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Laboratory Safety

Internal Audit Report No. I2020-106

July 31, 2020

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UNIVERSITY OF CALIFORNIA, IRVINE

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INTERNAL AUDIT SERVICES
IRVINE, CALIFORNIA 92697-3625

July 31, 2020

JOHN STERRITT
EXECUTIVE DIRECTOR
ENVIRONMENTAL HEALTH & SAFETY

Re: Laboratory Safety Audit
Audit No. I2020-106

Internal Audit Services has completed the internal audit of Laboratory Safety and the final report is attached.

We extend our gratitude and appreciation to all personnel with whom we had contact while conducting our review. If you have any questions or require additional assistance, please do not hesitate to contact me.

Mike Bathke

Mike Bathke
Director
UC Irvine Internal Audit Services

Attachment

C: Audit Committee
Sandra Conrrad, Assistant Director – Environmental Health & Safety
Hal Stern, Interim Provost and Executive Vice Chancellor
Karl Wolonsky, Associate Vice Chancellor– Environmental and Facilities Services

I. MANAGEMENT SUMMARY

In accordance with the fiscal year (FY) 2019-20 audit plan, Internal Audit Services (IAS) performed an audit of laboratory safety – hazardous material handling. Specifically, IAS reviewed the areas of hazardous chemical inventory management, research laboratory inspections, follow-up and escalation of laboratory deficiencies, online laboratory safety training for new hires and continuing employees, and the UCI Chemical Hygiene Plan (CHP) documentation review and maintenance. All of these processes are in need of improvement. The following opportunities were noted.

Hazardous Chemical Inventory Management – The CHP requires that each research lab maintain a current inventory of stored chemicals, which must be updated at least annually. A majority of UCI Principal Investigators (PIs) are not verifying their stored chemicals and/or not updating their chemical inventory records. This failure to follow procedure increases the risk for human injury and property damage when the next catastrophic lab incident occurs. This concern is discussed in section V.1.

Research Laboratory Inspections – Although the current CHP requires that PIs and lab supervisors perform periodic self-inspections of their labs, self-inspections have not been performed for the past five years. The UCI Environmental Health and Safety department (EH&S) is the sole provider of lab inspections at UCI. Additionally, in the past three years, EH&S lab inspection cycle times have increased from a two-year cycle average to three-plus years. A survey of other UC campuses indicate shorter lab inspection cycles. This observation is discussed in section V.2.

Follow-up and Escalation of Laboratory Deficiencies – The California Division of Occupational Safety and Health (Cal/OSHA) regulations require that laboratory inspections include methods for correcting unsafe conditions in a timely manner. The CHP identifies two categories of deficiencies that may result from lab inspections and includes well-defined timelines within which deficiencies must be corrected. However, EH&S is not consistently complying with CHP requirements. In addition, the CHP is silent with regard to escalation of unresolved lab deficiencies. This observation is discussed in section V.3.

Safety Training for New Research Laboratory Employees – Online research lab safety training for new hires is frequently non-compliant with Cal/OSHA regulations, UC policy, and/or the CHP. Furthermore, contingency plans and back-up systems have not been developed as key countermeasures should the UC Learning Center (UCLC)/Safety Training Self-Assessment (STSA) systems malfunction again in the future. In addition, current EH&S interventions are untimely in detecting lab employees with insufficient lab safety training. This observation is discussed in section V.4.

Safety Training for Continuing Research Laboratory Employees – Online safety refresher training for continuing research lab employees is frequently non-compliant with UC policy. Furthermore, current EH&S interventions have not been successful in detecting continuing lab employees who have not completed the STSA and/or Laboratory Safety Fundamentals (LSF) refresher training. Finally, there are two categories of lab personnel, "WOS" personnel and PI/other retirees, who are not consistently assigned to the STSA, and/or do not complete LSF training, even though they work in research labs in some capacity. This observation is discussed in section V.5.

CHP Documentation Review and Maintenance – Contrary to Cal/OSHA regulations, the CHP is not updated annually. When litigation occurs as a result of an incident at UCI involving hazardous chemicals, the University may be at greater risk for penalties and other sanctions resulting from laboratory practices that are inconsistent with the CHP. This observation is discussed in section V.6.

II. BACKGROUND

The storage, handling, and use of hazardous chemicals in University research poses a high level of risk to the University of California and to UC faculty, staff, and students.

Currently, there are approximately 800 active laboratories located on the UCI campus. Approximately 450 of these laboratories use, handle, and/or store hazardous chemicals for research purposes. The Cal/OSHA Workplace Injury and Illness Prevention Program (IIPP), better known at UCI as the "Safety-on-Site" (SOS) program, includes procedures for identifying and evaluating workplace hazards. In addition, the CHP (an EH&S document required by Cal/OSHA)

includes procedures and practices for lab safety that are aligned with Cal/OSHA regulations, UC/UCI policies, and/or best safety practices.

At UCI, the EH&S mission is to provide reliable, innovative, and proactive services to the campus community. EH&S's goal is to work with campus faculty, staff, and students to integrate safety into the culture of the UCI community while supporting academic and research excellence.

III. PURPOSE, SCOPE, AND OBJECTIVES

The purpose of the audit was to verify that adequate internal controls are in place to assure the safety of UCI research laboratory personnel who use, handle, and/or store hazardous chemicals, and to assure the protection of laboratories, equipment, and other facilities used in UCI research. A second purpose was to assess PI, laboratory personnel, and EH&S compliance with Cal/OSHA regulations, applicable UC/UCI policies and procedures (including the CHP), other applicable regulations, and/or best practices.

The audit scope included FY 2019-20 (and prior fiscal years, as needed) laboratory inspections, laboratory deficiency status reporting, research laboratory employee (new hire and continuing employee) online safety training, and hazardous chemical inventory management processes.

The following audit objectives were included in the review.

1. **Hazardous Chemical Inventory Management and Reporting** – Verify that PIs validate their stored chemicals and update their chemical inventory balances at least annually, in accordance with the CHP. Verify that inventory data stored in the CiBR-Trac inventory management system is accurate and up-to-date. Verify that EH&S monitors identified campus locations that have sufficient hazardous material storage capacity to potentially meet or exceed defined Threshold Planning Quantities (TPQs). Verify that annually (by March 1st), EH&S reports maximum amounts of hazardous materials stored at these identified campus locations through the California Environmental Reporting System (CERS) to the Orange County Environmental Health division (OCEHD). OCEHD is the CalEPA-designated California Unified Program Agency (CUPA) for Orange County.

2. **Laboratory Inspections** - Verify that inspections for research laboratories that use, handle, and/or store hazardous chemicals are completed in a timely manner in comparison to other UC campuses, and in accordance with Cal/OSHA regulations, UC/UCI policies, and/or best practices.

3. **Follow-up and Escalation of Laboratory Deficiencies** – Verify that EH&S has processes in place for monitoring and following up on noted critical and non-critical laboratory deficiencies. Verify that critical deficiencies are corrected within 48 hours, and non-critical deficiencies are corrected within 30 days, as required by the CHP. Verify that, within 45 days of a noted deficiency, the school/department coordinator for laboratories that fail to correct deficiencies within the required timeframe completes a follow-up. Verify that, as a best practice, an escalation process is in place whereby uncorrected deficiencies are reported to senior level administrators for corrective action.

4. **Safety Training for New Research Laboratory Employees** – Verify that research laboratory new hires have completed the online STSA and the online Laboratory Safety Fundamentals course (LSF) in compliance with Cal/OSHA regulations, UC policy, and the CHP. Verify that training requirements are completed by new hires in a timely manner: UC policy and the CHP require that lab personnel complete required training before they are granted unescorted lab access. Verify that EH&S interventions are adequate to detect new hires working in research labs without required lab safety training.

5. **Safety Training for Continuing Research Laboratory Employees** – Verify that continuing employees in research laboratories are current with online LSF refresher safety training. Verify that continuing employees are completing LSF refresher safety training cycles in a timely manner (every three years), as required by UC policy. Verify that EH&S interventions are adequate to detect continuing employees working in research labs without required LSF refresher safety training. Determine the special categories of lab personnel who are not assigned to LSF training.

6. **CHP Documentation Review and Maintenance** – Verify that the CHP is evaluated at least annually and updated as necessary in accordance with Cal/OSHA regulations.

IV. CONCLUSION

EH&S currently monitors all campus locations with sufficient hazardous material storage capacity to potentially meet or exceed defined TPQs. In addition, prior to the March 1, 2020 deadline, EH&S successfully completed annual reporting of hazardous material amounts for 51 campus locations to the OCEHD, no exceptions were noted.

Opportunities exist to improve certain aspects of EH&S chemical inventory management, research laboratory inspections, follow-up/escalation of laboratory deficiencies, online laboratory safety training for new hires and continuing employees, and review/maintenance of the CHP.

Improvement is necessary to comply with Cal/OSHA regulations, UC/UCI policies, and/or best practices.

With regard to the scope of the audit, it is important to note that the review of laboratory safety training for new hires and continuing employees was limited to online training only. Onsite laboratory safety training is also an important part of safety training for UCI research lab employees. However, this component of lab safety training was not included in the audit scope due to difficulties in accessing onsite training records located in each research lab.

Observation details were discussed with management, who formulated action plans to address the issues. These details are presented below.

V. OBSERVATIONS AND MANAGEMENT ACTION PLANS

1. Hazardous Chemical Inventory Management

Background

The CHP states that "Each laboratory group is required to maintain a current chemical inventory that lists the chemicals and compressed gases used and stored in the labs and the quantity of these chemicals. Specific storage locations must be kept as part of the inventory list to ensure that they can be easily located. Chemical inventories are used to ensure compliance with

storage limits and fire regulations and can be used in an emergency to identify potential hazards for emergency response operations." [PIs need to] "inventory the materials in [their] laboratory frequently (at least annually)."

Currently, three chemical inventory systems are in use at UC Irvine: CiBR-Trac, ChemInnovation, and UC Chemicals. CiBR-Trac is the most widely used inventory system. ChemInnovation is a chemical and biological information system that is used exclusively by the UCI Chemistry department. Inventory information is uploaded every week into CiBR-Trac. As a result, CiBR-Trac contains almost all of the inventory balances for hazardous chemicals stored at UCI. Finally, UC Chemicals is a new, web-based inventory system developed by the University of California. UC Chemicals utilizes 2-D barcodes to record physical inventory; there are approximately 40 UCI labs currently using this inventory system.

UCI research labs may have multiple locations where chemicals are stored. When a chemical inventory balance is updated for an inventory location, CiBR-Trac records the name of the person responsible for the inventory update (generally the lab's PI) and the date of the inventory update. Additionally, information pertaining to previous inventory updates is overwritten. As a result, CiBR-Trac only retains the most recent inventory balance update.

Observation

Audit testwork for hazardous chemical inventory management involved a review of the CiBR-Trac database contents as of March 2020. Audit procedures were designed to verify how often PIs update their chemical inventory balances in CiBR-Trac, and whether or not inventory updates occur annually, as required by the CHP.

The recorded dates in CiBR-Trac for all inventory balance updates were extracted and sorted by calendar year. A comparison was then made, by calendar year, of the inventory locations that actually had updated inventory balances in CiBR-Trac to the inventory locations that were required to have annual inventory balance updates (estimated at 450). If inventory balances at all inventory locations are being updated annually, the comparison results should demonstrate that all 450 inventory updates were recorded in CiBR-Trac during CY 2019. The following test results were obtained.

CY	# Updated Inventories		CY	# Updated Inventories
2019	121		2011	22
2018	156		2010	6
2017	83		2009	5
2016	108		2008	4
2015	39		2007	6
2014	45		2006	2
2013	15		2005	3
2012	23		2004	2

The test results indicate that chemical inventory balances for most inventory locations are not updated annually. Actual CY 2019 inventory updates (121) did not come close to matching the number of required inventory updates. Although a small number of UCI inventory locations do not need to update their chemical inventories annually because the balances do not change (chlorine inventory balances at the Anteater Recreation Center, for example), these locations are the exception rather than the rule.

Additional audit testwork disclosed that data stored in CiBR-Trac is not always accurate. EH&S is encouraged to carefully review all inventory information recorded in CiBR-Trac to determine whether or not it is accurate.

Failure by UCI PI/labs to update their chemical inventory balances at least annually is non-compliant with the CHP and with best safety practices.

Management Action Plan

1. By January 31, 2021, EH&S will develop and implement a marketing and communication campaign to better communicate existing Cal/OSHA and UCI policies regarding annual updates to the laboratory chemical inventory.

2. By September 30, 2020, EH&S will incorporate a review of the current chemical inventory (and annual review completion) into the updated laboratory inspection process.

3. By December 30, 2020, EH&S will develop and submit a comprehensive plan to implement the UC Chemicals Program Campus-wide to the Vice Chancellor of Research.

4. By January 31, 2021, once the comprehensive UC Chemicals implementation plan is approved, EH&S will begin the first phase of the approved UC Chemicals Implementation plan.

2. Research Laboratory Inspections

Background

Cal/OSHA CCR Title 8, Section 3203 requires California employers to implement an effective workplace IIPP that addresses hazards in workplaces covered by the program. Section 3203 (a) (4) requires that procedures exist "for identifying and evaluating work place hazards, including scheduled periodic inspections to identify unsafe conditions and work practices."

In collaboration with Cal/OSHA requirements, the current CHP states that PIs and laboratory supervisors need to conduct lab self-inspections. EH&S is required to conduct periodic, formal inspections of labs with hazardous chemicals to ensure that the labs are operating in a safe manner and are compliant with Cal/OSHA regulations, UC/UCI policies, and/or best practices.

Observation

Laboratory Self-Inspections

Discussions with EH&S management regarding the current status of UCI lab self-inspections disclosed that self-inspections have not been conducted for approximately five years, contrary to CHP requirements. Lab self-inspections were ended by EH&S due to PI/lab supervisor unwillingness to complete them. EH&S management indicated that many PIs believe that lab inspections are the sole responsibility of EH&S. Furthermore, PIs/lab supervisors assert that other safety measures are performed in their labs (Standard Operating Procedures

[SOP} development and hazardous chemical assessments, for example) that are time-efficient and potentially more effective than laboratory self-inspections. As a result, EH&S currently performs all lab inspections.

Failure to perform and document periodic lab self-inspections is non-compliant with the CHP and substantially weakens preventive control measures for laboratory safety. Furthermore, Cal/OSHA CCR Title 8, Section 5191, Appendix A, Part D.4(b) recommends, but does not mandate, that formal housekeeping and chemical hygiene inspections be held at least quarterly for units that have frequent personnel changes, and semi-annually for units with less frequent employee turnover.

EH&S Laboratory Inspections

Audit testwork for EH&S lab inspection practices involved a random sample review of seventeen laboratories dispersed among the UCI Schools of Biological Sciences, Physical Sciences, Engineering, and School of Medicine (SOM). Audit procedures were designed to determine the frequency with which UCI labs were inspected over the past three-plus years (i.e., a review of the lab inspection cycle). Testwork revealed the following results.

Time Gap Between Inspections:	Count	Percentage
Approximately 2.0 years	4	24%
Approximately 2.5 years	5	29%
3.0+ years	8	47%

Audit testwork also revealed that six of the sampled labs had been recently inspected in CY 2019. All six labs fell in the "~3.0+ years" category for inspection cycles, indicating an approximate one-year increase in cycle time, relative to CY 2017 lab inspection cycles. In addition, EH&S management has stated that all new UCI labs are now assigned to an automatic three-year inspection cycle.

Failure to perform and document periodic lab self-inspections is non-compliant with the UCI CHP and CALOSHA requirements.

In addition, although Cal/OSHA regulations and the CHP only require

periodic lab inspections, a survey of other UC campuses' lab inspection cycles indicated that, comparatively, the UCI lab inspection cycles is not in alignment with other UC campus locations, which conduct structured laboratory safety inspections annually (or more frequently). While EH&S does perform mid-cycle reviews of labs between inspections, the reviews are less formal and are not documented. Documentation of lab inspections is required by Cal/OSHA regulations. EH&S should consider collaborating with other UC campuses to create best practices and develop methods to lessen the time gaps between lab inspections.

Management Action Plan

1. By December 30, 2020, EH&S will develop a communication and marketing campaign to communicate the CHP annual laboratory self-inspection requirement for campus researchers.

2. By December 30, 2020, EH&S staff will update the self-inspection reference guide and inspection checklist and create an on-line training tutorial to assist research staff in conducting the annual self-inspection.

3. By December 30, 2020, EH&S will review inspections records to ensure current inspections adhere to existing inspection frequency requirements, lab inspection that are over 3-years old.

4. By October 1, 2020, EH&S will develop and implement a program to reduce the time between EH&S inspections which will bring UCI to the established inspection frequency of the other UC locations.

5. By December 30, 2020, EH&S will develop and implement an internal laboratory inspection quality assurance process to conduct quarterly assessments of the inspection program and generate reports to EH&S Executive Director, the Laboratory Safety Committee, and the Provost.

3. Follow-up and Escalation of Laboratory Deficiencies

Background

Cal/OSHA CCR Title 8, Section 3203(a)(4)(C)(6) states that, "[Inspections shall] include methods and/or procedures for correcting unsafe or unhealthy conditions, work practices and work procedures in a timely manner based on the severity of the hazard."

In defining lab deficiencies, the CHP identifies two categories of deficiencies that may result from lab inspections: critical and non-critical. . Critical deficiencies have the potential to lead to serious incidents or affect the state of an emergency, and must be resolved within 48 hours of written notification. Conversely, non-critical deficiencies are a safety concern, but do not necessarily pose a risk of imminent danger. Non-critical deficiencies must be corrected within 30 days. Failure to resolve deficiencies within this timeframe will result in a 45-day follow-up by the EH&S inspector. If needed, subsequent follow-ups are delegated to the department coordinator.

Escalation processes for uncorrected lab deficiencies are also a key component in laboratory safety quality assurance. Currently, the CHP is silent with regard to escalation processes. However, EH&S can escalate persistent, uncorrected deficiencies to the PI's department chairperson or to the Dean. However, this option is rarely utilized by EH&S due to concerns for repercussion.

Observation

Audit testwork involved two tests designed to verify whether EH&S follow-up and escalation processes for lab deficiencies are compliant with Cal/OSHA regulations, the CHP, and/or applicable UC/UCI policies.

Test #1: Follow-up and Escalation of Non-Critical Deficiencies

A random sample of 17 labs that had one or more EH&S laboratory inspections between FYs 2016 and 2019 was selected for review. Lab inspection reports for the sampled labs documented 56 lab deficiencies in total. An EH&S "Lab Safety Survey Findings and Status Update" report was obtained for each sampled lab inspection. With these status update reports, a review was

completed of the current status for all 56 deficiencies. The following results were obtained.

1. As of the audit date, seven of the 17 sampled labs (41%) still had one or more open and uncorrected deficiencies.

2. In addition, 17 of the 56 deficiencies (30%) noted for all 17 sampled labs had not been corrected. The average age of the 17 uncorrected deficiencies was 18 months. In particular, four of the oldest deficiencies had an average age of 2 years, 9 months.

   a. Of note, four uncorrected deficiencies resulted from PI failure to make required corrections after EH&S intervention. Two deficiencies resulted from gas cabinets that EH&S had failed to inspect. Reasons for nine uncorrected deficiencies could not be determined.

   b. EH&S did not escalate any of the stale, uncorrected deficiencies to higher levels of academic or administrative management.

3. A review of the 30-day and 45-day follow-ups for the 17 uncorrected lab deficiencies disclosed the following results.

Timely Completion of Follow-ups	# of 30-day follow-ups	%	# of 45-day follow-ups	%	# of 30-day & 45-day follow-ups	%
Yes	10	59%	4	24%	14	41%
No	7	41%	11**	65%	18**	53%
N/A*	-	-	2	11%	2	6%
Total	**17**	**100%**	**17**	**100%**	**34**	**100%**

*Deficiencies were completed at the first 30-day follow-up visit
**Five follow-ups were likely to have been completed but not documented

Test #2: Follow-up and Escalation of Critical Deficiencies

A list of open and uncorrected critical deficiencies discovered in EH&S completed lab inspections was obtained. The list contained the names of 45

UCI labs, each with one or more critical deficiencies. A random sample of 15 labs (33%) was extracted from the list. For each sampled lab, the reported critical deficiencies were analyzed. Follow-up and escalation efforts associated with these deficiencies were also analyzed. The two analyses revealed the following results.

The analysis of lab inspection reports for the 15 sampled labs revealed 20 open and uncorrected critical deficiencies. Of note, 13 uncorrected deficiencies (65%) involved a failure of lab personnel to complete the LSF course or the LSF refresher course. Four additional uncorrected deficiencies (20%) resulted from a failure of lab personnel to complete work unit (lab)-specific training.

The analysis of follow-up and escalation efforts for the 20 identified critical deficiencies disclosed that none were followed up within the required 48-hour time period. Furthermore, follow-ups for some deficiencies were never completed, or were completed a long time after the 48-hour time period.

In conclusion, EH&S follow-ups of non-critical and critical deficiencies are frequently not completed in a timely manner (and many times not completed and/or documented at all) contrary to Cal/OSHA regulations and established industry best practice. Improvement is needed in lab deficiency follow-up processes.

Currently, there is not a mandatory escalation process in place with the LSC. Among the established LSC responsibilities, the LSC is responsible for assessing and improving the Laboratory Safety Program, including communications with the UCI research community. The LSC should review the EH&S laboratory safety inspection program and escalation process to assist in the resolution of identified inspection deficiencies.

Management Action Plan

1. By October 30, 2020, EH&S will develop and implement a laboratory safety inspection escalation process.

2. By December 30, 2020, EH&S will develop and implement an internal laboratory inspection quality assurance process to conduct quarterly assessments of the inspection program and generate reports to the EH&S Executive Director and to the Laboratory Safety Committee.

3. By October 30, 2020, EH&S will work with the Campus Laboratory Safety Committee to develop a Laboratory Inspection Program Status Quarterly Report (to include finding closure and lag time measures) and provide the committee with a quarterly update as a standing meeting agenda item.

4. By October 30, 2020, EH&S leadership will include a quarterly Lab Safety Audit Program update to the agenda for the established quarterly one-on-one meeting with the Vice Chancellor of Research by October 30, 2020.

5. By December 30, 2020, EH&S will review current laboratory safety inspections records to ensure that outstanding identified deficiencies are reevaluated and/or closed out.

4. Safety Training for New Research Laboratory Employees

Background

Cal/OSHA CCR Title 8, Section 3203(a)(7) states that training and instruction shall be provided to new employees, to employees given new job assignments where training has not previously been provided, and to employees affected by changes in their work environment that have created new hazards.

The UC Laboratory Safety Training policy establishes minimum training requirements for new lab personnel. The policy states that, "A laboratory safety training needs assessment and a fundamentals of laboratory safety training shall be completed . . . Before any worker is granted unescorted access to laboratory/technical areas, they shall successfully complete a 'Fundamentals of Laboratory Safety' training as offered/managed by their local EH&S department." At UCI, the STSA and the LSF fulfill UC Laboratory Safety Training policy requirements. Additionally, the CHP requires new research lab personnel to complete the STSA and LSF before they are granted unescorted lab access.

The STSA and LSF

With some exceptions, UCI Human Resources automatically assigns the STSA to UCI new hires. SOM new hires represent one of the exceptions. They are not automatically assigned to the STSA because it cannot be readily

determined if they will be working in a research lab. Nevertheless, the timely completion of the STSA and LSF is a key control in ensuring research lab employee safety. UCI offers the STSA and LSF training online through the UC Learning Center (UCLC). Furthermore, only after research lab new hires complete the STSA, will UCLC assign the LSF.

Despite the fact that the STSA is not automatically assigned to SOM new hires, it is important for new research lab employees to complete the STSA when they are hired. Without a completed STSA, there is a strong probability that these new hires will remain "invisible" to EH&S with regard to their training status. Consequently, EH&S must rely on other interventions (i.e., employee onboarding processes, lab inspections, mid-cycle lab reviews, etc.) to "find" these employees and assign them to the STSA. Due to the varied objectives of these other interventions, coupled with the length of time required by EH&S to complete them, it can take months or years for EH&S to find these "invisible" employees, if ever. Timely assignment and completion of the STSA by research lab new hires is the best intervention to ensure LSF completion and visibility of new hire training records to EH&S.

STSA Malfunction

In CY 2017, an upgrade to the UCLC system caused the STSA to malfunction. EH&S immediately began to build an STSA that would work with the new UCLC system. However, the new STSA required over two years to complete. During these two years, a back-up system for the STSA was not available. As a result, many employees did not complete their required training. There is not any easy way for EH&S to identify who these employees are.

Between July 2019 and February 2020, a new STSA tool was rolled out to the UCI campus in stages; the SOM roll-out occurred on February 27, 2020. At this time, EH&S asked all research lab employees to take the STSA in an effort to ensure LSF training for those who had not previously completed the STSA.

Clinical vs. Research Lab Employees

EH&S has also encountered ongoing difficulties in determining whether lab employees are working in a UCI Medical Center clinical lab or in a main campus research lab. This distinction is important because the assignment of lab safety training for clinical lab employees is the responsibility of Health

Sciences Human Resources. Conversely, the assignment of lab safety training for SOM research lab employees is the responsibility of EH&S.

Prior to CY 2017, EH&S utilized various processes to make this determination, with partial success. In CY 2017, the STSA malfunctioned and EH&S did not need to make this determination, as they could not assign new hires to the STSA anyway. However, when the new STSA became available in CY 2020, EH&S renewed their efforts to identify best practices for identifying new hires (including SOM new hires) who require LSF training.

Observation

Audit testwork for SOM research lab online safety training for new hires involved a random sample of 19 employees. The sampled employees were hired between January 1, 2019 and March 2, 2020. Audit procedures were designed to determine:

- whether or not the new hires had completed the STSA/LSF;
- the amount of time the new hires took to complete the STSA/LSF; and
- whether or not the time required by the new hires to complete the STSA/LSF was compliant with UC policy and the CHP.

The following audit results were obtained.

1. Timely Completion of the LSF/STSA

   Discussions with EH&S management indicated that most new hires are able to complete the STSA/LSF within 14 days of their hire date. As a result, 14 days became the benchmark. Two of the 19 sampled new hires (11%) completed the LSF eleven and seven days after their respective hire dates. In addition, these two new hires completed the STSA four and seven days after their respective hire dates.

2. Untimely Completion of the LSF/STSA

   Fifteen new hires (78%) completed the LSF more than 14 days after their hire dates. The average and median number of days required to complete the LSF were 90 and 33 days, respectively. The highest and lowest number of elapsed days were 381 days and 21 days, respectively.

Additionally, 15 new hires (78%) completed the STSA more than 14 days after their hire dates. The average and median number of days in which these sampled employees completed the STSA were 179 days (6 months) and 88 days (3 months), respectively. The largest and smallest number of elapsed days between these sampled new hires' hire dates and STSA completion dates were 400 days (1 year, 1 month) and 20 days, respectively.

3. Non-Completion of the LSF/STSA

   Finally, two of the 19 sampled new hires (11%) had never completed the STSA or the LSF. As of the audit date, 455 days (1 year, 3 months) and 284 days (9+ months) respectively had elapsed since each employee's hire date.

The audit results indicate that research lab safety training for new hires is frequently non-compliant with Cal/OSHA regulations, UC policy, and/or the CHP, and needs improvement. EH&S should develop a reliable process to identify all SOM and other research lab new hires who will require LSF training. Once these employees are identified, they should be immediately assigned to the STSA so as to become "visible" to EH&S with regard to their training requirements.

Furthermore, the audit results confirmed that the continuous availability of the STSA is a key control in ensuring timely assignment and completion of the LSF. Contingency plans and back-up systems should be developed as a countermeasure should UCLC/STSA malfunction again in the future. In addition, EH&S interventions need refinement to ensure that research lab employees with insufficient training can be detected and assigned to the STSA in a timely manner.

Management Action Plan

1. By November 30, 2020, EH&S will incorporate a review of the current LSF and STSA compliance into the updated Laboratory Inspection Program.

2. By December 30, 2020, EH&S will develop and implement a lab safety training compliance quality assurance process to conduct quarterly assessments of the lab safety training program (LSF/STSA compliance) and

generate reports to the EH&S Executive Director and to the Laboratory Safety Committee.

3. By December 31, 2020, EH&S will work with the Campus Laboratory Safety Committee to develop a Laboratory Safety Training Program Status Biannual Report (to include LSF and STSA compliance measures) and to provide the committee and the Provost biannual updates as a standing meeting agenda item.

4. By December 30, 2020, EH&S will review current laboratory safety training records (LSF/STSA) to generate a list of non-compliant employees and provide the list to school leadership to assist in the completion of required training elements.

5. By May 31, 2021, will work with Human Resources (owners of the Learning Management System) to establish a cross functional team (Human Resources, EH&S, OIT, DFA, etc.) to develop a contingency plan to address potential STSA and Learning Management System quality concerns and potential system failures.

5. Safety Training for Continuing Research Laboratory Employees

Background

Cal/OSHA CCR Title 8, Section 5191(f) "Employee Information and Training" provides guidance regarding the employer's requirement to provide training and information to apprise employees of chemical hazards present in the workplace. Subsection (f) states that, "The frequency of refresher information and training shall be determined by the employer."

The UC Laboratory Safety Training policy establishes minimum refresher training requirements for continuing lab personnel. The policy states that, "Refresher training for Fundamentals of Laboratory Safety will be provided at a minimum of every three (3) years. More frequent refresher training requirements will be at the discretion of individual campuses." However, the CHP only states that "refresher training is also required for all laboratory personnel." Because the CHP does not impose more rigorous requirements for lab safety refresher training, the time requirement for LSF refresher training at UCI is established as "every three years."

Observation

Audit testwork for SOM research lab employee online safety refresher training involved a random sample of 17 continuing lab employees. The sampled employees were hired between July 1, 1967 and October 2, 2018. Primary audit procedures were designed to verify, for each sampled employee, whether their STSA and LSF refresher training were up-to-date. To be current, the STSA and LSF had to be completed three years or less prior to the audit date.

Additional audit procedures were designed to verify, for each sampled employee, whether the employee's most recent LSF refresher training cycle was completed in three years or less, in accordance with UC policy. To be in compliance, the elapsed time between the most recent and second most recent STSA and LSF completion dates had to be three years or less. The following audit results were obtained.

- LSF/STSA Refresher Training - Current Status as of the Audit Date

  Ten employees (59%) were up-to-date with their LSF refresher training. Nine employees (53%) were up-to-date with the STSA.

- LSF/STSA Refresher Training Cycle – Compliance with UC Policy

  a. Timely Completion of the Refresher Training Cycle

     Three employees (18%) and two employees (12%) had retaken the LSF and STSA within three years, respectively. As a result, these employees were in compliance with UC policy with regard to refresher training.

  b. Untimely Completion of the Refresher Training Cycle

     Three employees (18%) and five employees (29%) took more than three years to retake the LSF and STSA, respectively. As a result, these employees were not in compliance with UC policy with regard to refresher training.

c. Non-compliance with Refresher Training

Nine employees (52%) completed the LSF only one time, and thus never completed LSF refresher training. As a result, these employees were not in compliance with UC policy and the CHP. In addition, seven employees (41%) completed the STSA only one time.

Two Employees (12%) never completed the LSF, and thus never completed LSF refresher training. As a result, these employees were not in compliance with UC policy and the CHP. In addition, three employees (18%) never completed the STSA.

The audit results indicate that safety refresher training for continuing research lab employees is frequently non-compliant with UC policy, and needs improvement. Only 18 percent of sampled employees completed the LSF refresher training cycle in a timely manner. In addition, only 59 percent of sampled employees were currently up-to-date with their LSF refresher training. Many sampled employees (64%) completed the LSF just one time or have never completed LSF.

Furthermore, EH&S interventions (lab safety inspections, mid-cycle lab reviews, etc.) and communication methods designed to detect lab employees who have not completed the STSA and/or LSF refresher training have not been successful, and need improvement.

One additional training issue was noted during the course of the audit. There are two categories of lab personnel that are not consistently assigned to the STSA, and/or do not complete the LSF. The first category involves "WOS" (without salary) employees. These individuals are not automatically assigned to the STSA or complete LSF training, even though they may work in research labs. The second category involves retirees. Some PI retirees continue their labs in retirement; others may volunteer in research labs. However, these individuals do not always complete LSF training. EH&S should develop preventive measures that ensures these individuals are assigned to STSA and/or complete LSF training when required.

Management Action Plan

1. By October 30, 2020, EH&S will develop and implement a laboratory safety training noncompliance escalation process (to be included as a sub part of the laboratory safety inspection escalation process).

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2. By September 30, 2020, EH&S will incorporate a review of the current LSF and STSA compliance into the updated Laboratory Inspection Program.

3. By December 30, 2020, EH&S will develop and implement a lab safety training compliance quality assurance process to conduct quarterly assessments of the lab safety training program (LSF/STSA compliance) and generate reports to EH&S Executive Director and the Laboratory Safety Committee.

4. By December 31, 2020, EH&S will work with the Campus Laboratory Safety Committee to develop a Laboratory Safety Training Program Status Biannual Report (to include LSF and STSA compliance measures) and provide the committee and the Provost biannual updates as a standing meeting agenda item.

5. By February 28, 2021, EH&S will evaluate the identified two groups of lab personnel (WOS and Retirees) and develop a process to assure their data is tracked and periodically evaluated.

6. By December 30, 2020, EH&S will review current laboratory safety training records (LSF/STSA) to generate a list of non-compliant employees and provide the list to school leadership to assist the in the completion of required training elements.

6. CHP Documentation Review and Maintenance

Background

The CHP is a key document to ensure that regulatory compliance is maintained within the laboratory environment. The CHP establishes a formal written program for protecting laboratory personnel against adverse health and safety hazards associated with exposure to potentially hazardous chemicals. The

CHP must be made available to all employees working with hazardous chemicals. California Division of Occupational Safety and Health (Cal/OSHA) Title 8 section 5191 (e) (4) states that, "The employer shall review and evaluate the effectiveness of the Chemical Hygiene Plan at least annually and update it as necessary."

Observation

A pre-entrance conference review of the CHP indicated that the document had not been updated since August 2015. The document was reviewed and updated and the date on the corrected version of the CHP was changed to January 2020. However, certain portions of the CHP are inconsistent with actual EH&S laboratory expectations.

For example, with regard to the responsibilities of the principal investigator (PI) and the laboratory supervisor in performing self-inspections of the PI's laboratory, the CHP states that, "The PI/laboratory supervisor is responsible for conducting periodic self-inspections of laboratory or facility and maintaining records of inspections, as required."

A failure to review and update the CHP annually is non-compliant with state regulations.

Management Action Plan

A comprehensive review of the CHP has been completed and the document has been updated. Current EH&S policies and procedures have been reviewed and the CHP has been updated to accurately reflect current EH&S processes and expectations of laboratories (i.e. laboratory self-inspections). A process has been established to review the CHP annually. IAS considers the management action plan to be implemented and no further follow-up is necessary.