("bird burrito" technique or chemical restraint). 3) Develop a system of communication that warns females of childbearing age that work with *Toxoplasma gondii* is an increased risk during pregnancy. 4) Improve lighting in procedure room.
- e. IAMM flooding of ground-second floor lobbies caused by a dislodged tubing running water from the house manifold to a piece of equipment located in IAMM 251 (#107). This one was

notable in the scale of the mess (not sure the size of the insurance claim, if any).

- i. **Summary:** An instrument (molecular beam epitaxy) that was connected to building chill water leaked causing a flood in Rm 251. The water then flooded the 2nd floor lobby area and cascaded down to the first-floor lobby area and ground floor lobby area. Facilities Services was on site to vacuum the water and provide remediation support for the water clean-up.*
 - ii. **CAPA:** The instrument is on the house chiller loop by way of a manifold (required for constant cooling). Hose clamps and threaded connections were recommended.*
- f. Splash of 5M sodium hydroxide to the eye with follow-up to emergency room (#148; report attached as incident log summary does not include details).*

 - i. **Summary:** CEE student was shaking a prepared solution of 5M sodium hydroxide to mix. The top of the volumetric flask was only covered with Para-film, which broke resulting in a splash to the student's face and eyes. The student (wearing only safety glasses) immediately flushed her eyes and rinsed off in the safety shower for 5 minutes. She reported to the emergency room to address eye stinging.*
 - ii. **CAPA:** 1) Modify and document a procedure for proper preparation and mixing of solution (not shaking with Para-film). Train all lab personnel on the procedure. 2) Provide appropriate tools for mixing (beakers, stir bars, mixing plates, etc.). 3) De-clutter lab benches and fume hoods, which may have indirectly contributed to the circumstances. 4) Wear indirectly-vented chemical splash goggles when handling/preparing volumes of corrosive/injurious chemicals that have the potential to splash/spray.*
- g. Chemistry graduate student was exposed to benzyl mercaptan, causing respiratory distress and follow-up to the emergency room (#175).*

 - i. **Summary:** Graduate student was working with benzyl mercaptan. The student indicated that she was working within the chemical fume hood with the sash closed to lowest possible level, but she could still smell it outside of the hood. The student later developed lung/chest pain and sought medical attention. The student was diagnosed with chest wall inflammation and treated at the ER.*
 - ii. **CAPA:** A follow-up investigation by EHS LSS indicated that the chemical was properly contained and that the fume hood was working appropriately. The student indicated the chemical was not being heated, though turbulence caused by procedural manipulations may have*

played a role in detecting the chemical outside the hood and the possible exposure. EHS collected the remainder of the benzyl mercaptan and disposed of as hazwaste.

3. **Problems Relating to Safety and Health**

None other than those noted during the annual inspection.

4. **Annual Safety and Health Review Findings**

a. **TOSHA Inspection:** On February 17, 2022, TOSHA compliance officer John Houghton conducted a monitoring visit of our university to evaluate and discuss the status of our occupational safety and health program. The following locations were inspected during the visit: 1) Facilities Services; and 2) Tickle Engineering Building. We received two Notice of Violations:

- i. On 02/17/22, the inspector noted an extension cord in use that was located in the Facilities Service's building as a means of permanent wiring to energize a scale for weighing materials. On March 1, 2022, properly wired permanent wiring was added at the location in question. Additionally, Managers, Supervisors and Foremen have been trained to recognize the hazard to prevent recurrence.
- ii. On 2/17/22, the employer had not labeled a plastic squirt bottle containing a white liquid with the product contents, along with information (i.e. pictograms or other acceptable workplace label) regarding the hazards of the chemical. The squirt bottle was located in the material testing area of the building. The issue was corrected on March 7, 2021. Additionally, all labs were swept for unlabeled bottles. Additional labeling materials and pictogram labels were placed in all work zones. The process for labeling all materials is part of the current required training for this space. The hazard/ requirement has been reiterated to all users and lab owners.

b. Hazardous Waste Inspection (2022) Closeout:

On April 12, 2022, the Division of Solid Waste Management (DSWM) conducted a hazardous waste follow-up inspection at the University of Tennessee (UT). The inspection was conducted to evaluate UT regarding compliance with the July 22, September 14, and December 9, 2021, notices of violation (NOVs). All remaining findings were closed and the university received a letter acknowledging its return to compliance. On June 24, 2022, the university received a settlement letter and consent order for the payment of TDEC incurred damages (costs) of \$4,581.40. In addition, TDEC assessed a civil penalty of \$12,170.00 pursuant to the schedule of fines contained in the Act and the rules promulgated under the Act. The fines were distributed to the various departments where the

violations occurred for payment. The breakdown of the fines paid by department were:

BCMB		5		\$1,373.07
CBE		3		\$823.84
Chemistry		15		\$4,119.20
EEB		2		\$549.23
EHS		1		\$274.61
EEB/ANTH		1		\$274.61
Facility Services		12		\$3,295.36
Microbiology		21		\$5,766.88
Sustainability		1		\$274.61

5. **Additional Safety Program Information**

Audit No. A21015, Laboratory Safety. The UTSA Audit and Compliance Office performed an audit in June 2022, of our laboratory safety services. The audit indicated that management has designed and implemented controls that are often effective at maintaining laboratory safety. The auditor made several recommendations in the areas of training and chemical inventories that included:

- a. Principal investigators do not have access to the student training records retained in the CANVAS system to use as a means of monitoring completion. In one laboratory, 2 out of 11 students did not take the required safety training prior to using the facility.

In the absence of a university-sponsored Learning Management System, EHS provided instructions to faculty, staff and students on several methods available to receive training: [Training | Environmental Health & Safety \(utk.edu\)](#). It is the responsibility of the PI to ensure students provide proof of training prior to being given access/permission to use a facility.

- b. In four out of five laboratories tested, there were two or more discrepancies in the chemical inventory.

This item will be addressed in 2023 with the implementation of a chemical inventory software from SafeyStratus.

6. **Program Objectives for FY 2023**

- a. Continue on pace to add additional identified positions to our organizational chart for FY23 year. (carry over from 2021 goals).
- b. Integrate SafetyStratus across campus in accordance with the implementation plan.
- c. Update the EHS Manual procedures and guidelines based upon the 2022 gap analysis results. Align updates with the UTSA policy and procedures protocol.
- d. Work towards an 85% completion of fire drills across campus.