

Safety
Starts
with U



The Joint Safety Team: A researcher-led initiative for improving academic safety culture

Clifford Gee, Ph.D.

Building a Safety Culture Across the Chemistry Enterprise
August 21, 2017

**Safety
Starts
with**



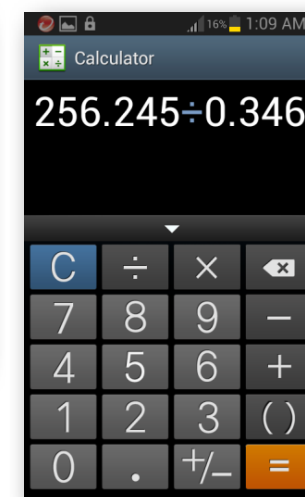
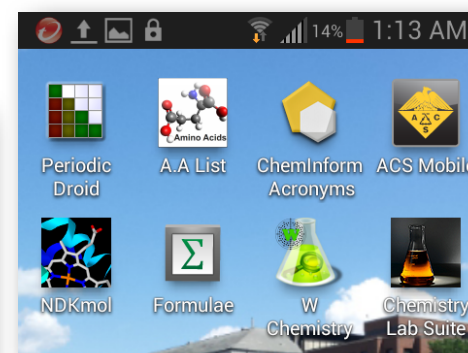
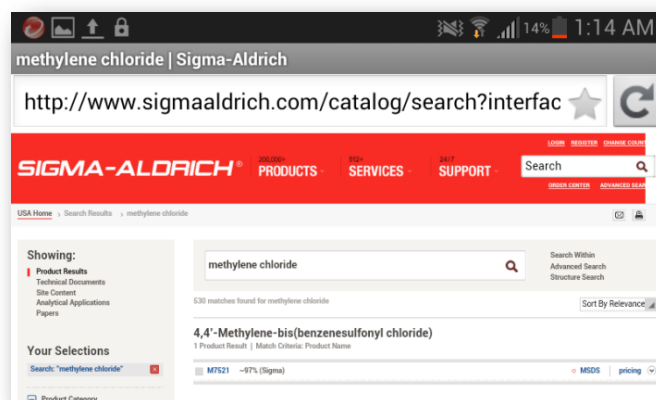
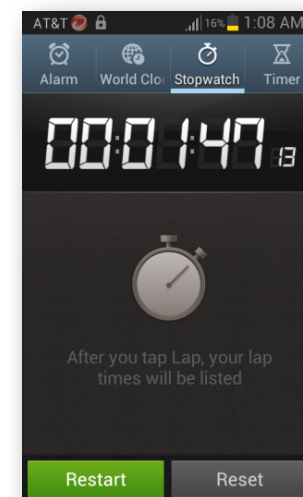
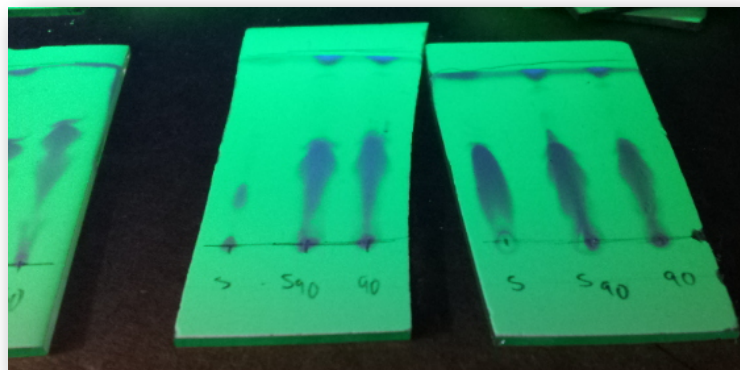
Cell phones in lab



Phones can be useful tools

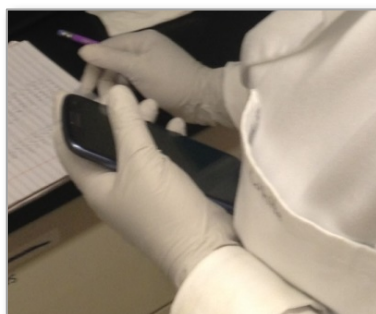
Positive phone uses:

- Lab timer
- Take pictures
- Calculator
- Apps
- Look up information on the internet



Phones can be problematic

Risk 1: Cross-contamination/Transfer of hazardous chemicals



Risk 2: Distractions/Lack of awareness



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University of Minnesota

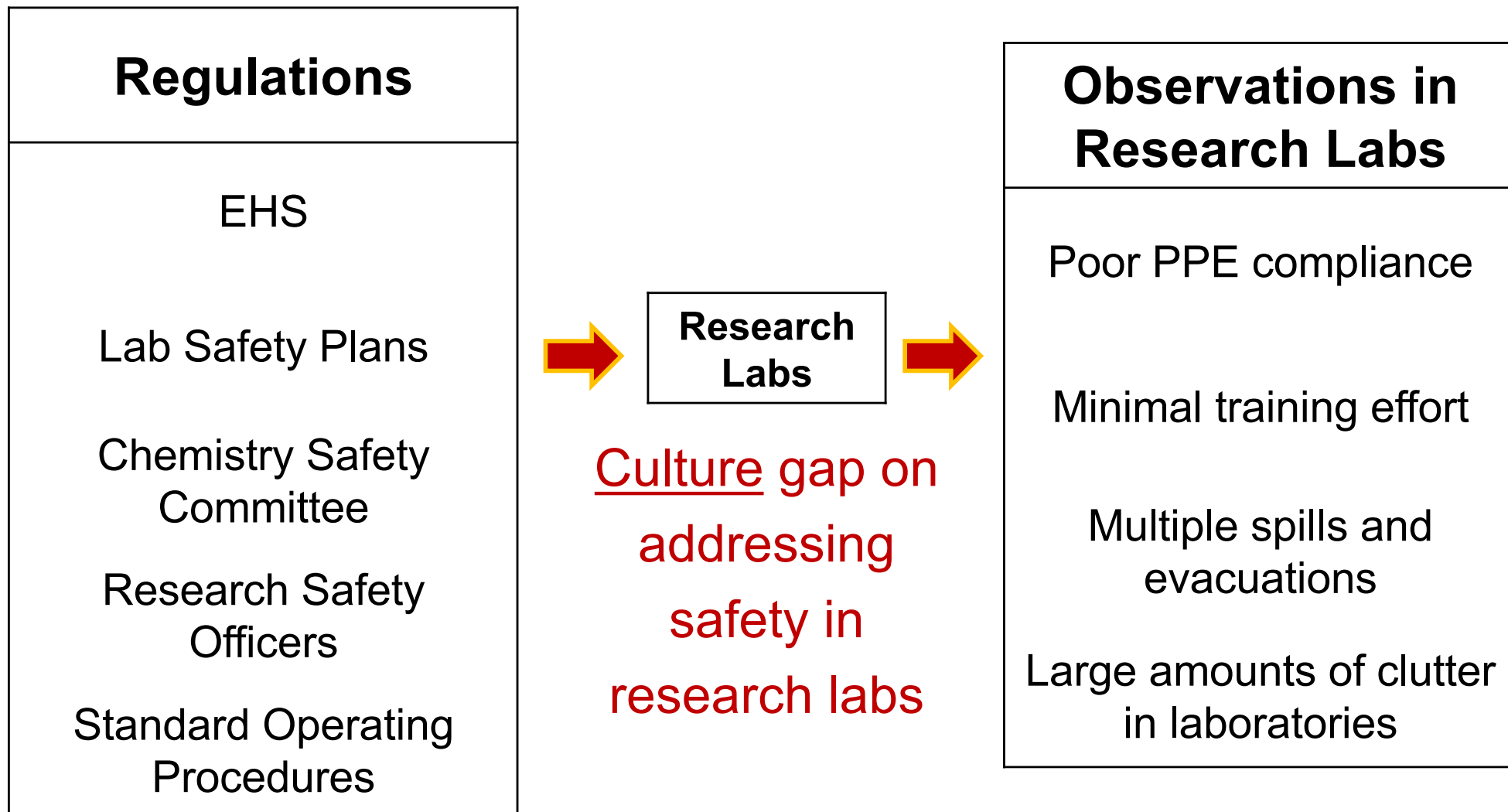
Department of Chemistry (CHEM)

- 200 graduate students
- 400 undergraduates
- 75 Post docs
- 44 faculty members

Department of Chemical Engineering & Materials Science (CEMS)

- 261 graduate students
- 240 undergraduates
- 60 Post docs
- 52 faculty members

UMN Safety 2011 and Prior



How do you change culture?



Starting an Initiative

Partnership:



Offered suggestions and demonstrated industrial safety values

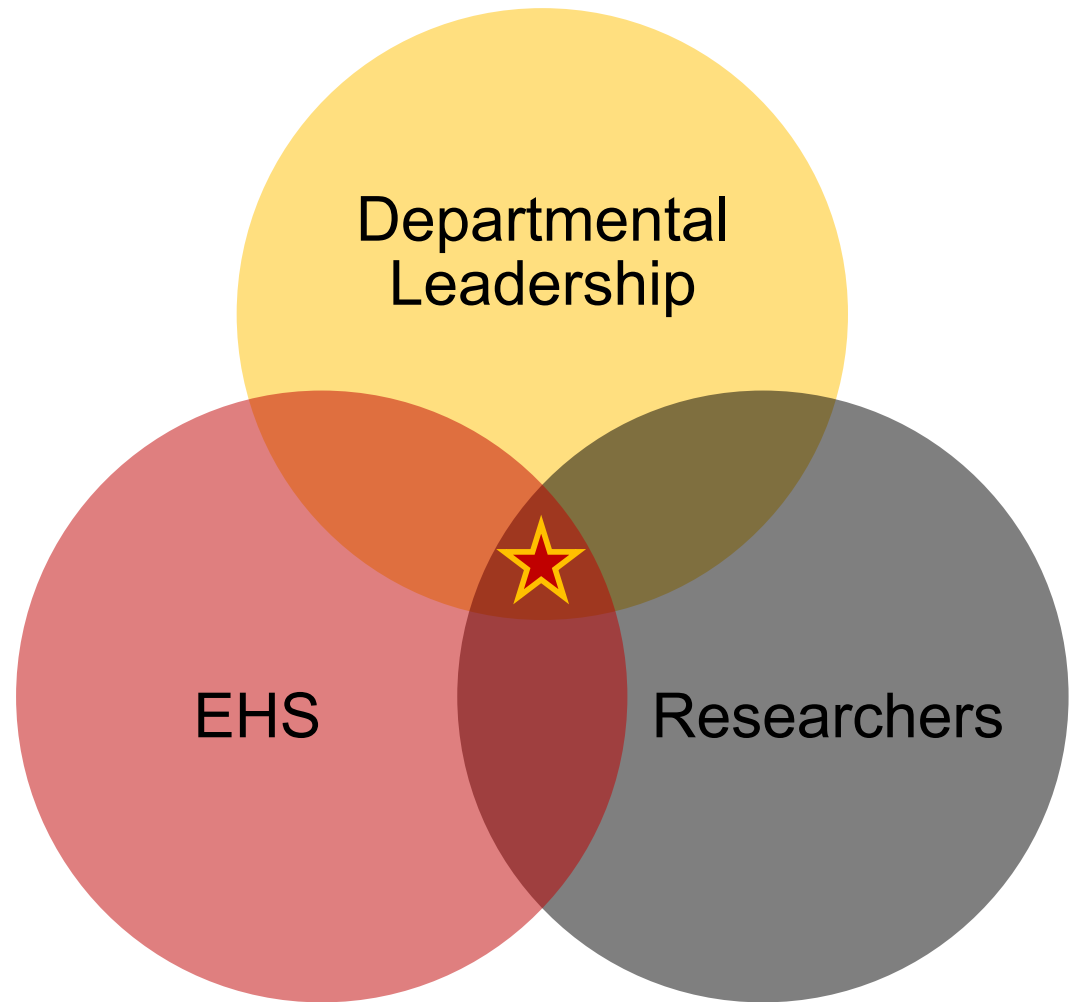


Setting the Ground Work

★ Lasting Changes

Joint Safety Team (JST)

Student-led initiative
between CHEM and CEMS
supported by departmental
leaders and EHS



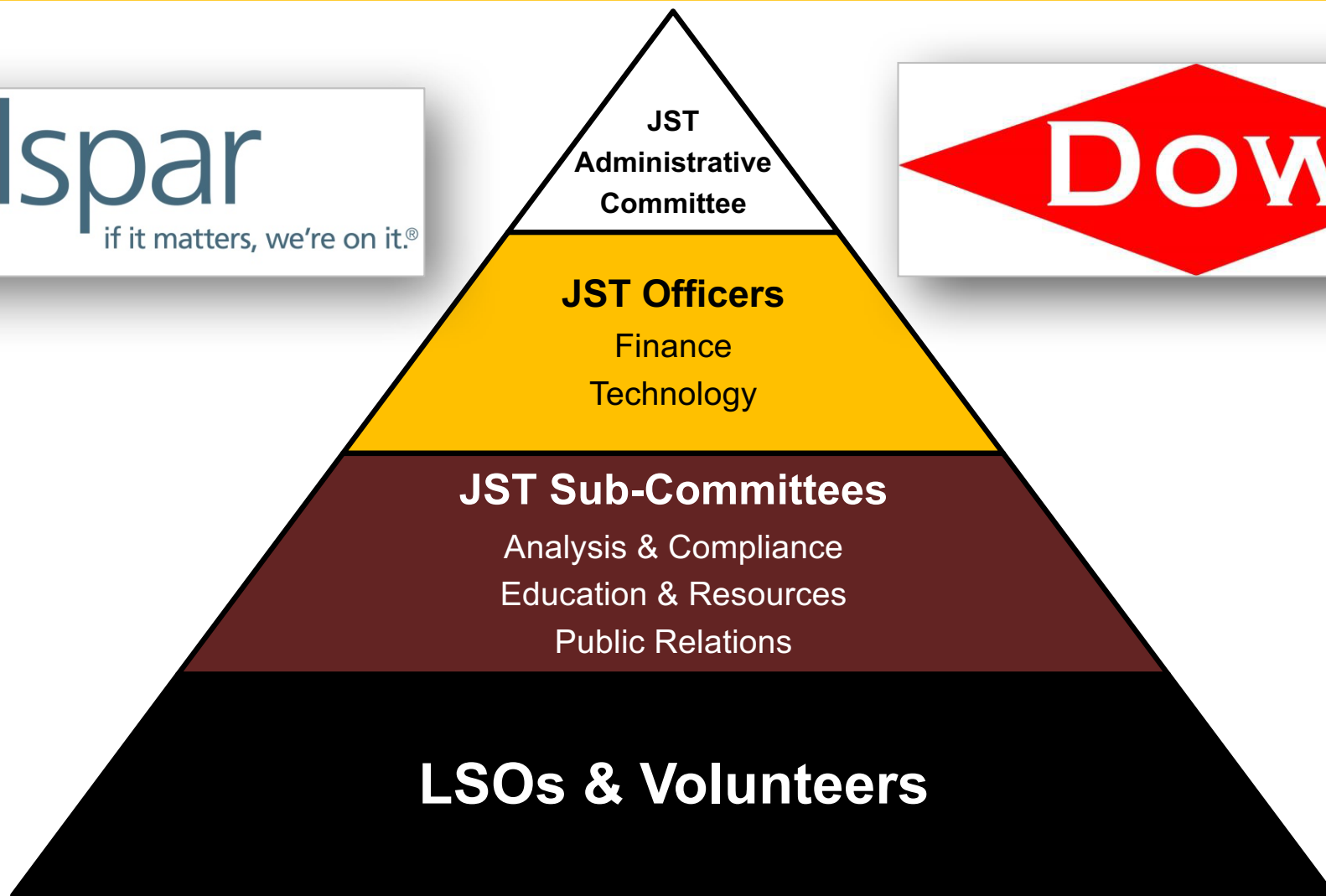
Defining Goals

Provide consistency and promote lasting changes

C A R E

- | | |
|--------------------|--|
| C ompliance | Define and enforce standard roles and expectations through biannual lab walkthroughs |
| A wareness | Enhance safety through signage, safety moments, posters, and email communication |
| R esources | Provide easy access to information and establish a system for maintaining records |
| E ducation | Provide frequent and relevant training |

JST Organization



JST is composed of Lab Safety Officers (LSOs) from each research group (~ 80 people) as well as volunteer undergraduates, graduates, and postdocs.

C.A.R.E.

C ompliance: Walkthroughs and Incentives

A wareness: Posters and Media

R esources

E ducation

Workshops and Training

Student-led Lab Walkthroughs

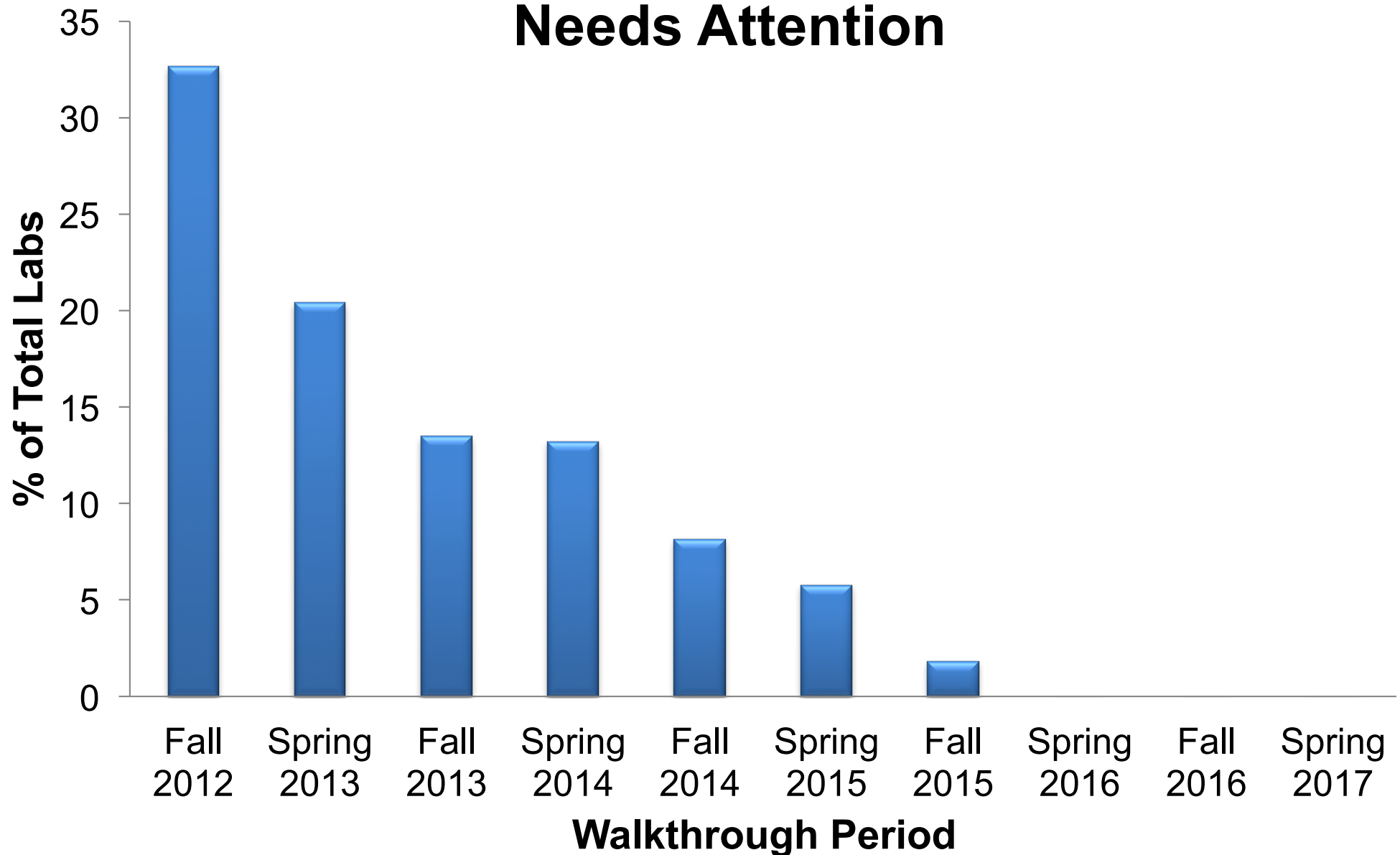
Allows Lab Safety Officers (LSOs) to examine labs for:

- General safety concerns
- Proper lab signage
- Different safety practices

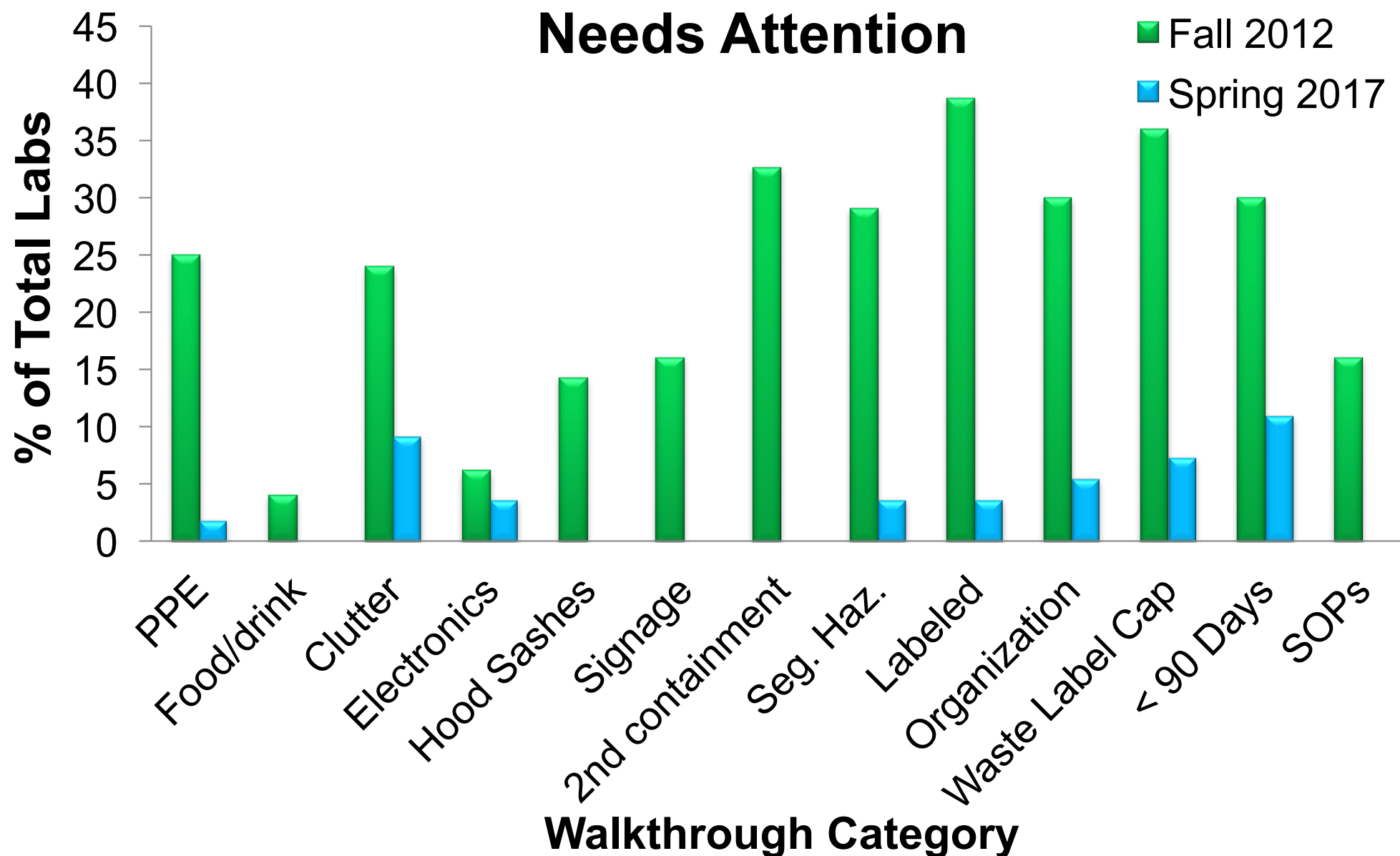
Safety Item	Score	Possible Scores	Comments
Proper lab signage (emergency contacts, PPE requirements)		(1,2,3,4,5)	
Researchers wearing correct PPE		(1,2,3,4,5)	
No food or drink in lab		(1 or 5)	
Eyewash Checked		(1,3,5)	
Aisles and hallways clear of chemicals and clutter		(1,2,3,4,5)	
Electronics near possible leakage sources raised off floor		(1,2,3,4,5)	
Hood sashes low		(1,2,3,4,5)	
Samples and chemicals in secondary containment where appropriate		(1,2,3,4,5)	
Samples and chemicals segregated by hazard		(1,2,3,4,5)	
Samples and chemicals labeled		(1,2,3,4,5)	

Secondary Containment

Needs Attention



Fall 2012 → Spring 2017



Safety Awards



Safety Posters

Large safety posters are placed in high traffic areas of the building



Do you know

UNIVERSITY OF MINNESOTA
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the **guidelines**
for a **safer lab?**



Keep sash down when using hood.



No food or drink in labs.

Properly store and dispose of waste.

Maintain SOPs.



Keep aisles clear.



Lift electronics off the floor if near water sources.



Post proper lab signage.

Joint Safety Team

Departments of Chemistry and
Chemical Engineering and Materials Science

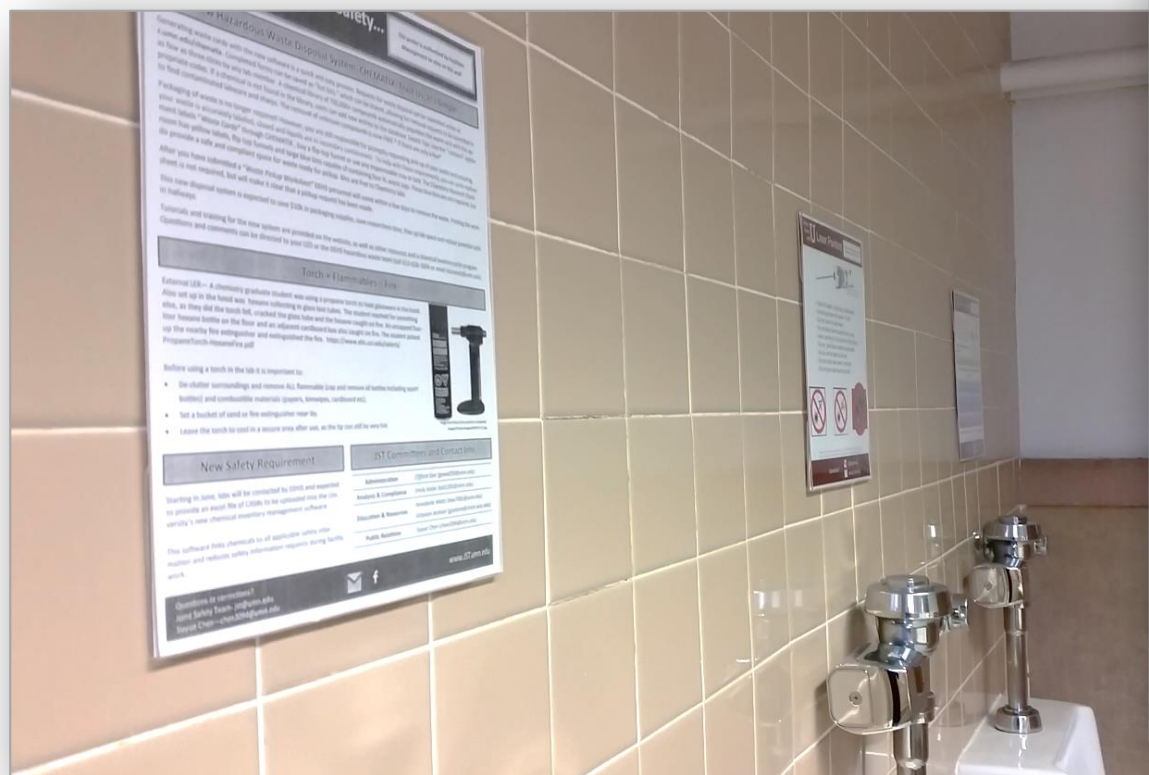
Questions? Comments? Contact JST@umn.edu or visit us at jst.umn.edu

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Safety Starts with **U**

Stall Wall Moments

Safety reminders and newsletters posted in all of the departmental restrooms



Stall Wall Moments

General Emergency Response Procedure

Communicate

Alert others, secure area, apply First Aid



Assess

Quantity, health risks, spread of hazard



Determine

If situation is simple or complex



Address for Simple

Neutralize, control, collect waste, decontaminate

Call for Complex

Dial 911 from any phone, say "Call AHERPS," stay on the line

EHS representative will give advice or send backup



Document

Write incident summary, file LER




CEI/CCS Task Force on Laboratory Waste Management. American Chemical Society, Washington, DC. 1995.

<<http://www.acs.org/content/acs/en/about/governance/committees/chemicalsafety/publications/guide-for-chemical-spill-response.html>>

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Safe Operating Cards

Name of Researcher			Date/Time
Reaction Scheme			
Reaction Conditions and Hazards	<input type="checkbox"/> Acid <input type="checkbox"/> Base <input type="checkbox"/> Oxidizer <input type="checkbox"/> Flammable <input type="checkbox"/> Biohazard		Temp _____) scribe _____
In case of spill			Emergency Shut Down

Brief description
of reaction,
conditions,
emergency
procedures, and
contact
information

CHAS 33: Safe Operating Cards

Walter E. Washington Convention Center

Alexander Miller, Ian Tonks

Room 209C, Wed 8/23, 8:35-9:00

Learning Experience Reports

LER forms can be filled out at JST website

Learning Experience Reports

A Learning Experience Report (LER) is a document for recording any incident or situation that happened in a laboratory setting. These files will be completely anonymous and only require a brief description of the incident and the measures that could be taken to solve the problem.

Learning Experience Report Form (requires a University of Minnesota e-mail address)

Note: (*) Please email jst@umn.edu if you are interested in obtaining our archived LER reports

Fire while cleaning glassware

April 8, 2016

Scale-up accident

February 10, 2016

Overheating an oil bath

November 9, 2015

Liquid oxygen condensation in culture tube

October 1, 2015

Learning Experience Report

If you experienced or observed an incident, an accident, or an 'almost!' situation, please report it here. This form is anonymous and secure. The contents will be communicated to our academic laboratory communities and used to prevent safety issues in the future.

* Required

Five Word Title *

Please provide a title of five words or less that describes the incident

Please describe the incident without using identifying terms such as names, room numbers, etc. *

If relevant, include information about time of day, whether the researcher was alone when the incident happened, whether an injury resulted, what response was taken, etc.

Check all boxes which apply to this situation. *

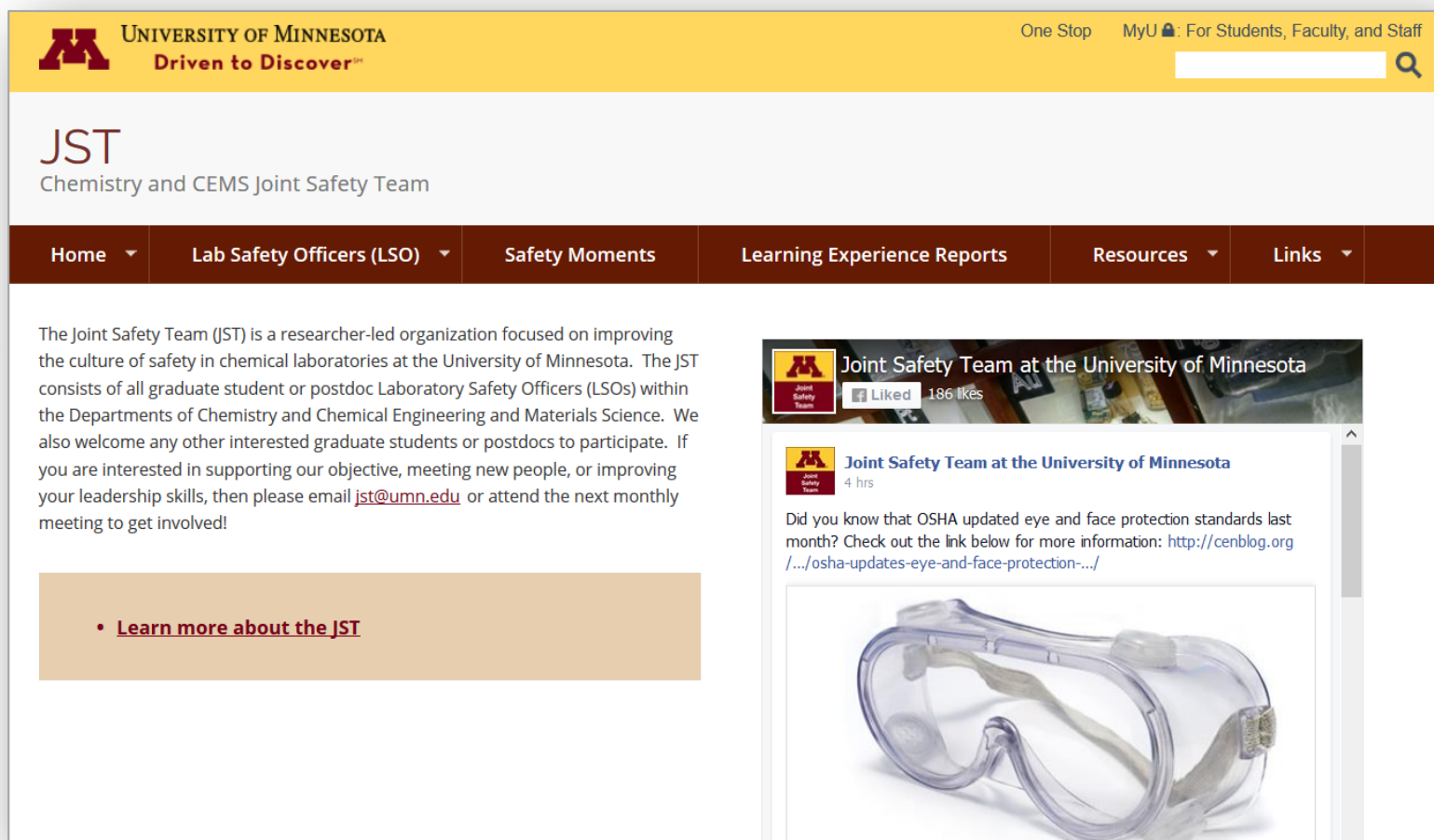
These tags will help our Learning Experience Report database to be more searchable.

- ☐ Spill
- ☐ Explosion
- ☐ Fire
- ☐ Equipment Failure
- ☐ User Error
- ☐ Required DEHS Response
- ☐ Required Emergency Response (911)

JST Website

Provide a central location for safety resources

www.jst.umn.edu



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One Stop MyU For Students, Faculty, and Staff

JST
Chemistry and CEMS Joint Safety Team

Home ▾ Lab Safety Officers (LSO) ▾ Safety Moments Learning Experience Reports Resources ▾ Links ▾


The Joint Safety Team (JST) is a researcher-led organization focused on improving the culture of safety in chemical laboratories at the University of Minnesota. The JST consists of all graduate student or postdoc Laboratory Safety Officers (LSOs) within the Departments of Chemistry and Chemical Engineering and Materials Science. We also welcome any other interested graduate students or postdocs to participate. If you are interested in supporting our objective, meeting new people, or improving your leadership skills, then please email jst@umn.edu or attend the next monthly meeting to get involved!

- [Learn more about the JST](#)

Joint Safety Team at the University of Minnesota
Liked 186 likes

Joint Safety Team at the University of Minnesota
4 hrs

Did you know that OSHA updated eye and face protection standards last month? Check out the link below for more information: <http://cenblog.org/.../osha-updates-eye-and-face-protection-.../>



Workshops and Training



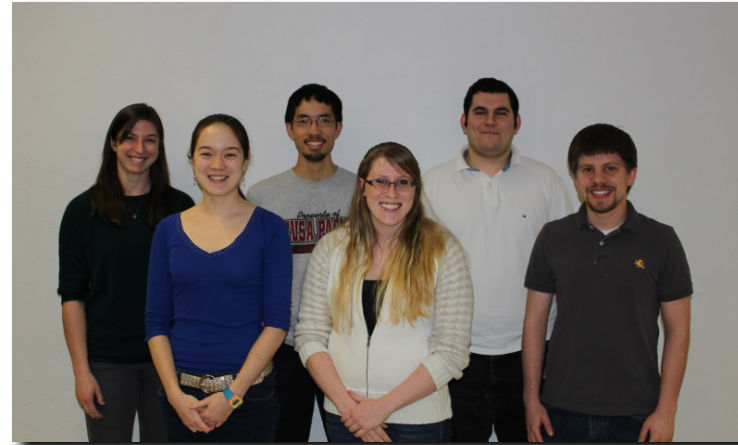
Departmental Safety Event



Is it sustainable?



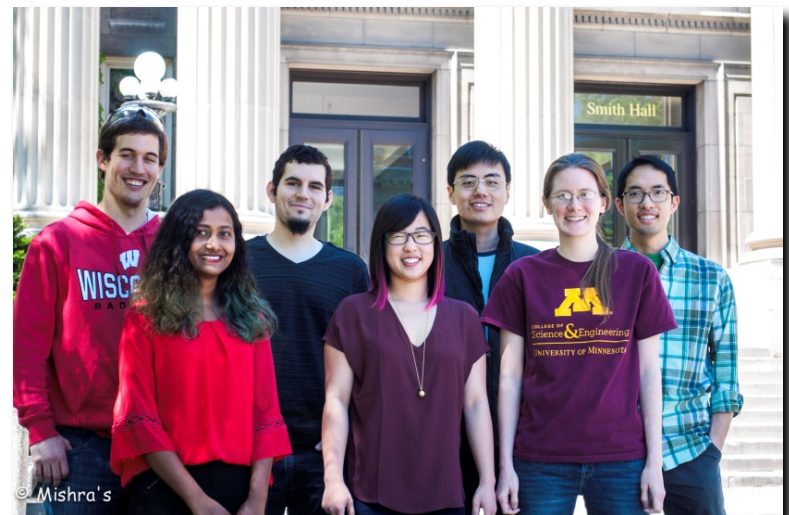
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6

Departmental Recognition

Intra-University Collaborations



External Collaborations



Benefits of a Safety Initiative

University

- Community trust
- Departmental recognition

EHS

- Actual compliance
- Attitude of teamwork

Faculty

- Increased knowledge
- Decreased anxiety

Researchers

- Job opportunities
- Confidence in work environment

JOURNAL OF
CHEMICAL EDUCATION

Commentary

pubs.acs.org/jchemeduc

Student Involvement in Improving the Culture of Safety in Academic Laboratories

Kathryn A. McGarry,[†] Katie R. Hurley,[†] Kelly A. Volp,[†] Ian M. Hill,[‡] Brian A. Merritt,[‡] Katie L. Peterson,[†] P. Alex Rudd,[†] Nicholas C. Erickson,[‡] Lori A. Seiler,[§] Pankaj Gupta,[§] Frank S. Bates,[‡] and William B. Tolman^{*,†}

Testimonial

“In the spirit of this tradition [safety moments], I included a safety moment in my (20 minute) technical presentation while interviewing with BASF. The interviewers were surprised and clearly impressed that safety was an important consideration for us. In BASF, we regularly hear that “Safety is our license to operate,” but academia is still transitioning to this mindset.

Making safety a core value and expressing this to potential employers is a win-win, and I credit it with part of my success in landing a great job.”



Alex Rudd (Ph.D. 2014)
Founding JST member

Keys to Success – Distinct Responsibilities

Safety Committee

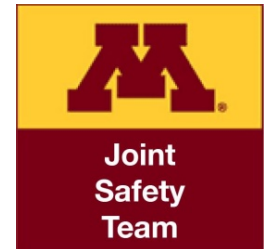


Compliance

Official Inspections
Departmental Policy
SOP Review

JST

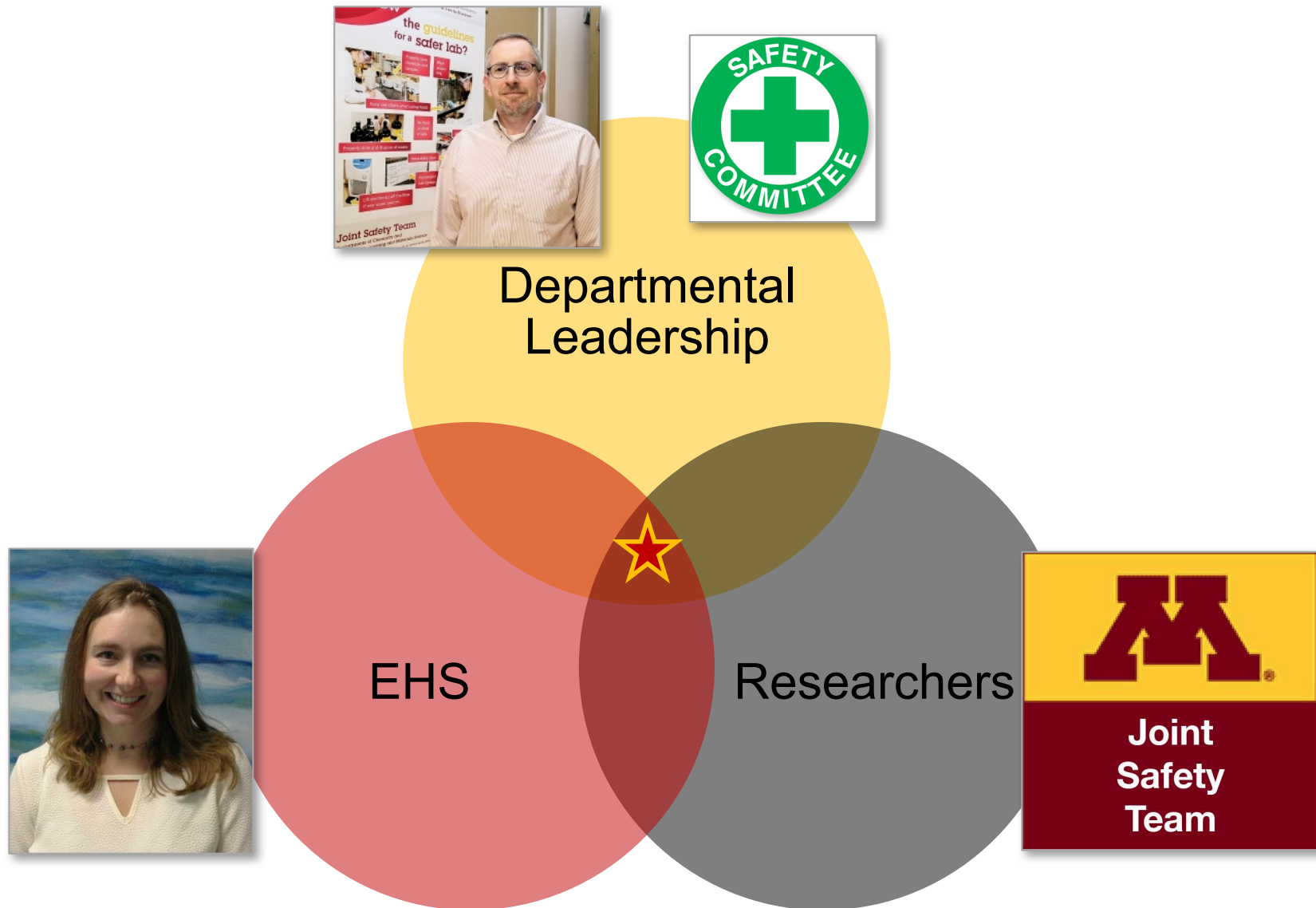
Culture



Peer Inspection
Awareness
LSO Training

*Goal: making safety an integral part of
all research & teaching activities*

Keys to Success – Integration and Trust



Keys to Success – Industrial Partnerships



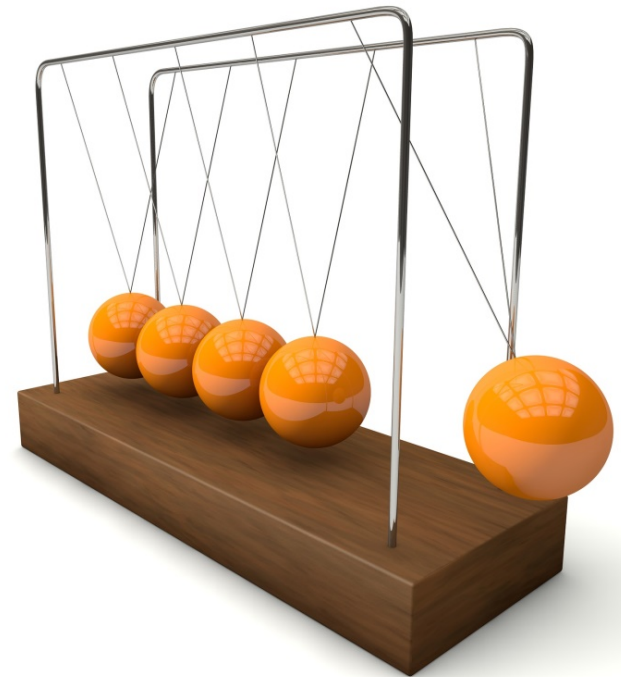
valspar
if it matters, we're on it.®

Keys to Success – Adaptability



Current efforts to maintain momentum

- Assigned and volunteer-based committee service
- Committee service stipend
- Safety seminar series



Acknowledgements

- Bill Tolman, Chair of the Department of Chemistry
- Dan Frisbie, Head of the Department of Chemical Engineering & Materials Science
- Anna Sitek, Research Safety Specialist, Environmental Health & Safety
- Dow and Valspar, Industrial Sponsors
- Steering Committee (Founding members): Kate McGarry, Katie Hurley, Kelly Volp, Ian Hill, Brian Merrit, Katie Peterson, Alex Rudd, Nick Erickson
- All members of the Joint Safety Team

The Joint Safety Team

University of Minnesota

jst@umn.edu

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THANK YOU

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JST Organization

JST Committees & JST Officers	What is Accomplished
Administrative Committee	<ul style="list-style-type: none"> • Sub-committee chairs & officers update which tasks are being accomplished • Organizes LSO meetings and departmental wide events • Determines new goals or ideas for the JST
Analysis & Compliance Sub-Committee	<ul style="list-style-type: none"> • Conduct and analyze surveys • Coordinates and analyzes lab audit walkthroughs • Creates the incentive system and determines winners
Education & Resources Sub-Committee	<ul style="list-style-type: none"> • Trains LSOs • Conducts safety workshops • Provides cleanup weeks • Provides resources for students
Public Relations Sub-Committee	<ul style="list-style-type: none"> • Creates safety posters and stall wall moments • Provides monthly newsletter to LSOs • Provides safety tips through social media (Facebook) • Collects and provides safety moments
Finance Officer	<ul style="list-style-type: none"> • In charge of the JST budget
Technology Officer	<ul style="list-style-type: none"> • In charge of the JST website

JST Meetings

JST Meetings	Whose Involved	How Often they Meet
Administrative Committee Meeting	<ul style="list-style-type: none"> • JST President • JST Sub-Committee Chairs • JST Officers • DEHS • Departmental Chairs 	1 hour meeting – once a month
Analysis & Compliance Meeting	<ul style="list-style-type: none"> • JST Sub-Committee Chair • 5 – 6 assigned LSOs • Volunteers 	1 hour meeting – once a month
Education & Resources Meeting	<ul style="list-style-type: none"> • JST Sub-Committee Chair • 5 – 6 assigned LSOs • Volunteers 	1 hour meeting – once a month
Public Relations Meeting	<ul style="list-style-type: none"> • JST Sub-Committee Chair • 5 – 6 assigned LSOs • Volunteers 	1 hour meeting – once a month
All LSO Meetings	<ul style="list-style-type: none"> • JST President • JST Sub-Committee Chairs • JST Officers • All LSOs • Volunteers 	1 hour meeting – twice a year (June and December)

Continuing the Culture

Addressing Challenges

- Realistic timelines
- Student turnover
- Participation and leadership

Future actions

- Funding for CPR/First Aid certification
- Improving the incentive system
- Hosting more safety workshops

JST Sub-Committees

Analysis & Compliance: Surveys

Annual surveys are taken to assess how:

- Graduate students and postdocs view safety in own lab
- Most common/recent safety concerns
- Improve the JST
- Data collection to compare results to previous years

JST Safety Survey - Fall 2014

Form Description

1. Are you regularly exposed to laboratory settings?

If you click 'no,' feel free to skip questions that are not applicable to you. This question will help us to categorize survey responses.

- ☐ Yes, I work in a laboratory at least some of the time
- ☐ No, I do not work in a laboratory.

2. If you see a labmate participating in unsafe lab practices, which of the following reasons most likely prevents you from discussing better lab practices with that labmate?

- ☐ seniority
- ☐ personality differences
- ☐ don't want to disrupt labmate
- ☐ lab practice isn't too dangerous
- ☐ not my responsibility to regulate/patrol others
- ☐ I'll definitely say something
- ☐ Other:

3. State the degree to which you agree with the following statement: "The safety posters give me useful, practical information that I can use day-to-day."

1 2 3 4 5

Strongly Disagree ☐ ☐ ☐ ☐ ☐ Strongly Agree

4. My advisor actively supports safety concerns by doing one or more of the following. If you are the advisor, state the actions you take to show your support.

Analysis & Compliance: Lab Signage

Each research group post a **standardize** sign to provide contact information, PPE requirements, and hazards before entering the lab

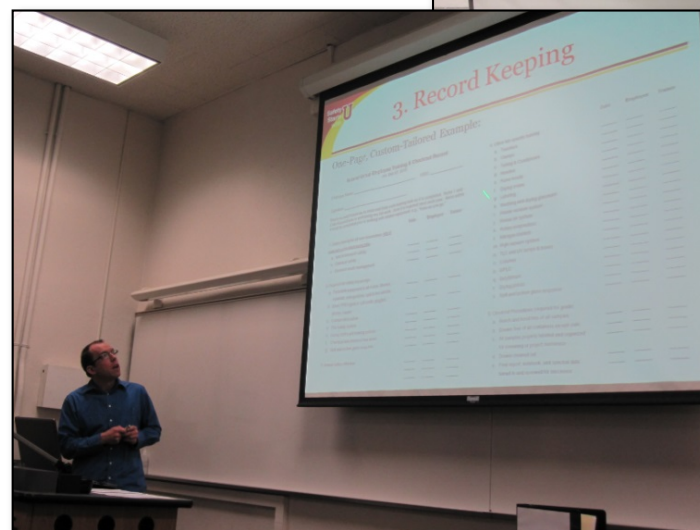
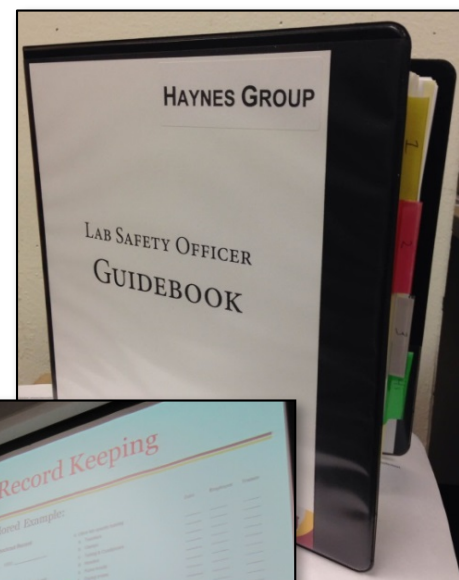


Laboratory Information	Building & Room
	Principal Investigator, phone/email
	Lab Safety Officer, phone/email
	Description
Minimum PPE Required	
Hazards	In an emergency, call 911. In non-emergency situations, contact the LSO or PI.

Education & Resources: LSO Guidebook and Training

Each lab in CHEM and CEMS department has an LSO

- Address large turnover LSO:
 - Provide annual LSO trainings
 - Provide LSO guidebook (available on JST website)



Education & Resources: LSO Guidebook

LSO Guidebook

- Defining LSO roles and responsibilities
- Guidelines on writing and maintaining SOPs
- Record keeping
 - EHS training records
 - Lab specific training records
- Addition resources and templates

Roles and Responsibilities of a Lab Safety Officer

Each active laboratory at the University of Minnesota must have a lab safety officer (LSO). The LSO serves as a resource for ensuring safe practices in the lab as well as serve as a role model for safety. Larger groups may have more than one LSO if needed in order to fulfill all duties.

Responsibilities of an LSO are divided into a few groups...

JST Responsibilities:

- Be
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Eyewash Inspection

Weekly Checklist

Recommended 3 min weekly flush and 15 min monthly flush (to ensure continuous water flow and inhibit growth of bacteria)

Check that:

- area around the eyewash station is clear of obstruction, debris or tripping hazards
- eyewash station operates correctly:
 - activating arm operates smoothly and remains open when released
 - water flows continuously, with each nozzle expelling water in roughly equal amounts and equal height
 - water is clear and colorless

Date	Initials

Date	Initials

Date	Initials

Education & Resources:

Safety Workshops

Have safety workshops at monthly JST meetings

10 – 20 minute activities that covering current concerns students have on safety

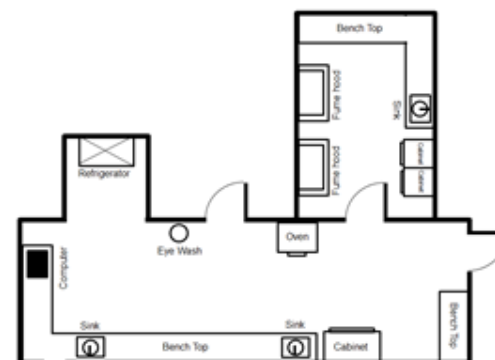
Workshops include:

- Various spill scenario
- Work alone in labs
- Risk assessment

Various Spill Scenario Workshop

Indicate a type of spill with a color:

- Black = Unknown
- Silver = Mercury
- Red = Flammable
- Blue = Volatile Toxic
- Purple = Stench Chemicals
- Orange = Reactive
- Green = Low Hazard Salts & Buffers
- Pink = Corrosive
- Yellow = Oxidizer
- Brown = Oil



Education & Resources: Designated Cleanup Week

- Hazardous and Unknown Waste Seminar attended by ≥ 90 students and faculty
- 321 samples processed by students who were trained and assisted by EHS staff
- Saved the departments ~\$4,500 and weeks of work by EHS staff



A poster for Cleanup Week at the University of Minnesota. The top section is for 'CLEANUP WEEK PART I: FREE UNKNOWN CHEMICAL TESTING AND DISPOSAL' held from 'JANUARY 7-11, 2013'. It features illustrations of various chemical containers: a test tube with green liquid, a beaker with orange liquid, a bottle with brown liquid, and a beaker with brown liquid. The bottom section is for 'CLEANUP WEEK PART II: ELECTRONICS/EQUIPMENT DISPOSAL' coming in 'SUMMER 2013'. It features an illustration of a blue and white electronic device. At the bottom, it says 'QUESTIONS? CONTACT YOUR LSO OR E-MAIL JST@UMN.EDU'. Logos for the 'Joint Safety Team' (Departments of Chemistry and Chemical Engineering and Materials Science), 'UNIVERSITY OF MINNESOTA Driven to Discover™' (© 2012 Regents of the University of Minnesota. All rights reserved.), and 'Safety Starts with U' are also present.

JANUARY 7-11, 2013
CLEANUP WEEK PART I
 FREE
 UNKNOWN CHEMICAL TESTING AND DISPOSAL

COMING SUMMER 2013
CLEANUP WEEK PART II
 ELECTRONICS/EQUIPMENT DISPOSAL

QUESTIONS? CONTACT YOUR LSO OR E-MAIL JST@UMN.EDU

Joint Safety Team
 Departments of Chemistry and
 Chemical Engineering and Materials Science

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Public Relations: Safety Moments

Every group meeting
and seminar:

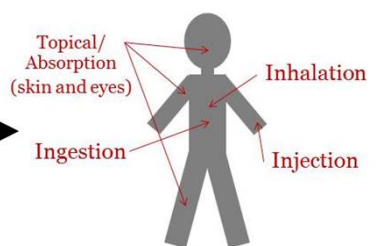
- Expected to give a safety moment
- 1 – 2 min. presentation on a safety reminder
- JST website provides additional safety moments

Safety moments contain:

- A relevant safety topic
- Educational content
- Citation or reference

Chemical Exposure

Exposure Sites



Topical/
Absorption
(skin and eyes)

Inhalation

Ingestion

Injection

Factors

- Toxicity
 - extent to which a substance is poisonous
- Dosage
 - amount of chemical exposure
- Duration
 - amount of time exposed to chemical (acute vs. chronic)

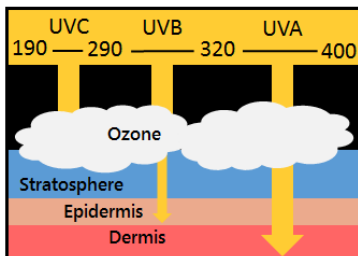
Fox, Stephen; Wilson, James. "Signs and symptoms of chemical exposure" Presentation.
<http://www.maine.gov/tools/whatsnew/attach.php?id=241098&an=1>

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Public Relations: Stall Wall Moments

Post monthly safety tips in the interior of all bathroom stall doors

Stall Wall Moments



Lab UV



Shortwave UV radiation is naturally filtered by atmosphere but can be found in many places in the laboratory. Keep your skin and eyes safe: wear eye and face PPE when using UV lights.

Stall Wall Moments

Learning Experiences Spring-Summer 2014

Learning Experience Reports (LERs) are brief online forms (jst.umn.edu/incident) filled out after a near-miss or an incident occurs.

LER breakdown from Spring-Summer 2014:	Number of incidents:	11
	Number of injuries:	4

Each incident had multiple contributing factors. Below are the most commonly reported factors compared to number of injuries that occurred.



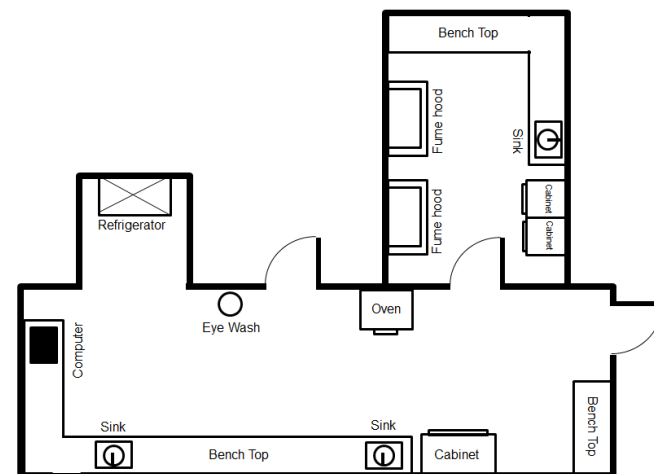
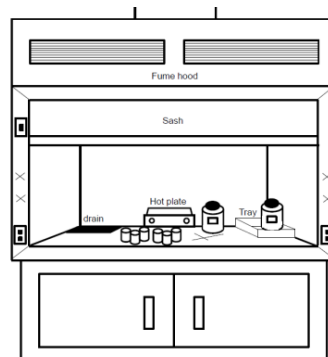
Safety Workshops

Various Spill Scenario Workshop

Groups had to choose between a fume hood, research lab, or building floor

Indicate a type of spill with a color:

- Black = Unknown
- Silver = Mercury
- Red = Flammable
- Blue = Volatile Toxic
- Purple = Stench Chemicals
- Orange = Reactive
- Green = Low Hazard Salts & Buffers
- Pink = Corrosive
- Yellow = Oxidizer
- Brown = Oil



Give their spill to another group to figure out how they would respond to the spill