ENVIRONMENTAL HEALTH & SAFETY OFFICE

ANNUAL REPORT

FY 2016-2017

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Environmental Health & Safety (EHS)

Mission Statement

The mission of the Environmental Health &Safety Office is to support the University's teaching, research and health care activities by providing guidance, training and services to the institution and its employees. Our goal is to promote and foster a safe working environment by incorporating health and safety into the daily operations of the University, resulting in the prevention of injuries and illnesses of faculty, staff and students, promotion of best practices as well as compliance with federal, state, and local regulations and laws governing the activities of the institution.

Responsibility Statement

The Environmental Health & Safety Office (EHS) is responsible for the administration of the biological safety, chemical safety, occupational safety, radiation safety, and specific environmental programs, and other programs deemed necessary for the health and safety of the University community. EHS program activities are organized into five sections that are supported by an administrative group. These sections are: 1) Biological Safety; 2) Chemical Safety; 3) Environmental Programs; 4) Occupational Safety; and 5) Radiation Safety.

Aspirations

The Environmental Health & Safety Office aspires to make significant contributions to the University by:

- Functioning as a major resource for environmental health, safety and environmental protection.
- Integrating health protection and safety practices into employee and departmental activities.
- Communicating effectively so staff can readily use the resources created and services provided.
- Providing quality service to foster a safe and healthful workplace.

Executive Summary

In addition to routine business activities, EHS focused on the following areas during the last fiscal year: (1) working with University of Iowa Health Care (UIHC) to implement new standards for handling hazards drugs and hazardous materials management; (2) coordinating the standardization of Arc Flash requirements on campus; (3) creating a job safety analysis (JSA) form; and (4) hosting the annual Midwest Area Biosafety Network (MABioN) symposium.

1. **UIHC Hazardous Materials Management Project.** This project was initiated in 2016 by UIHC to manage the implementation of new standards from the National Institute for Occupational Safety and Health (NIOSH) and the USP General Chapter 800 changes relating to the handling of hazardous drugs in healthcare settings. Meetings were held regularly throughout the year to update policies, create comprehensive educational modules, provide supplies (PPE, spill kits, disposal containers), and communicate to key stakeholders. Standardized procedures for disposal of RCRA hazardous waste disposal across all nursing units, clinics and pharmacy locations were implemented; EHS Environmental Programs staff collected and disposed of the older hazardous waste containers and contents

2. **Arc Flash**. A concerted effort to coordinate efforts among various UI departments to standardize our processes around electrical safety, and more specifically, Arc Flash and NFPA 70E compliance was undertaken over the last year. This is an ongoing effort to ensure that hazard assessments for all University buildings are completed, proper documentation of each assessment is maintained, electrical panels are labeled, and employees who are exposed to this risk are trained and use the appropriate personal protective equipment.

3. **Job Safety Analysis (JSA)**. The Workplace Occupational Safety and Health Work Group identified a gap in the training of individuals regarding how they perform particular tasks, especially those that involve tasks where injuries commonly occur and for which re-training is often necessary. In order to reduce the frequency and severity of work-related injuries, a JSA tool was created to assist supervisors and employees in investigating accidents. A subcommittee worked to create a JSA template, an ICON training course, and a JSA webpage; it continues to work towards rolling this out to campus.

4. **Hosted the 13th Annual Midwest Area Biosafety Network (MABioN) Symposium.** The EHS Biological Safety Section staff worked throughout the year in preparation for the annual MABioN symposium that was hosted at the University of Iowa in August 2017. MABioN is an affiliate of the American Biosafety Association and represents a group of professionals dedicated to the field of biosafety within the Midwest, Great Lakes, and Great Plains regions. Hosting this two and one-half day event necessitated that EHS staff organize the entire experience. This entailed finding a suitable venue, securing reasonable hotel accommodations and costs, identifying speakers (local and national), contacting potential sponsors, determining meals and catering services, obtaining speaker and attendee gifts, and finding a suitable place to host a fun evening event, to name a few tasks. The event was a success with 44 attending from 25 institutions.

Biological Safety Section

The Biological Safety Section is responsible for the administration of programs in the research and non-research community that involves the management of biological or infectious agents and biohazardous materials used at The University of Iowa. The covered programs include general biological safety, bloodborne pathogens, recombinant DNA, select agents, and shipping/transportation of infectious substances/biological substances with or without dry ice. Administration of these is accomplished by developing, recommending, administering and implementing policies and procedures that promote the safe use of the types of materials covered by each program, as well as exercising surveillance and enforcing standards for health and safety within their jurisdiction.

Biological Safety Program

Scope: This program provides support to areas that work with biological materials or infectious agents, which primarily include clinical and research lab areas. The program consists of maintaining a biosafety manual and reference materials, providing health and safety consultation to the University's Biohazardous Waste Program, reviewing protocols where biosafety level 2 or 3 organisms are manipulated, providing biosafety signs, prescribing safe handling techniques, and conducting site visits for containment and/or regulatory assessments.

Activities and Accomplishments for FY17:

- Reviewed 262 protocols submitted primarily from Animal Protocols (AP) and Hazard Containment Protocols; in addition, one material transfer agreement (MTA) was reviewed.
- Reviewed grant notifications from Division of Sponsored Programs which involved use of human pathogens or stem cells.
- Updated the web-based Basic Biological Safety course and transferred this course into Storyline.
- Updated the web-based Advanced Biosafety course.
- Updated the web-based Biosafety Cabinet course and transferred this course into Storyline.
- Updated the web-based Dual Use Research of Concern course and transferred this course into Storyline.
- Updated the web-based Human Stem Cell and Pluripotent Stem Cell Use course and transferred this course into Storyline.
- Updated biosafety web documents.
- Published Lab News articles that were distributed to the research community.
- Updated bio agent inventories for research staff following their annual laboratory audit.
- Received requests from seven investigators for documentation of their laboratories or other authorization, related to funding or ordering materials from suppliers.
- Evaluated eleven injuries/possible exposures, non-bloodborne pathogens related.
- Reviewed registration documents for the human pluripotent stem cell committee and program; two proposed research projects were reviewed and approved.

- Held the annual meeting for the oversight of Dual Use Research of Concern, four PI registration forms were reviewed.
- Created and implemented a program to track CDC/USDA import permits and assist University staff with compliance. Met with the Iowa State Plant Health Inspector and submitted a FOIA request to USDA; developed and posted web-based material for University staff reference.
- Created a Lab Audit historic document detailing the incidents/regulations that prompted any changes, to serve as a resource for the Safety Advisor Team.
- Contacted administration in each department with wet labs to designate a "Health & Safety Coordinator" who will serve as a resource for EHS staff. Held a meeting of all coordinators to introduce EHS staff and program material.
- Collaborated with the College of Public Health and the State Hygienic Laboratory to create two videos demonstrating how to clean up a spill of biohazardous materials OUTSIDE a biosafety cabinet and how to clean up a spill of biohazardous materials INSIDE of a biosafety cabinet. Videos were posted online and within training course material.
- Collaborated with Office of Animal Resources to review and revise procedures for the handling and disposal of animal waste from animals exposed to agents (non- recombinant) requiring ABSL1/2 housing.
- Monitored both the Iowa Administrative Bulletin and the Federal Register for regulatory changes which may impact the biological safety programs.

Biological Safety Equipment Certifications

Scope: This program involves overseeing the biosafety cabinet certification, repair and maintenance contract with ENV Services. Administration of the program involves coordinating the testing and repair of biological safety cabinets (BSCs) and horizontal flow equipment, in compliance with NSF Standard 49 and industry standards, for their safe operation and maintenance, scheduling cabinet decontaminations for repair or prior to a move, and billing for all services performed by ENV technicians.

Activities and Accomplishments for FY17:

- Reviewed use and approved the purchase of 6 new BSCs.
- Scheduled 280 BSCs and clean benches for certification.
- Scheduled vaporous hydrogen peroxide (VHP) decontamination of 28 BSCs.
- Scheduled annual testing of other HEPA-filtered safety equipment including Thoren cage racks, an ultra-centrifuge, and rooftop exhaust HEPA filter units for the BSL3 labs.
- Scheduled troubleshoots and/or repair service for 26 cabinets.
- Coordinated with ENV Services to transfer scheduling duties from EHS to ENV Services. Biosafety staff acted as a liaison between the UI researchers and ENV services during and following the transition.

- Coordinated with ENV Services to obtain emergency services for cabinets impacted by the fire in BSB.
- Responded to four requests by departments/PIs to review BSC maintenance history.
- Assisted Purchasing Department in drafting the Request for Proposal for the certification testing of cleanrooms and biosafety cabinet services for the University. Biosafety staff also participated in the review of submitted proposals.

Bloodborne Pathogens Program (BBP)

Scope: This program is intended to assist departments in meeting the requirements of OSHA's Bloodborne Pathogens Standard. This law, as defined by OSHA, covers individuals whose duties entail reasonably anticipated contact with blood and blood products and other potentially infectious materials. The purpose is to reduce or eliminate the risk of exposure to bloodborne pathogens in clinical, research, teaching, service, and administrative units.

Activities and Accomplishments for FY17:

- Reviewed and/or updated 57 Exposure Control Plans (ECP) upon request.
- Updated the University's ECP template, and provided notice of the update to UI departments.
- Updated EHS's five online BBP training courses, and transferred the Bloodborne Pathogen Refresher course into Storyline.
- Evaluated five possible BBP exposures.
- Continued to contact departmental BBP Exposure Control Officers to ascertain status of their BBP Exposure Control Program (ECP), met with and trained 5 new Exposure Control Officers (ECO).
- Met and worked with the new Exposure Control Officer in the College of Nursing several times over a span of 6 months to help review and update their ECP.
- Met with several administrators at the College of Dentistry, to assist with reviewing the various components of their BBP program.
- Met with administrators at the upcoming College of Biomedical Sciences Program, to discuss the Bloodborne Pathogen Program for graduate students in the departments coming under this umbrella program
- Initiated 2 additional BBP Exposure Control Programs.
- Developed two flowcharts detailing the various components of the Bloodborne Pathogen Program to help new employees, and to assist with HR classifications.

DOT Transportation Compliance Program: Shipping/Transportation of Infectious Substances and/or Dry Ice

Scope: The Department of Transportation (DOT) and International Air Transport Association (IATA), which regulate the shipping of hazardous materials, require that individuals who ship materials defined as infectious substances or diagnostic specimens receive training to ensure they have knowledge of and are thus able to comply with shipping regulations.

Since these often involve shipments using dry ice, a hazardous material, information on shipping with dry ice is included in this training course. A separate course for individuals who use dry ice to ship otherwise non-hazardous materials is also available.

Activities and Accomplishments for FY17:

- Reviewed the online Shipping Infectious Substances, with or without Dry Ice course and the Shipping with Dry Ice course to ensure compliance with the 2017 updates to the IATA/DOT regulations.
- Updated shipping web documents, as necessary.

Recombinant DNA Program

Scope: The National Institutes of Health's *NIH Guidelines for Research Involving Recombinant or Synthetic Nucleic Acid Molecules (NIH Guidelines)* governs the creation of recombinant DNA molecules and their use in organisms, human subjects, animals, and plants. Compliance authority on campus is placed with the Institutional Biosafety Committee (IBC) for review of recombinant DNA use. EHS's Biosafety Officer and Director are members of the committee and also coordinate the committee's review process; biosafety section staff generates the approval letters that are sent to PIs after IBC review and inspects laboratories for proper procedures, practices, facilities, and experience.

Activities and Accomplishments for FY17:

- Approved 105 new recombinant DNA registration documents.
- Approved 158 amendment requests to active recombinant DNA registration documents.
- Reviewed all submitted Animal Protocols (Aps) to ensure all proposed recombinant work is registered with the IBC.
- Reviewed submitted AP amendments involving rDNA to ensure recombinant work is registered with the IBC.
- Received 301 grant notifications from Division of Sponsored Programs which involved recombinant DNA.
- Held 25 IBC meetings.
- Utilized the recombinant DNA database to track and facilitate annual reviews of protocols.
- Conducted monthly reviews of protocols approved 1 and 2 years prior to assess status and ensure notification of any significant changes made by the PI. Protocols reviewed: 251.
- Conducted monthly reviews of expired protocols (protocols are approved for a maximum of 3 years.). Protocols reviewed: 172. In addition, inactivated 17 protocols before they expired (PI reported the rDNA work was no longer active or the PI left the University).
- As part of the laboratory audit program, conducted audits of all BSL2 laboratories using recombinant DNA.

- Provided one-on-one assistance for faculty and staff accessing/using the online registration process.
- Updated recombinant DNA web documents.
- At the request of the Institutional Biosafety Committee, visited two clinical sites related to human gene transfer studies.
- Updated our registration with NIH/OBA's online Institutional Biosafety Committee Registration Management System (IBC-RMS).
- Updated EHS's online training course for researchers using recombinant DNA and transferred this course into Storyline.
- Revised an internal program SOP and updated procedures for IBC review of recombinant DNA documents.
- Collaborated with Office of Animal Resources to review and revise procedures for the handling and disposal of animal waste from animals exposed to recombinant agents requiring ABSL1/2 housing.

Select Agent Program

Scope: The program was developed in response to the 2001 Patriot Act and the 2002 Public Health Security and Bioterrorism Preparedness and Response Act to provide compliance oversight and administrative support to researchers who wish to use biological agents and toxins that present a severe threat to human, animal, or plant products (select agents). The program establishes requirements concerning registration, security risk assessments, safety plans, security plans, emergency plans, training, transfers, record keeping, inspections and notifications to CDC or USDA/APHIS. The regulations are designed to provide protection against misuse of select agents and toxins whether inadvertent or the result of terrorist acts against the United States homeland or in the commissioning of other criminal acts. Registering with the DHHS (CDC) or USDA involves submitting an application form, obtaining approval from the Department of Justice for each person who will have access to select agents, and the laboratory facility undergoing an inspection by DHHS/USDA. The UI has assigned Haley Sinn, Biological Safety Officer, as the Responsible Official (RO). Nyree Maes, Associate Biological Safety Officer and Carol McGhan, EHS Director, serve as alternate ROs. These individuals are authorized to receive or ship the agents and serve as the primary contact(s) with the registering agency. Principal Investigators are exempt from registering with the CDC or USDA if they possess toxins in quantities that are below the amount listed in the regulation. Clinical labs are also exempt from registering if they destroy or transfer agents after being isolated from clinical samples and required agency reporting.

Activities and Accomplishments for FY17:

- Maintained the list of current active/approved individuals who are allowed access to the registered rooms/areas.
- Updated select agent campus inventory, as necessary.
- Held monthly meetings with two groups for safety/security issues related to select agent work.

- Performed an annual general biosafety and security inspection of the laboratories registered under 42 CFR 73.
- Audited the select agent inventory records annually.
- Audited the BSL3 training records for researchers, manager, director, emergency response staff, support staff and RO/ARO.
- Updated EHS's Select Agent Program website.
- Updated the web-based Select Agent Toxin-Exempt Quantities course and transferred this course into Storyline.
- Participated in annual drill/exercises at select agent facilities to test and evaluate the effectiveness of the three plans for each facility.
- Collaborated with the two groups to prepare and conduct annual training for individuals who are allowed access to the BSL3 rooms/areas.
- Submitted amendment requests to CDC in order to update our registration, as necessary.
- All new PIs sign a form declaring that they do/do not have any select agents or toxins. The declaration form is kept on file in EHS. Each PI using exempt quantities of toxins on the select agent list signs a separate form to attest that he/she knows there is a quantity limit and must maintain his/her toxin inventory below that limit to remain exempt.
- Updated the declaration form to reflect the updated toxin permissible amounts.
- Updated Exempt Quantity transfer form to reflect the updated toxin limits.
- Conducted a survey to determine if any UI PIs possess the newly added select agent, *Bacillus cereus* Biovar *anthracis.*
- Audited inventory records for all select agent toxin users with exempt quantities.
- Developed a new Standard Operating Procedure template for exempt toxin use.
- Closely reviewed updates to the Federal Select Agent regulations and informed select agent users of the updates.
- Made various updates to BSL3 policies and procedures to meet the new regulations.
- Closely reviewed drafts of the updated guidance documents issued by the Federal Select Agent (FSAP) program and provided feedback to FSAP.
- Developed new forms for Inactivation Protocol submission to meet requirements of the updated regulations.
- Developed an Inactivation Certificate to meet requirements of the updated regulations.
- Performed a literature review of disinfectant efficacy against particular select agents in possession. The results of the review were used to develop new and/or verify existing disinfectant protocols as required by the updated regulations.
- Collaborated with UIHC staff to develop an SOP for destruction of select agent patient samples, as required by the updated regulations.
- Collaborated with SHL Biosafety Officer to provide guidance to neighboring hospitals that had questions about the updated regulations.
- Three facilities were re-commissioned, as part of the annual requirement for the select agent program.

- Completed pre-assessment review of new users and on-going suitability review of current users, as necessary.
- Held annual Suitability Assessment Review meeting to review all Tier 1 users.
- Conducted monthly audits of all BSL3 laboratory facilities.
- Reviewed 8 protocols submitted with revisions and/or for annual review by the CCOM BLS3 Committee**.**
- Reviewed annual sterility protocols as required by internal BSL3 policies and procedures and reviewed draft inactivation protocols to meet new select agent requirements.
- Continued to scan select agent related documentation and update the Excel spreadsheet to record and track amendment submissions and transfer requests to CDC.
- Reviewed grant notifications from Division of Sponsored Programs which involved use of select agents or toxins.

Biological Safety Program Goals for FY18:

- Conduct annual laboratory audits of BSL2/3 laboratories.
- Support Office of Animal Resources by providing biological assessment services for review of projects using pathogenic organisms with animals.
- Perform annual general and security inspection of the laboratories registered under 42 CFR 73.
- Perform an annual inspection of select agent toxins (exempt quantities) labs.
- Perform an annual drill/exercise at select agent facilities with emergency responders to test and evaluate the effectiveness of the three plans for each facility.
- Perform annual suitability evaluation with the Suitability Assessment Review Committee.
- Perform annual review of projects with Dual Use Research of Concern.
- Host the 13th Annual Midwest Area Biosafety Network Symposium.
- In collaboration with the State Hygienic Laboratory, host an FBI Academic Biosecurity Workshop.
- Assist the Purchasing Department in the transfer of the certification testing of cleanrooms and biosafety cabinet services contract to the newly awarded company.
- Transfer the University's Select Agent Registration with CDC into the new tracking system.
- Evaluate online documents and training for ADA compliance and revise where necessary.
- Evaluate the ability of the various Colleges to produce a listing of new and terminated Principal Investigators on a routine basis.

Chemical Safety Section

Chemical Hazard Assessment Program

This program provides services for monitoring chemical exposures and, where possible, applying the knowledge gained from these assessments to "similar" exposures in other areas of the institution. Services are also provided for assessing safe material handling practices and providing guidance on minimizing or eliminating exposures to hazardous chemicals.

Activities and Accomplishments for FY17:

- Cooperated with investigation by IOSHA inspector regarding a possible formaldehyde splash exposure in SPL.
- Worked with chemical engineering department and ATF to ensure proper procedures were in place for the possible manufacture of a regulated chemical explosive.
- Numerous hazard assessments were conducted throughout the year to evaluate safe material handling, review chemical use with animals, and investigate individual or area concerns. Examples include assessments for the safe use of isofluorane, an anesthetic agent, nanomaterials handling in research labs, safe use and handling of a variety of items such as, formaldehyde, 3-nitro-1,2,4-triazole-5-one an explosive, and antineoplastic drugs.
- One hundred and five (105) chemical hazard containment protocols were reviewed for the office of animal research (OAR).
- Numerous chemical hazard assessments were conducted in FY17; a significant number of these were conducted as part of the formal OAR ACURF Hazardous Agent Review process.
- ER-RTK audits were done for all 319 UI buildings. This includes the Main Campus, Oakdale Research Park, McBride Nature Center and Hawkeye Campus. UI buildings located in Iowa City, Coralville, North Liberty and surrounding areas were also included. A MS Surface Tablet was used for all field inspections and map updates. A PDF Annotator (a third party program) was purchased for editing the maps.
- Conducted chemical monitoring in several areas. The goal was to assess environmental conditions in labs and other spaces, either related to personnel concerns or for chemical spill/incident investigations.
    - Mercury concentration in the air was measured using the Jerome. Five air samples were taken in 4324 MERF and 369E BB.
    - Air sample measurements for chlorine were taken in OPP and OWH.

Chemical Inventory System

EHS has implemented a university-wide chemical inventory system using a web-based software program. The goal of this project is to have accurate inventory data online for research investigators in 112 departments and other chemical use areas. Implementation expanded to other campus areas where chemicals are used and stored. The inventory data are also available to emergency responders as needed.

Activities and Accomplishments for FY17:

- The chemical inventory system, OnSite's Chemical Safety Assistant (EHSA), was used throughout FY17. The following is a breakdown of some EHSA data categories.
  - Number of chemical owners/PIs 555
  - Number of total Users 1423 #
  - Number of buildings 180
  - Number of rooms 2355
  - Number of inventory items 115612

Total number of users includes labs, non-labs, 15 BET groups and 2 emergency responder groups

- Work to ensure newly-entered and all chemicals in the inventory database also appear in the associated EHSA Chemical Inventory Catalog continued. This is necessary to ensure that all Department of Homeland Security's Chemicals of Interest (DHS's COI) chemicals and TIER II chemicals can be included when running the appropriate reports.
- Work has begun on beta testing the new browser-based EHSA system.
- Each inventory account holder was contacted to ensure their information was updated regarding rooms, buildings and current users.

Laboratory Assessments

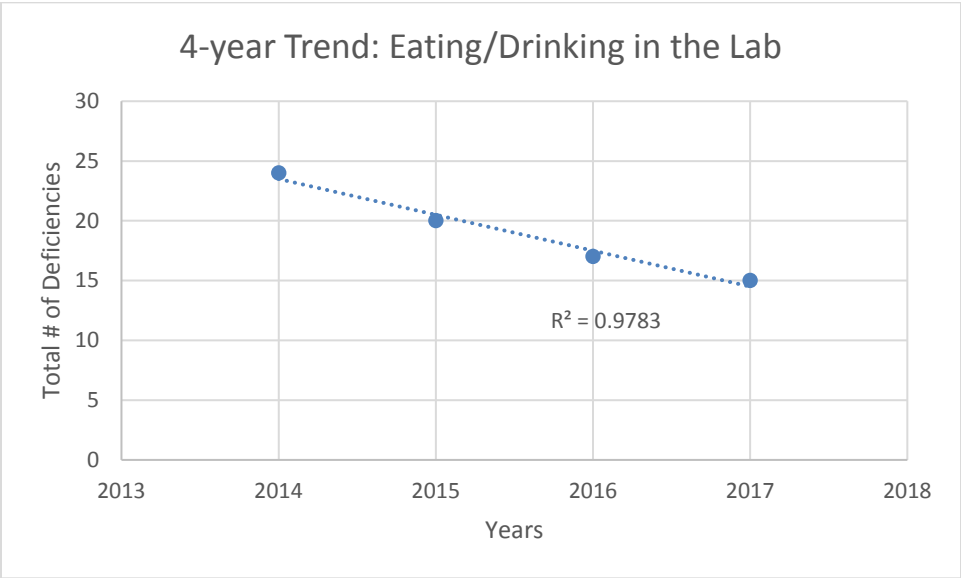
This program was developed for the purpose of supporting the UI's research goals by promoting safe research and assuring sound laboratory safety, health and environmental management. This is accomplished by providing oversight of occupational and environmental safety programs with emphasis in the areas of biological, chemical, and radiation safety and waste management. As recommended by the University's Internal Auditors, the program is also intended to implement a more comprehensive assessment of programs and practices within the research community. Each principal investigator's (PI's) research area is reviewed in order to build a comprehensive picture of laboratory research operations, assess the current status of their safety programs, and build additional resources to assist the research community in implementing best safety practices and compliance-based programs, such as those required by the University, state and/or federal regulations.

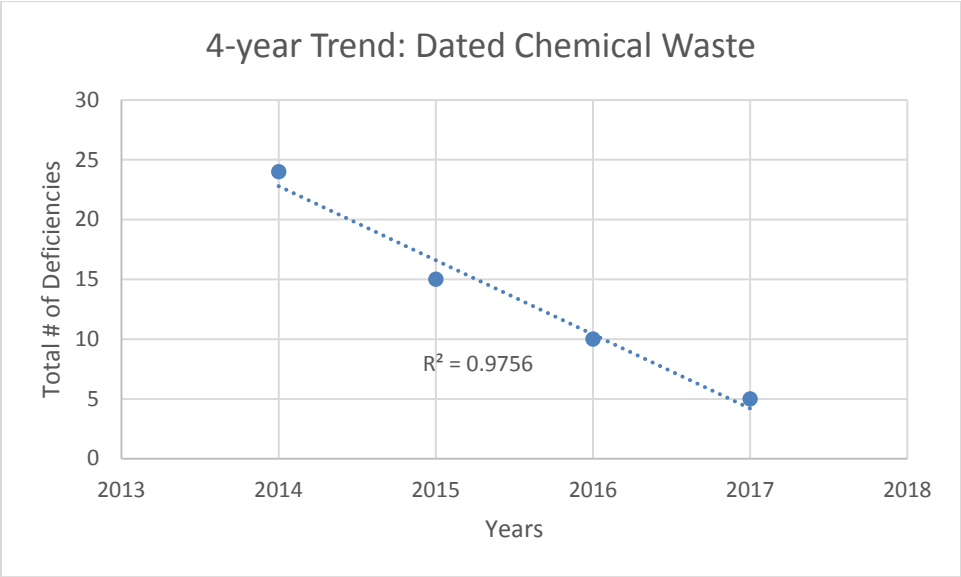
Activities and Accomplishments for FY17:

Safety Advisor Team (SAT) Accomplishments

- Provided direction on how the team would consistently assess and record findings on items from the lab review checklist. Provided technical guidance to address issues and concerns arising from the lab review process.
- Team meetings were periodically held to discuss unique lab review findings and subsequent resolution, where applicable.
- Provided training for one new safety advisor.
- The team was utilized to collect and disseminate information throughout the year.
- Introduced one new training course requirements related to resetting electrical breaker boxes.
- Disseminated information on OSHA's clarification on SDS requirements.

- Continued a program for standardizing auditor training that includes annual shadowing by team leads, bi-annual ICON retraining, and periodic review and discussion of audit processes during team meetings.
- The safety advisors conducted 375 bio/chemical lab reviews. In addition, 41 new PI orientations were completed. The team also conducted radioactive materials user inspections for labs as described in the Radiation Safety Programs section of this report.
- Seventy-one (71) questions, in total, were asked during the annual review. Seven (7) were informational only. Sixty-four (64) individual audit/review findings (areas that need improvement) were tracked for the annual lab reviews. In addition to being tracked individually, lab review findings were placed into eleven general categories and tracked to help correlate problems within general health and safety programs or areas. Of the eleven categories, the highest numbers of findings were in areas that included general lab safety, emergency preparedness, training, chemical management and personal protective equipment.
- In 2017, a new deficiency designation was utilized. A "Warning" was given if the lab fixed a noted deficiency either during the audit or before the audit report was finalized.
- Of the labs reviewed in 2017, 40.8% of labs either had no findings or fixed all findings before the audit report was finalized.
- Of the labs with outstanding findings, 32.9% had one item unresolved, 28.4% had two items unresolved and the remaining 38.7% of labs had three or more unresolved findings.
- For the second straight year, the top three annual lab review findings were: 'Incomplete training,' 'PPE hazard assessment training not reviewed and signed by all staff,' and 'Spill supplies not adequate or readily accessible.'
- Notable improvements in FY17 include:
    - 30.8% improvement in the category entitled 'Training records are incomplete or out of date for laboratory staff.'
    - 40.0% improvement in the category entitled 'Chemical containers are not all labeled.'
    - 54.3 % improvement in the category entitled 'Chemicals or groups of chemicals were not segregated by hazard class.'
    - 44.4% improvement in the category entitled 'Peroxide-forming chemicals are not dated when opened and tested or disposed of before the expiration date.'
- Notable trends toward improvement over four years are shown in the following graphs (FY14 through FY17):





- Safety advisors actively followed-up on a specific set of lab findings (including training and documentation) to ensure the outstanding items were completed after the lab review. 74.8%of the labs completed all outstanding items found during lab review in FY17.
- The safety advisors conducted 376 Lab Safety Rounds (LSR), unannounced brief observation-only lab reviews.
- The top three LSR findings were 'unlabeled containers,' 'evidence of food or drink in lab area,' and 'overflowing biohazardous waste/sharps containers.'

<u>Mobile Inspection Development Activities (FY17)</u>

- Created review questions pertaining to electrical panel access and inactive biological safety cabinets.
- Expanded the review questions pertaining to select agent toxins and housekeeping.
- Added checkboxes for isoflurane use and field work/off-campus work.

- Updated the LSR report to include recommendations for all violations.
- Began beta testing the new On-Site EHSA system.
- Acquired access to unpaid student safety training. EHSA now has access to all online training records completed at the university.
- Began the process of determining procedures for archiving old information in EHSA.

Laboratory Chemical Safety and Chemical Hygiene Program

This program applies to all laboratory chemical use under normal working conditions or during a foreseeable emergency. This includes approximately 50 major departments with labs in research, medical and academic activities.

Occupational Health & Safety Support for Research Grant Submissions

Beginning in 2001 the US Army Medical Research and Material Command (USAMRMC) required two safety submittals for grants: an institutional facility safety assurance which is completed by EHS, and a safety assurance from the principal investigator. Effective FY16, these are annually reviewed (and compiled) by EHS.

Activities and Accomplishments for FY17:

- Completed the annually required Facility Safety Plan Status report; EHS provided site visits, follow-ups, and coordinated USAMRMC safety plan information for 18 UI investigators involving 47 funded projects that were sponsored by USAMRMC or other DOD organizations.
- After receiving each first report of injury (FROI), affected researchers were counseled to assure safe work practices including the use of appropriate PPE and engineering controls for hazardous chemical handling/processing. In addition, researchers were encouraged to discuss the lessons learned from uncommon incidents during research group meetings.

Support and Services for Research Laboratory Contacts and Department Health and Safety Coordinators

EHS works directly with research laboratory investigators and their staff to provide consultation and assessment services, education, and laboratory site reviews to assess health and safety practices and compliance. EHS also provides support services to voluntary department personnel who serve as the primary administrative liaisons (coordinators) between EHS and their respective units. In addition, EHS provides general support services such as development of guidance documents or resource information to help researchers manage hazards in the laboratory.

Activities and Accomplishments for FY17:

- All chemical safety online training modules were reviewed/revised.
- Updated emergency preparedness plan (EPP) in FY17.
- Bimonthly Lab News articles were published on chemical safety topics.
- Provided chemical consultations and/or assessments for the research laboratory community upon request. Assisted with issues such as safe handling and controls for toxic or hazardous chemicals, review of lab experiment protocols for chemical safety issues, chemical reaction products related to safety and exposure, safe chemical segregation, grant

application safety issues/questionnaires, formaldehyde use assessments, post-incident evaluations, chemical use in the Office of Animal Resources facilities, and moving lab chemicals.

Examples of issues for which support was provided for FY17 included:

- Lab showers and emergency eyewash stations locations were inventoried in the Biology Building. Recommendations were made to the biology department about the placement of new stations.
- Met with FM and MBE staff to assure the fume hood maintenance and operating procedures are easily available to FM staff and lab personnel. Developed and reviewed the custom procedure with the help of MBE staff.
- Investigated the use of charcoal/HEPA filtered recirculating hoods for handling hazardous substances, including formaldehyde, in research labs and made recommendations.
- Working with the Carver College of Medicine (CCOM) and Vice President for Research and Economic Development (VPRED) office to establish a university wide SDS program.
- Consulted with Chem Stores and chemistry department staff on issues of chemical storage, chemical hazards, liquid nitrogen handling and transportation of chemicals.
- Contacted by the Chemical Engineering department on issues regarding the manufacture of ATF regulated chemical explosives. Representatives from the department of ATF were consulted.
- Met with CCOM to resolve issues concerning the possible viability of employing a benchtop hood to perform animal perfusions using formaldehyde.
- Chemical safety and management issues were reviewed in 366 labs as a part of the annual biological/chemical lab review process. Chemical safety issues were also reviewed during Lab Safety Rounds unannounced walk-throughs.

- Provided lab and waste regulation training to incoming grad students from the following departments: Chemistry, Biology, Pharmacy and Biochemical Engineering.
- Worked with departments in BSB affected by the June 2017 fire regarding chemical storage, safety and waste issues.

Respiratory Protection Program for Laboratories

Implement a Respiratory Protection Program in research laboratories where respirators are available for use. See the Respiratory Protection Program report section for additional information.

Activities and Accomplishments for FY17:

- Approximately 35 new lab respirator use evaluations were completed in FY17. As of the date of this annual report, EHS records show there are approximately 187 respirator use labs.

- The status of respirator use in labs was tracked with the EHS bio/chemical lab reviews and lab walkthroughs. Labs were assisted with the following respirator use issues: storage, reuse, and disposal; use of single strap dust masks or the masks that are not approved by NIOSH; the use of surgical masks for handling chemical/biochemical powders.
- Annual administrative review of three required respirator programs involving 42 staff in research lab areas were conducted during the FY17.

Personal Protective Clothing and Equipment (PPE) Program for Laboratories

This program is a component of the overall PPE Program and includes departments with research laboratories where PPE is used for hazard protection.

Activities and Accomplishments for FY17:

- Assisted investigators with completing the written PPE hazard assessment form and certification, whenever needed. The EHS Safety Advisors and chemical safety staff provides support for the PPE program in research labs. Safety advisors reviewed PPE hazard assessment and training documents during each EHS bio/chemical lab review.

  Chemical safety section staff provided personal consultations, coaching and education for individual laboratories on:
  - Cuts, punctures, and piercings while handling glass apparatus or razors.
  - Glove disposal issues related to improving safety at unattended chemical use benches and computer stations.
  - Using a vendor for laundering of lab coats. Advice on laundering of lab coats.
  - Use of fire resistant lab coats in labs using pyrophoric chemicals.
  - Improving the types of gloves worn for a specific purpose (e.g., cut resistant gloves or thermal resistant gloves).
  - Improving the use of safety glasses or goggles, especially while working with liquids.
- PPE use was routinely reviewed or recommended as part of several hazard evaluations, spill consultations, and post-incident follow-ups.

Ventilation and Fume Hood Program

This program focuses on the fume hood as the major engineering control for chemicals used in laboratories. Annual airflow performance checks are performed on chemical fume hoods to assess inflow velocities. Results are communicated to users, departments, and Facilities Management. Support is provided to Research and Facilities Management (FM) for laboratory ventilation issues pertaining to new installations and renovations.

Activities and Accomplishments for FY17:

Fume Hood Program

- The annual test cycle of all fume hoods on campus was completed and the report was issued in January 2017 to 8 departments and colleges, as well as to FM the Hygienic Lab and UIHC.
- Continued to maintain the website tracking hoods that need attention for airflow issues.

- 962 hoods were visited, with 904 chemical fume hoods measured for hood face velocity:
    - 841 hoods passed
    - 33 hoods were designated for restricted use only
    - 12 hoods failed
    - 18 hoods were designated "Not Determined", meaning the hood could not be adjusted within normal airflow specifications due to its configuration.
- One hundred and sixty-one (161)referrals were made to maintenance (FM Work Control Center and UIHC) for airflow issues. Referrals made for problems with lights, baffles, sashes or monitors are not counted in this tally.
- Smoke tests were performed on approximately every 5th conventional-type hood and each low flow high performance hood.
- Fume hoods were assessed throughout the year upon request or were re-assessed following notification that maintenance was complete.

Fume Hood Program Report	1/2017
Number of departments receiving report	8
Total number of hoods tested	904
Number of hoods passed	841
Number of hoods failed	12
Number of hoods restricted	33
Number of unconventional/unadjustable hoods	18
Number of referrals made to FM	161
Number of hoods under construction	9
Number of hoods inaccessible	4
Number of hoods not in use	24
Number of hoods removed or decommissioned since previous year	21

Research and Facilities Management Project Support

The Chemical Safety section continued to provide support to both FM and Research staff for various projects. The majority of projects involved management of airflow in laboratories, and in particular, methods to reduce air exchange rates in labs to control cost or to directly reduce cost by managing the loss of conditioned lab air. The following projects were supported:

- PBDB Aircuity work group.
- Assessment for reduced lab ventilation in unoccupied labs.
- Amount of flammable liquids allowable per floor of the new College of Pharmacy (COP) building.
- Expedited testing of and repairs to Chemistry department teaching lab hoods.
- Identification of out of service/unused hoods to eliminate testing and repairs.

Materials Management - Regulatory Reporting

The Tier II and Emergency Response Right-To-Know (ER-RTK) reports on hazardous materials locations within the institution are required to be submitted annually. EHS produces the reports and distributes them to the appropriate agencies. There are also reporting requirements for DHS Chemical Security Anti-Terrorism Standards for Chemicals of Interest (COIs).

Activities and Accomplishments for FY17:

ER-RTK

- RTK Report was completed and distributed to appropriate UI, local and state emergency authorities. AutoCAD files (in PDF format) are stored on a local drive for access by EHS personnel and transferred to thumb drives for non-UI emergency personnel. As building floor plans/maps were updated by UIHC ATG and Design & Construction (D&C), they were incorporated into the ER-RTK information collection. Examples of changes include building names and numbers as well as building addresses.
- The table below represents numbers for the ER-RTK effort for FY 2017.

Updated In AutoCAD	# Buildings	# Floor Plans	# New Maps
East Campus	72	363	213
Hawkeye Campus	32	54	9
Off Campus Coralville	15	24	4
Off Campus Iowa City	19	23	6
Off Campus Lake MacBride	10	11	2
Off Campus Muscatine	1	1	0
Off Campus North Liberty	4	4	0
University Research Park	36	66	18
West Campus	84	461	198
New Buildings	4	25	25
Residence	42	90	2
TOTALS for ER-RTK AutoCAD	**319**	**1122**	**477**

- A total of 1122 floor plans were updated for the ER-RTK 2017 Report. 477 new floor plans were formatted for the ER-RTK 2017 report and 319 cover pages were updated for each building.
- Additionally, 319 buildings and 1122 floor plans were created as PDFs for internal and emergency responders' use. Flash drives were used to deliver the PDFs to UI personnel, local fire departments, and emergency responders.
- A total of 224 buildings were audited.

The ER-RTK improvement process for 2017 included:

- A MS Surface Tablet was used for all in the field inspections and map updates. A PDF Annotator (a third party program) was purchased for editing the maps due to Acrobat's poor performance.
- ER-RTK map information as well as chemical inventory system and the Tier II report data were compared to assure they match as much as possible.
  - Areas with inventories in the EHSA system but not marked as hazardous materials areas on ER-RTK maps were identified. These rooms were then inspected to determine if they met the criteria to be designated as hazardous areas on the ER-RTK maps.

Tier II

- Completed the Tier II report; copies were provided to local, county and state emergency and disaster service organizations.
- Information from the chemical inventory system was used to verify locations and amounts listed in the Tier II inventories. The ER-RTK report data were also used for Tier II preparation.
- Forty-three Tier II reports were filed in FY17.
- There are currently 37 active participants who provide updated chemical data for Tier II reporting, with 36 chemicals of reportable quantities.
- Several new locations were added to the report, including Visual Arts Building, UIHC Centralized Emergency Power Generation Facility, the University of Iowa Hygienic Lab, and the Stead Family Children's Hospital.
- The Tier II reporting process includes:
  Verification of accurate chemical inventory quantities, storage container types and storage locations/periods from relevant participants across the UI campus. Querying the UI chemical inventory database to identify all chemicals meeting certain criteria above regulatory reporting thresholds. Data were extracted from the chemical inventory to create an Excel spreadsheet in which chemicals could be summed and physical property data for chemicals could be entered to allow calculation of final quantities in pounds. Data were ultimately entered into an online regulatory agency-provided reporting tool. In addition, all owners of Tier II chemical inventories were contacted by phone or by onsite inspections to verify inventory amounts.

DHS Chemical Facility Anti-Terrorism Standards (CFATS)

- Utilized the chemical inventory system as the primary compliance tool for this regulation. Worked with users to maintain and update the chemical inventory and track any change in amount of COIs at the University.
  - Maintained a listserv of chemical owners/users. The listserv functions as a means to regularly distribute reminders to chemical owners to update their chemical inventories annually. Currently, there are 1163 (this number has remained steady since FY 2012) individuals in the listserv.
- Improved search efficiency in chemical inventory system for DHS-listed COIs.
  - Continued using the vendor-created DHS Report which tracks 325 DHS regulated chemicals. The report sums COIs present in the EHSA system by building and by PI. It is estimated that over 2800 COI chemicals are tracked annually.

- Work continues to ensure the reliability of the report through spot checks on COI amounts in the report and those seen in inventory.
- Worked with EHSA to resolve several errors in which non-COI chemicals were being reported as COIs. EHS personnel continue to work with the vender to correct errors in the programming and data tables.

- No material was determined to exceed a threshold reportable quantity in FY17. Chemicals that will trigger reporting upon shipment were identified and issues surrounding shipping of these materials were discussed with chemical owners.

Emergency Preparedness

This program is intended to improve hazardous materials management practices and emergency preparedness for departments and assess the expanded use of the Emergency Preparedness Plan (EPP) for a broad range of incidents. EHS works with volunteer building occupants to establish and maintain Building Emergency Teams (BETs) who can coordinate building and response issues related to incidents involving hazardous materials.

Activities and Accomplishments for FY17:

- To date, 21 Building Emergency Teams, representing 23 campus buildings, have been established.
- Two additional spill carts were added in chemistry building in 2017. Currently, more than 120 university faculty and staff volunteer their time to 21 building emergency teams and maintain more than 40 spill carts.
- Worked with individual BETs throughout the year, as issues arose.
- Individual meetings were held with BETs to review the past year's incidents, discuss learning opportunities, and promote idea sharing.

University Spill Resource (USR) Group

The University Spill Resource Program (USR) was instituted in 1993 to be a resource unit and provide coherent support services within the University's Emergency Preparedness Program. The nine members of the Spill Resource Group provide consultation and advice to spillers on safe and appropriate response actions. Additionally, the Department of Public Safety (DPS), the Iowa City Fire Department and Johnson County HAZMAT Team provide campus emergency response services.

Activities and Accomplishments for FY17:

- Administration of the spill resource group was maintained, e.g., written guides, appropriate levels of equipment and supplies, and annual refresher training.
- Spill resource members responded to and provided consultation services for 12 campus incidents/inquiries.
  - Five incidents involved chemical spills; two incidents involved mercury, one acetic acid, one steam treatment water/chemicals and one involving a chloroform/phenol/ethidium bromide water mixture.
  - One of the incidents involved odor; one unknown odor in an autoclave area. The origin of the odor remains unidentified.

  - Four incidents involved leaks; two involved oil, one sulfuric acid waste and one liquid nitrogen.
  - One of the incidents involved a fire caused by an electrical extension cord.
  - Eight of the incidents involved research laboratories, one incident involved a temporary boiler building, one incident occurred on a dock and one incident occurred on a street.
  - One incident involved a chlorine leak at the OPP from a tank located in the OWH.
  - DPS was involved in four of the incidents.
  - ICFD/JCHMT was involved in three of the incidents.
  - UIHC S&S was not involved in any of these incidents.
  - The IDNR was notified of a potential release in five incidents.
- EHS maintained and revised Resource Unit Contact Information provided to DPS.
- Continued to foster lab management of spills by reviewing lab preparedness supplies and sharing guidance and information on spill preparedness during the annual lab reviews.
- Spill resource group members completed an eight-hour online HAZWOPER refresher training through Safety Unlimited, Inc.

Chemical Safety Section Goals for FY18:

- Provide support for the further implementation of mobile lab auditing and lab web access to inspection information.

  Identify and audits shared/common areas for proper chemical storage.
- Continue to use the EHSA inventory system to remain compliance with DHS COI reporting requirements. Monitor the EHSA system to ensure accuracy.
- Begin transition to new EHSA browser based chemical inventory system.
- Continue to improve the quality of chemical inventory data entered by researchers through EHS administrative methods. Data are reviewed to assure it appears in or matches chemical information in the associated chemical catalog. This allows capture of materials when searches are conducted and/or regulatory reports generated that might otherwise be missed due to spelling or other entry errors.
- Update user information on EHSA i.e. workers, chemical storage space etc.
- Inventory locations emergencies showers and eyewashes in university buildings to ensure OSHA compliance in regards to locations.
- Continue to support the laboratory ventilation and energy reduction projects initiated byFM.
  - Support the energy reduction goals for FM in labs by contributing EHS reviews of lab hazardous material use in selected labs to determine if ventilation rate reductions can be implemented safely.
  - Periodically monitor the demand-controlled ventilation data dashboard for a new research building to gain a better understanding of volatile chemical and particulate concentrations in air during routine research activities as well as during accidental/non-routine upsets.
- Inspect all of the University for ER-RTK.
  - Review each building map/floor plan available from FM for changes prior to conducting physical audits of buildings for 2018 RTK Report.

- Conduct site reviews for USAMRMC-funded principal investigators; submit annual Facility Safety Plan Status report.
- In support of the animal care and use review process, provide chemical assessment services for review of projects using hazardous chemicals with animals.
- Assist labs and departments in compliance with SDS regulations.
  Begin implementation of MSDS Online program for collection and storage of SDSs.

Laboratory Assessments/ Safety Advisor Team Goals for FY18:

- Implement the new audit follow-up procedure, which includes 30-day re-inspections and closure of all audit items.
- Set up the new EHSA browser based system for audits. This will include new SOPs for use and training for the auditors.
- Start external training opportunities for SAT members (ACS short-courses, etc.)
- Continue unscheduled lab visits (Lab Safety Rounds) to improve lab follow-ups and to create opportunities to interface with researchers and answer their questions.
- Continue to seek training opportunities for SAT leaders (CSHEMA conference, etc.)

Environmental Programs Section

The Environmental Programs Section is responsible for facilitating compliance with pertinent environmental regulations by managing biological, chemical, and radioactive wastes, conducting waste generator compliance assessments, facility inspections and audits, institutional waste generation and minimization assessments, and annual reporting to the Environmental Protection Agency of these compliance-based activities. Environmental programs are focused on two areas: operational and compliance.

Summary of Major Environmental Program Initiatives

- Completed review and updated the EHS Health & Safety Plan.
- The Environmental Section's recycling program recycled 452 lbs. of mercury containing devices; 2,312 lbs. of PCB ballasts; 856 lead-acid batteries weighing 7,052 lbs.; 2,426 other hazardous batteries weighing 1,946 lbs.; and 1,107 pieces of lead shielding weighing 3,113 lbs.
- The Environmental Section's DEA Controlled Substance destruction program properly disposed of 145 containers of controlled substances.

Operational Programs

Hazardous, Radioactive, and Biohazardous Waste Management Programs

These programs cover requirements that are imposed on the University by federal and state regulations, and the conditions imposed on the University in order to operate a permitted treatment, storage and disposal facility (TSDF) on the University of Iowa Research Park campus. Program activities are defined and regulated by the following agencies: U.S. Environmental Protection Agency (EPA), U.S. Department of Transportation (DOT), Iowa Department of Public Health-Bureau of Radiological Health (IDPH-BRH), Iowa Department of Natural Resources (DNR), Iowa Occupational Health & Safety Administration (IOSH).

Waste Collection, Container Tracking, Transportation and Storage

Hazardous waste chemicals are identified, inventoried, collected and transported to the University of Iowa Research Park for processing and storage prior to contractor collection and disposal. EPA prohibits the entry of unknowns into a TSDF. For unknown chemicals, a chemical analysis service is offered to clients that will then allow the identified chemical to be entered into the waste management system. In addition, EHS facilitates the management of unstable and/or explosives by contracting with a high hazard technical team that stabilizes and deactivates such chemicals.

Radioactive wastes are collected from University research operations and UIHC patient treatment areas. The wastes are transported to the University of Iowa Research Park for processing, decay in storage, and storage prior to contractor collection and disposal.

Biohazardous waste collection is managed by EHS as follows:

- EHS oversees contractor collection and disposal of wastes generated at major UI research, academic and support facilities (~ 10-15 areas).

- EHS collects waste from the remaining facilities and subsequently disposes of those through contractor collection. EHS does not participate in the collection and management of biohazardous waste generated at University of Iowa Hospitals & Clinics, but does manage and oversee the vendor contract for this service.

Activities and Accomplishments for FY17:

- Hazardous chemical waste: a total of 29,533 containers were collected from 690 waste generators during 3,4438 visits. Waste amounts varied in size from a few milligrams to 55 gallons.
- Radioactive waste: a total of 776 containers were collected from 54 waste generator sites during 185 visits. Waste consisted of liquids, solids, and patient therapy waste.
- Biohazardous waste: a total of 24,318 containers were collected (excludes waste generated at UIHC); 21,995 collected by contractor; 2,323 collected by EHS.
- Unknown analysis: 120 unknowns from 34 locations were analyzed and identified.
- Cleanouts: completed 92 laboratory cleanouts generating 9,856 items of hazardous chemical waste.
- See attachments for statistical and graphical information.

Waste Processing, Contractor Shipment and Disposal Activities

Hazardous chemical waste collected throughout the University is transported to the Environmental Management Facility (EMF) located at the University of Iowa Research Park and stored prior to processing, recycling, treating, or disposal. Chemicals are disposed of through a contractor who received a single contract covering both labpack and bulk disposal. The contract is a Board of Regents coordinated, cooperative contract that includes the University of Northern Iowa, Iowa State University (ISU) and the University of Iowa (UI). The contract is issued through ISU and UI and reviewed by the Risk Management Department with input from the section manager.

Radioactive waste is intensively micro-managed through the segregation of wastes into 45 separate streams and subsequent processing to achieve maximum cost savings. The foundation of radioactive waste management is decay-in-storage. This technique is used to reduce the amount of radioactivity contaminating a particular waste stream to background levels.

Activities and Accomplishments for FY17:

Hazardous Chemical Waste

- Processing:
  - Bulking – 17,879 items were commingled together into 597 drums last fiscal year.
  - Recycling – 452 lbs. of mercury containing devices; 2,312 lbs. of PCB ballasts; 856 lead-acid batteries weighing 7,052 lbs.; 2,426 other hazardous batteries weighing 1,946 lbs., and 1,107 pieces of lead shielding weighing 3,113 lbs.
  - DEA Controlled Substance destruction – 145 containers of controlled substances were disposed of through a DEA-approved method and completing the required reports.
  - Waste processing generates a large amount of regular trash to be disposed of at a landfill. Last year 27 truckloads containing such waste were taken to the Iowa City Landfill.

- Other:

	FY15		FY16		FY17	
Process	**Weight (kg)**	**Items**	**Weight (kg)**	**Items**	**Weight (kg)**	**Items**
Neutralization	999	651	754	500	901	878
Non-hazardous Gases Vented	92	57	60	33	95	37
Non-hazardous-to IC Landfill	928	1,823	1,004	1,351	1,341	1,367
Sewered	4,282	2,783	3,595	2,846	3,671	3,346

- Cost Containment:
  - Labpacks are a considerably more expensive disposal option, but are necessary due to extenuating factors such as chemical compatibility, stability, or EPA-mandated treatment methods. Because of their high cost [in FY17 bulk solvents cost $0.65/kilogram (kg), labpacks cost $18.71/kg], EHS makes every effort to minimize the number of labpacks that are created.
  - Last year 180 labpack drums were filled with 1,749 items weighing 1,597 kg.
- Contractor Shipments and Disposal:
  - Fifteen shipments of hazardous chemical waste were completed and sent to off-site EPA permitted facilities.
  - One shipment of mixed waste (chemical and radioactive hazards). of one drum.
  - Eight shipments of bulk drums/labpacks totaling 745 drums.
  - One shipment of PCB lamp ballasts totaling 4 drums.
  - One shipment of used oil totaling 38 drums.
  - Four shipments of incinerable pharmaceuticals totaling 6 boxes.
- See attachments section for statistical and graphical information.

Radioactive Waste

- Saved approximately $18,500 in contractor disposal costs by using labor-intensive practices to process radioactive waste.
- Aqueous liquids are held for varying periods of isotope-dependent decay times prior to being discharged to the sanitary sewer. Last year, 336 containers commingled in 9 drums along with 32 individual smaller containers were discharged for a total of 571 gallons.
- Mixed wastes are stored on shelves, allowed to decay, surveyed, reclassified as hazardous waste, and then disposed of through the hazardous waste program. This reduces the toxicity of the waste, eliminates the “mixed waste” classification and affords a large cost savings. Three drums and 19 individual containers of mixed waste were released after decay-in-storage.
- Lead shielding is surveyed for contamination and recycled through the hazardous waste program if no contamination is present. Last year, 1,108 pieces were collected.
- Refuse is created during the extensive processing of RWMP, which is disposed of through landfilling. Last year, 27 truckloads of such waste were taken to the Iowa City Landfill.

- A sorting station is used to sort dry waste for review and removal, if necessary, of in appropriate items prior to disposal in the Iowa City Landfill. Last year 35 drums of short-lived waste were processed.
- Completed three radioactive waste shipments of 34 shipping containers, including:
  - 2 – Animals containers;
  - 2 – dry waste barrels;
  - 1 – mixed hazardous/radioactive liquids;
  - 23 – non-hazardous scintillation cocktail vials;
  - 4 – dry waste in yard-boxes, and
  - 2 – sharps in yard boxes.
- See attachments for statistical and graphical information.

Biohazardous Waste

- Operated the program that manages biohazardous waste, excluding waste generated by UIHC, which operates a separate program.
- Established procedures in which a vendor collects waste from dock areas at twelve buildings that are large quantity generators; EHS collects waste from twelve small quantity generators.
- Disposed of 24,318 containers of waste (excludes waste generated at UIHC); 22,198 collected by contractor; 2,120 collected by EHS.

Monitoring Activities

The radioactive waste management program performs significant internal monitoring directed toward contamination control, environmental monitoring, and personal dosimetry. Contamination control includes extensive use of wipes and survey instruments.

Activities and Accomplishments for FY17:

- Surveys - more than 8,000 surveys are performed annually.
  - Vehicle – surveyed after each use – 103 times – using 1,030 wipes.
  - Facility – surveyed on a weekly basis – 52 surveys – using > 1,500 wipes.
  - Containers – surveyed > 800.
  - Lead shielding – surveyed prior to disposal – 1,108 pieces.
- Environmental dosimeters – no significant doses were released in the facility operations.

Quality Assurance Activities

The waste section maintains an extensive quality assurance program regarding waste records and waste section practices. Audits are conducted to ensure the accuracy and completeness of generated records used for tracking wastes from generator to final disposal.

Activities and Accomplishments for FY17:

- Daily review of data collected during waste collections; ongoing record audits.
- Periodic review of drum contents for quality assurance and annual barrel record review.
- Weekly review of individual storage location contents and periodic inventory checks.
- Quarterly self-RCRA inspections.
- Barrel check and item inventory checks after every waste shipment.
- Reviewed drum contents for quality assurance.

Regulatory Compliance Programs

Environmental Reporting/Permit Management

The Environmental Section manages a permitted TSDF that allows the University to store hazardous waste at several locations on the University of Iowa Research Park campus. This permit dictates an extensive recordkeeping network of information that documents the condition of the facilities and allows EHS to track each container of waste from a specific generating site within the University to the ultimate disposal site. Information from generators, transportation manifests, in-house storage records, packaging and container information, contractor transportation records, and contractor disposal records are merged into an operating record. The operating record is the basis of assessing compliance with applicable regulations. This program includes submitting required regulatory reports to the appropriate agencies.

The University of Iowa's TSD operating permit also requires a Waste Minimization Plan focused on reducing generation and subsequent release to the environment of the most persistent, bio accumulative and toxic constituents in hazardous wastes. The plan's three inherent goals are to reduce the most hazardous substances, avoid transferring these constituents across environmental media, and ensure these constituents are reduced at their source.

Activities and Accomplishments for FY17:

- Completed annual EPA report, as required by our EPA operating permit. EHS is required to submit an "Annual Report to EPA on the Status of Waste Reduction Techniques" and a signed Certification that a program is in place.
- Performed the following waste minimization activities:
  - Conducted regular solicitation of waste coordinators at each generator site.
  - Performed waste segregation and micro-management.
  - Conducted waste training and education activities.
  - Performed waste generator assessments, which allowed direct one-on-one communication with generators. To date, thirty-one different waste minimization techniques are in use.
  - Micro-managed the bulk fluid portion of the waste stream to allow fuel-blending as the preferred method for disposal. Fuel-blending allows recovery of the heat value from the waste.
  - Generated an annual historical summary of waste disposal costs and submitted it to the Associate Vice President for Research, Regulatory Affairs.
  - Generated graphical information on waste minimization of liquid scintillation cocktail, mixed waste, benzene, chromic acid, and lead shielding for the Annual Report to EPA on the Status of Waste Reduction.

EPA Compliance

The EPA Compliance Program is intended to promote compliance with select environmental programs. The program consists of participating in regulatory agency inspections, conducting waste generator assessments, and managing a Safety Data Sheets (SDS) inventory used for conducting hazardous waste determinations. The purpose of waste generator assessment/audits is to evaluate waste generator sites, confirm generator identity, identify waste generating processes, evaluate regulatory compliance, promote waste minimization efforts, disseminate information on new methods and technology to reduce waste, promote disposal of unwanted chemicals and proper chemical management. The audit program focuses on large quantity generators, groups targeted by EPA for inspection, and generators with disposal issues identified during waste collection.

Activities and Accomplishments for FY17:

- Completed written response to EPA for the results of the compliance evaluation inspections conducted by EPA on April 5, 2017. The inspection covered the permitted waste storage facilities, and waste generators on the UI Research Campus. No violations were identified.
- Implemented procedural changes to meet compliance with EPAs new "Hazardous Waste Generator Improvement Rule." Most notably, implemented significant labeling changes.
- The Iowa Department of Public Health conducted an inspection of the facility during the last fiscal year as part of the University's annual radioactive materials license inspection. No violations were identified.
- Continued the implementation of programs to perform audits or assessments for select areas that generate hazardous waste. Audits are alternated between lab and non-lab areas.
    - Completed 356 audits of laboratories that generate hazardous waste.
    - Completed 144 audits of non-laboratory areas that generate hazardous waste.
    - Completed 301 audits of areas where Universal Waste is accumulated.
- SDS solicitations: over 2,000 SDS were solicited from manufacturers; currently, over 25,000 separate SDS are part of the EHS' collection of this information.

Goals and Initiatives for FY18:

- Facility operations: receive no violations from EPA; complete quarterly self-RCRA inspections.
- Conduct additional spill exercises that implement use of an SCBA.
- Conduct facility reviews for local emergency personnel.
- Complete EPA biennial hazardous waste report.
- Review and update Environmental Programs Sections Health and Safety Program.
- Review and update ICON training courses.
- Complete staff annual refresher training.

Occupational Safety Section

The Occupational Safety (OS) section is committed to the promotion of a safe and healthy workplace for University of Iowa (UI) faculty, staff, and students through the development and implementation of programs and procedures to minimize occupational hazards.

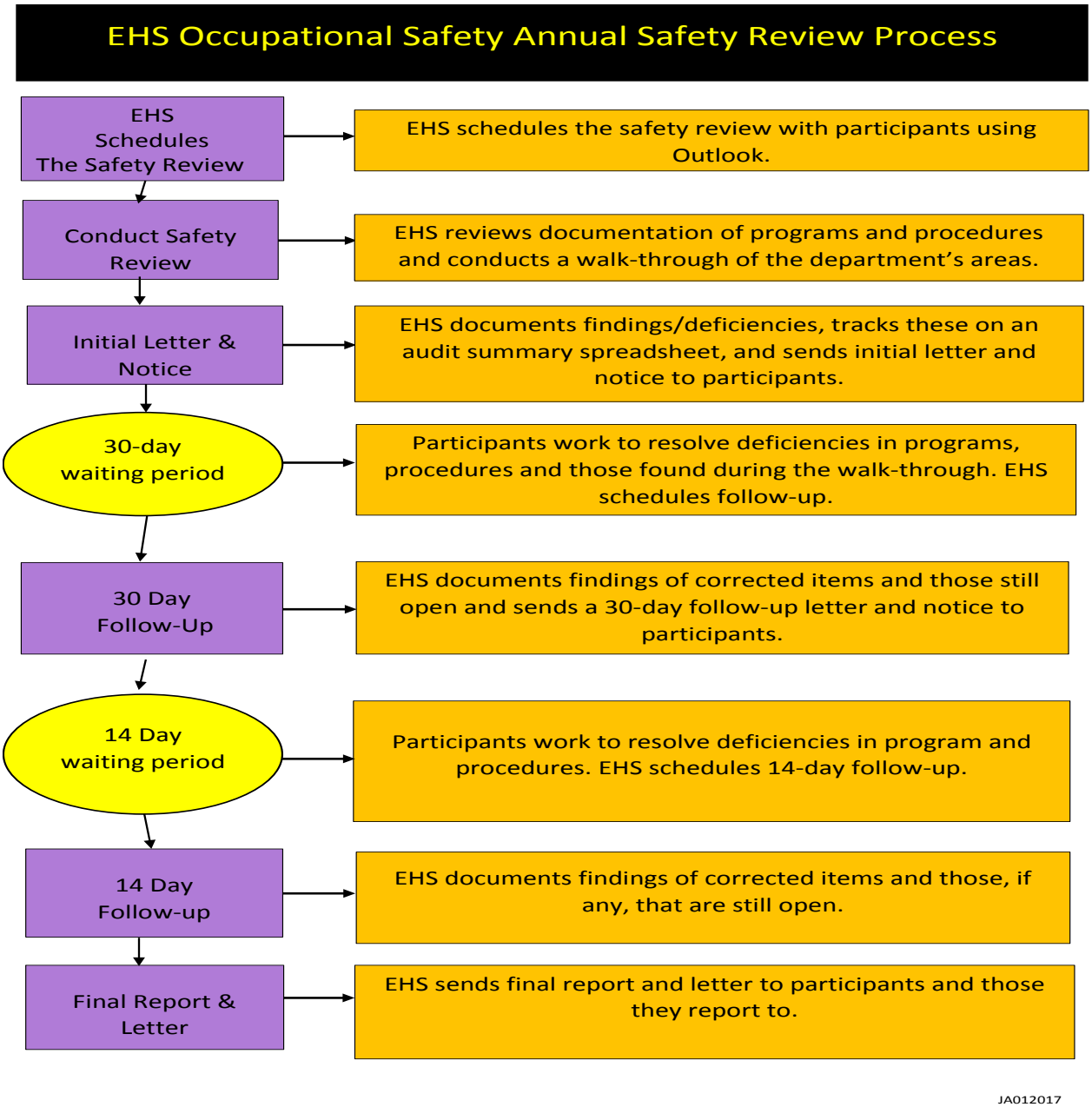
The Occupational Safety Section provides services to a broad range of departments and staff on campus. Its focus is on people and how they interact within their workplace in regard to occupational safety and health. The programs and services are designed to evaluate job hazards, help individuals and departments reduce or eliminate these hazards, and comply with state and federal occupational safety and health regulations. The OS section provides campus wide oversight for the following programs:

- Occupational Safety Programs such as Machine Guarding, Personal Protective Equipment, etc.
- Illness and Injury Prevention.
- Industrial Hygiene Programs such as Indoor Environmental Quality, Respiratory Protection, Hearing Conservation, etc.
- Exposure Assessments and Maintenance of Exposure Records.
- Support for the University of Iowa Hospital and Clinics (UIHC) and the UI Department of Human Resources (HR) by partnering with the Iowa Occupational Safety and Health Administration (Iowa OSHA) during routine or incident-based inquiries and inspections.

Upon request, additional services may be provided for the UIHC and include industrial hygiene exposure assessments, indoor environmental quality investigations, and subcommittee work associated with the Environment of Care Committee. Such services are coordinated through the UIHC Safety and Security Office.

Safety Reviews

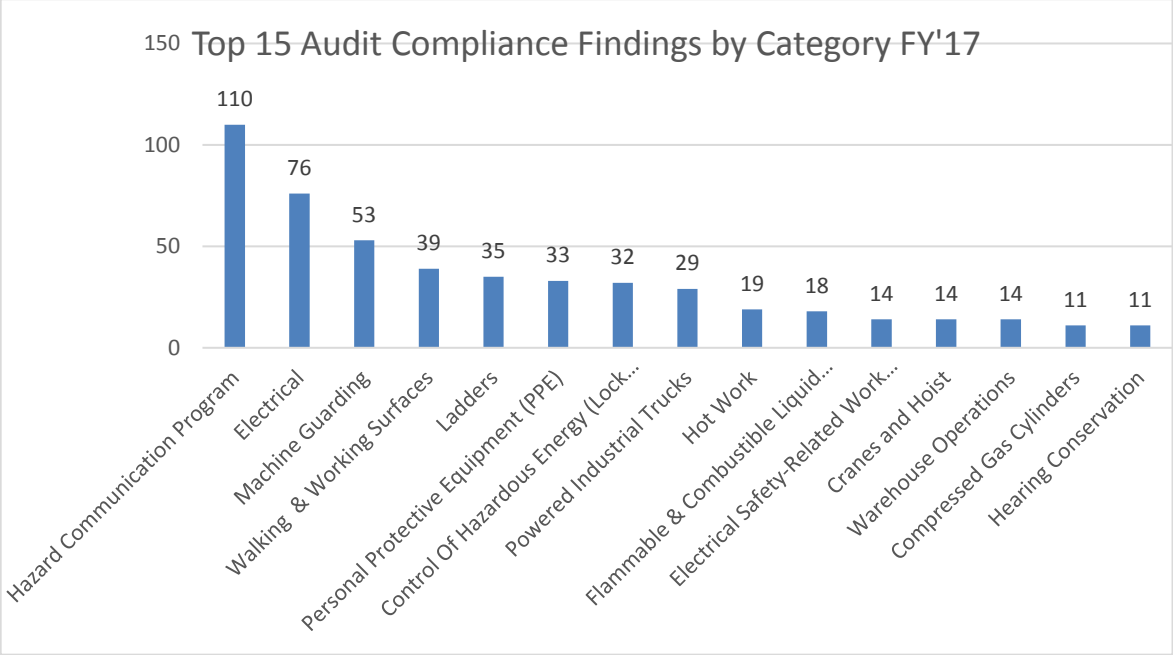
The OS section performs annual safety reviews of a variety of departments across campus including Facilities Management, Housing & Dining, Animal Resources, Business Services, Recreational Services, Studio Arts, Athletics, and some Academic areas. The purpose of the review is to look at the major occupational safety and health topics associated with a unit or department, and to ensure that controls are in place to eliminate or reduce risk.



Activities & Accomplishments for FY17

During fiscal year 2017, the OS section conducted 102 departmental reviews. All units were reviewed for compliance with the following Iowa Occupational Safety and Health (IOSH) and National Fire Protection Agency (NFPA) standards. These include:

- Personal Protective Equipment
- Machine Guarding
- Electrical Safety
- Control of Hazardous Energy - Lockout/Tagout
- Flammable and Combustible Storage and Compressed Gas Cylinders
- Hazard Communication
- Hot Work
- Bloodborne Pathogens
- Cranes and Hoists
- Theater Rigging
- Hearing Conservation
- Powered Industrial Trucks (Fork Trucks)
- Aerial Booms and Scissor Lifts
- Asbestos Awareness
- Hazardous Waste
- Emergency Preparedness and Access/Egress
- Housekeeping- Facility Cleanliness and Organization
- Walking/Working Surfaces
- Warehouse Safety



Hazard Communication Program Updates

The 2017 HazCom program updates include:

- Developed an updated Safety Data Sheet webpage that is clear, informative, and easy to understand. It enables any user to quickly read and understand what they need to do to make their location compliant with either OSHA's Hazard Communication Standard (1910.1200) or Lab Safety Standard (1910.1450).
- Working with departments to ensure that they replaced Material Safety Data Sheets (MSDS) with updated Safety Data Sheets (SDS);
- Working with departments to verify that their chemical inventories are up to date and reviewed in the EHS Assistant database; and
- Providing departments with templates so that they can customize documents to meet their programs' needs.

Hot Work

The OS section has been working with a committee comprised of representatives from Risk Management, Public Safety, and Facilities Management to update the UI written Hot Work Program. Some of the key program updates include:

- New Program incorporates all of campus, including UIHC;
- Updated Permits;
- Working on new ICON course that addresses specific UI issues;
- Clearly defining roles, responsibilities, and procedures for both UI employees and outside contractors in regards to both "Designated" and "Temporary" Hot Work sites;
- Updated the Hot Work Permit form and procedures to obtain and use it; and
- Setting up quarterly committee meetings to review the status of the program on campus.

Electrical Safety

The OS Section is coordinating meetings with representatives from Facilities Management, Housing and Dining, University Hospitals and Clinics, Athletics, and Recreational Services to standardize processes around our electrical safety program; and more specifically Arc Flash and NFPA 70E Compliance. This group meets on a quarterly basis to report on activities in their areas.

Training

Occupational Safety online training courses are offered by EHS for thirty-one (31) topics. These programs are reviewed on an annual basis and updated as needed.

Students Working with Machinery & Equipment

The Occupational Safety & Health Administration (OSHA) regulates the use of machinery, equipment, and mechanical power transmission apparatuses that are currently used in maintenance operations, machine, and repair shops. In some departments within the University, it is common for students, as well as faculty and staff, to use equipment of this sort including metal and wood turning lathes, band saws, drill presses, radial arm saws, and floor mounted grinders. This program covers departmental areas and activities in which students use large industrial powered equipment as part of professor-led academic class projects.

If students are allowed to use the equipment, the department must adhere to the following guidelines:

Training.

Students are trained on the use of powered equipment, which includes:

a) Completing an ICON training course on general machine safety;

b) Site-specific training that includes discussion of departmental shop rules & procedures, and

c) Machine or equipment-specific training.

Supervision.

While the equipment is in use by students, supervision must be provided at all times by an employee who has knowledge and experience with the equipment.

Personal Protective Equipment (PPE).

Proper PPE is worn. No dangling jewelry is allowed. Long hair must be tied back/restrained so that it cannot be pulled into equipment.

Activities & Accomplishments for FY17:

Ten areas that allow students to work with machinery and equipment were audited. These areas spanned four colleges and departments: School of Art, College of Engineering, Division of Performing Arts, and Physics and Astronomy. When necessary, follow-ups were performed to ensure that all items covered in the audit were in compliance with safety requirements.

Safety Processes, Collaborations, Regulatory Inspections

University-wide procedures are in place to provide a more consistent institutional response to potential health and safety issues raised by OSHA and to implement timely action to ensure a safe environment for employees. Safety and regulatory inspection processes are managed by the OS section and include management systems that increase the effectiveness of departmental processes and committee collaborations to identify and control risks.

Activities and Accomplishments for FY17:

The OS section participated in the following University and UIHC department committees:

- The College of Dentistry Nitrous Oxide Oversight Committee
- UIHC Staff Safety & Health Council
- The Workplace Occupational Safety and Health Work Group
- Job Safety Analysis Subcommittee
- Hot Work Committee

In addition, the OS section maintained Occupational Safety and Industrial Hygiene web publications for the campus covering twenty-seven (27) regulatory areas and online courses.

The OS section has started a collaboration with the Occupational and Environmental Health department in the College of Public Health. The collaboration will give researchers access to areas on campus that provide unique and under studied exposure scenarios and provides EHS with industrial hygiene samples at no cost to the University.

Injury and Illness Analysis

The OS section investigates injuries and illnesses that occur at the University in order to reduce the potential for similar recurrences in the future, the number of injuries and illnesses that occur, and to limit the severity of these incidents. The Injury and Illness Analysis program includes review and tracking of the First Report of Injury (FROI) claims submitted through the central HR database. The claims are classified due to the mechanism of injury, outcome, and the department in which they have occurred. During administrative reviews that are performed for non-laboratory and non-UIHC departments, each department is provided with reports of the OSHA recordable incidents occurring in their department; an analysis that focuses on addressing loss control activities is performed.

Activities and Accomplishments for FY17:

Job Safety Analysis (JSA) Development

The OS section led a sub-committee from the Workplace Occupational Safety and Health Work Group to design a Job Safety Analysis (JSA) template that will be used across campus. Our incident investigation process identified a gap in our safety training program. One of the most common corrective actions is to "Re-Train" someone on a particular task. When asked what that training consists of there is usually nothing documented. The common response is that "we just walked them through how to do it correctly."

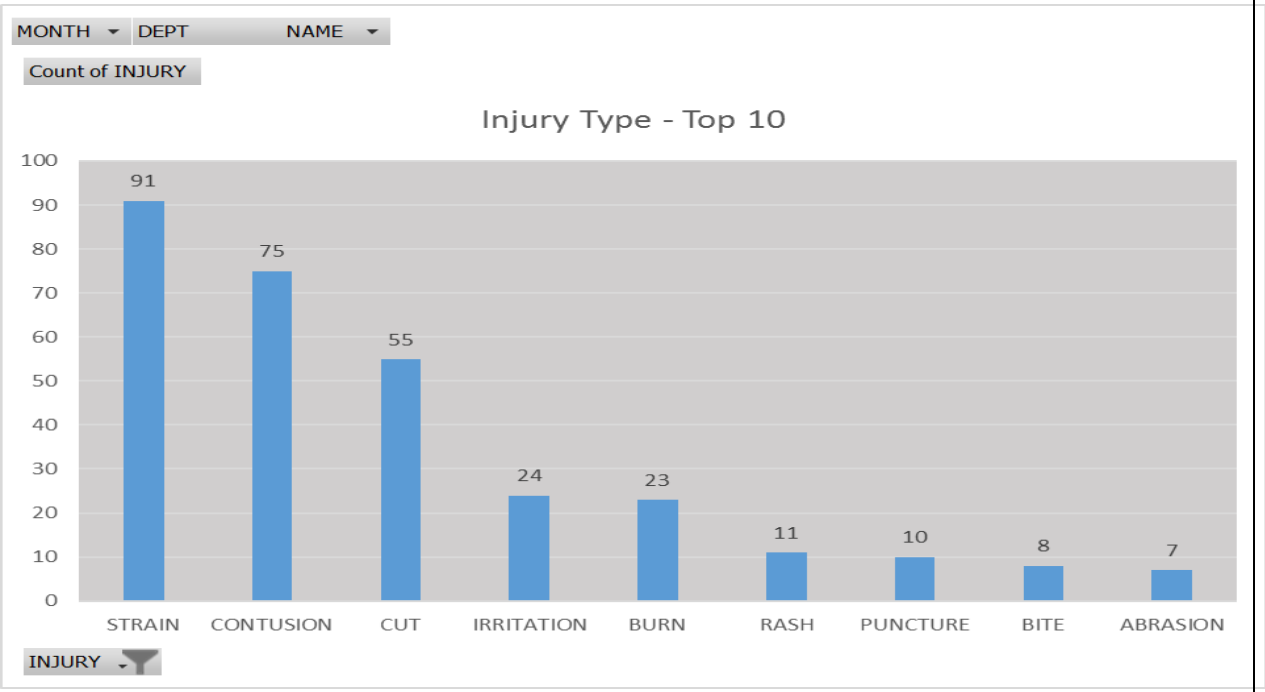
The JSA was identified as a tool that can help reduce the frequency and severity of work-related injuries at the University of Iowa. The template will help ensure that workers are trained to perform a specific task in a safe manner. This can also help departments identify safety hazards in the workplace and take steps to protect workers from those hazards.

The sub-committee accomplished the following:

- Created a Job Safety Analysis Template
- Received approval for the form from Legal & Risk Management
- Created a JSA ICON course that describes what a JSA is, how to write one, where to keep forms, etc.
- Created a JSA SharePoint page for all depts. to store their forms (hosted by EHS).
- Created a JSA webpage (hosted by EHS) that has links to forms, SharePoint, OSHA, etc. https://ehs.research.uiowa.edu/job-safety-analysis-jsa
- Rollout:
    - Facilities Management Safety Manager is testing the document with one of his departments (currently in process). They will take the training, create JSAs, and provide feedback.
    - Once all the issues are worked out, the JSA will make available to the entire campus.

Incident investigation reviews. The OS section meets with safety representatives from Facility Management, Housing & Dining, and UI Ergonomics on a monthly basis to review the First Reports of Injury and incident investigations for the prior month. The ultimate goal of the investigation process is to identify corrective actions and help lower our incident rate over time. As a result, 334 First Report of Injury (FROI) reports were reviewed over the course of the year.

Listed below is a comparison of the most frequently reported types of injuries by UI employees (excluding UIHC):



The OS section reviews the number of OSHA recordable injuries by year in comparison to the number of recordable injures with lost time only. These comparisons allow for the identification of trends in time and severity as well as a measure of the effectiveness of the current safety programs. The following four graphs show OSHA recordable and lost-time data for UI employees.

Figure 2: OSHA Recordable Injuries, Total and Lost Time Only

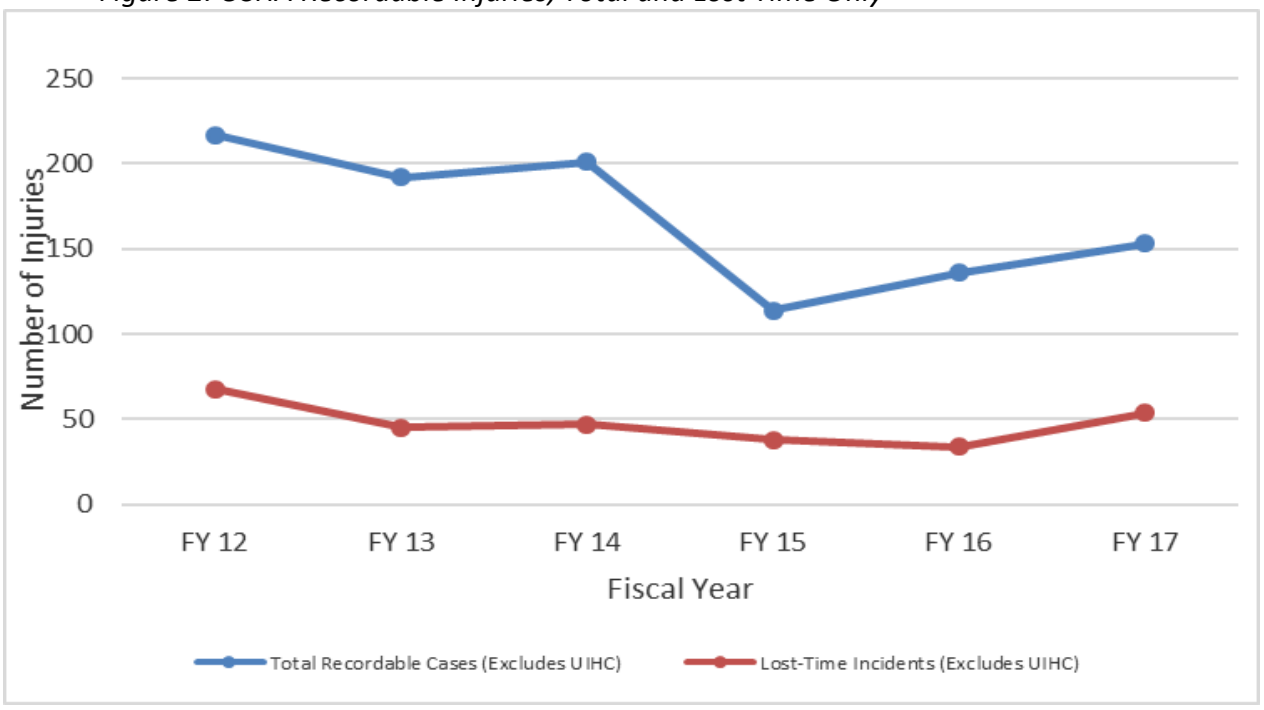
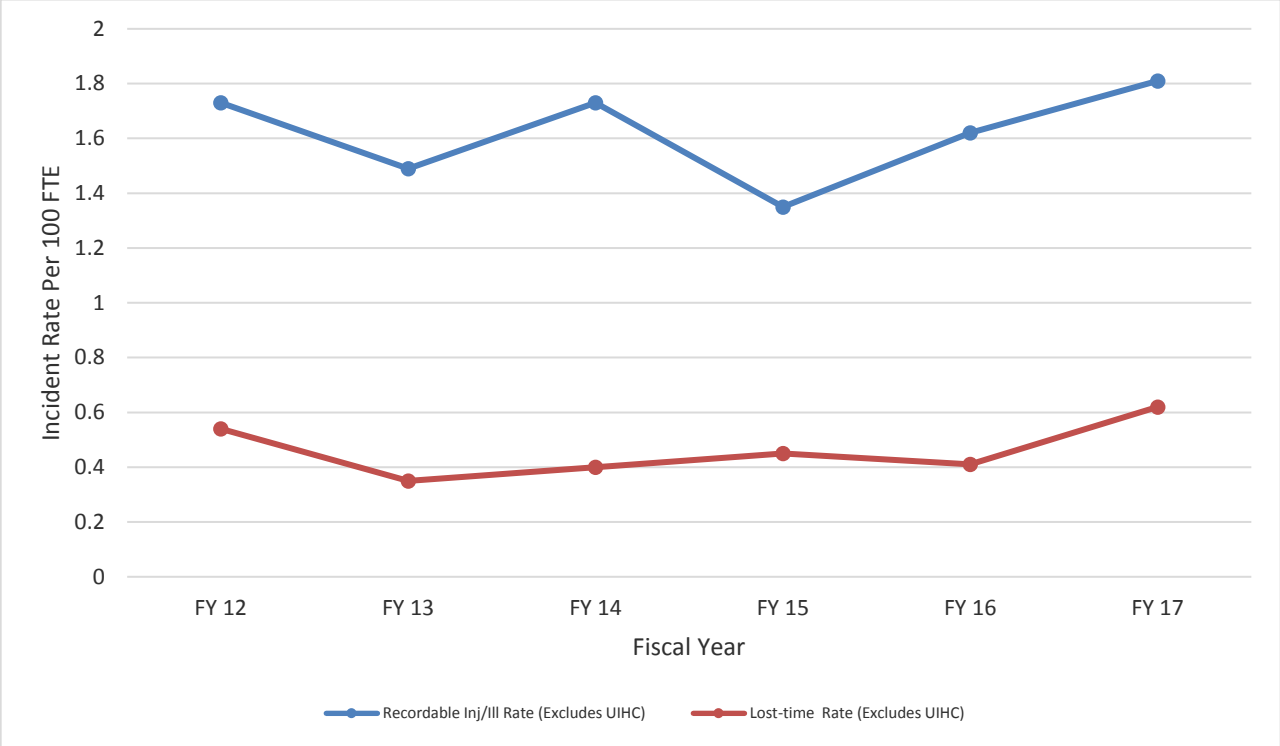


Figure 3: OSHA Recordable Injuries Rate, Total and Lost Time Only



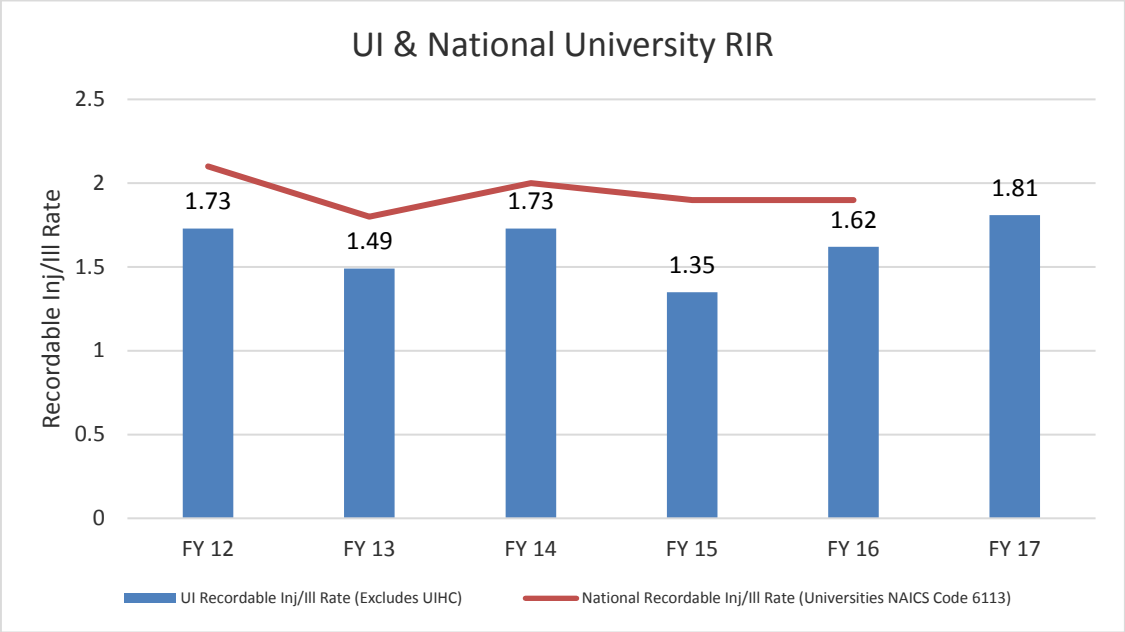
The Incident Recordable (IR) case rate represents the total recordable cases for a given year per 100 full-time employees (FTE). The incident rate is a metric to standardize the year's safety performance against the national and state average. The equation is as follows:

$$\text{OSHA Incident Rate} = \frac{\text{Total number of injuries x 200,000}}{\text{Number of hours worked by all employees}}$$

Lost Time Cases (LTC) represents the number of OSHA recordable injuries that resulted in lost time. The LTC rate is the number of cases in a given year per 100 full-time employees. The rate is calculated using the OSHA Incident Rate calculation outlined above, however the total number of injuries are only those resulting in lost time.

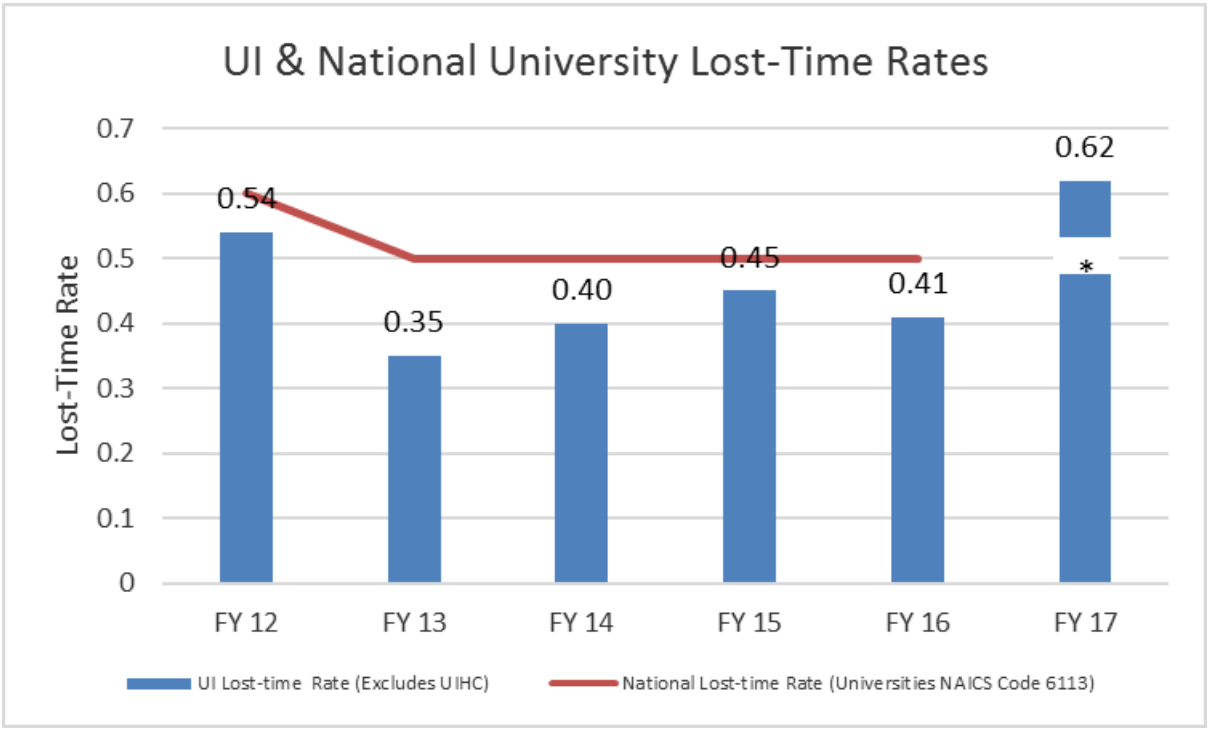
The following graphs compare the 5-year Recordable Injury/Illness and Lost-Time Rates for UI to the average rates for universities nationwide (NAICS Code 6113 - Figures 4 and 5).

Figure 4: OSHA Recordable Injuries Rate, National and UI rates by Fiscal Year



**National Data was not available for FY17 at the time of this report*

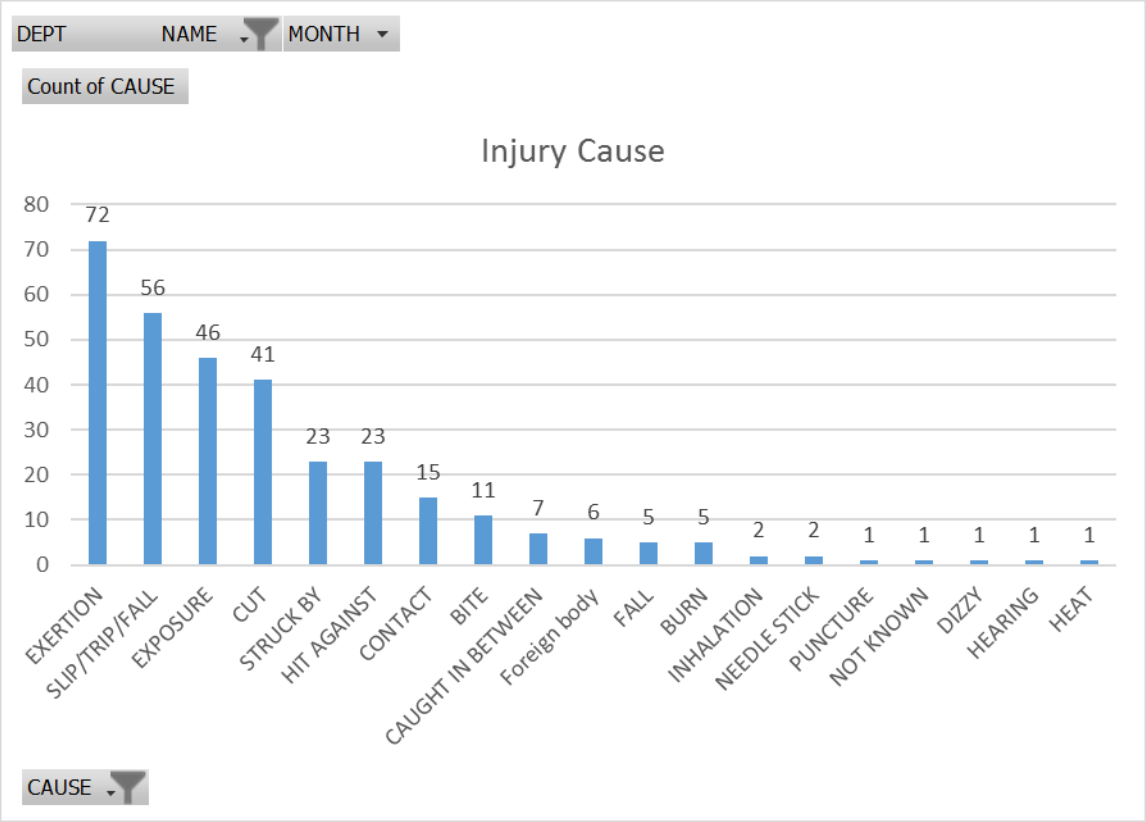
Figure 5: OSHA Lost Time Case Rate, National and UI rates by Fiscal Year



**National Data was not available for FY17 at the time of this report*

Departments are expected to investigate all injuries that happen in their department. The following graph lists the causes of the injuries investigated.

Table 2: FROI Investigations by Injury Cause FY17



The OS Section staff reviews incident and injury trends with non-laboratory and non-UIHC departments during an annual administrative audit. In addition, monthly incident reviews are done with Safety Representatives from Facility Management and Housing & Dining. The following topics are reviewed:

- The number of OSHA Recordable Injuries;
- Near miss incidents;
- The most common type of injury;
- The direct and indirect contributing factors including facilities, equipment, work practices, procedures, active management leadership, and employee involvement;
- Overall safety culture;
- The status of the department's injury investigation process and return to work program;
- Opportunities for corrective actions; and
- Areas of focus for department administrators, including day-to-day performance management and safe work practices.

Indoor Air Quality

The indoor air quality (IAQ) program addresses issues associated with indoor environmental quality for campus buildings. Requests are made by individuals, departments, administrators, medical providers, and staff involved with building maintenance, renovation, or construction. Issues that arise include general air quality, odors, mold, allergens, dust, and thermal comfort. Underlying issues are facilitated to resolution and may include the overall office environment, construction impacting occupied areas, and unique or aged structures.

Investigations often include assessing the building and/or Heating, Ventilation, and Air Conditioning (HVAC) system for moisture intrusion since that is the primary facilitator of mold growth indoors. Sampling may include carbon monoxide, carbon dioxide, relative humidity, temperature, dust levels, formaldehyde, volatile organic compounds (VOCs), and biological samples when indicated or requested to identify and rule out background substances more commonly associated with individual sensitivities or allergies.

Activities and Accomplishments for FY17:

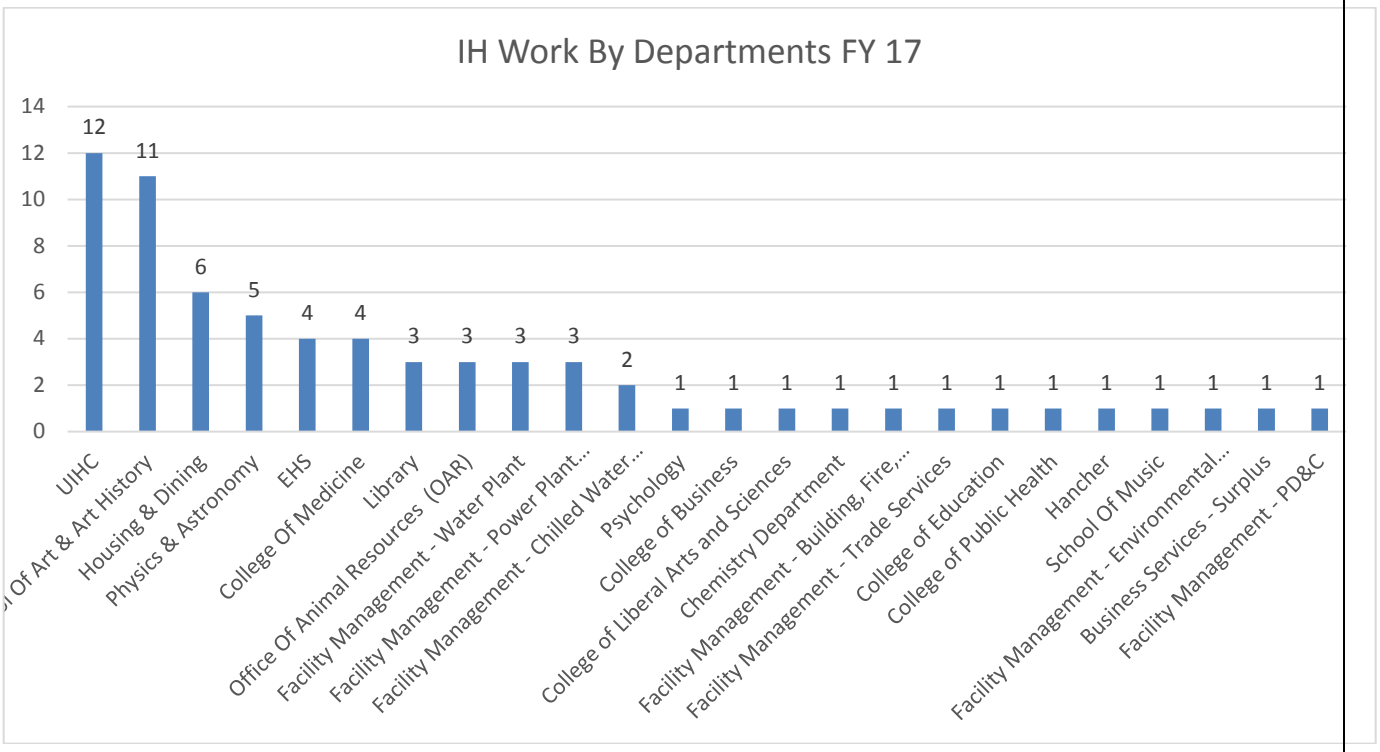
- Conducted fifteen (15) indoor air quality investigations.

Industrial Hygiene

Industrial hygiene services are provided to evaluate various chemical and physical hazards, recommend means of hazard elimination or control, and evaluate ongoing program effectiveness.

Activities and Accomplishments for FY17:

- Performed Respirator Program Administrator services for EHS respirator programs; and provided a summary report to the EHS Director.
- Provided twenty-eight (28) respirator fit tests to eighteen (18) employees in five (5) departments.
- Performed nineteen (19) industrial hygiene evaluations for airborne exposures for eight (8) departments. A total of 364 samples were collected to evaluate/test for 34 different chemicals.
- Performed fifteen (15) evaluations for noise exposures for nine (9) departments. A total of twenty-two (22) personal samples and seventy-six (76) area samples were collected.
- Performed an additional twelve (12) industrial hygiene evaluations for a variety of purposes including hazard assessments, recommending PPE and controls, and measuring and assessing existing controls.
- Provided input on safety related issues to Facilities Management Design and Construction on one (1) building project.
- Created programs and training for OSHA's two new standards on Silica and Beryllium.
- Collaborated with the Department of Occupational and Environmental Health in the College of Public Health to conduct air monitoring for metal exposures in the new Visual Arts Building as part of a student's master thesis project. Nineteen (19) samples were collected as part of this project.
- Collaborated with the Department of Occupational and Environmental Health in the College of Public Health to begin work on a project for monitoring noise exposure for faculty in the School of Music. The project currently awaits IRB approval.


IH Work By Departments FY 17
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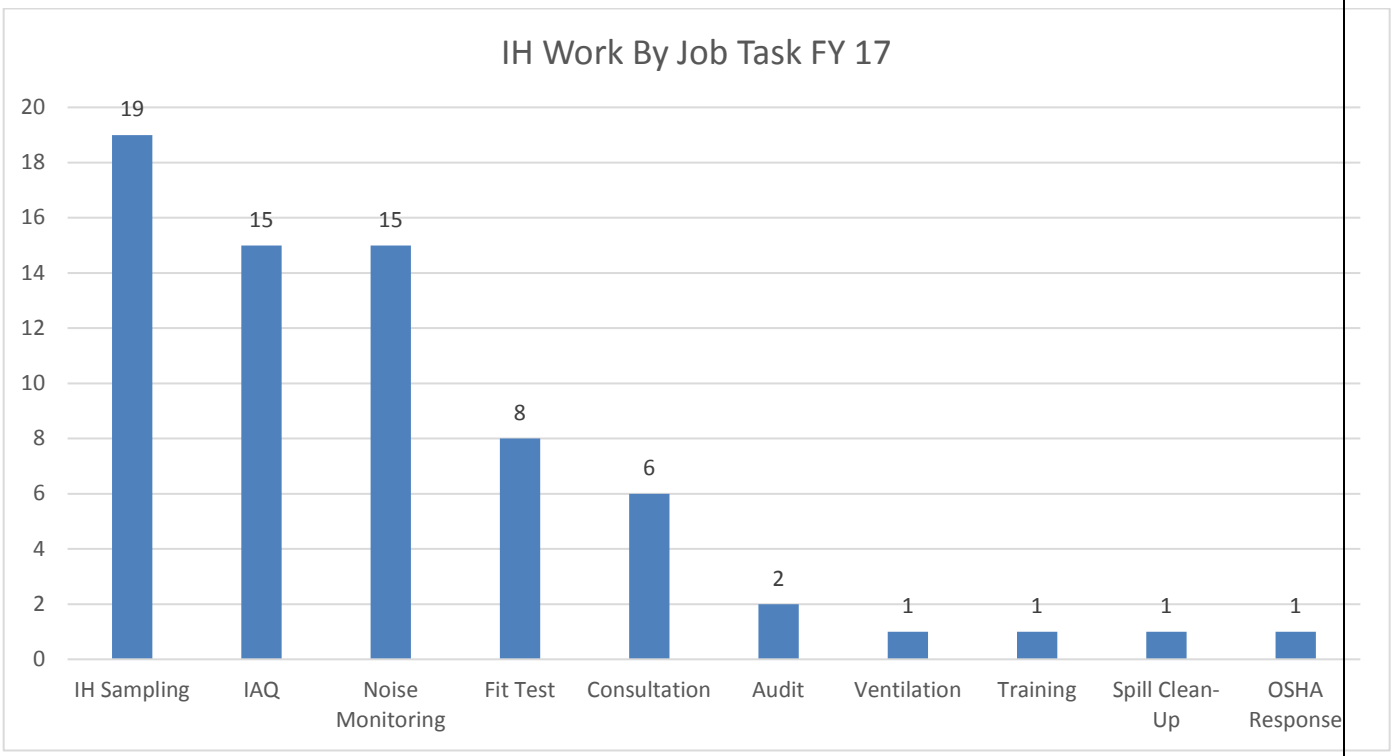
UIHC
Of Art & Art History
Housing & Dining
Physics & Astronomy
EHS
College Of Medicine
Library
Office Of Animal Resources (OAR)
Facility Management - Water Plant
Facility Management - Power Plant...
Facility Management - Chilled Water...
Psychology
College of Business
College of Liberal Arts and Sciences
Chemistry Department
Facility Management - Building, Fire,...
Facility Management - Trade Services
College of Education
College of Public Health
Hancher
School Of Music
Facility Management - Environmental...
Business Services - Surplus
Facility Management - PD&C


IH Work By Job Task FY 17
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IH Sampling
IAQ
Noise Monitoring
Fit Test
Consultation
Audit
Ventilation
Training
Spill Clean-Up
OSHA Response

Occupational Safety Section Goals for FY18

- Participate in University, UIHC, and department committees for risk control related to occupational safety and health.
- Participate in the Workplace Occupational Safety and Health Work Group and sub work groups.
- Support University and UIHC needs in the occupational safety including injury and illness prevention, training, annual safety reviews and follow-ups.
- Roll out the Job Safety Analysis (JSA) program across campus and assist departments in implementation as needed.
- Strategically implement the new Silica and Beryllium programs, where applicable, on campus.
- Collaborate with safety personnel across campus such as Facilities Management, Housing/Dining, Fire Safety, Recreational Services, Athletics, and UIHC to continually improve our safety program for the University of Iowa.

Radiation Safety Program

The Radiation Safety Section is responsible for administrating the University's radiation safety program. This includes maintaining the radioactive material license, registration and compliance testing of radiation producing machines, assessing program performance, providing training and program services, and managing regulatory and policy compliance.

Administrative Programs

Radioactive Materials License Maintenance

The Environmental Health & Safety Office's (EHS) Radiation Safety Section maintains the University's single academic/medical radioactive materials license of broad scope that covers all uses of radioactive materials for both research and medicine. The license is issued by the Iowa Department of Public Health - Bureau of Radiological Health (IDPH-BRH) and is subject to annual IDPH-BRH on-site inspection and five-year renewal.

Activities and Accomplishments for FY17:

- Completed review of the University's Radioactive Materials License. The license is up to date and not due for renewal until May 1, 2018.
- Filed for and received approval from the IDPH-BRH for regulatory variance to IAC 641-40.37(3)a that permits the University to utilize the NVLAP approved EDE2 calculation to assign a whole body dose for individuals wearing a single dosimeter outside their protective lead apron.
- Completed IDPH-BRH annual registration of Radiation Oncology medical physicists, personnel servicing X-Ray machines (Radiology Engineering and EHS), and EHS personnel conducting health physics activities.
- Completed annual inventory and registration of the University's and UIHC's radiation producing machines and generally licensed sources with the IDPH-BRH.
- Completed annual review of the University's program for managing security and access to Category I & II quantities of radioactive material to meet the requirements in IAC 641-37 (*Physical Protection of Category I & II Quantities of Radioactive Material*).
- Maintained access control programs and audited compliance for each of the sites under the requirements of IAC 641-37 *Physical Protection of Category I & II Quantities of Radioactive Material.*
- Negotiating with the DOE's Defense Nuclear Nonproliferation – Office of Radiological Security to install voluntary security enhancements for the sites under IAC 641-37 requirements, which are to be paid for and maintained for 3 years under a DOE funded grant.
- Routinely monitored both the Iowa Administrative Bulletin and the Federal Register for regulatory changes that may impact the radiation safety programs and notified stakeholders who are or may be affected.

License Inspection Activities for FY17

- EHS Radiation Safety staff participated in the IDPH-BRH's on-site inspection of the University's radioactive material license and radiation safety program from October 24 – 27, 2016. The inspection included reviews of the following: Physical Protection of Category 1 & 2 Radioactive Materials; Laboratory Security Personnel Monitoring & Exposure Control; Laboratory Audits & Surveys; Radiation Oncology; Radioactive Waste Disposal; Radiation Safety Program annual report; and Instrument Calibration. No violation or concern was identified within the scope of this inspection.
- EHS Radiation Safety staff participated in the IDPH-BRH's on-site Mammography Quality Standards Act (MQSA) inspection and stereotactic breast biopsy inspections at the UIHC on November 15, 2016. No violation or concern was identified within the scope of these inspections.
- EHS Radiation Safety staff participated in the IDPH-BRH's on-site Mammography Quality Standards Act (MQSA) inspection at the UIHC's Iowa River Landing (IRL) clinic on November 14, 2016. No violation or concern was identified within the scope of this inspection.

Radiation Safety Committees

The University's Radiation Safety Committee (RSC) is comprised of five interrelated committees that function to provide radiation protection program oversight, review, policy development, and radioactive materials use authorization under the management of the Associate Vice President for Research. The radiation safety program is delegated to the RSC and the Radiation Safety Officer (RSO) who have the authority to enforce and direct University personnel regarding radioactive material regulations, license conditions, and University radiation safety policies.

1. Radiation Protection Executive Committee

The Radiation Protection Executive Committee is responsible for providing oversight and review of the University's radiation protection program and establishing radiation safety use and enforcement policies. The Executive Committee is comprised of representatives of University administration and EHS, and the chair and vice-chairpersons of the Basic Science Radiation Protection Committee, the Medical Radiation Protection Committee, and the Hospital Radiation Safety Review Group.

Activities and Accomplishments for FY17:

- Meetings were held on December 12, 2016 and June 20, 2017.
- Reviewed and approved four quarterly UI/UIHC ALARA reports.
- Reviewed and approved RSO's evaluative summaries of each of 31 radiation safety audits, noting and initiating corrective action for a total of 9 items of non-compliance (2 items at the UIHC, 4 items at UIHC Outreach Clinics, and 3 violations in UI research labs). All violations were corrected and follow-up checks noted no repeat occurrences.
- Reviewed the 2016 COMPLY radionuclide air emissions report, noting that the UI/UIHC emissions (0.003 mrem/yr.) were well within regulatory limits (10 mrem/yr.).

- Reviewed and approved the Annual Radiation Safety Program Report for FY16.
- Reviewed the 2016 annual radioactive materials license inspection report and UIHC & IRL Mammography Inspection reports.

2. Hospital Radiation Safety Review Group (HRSRG)

The Hospital Radiation Safety Review Group is responsible for the review of the University Hospital's radiation protection program as well as the review and approval of medical authorized users and clinical uses of radioactive materials under the conditions of the University's radioactive materials license. The membership of the HRSRG is comprised of representatives of the UIHC's administration, nursing service, licensed physicians, and other individuals with specialized training and knowledge as necessary, and a representative from EHS. The chair and vice-chairpersons serve as representatives to the Executive Committee.

Activities and Accomplishments for FY17:

- Four quarterly meetings were held during FY17.
- Reviewed and approved 4 quarterly UIHC ALARA reports.
- Reviewed 4 quarterly reports on special procedure fluoroscopy patient skin doses. No skin damage was observed during follow-up medical exams of any of the 47 patients who's conservatively calculated skin dose exceeded the 300 rad adult threshold in the 8,147 fluoroscopic special procedures completed on adult patients at the UIHC. No skin doses exceeded the 100 rad pediatric threshold in the 192 fluoroscopic special procedures completed on pediatric patients at UIHC.
- Reviewed 4 quarterly radiation safety reports and annual audits on the UI Family Care Clinics in Southeast Iowa City, North Liberty, and River Crossing. Four items of non-compliance were identified and corrected.
- Reviewed and approved the credentials of 1 new medical physicist in Radiation Oncology.
- Reviewed and approved the credentials of 6 physicians as authorized users (2 in Nuclear Medicine, 2 in Radiation Oncology, and 2 in Nuclear Cardiology.
- Reviewed and approved the use of Ga-68 DOTATATE (NETSPOT™), for clinical use as a positron emission tomography imaging agent by physicians designated as Authorized Users in Nuclear Medicine to assist in the localization of somatostatin receptor positive neuroendocrine tumors in adult and pediatric patients.
- Reviewed and approved the use of F-18 Fluciclovine (AXUMIN™), for clinical use as a positron emission tomography imaging agent by physicians designated as Authorized Users in Nuclear Medicine to assist in the evaluation of adult patients with suspected prostate cancer recurrence.
- Reviewed the 2016IDPH annual radioactive materials license inspection report.
- Reviewed the 2016IDPH annual mammography inspection reports for UIHC and IRL.

3. Medical Radiation Protection Committee (MRPC)
The MRPC is responsible for ascertaining that all experimental or research uses of radiation in or on humans conform to currently accepted radiation protection practices, regulations, and license conditions. The membership of the MRPC is comprised of licensed physicians, individuals with specialized training and knowledge, as necessary, and a representative from EHS. The chair and vice-chairpersons serve as representatives to the Executive Committee.

Activities and Accomplishments for FY17:
The MRPC held 19 meetings and approved 50 new research applications and 28 application amendments for radiation and/or radioactive materials use with humans.

4. Radioactive Drug Research Committee (RDRC)
The membership of the MRPC serves as the RDRC and is responsible for the review and approval of certain proposed uses of radioactive drugs for human research intended to obtain basic information regarding metabolism, human physiology, pathophysiology, or biochemistry, but not for diagnostic or therapeutic use or for clinical trials.

Activities and Accomplishments for FY17:
- The RDRC held 4 quarterly meetings during FY17 to review the status of the single active RDRC protocol (# 201605762-R).
- The Committee Chair notified the FDA of a membership change (Dr. Goel's retirement from the Committee) on July 12, 2016.
- The Committee Chair submitted the annual membership summary and the annual study summary for protocol # 201605762-R to the FDA on January 25, 2017.

5. Basic Science Radiation Protection Committee (BSRPC)
The BSRPC is responsible for the review of applications for non-human use of radioactive materials to ensure that they conform to currently accepted radiation protection practices, regulations and license conditions. The Committee is comprised of authorized radioactive material users from within the University's Basic and Health Sciences. A representative from EHS also provides guidance on radiation protection regulations and policies to the Committee. The chair and vice-chairpersons serve as representatives to the Executive Committee.

Activities and Accomplishments for FY17:
- The BSRPC reviewed and approved 2 new UI applications for the non-medical use of RAM through its mail ballot process.
- The RSO reviewed and approved 64 non-medical use application amendments.
- Completed 72 non-medical use application renewals.

Radiation Safety Administrative Support Activities
The Radiation Safety Section provides administrative support for the management of both

medical and basic science radioactive material use applications and the routine operational activities associated with use of radioactive materials on campus. Administrative support activities also include preparing meeting agendas and documenting minutes for the Radiation Safety Committees.

1. Medical Research Applications Activities and Accomplishments for FY17:

- Processed and approved 50 new applications and 28 application amendments.
- Maintained the application files for 276 active medical research-use applications.
- The table below compares this fiscal year's medical use application activities with that of past years.

Activity	FY14	FY15	FY16	FY17
New Protocols	46	50	51	50
Amendments	21	29	30	28

2. Basic Science Applications

Activities and Accomplishments for FY17

- Processed 2 new applications, 6 cancellations, 2 inactivations, 64 application amendments, and completed 72 application renewals.
- Maintained and managed 76 active authorizations for RAM use in the basic sciences.
- The table below compares this fiscal year's non-medical use application maintenance activities with that of past years.

Activity	FY15	FY16	FY17
Renewals	76	69	72
Amendments	66	61	64
Cancellations	6	9	6
Inactivations	4	6	2
Reactivations	0	1	0
New Authorizations	90	82	76
Active Authorizations	90	82	76
Total Inactive Authorizations	134	139	141

3. Other Support Activities

Activities and Accomplishments for FY17:

- Managed Radioactive Materials (RAM) Procurement Program.
- Maintained and reviewed medical & basic science applications for completeness.
- Provided administrative support for each of the five committees, which make up the University's Radiation Safety Committee structure.

Operational Safety and Compliance Programs

University Audit Program

EHS audits the radiation safety program to assess its performance and provides those findings, evaluations, and actions to the Radiation Protection Executive Committee. The audit schedule for the periodic review of the radiation safety program is designed to provide limited quarterly reviews of the program elements that require the performance of daily, weekly, or monthly tasks, and annual review of the performance of less time critical elements. The current audit schedule is listed below:

1. Medical

- Nuclear Medicine – Quarterly limited scope review of daily, weekly and quarterly requirements 3 times per year plus 1 full annual review.
- PET Imaging Center - Quarterly limited scope review of daily, weekly and quarterly requirements 3 times per year plus 1 full annual review.
- Radiation Oncology - Quarterly limited scope review of daily, weekly and quarterly requirements 3 times per year plus 1 full annual review.
- Nuclear Cardiology – IRL - Quarterly limited scope review of daily, weekly and quarterly requirements 3 times per year plus 1 full annual review.
- Patient Fluoroscopy Dose Records – Reviewed quarterly by the Hospital Radiation Safety Review Group for each department performing special fluoroscopy guided procedures as specified by IDPH-BRH Regulations.
- X-Ray Administrative Audit for Mammography- Annually for film-screen, digital and stereotactic mammography operations.
- UIHC Family Care Clinics (Scott Boulevard Iowa City, North Liberty, and River Crossing) – Annually audit their x-ray programs.

2. Basic Science

- Radiation Research Gamma Irradiation Facility - Annually during use authorization application renewal.
- Non-medical research labs – Audited monthly, quarterly, or semi-annually according to radioactive materials used.
- After Hours Security Checks – Research labs are checked periodically for RAM security during other than normal business hours.

3. EHS Radiation Safety Programs

- Operational Radiation Safety Programs – Quarterly review of room surveys, bioassay, RAM receipt and delivery, instrument calibration, and sealed source programs.
- Radioactive Waste – Four quarterly limited scope audits which review all operations at least once per year.

Activities and Accomplishments for FY17:

- Thirty-one program audits were completed.
- Audits identified a total of 11 items (4 UIHC, 4 UIHC Outreach Clinics & 3 UI) of regulatory or University safety policy non-compliance.

- The UIHC non-compliances included 1 dose calibrator linearity check at the IRL Nuclear Cardiology clinic that did not include the highest dosage range administered clinically, 2 missed end of the day radiation surveys, and 1 missed dose calibrator linearity check within a 3 month interval in Nuclear Medicine. Each of the 4 items has been corrected.
- The 4 UIHC Outreach Clinic violations were identified at the North Liberty Clinic. They included: x-ray procedure log did not have a column to record the name of individuals holding patients during x-ray procedures; failure to complete annual inspection of protective lead aprons in accordance with Joint Commission standards, failure to have up to date copies of each technologist's permit to practice available at the facility; and the x-ray machine's field size display was not functioning. Each of the 4 items has been corrected.
- The 3 UI violations which occurred in posted basic science research labs include 2 first offense RAM security violations and 1 first offense violation for eating & drinking in a posted area. Follow-up checks have verified that each of the violations has been corrected.

4. Audits for Physical Protection of Category I & II Radioactive Materials

- Audits of security and approved access to each of the areas containing Category I or II radioactive materials are conducted at least once each calendar quarter. A complete review of the Physical Protection program is also performed annually. The Program is up to date and functioning well. EHS is currently working with the Defense Nuclear Nonproliferation Office of Radiological Security Voluntary Security Enhancements Program to bring our Category I source in compliance with IAC 641-37.49(1) c., and to upgrade our security systems to exceed the regulatory requirements.

Bioassay Program

EHS monitors occupational dose commitment of radiation workers at the University with the greatest potential for internal radionuclide intake based on receipts and/or usage of radioactive material by the end users. Bioassays are also offered to monitor potential exposure to the embryo/fetus throughout gestation of female personnel declaring a pregnancy who work in areas where radioactive materials are actively used.

Activities and Accomplishments for FY17:

- Performed 91 bioassays for UI/UIHC personnel. No internal exposures exceeded 10% of our operational ALARA limit of 125 mrem effective dose equivalent. The table below provides a comparison of the total number of bioassays performed in previous years.

Bioassay Types	FY15	FY16	FY17
Thyroid	68	71	63
Urine	20	40	28
TOTAL	**88**	**111**	**91**

Dosimetry Program

EHS manages and maintains the Dosimetry Program that provides external exposure monitoring for radiation workers and the embryo/fetus of declared pregnant radiation workers, as required by regulation.

Activities and Accomplishments for FY17

- Issued a total of 22,069 dosimeters to a monthly average of 1151 individual participants. Only a total of 57 (4.9%) individuals participating in the dosimeter program received an annual occupational whole body radiation dose greater than the 100 mrem regulatory limit prescribed for members of the general public not working with radiation. Of the dosimeters issued, 4.9% were either returned late for processing or not returned. Comparisons to the past two fiscal years are given below:

Activity	FY15	FY16	FY17
Dosimeters Issued (Annual total)	17,347	18,554	22,069
Individual Participants (monthly average)	834	901	1,151
Lost/late Dosimeters (annual average %)	4.4%	5.1%	4.9%
Percentage Issued to UI Personnel	5.0%	5.0%	4.4%
Percentage Issued to UIHC Personnel	95.0%	95.0%	95.6%

- The number of individual dosimeter program participants increased 27.7% from FY16, while the total number of dosimeters issued increased by 18.9%. Nearly 80% of this increase in people and dosimeters is due to increasing the number of participants in the Department of Anesthesia.
- The number of late/lost dosimeters decreased from 5.1% to 4.9%. The Radiation Section will continue to focus efforts on further reduction of late/lost dosimeters.

ALARA Program

Dosimetry and bioassay results are reviewed each month by EHS to maintain exposures **A**s **L**ow **A**s **R**easonably **A**chievable (ALARA) and personnel exposures in excess of established monthly ALARA limits are investigated. Quarterly ALARA reports, compiled by EHS, are distributed to the Radiation Executive Committee and the Hospital Radiation Safety Review Group for their review.

Activities and Accomplishments for FY17:

1. External Radiation Exposures

A. UIHC Dosimeter Participants

- Twenty-eight UIHC participants recorded exposures (2.5% of the total UIHC dosimeter participants) that exceeded the monthly ALARA Level I limits (4% of the annual regulatory limits). Of these, 12 were whole body deep dose exposures (11 of which were determined to be falsely elevated due to improper dosimeter use), 9 lens of the eye, and 7 extremity exposures.

- Five UIHC participants recorded exposures that exceeded whole body deep dose ALARA Level II limits (8% of the annual regulatory limits). All of these were determined to be falsely elevated exposures due to improper dosimeter use.
- Each quarter EHS performs a review of the dosimeter wear practices and dose records of up to three user groups which is included in the quarterly ALARA Reports that are reviewed by the HRSRG and Executive Committee.

B. UI Dosimeter Participants

- No UI participant exceeded any of the institutional ALARA limits.

C. ALARA Totals

- The following table reflects the UI and UIHC department demographics of exposures in excess of the University ALARA levels.

# Reports Exceeding ALARA Level I Action Levels		
Whole Body Deep Dose Equivalent	Interventional Radiology (improper use)	2
	Pain Clinic (improper use)	2
	Adult Cardiac Cath Lab (improper use)	4
	Surgery (improper use)	3
	PET Imaging Center	1
Lens of Eye Dose Equivalent	Interventional Radiology	4
	Adult Cardiac Cath Lab	1
	PET Imaging Center	1
Extremities Dose Equivalent	PET Imaging Center	6
	Research Chemistry	1
Total FY17 Level I ALARA Exposures (11 falsely elevated due to improper dosimeter use)		**28**

# Reports Exceeding ALARA Level II Action Levels		
Whole Body Deep Dose Equivalent	Interventional Radiology (improper use)	4
	Diagnostic Radiology (improper use)	1
Total FY17 Level II ALARA Exposures (5 falsely elevated due to improper dosimeter use)		**5**

1. Internal Radiation Exposures

Thyroid Bioassays

- During FY17 EHS performed 63 thyroid bioassays. None of the thyroid bioassay results exceeded 10% of our 125 mrem committed effective dose equivalent ALARA limit.

Urine Bioassays

- During FY17, EHS performed 28 urine bioassays. None of the urine bioassay results exceeded 10% of our 125 mrem committed effective dose equivalent ALARA limit.

Airborne Radioactive Material Emissions

Regulations require the University to demonstrate that the atmospheric emissions from its licensed radioactive materials operations will not result in a total annual exposure in excess of 10 mrem to the general public. To demonstrate compliance with this requirement EHS uses the Environmental Protection Agency's (EPA) Clean Air Assessment Package – 1988 (CAP88). The CAP88 program is a dosimetrically conservative computer model that uses the University's total annual inventory of radioactive materials to calculate the potential airborne dose to the general public.

Activities and Accomplishments for FY17:

- Based on the University's total annual radioactive material inventory from January 1 through December 31, 2016, the CAP88 Program calculated an effective dose equivalent (EDE) of 0.003 mrem to the nearest potentially exposed individual residing outside the University's facilities. This result demonstrates airborne emissions from the University's radioactive material usage did not exceed 0.03% of the 10 mrem/year regulatory limit.

Emergency Response and Preparedness

EHS serves as a resource unit for the UI, UIHC (including the Emergency Trauma Center (ETC)) and the Johnson County HazMat Team for emergencies involving sources of ionizing radiation.

Activities and Accomplishments for FY17:

- There were no radiation incidents or drills requiring emergency response from EHS.

Health Physics Monitoring Support

EHS provides radiation monitoring of facilities in areas where radioactive materials are used stored: (1) to evaluate user control of exposure and contamination; (2) monitor compliance with regulations and license conditions; and (3) prior to facility maintenance or equipment disposal.

Activities and Accomplishments for FY17:

1. Room Survey Program

- Performed a total of 1,276 area and equipment monitoring surveys for academic labs and the UIHC. Surveys include routine laboratory audits, after hours security checks, facility decommissioning, posting/de-posting, pre-maintenance, spill response and post-iodination activities. A comparison of the last three fiscal years is provided below:

Activity	FY15	FY16	FY17
UI Surveys	572	496	468
UI Afterhours Security Checks	709	679	801
UIHC Survey	6	6	7
Total Surveys	**1,287**	**1,181**	**1,276**

2. Compliance Assessment Program

- Currently there are 181 UI labs posted for non-medical use of radioactive material, representing a decrease of 11 research labs from FY15. A total of 3 regulatory compliance violations were observed by EHS during 468 routine surveys and 801 afterhours security checks of non-medical use research labs conducted in FY17. The compliance violations occurred in 3 different labs under the use authorization of 3 out of the 76 active principal investigators (3.9%). The non-compliance violations consisted of 2 first time violations for radioactive materials security and 1 first time violation for eating & drinking in a posted area. Violation notices were sent to the principal investigators and each of the violations were corrected. No second or third violation/suspension notices were issued.
- A follow-up security check for each lab in which a security violation was identified has been performed and in each case, EHS is satisfied that the problem has been corrected.

3. Decommissioning Activities

- Extensive radiation monitoring and wipe tests are completed whenever a posted radioactive material use area is decommissioned to ensure all radioactive materials have been removed and no contamination remains before deposting and releasing the area for unrestricted use.
- EHS has initiated a new laboratory closeout procedure on our web site to assist the research community in decommissioning their laboratory prior to leaving the University or relocating to another lab space. The procedure is designed to ensure that all laboratory rooms, chemical storage areas, or areas where hazardous equipment or materials are used or stored need to be cleared by EHS staff before being assigned to new occupants or scheduled for renovation activities.
- During FY17, five principal investigators used the laboratory closeout procedure to decommission their labs.

Sealed Source Leak Testing Program

The sealed source leak testing program includes wipe testing to ensure sealed source structural integrity; ambient radiation level surveys in areas where the sources are used and/or stored; and physical inventories to ensure sealed source accountability and security.

Activities and Accomplishments for FY17:

- A summary of activity is given below:

Sealed Source Leak Test	FY15	FY16	FY17
UI	111	104	103
UIHC	249	183	196
Totals	**360**	**287**	**299**

- Performed 122 ambient radiation level surveys and 306 physical inventories.
- A total of 19 new sources were added to the inventory (2 UI & 17 UIHC) during FY17,

while 11 sources were properly disposed of or returned to the original manufacturer (1 UI & 10 UIHC).

- All sources were accounted for and all leak tests were negative (< 0.005 uCi of removable radioactive material).

Instrument Calibration Program

Annual calibration is required for survey instruments used for quantitative radiation measurement. EHS continues to provide this service for the UI and UIHC.

Activities and Accomplishments for FY17:

- A total of 160 instruments were calibrated and 19 instruments were tagged out of service. A comparison of the last three fiscal years is given below.

UI Activity	FY15	FY16	FY17
Compliance Calibrations	99	98	98
Tagged Out of Service	10	11	8
UIHC Activity	FY15	FY16	FY17
Compliance Calibrations	61	51	62
Tagged Out of Service	1	21	11

Machine-Produced Ionizing Radiation Safety Program

EHS maintains the registration with IDPH of all sources of machine-produced ionizing radiation at the University. In addition, EHS also performs radiation monitoring and machine compliance testing of each of these x-ray producing units to ensure operational safety and compliance with regulatory requirements. There are currently 312 registered x-ray units in the UIHC/UI's inventory. The current inventory of x-ray units by type is shown below:

Diagnostic or Therapy Units	108
Dental	171
X-ray Diffraction Units	11
Electron Microscopes	6
Bone Densitometer Units	6
Cabinet X-ray	7
Veterinary Units	3
TOTAL	**312**

Activities and Accomplishments for FY17:

- Conducted X-ray compliance inspection surveys of all medical and dental diagnostic X-ray units in service as well as 27 research related X-ray units and 6 bone densitometer units in the University's X-ray inventory. Details for the past three fiscal years are as follows:

X-Ray Unit Inspections	FY15	FY16	FY17
Dental	157	162	168
UI	18	21	27
UIHC	98	100	101
Iowa River Landing	6	8	7
Totals	**279**	**291**	**303**

- Identified 3 minor items of equipment non-compliance within the UIHC and 1 minor item with the units at the College of Dentistry. Radiology Engineering and Patterson X-ray promptly investigated and corrected all UIHC and College of Dentistry items of non-compliance respectively.
- Performed compliance testing for all clinical and research CT units at UIHC, incorporating Joint Commission requirements for this modality.
- Provided mammography physicist services to the UIHC and IRL to include Mammography Quality Standards Act (MQSA) equipment compliance checks for each of the five tomographic mammography units and the stereotactic breast biopsy add-on. Performed three limited inspections as required following maintenance activities, and assisted with troubleshooting activities on two of the units.
- The EHS mammography physicist performed quality control checks on all the physician review workstations in mammography, as well as on the Kodak Carestream monitors that are being integrated into PACS for use with mammographic images.
- The EHS mammography physicist participated in the IDPH-BRH's MQSA and Stereotactic Breast Biopsy inspections of the Department of Radiology's Breast Imaging Center and Iowa River Landing on November 14 -15, 2016. No violations or concerns were identified with the UIHC's or IRL's mammography and stereotactic breast biopsy programs.
- Provided health physics monitoring support for Radiation Oncology during Intrabeam™ Intraoperative Radiation Therapy (IORT or electronic brachytherapy) x-ray unit patient treatments.

Radiation Shielding Design and Construction Analysis

EHS provides radiation shielding evaluations for new construction planning and existing facilities to assist in assuring that all facilities designed for radiation producing machines and radioactive material use and storage meet applicable standards and regulations.

Activities and Accomplishments for FY17:

- Consulted and provided construction shielding plans for the Pappajohn Biological Discovery Building (PBDB), UIHC's Out Reach Clinics, and UIHC's departments of Radiology, Nuclear Medicine, Cardiology, Emergency Treatment Center, Children's Hospital, and Iowa River Landing (IRL). The evaluations covered a wide range of equipment, including CT, mobile c-arm, as well as stationary radiographic and fluoroscopic equipment.
- Consulted and provided construction shielding calculations and requirements for a number of potential locations for a shielded patient room capable of accommodating isolation for high dose I-131 patient therapies.

- Provided post construction shielding verification measurements for new x-ray rooms at UIHC's Department of Radiology, Nuclear Medicine, Pediatric Cath Lab, Emergency Treatment Center, Children's Hospital, IRL's Nuclear Cardiology, and PBDB.
- Scanned older shielding evaluations and created an electronic archive of shielding specifications and testing results.
- Continued the use of short-lived radioactive material, rather than portable x-ray machines for performing post-construction shielding verifications, increasing efficiency for this function.

Radioactive Materials Procurement and Shipping Program

This program oversees the receipt, distribution and documentation for all radioactive materials delivered to the University. The shipment of radioactive material is controlled and regulated by the IDPH-BRH, the DOT and the International Air Transportation Agency (IATA). These regulations specify that documented training is required for any persons involved in the shipping of radioactive material. As such, EHS provides shipping services for UI and UIHC to minimize the burden on users of radioactive materials. Shipping services involve: completing required documentation; obtaining copies of recipient's radioactive materials licenses; preparing and packaging radioactive materials for shipment; providing training to individuals when required; and maintaining records.

Activities and Accomplishments for FY17:

- Radioactive Materials Receipt and Delivery: a total of 319 items of radioactive material were processed and delivered to UI or UIHC facilities. Receipt totals from previous fiscal years are provided below for comparison.

# Receipts	FY15	FY16	FY17
UI	249	263	198
UIHC	133	111	121
Total	**382**	**374**	**319**

- Radioactive material inventories were maintained within the University's license limits.
- Radioactive Materials Shipments: 44 packages were shipped for UI (4) and UIHC (40) personnel. RAM shipment totals from previous fiscal years are provided below for comparison.
- There was an increase in shipments for UIHC due to covering the return shipping of Mo-99 generators while the Nuclear Pharmacist was on leave.

# Shipments	FY15	FY16	FY17
UI	7	0	4
UIHC	20	14	40
Total	**27**	**14**	**44**

Radiation Safety Education Program

The EHS Radiation Safety Section provides a wide variety of radiation safety courses tailored to specific types of use and exposure risks. Required radiation safety training is provided both initially and annually to individuals listed on an active radioactive materials use authorization in the basic sciences and to health care workers who receive an annual radiation dose equivalent greater than 100 mrem. Completion of initial radiation safety training is also required as a prerequisite to receiving a radiation dosimeter. Health care workers providing care to brachytherapy and/or radiopharmaceutical therapy patients at the UIHC are trained annually as required by regulation. Radiation safety training for ancillary personnel is provided annually, or on an as needed basis. In addition, the EHS Radiation Section also provides laser safety training courses for both the UI researchers and UIHC medical users.

Activities and Accomplishments for FY17:

- A total of 2,200 radiation safety courses were completed during FY17, representing an 18.4% increase over FY16 totals. A breakdown in course participation is listed as follows:

Radiation Safety Course	Total Participants
Analytical X-Ray Equipment	23
Electron Capture Detector	17
Laser Safety - Research	190
Laser Safety - UIHC	29
Nuclear Medicine Staff	17
P.E.T. Imaging Staff	8
Radioactive Materials Shipping	0
Radiation Oncology Staff	86
Radiation Awareness for Labs	326
Radiation Safety, Basic	165
Radiation Safety, Refresher	283
Radiation Safety CRU Staff	1
Radiation Safety CS Staff	3
Radiation Safety for FM Staff	219
Radiation Safety 3JPP Staff	162
Radiation Safety 3RCP Staff	223
Radioactive Waste Management	12
SAIC Radiation Safety	4
Sealed Sources Radiation Safety	16
UIHC Radiation Awareness	0
UIHC Radiation Safety, Security	9
X-Ray Safety for Fluoroscopy Staff	42
X-Ray Safety for Fluoroscopy	2
X-Ray Safety, General	55
X-Ray Safety, Limited	9
Y-90 Microspheres Radiation Safety	263
I-131 MIBG Therapy Radiation Safety	36
Radiation Safety Training Total	**2,200**

UIHC Therapy Patient Monitoring Program

EHS provides health physics support and radiation safety monitoring service for UIHC departments administering therapeutic amounts of radioactive materials to patients. Support services include post-administration radiation surveys; staff and family/visitor education and training; after hours on-call; facility decontamination; and radioactive waste collection.

Activities and Accomplishments for FY17:

- Therapy patient activities and historical comparison are provided below:

Therapy Procedure	FY14	FY15	FY16	FY17
I-125 Eye Plaque Brachytherapy	34	42	40	43
I-125 Prostate Brachytherapy	3	1	2	1
Ir-192 Brachytherapy	1	2	0	0
I-131 Radiopharmaceutical Therapy	40	52	41	44
Y-90 Radiopharmaceutical Spheres	15	5	17	52
Lu-177 Radiopharmaceutical Therapy	16	3	0	6
Intraoperative Radiation Therapy (IORT)	31	15	17	17
Y-90 Radiopharmaceutical Therapy (DOTATOC)	NA	3	16	13
TOTAL Therapy Procedures	140	123	133	176

- All therapies were delivered as prescribed. No reportable medical events occurred during FY17.

Laser Safety Program

EHS provides laser safety support to UI and UIHC laser users. The program includes training, consultation, unit registration, and safety audits. Currently there are 81 research lasers registered with 29 investigators at the UI and 36 medical lasers registered to 9 departments at UIHC and IRL.

Activities and Accomplishments for FY17:

- The Assistant Radiation Safety Officer serves as the University's & UIHC's Laser Safety Officer.
- The Assistant Radiation Safety Officer also serves as a member of the UIHC Laser Safety Panel.
- Approved the purchase of new medical use lasers for the UIHC's Departments of Ophthalmology, Surgery, and Dermatology in conjunction with the UIHC's Laser Safety Panel.
- Approved purchase of new research lasers in the departments of Biochemistry and Physics & Astronomy.

- Performed laser safety audits of 12 UI research groups utilizing 38 lasers and 9 UIHC departments utilizing 36 lasers. EHS met with two new research laser users to register equipment and provide guidance for establishing a safe laser use environment.
- Assisted the UIHC's departments of Dermatology and Ophthalmology in correcting area entry control system deficiencies in their laser use rooms.
- Provided equipment and area audits for new and trial use lasers.
- Continued work on implementing a laser competency program for UIHC physicians.
- Working cooperatively on this program with the VA Medical Center.
- Updated UIHC laser safety policies and supporting documentation to reflect physician competency requirements and other changes.

Radioactive Waste Management Program

The EHS manages the Radioactive Waste Management Program for the UI and UIHC. The program includes: (1) collection, transportation, processing, storage and disposal of radioactive waste materials; (2) the management of required program records; (3) facility and environmental monitoring of its operation; and (4) educational support services regarding hazardous materials waste handling.

Activities and Accomplishments for FY17:

EHS dedicated 0.7 FTE to the management of radioactive waste during FY16. This effort is broken down as follows:

UI	0.33 FTE
UIHC – Pathology	0.03 FTE
UIHC – Radiology	0.30 FTE
VAMC	0.04 FTE

A summary of the radioactive waste management program is provided below with data from the previous 2 fiscal years included for comparison.

Summary (UI & UIHC)	FY15	FY16	FY17
# Pick-Ups	195	205	184
# Items Radioactive Collected	768	849	776
# Pieces Lead Shield Collected	480	1,878	1,108
Activity Collected – Curies	0.349	0.666	0.463
# Containers Shipped Off-Site	35	47	
# Liquid Barrels Discharged	4	1	
Activity Discharged to Sewer	0.005	0.004	

# Shipping Containers	FY15	FY16	FY17
Animal Carcass	1	4	4
Dry Waste	28	38	24
Liquid Waste, Aqueous	4	5	4
Liquid Waste, Mixed	1	2	0
LSC Vials (Hazardous)	1	1	0
LSC Vials (Non-hazardous)	23	28	25
Other	2	1	0
Sharps	1	2	2
Total Containers	61	81	59
*Shipping containers may be 55-gallon drums, 30-gallon drums, pails, or yard boxes.			

Any reductions in numbers are attributable to several factors, including:

- Intensive in-house processing of various waste streams;
- A reduction in the use of long-lived radioactive materials;
- Users ordering less activity for the same experimental protocols due to vendor improvements in radionuclide purity and methodologies;
- EHS involvement with researchers during audits, training and renewals which encourages ordering only the amount of activity needed and correct identification of radioactive waste;
- A shift towards research using biochemical alternatives rather than radioactive materials.

EHS processes some radioactive waste via in-house methods to reduce disposal costs charged back to the University due to disposal at a low-level radioactive waste burial site. A summary of the number of containers processed by in-house methods and the number of drums eliminated from radioactive burial is shown below.

# Processed	FY15	FY16	FY17
Patient Linens Decay-In-Storage (containers)	0	13	3
Sharps Decay-In-Storage (containers)	0	35	68
Dry Waste Decay-In-Storage (drums)	0	16	35
Dry Waste Incineration (containers)	78	91	110
Total	**78**	**155**	**216**

# of Drums Eliminated from Radioactive Waste Burial	FY15	FY16	FY17
Dry Waste Decay In Storage	0	16	35
Sharps	0	2	4
Dry Waste Incineration	5.5	6	7.5
Total	**5.5**	**24**	**46.5**

Cost savings resulting from in-house processing and/or material segregation of radioactive materials are listed below:

Waste Processing Cost Savings	FY15	FY16	FY17
Dry Waste Decay In Storage	0	$26,200	$16,860
Sharps Decay in Storage	0	$12,000	$1,650

Radiation Safety Program Goals for FY18

- Respond to findings of the VPR's departmental review and University's Internal Audit to improve our services and workplace.
- Ensure that the University's broadscope radioactive materials license is renewed in a timely manner.
- Work with UIHC Radiation Oncology to license a new gamma knife.
- Continue work with the DOE's National Nuclear Security Administration (NNSA) Office of Radiological Security-Radiological Security Partnership (ORS RSP) to enhance the security of the University's Category I & II radioactive material.
- Continue the transfer of paper radiation safety records and files to an electronic, searchable format.
- Continue to work with the UIHC Hospital Advisory Committee towards the implementation of fluoroscopy user credentialing program.
- Continue to work toward implementing a physician laser competency program.
- Continue to work with the UIHC's Interventional Radiology staff to help reduce lens of eye dose.
- Continue to work with the UIHC's Departments of Anesthesia and Surgery to ensure proper dosimetry wear and radiation safety practices.
- Complete integration of laser safety audits into EHS Assistant.
- Develop means to credit physicians for completing radiation safety and laser safety training at either VAMC or UIHC so they don't have to duplicate this training at both locations.
- Provide radiation safety support to forthcoming research projects involving substantial radioactive materials in-patient time.

Administrative Services Section

The Administrative Services Section provides information management and administrative support for all EHS program areas.

General Administrative Activities

Scope: The purpose of the General Administrative Program is to provide budgetary, human resources, and administrative support to all EHS programs and staff. These activities are performed by the West Side HR Professional, Administrative Services Coordinator and Clerk IV, with oversight provided by the OVPR&ED Compliance Unit Business Manager.

Activities for FY17:

- Biosafety Cabinet Program Support
- Financial accounting & billing for services provided to campus
- Administrative Support
- Human Resources:
  - Participated in the recruitment and onboarding of one position.
  - Assisted other Research Compliance units with recruitment, onboarding and appointments for staff and student hires.
  - Served as Wellness Ambassador for EHS.
- Special Projects:
  - Event Planning
  - Building Maintenance coordination
- Lab News – Safety Matters coordination and distribution through Campaign Monitor
- Staff Training Records tracking – working on Compliance and Qualification implementation in FY18
- Website Maintenance and ICON Training administration

Training and Education Program

Type	FY17	FY16	FY15	FY14	FY13	FY12	FY11	FY10	FY0
ClarityNet		--	--	2445	3019	3609	3963	3141	497
Classroom		91							
VA	237	118	152	4	26	125	244	118	
ICON	30414	26333	16178	14951	12965	9988	9337	10519	971
Total	**30651**	**26542**	**16330**	**17400**	**16010**	**13722**	**13544**	**13778**	**146**

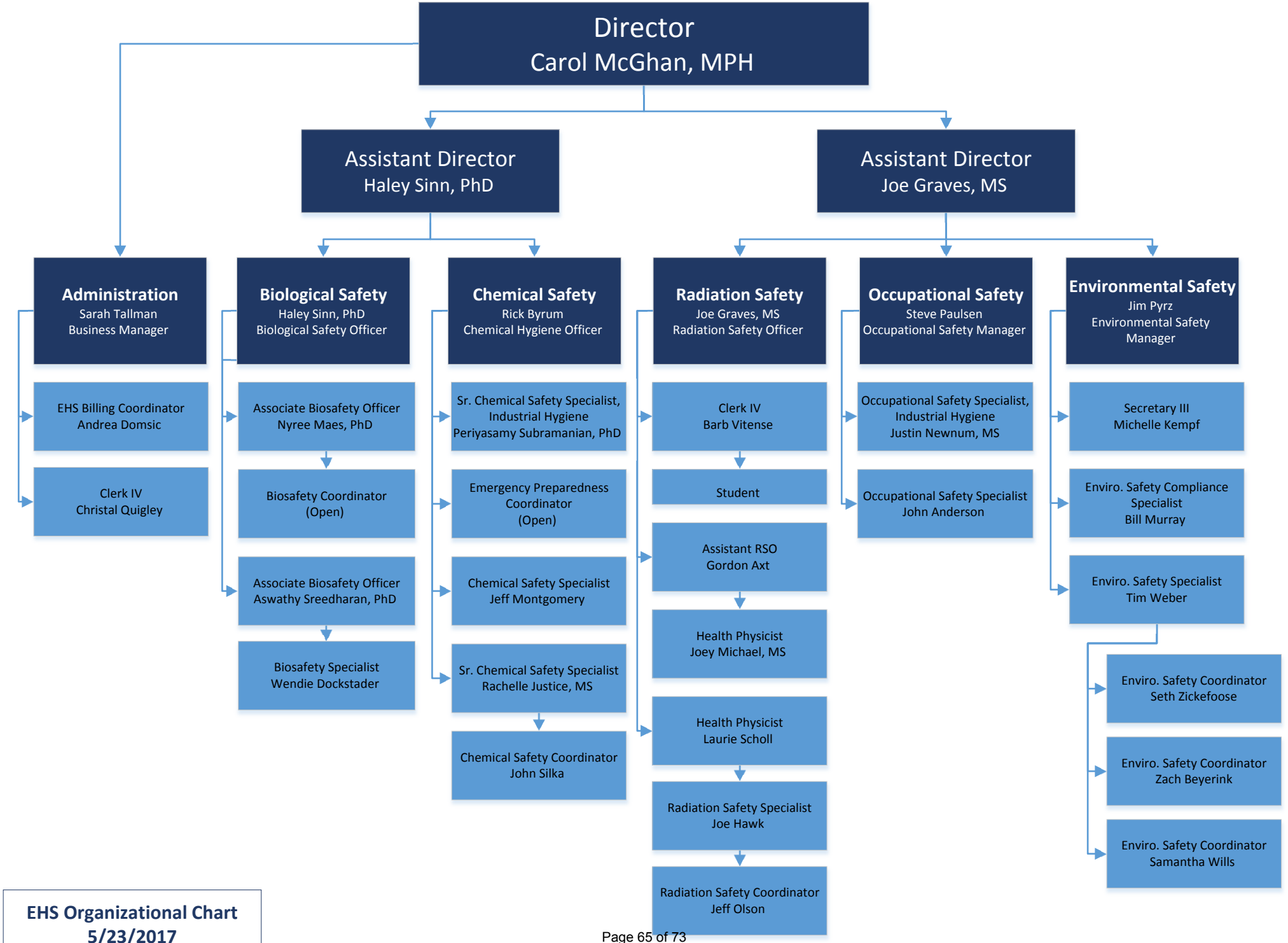
ICON Courses	Number	ICON Courses	Number
Advanced Biological Safety	580	Lockout/Tagout Safety	377
Aerial Lifts	117	Machine Guarding	256
Analytical X-ray Equipment	23	Nanomaterials Research Safety	33
Antineoplastic Agents Safety	39	Nuclear Medicine Staff	17
Asbestos Awareness	710	Office Safety	49
Basic Biological Safety	1078	P.E.T. Imaging Staff	8
BBP for FM, Housing & Dining	954	Pandemic Influenza Dust Mask	1
Biohazard Waste Management	1510	PPE Awareness for Labs	1430
Biological Safety Cabinets	58	PPE Awareness for Non-Labs	936
BBP Refresher	1179	Rad Safety 3JPP Staff	162
BBP, CPH	58	Rad Safety CRC Staff	1
BBP, Labs	792	Rad Safety for 3 RCP Staff	223
BBP, Non-labs	692	Rad Safety for FM Staff	219
Chemical Fume hoods	1406	Radiation Awareness for Labs	326
Chemical Storage Safety	162	Radiation Oncology Staff	86
Compressed Gas Safety	438	Radiation – CS Staff	3
Confined Space – Reclass/Alt	284	Radiation, Basic	165
Confined Space Administrator	6	Radiation Safety, Refresher	283
Confined Space Evaluators	8	Radioactive Waste Management	12
Confined Space Full Permit	5	rDNA Research, NIH Guidelines	463
Confined Space Prohibited	49	Respirable Crystalline Silica Safety	2
Contingency Plan Training	7	Respirator Dust Mask	68
Controlled Substances Research	34	Respirator PAPR Hood or Helmet	36
Dual Use Research of Concern	3	Respirator PAPR Tight Fit Face	90
Elect Panel Breaker Resetting	20	Respirator Tight Fit Face	130
Electrical Safety	334	Respirator Voluntary Use	504
Electron Capture Detector	17	Safety Leadership	96
Ergonomics – Back Safety	1233	SAIC Radiation Safety	4
Ergonomics – Computer Use	255	Sealed Sources Radiation Safety	16
Fall Protection	347	Shipping Infectious Substances	226
Fire Extinguishers	491	Shipping with Dry Ice	226
Forklifts	66	SPCC: Oil Spill Prevention	17
Formaldehyde Safety	601	Spill Preparedness Response	118
Hand Safety	128	Stem Cell Research	13
Hazardous Waste – Labs	1367	SWPP Plan (Storm Water Pollution Prevention Plan)	6
Hazardous Waste – Non-Labs	26	Tool Safety	170
HazCom with GHS	3280	Toxins, Select Agent Quantity	50
Hearing Conservation	217	UIHC Radiation Safety, Security	1
Incident Investigation	116	Universal Waste Management	450
Indoor Cranes	95	Walking and Working Surfaces	418
Lab Chemical Safety	1983	Welding and Cutting	132
Ladders	1003	X-Ray Safety - - General	55
Laser Safety – Research	190	X-Ray Safety for Fluoro Staff	42
Laser Safety – UIHC	29	X-Ray Safety, Fluoroscopy Practitioners	2
Lead Safety Awareness	239	Y-90 Microspheres Rad Safety	263
		Total	**30414**

Scope: The EHS training and education program addresses the University community's need for regulatory compliance and professional development in the areas of hazardous materials, emergency preparedness, health and safety and use of personal protective equipment, enabling staff to perform their respective jobs safely. See the tables below for statistical information. These data reflect staff usage of courses only and do not include students.

EHS Committee Activities

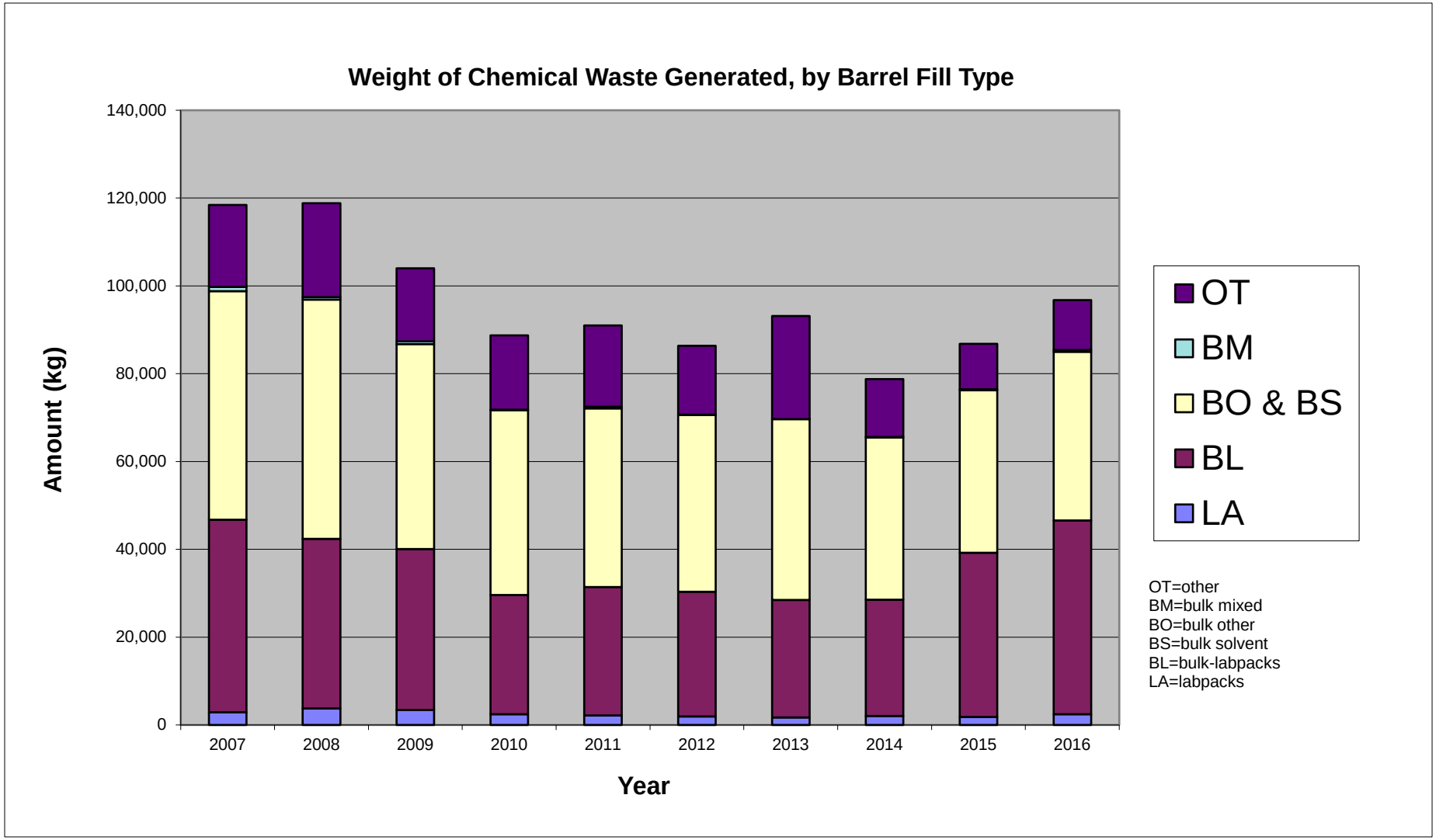
EHS staff members are involved in the following campus committees, subcommittees, and workgroups:

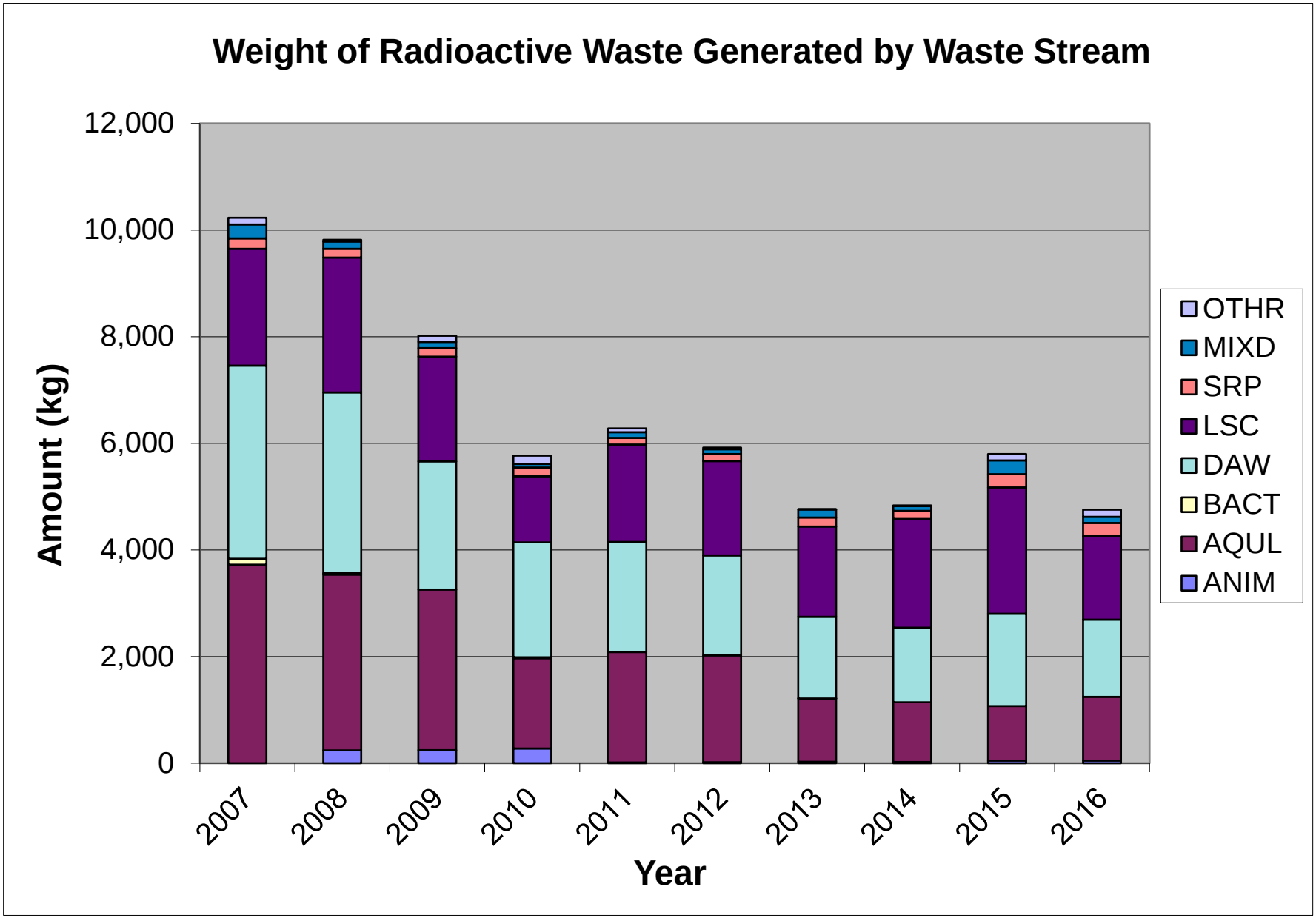
Institutional Animal Care and Use Committee
College of Dentistry Nitrous Oxide Oversight Committee
Emergency Preparedness Planning Committee
Employee Health and Safety Work Group
Facilities Design Center Committee
Fire Safety Advisory Group
Flood Emergency Response Team
FM Safety Steering Committee
Hospital Radiation Safety Review Group
Hot Work Committee
Institutional Biosafety Committee
Integrated Health Management Advisory Group
Job Safety Analysis Subcommittee
Medical Radiation Protection Committee
Minors on Campus Committee
Pharmaceutical Safety Committee
Radiation Protection Executive Committee
Radioactive Drug Research Committee
UI Medical Surveillance Workgroup
UI Pre-Disaster Mitigation Plan Steering Committee
UIHC Environment of Care Committee
UIHC Hazardous Materials Workgroup
UIHC Indoor Air Quality Workgroup
UIHC Laser Safety Panel
UIHC Safety Education Workgroup
UIHC Staff Safety & Health Council
Workplace Occupational Safety and Health Work Group



EHS Organizational Chart
5/23/2017

ATTACHMENTS


Weight of Chemical Waste Generated, by Barrel Fill Type
Amount (kg)
140,000
120,000
100,000
80,000
60,000
40,000
20,000
0
2007
2008
2009
2010
2011
2012
2013
2014
2015
2016
Year
OT
BM
BO & BS
BL
LA
OT=other
BM=bulk mixed
BO=bulk other
BS=bulk solvent
BL=bulk-labpacks
LA=labpacks


Weight of Radioactive Waste Generated by Waste Stream
Amount (kg)
12,000
10,000
8,000
6,000
4,000
2,000
0
2007
2008
2009
2010
2011
2012
2013
2014
2015
2016
Year
OTHR
MIXD
SRP
LSC
DAW
BACT
AQUL
ANIM

Radioactive Waste Generation Statistics

Waste Type		1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004
Animal		1	161	210	153	87	68	45	3	11	1	9	2	4	0
Ash		43	78	4	3	7	5	5	5	2	0	2	0	0	0
Bactec Vials															
Dry (Box) - Yard Box								115	105	131	90	123	129	2	15
Dry (Drum)-Long		1	78	66	49	38	30	18	11	12	7	9	7	3	3
Dry (Drum)-Short		90	148	153	139	122	105	97	88	87	61	63	48	45	42
Dry (Drum)-Total		2	226	219	188	160	135	115	99	99	68	72	55	48	45
Liquids-Aqueous		1	188	81[a]	48	53	45	36	42	34	29	37	28	26	32
Liquids-Mixed		9	17	14	18	20	17	12	15	10	9	10	8	5	6
Liquids-Total		2	205	95	66	73	62	48	57	44	38	47	36	31	41
LSC (Vials)		1	114	122	107	92	74	58	51	37	28	20	18	15	13
Sharps-Long		26	25	18	10	3	3	2	1	3	2	2	3	1	2
Sharps-Short		0	0	8	0	5	3	3	2	2	1	6	1	2	1
Sharps-Total		26	25	26	10	8	6	5	3	5	3	8	4	3	3
Sealed Source					1	0	2	3	3	2	1	1	2	1	1
Total		7	808	676	528	428	353	394	326	331	229	282	246	207	11
Waste Containers (excludes lead)								5,265	4,738	4,153	3,703	3,373	2,745	2,092	1,904
Lead shielding (pieces)					61	2,120	3,651	4,283	2,843	3,333	2,629	3,198	3,270	2356	2,818
Incoming Packages			4,238	3,776	3,932	3,693	3,329	3,417	3,424	3,284	3,008	2,308	2,137	1,843	1,442

Waste Type	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	
Animal	17	7	0	5	7	5	5	12	0	1	0	5	
Bactec Vials		2	1	0	1	0	1	0	0	0	1	0	
Dry (Box) - Yard Box	8	7	5	6	5	4	5	4	5	5	5	4	
Dry (Drum)-Long	5	3	5	5	4	3	3	3	2	1	1	2	
Dry (Drum)-Short	36	29	30	20	20	13	13	10	6	20	25	28	
Dry (Drum)-Total	41	32	35	25	24	16	16	13	8	21	26	30	
Liquids-Aqueous	25	21	18	17	16	11	8	6	5	5	4	5	
Liquids-Mixed	6	4	1	1	0	1	0	1	1	0	1	2	
Liquids-Total	31	25	19	18	16	12	8	7	6	5	5	7	
LSC Vials (Mixed)	13	14	13	8	8	3	9	0	0	1	1	2	
LSC Vials (Nonhaz)					19	15	19	19	18	21	33	19	
Sharps-Long	3	3	2	1	1	1	0	0	1	1	2	3	
Sharps-Short	1	0[b]	0	0	0	0	0	0	0	0	0	0	
Sharps-Total	4	3	2	1	1	1	0	0	1	1	2	3	
Sealed Source	2	1	1	0	1	0	0	0	0	0	1	0	
Total	116	91	76	63	82	57	63	55	38	55	74	68	
Waste Containers	2,092	1,904	1,812	1,468	1,366	1,255	1,129	925	865	776	822	805	
(excludes lead)													
Lead shielding (pieces)	3,532	2,386	2,097	2,444	2,192	2,061	2,532	1,773	984	901	1549	1,233	
Incoming Packages	1,207	1,254	1,147	1,001	817	766	385	501	264	390	366	362	

a = Converted from 30-gallon to 55-gallon drums in 1993.

b = short-lived sharps are now being held for decay, and subsequently shipped to Stericycle

University of Iowa Environmental Health & Safety Historical Waste Collection Statistics Summary

	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004
Chemical Waste												
Stops	2,992	2,728	2,831	2,786	2,819	3,026	3,277	3,454	3,511	3,633	3,464	3,73
Containers	13,556	12,556	15,931	18,853	21,054	21,198	22,077	25,519	25,275	29,211	22,108	26,04
Weight (kg)	62,531	75,810	70,768	77,162	66,444	86,113	103,61	121,134	119,960	127,095	118,038	119,88
Radiation Waste												
Stops	2,596	2,104	1,816	1,581	1,358	1,177	1,177	942	934	798	659	644
Containers (excludes lead)*		6,283	5,259	4,738	4,153	3,703	3,373	2,745	2,786	2,523	2,092	1,904
Lead shielding (pieces)		61	2,120	3,651	4,283	2,843	3,333	2,629	3,198	3,270	2,356	2,818
Total containers	8,578	6,344	7,379	8,389	8,436	6,546	6,706	5,374	5,984	5,793	4,448	4,722
Weight (kg) (excludes lead)	62,324	38,951	33,5773	28,787	26,526	22,102	21,648	20,802	19,811	17,163	17,560	15,830

	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Chemical Waste												
Stops	3,593	3,324	3,702	3,517	3,783	3,903	4,039	3,824	3,951	3,807	3,408	3,540
Containers	26,872	24,216	27,543	28,950	26,847	21,739	27,166	22,514	24,865	29,103	26,524	30,614
Weight (kg)	130,177	117,494	118,446	118,192	103,980	88,744	90,974	88,479	93,122	80,210	76,562	94,566
Radiation Waste												
Stops	556	451	412	365	336	292	249	238	189	205	196	205
Containers (excludes lead)*	1,812	1,468	1,366	1,225	1,129	925	865	776	664	731	822	805
Lead shielding (pieces)	3,532	2,386	2,097	2,444	2,192	2,061	2,532	1,773	984	901	1,549	1,233
Total containers	5,344	3,854	3,463	3,669	3,321	2,986	3,397	2,549	1,684	1,631	2,371	2,038
Weight (kg) (excludes lead)	14,194	11,502	10,178	9,886	8,017	5,766	6,174	5,918	4,764	4,836	5,581	4,755
Biohazardous Waste"												
Total Containers				28,846	27,873	27,671	26,417	26,001	26,142	25,171	25,205	27,439
Total Weight (lb)				1,018,432	930,921	842,858	783,722	804,263	780,305	744,022	745,885	771,030

*Collection and accounting method changed in 1995. Lead shields are accounted for separately.
"EHS assumed responsibility for the biohazardous waste program in mid-year 2007

	FY09	FY10	FY11	FY12	FY13	FY14	FY15	FY16	FY17
Biological Safety Program Summary									
Biosafety Cabinet (BSC) Certifications			442	506	561	594	598	467	***
Horizontal Flow Cabinets Tested			20	22	17	21	19	16	***
BSC Decontaminations			55	62	50	47	97	49	***
BSL3 Room Decontaminations			2	1	0	0	0	0	0
Bio exposure/needle stick injury evaluations	8	22	27	12	11	4	10	4	5
New rDNA/IBC Non-exempt Protocols	206	179	158	170	177	164	170	114	105
rDNA/IBC Non-exempt Protocols Reviewed	236	199	241	297	304	351	na	na	na
rDNA Annual protocols reviewed (years 1&2)	323	321	311	292	279	295	272	353	251
rDNA/IBC Exempt Protocols Reviewed	196	150	109	86	77	27	na	na	na
Reports to NIH/CDC – potential exposures	2	2	3	3	19	5	1	0	0
USDA permit application inspections			2	2	2	1	0	0	0
BSL3 Protocols reviewed	15	14	12	14	16	16	11	8	8
hPluripotent Stem Cell protocols			1	2	1	1	4	2	2
Occupational Safety & Health Summary									
Departmental OS Reviews Conducted	45	45	72	89	63	60	87	99	102
Departmental Reviews – Student Use of Machines (Machine Shops) **				17	7	7	10	10	10
Departmental Reviews – Required Respirator Programs			13	13	13	13	14	13	14
Departmental Reviews – Confined Space	3		7	0	10	18	18	0	25
Incident Reports Reviewed	1821	1534	1426	1499	1,571	1,576	1545	1523	1581
Formal Incident Investigations	5	11	134	82	85	58	66	96	334
Indoor Environmental Quality (IEQ)	25	17	17	25	21	13	7	5	15
IEQ samples collected		20	20	42	84	58	17	142	295

	FY09	FY10	FY11	FY12	FY13	FY14	FY15	FY16	FY17
Fit tests completed		52	41	47	51	47	48	35	28
Quantitative		38	33	32	34	34	37	32	26
Qualitative		14	8	15	17	13	11	3	2
Asbestos Programs reviewed		3	6	6	6	7	7	5	5
IH evaluations performed		18	56	61	67	31	3	24	69
Samples collected/interpreted		61	61	79	214	189	22	165	364
Noise Monitoring Exposure/level	14	20	53	66	17	5	34	34	98
Chemical Safety Program Summary									
Hazard Assessments Conducted	29	29	40	46	52	100	101	126	105
Personal and Area Chemical Monitoring (samples/measurements taken)	21	16	22	7	21	9	7	12	8
Chemical Inventory System (# of PIs/users)			590/1030	530/1400	554/1363	547/1331	549/1607	568/1605	555/1423
No. of inventory items			83,000	103,00	111,700	165,958	163,782	112,726	115,612
Fume Hood Evaluations	764	664	892	863	876	870	881	905	904
# of hoods referred to FM	65	45	163	126	138	72	189	214	161
Bio/Chemical Lab Reviews Conducted	384	364	379	358	394	390	363	366	375
Spill Response Consultations		11	18	11	18	14	17	12	12
# PIs sponsored by USAMRMC/DOD	17	17	17	18	15	16	11	14	18
Respirator Program lab use reviews			100	75/140	32/164	21/175	13/194	32/187	35/187
***New program - 2011; ** new program - 2012**									
*** All work in this program is now managed entirely under a contract; EHS does not have real-time data.									