



Chemical Hygiene Plan Evaluation
Annual Report
Academic Year 2017-2018
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California State University, Sacramento
Environmental Health and Safety
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Executive Summary

The regulation pertaining to the laboratory use of hazardous chemicals requires an annual review of the effectiveness of the program. In the past, the Office of Environmental Health and Safety (EH&S) determined the effectiveness by using indicators including employee training compliance, reports of spills and incidents and findings in annual inspections. In 2018, the California State Auditor completed an audit of campus safety and recommended that the annual evaluation be more formal and documented. This report will meet the recommendations of the audit as well as comply with the regulatory obligation. The methodology for assessing program effectiveness included a review of the indicators previously noted as well as a section by section review of the written program with recommendations for improvement.

A significant improvement was noted in training compliance for faculty and staff. This was the result of efforts by EH&S as well as the Natural Science and Math (NSM) Safety Manager, a new position established this year. EH&S also rolled out an online version of laboratory safety training which provided the much needed flexibility to complete the training outside of regularly scheduled instructor-led sessions.

Another notable improvement to the chemical hygiene program was the revision of Section 14, Accidents and Chemical Spills. Risk Management and NSM representatives revised the entire section to more clearly establish procedures for responding to spills and accidents occurring in the laboratory. No significant or “complex” spills have occurred over the past year.

Overall, the campus Chemical Hygiene Plan is effective in identifying how chemicals are used, stored and managed in laboratories. The process did result in identifying several opportunities for improvement, notably the use of recently purchased inspect, assessment and inventory applications.

Recommendations for improvement include the following:

Section 6, Responsibilities

- Remove all references to the University Environmental Health and Safety Committee and replace with Executive Safety Committee.
- The document should be revised to assign responsibility of incident/accident review to college level safety committees. College level committees should report laboratory incidents in summary to the ESC once/semester.
- The Chemical Hygiene Officer should complete inspections of chemical use and storage areas at times when laboratory supervisors are present. Although this will be more time consuming, it provides an additional opportunity for interaction with the responsible party.

Section 7, Standard Operating Procedures

- The NSM Safety Manager and CHO are in the process of creating new SOPs for general and more specific processes that will improve understanding of hazards and appropriate

methods of control. It is recommended that the Chemical Hygiene Plan include the general SOPs and, when developed, the college laboratory safety manual include SOPs for specific operations.

Section 8, Control Measures and Equipment

- Recognizing the critical importance of preventing spills from occurring, it is recommended that actions taken to reduce this risk are specifically identified in this section.
- In each location where hazardous materials are used or stored, there is a requirement to provide signage at the entry that informs emergency responders of the hazards they may encounter. The requirement for updating these signs does not appear in the CHP document and should be added to this section.

Section 10, Particularly Hazardous Substances

- Revise the CHP to reflect the use of the RSS application “Assessment”.

Section 12, Approval Procedures

- Document should be revised to reflect approval procedures that will provide assurance that hazards are mitigated prior to use of a chemical or process described by this section.

Section 13, Procurement and Gifts

- This section should be revised by a task force including faculty, EH&S, college leadership and Procurement.

Efforts to Minimize Hazardous Waste

Although not required by regulation, the current CHP requires an annual review of efforts to minimize the generation of hazardous waste. With the exception of specific construction and maintenance activities noted in the report, the waste generation rates over the past 5 years are fairly static. The increase in non-asbestos waste generation in 2017 over 2016 is the result of laboratory clean-out activities prior to the creation of an accurate chemical inventory in the College of Natural Science and Math. It is expected that this number will remain elevated as NSM disposes of additional chemicals prior to the move to Tschannen Science Complex in 2019. Significant reductions in waste will not be possible without a change in teaching methods and a shift to microscale or reduced scale laboratory techniques. The NSM Safety Committee will consider alternatives during the 2018/19 academic year.

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I. Introduction and Scope

The Chemical Hygiene Plan (CHP) provides guidance to all campus faculty, staff, students and volunteers who work with hazardous chemicals in a laboratory setting in compliance with California Code of Regulations, Title 8 §5191, [*Occupational Exposure to Hazardous Chemicals in Laboratories*](#). The “laboratory use” of hazardous chemicals is defined as activities where the work is “laboratory scale”, e.g., work performed by one person using standard laboratory safety equipment, with multiple chemicals and procedures, not as part of a production operation. Chemical use in shops, art studios and facility operations is performed in accordance with the campus Hazard Communication program, Title 8 §5194, [*Hazard Communication*](#), and not included in this review.

The campus CHP includes a requirement for the University Environmental Health and Safety Committee, now known as the Executive Safety Committee, to review the University’s efforts to minimize hazardous waste. This information is provided in Part XI of this report.

This evaluation is the result of observations made by the Chemical Hygiene Officer (CHO) during routine visits and inspections of laboratory spaces, review of department and college safety committee meeting minutes as well as discussions with the Safety Manager for the College of Natural Science and Math. Recommendations are provided at the end of the evaluation of each section of the CHP.

II. Section 6, Responsibilities

The CHP identifies specific responsibilities as summarized in the table below.

Title	Responsibility
University President	<ul style="list-style-type: none">• Ultimate responsibility for all risks: financial, business, reputational, legal and hazard
University EH&S Committee	<ul style="list-style-type: none">• Develop and recommend policy• Review efforts to minimize waste• Review the annual report of the Chemical Hygiene Officer• Review laboratory accident reports
Office of Environmental Health and Safety	<ul style="list-style-type: none">• Provide support on hazard assessment and controls to prevent exposure• Provide training and maintain records• Complete inspections of all laboratory spaces and safety equipment
Chemical Hygiene Officer	<ul style="list-style-type: none">• Advise all employees on matters of chemical hygiene• Investigate accidents and incidents• Maintain currency on regulatory matters• Facilitate the medical surveillance program

	<ul style="list-style-type: none"> • Provides safety training
Deans, Directors, and Department Chairs	<ul style="list-style-type: none"> • Identify all laboratories and employees who work with hazardous chemicals • Monitor training compliance in their unit
Laboratory Supervisor	<ul style="list-style-type: none"> • Ensure appropriate procedures and personal protective equipment are identified and employed to prevent exposure • Inspect labs at least once/semester • Maintain chemical inventory and assure SDSs are available
Laboratory Workers	<ul style="list-style-type: none"> • Understand and act in accordance with the CHP • Participate in training programs • Report all incidents to supervisor • Review SDSs to ensure an understanding of the hazards in the laboratory.

Section 6.1 University Environmental Health and Safety Committee no longer exists and has been replaced by the campus Executive Safety Committee. This committee met on three occasions in the spring 2018 semester. The committee will review the efforts to minimize waste and the effectiveness of the CHP during the fall 2018 semester. However, the committee did not review investigation reports of laboratory spills/incidents.

Recommendations:

1. Remove all references to the University Environmental Health and Safety Committee and replace with Executive Safety Committee.
2. The Chemical Hygiene Plan should be revised to assign responsibility of incident/accident reporting to college level safety committees. College level committees will report laboratory incidents in summary to the ESC once/semester.

Section 6.2 The Office of Environmental Health and Safety has continued to support the faculty and staff using chemicals. Hazardous waste is routinely removed from the laboratories and disposed in accordance with regulatory requirements. Employee training statistics have been provided to department chairs and instructor-led and computer based training were made available. EH&S served as the principal point of contact with the CSA audit and Cal/OSHA inspection which both occurred during this review period

Recommendation: None

Section 6.3 Chemical Hygiene Officer provided support on issues related to chemical safety. The CHO participated in Chemistry department and NSM safety committees. Audits were completed after the completion of the spring 2018 semester.

Recommendation: The Chemical Hygiene Officer should complete inspections of chemical use and storage areas at times when laboratory supervisors are present. Although this will be more time consuming, it provides an additional opportunity for interaction with the responsible party.

Section 6.4 Deans, Directors, and Department Chairs worked with EH&S to identify laboratories and responsible parties for each, reviewed training records and promoted safety in each department.

Recommendation: None

Section 6.5 Laboratory Supervisors supported the roll-out of the new inventory program purchased by campus. Many faculty also began using the assessment tool which assists in identifying hazards and personal protective equipment. Laboratory self-inspections were completed as required.

Recommendation: None

Section 6.6 Laboratory Workers maintained compliance with training obligations and reported spills and incidents in a timely manner. Where applicable, they also participated in the Medical Surveillance Program.

Recommendation: None

III. **Section 7 Standard Operating Procedures**

Section 7 includes general standard operating procedures for housekeeping, hygiene unattended operations, protective clothing and categories of chemical hazards. The assessment under this section is based on observations of the CHO as well as the annual inspection.

In general, laboratories were in compliance with the requirements of this section. Housekeeping, particularly related to materials spilled on balances or in fume hoods were addressed appropriately. Personal protective equipment was consistently worn by faculty and staff and the policy was enforced for students. Formal inspections completed after the semester did identify some areas for improvement with regard to storage but these findings were addressed in a timely manner with one exception that is in progress.

Recommendations: The NSM Safety Manager and CHO are in the process of creating new SOPs for general and more specific processes that will improve understanding of hazards and appropriate methods of control. It is recommended that the Chemical Hygiene Plan incorporate the general SOPs and, when developed, the Department laboratory safety manual include SOPs for specific operations.

IV. **Section 8 Control Measures and Equipment**

Observations by the CHO confirm that hazardous operations are performed in laboratory fume hoods. All fume hoods were tested during the spring semester and deficiencies were resolved quickly by Facilities Management. Emergency eyewashes and showers were present where required. A small fraction of eyewashes were not tested or not recorded on the tag as required and this finding was addressed immediately. It was also noted that faculty spaces which are in general not used over the summer were not tested. EH&S has assumed the responsibility for testing in vacant rooms. Containers of chemicals were appropriately labelled in accordance with regulations.

Recommendations:

1. In each location where hazardous materials are used or stored, there is a requirement to provide signage at the entry that informs emergency responders of the hazards they may encounter. The requirement for updating these signs does not appear in the CHP document and should be added to this section.
2. Recognizing the critical importance of preventing spills from occurring, it is recommended that actions taken to reduce this risk are specifically identified in this section.

V. Section 9: Medical Consultation and Monitoring

The use of proper personal protective equipment and engineering controls will eliminate exposure to hazardous chemicals and medical surveillance is not required for most laboratory workers. Although Instructional Support Technicians in Chemistry follow proper procedures, it is recognized that they have an increased risk of exposure due to the tasks they perform. All ISTs are participating in the Medical Surveillance Program at no cost to the employee. All exams are performed during the employee's regular shift and records are maintained by Kaiser on the Job, the campus provider.

Recommendation: None

VI. Section 10: Particularly Hazardous Substances

Particularly hazardous substances include carcinogens, reproductive toxins or substances with a high degree of acute toxicity. When working with these chemicals procedures for reducing exposure, warning signage and establishment of designated work areas must be in place. The current CHP does not clearly state how the assessment is to be documented. In 2017, the campus purchased an application for completing hazard assessments of all spaces including those containing particularly hazardous substances.

Recommendation: Revise the CHP to reflect the use of the RSS application "Assessment".

VII. Section 11: Training

EH&S is responsible for providing general laboratory safety students to faculty and staff on a 3 year refreshed frequency. The laboratory supervisor is responsible for training students and staff on laboratory-specific processes.

EH&S has provided the required training in instructor-led and computer-based formats and laboratory specific training is being completed by the responsible party.

Recommendation: None

VIII. Section 12 Approval Procedures

Approval is required for particularly hazardous substances when there is a risk of exposure or when a chemical exposure is likely to exceed the Permissible Exposure Limits established by Cal/OSHA. The CHP indicates that the Activity Hazard Document is used to initiate this

process. However, no requests for approval were received by EH&S during this review period.

Recommendation: Section 12 of the document should be revised to reflect approval procedures that will provide assurance that hazards are mitigated prior to use of a chemical or process described by this section.

IX. Section 13 Procurement and Gifts

This section provides general guidance on the procurement of chemicals with very few prohibitions or additional controls. Establishing clear procedures for procurement and approval of highly hazardous chemical agents would significantly reduce the potential for an exposure, injury or property damage.

Recommendation: This section should be revised by a task force including faculty, EH&S, college leadership and Procurement.

X. Section 14 Accidents and Chemical Spills

This section was completely revised by Risk Management and NSM representatives in spring 2018. The revision clearly describes the difference between an incidental or “simple” spill which can be managed by trained campus employees and a “complex” spill which required assistance from emergency responders.

No complex spills were reported during the 2017/18 academic year.

Laboratory incidents/accidents reviews by the department safety committees did indicate a slight increase in accidents compared to previous years but this is assumed to be the result of increased reporting of minor events.

Recommendation: None

XI. Section 15 Hazardous Waste Management

EH&S is responsible for the removal of hazardous waste from collection areas on campus and managing the disposal of wastes through our hazardous waste management contractor. Waste has been managed appropriately and there have been no regulatory violations during this review period.

Recommendation: None

Efforts to Minimize Hazardous Waste

Hazardous waste on campus is generated through maintenance activities, renovation of buildings, and operation of laboratories and shops. Waste is removed by licensed contractors and disposed through various means including incineration, neutralization, fuel blending and landfill. Each shipment is accompanied by a uniform hazardous waste manifest which provides shipping and hazard information as well as a volume of each material. The units of measure on the manifest are pounds, gallons or cubic yards depending on the shipping

container. For annual reporting, the Department of Toxic Substances Control uses a conversion factor to convert all units of measure to tons resulting in some discrepancy of the actual weight. The table below lists the total tons of each waste stream generated by campus for 2013 – 2017.

Waste Type	2013	2014	2015	2016	2017
Asbestos Containing	76 ¹	27.52	24.38	69.92 ²	7.82
Waste Oil/Mixed Oil	1.786	1.064	0.646	0.836	0.209
Empty Containers < 30 gall	1.7425	1.855	1.405	0.1	
Photochemical Waste	1.1468	0.68805	0.68805	0.6255	0.47955
Off-Spec. Aged or Surplus Organics	1.0165	2.103	1.633	1.233	0.1985
Laboratory Waste Chemicals	0.935	3.065	1.8635	0.5537	0.471
Unspecified Organic Liquid Mixture	0.497	0.3025	1.143		0.7545
Unspecified Oil Containing Waste	0.353	0.1325	14.4619 ³		0.63795
AG Sol (2<PH<12.5) w/Org Residues <10%	0.231				
Other Inorganic Solid Waste	0.201	2.049	29.9974 ⁴	1.4505	1.0295
Liquids s PH<=2 w Metals	0.055	0.6736	0.64635	1.03416	1.36685
Unspecified Aqueous Solution (2<PH<12.5)		0.286			
Latex Waste		0.09	0.225		0.105
Other Organic Solids			1.1037	0.75945	2.761
Liquids with PH<=2			0.1668		
Alkaline Solution (PH>=12.5) w/metals			0.02085	0.04587	
Polychlorinated Biphenyls			0.0022	0.11138	
Liquid w/Halogenated Organic Comp >=1000 MG/L			0.002	0.00834	
Unspecified Solvent Mixture				0.2415	2.2175
Off-Spec. Aged or Surplus Inorganics					0.2775
Blank/Unknown	0.0825		0.9841		
Annual Total	84.0463	39.82865	79.36885	76.9194	18.32785
Total w/o asbestos	8.0463	12.30865	54.98885	6.9994	10.50785

1. Asbestos-containing roof replacement 2. Library asbestos abatement 3. Hydraulic fluid and contaminated soil from elevator modernization 4. Lead-containing waste from El Dorado Hall demo.

With the exception of specific construction and maintenance activities noted in the table, the waste generation rates over the past 5 years are fairly static. The increase in non-asbestos waste generation in 2017 over 2016 is the result of laboratory clean-out activities prior to the creation of an accurate chemical inventory in the College of Natural Science and Math. It is expected that this number will remain elevated as NSM disposes of additional chemicals prior to the move to Tschannen Science Complex in 2019.

The Hazardous Waste Source Reduction Management Review Act of 1989, promotes source reduction over recycling or treatment of hazardous waste as a best management practice. The Act requires any generator who routinely generates more the 12,000 kilograms of hazardous waste or 12 kilograms of “extremely hazardous waste” per year to prepare a plan for reducing waste and to report on their efforts annually. Sacramento State does generate more than 12 kilograms of extremely hazardous waste; however, these waste are the end product of laboratory operations and exempt from the reporting process.

Although campus is exempt from formally reporting, it is prudent to consider alternatives, where possible, to reduce the total volume of chemicals used or to substitute less hazardous materials. Reduction will require a change in curriculum and options will be explored by the NSM Safety Committee.

XII. Section 16: Records and Recordkeeping

EH&S has maintained records in accordance with this document. Workers’ Compensation maintains injury records.

Recommendations: None

XIII. Section 17: Changes to the Chemical Hygiene Plan

This section identifies the process for updating the CHP.

Recommendations: Remove references to Environmental Health and Safety Committee.

XIV. Section 18: Definitions

Terms used in the CHP

Recommendations: None

XV. Summary

The present Chemical Hygiene Plan was written in 2003, with the exception of the spill chapter which was revised in 2018. Although training completion records, the absence of significant spills and minor non-compliant conditions noted during inspections indicate overall program effectiveness, there are opportunities to improve the document and improve the safety culture. With support from college and department level safety committees, NSM and Risk Management Services should consider the recommendations provided and revise the existing document.