BK3.2 - Laboratory Safety at UC

Ken Smith, CHP CIH

Executive Director for EH&S,

UCOP Risk Services

Environmental Health and Safety

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HISTORY

- Nineteen years after the University of California was chartered in 1868 as California's land-grant institution under the Morrill Act, the Hatch Act of 1887 linked research and public service to instruction as inseparable elements of the University's mission.
- It allocated federal funds to land-grant colleges for research at agricultural experiment stations and making the latest agricultural methods publicly available.
- The Hatch Act, after many reauthorizations and expansions, still provides UC funding for agricultural research and cooperative extension.

UC's Mission

"The distinctive mission of the University is to serve society as a center of higher learning, providing long-term societal benefits through transmitting advanced knowledge, discovering new knowledge, and functioning as an active working repository of organized knowledge. That obligation, more specifically, includes undergraduate education, graduate and professional education, research, and other kinds of public service, which are shaped and bounded by the central pervasive mission of discovering and advancing knowledge."

We **teach**

We do **research**

We provide **public service**

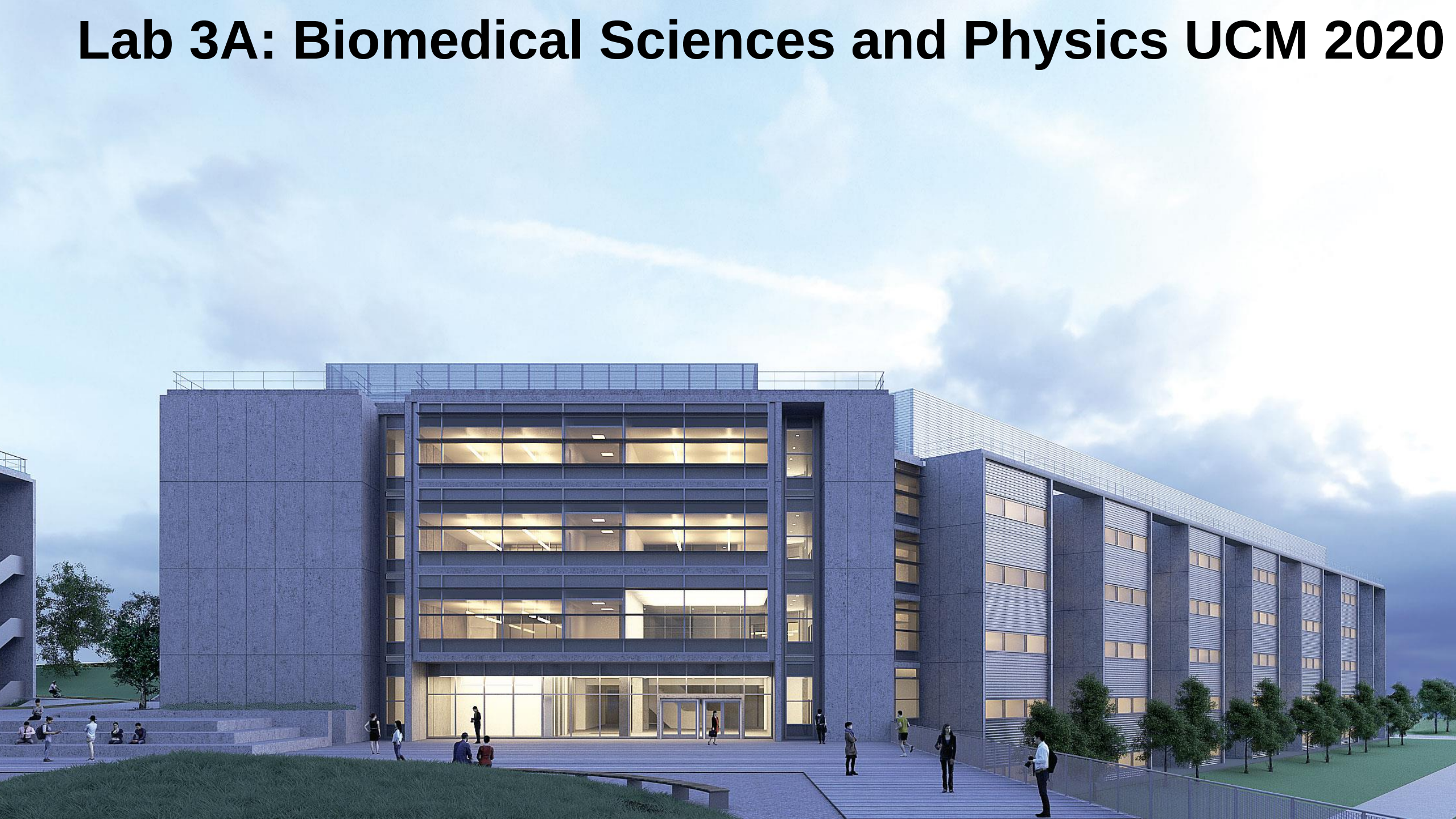
SIZE AND SCOPE OF UC'S RESEARCH PROGRAMS

- UC performs nearly one-tenth of the nation's academic research.
- During 2016-17, direct expenditures for research at UC totaled over $4.5 billion, with federal funds providing about half. Private sources account for about 17 percent — 11 percent from nonprofit organizations and 6 percent from corporate sponsors.
- In 2016–17, UC's indirect cost recovery was just over $1 billion, with the great majority from research activities.

UC's Research Workforce, 2016-2017, FTE

Students	4,310.6	16%
Postdoctoral researchers	4,337.6	16%
Other staff	11,203.0	41%
Other academics	4,546.6	17%
Faculty	3,068.4	11%
Grand total	27,466.2	100%

Lab 3A: Biomedical Sciences and Physics UCM 2020




starcourt
Mall


starcourt
REGIS HAIRSTYLIS
GREAT COOKIE

Issues with Compliance

- Who is responsible?
  - Who is the 'Employer?'
    - Who is doing the work?
    - Who is the supervisor? Is there a "supervisor"?
- Who's going to pay?
  - Fines
  - Controls & protection *(engineering through PPE)*
  - Exposure monitoring *(initial & periodic)*
  - Written documents
  - Signs
  - Equipment

Research Laboratories

Teaching Laboratories

Clinical Laboratories

Field Laboratories

Labs are Different

- Cal/OSHA Lab Standard
  - OSHA & Cal/OSHA Lab Standard are essentially identical
  - www.dir.ca.gov/Title8/5191.html
- EPA Academic Lab Rule
  - Not yet adopted by California
  - Flexibility afforded academic laboratories:
    - delay in making waste determinations, longer accumulation times, labeling simplified, encourages lab cleanouts – useful for small quantity generators
- www.epa.gov/epawaste/hazard/generation/labwaste

Cal/OSHA Laboratory Standard

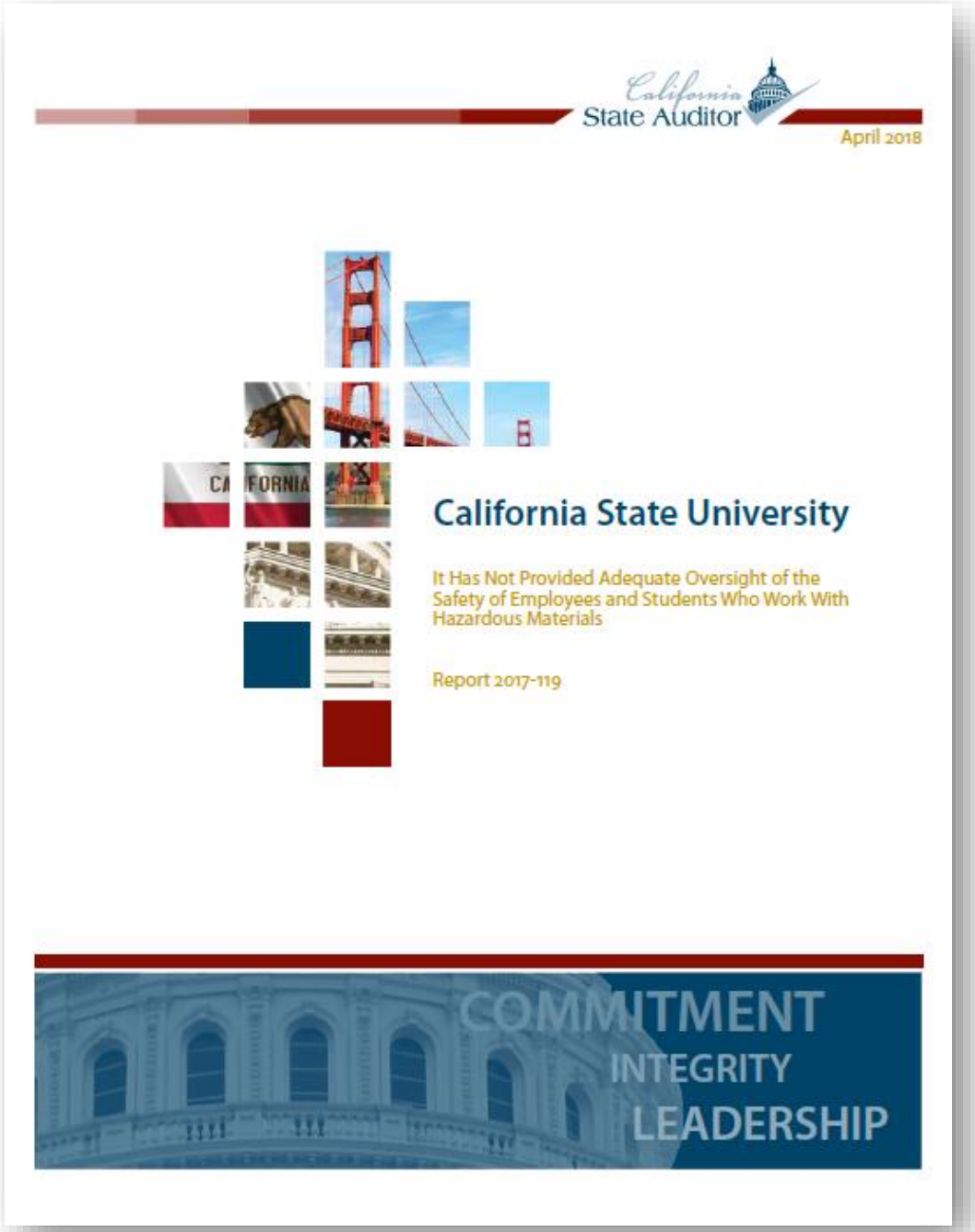
- Occupational regulations for labs that uses chemicals is the "Laboratory Standard"
- Requires:
  - Employer limit exposure
    - www.dir.ca.gov/Title8/5155table_ac1.html
  - Initial and periodic exposure monitoring
  - Written Chemical Hygiene Plan
    - Capable of protecting employees from health hazards
    - Capable of keeping exposures below the limits
    - Readily available to employees

California State Auditor

April 2018

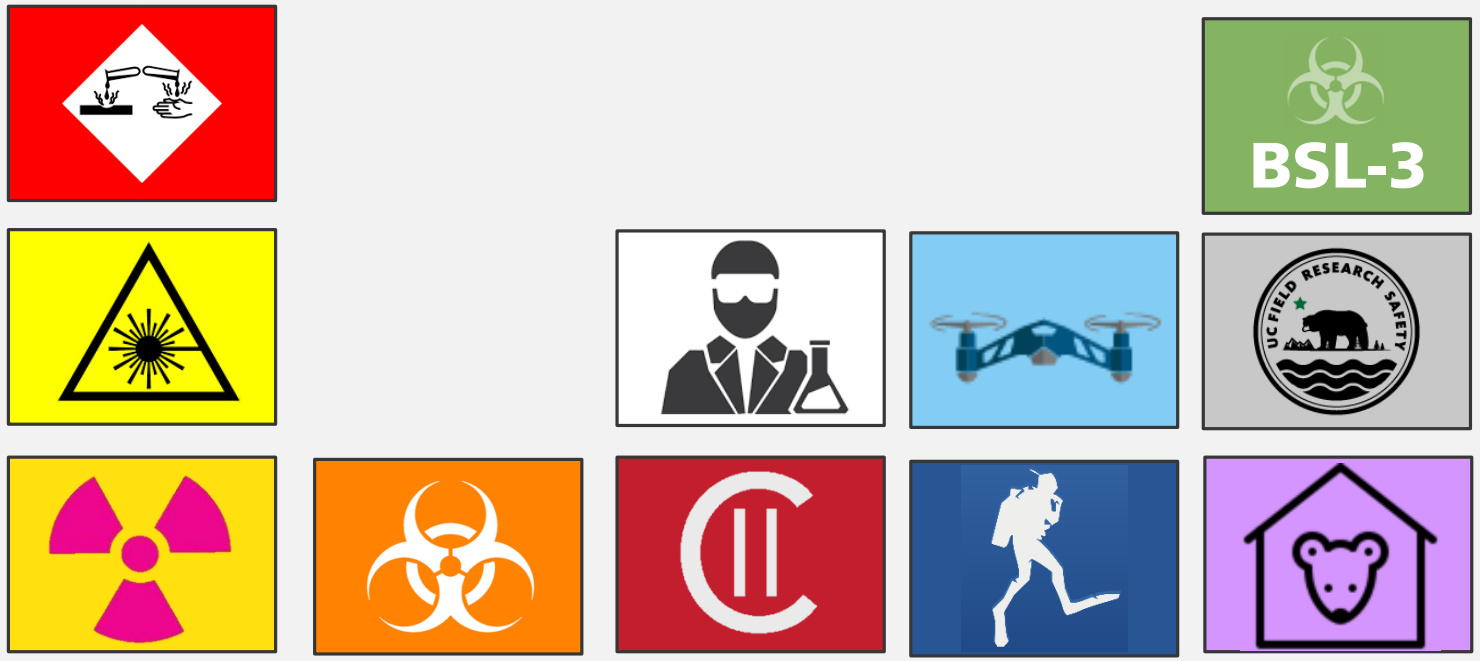
California State University

KCRA 3



http://auditor.ca.gov/pdfs/reports/2017-119.pdf

EH&S RESEARCH SAFETY ELEMENTS



Chemical Hygiene

Description	Overseeing compliance with the California Laboratory Standard that covers the use of chemicals that pose a health hazard. UC also expands its authority to cover chemicals that have physical hazards.
Lead Specialist	Chemical Hygiene Officer (CHO)
Oversight Committee	Some campuses use a Chemical Safety Committee.
Major Programs	Highly Toxic Gases, Reproductive Health Hazards, Carcinogen, Hazard Communication Standard, Pyrophoric Safety, Chemical Hygiene Plan Exposure Assessment, Standard Operating Procedures (SOP), Nanomaterial,

Chemicals

Last updated: Oct 28 2019 2:59AM

Location
Multiple selections

Received Date
10/6/1058 4/10/2207

Chemical Search
All

Department
All

Inventory
All

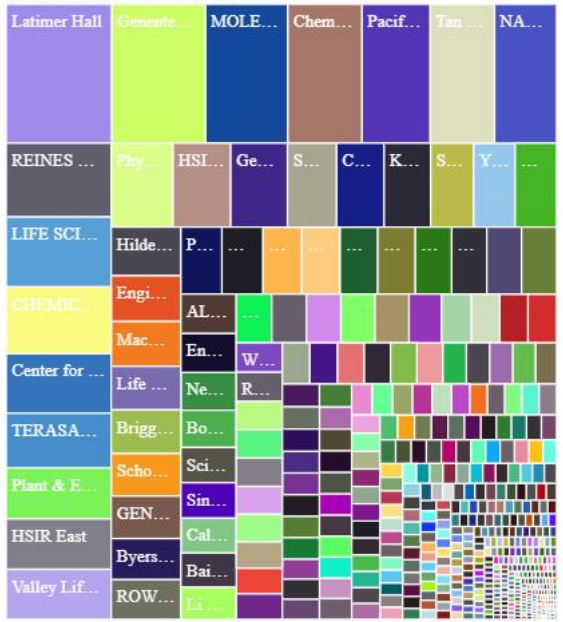
Facility
All

Building
All

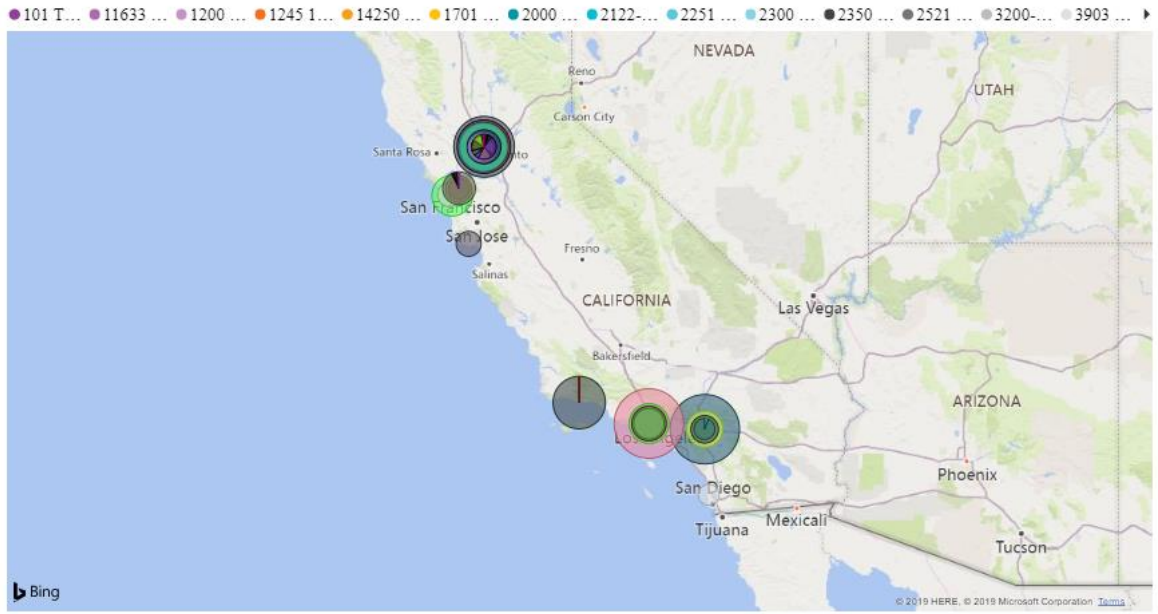
Room
All

1M	5,476	0	74K	12.66bn	832 Buildings / 107 Floors / 9,705 Rooms / 3,883 Inventories
Current Container Count	Expired Containers	Checkout Containers	Unique Chemicals	Normalized Kilogram	

Containers by Building/Floor/Room/Sublocation



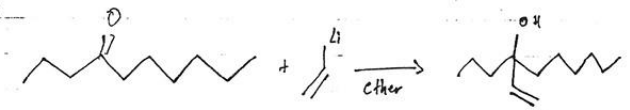
Container Location



FILTERS

Overview | Comprehensive

12/21/08



Step 1: generate  via  2x t-BuLi, Ether → 

Reagent	mol eq.	mmol	g/y added
- Vinyl Lithium	1.90	128.331	—
- 4-undecene	1.00	67.53	11.7 mL (0.821 g/mL)

Reagent	mol eq.	mmol	g/y added
Vinyl Bromide	1.00	~~42.777~~ 123.529	9.0 mL
t-BuLi Sol'n Pentane	2.10	268.50	


RQ
BIOFIT

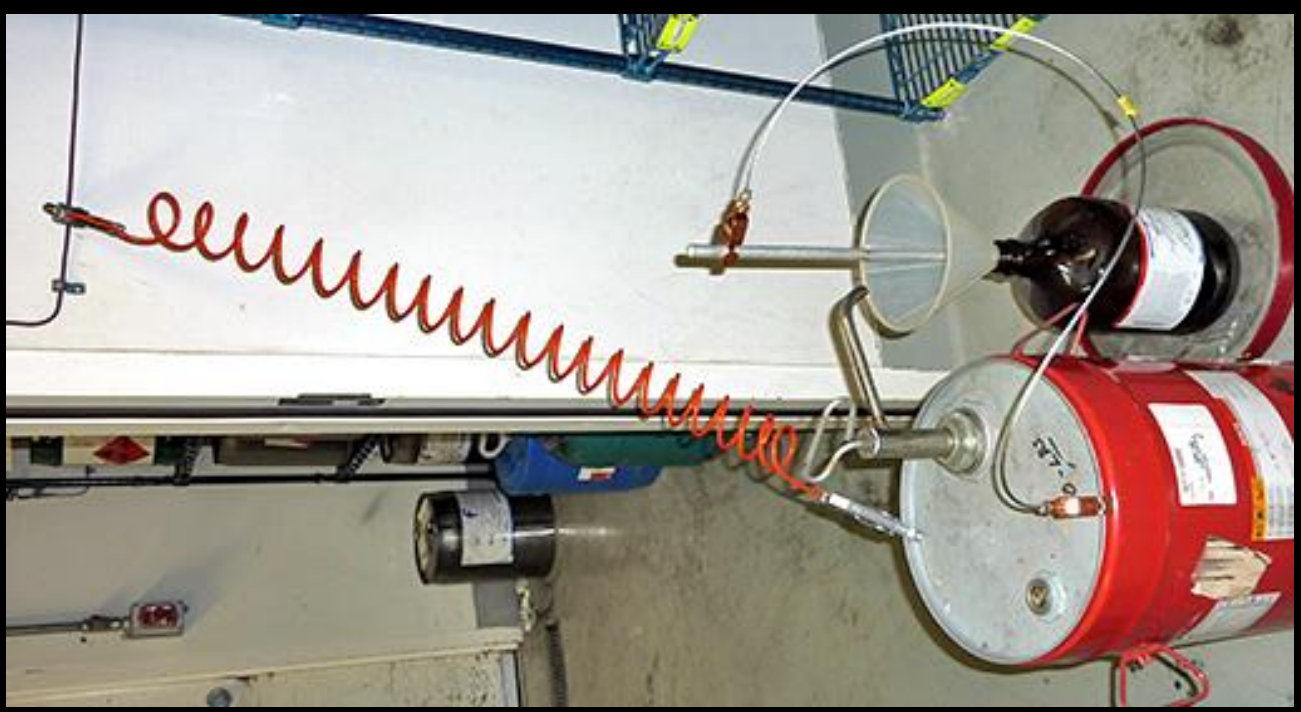
2008 UCLA Case

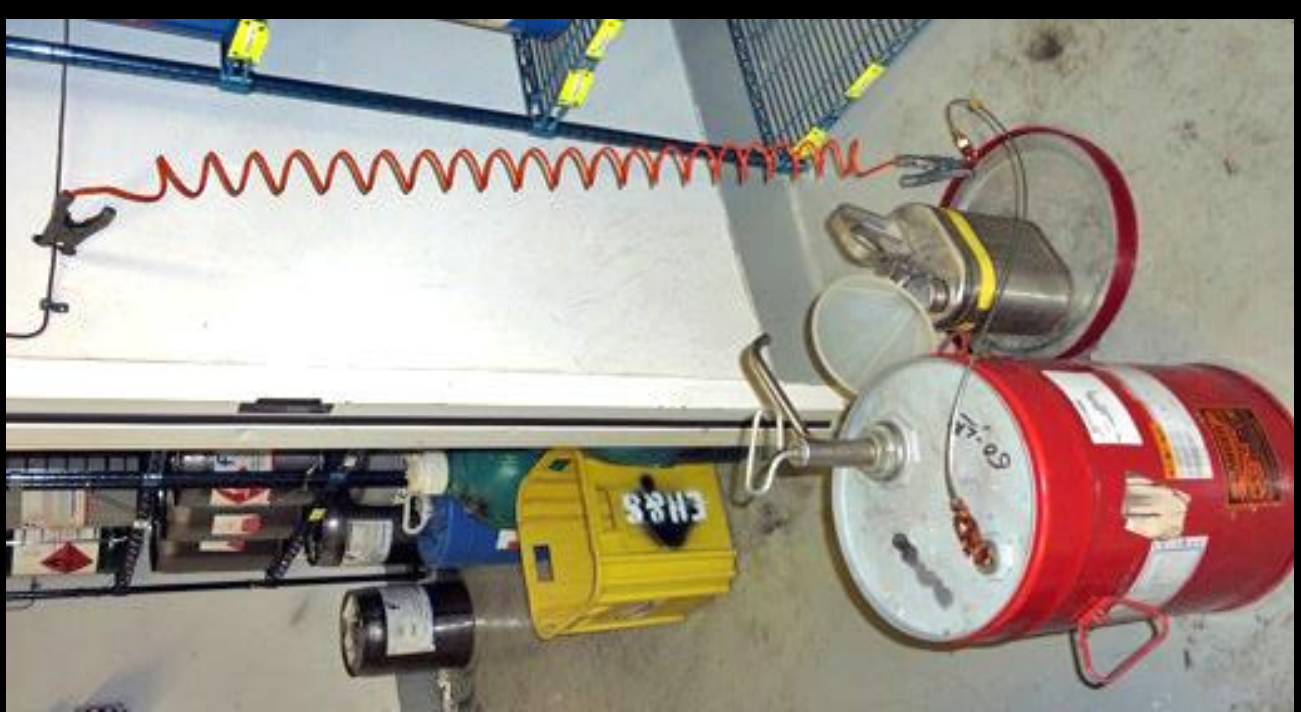
- PARADIGM SHIFT: Completely reframed university expectations and concerns regarding campus safety
- FOR THE FIRST TIME: Both faculty member and a university held accountability under criminal legal proceedings
- CRIMINAL CHARGES: Charges of criminal liability in Sheri Sangji's death
- SETTLEMENT: Agreement reached with Professor Harran after 4 years of criminal court proceedings, charges to be dropped if settlement terms met
- REPUTATIONAL IMPACT: Both to Professor Harran and to UCLA
- COSTS: In excess of $9M paid out by university
- CIVIL CHARGES: Possible civil charges?
- SANGJI FAMILY ADVOCACY: ACS meeting in Boston, Fall 2015


UN1265,
PENTANES, 3, PG II


3510
BRANSON

The graduate student involved was wearing goggles, gloves, and a flame-resistant Nomex lab coat and did not sustain any injuries






8:29 57°
KCAL 9
KCAL9.com

Personal Protective Equipment (PPE)

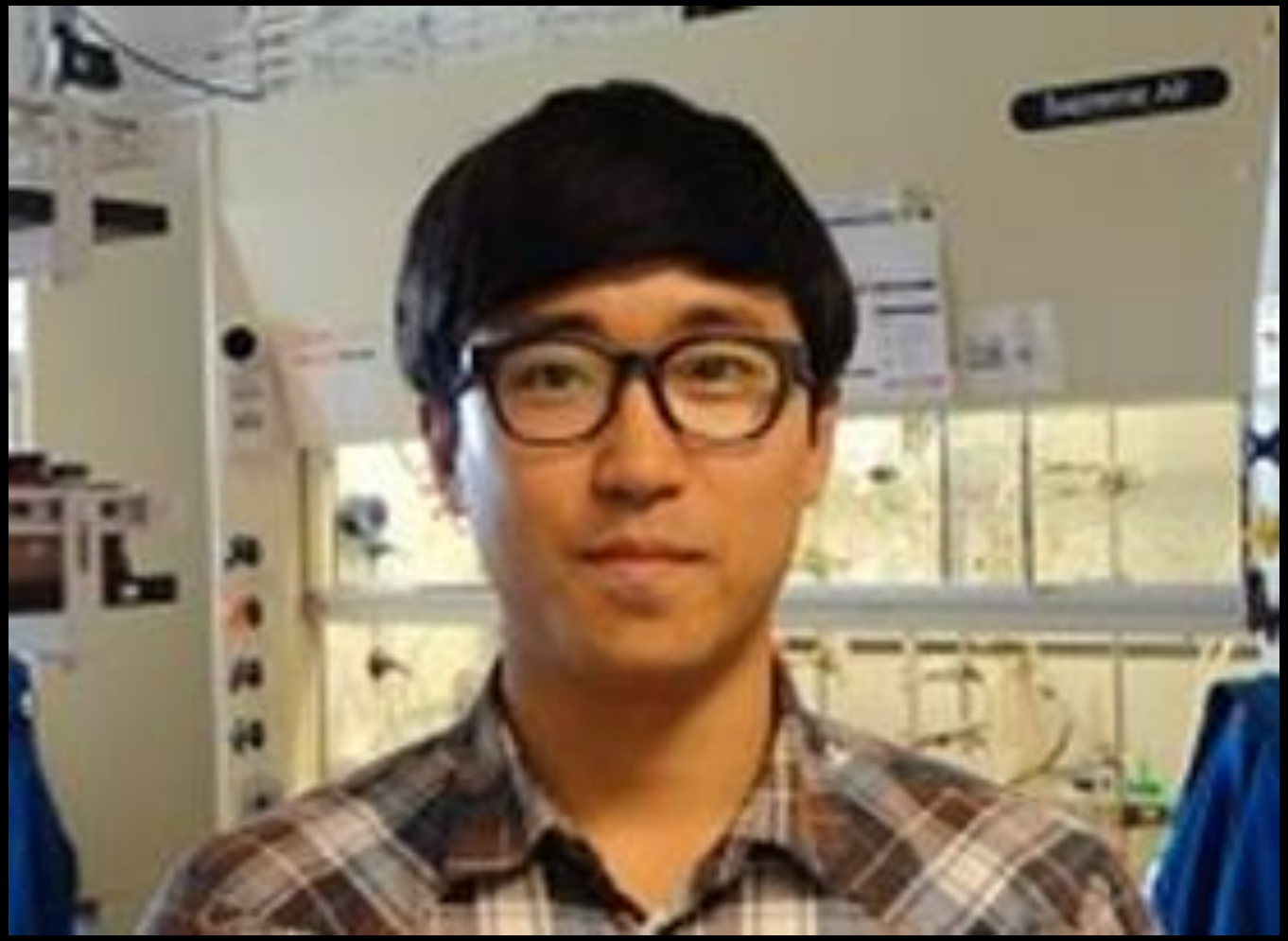
Description	Oversees the selection, fitting and issuance of PPE to researchers.
Lead Specialist	PPE Coordinators.
Oversight Committee	
Major Programs	Lab Coats, Safety Glasses, Gloves, Flame-resistant (FR), Slip-resistant shoes, specialty PPE.


HAZARDOUS


SAFE

Why PPE?


Elimination
Substitution
Isolation
Engineering
Administrative
PPE
UNIVERSITY OF CALIFORNIA



University of Utah

- In February 2018, an incident in the University of Utah's Chemistry Department led to chemical burns for two lab personnel.
- This incident involved air-reactive chemicals that combust when exposed to air.
- In this incident, the researcher conducting the experiment and their spotter, who had a fire extinguisher, each received burns.

92-675 Nitrile glove FR test

sample	burn time after flame	melting/ drips	burn/char length	pass / fail
92-675	>45	none	consumed	Fail
92-675 over 70-200	45	none	consumed	Fail
92-675 over 80-813	>45	none	consumed	Fail

Nitritle glove

Exposed to flame, nitrile gloves make **good torches**, and the flames don't go out until **all** material is **consumed**

ASTM D6413 FR test; 12 second, 37 mm flame
NFPA 2112 grading; pass is < 2 seconds afterflame, no molten drips, less than 4 inches char damage

92-675 over 80-813

92-675 over 70-200

SU gloves underneath FR liners

sample	burn time after flame	melting/ drips	Burn /char length	pass / fail
25-101 under 80-813 fingers	0.88	None	<1 inch	**Pass**
25-101 under 80-813 folded	0.72	None	<1	**Pass**
25-101 under 70-200 fingers	0.57	None	<1	**Pass**
25-101 under 70-200 folded	0.49	None	<1	**Pass**
92-675 under 80-813 fingers	0.72	None	<1	**Pass**
92-675 under 70-200 fingers	0.77	none	<1	**pass**
**In all cases, the SU underglove was intact after flame exposure				

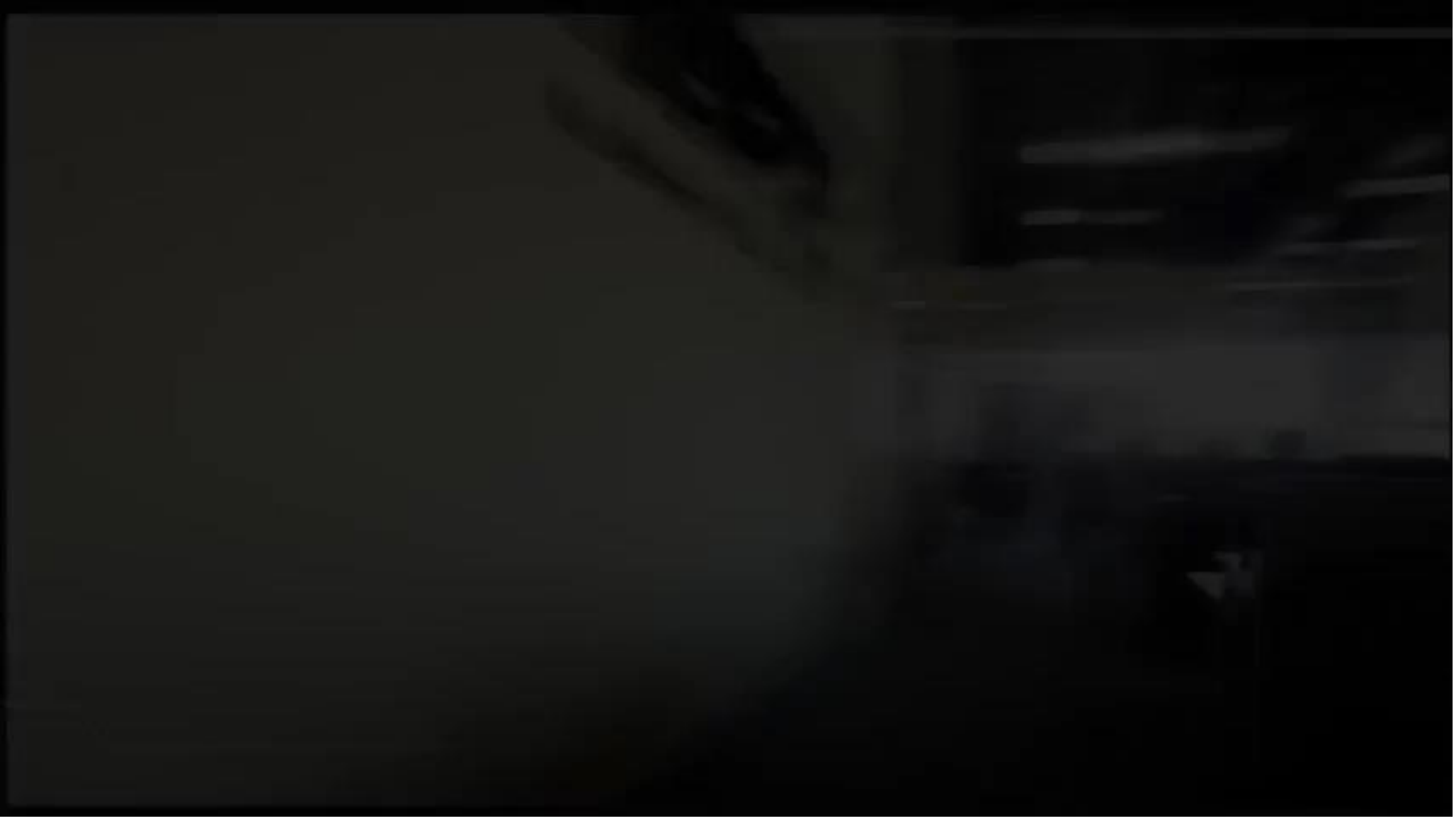
ASTM D6413 FR test; 12 second, 37 mm flame
NFPA 2112 grading; pass is < 2 seconds afterflame, no molten drips, less than 4 inches char damage

80-813 over 25-101

WHAT THE
ARE THOSE

Biosafety

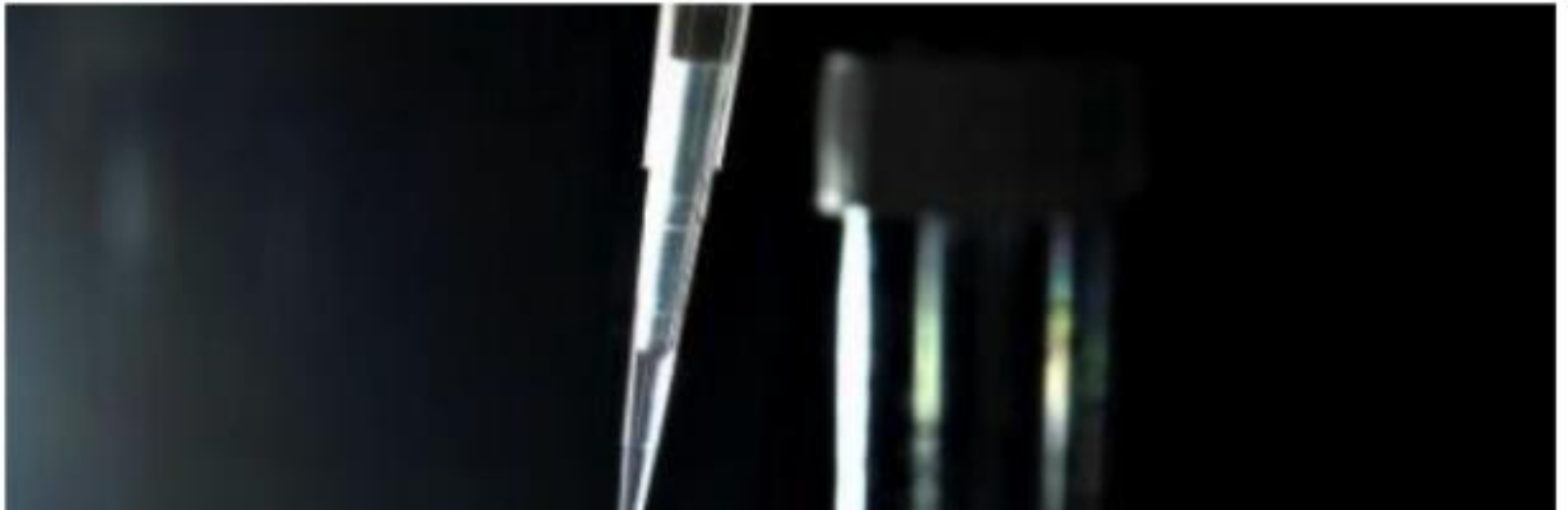
Description	Responsible for all biological and etiological agent use on the campus.
Lead Specialist	Biosafety Officer (BSO).
Oversight Committee	Institution Biosafety Committee (IBC)
Major Programs	Risk group agents 1-3 (Risks groups 2 and 3 having the potential to cause disease in humans), bloodborne pathogens, aerosolized transmissible disease, recombinant and synthetic DNA research.



Local

San Francisco VA Lab Faces Sanctions For Researcher's Death

February 20, 2013 9:30 PM



Five People Accidentally Exposed to Live Anthrax

June 11, 2004

Share

http://nti.org/2381GSN

Five researchers at a California hospital laboratory were exposed to anthrax while working on a vaccine to protect children from infection, the Associated Press reported yesterday (see *GSN*, June 8).

The workers at Children's Hospital Oakland Research Institute believed they were working with syringes carrying a dead form of the virus. However, the Southern Research Institute in Frederick, Md., had shipped live anthrax, said hospital spokeswoman Bev Mikalonis.

High Containment Laboratories

Description	Responsible for all biological and etiological agent use on the campus.
Lead Specialist	High Containment Laboratory Director (HCLD).
Oversight Committee	Campus: High Containment Laboratory Oversight Group (HCLOG), Systemwide: High Containment Laboratory Oversight Committee (HCLOC).
Major Programs	Select Agents and Toxins, Risk Group 3 Organisms 34 HCLs: BSL-3: 21, Animal BSL-3: 8, Arthropod BSL-3: 3, Plant BSL-3: 2. 17 different agents ~315 HCL trained individuals.

som.uci.edu/bsl3-training

Partnership with NIH National Biosafety & Biocontainment Training Program (NBBTP)

som.uci.edu/bsl3-training

som.uci.edu/bsl3-training

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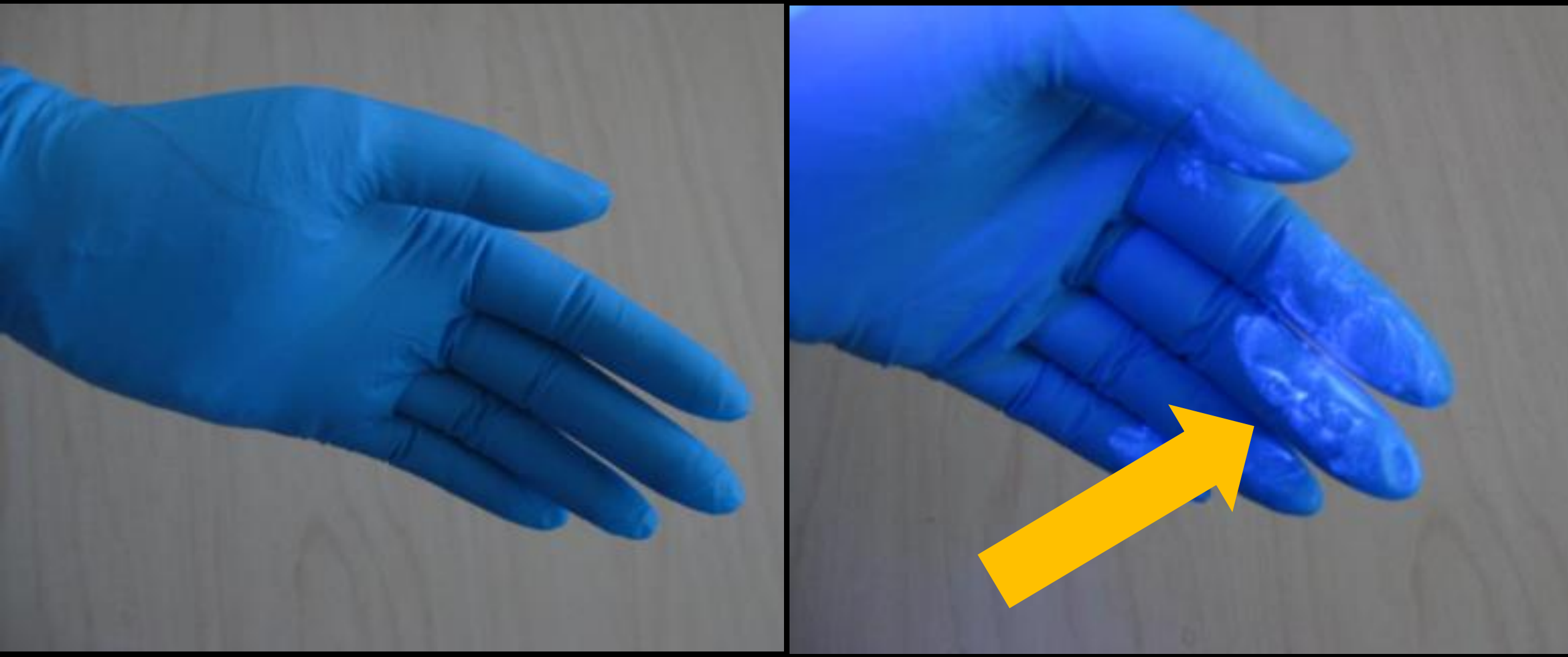
9 years continuous NIH funding

som.uci.edu/bsl3-training



som.uci.edu/bsl3-training

Over 1000 personnel trained

som.uci.edu/bsl3-training

First courses for O & M personnel, biosafety professionals

som.uci.edu/bsl3-training


GARMENT
GARMENT
som.uci.edu/bsl3-training

Vivarium Safety

Description	Performed occupations safety for researchers and amical husbanded staff who have access to research vivarium's.
Lead Specialist	Vivarium Safety Officer (RSO). Sometime embedded in the Animal Care Program.
Oversight Committee	Works closely with the Institutional Animal Care and Use Committee (IACUC)
Major Programs	Typical hazards include allergies, zoonotic diseases, poisonous bites, and vector-borne illnesses as well as occupational hazards like ergonomic, noise and respiratory hazards.

Elizabeth R. Griffin

Beth Griffin was an artistic, intelligent and compassionate young woman who met a tragic and premature death after contracting B virus (Cercopithecine Herpesvirus 1), a disease carried by macaque monkeys, as a result of a preventable ocular exposure and subsequent delayed diagnosis and treatment.

Radiation Safety

Description	Oversees the use of all radioactive materials and ionizing radiation (X-Rays) on the campus or medical center.
Lead Specialist	Radiation Safety Officer (RSO). Their staff are Health Physicists and technicians.
Oversight Committee	Radiation Safety Committee (RSC), Radioactive Drug Research Committee (RDRC), Human Exposure to Radiation Committee (HERC)
Major Programs	Irradiators, X-ray, Reactors (UCI, UC Davis), Cyclotrons, Radioactive Material (RAM), Accelerator Productid Radioactive Material (APRM), Natural Occurring Radioactive Material (APRM), Special Nuclear Material (Pu, U),

Cs-137 and Co-60 Irradiators

- The University of California owns **47** ^{137}Cs/Co-60 irradiators
- 2017 decision to transition to x-ray irradiators where found equivalent

37 ^{137}Cs & **3** Co-60 irradiators are planned for removal from University of California facilities


FRONT

New X-ray Irradiators

UC Cs Irradiator Removal Project Status Dashboard

Total 47 Cs & Co irradiators

Date: 10/24/2019

- **Cesium & Cobalt Removals- 40 planned**
  - **Irradiator Removal Done- 13**
  - **Pending Removal- 11** (UCIMC, UCLA, UCDMC, UCR next)
  - **Planned Removal- 16**

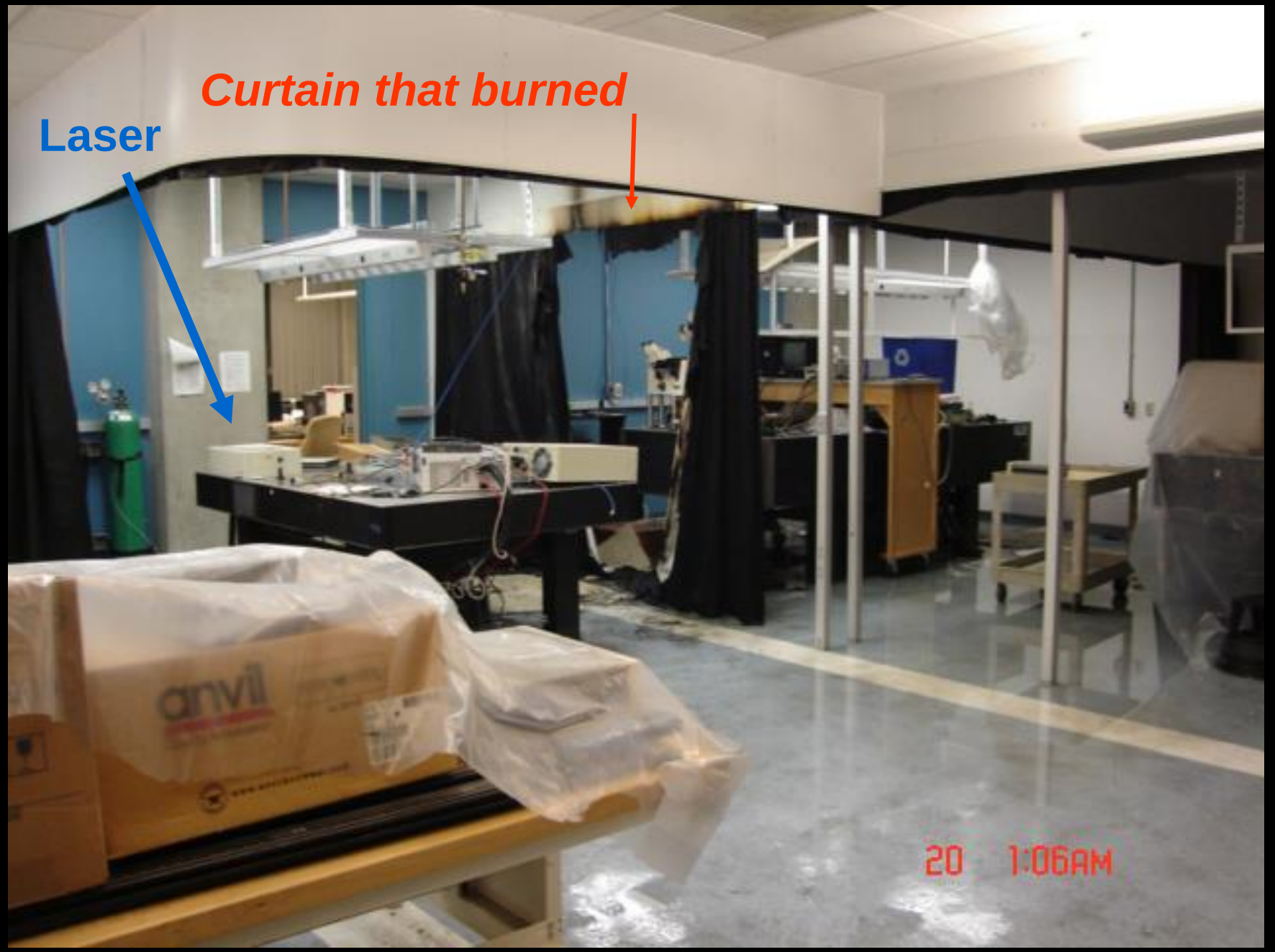
- **X-ray/LINAC Purchases & Installations- 27**
- **Installation Done- 22**
- **Pending Purchases- 4**
- **Planned Purchases- 1**
- **Cesium & Cobalt Retained- 7** (UCSD, UCI, UCSF, UCDMC)


24
7
ON MOBILE
ONLINE
ON AIR
kiro7.com
KIRO 7
LIVE. LOCAL. IN-DEPTH.

Laser Safety

Description	Oversees the use of high powered lasers, usually consisting of Class 3B and 4. The Laser Safety Officer performs an analysis of the laser setup and prescribes required controls.
Lead Specialist	Laser Safety Officer (LSO)
Oversight Committee	Some campuses use a Laser Safety Committee.
Major Programs	Visible and non-viable laser, Sometime Non-ionizing radiation safety like microwaves and radio-frequency generators. a violet


© Laurie Hatch


Curtain that burned
Laser
anvil
20 1:06AM

Controlled Substance Program

Description	Responsible for obtaining the required DEA registrations in order to legally possess controlled substances.
Lead Specialist	Controlled Substance Program Administrator (CSPA)
Oversight Committee	Some research may have to be approved by the California Research Advisory Panel.
Major Programs	Controlled Substances are banded into Schedules I-V. Most of these substances are used as analgesics and anesthesia for animal research. Examples include: fentanyl, methadone, morphine, oxycodone, fentanyl, pentobarbital, and secobarbital, cocaine, opioids, cannabis, THC

Controlled Substance Program

Wednesday, October 30, 2019

8:00 AM – 9:00 AM	**BK7.2 - Controlled Substances Programs: Overview of Policy, Responsibilities, & Changes** This session will provide an overview of the current UC systemwide policy for Controlled Substance use (BFB-BUS 50 Controlled Substances) including designated roles and responsibilities, regulatory requirements, and current controls and oversight. The presentation will highlight recent communications and clarification that UC has received from DEA and will review changes to the structure and organization of Campus research registrations. Lastly, the presentation will provide a status report on efforts to update the BUS-50 policy to cover the use of controlled substances throughout the UC enterprise, including both Clinical and Research activities. **Speaker(s):** Brent Cooley (UCOP), Thomas Harper (UCD Health) and Hoyt Sze (UCOP)

Field Safety

Description	Encompasses activities conducted outside of the laboratory but still in the domain of research. Field Safety is an emerging area of practice for EHS.
Lead Specialist	Vivarium Safety Officer (RSO). Sometime embedded in the Animal Care Program.
Oversight Committee	
Major Programs	Outdoor heat, Filed Safety planning, Emergency communications, Wildlife hazards, wilderness fist aid. May include Agricultural Safety. Works closely with the Natural Reserves and filed based science programs.

Fieldwork

- The normally the most hazardous activity
- Throughout US and several foreign countries
- Thousands of trips UC-wide
- https://www.uctrips-insurance.org
- Field Safety Plans
- Transportation , People; Samples, Materials, Supplies, Equipment; and Hazardous Materials, Medical Considerations , Security, Communications.
- Activities: Before, while there, when you get back

Diving and Boating Safety

Description	Establishes training programs, certifies scientific divers, reviews and approves all scientific diving projects performed by the institution.
Lead Specialist	Dive Safety Officer (DSO)
Oversight Committee	Diving Control Board. Three campuses have a shared DCB.
Major Programs	Scientific Diving Plans, Small Boat Float Plans, Scientific Diver Training and Certification, Dry Suit Diving, Special Gas Diving, Marine Safety

THE CAMBRIAN

UC Santa Barbara marine ecologist dies off the Cambria coast

BY KATHE TANNER

NOVEMBER 13, 2018 01:55 PM, UPDATED NOVEMBER 13, 2018 04:46 PM

Don Canestro with daughters Carla, 13, and Stella, 11, and their pet goats in 2016, outside the barn near their home on the UCSB Norris Rancho Marino Reserve in Cambria. UC SANTA BARBARA

News > **Accidents and Fires**

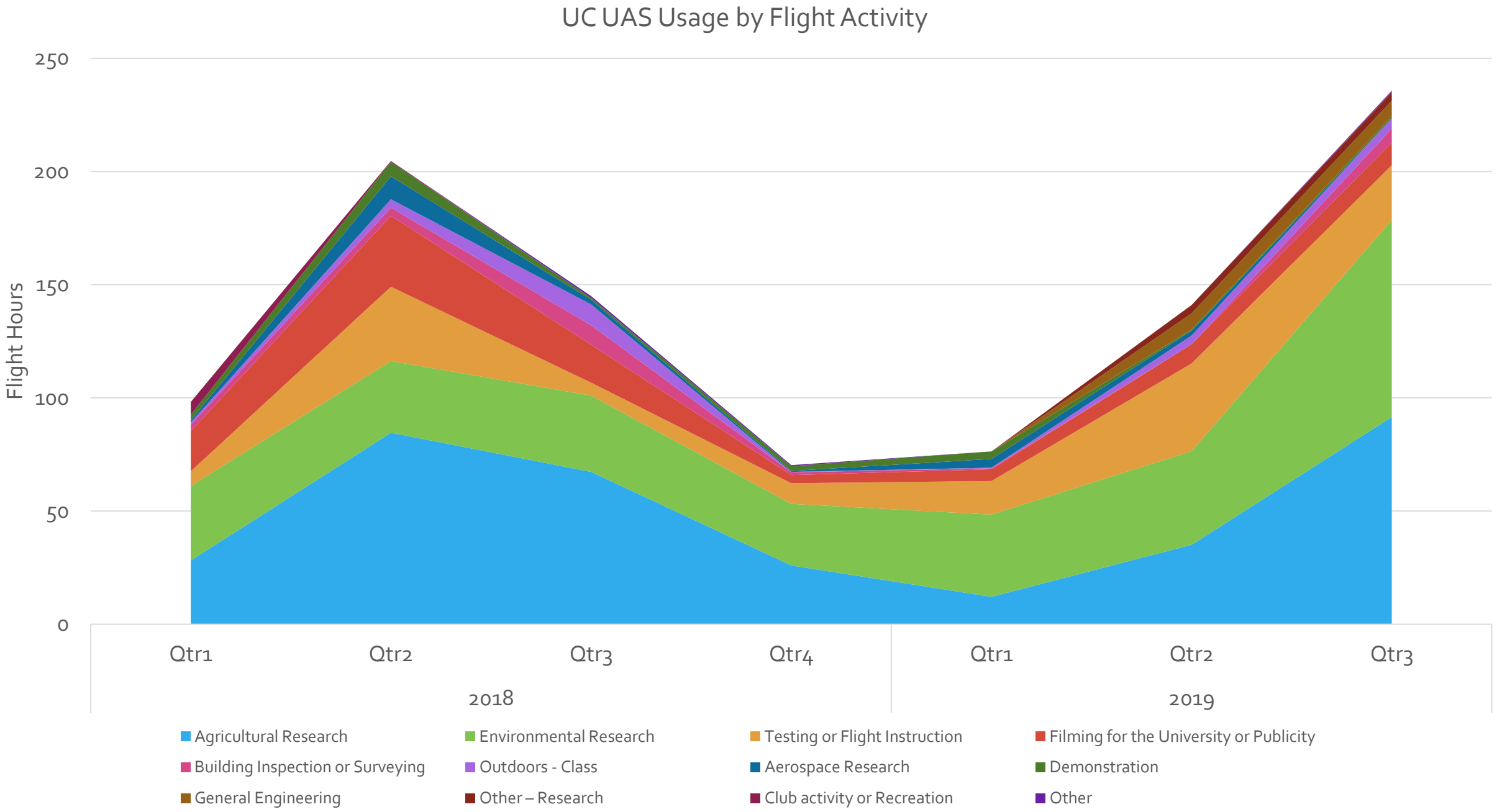
UC Santa Cruz mourns death of young researcher killed in diving accident

Umihiko Hoshijima died in apparent diving accident on research trip to Alaska

By **NICK IBARRA** | nibarra@santacruzsentinel.com | Santa Cruz Sentinel
PUBLISHED: August 13, 2019 at 5:37 am | UPDATED: August 13, 2019 at 5:43 am

Unmanned Aircraft System (Drone) Safety

Description	UC requires FAA licensure or categorial exemption for all of our drone pilots. All UC drone flights must have a flight plans filed in our tracking software and approved by the location prior to flight.
Lead Specialist	Campus: Designated Local Authority (DLA) Systemwide: Systemwide Designated UAS Authority
Oversight Committee	Systemwide Designated UAS Advisory Board
Major Programs	Drones, other autonomous vehicles.

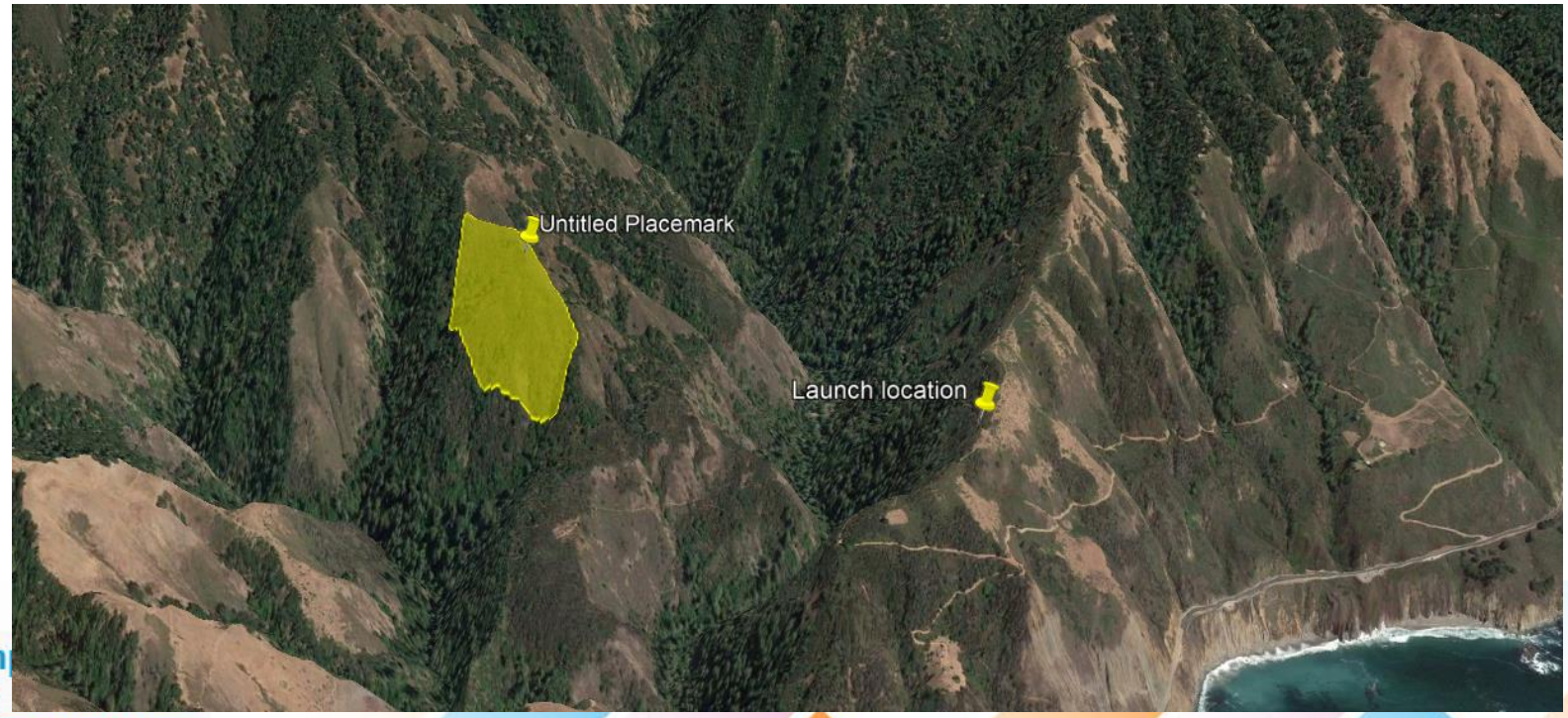

UC UAS Usage by Flight Activity
Flight Hours
250
200
150
100
50
0
Qtr1
Qtr2
Qtr3
Qtr4
Qtr1
Qtr2
Qtr3
2018
2019
Agricultural Research
Environmental Research
Testing or Flight Instruction
Filming for the University or Publicity
Building Inspection or Surveying
Outdoors - Class
Aerospace Research
Demonstration
General Engineering
Other – Research
Club activity or Recreation
Other

UC Riverside Media Team

Flight Procedure	Would like to film another drone from a safe distance (Matrice equipped with a 360 camera). The 360 flight is scheduled for the morning of Friday, August 23rd and is currently pending. I will be piloting the Matrice and Taylor will most likely be piloting the Mavic.
Operation Restriction	
Comments	test flight... accidentally put 11pm on last request sorry for the inconvenience
RiskAssessment	Will keep a safe distance from the larger drone (Matrice), which will only be flying vertically. Smaller drone (Mavic) will be used to document the flight and will have minimal horizontal movement. We will have a team of 5 spotters.
Observers	Christina Bristol Taylor Ruthford Christy Zwicke
Flight Durations	2 minutes
Takeoff and Landing Damages	Landing Damages. Drone legs are broken, propellors are broken.
Equipment Malfunctions	- Navigation system
Lost Link Events	- Lost link of pilot control
Event Notes	- We encountered a malfunction during which the pilot, Nathaniel, could not control the drone with the remote. The device lost connection with the remote and the pilot, flew off by itself, and did not stop until it crashed into a tree.
Accidents/Mishaps/Near-Misses	- Substantial damage to the unmanned aircraft system where there is damage to the aircraft that must be repaired prior to further flight - Total aircraft loss

UC NRS – M210 into tree

Takeoff and Landing Damages	Surveying an invasive species extent in a very very remote location on the reserve, M210 collided with a tree resulting in the total loss of the drone. I reviewed the proposed area with the reserve manager, inspected the ridgeline with a Mavic prior to flying the survey to double-check elevation. The elevation flow was sufficient to clear the ridge but didn't take into account one lone very tall tree. The drone stopped prior to hitting the tree using the collision avoidance settings, but when I was maneuvering it out of the tree I accidentally collided with the tree. The drone crashed and is not recoverable due to the extreme remote location.
Equipment Malfunctions	- None
Lost Link Events	- None
Accidents/Mishaps/Near -Misses	- Total aircraft loss



Laboratory Safety Inspections

Description	usually refers to the audit and inspection team that is designed to perform periodic inspections of the research laboratories.
Lead Specialist	Lab Safety Specialists
Oversight Committee	
Major Programs	This group is typically responsible for checking program compliance in all of the areas previously discussed. Laboratory ergonomics, Departmental Contacts. This allows a single entity to interact with the laboratory staff to ensure compliance.

Safety Audits and Inspections

- Labs inspected for compliance with
  - California Fire Code
  - Cal/OSHA Lab Standard
    - Chemical Hygiene Plan
  - Hazardous, Medical and Radioactive Waste
    - Labeling, Storage & Segregation
  - Radioactive isotope use
  - Biohazardous materials use
  - Electrical Code

Audit Process Options

- Contact department and/or lab representative
  - Schedule audits for that dept/lab
- Occupants present
  - Yes – can ask more – takes longer – better result
  - No – limited to physical conditions only
- Paper or paperless process
  - Time to inspect, time to create reports
  - Consistency between auditors & inspections
  - Automating report creations, summary reports
    - $, FTE, expertise, priorities, accountability

Implementation Guide

20 recommendations for a safety culture drawn from top resources

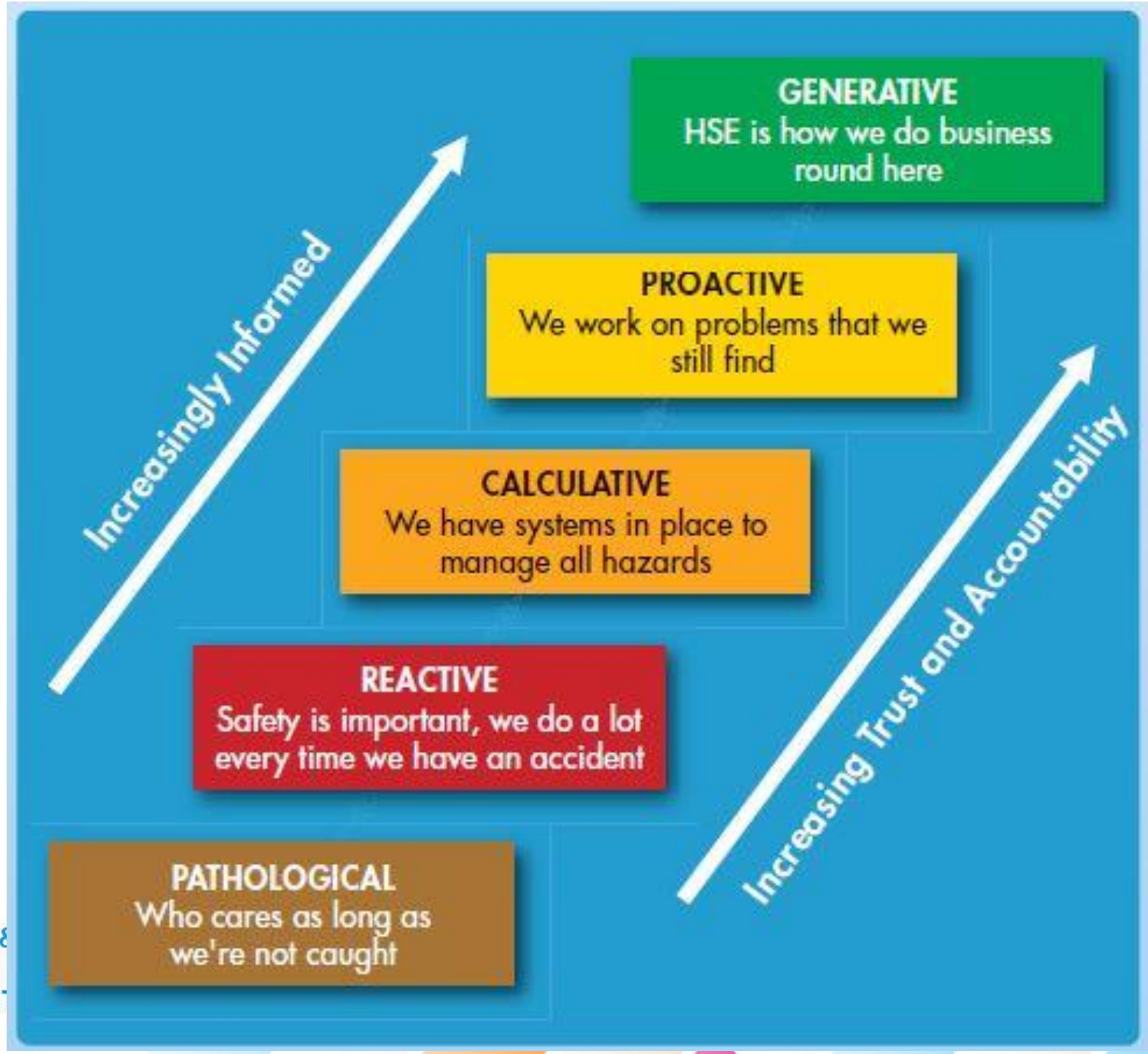
Tools and resources for implementation (+ values, roles, responsibilities resources).

Suggested Core Institutional Values

- Safety is everyone's responsibility.
- Good science is safe science.
- Safety training & education is critical to research and education.
- Safety culture is necessary to implement true risk reduction.
- Diversity and flexibility of approaches and methods.

The path to a culture of safety

Safety culture refers to an organization's shared values, assumptions, and beliefs specific to workplace safety.



EH&S Professional Education

HOME PROGRAM BENEFITS WORKSHOP ENROLL SPEAKERS PARTNERS CONTACT US

ABOUT

The EH&S Professional Education program cross-trains UC EH&S staff and safety personnel to expand their knowledge and skills in a variety of EH&S programs applicable to the university setting. Taught by UC subject matter experts, this blended learning experience (consisting of online modules and an in-person workshop) offers an opportunity to earn three certifications:

1. **EH&S Generalist**
2. **EH&S Professional**
3. **EH&S Specialist**

In addition to the three certifications, this program provides continuing education units (CEUs) for various professional accreditations.

training.ucr.edu