

Laboratory Safety Efforts at Penn State

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*Presented at the Council for Chemical
Research, Arlington, VA, May 19, 2013*

Safety Structure at Penn State

- Environmental Health and Safety (EHS) establishes general policies and procedures
 - On-line training, yearly safety inspections
 - Well-trained staff available for support
- Implementation is highly decentralized
 - Large differences between units / Departments
 - Minimal communication between units
 - Chemistry, Chemical Engineering, and MATSE located in three separate Colleges

Background

- Safety programs in Chemistry and ChE were fairly typical of most universities
 - No major accidents, but definitely not a priority
 - No formal programs in place to support safety
- MATSE had strong safety initiative in place since 2008
 - Active safety committee
 - Safety newsletters
 - Policy of safety enforcement

MATSE Initiatives



2008

- MatSE safety committee formed as the MatSE Safety Awareness Organization (MSAO)
- Safety glasses mandated in all labs and safety signage redesigned to signal the push towards better safety practices
- Department EAB engaged with safety culture improvement



2009

- First annual MatSE Safety Awareness Week
- First industry visit from Owens Corning on safety
- Stall Wall Safety started



2010

- Monthly lab inspections started
- Annual face-to-face Lab Safety Refresher training required in MatSE
- Laboratory Safety Officer Training made available to lab overseers in MatSE labs (a first at Penn State)



2011

- MatSE Safety Dance Video released
- MRI engaged to convey consistent safety message within entire materials community at Penn State
- MatSE safety article released via PSU Live (<http://live.psu.edu/story/56194>)



2012

- Asked by Physics department at Penn State to provide advice on safety methods and practices
- MatSE begins using hazard assessment tool to evaluate safety of experiments before going into the lab
- Engagement with Dow Chemical began with two visits by Dow personnel to Penn State and one to Dow by Penn State researchers
- Initiated Safety Moment presentations to start seminars



2013

- Materials Safety Newsletter (joint effort between MatSE and MRI) started
- Continuing to raise awareness across campus and with other Universities

- Started big safety push in 2008 with the help of our industrial advisory board.
- Department chair has steadfast commitment to excellence in safety.
- Staff is relentless on housekeeping issues and inspections.
- Little confusion about rules now that everyone is used to our new system.
- Continue to push the level of sophistication in our safety initiatives and commitment by everyone in the building.

MATSE Initiatives

- Yearly re-training for everyone – including office staff and computer modelers.
- Oversight by dedicated staff, faculty and department head. Top down approach with consistency has worked well.
- Communication directly with labs – PIs are not the slow step. Monthly inspections are critical.
- Outreach and advertising safety to keep it fresh.
- Encourage ideas and participation from all personnel: <http://www.youtube.com/watch?v=Aly6AC9F1Gk>

New Efforts (Spring 2012)

- **Dow – Penn State Safety Charter**
 - To elevate safety awareness, identify best safety practices applicable to academic laboratory environment, and develop tools to improve and sustain a culture of safety in ChE, Chemistry, and MATSE at Penn State
- **Joint safety team developed**
 - Faculty, staff, and grad students from 3 Depts plus representatives of EHS
 - Bi-weekly video conference calls with Dow

Initial Safety Survey

- **Developed by all three Departments**
 - Based on published study in *Safety Science Monitor* (Volume 15, Issue 3, 2011)
 - Likert scale + space for free form comments
 - Significant input from EHS and Dow
- **Distributed to students, faculty, and staff**
 - Overall response rate of 44%
 - Data analyzed separately by Department
 - Follow-up focus groups led by Dow

Survey Results - Sample

	Chem	CHE	MATSE
I wear safety glasses whenever I am in the lab	3.8	3.9	4.7
Safety is a core value in my Department	3.8	3.8	4.8
I hear about and learn from safety incidents in my Dept	3.2	3.1	4.3

1 = Disagree, 3 = Neutral, 5 = Agree

Visit to Dow in Midland

- 21 visitors from Penn State
 - 5 PhD students + 1 faculty from each Dept
 - Safety coordinators, EHS representative
 - Lab tours + safety seminars on diverse topics



ChE Activities

- **Addressed several “facilities” issues**
 - Replaced electrical switches for fume hoods
 - Installed AED unit in ChE building
 - Installed safety glass holders throughout bldg
 - Purchased safety glasses and lab coats for all new graduate students
- **Established formal ChE Safety Committee**
 - Grad students, faculty, and staff
 - Regular monthly meetings with minutes

ChE Safety Initiatives

- **Safety Website directly accessible from home page**
 - Information on required training and PPE
 - Links to EHS for “near misses”
 - Visible button for reporting safety concerns
- **Enhanced communications**
 - Monthly safety newsletter, safety posters
 - Safety “stall wall” posted in all bathrooms

ChE Safety Initiatives

- **Expanded safety training program**
 - Full day during initial orientation
 - Topics include chemical waste handling and disposal, chemical labeling, MSDS, hands-on fire extinguisher training, SOP, etc.
 - Required to obtain a key to lab
- **New incentives for safety performance**
 - PAWS student of the month (\$25 gift card)
 - Best research lab during EHS inspection

Safety Class / Inspection

- CHE 452 Process Safety undergrad elective
 - Approximately 70 students in class
- Student assignment – inspect research lab using standard EHS inspection form
 - Students work in teams of two
 - Report submitted to Lab Group and PI (faculty)
- Reports identified several major concerns
 - Inadequate access to extinguishers and eye wash
 - Problem with chemical waste disposal
 - All issues quickly corrected as needed

Chemistry Initiatives

- **Student safety leadership team**
 - Lab Safety Officers + faculty advisor
 - Measures ‘pulse’ of students in the laboratories to ensure maximal impact of safety initiatives
- **Near-miss reporting and safety website**
 - Accessible directly from Department homepage
- **Safe Operation Cards**
 - Succinct list of chemical / physical hazards, safe shut-down procedures, and contact information

Chemistry Initiatives

- **Safety awareness incentive program**
 - Recognition for completion of all EH&S requirements (decal posted on lab door)
 - Rewards for quarterly self-inspections and near-miss reporting (coffee and donuts provided at subsequent group meeting)

Integrated Safety Plan (ISP)

- Incentive based approach designed to promote broader employee involvement in workplace safety and health at Penn State
- ISP designed to create a “structure” for managing safety and health within individual units through a partnership with EHS
- Three core elements:
 - Leadership Commitment
 - Employee Involvement
 - Self-Review

ISP Certification

- **Leadership Commitment** – visibly demonstrate leadership commitment to workplace safety and health, clearly assign / communicate responsibilities to all employees
- **Employee Involvement** – establish department safety committee that represents all employees, develop mechanisms by which employees can communicate concerns and suggest improvements
- **Chemical Engineering, Chemistry, and MATSE** only academic units to be certified

Progress - Overall

	Chem	CHE	MATSE
The safety culture in my Dept has improved over past year	4.4	4.6	4.4
My attitude towards safety has improved over past year	4.2	4.6	4.5
My research group instituted new safety practices	4.2	4.4	4.3

1 = Disagree, 3 = Neutral, 5 = Agree

Progress – Chemical Engng

Chemical Eng

	Before	After
I wear safety glasses whenever I am in the lab	3.9	4.3
Safety is a core value in my Department	3.8	4.6
I hear about and learn from safety incidents in my Dept	3.1	4.5

1 = Disagree, 3 = Neutral, 5 = Agree

Progress – Chemistry

Chemistry

	Before	After
I wear safety glasses whenever I am in the lab	3.8	4.2
Safety is a core value in my Department	3.8	4.1
I hear about and learn from safety incidents in my Dept	3.2	4.2

1 = Disagree, 3 = Neutral, 5 = Agree

Summary

- **Significant progress in changing safety culture**
 - Improved training and safety protocols
 - New Departmental incentive programs
 - New attitudes among graduate students and faculty
- **Partnership with Dow**
 - Energized graduate students about safety
 - Demonstrated integration of research and safety
 - Provided advice, sounding board, and encouragement

Learnings

- **Buy-in from graduate students critical**
 - Lab Safety leaders, incentives, peer pressure
 - Direct communication is important
 - Professional development -> job opportunities
- **Leadership commitment from Departments**
 - Engagement of Department Head essential
 - Participation of key faculty leaders required
- **“Cost” is non-trivial, but mostly in time**
 - Small dollars can have large impact
 - Staff need to have time and support from Department

Acknowledgements

- **Departmental Safety Officers**
 - Roger Dunlap (Chemical Engineering)
 - Larry Johns (Chemistry)
 - Libby Kupp (MATSE)
 - Scott Henninger (MATSE)
- **Kate Lumley-Sapanski (EHS at Penn State)**
- **Pankaj Gupta, Lori Seiler, and colleagues at Dow**



CHE 452 Assignment

1. Obtain copy of inspection form from EHS website.
2. Review form to assure a basic understanding.
3. Contact Group Safety Leader to arrange inspection.
4. Inspect the lab:
 - a. Dress appropriately and wear required PPE.
 - b. Get some understanding of the experiments.
 - c. Take notes, photos, etc as needed for your report.
 - d. Inspect Lab Book for clarity and neatness.
 - e. Determine if there is a Standard Operating Procedure (SOP) and ask if it is adhered to.
5. Write a report of your findings and send to instructor, Principal Investigator (Faculty), and Safety Leader.

PAWS to put Safety First!

Clothing — Safety glasses, lab coats, and closed toe shoes required in lab at all times

Housekeeping — Clean-up lab benches, glassware, and chemicals

Emergencies — Know where to find and how to use eye wash station, safety shower, and fire extinguisher

Chemicals — Read MSDS carefully, label bottles properly, use secondary containment when transporting

Hazards — Be aware of hazards, no food or drink in the lab, remove gloves and wash hands before leaving lab

Equipment — Design for inherently safe operation



ChE Safety Newsletter



December 2012

www.che.psu.edu/safety/index.htm

Volume 4

Safety Thought of the Month

Safety Showers & Eyewashes



- Showers and eyewashes must be easily accessible with at least 16" of clearance from center
- Eyewashes must be inspected and flushed weekly, find the weekly checklist under Tabs at ehs.psu.edu
- Showers are flushed annually by EHS but regularly ensure they are free from obstruction
- Verify that you understand proper use of both showers and eyewashes so you can confidently operate them in the case of an emergency

NEWS

- A user of a Penn State Nanofab facility was recently exposed to hydrofluoric acid. The researcher was disposing of a hydrofluoric acid solution when the solution overflowed and splashed onto the user's personal protection equipment (PPE). In response to the amount of wet chemical safety incidents, the Materials Research Institute is developing and implementing standardized chemical use procedures and policies.
- In November, an acid waste bottle ruptured and sprayed chemicals through the Nanofab clean room (MSC). The clean room was forced to close and EHS was called to address the situation. Always review potential hazards presented by chemicals, dispose of chemicals properly, and wear proper PPE to prevent an accident like this from occurring.

PAWS Student of the Month

Please join us in congratulating graduate student

Jason Binz

who was selected as the PAWS Student of the Month. Jason will receive a \$20 gift card to a local business of his choice.

"Jason is the model student regarding safety in the department. Jason is a member of the Rioux group. In the past few months we have undergone a number of safety renovations that had nothing to do with his project. His commitment to safety is extraordinary and he is selfless in terms of ensuring the Rioux laboratory is a safe place to work."

- Nominator

Nominate qualified individuals for next month's award by sending your recommendation (www.che.psu.edu/safety/index.htm) to Roger Dunlap at rdunlap@engr.psu.edu by December 15th.

DID YOU KNOW?

Christmas trees and decorative lighting are involved in about 400 home fires leading to approximately 20 deaths each year (www.nfpa.org).

Approximately 5,800 people are sent to the emergency room due to holiday decorating-related falls each year (www.cdc.gov).

Don't be a statistic – Have a fun and SAFE holiday!

- Don't overload extension cords
- Properly use ladders when hanging decorations
- Keep Christmas trees away from open flames

Playing it Safe!

It may just be what you are right now...

If we stumped you last month:

Thodepught

The series of letters (A,T,G, and C) was the genetic code spelling our S-A-F-E-T-Y using single letter amino acid abbreviations

The series of numbers (0 and 1) was binary code spelling SAFETY

Questions or concerns? (814) 863-4800

Emergency? Call 911

ENNSATE



MATSE - Enhanced Training

- Instituted yearly face-to-face retraining of all personnel during “Safety Week”
 - Indoctrinate new students the week they arrive
 - Renewed commitment of existing personnel including faculty, staff, computational researchers
 - Interactive program for building safety including fire drills, AED/CPR training, and shelter in place
 - Partnered with PSU EHS for local training sessions and advertised heavily

MATSE - Enhanced Oversight

- Empowered safety staff to work directly with labs
 - PIs no longer a bottleneck
 - Strong support from administration
 - Little confusion over procedures with a central body in charge
- Monthly inspections of all labs
 - No hiding problem areas
 - Very high housekeeping standards
 - Continuous helpful feedback to habitual offenders

MATSE - Enhanced Participation

- Safety committee and staff worked directly with students in the labs – more interactive feedback and idea generation
- Heavy involvement from our External Advisory Board and Industrial Partners
 - Twice-yearly inspections from industry visitors
 - Safety seminars from Owens Corning Safety Overseer
- Safety Dance

<http://www.youtube.com/watch?v=Aly6AC9F1Gk>

MATSE - Enhanced Communication

Monthly Stall Wall
and Newsletters

Safety Moments
before seminars



SAFETY FIRST.

STALL WALL SAFETY

Issue 43 – April 2013
(get your copy <http://www.matse.psu.edu/safety>)

MatSE Safety Awareness Organization (MSAO): MSAO's mission is to oversee laboratory safety, awareness, and organization within the MatSE department. Our organization is a combination of faculty, staff, and students. Come to our next meeting, **THURSDAY, May 2nd**, in 116 Steidle at 9 am. Have a suggestion? Contact us at: safety@matse.psu.edu.

Does YOUR Group Meeting Start with Safety?
Bringing up safety concerns is a great way to start group meetings. Take five minutes to chat about a safety issue that you have observed lately. If there are no current lab issues, discuss a safety topic that you have seen on Stall Wall or in the news.

Free—Exchange your Mercury Thermometers



Encourage your Lab Mates to be Safe!
Do your lab mates follow safety policies? Do you think

Mercury thermometers are not allowed on Penn State Campus, and they have not been allowed for some time. **Mercury is very toxic and will kill you!**



Active engagement of staff and faculty with PSU
EHS and Materials Research Institute