Environmental Health & Safety at Stanford – Annual Report and Update

Presented at the Public Meeting of the University Committee on Health and Safety – July 15, 2014

Larry Gibbs
Associate Vice Provost
Environmental Health & Safety
Environmental Health and Safety

- EH&S Organizational overview
- Health, safety and environmental programs
- Current trends and issues
- EH&S at Stanford Summary
“We will support and advance the teaching, learning and research activities of the University, and promote a safe and healthy campus environment, by providing and coordinating programs and services that minimize safety, health, environmental and regulatory risks to the Stanford University community in a manner consistent with responsible fiscal and environmental stewardship.”
EH&S Risk Management Categories

- Health Decrement (Injury and Illness Prevention)
- Environmental Degradation
- Regulatory Liability (Environmental, Occupational and Research Compliance Risk)
- Public Relations
- Operational Impact to University Mission
- General Liability (Third party lawsuits)
EH&S - Regulatory Agency Interaction
Supporting the Stanford Community

Environmental Health & Safety
- Chemical Waste
- Biological Waste
- Radioactive Waste
- Radiation Safety/Health Physics
- Fire Safety Engineering
- Hazardous Materials Mgmt.
- Environmental Compliance
- Industrial Hygiene
- Occupational Medicine
- General Safety
- Compliance Assistance
- Biological Safety
- Training and Communications
- Emergency Management
- Program and Compliance Mgt.

Regulatory Agencies
- Federal Environmental Protection Agency
- Federal Aviation Administration
- California Environmental Protection Agency
- California Department of Toxic Substances Control
- California Occupational Health and Safety Administration
- The Governor's Office of Emergency Services
- Santa Clara County Health Department
- Santa Clara County Planning Dept. - Office of Building Inspection
- Santa Clara County Planning Dept. - Fire Marshal's Office
- California Fire Marshal
- Santa Clara County Water District
- Santa Clara County - Office of Toxic and Solid Waste Management
- San Francisco Bay Regional Water Quality Control Board
- Bay Area Air Quality Management District
- City of Palo Alto Fire Department
- City of Palo Alto Regional Water Quality Control Plant
- Federal Department of Transportation
- Federal Drug Administration (FDA)
- U.S. Department of Homeland Security
- U.S. Nuclear Regulatory Commission
- California Department of Public Health
- Federal Drug Enforcement Agency
- California Department of Justice
Asbestos, Lead, Construction Safety

Control exposure to hazardous building materials and manage regulated demolition debris

- 256 projects in last year
- **Major upcoming Projects:**
  - 9 EV apartments demo (Comstock)
  - Old Chem Renovation
  - Steam to hot water conversion
  - GSB South major renovation
- **On the Horizon:**
  - Meyer Library demolition
  - Cardinal Cogen decommissioning
  - Organic Chem and Stauffer III demolition

Terman Demolition
Biosafety

- Supports institutional biosafety committee (APB) in review of research protocols involving biohazardous agents and rDNA; IRB, APLAC; SU Industrial Contracts Office. Also supports biosafety in research at veterans hospital.

- Participation
  - Animal Care and Use Committee
  - Stem Cell Research Oversight Committee

- Challenges: Increased involvement with oversight of:
  - Specialized biosafety training
  - Use of biohazards in animals
  - Increase use of biohazards outside of traditional life science research labs
  - Synthetic Biology – implementing APB oversight this coming year
  - Translational research impacts

- Current Focus: coordinate APB for all research compliance panels; increase outreach to PIs and laboratories via biovisits; implementation of new Cal OSHA Aerosol Transmissible Disease (ATD) standard; identification of new lab specific biosafety related training
Chemical Hygiene & Laboratory Safety

- University’s Chemical Hygiene Plan is the cornerstone of chemical health and safety in laboratories. Services include:
  - Protocol reviews (e.g., involving toxic gas; animal research with neurotoxins, nanomaterial safety, etc.)
  - Exposure assessments
  - Specialized surveys (e.g., nanofabrication facility, teaching labs)

- Program Highlights:
  - Conducted comprehensive lab safety audits for five engineering faculty member laboratories to assess key elements of Cal/OSHA-IIPP and chemical hygiene plan implementation
  - Teamed with Chemistry to provide hand’s on, interactive safety training to incoming graduate students in fall 2013

- Challenges:
  - Research environment is dynamic; EH&S supports ~700 Faculty/Principal Investigators and their laboratories
  - Frequent turn-over among new students, post-docs, and researchers makes implementation of training and work practices an on-going issue
Centralized EH&S registration program facilitates registration and acquisition of materials for 130 faculty in 39 departments

Also support individual faculty seeking or holding individual DEA registrations for research

- Plans review
- Lab ventilation
- Toxic Gas Ordinance mgt.
- Select Agent Toxins inventory
Safety & Compliance Assistance (SCA) Program

- The SCA Program routinely conducts outreach to operating areas with hazardous materials usage and storage. Conduct safety and compliance surveys and training. Each member of the program is assigned specific buildings on campus.

- SCA Program staff supplement EH&S expert staff in evaluating issues that cross multiple technical areas, including:
  - Hazardous materials usage & storage
  - Hazardous waste management
  - Medical waste management
  - Laboratory safety
  - Radiological surveys
  - Basic fire safety
  - Storage tank compliance
  - Waste water compliance
  - Toxic gas usage & storage

![Total Radiation Surveys](chart.png)
Hazardous Materials Management and Permits

- Provide local agencies with regulatory reporting of hazardous materials storage to fulfill community right-to-know requirements and to obtain required hazardous materials permits for 132 University buildings (includes approximately 2200 laboratory rooms and/or spaces).

- Manage Stanford user community ChemTracker (chemical inventory) interface and administration to facilitate accurate chemical inventory and regulatory reporting.

- Manage compliance with Federal Chemical Facility Anti-Terrorism regulations
## Hazardous Materials Regulatory Inspections

### FY 2013

<table>
<thead>
<tr>
<th>Inspection Type</th>
<th>Buildings Inspected</th>
<th>Inspector Hours On Campus*</th>
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<tbody>
<tr>
<td><strong>Hazardous Material &amp; Waste</strong></td>
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<tr>
<td>Santa Clara County</td>
<td>36 buildings and 23 generators</td>
<td>85.6</td>
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<td><strong>Hazardous Material</strong></td>
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<td>Palo Alto Fire Dept.</td>
<td>0</td>
<td>6</td>
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<td><strong>Waste Water</strong></td>
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<tr>
<td>City of Palo Alto</td>
<td>34</td>
<td>32</td>
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<tr>
<td><strong>Medical Waste</strong></td>
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<tr>
<td>Santa Clara County</td>
<td>14</td>
<td>12.5</td>
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<tr>
<td><strong>Medical Waste</strong></td>
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<tr>
<td>San Mateo County</td>
<td>1</td>
<td>1</td>
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<tr>
<td><strong>Total</strong></td>
<td><strong>108</strong></td>
<td><strong>131.1</strong></td>
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*Hours on campus includes only the actual inspection time. Pre-inspection discussions and negotiations with inspectors are not included in the total.
Industrial Hygiene & General Safety

- Workplace health and safety of faculty, staff, and students
  - Compliance with Cal/OSHA workplace standards and follow up to Cal/OSHA inquiries and investigations
  - Coordinate workers’ compensation injury investigations and follow

- Provide supervisors and employees support for workplace safety and health matters including but not limited to:
  - Chemical exposure assessment – for research, maintenance and related operations
  - Respiratory protection - ensuring proper fitting and use of respirators
  - Electrical safety – for research and maintenance operations
  - Confined space safety – for all campus sites incl. manholes and vaults
  - Indoor air quality – investigation and evaluation; including odor complaints
  - Shop safety – guidance on shop equipment use in laboratories and traditional shops

- Challenges:
  - Large volume of capital projects which can pose concerns to the campus population (i.e., indoor air quality in bldgs nearby construction)
  - On-going injuries in campus manual materials handling jobs
EH&S spreads awareness of proper workplace ergonomics for prevention of repetitive stress and other musculoskeletal injuries.

- > 30 dept trainings/year
- Ergo Equipment Fund
- Integration of ergo program with BeWell healthy living classes
- Provide support at SLAC
- Aging workforce issues
Occupational Medicine Clinic

Serving the Stanford University community via-

- **Prevention** -- medical surveillance, immunizations, occupational health education

- **Treatment** -- work-related injury or illness care - concern over increases in injury severity and costs

![Preventive Medical Surveillance Chart](chart.png)

![Workers' Comp Injury Visits Chart](chart.png)

<table>
<thead>
<tr>
<th>Calendar Year</th>
<th>2009</th>
<th>2010</th>
<th>2011</th>
<th>2012</th>
<th>2013</th>
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<tr>
<td>Number of WC Claims</td>
<td>464</td>
<td>527</td>
<td>604</td>
<td>578</td>
<td>621</td>
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<tr>
<td>Net Incurred Total</td>
<td>$2.03M</td>
<td>$4.29M</td>
<td>$2.91M</td>
<td>$2.80M</td>
<td><strong>$5.24M</strong></td>
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<td>WC Loss Rate (direct costs per 100 FTE employed)</td>
<td>$11.7K</td>
<td>$24.3K</td>
<td>$15.8K</td>
<td>$14.4K</td>
<td><strong>$26.1K</strong></td>
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Campus Injury/ Illness Case Rate Trends

SU Total Recordable Case Rate

- Start of SU budget reductions
- SU OHC Open

SU Lost Work Day Case Rate

- Start of SU budget reductions
- SU OHC Open

Workers’ Compensation: Incident Types

CY13 Highest Occurring Incident Types (and change from CY12):
1. Repetitive motion (↑15%)
2. Slip/trip/fall (↑18%)
3. Cut/puncture/scrape (↑31%)
4. Overexertion (↑1%)
5. Bodily reaction (↓27%)

Highest Cost per Type
1. Bodily reaction (bending, climbing, using tools) ($16k)
2. Repetitive motion ($13k)
3. Slip/Trip/Fall ($13k)

SU Workers’ Compensation Incident Types, and Average Cost per Claim (CY 2013)

Source: Zurich Risk Intelligence (2014)
50% of CY13 WC cost due to slip/trip/fall and repetitive motion claims:

**Slip/Trip/Fall (STF)**
- 56 of 103 STF claims (54%) occurred outside the primary work area (i.e. hallways, stairs, outdoors)
- 23 of 103 STF claims (22%) involved stair use
- Special considerations:
  - Ongoing campus-wide construction = Increased campus traffic and more route detours/closures
  - Nation-wide, a developing trend of increasing pedestrian incidents related to distracted walking (i.e., smartphone use, etc.)

**Repetitive Motion**
- 70 of 121 repetitive motion claims (58%) were associated with computer use
  - Account for 26% of total repetitive motion injury costs, average claim cost = $6K
- 51 of 121 repetitive motion claims (42%) were related to manual work activities (e.g. food service, lab animal care services, janitorial, facilities maintenance)
  - Account for 74% of total repetitive motion injury costs, average claim cost = $22K
Fire Safety- Stanford University Fire Marshal Office

- Fire Protection Engineering
  - Code Compliance Consultation
  - Plans Review of Capital Projects
  - Acceptance Tests of New Fire Protection Systems
  - Liaison with Regulatory Agencies

- Fire Protection Systems Technical Services
  - Maintenance of Fire Alarm, Fire Sprinkler, and Fire Extinguishers
  - Operation of Proprietary Fire Alarm Monitoring Station

- Fire Safety Inspection Program
  - County and City Fire Official Inspections
  - Regular Inspections of Existing Buildings

- Training, Evacuation Drills & Event Safety Planning

- Code Development Input
Fire Alarm, Sprinkler and Extinguisher Systems
Parallels continued growth of campus
Santa Clara County Fire authority is required by law to inspect annually all residences, high rises, day care centers, and assembly spaces on campus - NO MAJOR FINDINGS

For 2013, SUFMO inspected a total of 171 buildings. A total of 119 of those buildings have been cleared of identified deficiencies.

Conducted total of 628 building evacuation drills

Automated External Defibrillator program management - campus now has 164 AED units in this program.
Fire Safety – Accomplishments/Challenges

- Working with SCC officials developed reasonable accommodation of new state law CO monitoring requirements for various residential occupancies without increased risk to occupants.

- Resolved conflict between the State Elevator Code and the California Building Code (CBC) which was holding up sign off of Capital projects. Working directly with the State Fire Marshal, the resolution was published in Chapter 30 of the Building Code thus removing the conflict.

- Rebutted local jurisdiction’s interpretation of Bulk Storage of Inert Cryogenic fluids vs individual dewars. This would have required Stanford to install oxygen deficiency sensors and system connected smoke detectors in any laboratory that has unconnected dewars. Agreements were reached with code-development organization to revise the definition of Bulk Storage to clarify requirements do not apply to individual dewars.

- Campus continually challenged by conservative/ restrictive code interpretations by local code officials.
Radiation Safety

- Coverage area: Stanford University, SH&Cs, LPCH, VAPAHS
- University and Medical Center, including Stanford Hospital and LPCH, operate under one State DPH issued “Broad Scope Medical License” to Stanford
- VA operates under Central VA regulatory program licensed by Federal NRC
- Radiation Safety Faculty Administrative Panel, through subcommittees, oversees all use of radioactive material (RAM) and radiation producing machines
- Also, oversees electro-magnetic field (EMF) issues and Laser use on campus – EMF program under development
Radioisotope Usage & Production Trends

Traditional radioactive isotope (H3, C14, P32, S35) packages are delivered from outside producers/vendors. Deliveries continue to level off at approximately 1000 packages per year.

Cyclotron products are produced on-site and have much higher energy and very short half-lives. Production began in 2005.

Positron emitting isotopes are produced for both clinical and research applications. Production increasing after down time in 2011-2012.
Medical Procedures and Research Protocols Using Radioisotopes

Stanford Hospital has performed MicroSphere Yttrium 90 procedures since 2005.

This is a non-surgical outpatient therapy that uses microscopic radioactive spheres to deliver radiation directly to the site of the liver tumors; requires significant oversight of each surgical procedure by Radiation Safety professionals.

Experimental Uses Of Radionuclides
Projects Using Machine Produced Radiation

Stanford Machine Projects

VA Machine Projects
Radiation Exposure Dosimetry Results

- ~2500 persons monitored monthly
- Continued high number of annual radiation exposure investigations due to use of PET isotopes and use of fluoroscopy in the hospitals
- Expecting an increase in additional isotope and radioactive drug production including F18, C11, N13, Cu64 etc. leading to additional oversight issues
- Hospital fluoroscopy use continues to increase with corresponding increase in dose investigations.
CT Machine Usage

- X-ray Computed Tomography devices (CT)s.
- CTs now require testing and new reporting requirements per state law SB1237
- Off campus imaging clinics now in operation in many off-site locales
- Requires dose estimation for each exposure

![Chart showing total CTs at Stanford & VA from 1998 to 2013](chart.png)
Class IIIb and Class IV Lasers

- Class IIIb and IV lasers can cause eye and skin damage and can be a fire hazard.
- These lasers require periodic inspection, hazard evaluations, registration and user training.
- Increase in training levels due to more laser users and increased compliance.

Graphs showing the trend in Class 3b and 4 Lasers and Laser Safety Training from 2002 to 2013.
Radiation Safety

Challenges

- Increase in new radio-pharmaceutical procedures in the hospital for patient treatment

- Continued increase in Positron Emission (PE) isotope production to support growing clinical and research use. New Porter Drive site with radiochemistry “Hot Cells”.

- Working with the hospitals to ensure that patient exposures from CT and fluoroscopy procedures are optimized to ensure radiation doses are maintained low.

- Continued hospital decentralization and off site development and uses in nuclear medicine

- Porter Drive radiochemistry; South Bay Cancer Center; Hoover II expansion; the new Nuclear Medicine program for LPCH; Lucas PET-MR; etc.
Environmental Mgt. Programs

- **Hazardous Waste Programs**
  - Chemical, Radiological, and Biological Waste
  - Hazardous Materials Release Response
  - Incinerator Decommissioning

- **Sustainability**
  - Surplus Chemical Program
  - Electronic Scrap Program
  - Used Battery Recycling
  - Solvent Recycling

- **Environmental Management**
  - Hazardous Waste Compliance Tools
  - Air Emission Permits
  - SPCC (spill prevention control and countermeasures)
  - California Ocean Plan; (Areas of Special Biological Significance) – Hopkins Lab

- **Regulatory Outreach**
  - New RCRA Lab Waste Rule
  - BAAQMD Air Toxics Proposal
Campus Hazardous Waste Management Data

Chart #1: Hazardous Waste Pickups, FY2008-2013

Chart #2: Lab Cleanouts FY2008 - FY2013

Chart #3: Radioactive Waste Picked Up; FY2008 to FY2013

Chart #4: Hazardous Waste Shipments and Costs
Emergency Management -

Emergency Operations Center Activated

- 2013-05-30, SLAC power outage
- 2013 June/July - Campus chilled water issues
- 2013 July - Armed robbery
- 2013-08-16 - Chilled water system issues
- 2013-10-31 report of man with a gun
- 2014-02-11 Tresidder backpack incident
- 2014-04-29 Gas Line Break
- 2014-06-03 Power Failure to 12 buildings on campus
- 2014-06-09 Gas Line Break

- 2013-08-02 SOM Power Failure Stone Complex
- 2013-08-19 robbery Wilbur Parking lot
- 2013-09-10 sexual assault
- 2013-10-04 Community Alert Vehicle Thefts and Burglaries Menlo Park and Palo Alto
- 2013-10-05 attempted robbery
- 2013-11-03 Community Alert drinking issue
- 2013-11-10 Community Alert Redwood city metal fire
- 2014-01-27 Missing Person
- 2014-01-29 Robbery/Burglary
- 2014-02-04 Residential Burglaries
- 2014-02-11 Community Alert Vehicle Thefts
- 2014-02-14 Reported Sexual Assault
- 2014-02-23 Unauthorized Entry
- 2014-03-04 Community Crime Alert
- 2014-03-05 Peeping Incident
- 2014-04-05 SOM Stone Power Outage from planned SHC Power shutdown
- 2014-04-21 reported assault
- 2014-04-24 Alleged robbery Stanford Shopping Center
- 2014-04-25 Community Alert Bomb Threat - Hoax - STAT Only
- 2014-04-29 Bomb Threat - Hoax STAT Only
- 2014-05-07 Reported Sexual Assault
- 2014-05-10 Prowling/Peeping Incident
- 2014-05-16 Community Crime Notification Palo Alto Robberies
- 2014-05-18 Community Alert Flooding Florence Moore
- 2014-06-08 Community Alert Armed Person Seen
- 2014-06-14 Brush Fire
Emergency Management Planning

- Business Continuity Planning Pilots (PrepareSU) with selected departments (GSB, LB&RE, DoR)

Non-structural hazard mitigation program to protect high value research equipment (ProtectSU)
EH&S offers over 80 different safety, health and environmental training courses – with more moving online each year.

Improved service through better integration of EH&S online courses with STARS centralized training recordkeeping system. Work is ongoing.
ChemTracker (chemical inventory) at Stanford

Chemical Inventory Management System

- **Currently Tracking:**
  - 259,063 individual chemical containers
  - In 2,615 rooms, 263 buildings
  - 722 chemical owners, 193 departments, 4,429 users

- **Generating Regulatory and Hazard Risk Reports:**
  - UBC/UFC (IBC/IFC) for project planning and permitting
  - HMIS, HMBP for city and county regulatory compliance
  - Particularly Hazardous Substances: Cal-OSHA Lab Standard
  - “Special Needs” e.g. DHS Hazardous Materials of Concern (CFATS screening) and related reports
  - Life Safety Box placards for lab rooms, NFPA summaries for risk assessment

- **Usage Benefits:**
  - Tools for lab users to easily access storage, physical properties, and health and safety information, manage chemical inventory on hand
  - Tools for EH&S to monitor and manage regulatory compliance and reporting, increase reporting accuracy, reduce citations for non-compliance
  - Ability to rapidly respond to changing regulatory requirements
  - Support of hazardous waste materials management (separate program)
  - Not possible to do inventory management manually
## ChemTracker Consortium Member Organizations

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<td>1.</td>
<td>Stanford University</td>
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<td>2.</td>
<td>Carnegie Mellon University</td>
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<td>3.</td>
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<td>Desert Research Institute, Nevada</td>
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<td>Texas A&amp;M Health Science Center</td>
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<td>16.</td>
<td>City University New York (20 campuses)</td>
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<td>West Texas A&amp;M University</td>
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Ongoing EH&S Focus Issues

- Promotion and Support of Institutional Safety Culture – Lab Safety Culture Task Force follow up

- Research Technologies and Issues

- Off site development of campus facilities: research/administrative

- Regulatory development issues
Summary of Health, Safety and Environment at Stanford

- Major EH&S challenge with continued growth of new research facilities, new construction and university buildings, and off site locations of operations and people requiring EH&S services
- EH&S status and programs for campus remain in good overall condition with strong support by Stanford administration
- Compliance overall is good at institutional level with significant external agency monitoring – need for continued emphasis on attending to detail of regulatory requirements
- EH&S programs need to be more proactive
- Stanford recognized by peer institutions as a leader in campus EH&S
- Future focus will be on institutionalizing a value for safety throughout the organization
Thank You!

Questions/Comments?