

Materials Research Institute Fourth Annual Safety Report

Report Covering Dates: Spring 2016-Spring 2017

Date of Last Report: Spring 2016

Executive Summary

This is the Fourth Annual MRI Safety Report highlighting significant safety accomplishments and on-going safety initiatives to improve the standards in and around the 51 labs housed in the north wing of the Millennium Science Complex (MSC). The report reflects the efforts of faculty, students, and the MRI Safety Committee (MRI-SC) to make the lab a safe working environment for users, visitors, and occupants of the MSC north wing. The report encompasses four categories: Safety Successes, Points of Concern, Continuing Safety Progress, and Future Initiatives.

Safety Successes

New Faculty Member

2016 saw several successes brought about by the new faculty lead, Roman Engel-Herbert. The first success was adding another faculty committee member, Professor Siyang Zheng. Professor Zheng is a faculty member in the Department of Biomedical Engineering and his active participation in the MRI Safety Committee not only adds a second faculty perspective to assist in elevating awareness about safety among MRI occupants, it also adds to the diversity of safety expertise of the Committee. Prof. Zheng's research focus is to develop innovative micro and nanotechnologies for biological and medical application. The committee appreciates his involvement.

Lab Inspections

Random lab inspections were implemented this year, and they will continue throughout 2017. These additional inspections are performed immediately following the regularly scheduled lab safety manager meetings. Lab managers are typically graduate students that



Figure 1 Fire Extinguisher Demo April 2016

represent the labs of individual PIs. Lab manager safety meetings are held to ensure that the higher safety standards established at MRI are clearly communicated to all labs. After each meeting, labs are randomly selected and a group of safety managers along with the building officers and MRI's facility coordinators conduct the inspections. It has proven to be a very effective educational exercise in that lab managers have the opportunity to talk one-on-one with safety officers. It further provides a critical feedback to the Safety Committee to confirm that minimum safety standards set by

Environmental Health & Safety (EH&S) are met at all times in MRI labs and that high lab safety standards are maintained in the labs between annual lab inspections from EH&S.

Typically, five labs are inspected after each lab manager meeting, which means 30 labs are inspected during the year between the annual lab inspections performed by EH&S. Random lab inspections will continue in 2017 upon request from lab managers. They have provided encouraging feedback and been an effective instructional tool for the managers to develop an eye for potential safety hazards in labs.

We are coordinating with the Materials Science and Engineering Department (contact is Dr. L. Kupp) and Chemistry Department (contact is Prof. J. Asbury) to evaluate the option to develop a Graduate Safety Course for lab safety managers to receive official recognition and credit from the University for their service. A course in lab safety would provide an educational forum for efficient and effective communication with safety officers across departments. MRI industry partners have indicated that newly graduated employees lack knowledge and awareness in the safety aspects of process development and are not sufficiently trained to have an easy transition to adapt to industry safety standards.

Safety Olympics

The Second Annual Materials Safety Olympics was another success. Safety Olympics marks the highlight of Safety Week in MRI. Safety Week activities have three components: an invited industry talk at the M-café on the importance of safety from the industry viewpoint. (Keeping the industry perspective on safety at the forefront of awareness is the mission of the Safety Committee.) Second, a safety refresher course is held Tuesday morning of that week. And third, on Thursday the Safety Olympics is held.

This year, the financial sponsorship of the Safety Olympics grew. In 2015 the primary financial sponsor was Corning, Inc. In 2016, PPG came on board and provided funds for a department trophy for the first time. We believe competition between departments adds interest to the Olympics. In addition to the departmental competition, 18-20 four-person teams compete for prizes. In 2016, Chemistry took the department trophy, which is on display in the Chemistry Department until the third MRI Safety Olympics in fall 2017.



Figure 2 PPG Sponsored Department Trophy

The Olympics continues to grow, we believe, because it is a venue that emphasizes safety among students and across departments while offering fun and competition. It is a venue to assess knowledge and to learn. Furthermore, the Olympics is an event that exhibits MRI leadership, with staff and student participation, while fulfilling an element of the ISP (Integrated Safety Plan). The ISP is an EH&S incentive program, coordinated with MRI, which promotes broader employee involvement.

Recordkeeping

Keeping track of safety certificates is an organizational challenge. Safety certificates are pertinent because each user is required to complete varied on-line safety courses before

being allowed access to an instrument. Multiple kinds of safety courses/certificates exist, such as the Initial Safety Course, X-ray Diffraction Safety Course and Chemical Safety course, to name only a few. As it stands, students and external users must produce their paper copy over and over to lab managers of different labs to verify safety training. Paper certificates are easily misplaced. Multiple copies are required for the many labs where a student will be working. The present system is inefficient and cumbersome, yet no Penn State database exists to store and access safety certificates.

The committee reached out to EH&S about central storage and management



Figure 3 Chemistry Department wins PPG Department Trophy

of safety certificates. They have no storage capability at present, though they might in the future with enough time and effort. Therefore, MRI's IT department recently developed a way for users to store safety certificates on the MRI/Safety website using the JIRA software. Certificates can be uploaded by the user, and then verified at any time by technical staff, faculty, and the user themselves.

This is a significant step toward developing a unified and organized way to maintain certificates, at least within the MRI community of users. The tool is being rolled out in spring 2017 and will have a "hard" announcement summer 2017, once bugs are worked out of the system. MRI Safety Certificate storage can be found on MRI's main webpage under the Safety Tab. There viewers will find a Safety Certificate Submission page to upload their individual certificate(s): <https://www.mri.psu.edu/mri/safety/safety-certificate-submission>. Then, to check if a user is current, they or any technical staff can view certificates by selecting the Submission view: <https://www.mri.psu.edu/mri/safety/safety-certificate-submission>. The Committee and MRI is pleased with this tailored solution, but it is pertinent only to MRI. The Committee hopes this issue can be addressed university-wide in the future.

Safety Minute Slides

MRI now begins its weekly Millennium Café with a safety slide, which is presented by a student. As a result, safety is brought to the forefront of awareness, reaching the wide audience of the M-Café. It further highlights to students, faculty, and visitors that safety is a serious and important topic to practice. A large collection of slides (~100) provided by Corning, Inc. has been adapted for this purpose. Corning giving safety slides to MRI is an example of industry support and a close working relationship between them and MRI. A safety slide is selected by the presenting student and then it is presented by him/her at the start of each M-café.

Point of Concern

Standard Operating Procedures (SOP's)

Standard Operating Procedures, SOP's, are required by Penn State's EH&S for labs with hazardous chemicals that are not addressed in the Laboratory and Research Safety Plan (LRSP) notebook. The LRSP notebook is a reference book unique to each lab. For example, if a lab group finds themselves working with a new chemical, an SOP is written and referenced. That SOP will describe the class of chemical and how to handle it to keep everyone safe. The challenge is to keep them up to date and there is no process in place to review refine them. Furthermore, there is no easy implementation of SOP's for new procedures in labs. Is there a way to not recreate an existing SOP? Is there a way to make a Penn State database available to the larger Penn State community? After networking with EH&S and with other departments, the answer to a Penn State SOP database is that one does not exist. How, then, can MRI address this?

MRI Safety Committee met and talked with EH&S's interim director, Bob Segura. The process for EH&S is slow and they are confronted with a very large, complex structure being over 3000 faculty PI's across the 26 Commonwealth campuses. Implementation for a database is undoubtedly a massive project to undertake which would involve representatives from various PSU areas, i.e., IT professionals, faculty, systems analysts, lab managers, and common users to name a few. Plans for a campus-wide SOP database will not be implemented in the foreseeable future. Therefore, MRI may spearhead implementation of a small database of its own? Currently the following strategies are being considered.

- 1) Individual labs continue to maintain their own SOP's which would be supported by standard templates provided.
- 2) PSU students could use the UCLA database. Link: <http://www.sop.ehs.ucla.edu/>
- 3) MRI could engage high level Penn State administrators to recognize the real need and the benefit of an SOP database for research students and faculty, along with the fact an SOP database supports overall safety for the whole university. This problem is not unique to MRI.
- 4) MRI could maintain SOP's for the 52 MRI labs.

Continuing Safety Progress

Safety Orientation Modules

In order to ensure that new building occupants receive adequate building training, a Millennium Science Complex/ Materials Research Institute (MSC/MRI) orientation is in development. This will be similar to training modules previously initiated by the safety committee but will focus on important information pertaining to the labs as well as highlighting safety information and modules directly relevant to the MSC. This project continues the digital safety initiative by providing an online portal as guide for new students and serving as a resource for students who may have questions. The building orientation will be comprised of video clips, slide shows, and images, as well as narratives on important safety information, simple-to-follow 'To-Do' lists to aid proper responses to emergencies or injuries, and lab evacuation routes for the building. Completion is expected late summer 2017.

The modules as viewed as a safety educational tool used to guide new researchers on equipment procedures to safely work in the MSC. The modules will be on the MRI website, a location easily accessible to MSC occupants and where they can be quickly

referenced when needed. It is important to understand that education increases safety as well as dollar savings. One example of dollar savings is proper equipment installation. When done correctly it saves numerous breaks to deionized (DI) water by not having to replace a broken \$250.00 valve on a zero dead leg faucet which was broken by a user because of improper use/installation.

Standard Operating Procedures (SOPs)

Easy access to SOP's and how to readily add SOP's remain a challenge to the committee, as cited above. The committee agreed to collect SOP's from the Nanofab, MCL, and the electrical lab as a beginning. Committee member Alissa Handshew, the EH&S representative, is spearheading the effort with her ideas of how to utilize Box.psu.edu for this purpose. Remaining questions include: if stored and used via Box, what level of access should be made for general use? Or, if a student uses an SOP and wants to update it, how is the update saved appropriately? These and other questions will arise as the committee progresses through the initial SOP saving and access process. The committee's approach is to find answers as we move through the process.

Safety and Interacting with Other Departments

The committee would like to reach out to EH&S, and possibly safety officers from other departments, in order to learn how other departments deal with similar safety policies and concerns. We plan to meet with MatSE's safety officer to learn how they handle SOP's. This allows for more informal discussions to learn about safety policies and lab-specific issues, and potentially lead to participation on a broader university level.

Future Initiatives

Storing Safety Certificates and SOP's

Projects for storing safety certificates and SOP's are ongoing. The initial set-up for storing Safety Certificates is already implemented on the MRI website but is just beginning. It will require monitoring over time as use increases. The other area considered as future initiative is the storing of SOP's in Box. The committee will evaluate its implementation.

Safety Poster in MRI Lobby

A safety poster and display area in the lobby of MRI is a future initiative. The vision is to have a poster that incorporates safety information about MRI situated in the lobby so that when visitors are given a building tour, a stop at the poster would be standard to discuss and highlight safety in the MRI labs. Poster content would include information about what the stars at each lab represent, what is proper attire for the lab, Personal Protective Equipment (PPE) information, a photo of a Safety Olympic event, and an MRI safety mission statement. Alongside the poster would be a rack of safety glasses for visitors and an information safety sheet. Having safety information at the main entrance makes a statement about how paramount safety is to MRI.

MSC Building Cleanup

The final future initiative is to consider periodic Building Cleanup's throughout the year. After 5 years of building occupancy items and clutter have accumulated. Cleanup will focus on such areas as office/desk spaces, miscellaneous cardboard boxes that cannot be

stored and on sample storage. It is not uncommon to find many samples kept on any one desk rather than storing them in the sample storage cabinet made available to students. The committee recognizes that periodic building cleanup is a significant component of safety.