

Enhancing Laboratory Safety

Academic Laboratory Safety in a Post 12/29 World

Professor Craig Merlic

UCLA Department of Chemistry and Biochemistry

April 11, 2013

Early Chemistry Laboratories



Early Chemistry Laboratory



Improved Laboratory Conditions



Early PPE Use

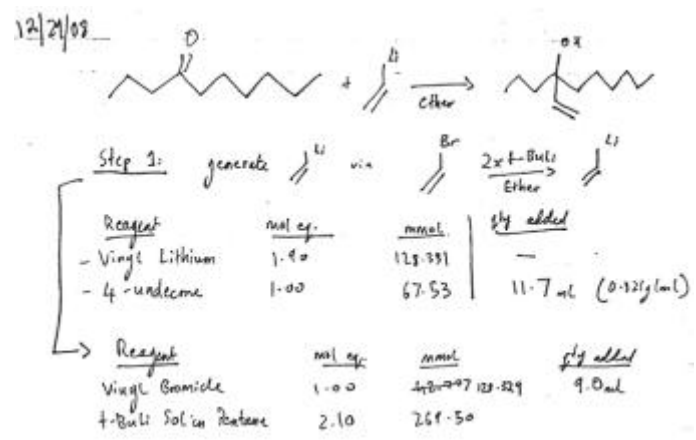


Modern Laboratory Conditions

University of Kansas Center of Excellence
in Chemical Methodologies & Library Development



December 29, 2008



Sheharbano Sangji



UCLA Timeline

- 12/29/2008 – Sheri Sangji lab accident
- 1/16/2009 – Sheri Sangji dies from her injuries
- 1/2009 – Cal/OSHA lab inspections
- 5/2009 – Cal/OSHA citations \$31,875
- 8/2009 – Cal/OSHA inspection complaint on lab coats
- 12/2009 – Cal/OSHA investigative lab accident report
- 2/2010 – Cal/OSHA lab coats citation \$67,720

UCLA Timeline

- 12/29/2008 – Sheri Sangji lab accident
- 1/16/2009 – Sheri Sangji dies from her injuries
- 1/2009 – Cal/OSHA lab inspections
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- 8/2009 – Cal/OSHA inspection complaint on lab coats
- 12/2009 – Cal/OSHA investigative lab accident report
- 2/2010 – Cal/OSHA lab coats citation \$67,720
- 12/2011 – Los Angeles District Attorney files felony charges against the Regents of the University of California and Professor Patrick Harran for “willful violation of safety regulations”
- 7/2012 – UC signs **Settlement Agreement** terminating prosecution against the Regents of the University of California
- 4/2013 – Ongoing legal issues for Professor Harran

Key Safety Questions Resulting from the Aftermath of the Accident

- What changed?
- Where did it change?
- How did it change?
- When did it change?
- Who changed?
- Why did it change?

Accident Aftermath

Repercussions across campus, the University of California system, the discipline of organic synthesis, and chemistry departments and universities across the nation.

US Chemical Safety Board

Key Lessons for Universities

From 2011 Report on Texas Tech Laboratory Accident

- Ensure that research-specific hazards are evaluated and then controlled by developing specific written protocols and training.
- Expand existing laboratory safety plans to address the physical hazards of chemicals
- Ensure that safety personnel report directly to a university official who has the authority to oversee research laboratories and implement safety improvements
- Document and communicate all laboratory near-misses and incidents to educate individuals and track safety at the university.

American Chemical Society Committee on Chemical Safety

Creating Safety Cultures in Academic Institutions 2012

Seven essential elements needed to support a robust safety culture

- Leadership and management – expectations from the highest levels
- Teaching laboratory and chemical safety – 80 topics teaching critical thinking skills
- Strong safety attitudes, awareness, and ethics – long-term and continuous emphasis on safety
- Learning from laboratory incidents – report, investigate and learn from incidents
- Establishing collaborative relationships – administration, faculty, EH&S and students
- Promoting and communicating safety – Reinforce safety through continuous and diverse efforts
- Strong safety programs require strong support – funding, effort, and people

American Chemical Society Presidential Commission Report

Advancing Graduate Education in the Chemical Sciences 2012

“3. Academic chemical laboratories must adopt best safety practices. Such practices have led to a remarkably good record of safety in chemical industry and should be leveraged.”

University of California Office of the President Response

- The Environment, Health & Safety team at UCOP provides strategic guidance, leadership, and system-wide coordination of resources to advance the goals of the University EH&S programs.
- Working with individual campus offices, the goal is to provide comprehensive environmental protection, occupational health, and industrial safety expertise to the entire university community.
- Resources for UCOP EH&S have expanded greatly and resources have been sent down to the ten UC campuses.

UCLA Response

UCLA has initiated a wide array of changes and activities in response to the accident, Cal/OSHA inspections, and legal filings.

- Chancellor
- Vice Chancellor for Research
- Associate Vice Chancellor for Research – Laboratory Safety
- UC Center for Laboratory Safety
- Laboratory Safety Committee
- Environment, Health and Safety
- Departments
- Faculty
- Graduate Students
- Undergraduate Students

UCLA Response: Chancellor's Office

- Chancellor has made safety a high priority on campus
- Chancellor has allocated financial resources (mainly to EH&S) to meet increased safety demands
- Vice Chancellor for Research charged with follow-through
- Associate Vice Chancellor for Research – Laboratory Safety
a new position created to coordinate safety activities
- Some resources from UCLA Office of Insurance and Risk Management



UCLA Response: UC Center for Laboratory Safety



Overview



The UC Center for Laboratory Safety (Center) has been created to improve the practice of laboratory safety through the performance of scientific research and implementation of best safety practices in the laboratory. The Center operates under the oversight of the UC Center for Laboratory Safety Advisory Board with technical support from the UCLA Office of Environment, Health and Safety and the UCLA School of Public Health – Department of Environmental Health Sciences.

Established March 2011

UCLA Response: UC Center for Laboratory Safety



Tripartite Mission

- Sponsor and support research in laboratory safety
- Develop and translate research into applied best practices
- Facilitate implementation and optimization of laboratory safety practices

UCLA Response: Laboratory Safety Committee

- Created by the Chancellor in February 2009
- Under the direction of Vice Chancellor for Research
- Chaired by a faculty member
- Twelve faculty from across campus
- Four EH&S representatives
- Vice Chancellor for Research
- Associate Vice Chancellor for Research – Laboratory Safety

- Parallel to existing Radiation Safety and Biosafety Committees
(Might become a top level committee by the creation of a new
Chemical & Physical Hazards Committee)

UCLA Response: Laboratory Safety Committee

- Develop, recommend and update policies on health and safety of laboratory workers
- Receive and review summary reports from EH&S on laboratory inspections
- Receive and review reports from departmental and faculty health and safety committees
- Establish strategies to ensure surveillance, hazard identification, and risk evaluation of laboratory activities
- Review communication of responsibilities and accountability for lab safety and incidents across campus
- Review Campus safety programs annually
- Coordinate with the Biosafety, Radiation, and School of Medicine Safety Committees
- Advise the Chancellor and Executive Vice Chancellor regarding compliance with campus safety policies

UCLA Response: **Settlement Agreement** with Los Angeles District Attorney July 2012

- Acceptance of Responsibility
- Establishment of Sheharbano Sangji Scholarship at the University of California Berkeley School of Law
- Agreement to pay Cal/OSHA costs
- Implementation of specific laboratory safety practices
- Certification of Compliance semi-annually for four years

http://newsroom.ucla.edu/portal/ucla/pagedoc/3/6/9/6/3/236963/Settlement_agreement.pdf

Settlement Agreement:

Required Laboratory Safety Practices

1. Lab Safety Manual required in all labs
2. Chemical Hygiene Plan required in all labs
3. Principal Investigator Training
 - Lab Safety Training for Principal Investigators
 - University safety policies training
 - Annual retraining in lab safety
4. Lab Personnel Training
 - Lab Safety Training Program
 - University safety policies training
 - Annual retraining in lab safety
5. Standard Operating Procedures for >600 Chemicals
6. Procedures for use of Pyrophoric Reagents

Settlement Agreement:

Required Laboratory Safety Practices

7. PPE Assessment by *each* Principal Investigator
8. PPE Requirements
 - Pants
 - Shoes
 - Lab coats
 - Flame resistant lab coats
 - No lab coats outside of lab areas
 - No gloves outside of lab areas
 - PPE cleaning
 - Eye protection
 - Additional PPE
 - PPE costs
 - PPE documentation
 - PPE monitoring

Settlement Agreement:

Required Laboratory Safety Practices

9. Enhanced EH&S Inspections
10. Enhanced Cal/OSHA Inspections
11. Enhanced Cal/OSHA Reporting
12. Enhanced Cal/OSHA Investigations
(Accident sites will be treated as crime scenes)

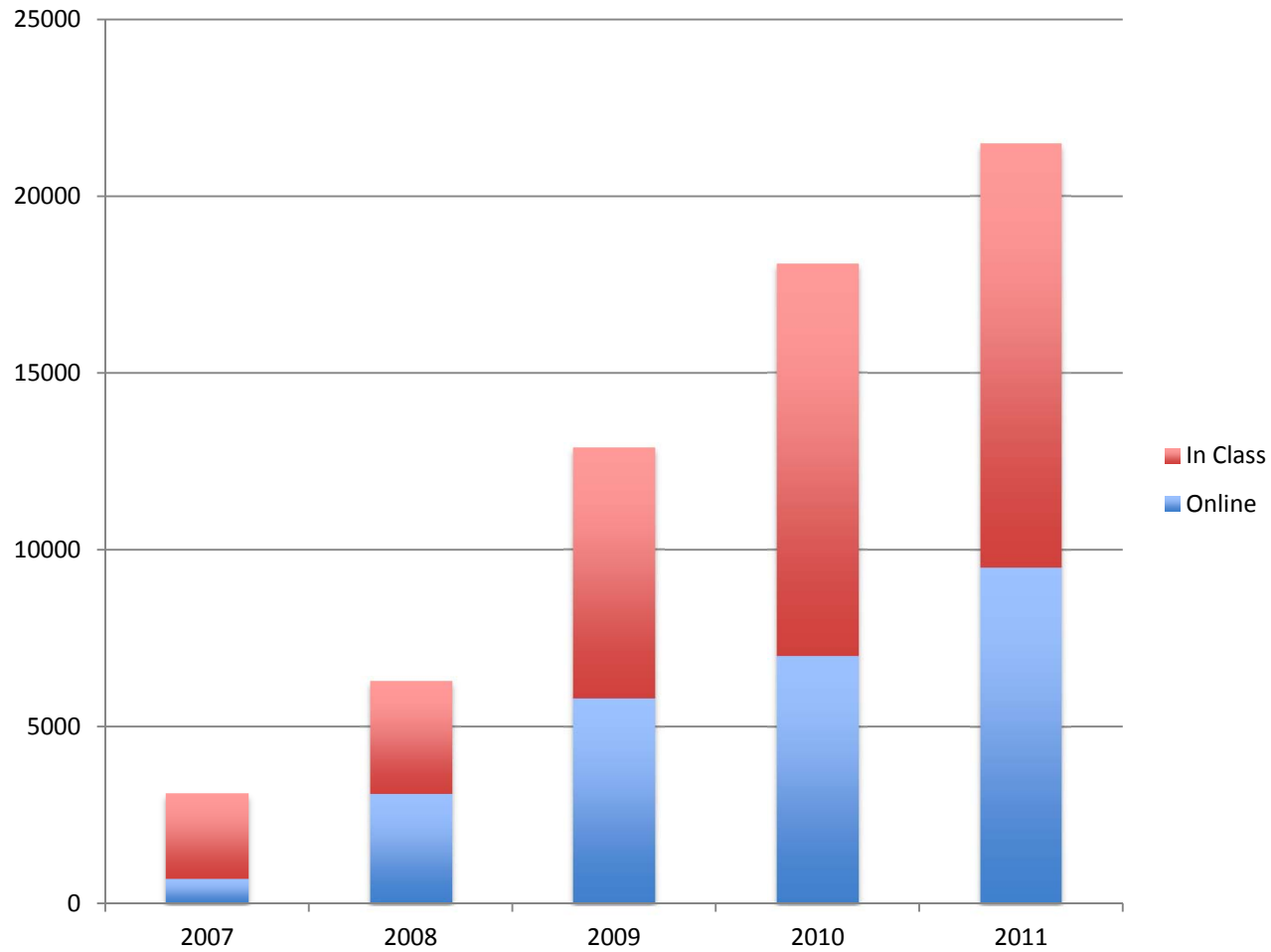
UCLA Response: Environment, Health & Safety

- Increased staff (currently 67 FTE)
- Increased frequency and scope of inspections
- Revised inspection checklist
- Revised inspection procedures
- Revised inspection reports
- Increased training programs
- Creation of Laboratory Hazard Assessment Tool
- Enhanced performance metrics
- Increased technical expertise
- Funding for safety projects
- Outreach projects
- Safety Videos
- SOP Library

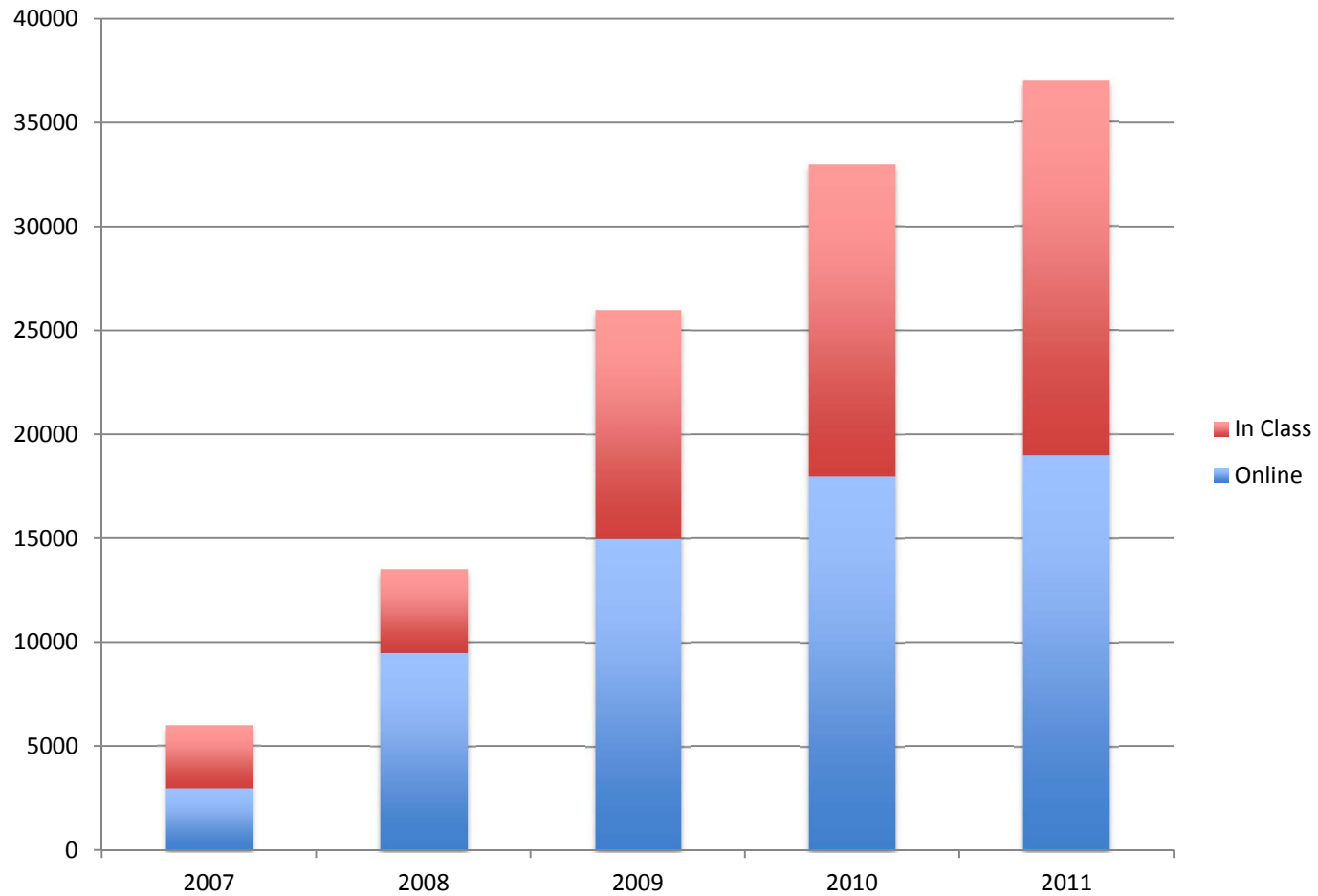
EH&S Training Classes

- Laboratory Safety Fundamental Concepts
- Laboratory Safety Training for Principal Investigators
- Hands-on Fire Extinguisher Training
- Hazardous Waste Training for Non-Lab Employees
- Respirator Training and Fit Testing
- Machine Shop Safety
- Laser Safety
- New Radiation Worker Qualification
- X-Ray Diffraction Safety
- Biological Safety Cabinets
- Biosafety A,B,Cs – Biosafety Level 2
- Biosafety Level 2 with Biosafety Level 3 practices
- Biosafety Level 3
- Medical Waste Management
- Bloodborne Pathogens
- Shipping Biological Materials
- Biological Toxin
- Carcinogen or Highly Toxic Chemical Use in Animal or Animal Tissue

EH&S Lab Safety Training Classes



Total EH&S Safety Training Classes



Fire Extinguisher Training

Who is trained? What training? Who does the training? Who pays for it?



UCLA Lab Book

UCLA LAB BOOK Managing Lab Training and Safety Requirements



[Log In](#)

[Main Site](#)

Welcome to Lab Book

UCLA's comprehensive researcher database that will allow you to track all required training for working in a laboratory. Our goal is to provide 'one-stop shopping' for all required training so that information you need is organized in a single online site. Lab researchers will be able to track their own training. Principal Investigators and lab supervisors will be able to track their own training, as well as those of all researchers in their lab. This includes required lab safety training (through a link to EH&S Laboratory Hazard Assessment Tool), animal use and care training, human subjects training, NSF responsible conduct of research training, HIPAA training, and Injury and Illness Prevention Program (IIPP) training. PIs and supervisors have additional UC-required training in sexual harassment prevention, ethics, and conflict of interest. The functionality of the database includes both automated and manual email messaging when researchers' training is about to expire. We have also included electronic workspace where you can upload files (e.g., your lab's chemical inventory list, lab orientation document, and SOPs) and a list of useful online resources (e.g., UC's Material Safety Data Sheet website). We hope you find this database useful. **The Manual will help guide you through LabBook to update your training information.**

UCLA Lab Book

UCLA *LAB BOOK* Managing Lab Training and Safety Requirements



- Track Training of PI and all lab members
 - Lab Safety Fundamentals
 - Ethics, Sexual Harassment, Conflict of Interest
 - Fire Extinguisher, PPE, Respirators, Fire Safety, Lasers
 - Animal Use, Human Subjects, HIPAA
- Messaging before training expiration
- Safety Files Management
 - SOPs, SDS Database, Training Documents
- Laboratory Safety Manual and Chemical Hygiene Plan
- Illness and Injury Prevention Program



Welcome, Craig A. Merlic | [Your Account](#) | [Logout](#)

[Main Site](#) : [Labs](#) : merlic

Welcome Craig A. Merlic

Merlic

If the training record is inaccurate, the researcher or PI/lab supervisor can change it manually by clicking on error

Lab Members Training Status

Lab Notices

Lab Files

Lab Links

Log

Members

Any EH&S Online Safety Training course status will not be updated immediately. Labbook is updated every night

Training/Name	Boon, Byron Adrian	Chen, Eric	GREEN, AARON	Karabiyikoglu, Sedef
CONFLICT OF INTEREST TRAINING	NA	NA	NA	NA
ETHICS TRAINING	NA	NA	NA	NA
Lab Safety Fundamental Concepts	No Data 	No Data 	No Data 	No Data
Lab Safety for PIs/Lab Supervisors	NA	NA	NA	NA
Online Refresher - Lab Safety Fundamental Concepts	No Data 	No Data 	No Data 	No Data
SEXUAL HARASSMENT PREVENTION	NA	NA	NA	NA
(PPE) Working with air or water reactive chemicals.	No Data 	No Data 	No Data 	No Data

EH&S Laboratory Hazard Assessment Tool

UCLA ENVIRONMENT, HEALTH & SAFETY

LABORATORY HAZARD ASSESSMENT TOOL

Live Chat Offline

Welcome back, CRAIG MERLIC

Logout

HOME LAB PERSONNEL

INSTRUCTION IDENTIFICATION SURVEY PPE

HOME / LHATS / SURVEY

MERLIC – LAB GROUP: MERLIC LAB GROUP

Biological Hazards

Chemical Hazards

Laser Hazards

Nanomaterial Hazards

Physical Hazards

Radiological Hazards

In this section, you will :

- Conduct a hazard assessment of this lab group to identify activities when PPE is needed to protect the lab staff from exposures.
- Certify the hazard assessment for the laboratory by signing Section 1.


The following checklists are an overview of common lab activities, associated potential hazards and applicable PPE. Check each box that describes activities performed by lab personnel. Be sure to review the entire list and save your selections at the bottom of the page before continuing to the next checklist. Continue to the next checklist by selecting one from the list to the left, or by clicking on the arrow to the right.

Yes All	No All	Activity	Potential Hazard	Applicable PPE
<input checked="" type="radio"/>	<input type="radio"/>	Working with small volumes (<4 liters) of corrosive liquids.	Eye or skin damage.	Safety glasses or goggles. Light chemical-resistant gloves. Lab coat. 4
<input checked="" type="radio"/>	<input type="radio"/>	Working with large volumes (>4 liters) of corrosive liquids, small to large volumes of acutely toxic corrosives, or work which creates a splash hazard. 1	Poisoning, increased potential for eye and skin damage.	Safety goggles. Heavy chemical-resistant gloves. Lab coat and chemical-resistant apron. 4

EH&S Laboratory Hazard Assessment Tool

Purpose:

- Assess potential hazards
- Quantify risk level
- Specify PPE according to risk-based assessment
- Verify PPE training
- Data collection

	Laboratory Safety Laboratory Hazard Assessment Tool 501 Westwood Plaza, 4 th Floor • Los Angeles, CA 90095 Phone: 310-825-5880 • Fax: 310-825-7076 • www.ehs.ucla.edu
---	---

This form must be completed by the PI, Lab Supervisor, or their designee to conduct a laboratory hazard assessment specific to activities in their laboratories. The laboratory hazard assessment identifies hazards to employees and specifies personal protective equipment (PPE) to protect employees during work activities. The person conducting the assessment must verify that it is complete and that training has been conducted.

This assessment consists of four sections and serves as a step in satisfying PPE requirements.

Section 1: Lab Information
Section 2: Laboratory Hazard Assessment
Section 3: Conduct PPE Training
Section 4: Verification of PPE Training

EH&S personnel are available to assist you with completing this form or with reviewing it after you have completed it. EH&S may also be consulted by calling the EH&S Hotline (310-825-9797).

Section 1: Lab Information

Department	
Lab location(s) with building & room number(s)	
Principal Investigator	
Laboratory Safety Coordinator	
Name & title of person conducting assessment	
Phone number	
Email address	
Date assessment completed	
Signature	

Section 2: Laboratory Hazard Assessment

In this section, you will:

- Conduct a hazard assessment of the laboratory to identify activities when PPE is needed to protect the lab staff from exposure to hazards.
- Certify the hazard assessment for the laboratory by signing in Section 1.

The following checklists are an overview of common lab activities and associated potential hazards and applicable PPE. Check each box that describes activities performed by lab personnel.

Created 3/2009 -1- Laboratory Hazard Assessment Tool


EH&S Laboratory Hazard Assessment Tool

Tailors PPE by Assessing Hazards:

- Activity
- Potential hazards
- Applicable PPE

Quantifies Risk Level

- Types of hazards present
- Quantities of hazardous materials

	Laboratory Safety Laboratory Hazard Assessment Tool 501 Westwood Plaza, 4 th Floor • Los Angeles, CA 90095 Phone: 310-825-5880 • Fax: 310-825-7076 • www.ehs.ucla.edu
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UCLA EH&S Laboratory Inspections

Lab Safety Inspection Checklist

Department: _____ Date: _____

Inspector: _____ Location: _____

	Chemical Storage/ Compatibility	Yes	No	N/A	Comments
1.	Maximum of 10 gal. flammables kept outside flammable storage cabinet	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
2.	Maximum of 60 gallons flammable liquids per lab	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
3.	Flammables kept in refrig./freezer approved for storage of flammables	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
4.	Minimal amount of acids stored outside acid/corrosive cabinet	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
5.	Acids and bases stored in secondary containers	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
6.	Acids, bases & incompatible stored segregated	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
7.	Flammables are not stored with combustibles	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
8.	Ethers and other peroxide formers dated or tested	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
9.	Water reactives, carcinogens, & corrosives stored separately	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Fume Hoods		Yes	No	N/A	Comments
1.	Current certification date(s)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
2.	Proper sash height indicated	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
3.	Sash at or below marked approval level	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
4.	Audible/ visual alarm functional	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
5.	Minimal clutter in hood (equipment, chemicals)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
6.	Proper equipment placement in fume hood	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
7.	Cleanliness	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Fire Safety		Yes	No	N/A	Comments
1.	Exits/aisles/corridors are not blocked: 36" min. width	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
2.	Combustibles are stored at least 24" from ceiling	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
3.	Second exit from lab maintained	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Seismic Safety		Yes	No	N/A	Comments
1.	Equipment, cabinets, etc., anchored or restrained	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
2.	Storage shelves have seismic restraints	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
3.	Cabinet doors have seismic restraints	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
4.	High overhead storage is secured	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Mechanical and Electrical Safety		Yes	No	N/A	Comments
1.	Moveable parts guarded on equipment	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
2.	Electric panel accessible	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
3.	Plugs, cords, outlets in good condition	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
4.	Extension cords or other cords out of way	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
5.	Are Extension cords being used correctly (They must not be run through walls, doors, ceilings; not represent a trip hazard running across aisle ways; not to be used as a permanent source of electrical supply- use fused outlet strips or have additional outlets installed; not to be linked together.)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
6.	Faulty or broken equipment removed from service	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	

Complete inspection checklist from 2004

Revised Inspection Checklist

- New sections on:
 - Documentation
 - Training
 - PPE
 - Housekeeping
- 60 Items added
- 23 Critical items identified
- Automated
- >830 PIs
- >3700 Lab rooms

UCLA ENVIRONMENT, HEALTH & SAFETY		Laboratory Safety Inspection Checklist			
501 Westwood Plaza, 4 th Floor • Los Angeles, CA 90095		Phone: 310-825-6689 • Fax: 310-825-7076 • www.ehs.ucla.edu			
Date: _____					
Lab Information					
Department					
Principal Investigator					
PI telephone					
PI email					
Building					
Lab room					
Lab corner					
Lab corner					
Lab corner					
Lab phone					
Inspector					
Inspector					
Inspector					
Accompanying					
Documentation					
1	0	C	N/A	Inspected	Comments
<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	Lab safety manual accessible to all laboratory personnel*	
<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	Initial EH&S Safety training given	
<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	Safety training certificate issued*	
<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	Safety training record kept in Lab Safety Manual*	

UCLA ENVIRONMENT, HEALTH & SAFETY		Laboratory Safety Inspection Checklist			
501 Westwood Plaza, 4 th Floor • Los Angeles, CA 90095		Phone: 310-825-6689 • Fax: 310-825-7076 • www.ehs.ucla.edu			
Date: _____					
Lab Information					
Department					
Principal Investigator					
PI telephone					
PI email					
Building					
Lab room					
Lab corner					
Lab corner					
Lab corner					
Lab phone					
Inspector					
Inspector					
Inspector					
Accompanying					
Hazard Communication					
1	0	C	N/A	Inspected	Comments
<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	MSDS available – Hard or electronic copies*	
<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	MSDS location known to each employee*	
<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	SOP available (experiment/equipment/hazardous activity)	
<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	Containers labeled with contents (full name, no conflicting labels)	
<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	Containers labeled with date	
<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	Containers labeled with hazard warning	
<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	Current chemical inventory accessible*	
				Chemical inventory format (i.e. hard or electronic copy)	

UCLA EH&S Laboratory Inspections

Lab Inspection Checklist 2013

- 8 pages
- Lab Information
- Types of hazards present
- Personnel list
- Training records
- Hazard communication
- Emergency information
- Fire safety
- General safety
- PPE
- Housekeeping
- Chemical Storage
- Fume hoods
- Biosafety cabinets
- Chemical Waste
- Seismic safety
- Mechanical safety
- Electrical safety

Most laboratory inspectors have PhD degrees

UCLA EH&S Laboratory Inspections


Lab Inspection Response

- Critical violations re-inspected after 48 hours
- Critical violations then re-re-inspected every 24 hours
- Other violations re-inspected after 30 days
- Other violations then re-re-inspected every 30 days
- Infrastructure violations automatically sent to Facilities

Detailed Reports Sent To:

- Initially: PI, EH&S, Department Chair, Dept Safety Committee
- After 30 days: Those and Divisional Dean
- After 60 days: Those and Associate Vice Chancellor, Research

UCLA EH&S Laboratory Inspection Reports

	Laboratory Safety Inspection Report 501 Westwood Plaza, 4th Floor • Los Angeles, CA 90095 Phone: 310-825-5689 • Fax: 310-825-7076 • www.ehs.ucla.edu
Inspector: Petros Yiannikouros Report Date: October 17, 2012 Building: MOLECULAR SCIENCES BLDG Laboratory Room(s): 3240LB, 3234LB, 3234A, 3035, Reinspection Date: 10/17/2012 Reinspection Date: 9/21/2012 Initial Inspection Date: 9/18/2012	Responsible faculty/PI: CRAIG MERLIC Lab Contact(s): Byron Adrian Boon
Summary of Lab Findings	
Finding & Required Action	Severity, Timeline & Location

Chemical Storage Compatibility

- Chemical containers in poor condition (i.e., corroded, broken cap, broken handle, ruptured, contaminated with spill/residue on the outside)

Non compliant 30 days

Either dispose of the chemical container(s) in question as hazardous waste or safely (i.e., by using proper PPE, engineering controls and other safety protocols) transfer the content(s) into a properly labeled container that is in good condition.

3234LB Corrected 10/17/2012

NOTE: Chemicals in deteriorating containers are considered as hazardous waste by state agencies. Chemical containers having residue on the cap/outside the container,

UCLA EH&S Laboratory Inspection Reports

Explanation of Findings

Chemical Storage Compatibility

Location: 3234LB

Finding: Chemical containers in poor condition (i.e., corroded, broken cap, broken handle, ruptured, contaminated with spill/residue on the outside)

Regulation: 1). 5191. Occupational Exposure to Hazardous Chemicals in Laboratories, Appendix A - National Research Council. 2). UCLA Hazardous Waste Disposal Protocols.

Comments:

Recommendation: Either dispose of the chemical container(s) in question as hazardous waste or safely (i.e., by using proper PPE, engineering controls and other safety protocols) transfer the content(s) into a properly labeled container that is in good condition.

NOTE: Chemicals in deteriorating containers are considered as hazardous waste by state agencies. Chemical containers having residue on the cap/outside the container, illegible labels (due to chemical drippings/spills), discolored vapor packet formation inside the container, discoloration of chemical, corroded metal containers holding chemicals, containers with dual/conflicting labels, containers with no labeling - all these types of chemical containers should be considered as hazardous waste, affixed with an on-line hazardous waste tag and disposed of accordingly.

[Corrected 10/17/2012](#)

Images:

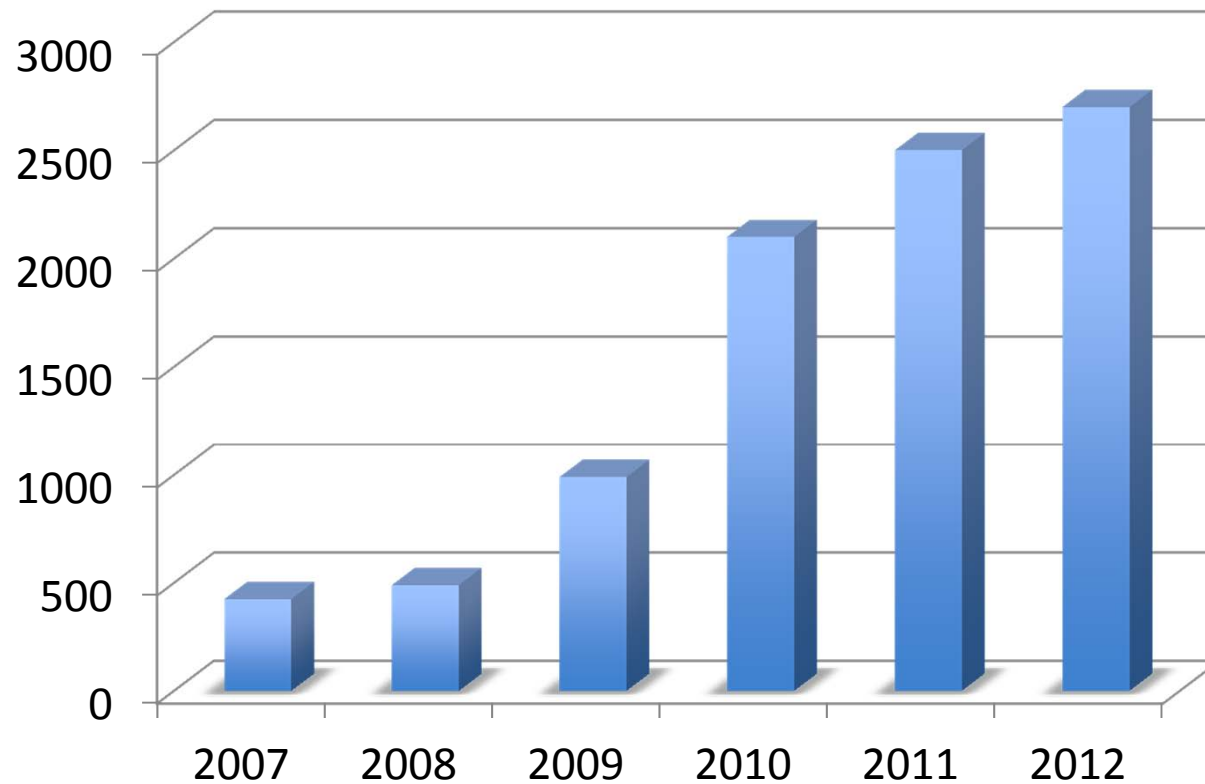


UCLA EH&S Laboratory Inspections

Additional Laboratory Inspections

- Category A Inspections for labs with high amounts of chemical hazards
- Unannounced PPE inspections

UCLA EH&S Laboratory Inspections



UCLA EH&S Laboratory Inspections

UCLA LABORATORY SAFETY THREE STRIKE POLICY

- Failure to correct safety violations result in “strikes”
- **One strike** will result in a special notice to the PI
- **Two strikes** will require the PI to provide a written explanation for the failure to correct violations **AND** appear before the Laboratory Safety Committee to discuss a corrective action plan
- **Three strikes** can result in a shutdown of the lab for five days by the Vice Chancellor for Research and opening of the lab requires corrective actions

The EH&S Challenge: Friend or Foe

Professor Ken Bradley:

- “Specifically, as I read the policy now with my "PI" perspective, it not only reinforces EH&S as a policing entity out to punish and not to be trusted, but it weakens the credibility of the Laboratory Safety Committee as it aligns us with this policing mentality. I would much prefer that EHS and LSC be seen as partners in promoting lab safety.”

The EH&S Challenge: Friend or Foe

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Dr. James Gibson, Director of UCLA EH&S:

- “In addition to scheduled lab safety inspections, we also conduct PPE compliance inspections, unannounced lab safety inspections and Level A Hazard inspections. While it is not our intention to be the police, we do have an obligation to record observations of serious safety issues if they are outside the scope of the above referenced inspections. ”

The EH&S Challenge: Friend or Foe

Proposal by several units on the UCLA campus:

Safety Coordinators

- Trained by EH&S
- Work for departments/schools
- Provide consultation of safety issues
- Conduct inspections
- Not required to write-up violations

EH&S Need for Technical Expertise

- Ethers now come in aluminum cans to reduce peroxides
- Sturdy non-breakable containers relative to glass bottles
- Ideal for waste too?



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- Ideal for waste too? **NO!**
- Several purification protocols in labs involve strong bases
- Packaging waste ether materials in an aluminum led to an explosion at the UCLA chemical waste facility



EH&S Need for Technical Expertise

- Ethers now come in aluminum cans to reduce peroxides
- Sturdy non-breakable containers relative to glass bottles
- Ideal for waste too? **NO!**
- Several purification protocols in labs involve strong bases
- Packaging waste ether materials in an aluminum led to an explosion at the UCLA chemical waste facility
- **Hydrogen Gas Created!**



Moving Bar Problem



Click here to view larger image



UCLA Response:

Departments / Department Chairs

- Commit to enhanced safety practices
- Monitor safety practices of their faculty
- Assist EH&S to obtain faculty compliance
- Help deliver safety protocols to staff, postdoctoral fellows, graduate students, and undergraduate students
- Manage work orders for safety-mandated building modifications
- Provide prescription safety glasses program

UCLA Response: Faculty

- Required PI safety training – initial and annual
- Required monitoring of researchers PPE
- Required training of lab staff
- Required documentation of training
- Required response to inspections
- Required changes to lab maintenance
- Required changes to chemical storage and handling
- Required changes to lab protocols
- Required documentation of protocols

Faculty Response

Professor Lin:

“Dear Craig, thanks for working so hard and for serving as our Safety Committee Chair at this critical moment. Yung-Ya”

Faculty Response

Professor Lin:

“Dear Craig, thanks for working so hard and for serving as our Safety Committee Chair at this critical moment. Yung-Ya”

Professor Bouchard:

“Hi Craig, I already called multiple (>5) 8:00 am group meetings to have people sign a variety of forms, including the PPE form. For me to call yet another lab safety group meeting would probably result in a Jihad on their part. Louis”

Faculty Response

Professor XYZ:

“Safety is not our responsibility. We are here to be doing research. EH&S should be doing all of the necessary training.”

Faculty Response

Professor XYZ:

“Safety is not our responsibility. We are here to be doing research. EH&S should be doing all of the necessary training.”

Professor Yaghi:

“You are completely wrong. The safety of our research students is our responsibility. And EH&S does not have the technical knowledge.”

Faculty Response

Professor Merlic:

“Hello Dan.”

Professor Neuhauser:

“Hi.”

Pause, looks at me.

“Sometimes I am really glad I am a theoretical chemist.”

Faculty Response

“Dear Craig and Miguel,

For the experimental physical chemistry class CHEM 114 I need to know exactly how the new rules for safety impact this class and what we need to tell the class.

I need to know if I am being held responsible for any accidents.

Who is responsible for any potential violations? The staff person or myself?

What steps should be taken to brief the students on the new safety rules?

Can inspections occur during and out of class time?

I therefore officially leave it to you to tell me in detail what the new policies are and what I should do in the class.

Jim”

Faculty Response

“Hi Craig

do you know when Cal-OSHA will be doing their inspections?

we cleared all the EH&S inspections in my lab, but the longer we wait for Cal-OSHA, the higher the chances of my lab members getting the place messy again.

ABC”

“Dear ABC,

No idea. They are supposed to be surprise unannounced inspections. So please keep up the good work on training your students and keeping your lab safe as this is an ongoing program.

Craig”

Faculty Response

Student Mentoring 1005 AD



Faculty Response

Student Mentoring 2005 AD



Faculty Response

Student Mentoring 2013 AD



Faculty Response

Student Mentoring 2012 AD

In addition to electronic records on Safety Training through UCLA EH&S, **each** research group must keep records in its Laboratory Safety Manual on:

- PPE Training
- PPE Issuance
- Lab-Specific Safety Training
- Safety Incidents
- Process SOPs
- Chemical SOPS

Faculty Response

PPE Records for
each research
group member
*-Certificate of PPE
Training and
Acceptance*

	Laboratory Safety Certificate of PPE Training and Acceptance
	501 Westwood Plaza, 4 th Floor • Los Angeles, CA 90095 Phone: 310-825-5689 • Fax: 310-825-7076 • www.ehs.ucla.edu

For each laboratory employee, use this document to maintain a record of PPE training completed and specific equipment issued. This documentation is to be maintained in the Laboratory Safety Manual.

Employee Name: _____ Print PI: **Craig Merlic** _____ Print
 Employee UID: _____

<p>Certification of PPE Training and Issuance</p> <p>I have reviewed UCLA Policy 905 – Research Laboratory Personal Safety and Protective Equipment and have received training the proper use of PPE as described below.</p> <p>Personal Protective Equipment (PPE)</p> <ol style="list-style-type: none"> 1. When PPE is necessary 2. What PPE is required 3. How to properly don, doff, adjust and wear PPE 4. The limitations of PPE 5. The proper care, maintenance, useful life, and disposal of PPE <p>Employee Signature: _____ Date: _____</p>

The record below indicates that I have either personally received or have access to specified PPE.

<i>Personal Protective Equipment*</i>	<i>Size</i>	<i>Shared Yes/No</i>	<i>Employee Signature</i>	<i>Date of Issuance and Training**</i>
Flame resistant lab coat		No		
Safety Glasses	n/a	No		
Safety Goggles	n/a	No		
Disposable Gloves		No		
Butyl Gloves		No		

Faculty Response

Records of
group meeting
discussions on
safety topics
*-Lab-Specific
Training
Documentation
Form*



Lab-Specific Safety Training Documentation Form

Topic: _____ Date: _____

Instructor: _____ Building/Lab Rooms: _____

Faculty/Supervisor: _____

Items Discussed:

- _____
- _____
- _____
- _____

Employee Name (Print Name)	Employee Signature	Employee ID#

Problem:

How Do You Capture New Researchers in Safety Database?

New postdoctoral fellows, graduate students, staff researchers, and undergraduate researchers arrive nearly every day of the year. How do you capture them in the Safety Training Database without relying on the due diligence of faculty? (Which is bound to fail.)

Faculty Response: Key Form to Capture New Researchers in Safety Database



KEY REQUEST FORM

NAME _____ EMAIL _____
ROOM _____ EXTENSION _____

STATUS:	KEYS TO ROOMS:
_____ Faculty	
_____ Non-Academic Staff (Full-time)	
_____ Visiting Scholar	
_____ Post-Doctoral	
_____ Graduate Student	
_____ Student-Employee (Part-time)	
_____ Undergraduate Researcher	
_____ Other (Explain) _____	

RESEARCH LABORATORY SAFETY ORIENTATION

Keys to research laboratories will only be issued after the following is completed. Person receiving keys must initial each item and sign below along with their faculty advisor.

I have been shown the laboratory and building exits in case of emergency:	
---	--

Faculty Response: Key Form to Capture New Researchers in Safety Database

Keys to research laboratories will only be issued after the following is completed. Person receiving keys must initial each item and sign below along with their faculty advisor.

I have been shown the laboratory and building exits in case of emergency:	
I have been shown the location of the fire alarms:	Initials
I have been shown the location of the laboratory phone:	Initials
I have been shown the location of the laboratory shower AND how to use it:	Initials
I have been shown the location of the laboratory eye wash AND how to use it:	Initials
I have been shown the location of the laboratory fire extinguisher AND how to use it:	Initials
I have been shown the location of the laboratory first aid kit:	Initials
I have been given a copy and read the departmental Emergency Information sheet	Initials
	Initials

SIGNATURE _____ **DATE** _____

SIGNATURE (Faculty Advisor or Supervisor) _____ **DATE** _____
Print Name _____

When this form is complete, please return to the Mail & Information Window, Room 3034, for final approval & issuance of key(s).

Faculty Response: The Challenge of SOPs

In addition to maintaining Standard Operating Procedures for processes and equipment such as:

- Distillations
- Gas cylinders
- Cryogenic equipment
- High temperature equipment
- Low pressure equipment
- High pressure equipment
- etc

Faculty Response: The Challenge of SOPs

All laboratories must ensure compliance with Title 8 requirements for Standard Operating Procedures (SOPs) **and the Settlement Agreement.**

SOPs shall be written for **EACH** chemical used in the laboratory listed in the Chemical Classification List.

Approximately 1000 Chemicals including: Acutely Toxic Chemicals, Regulated Carcinogens, Select Carcinogens, Reproductive Toxins, Explosives, Peroxide Forming Chemicals, Strong Corrosives, Strong Oxidizing Agents, Strong Reducing Agents, Pyrophoric Reagents, and Water Reactive Chemicals.

Faculty Response: The Challenge of SOPs

All laboratories must modify each SOP template, created by UCLA EH&S, for each chemical used in the specific laboratory.

The PI and all personnel responsible for performing the procedures detailed by the SOP shall sign the SOP, acknowledge the contents, requirements and responsibilities outlined.

Copies of all SOPs relevant to that particular laboratory's operations must be maintained with each Laboratory Safety Manual.


The Challenge of SOPs

Steps for Writing Protocols/Procedures

- STEP 1** Give a general range of quantities that can be used in a safe and consistent manner. If necessary, provide two procedures to cover a wider range of quantities.
- STEP 2** Outline the conditions under which the procedure applies.
- STEP 3** Provide a step-by-step explanation of a general experimental process covered within the range of quantities. Provide details on engineering controls and hazards associated with the process.
- STEP 4** Include a specific example procedure describing in detail the experiment. This could be an experimental procedure from your lab notebook.
- STEP 5** If quantities or conditions significantly deviate from the SOP be sure to obtain approval from the PI, and include any changes to an updated SOP.

Protocols/Procedures must include the following components, as illustrated in the example below:

Quantities and conditions that the SOP covers, a summary covering each type of use, and an example of the actual use.



Protocol /Procedure

Quantities covered by this SOP:
0 - 40 g

Conditions covered by this SOP:
0 °C - 50 °C

General:
Sodium hydroxide pellets are used to make aqueous solutions that range in concentration from 0.01M to 1M and volume of 10mL to 1L.
The sodium hydroxide pellets are weighed and then slowly added to a beaker of water that is cooled in an ice bath. **Caution: Dissolution of sodium hydroxide is exothermic!** The solution is then stirred until all the sodium hydroxide is dissolved. It is then allowed to warm to room temperature. The final concentration is determined by titration with potassium hydrogen phthalate. (See SOP on Titrations).

Example:
To make 1L of a 1M sodium hydroxide solution:
40g of NaOH pellets was weighed out in a plastic weigh boat. Slowly, only a few pellets at a time was added to 1L of water in a 2L beaker equipped with a magnetic stir bar in an ice bath. After the last of the sodium hydroxide was added and dissolved, the 2L beaker was removed from the ice bath and allowed to warm to room temperature before being titrated with potassium hydrogen phthalate. The plastic weigh boat was triple rinsed with water (the first wash being disposed as hazardous waste) before being disposed of in the trash.

NOTE
Any deviation from this SOP requires approval from PI.

Sodium Hydroxide (pellets) 5 Date: 10/18/2012

SOPs

Industry verses Academic Perspectives

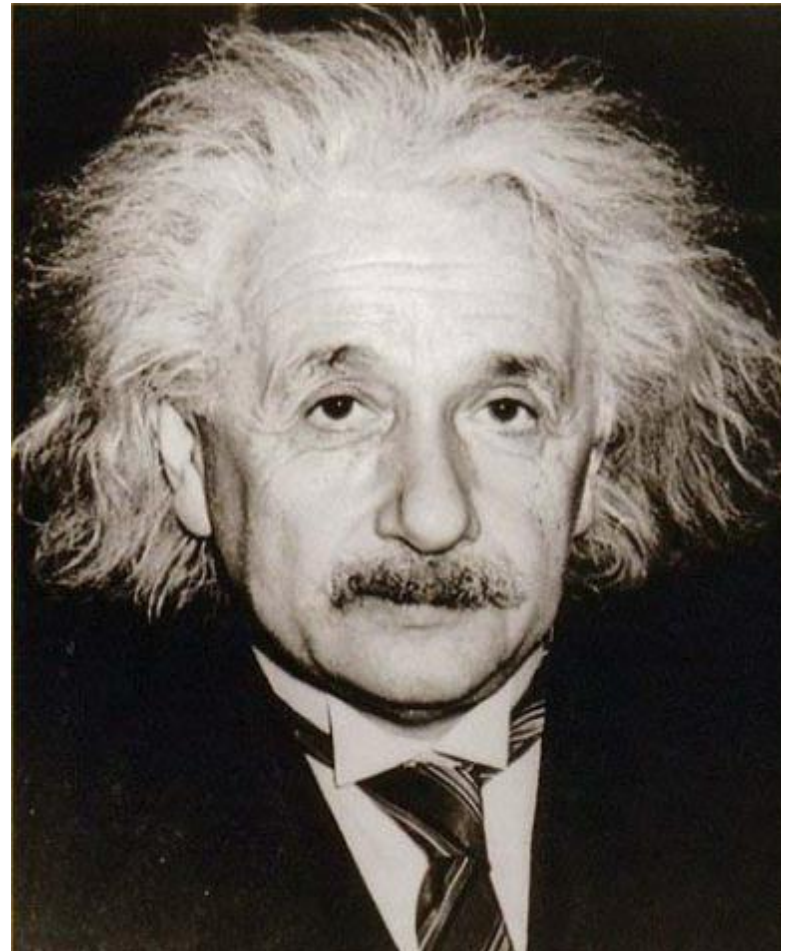
Albert Einstein:

Insanity: doing the same thing over and over again and expecting different results.

UCLA Faculty:

Some chemical use involves “standard procedures”.

More chemical use is unique each time.



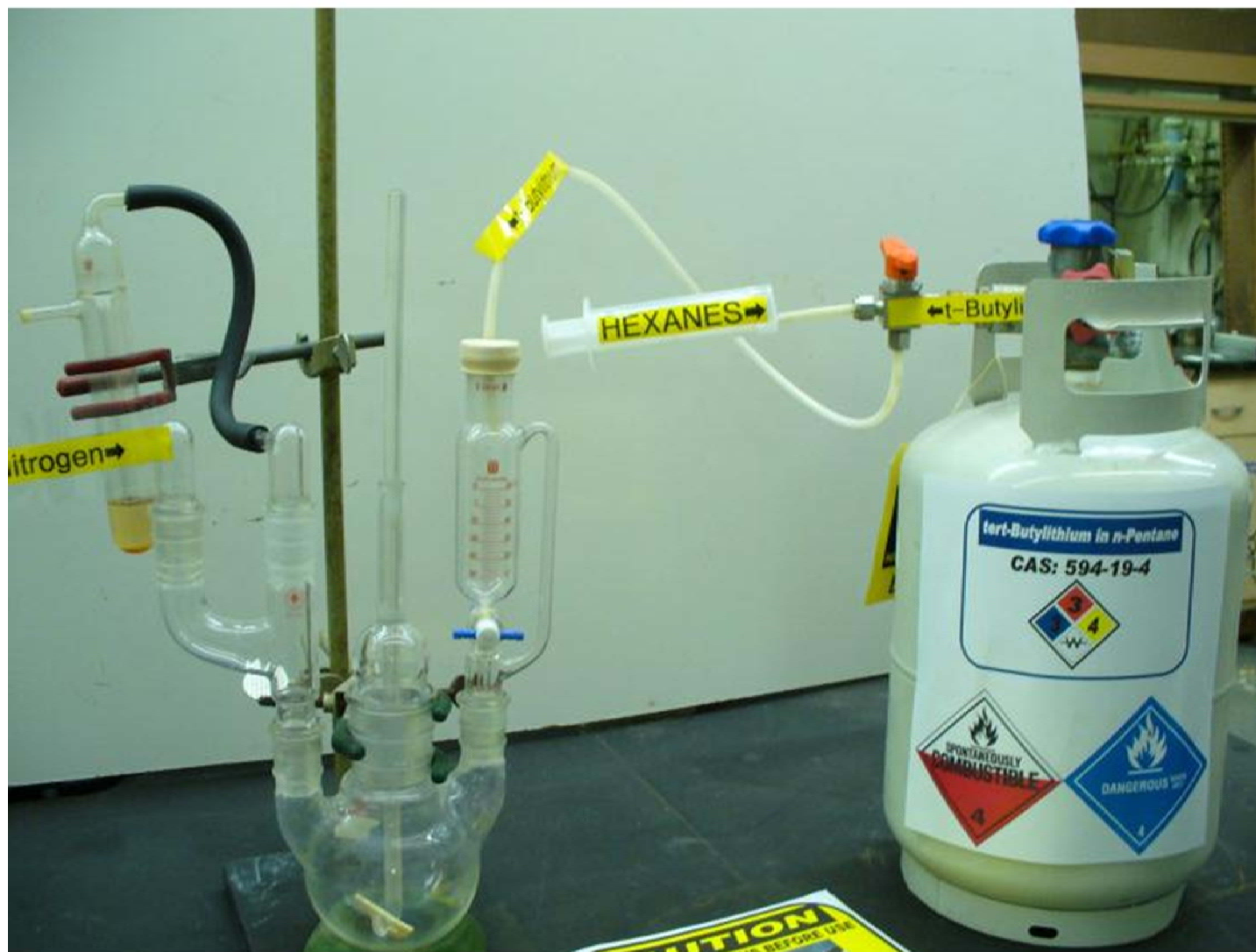
Faculty Response: The Challenge of SOPs

Real Outcome:

Research groups eliminated non-essential “listed” hazardous chemicals

SOPs

Industry verses Academic Perspectives



Faculty Response: PIs or Managers or Both

Laboratory Duties and Responsibilities

The PI/Laboratory Supervisor has responsibility for the health and safety of all laboratory personnel working in their laboratory. The PI/Laboratory Supervisor may delegate the safety duties for which they are responsible, but must ensure delegated safety duties are adequately performed. Specific responsibilities of laboratory personnel include:

Principal Investigator/Laboratory Supervisor

1. Knowing all applicable health and safety rules and regulations, training and reporting requirements and standard operating procedures associated with laboratory safety;
2. Identifying hazardous conditions or operations in the lab, determining safe procedures and controls, and implementing and enforcing standard safety procedures;
3. Establishing standard safety operating procedures (general and protocol specific) and performing literature searches relevant to health and safety that is appropriate for the work;
4. Providing prior-approval for the use of hazardous materials in the PI/Laboratory Supervisor's laboratory;
5. Consulting on use of higher risk materials, such as use of particularly hazardous chemicals, select agents or radioactive materials or conducting higher risk experimental procedures so that special safety precautions may be taken;
6. Maintaining an updated chemical and hazardous material inventory for the laboratory;
7. Ensuring laboratory personnel under his/her supervision have access to and are familiar with the appropriate Laboratory Safety Manual(s);
8. Training all laboratory personnel he/she supervises to work safely with hazardous materials and maintain written records of laboratory specific training in the appropriate Laboratory Safety Manual(s). Electronic records are also encouraged. Training must include informing laboratory personnel of the location and availability of Hazard Information;
9. Promptly notifying EH&S and/or Facilities Management should he/she become aware that work place engineering controls (e.g., fume hoods) and safety equipment (e.g., emergency showers/eyewashes, fire extinguishers, etc.) become nonoperational;
10. Ensuring the provision and maintaining in functional working order all appropriate personal protective equipment (PPE) (e.g., lab coats, gloves, eye protection, etc.);
11. Conducting periodic self inspections of laboratory and maintaining records of inspections, as required;
12. Prompt reporting of laboratory accidents and injuries to Risk Management and EH&S. Serious injuries MUST be reported to EH&S within 8 hours of the incident;
13. Provide funding for medical surveillance and/or medical consultation/examination for laboratory personnel, as required;
14. Informing facilities personnel, other non-laboratory personnel and any outside contractors of potential lab-related hazards.
15. Identified potential hazards should be minimized to provide a safe environment for repairs and renovations.

Laboratory Personnel

1. Reviewing and following relevant laboratory safety manual(s) (e.g., Radiation Safety, Biosafety, etc);

Faculty Response: Underage Researchers

Policy on Minors in the Laboratory:

- Parents/Guardians must sign Release of Liability, Waiver of Claims, Express Assumption of Risks, and Hold Harmless Agreement
- PI must notify parents of potential hazards in the laboratory
- Minors must follow all safety rules
- Minors can never work in any laboratory environment without direct, immediate adult supervision from the sponsor or someone designated by the sponsor

Faculty Response: Scrutiny of Lab Operations

MUCH greater scrutiny of Laboratories by EH&S:

- Housekeeping
- Chemical storage
- Chemical segregation
- Secondary containment
- Hazard labels
- Rebottling
- Strict time limits on peroxide forming chemicals
- Controls on carcinogens, acute toxins, reproductive toxins
- Project underway for campus-wide chemical inventory
- And many other issues...



Faculty Response

Professor Maynard:

“I do an inspection of my labs every Monday afternoon. I also had to change my group Lab Safety Officer because he was not aggressive enough.”

Faculty Response

Professor Maynard:

“I do an inspection of my labs every Monday afternoon. I also had to change my group Lab Safety Officer because he was not aggressive enough.”

Professor Garcia-Garibay:

“In my research group everyone was mad at the Lab Safety Officer. So now each person is required to be the Lab Safety Officer twice a month and complete two inspections a day.”

Faculty Response

Delegation of Chain of Command

Professor Miguel Garcia-Garibay, Chair
Department of Chemistry and Biochemistry
UCLA
Los Angeles, California 90095-1569

Dear Miguel,

I am writing to inform you that I will be out of town for two days, Wednesday-Thursday, April 3-4, 2013 on business in San Francisco. I will miss no classes. I will be back at UCLA on Friday, April 5, 2013.

In my absence, our normal “chain of command” structure will be used, namely:

For Administrative Matters: Mikhail Guzaev (Group Leader) (825-0549; cell: 760-224-9790)

For Group Safety Matters: Gloria Lee (Group Safety Officer) (825-0549; cell: 650-238-7291)

For Matters of Safety and Emergencies: Professor Craig A. Merlic (825-5466; cell: 310-992-4792)

As always, in any emergency, you can call me on my cell phone: 310-770-4613.

Sincerely,



Michael E. Jung
Professor of Chemistry

Graduate Student Response



Merlic Lab Personnel 2002-2012



Graduate Student Response

Requirements:

- Increased training – Initial, Annual, and Ongoing
- Increased expectations
- Increased responsibilities

Front line for implementation of safety practices!

Graduate Student Response

Requirements:

- Increased training – Initial, Annual, and Ongoing
- Increased expectations
- Increased responsibilities

Front line for implementation of safety practices!

Outcome:

- Changed behavior regarding personal clothing
- Changed behavior regarding PPE
- Changed attitudes about safety procedures (mostly)
- Have active roles as Laboratory Safety Officers

Undergraduate Student Response

Flame resistant laboratory coats required in **ALL** chemistry and biochemistry laboratory lab courses. (Along with safety glasses, long pants, and closed-toe shoes.)

(Regular lab coats have been required for more than twenty years.)



Student Contrasts

UNIVERSITY OF NEBRASKA-LINCOLN  UNL Login

 Department of Chemistry
COLLEGE OF ARTS & SCIENCES

UNL ▶ College of Arts & Sciences ▶ Department of Chemistry ▶ Undergraduate Pro

Department Faculty & Research Graduate Program Unde

Undergraduate Program Overview



UNL Organic Chemistry Research Lab



Student Response



>48,000 Bicycle injuries annually in US

>600 Bicycle deaths annually (about 100 in California)

95% of those killed were not wearing helmets

88% reduction in brain injuries for bicyclists wearing helmets

PPE – UCLA Policy 905

Policy regarding Personal Protective Equipment (PPE) requirements for all campus research laboratory faculty, staff and students.

- Created by the Laboratory Safety Committee
- Issued as official policy through the Chancellor's Office

PPE – UCLA Policy 905

Safety Requirements:

- Full length pants, or equivalent, and close-toed shoes must be worn at all times by all individuals that are occupying the laboratory area.
- Protective gloves must be worn while utilizing any hazardous chemical, biological or unsealed radiological material.
- Laboratory coats, or equivalent, are required to be worn while working on, or adjacent to, all bench top procedures utilizing hazardous chemicals, biological or unsealed radiological materials.

PPE – UCLA Policy 905

Safety Requirements:

- Flame resistant laboratory coats must be worn when working with pyrophoric materials or large amounts (greater than four (4) liters) of flammable liquids.
- Laboratory coats may not be worn outside of a laboratory unless the individual is traveling directly to an adjacent laboratory work area.
- Each department or research unit shall be responsible for providing professional laundry services as needed to maintain the hygiene of laboratory coats.

PPE – UCLA Policy 905

Modified for Department of Chemistry & Biochemistry

Safety Requirements:

- Flame resistant laboratory coats must be worn when working with pyrophoric materials or **ANY** amount of flammable liquids.

PPE – UCLA Policy 905

Safety Requirements:

- Eye protection or equivalent engineering controls must be used while handling any hazardous chemical, biological or unsealed radiological materials.
- Some operations and procedures may warrant further PPE, as indicated by the MSDS, the standard operating procedures for the material being used, facility policies, regulatory requirements, or the EH&S Laboratory Hazard Assessment Tool.

UCLA Unannounced PPE Inspections



Dr. James Gibson

Professor Joseph Rudnick

Chancellor Gene Block

Colin Dimock

Professor Nancy Wayne

Director, UCLA Office of Environment, Health & Safety

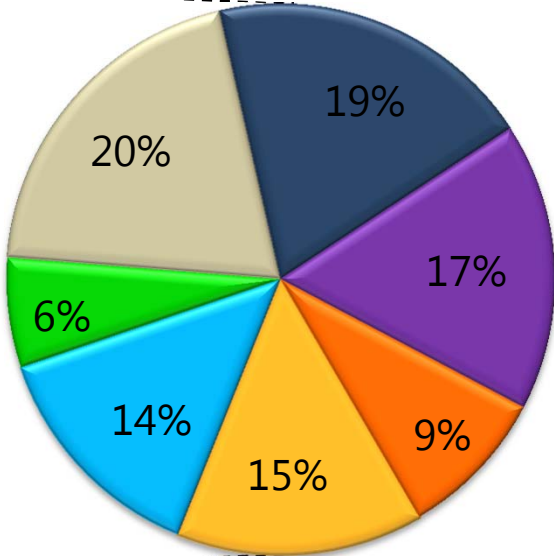
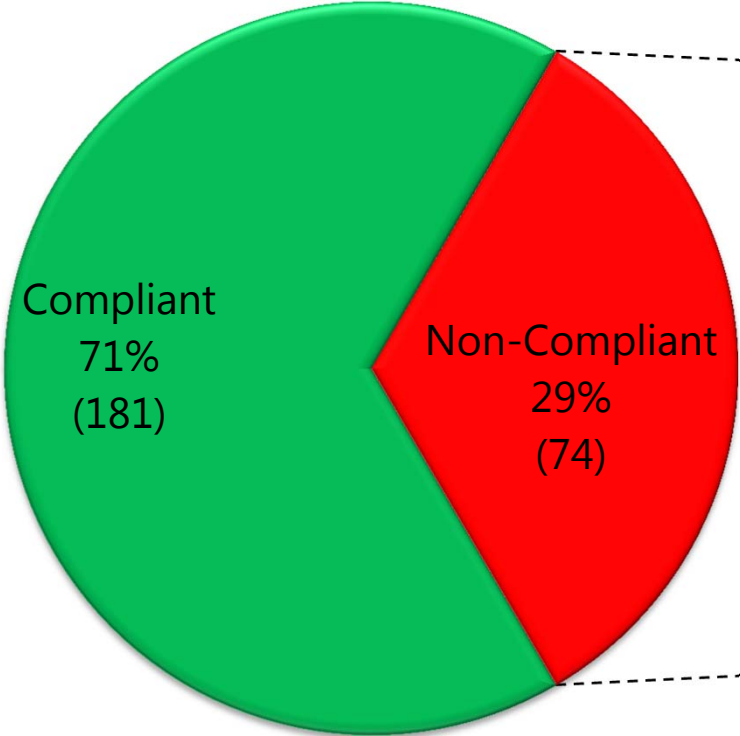
Dean of Physical Sciences

UCLA Chancellor

EH&S Research Safety Division Manager

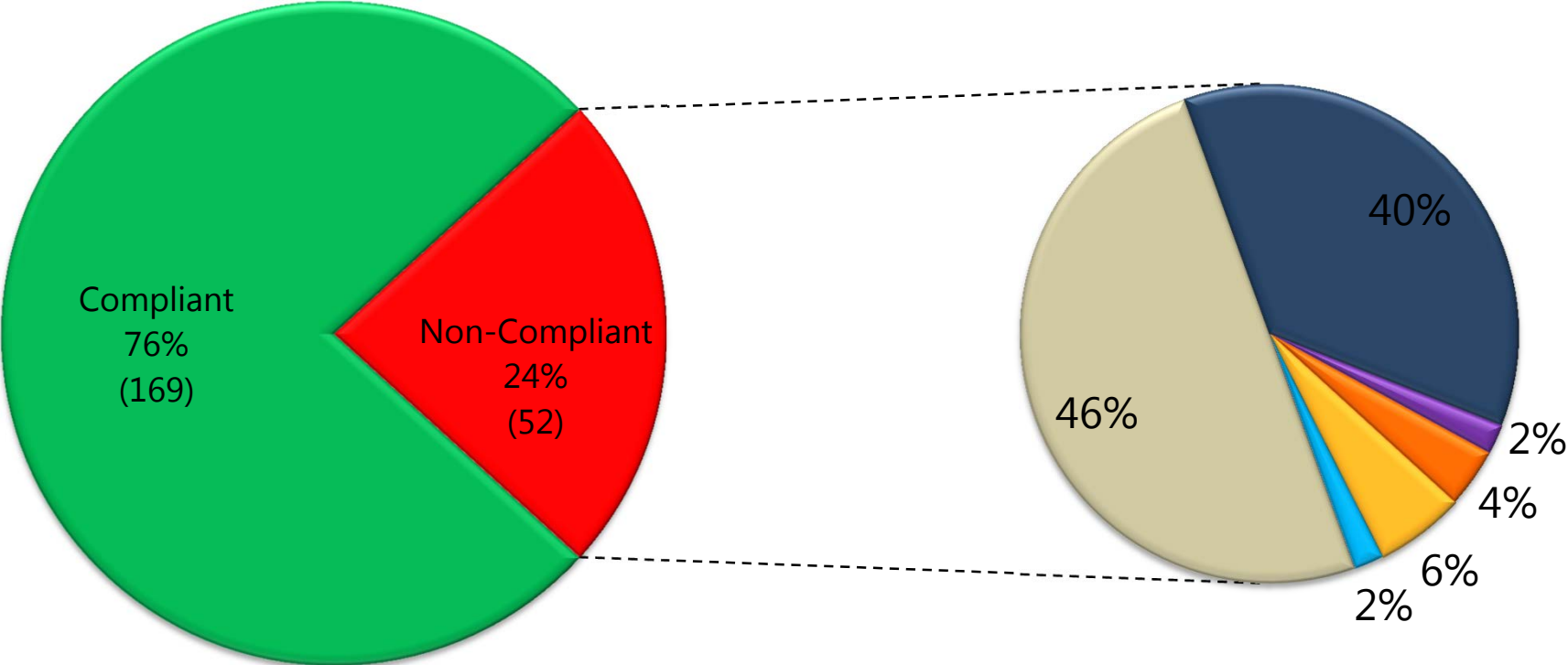
Associate Vice Chancellor for Research, Laboratory Safety

UCLA Unannounced PPE Inspections 2010



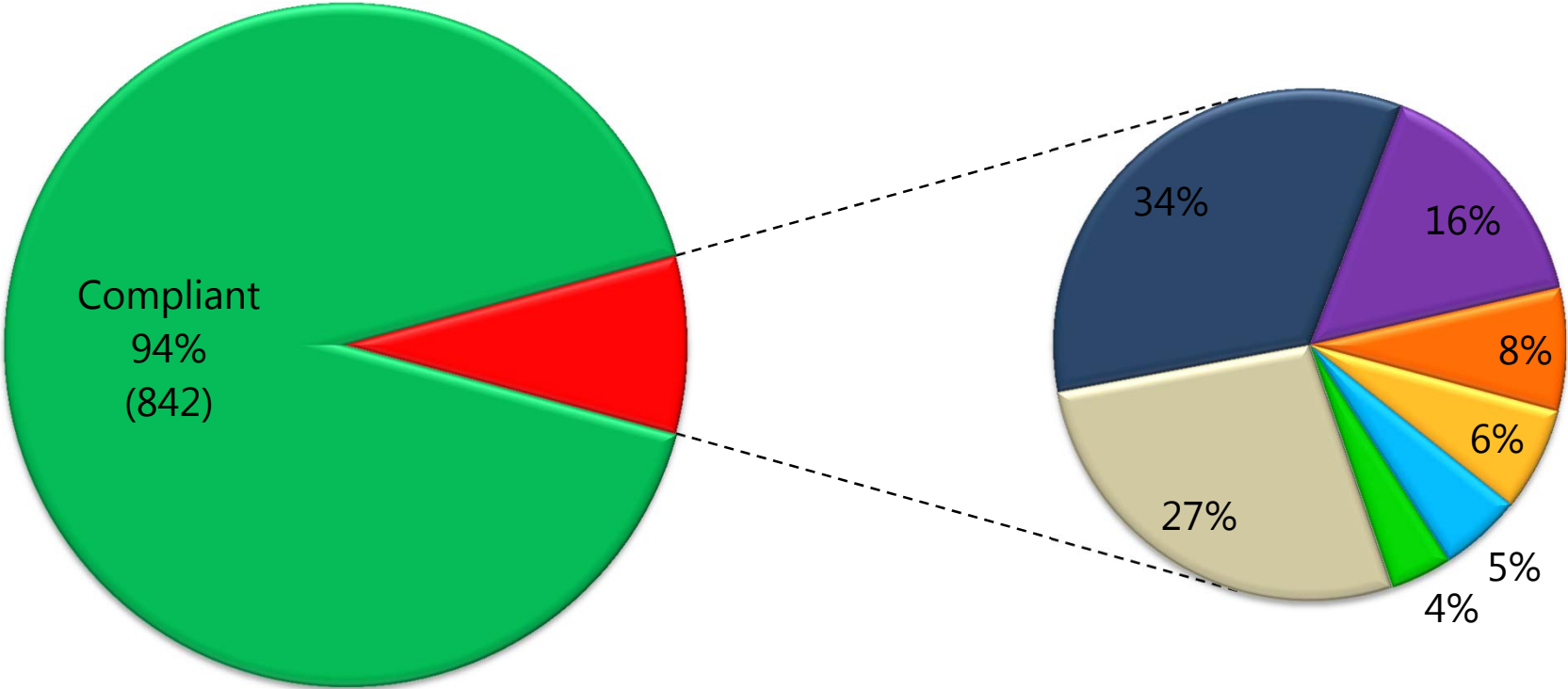
- Lab coats
- Non-PPE
- Shorts/Skirts
- Eye Protection
- Food/Drink
- Gloves
- Open-Toe Shoes

UCLA Unannounced PPE Inspections 2011



- Lab coats
- Non-PPE
- Shorts/Skirts
- Eye Protection
- Food/Drink
- Gloves
- Open-Toe Shoes

UCLA Unannounced PPE Inspections 2012



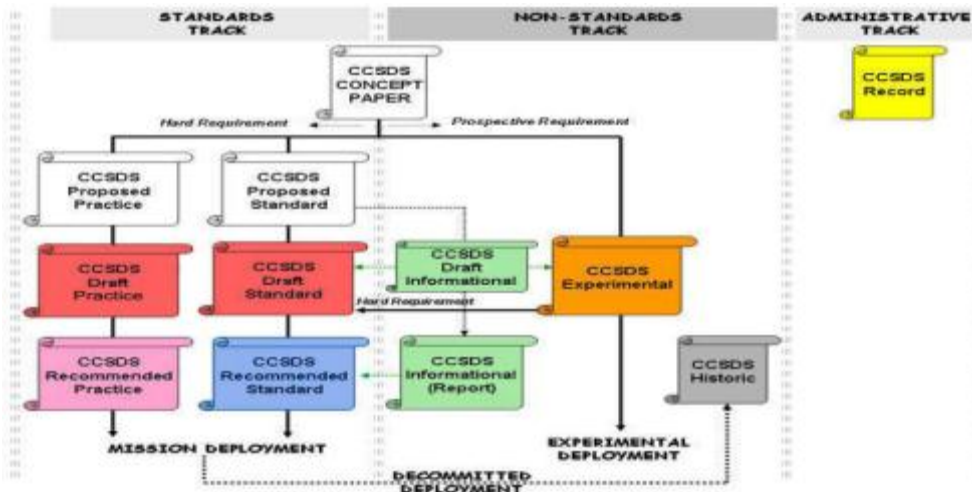
- Lab coats
- Non-PPE
- Shorts/Skirts

- Eye Protection
- Food/Drink

- Gloves
- Open-Toe Shoes

Challenges

- Funding
- Consistent Standards
- Clear and Explicit Rules
- Hazard Assessments
- Collaborative Relationships
- SOPs
- Training and enforcement



Conclusions

- Academic lab safety can change quickly
- Expectations lead to Compliance
- Compliance leads to a Culture of Safety
- EH&S must strike a working balance of enforcement and assistance
- Transferring industrial safety practices to academic labs not easy
- Faculty compliance is an ongoing challenge

Acknowledgements

- Dr. James Gibson
 - Director, UCLA Office of Environment, Health & Safety
- Professor Nancy Wayne
 - Associate Vice Chancellor for Research, Laboratory Safety
- Dr. Petros Yiannikouros
 - Chemical Hygiene Officer
 - Research Safety Division Supervisor
- Professor Ken Bradley
 - Chair, UCLA Laboratory Safety Committee
- Professor Miguel Garcia-Garibay
 - Chair, Department of Chemistry and Biochemistry