Environmental Health & Safety

Annual Report: FY 2018-2019

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Environmental Health & Safety Office

Mission Statement

The mission of the Environmental Health & Safety Office (EHS) 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, and compliance with federal, state, and local regulations and laws governing the activities of the institution.

Responsibility Statement

The Environmental Health & Safety Office 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 of Iowa (UI) 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.

Executive Summary

In addition to routine business activities, EHS focused on the following areas during this last fiscal year:

- **Laboratory Safety Committee:** Following the recommendation from the EHS Internal Review, the Laboratory Safety Committee, comprised of faculty and senior research and administrative staff, was established and held its first meeting in September 2018. The committee oversees physical and chemical hazards in the research labs and will interpret safety and compliance regulations, determine safety policies, and provide for enforcement of the campus policies.
- **Safety Compliance Policies:** In order to lessen the compliance burden placed on EHS staff, compliance policies were implemented at the level of the safety committees. EHS staff will be responsible for identifying practices inconsistent with regulatory/campus policies and assisting with corrective actions. Issues that remain from laboratory and occupational safety audits will be escalated to the appropriate committee in order to address accountability. The Laboratory Safety Committee has instituted a compliance policy for chemical and physical hazards in the labs; the Campus Safety Committee has instituted a compliance policy for safety issues in University workspace, excluding laboratories. A similar policy has been submitted to the Chair of the Institutional Biosafety Committee to address biological hazards in the laboratory.
- **Implementing the new EHS Assist Database:** Chemical and radiation safety staff were involved in beta-testing an upgrade to the database that manages all chemical, radioactive and laboratory review information. Many hours were spent testing the software and assisting the company address functionality issues. The 21-month project came to a close in the spring with the University-wide release of the new web-based EHS Assist.

Biological Safety Section

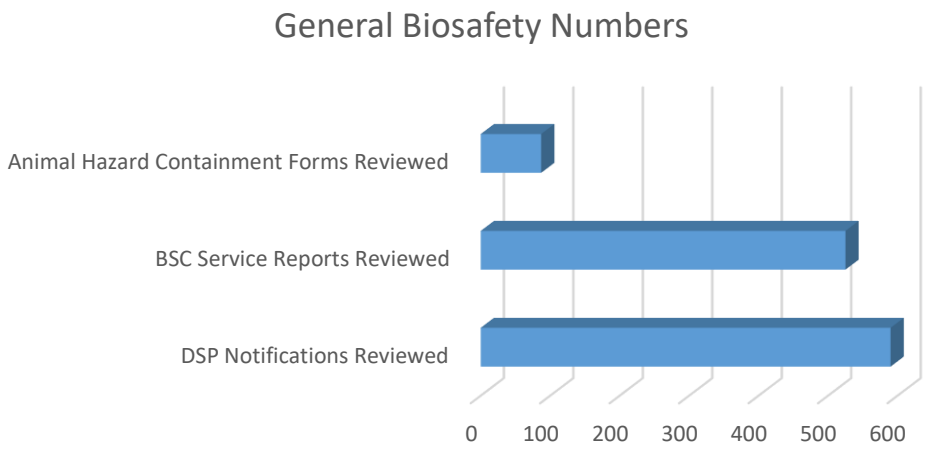
The Biological Safety Section is responsible for the administration of programs in the research and non-research community that involves the management of biological or infectious agents and biohazardous materials used at the University of Iowa. Administration is accomplished by developing, recommending, administering and implementing policies and procedures that promote the safe use of the types of materials covered by each program, outlined below, as well as exercising surveillance and enforcing standards for health and safety within their jurisdiction.

Biological Safety Program

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 University faculty and staff, reviewing procedures and practices where Risk Group 2 or 3 organisms are manipulated, providing biosafety signs, prescribing safe handling techniques, and conducting site visits for containment and/or regulatory assessments.

In order to ensure adequate oversight of incoming biological material/infectious agents, biosafety staff review notifications from the Division of Sponsored Programs (DSP) to ensure appropriate registration of material, if applicable, and that research staff are aware of any special hazards/handling procedures. As in the past, biosafety staff continue to coordinate review of the hazard containment form with the Institutional Animal Care and Use Committee (IACUC) when biological material is used in animals. Additionally, biosafety staff review biosafety cabinet (BSC) service reports to confirm actively used cabinets are maintained and certified, as necessary. The number of DSP notifications, hazard containment forms, and BSC service reports reviewed are included in the graph below.

The Biosafety section hired a new Associate Biosafety Officer this past fiscal year and was involved in training and reorganizing job duties in the section.



Bloodborne Pathogens Program

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 human material including blood, 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.

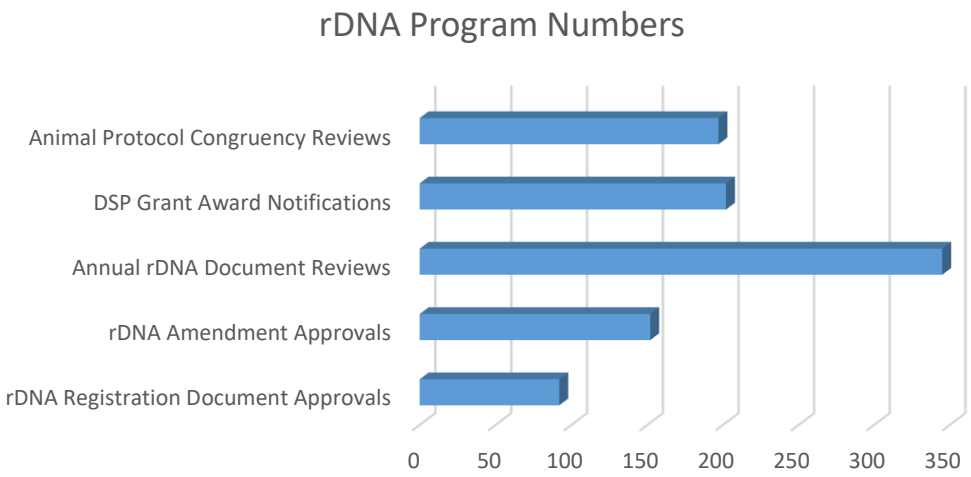
Biosafety staff works with each departmental/laboratory-specific Exposure Control Officer to create and maintain a compliant program in their area. The program covers Human Resources designation of staff as “At Risk” or “Not at Risk”, annual training, annual review of the Exposure Control Plan, and offering the hepatitis B vaccination. There are approximately 64 active programs over the course of a year.

DOT Transportation Compliance Program

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 receive training to ensure they have knowledge of and are thus able to comply with shipping regulations. Since these shipments often include dry ice, a hazardous material, information on shipping with dry ice is also required. Biosafety staff maintain several guidance documents and two training courses for individuals shipping such material.

Recombinant DNA Program

The Institutional Biosafety Committee (IBC) oversees compliance with the National Institutes of Health’s *NIH Guidelines for Research Involving Recombinant or Synthetic Nucleic Acid Molecules (NIH Guidelines)*. EHS's biosafety staff administer the Recombinant DNA (rDNA) Registration Document and coordinate the committee's review and approval process. Additionally, the Biosafety Officer serves as a voting member on the committee. Biosafety staff also ensure registration of applicable rDNA research through annual review of all approved rDNA Registration Documents and review of submitted Animal Protocols and Division of Sponsored Programs (DSP) grant award notifications, see graph below.



Select Agent Program

This program provides 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 with the Federal Select Agent Program (FSAP), security risk assessments, suitability review, safety plans, security plans, emergency plans, training, transfers, record keeping, inspections and notifications to FSAP. The UI has designated the Biological Safety Officer, as the Responsible Official (RO) and the Associate Biological Safety Officer and EHS Director as the alternate ROs. These individuals oversee the University's registration with the federal agencies and ensure compliance through frequent laboratory inspections, document review and revision and continual communication with federal agencies.

Principal Investigators are exempt from registering with FSAP if they possess toxins in quantities that are below the amount listed in the regulation (exempt quantities). Biosafety staff ensure compliance with the exemptions through annual review of toxin use on campus as well as visual confirmation of exempt toxin inventories. All new Principal Investigators are made aware of the exemptions and consequences if exempt quantities are not maintained, through use of the exempt toxin declaration.

This fiscal year the RO and AROs participated in two FSAP inspections. Both inspections included review by CDC and USDA/APHIS inspectors.

Chemical Safety Section

The Chemical Safety Section is responsible for the administration of programs in the research and non-research community that involves the management of chemicals or chemically hazardous materials used at the University of Iowa. Hazard assessments are conducted to evaluate safe material handling practices and provide guidance on minimizing or eliminating exposures to hazardous chemicals. Administration 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,

outlined below, as well as exercising surveillance and enforcing standards for health and safety within their jurisdiction.

Laboratory Chemical Safety and Chemical Hygiene Program

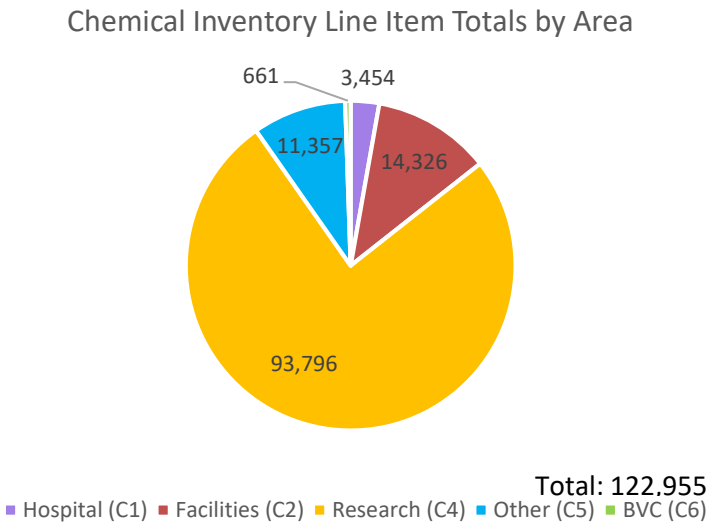
This program oversees all laboratory chemical use under normal working conditions and emergency preparedness. Significant changes were made to the Chemical Hygiene Plan (CHP) in areas of proper clothing in labs, food and drink in labs and lab coat laundering. The hazard assessment tool (HAT) and eyewash/shower testing requirements also underwent comprehensive review and updating. Additional, language, clearly defining location requirements for emergency showers and safety eyewashes was added and updated requirements were incorporated into the annual laboratory reviews.

Promoting the safe use of chemicals is accomplished through developing, recommending, administering and implementing policies and procedures. As in the past, Chemical Safety staff continue to coordinate review of the hazard containment form with the Institutional Animal Care and Use Committee when chemical hazards are used in animals. Work has begun to make available standard operating procedures (SOPs) for the use of hazardous chemicals; SOPs will be developed for both chemical hazard type and specific chemicals that present unique hazards and/or handling requirements.

Chemical Inventory System

EHS Assist is used to manage the university-wide chemical inventory with the goal of having an accurate, online inventory for all chemical-use areas. The inventory is made available to emergency responders. Chemical use by area is provided in the chart below. The inventory system has 634 accounts with 3,071 locations tracked and 1,264 users.

In spring 2019, Chemical Safety staff launched the EHS Assist database upgrade. EHS staff conducted training across campus to prepare users for the transition into the new chemical inventory system.



Safety Data Sheet (SDS) Program

This program facilitates the collection, storage, and upkeep of all required SDSs for the entirety of the University of Iowa, as required by OSHA's hazard communication. In a collaboration between the Office of the Vice President for Research and the Carver College of Medicine, the MSDSOnline SDS management program was purchased and continues to be populated. This online program utilizes an eBinder to maintain electronic copies of SDSs for chemicals/hazardous materials used, stored, or purchased by the University. EHS staff maintain and populate the eBinder by tracking chemicals through the chemical inventory in EHS Assist. In addition, several students have been hired to assist with SDSs entry and updating chemical inventories in the research, facilities, and hospital areas.

To date, EHS personnel have added 54,324 unique SDSs into the eBinder. In FY19, 22,900 were uploaded with an additional 1,122 SDSs obtained by EHS personnel and sent to MSDSOnline for inclusion in the eBinder. SDS entry has been completed for 65% of the research laboratories and 71% of non-laboratory areas. UIHC has also joined the University's eBinder this past fiscal year and steady progress has been made on their chemical inventory. Project completion is estimated at the end of the next fiscal year.

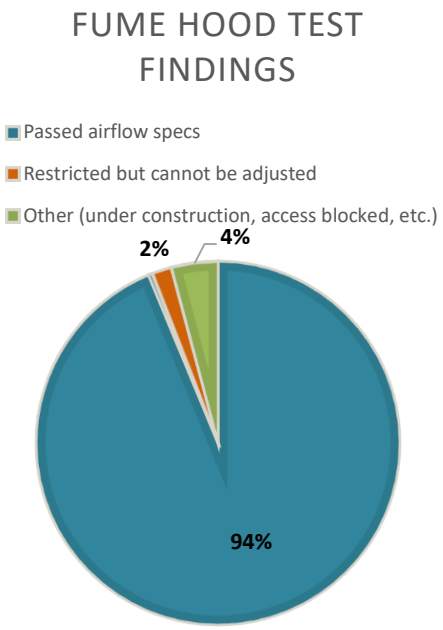
Personal Protective Clothing and Equipment (PPE) Program for Laboratories

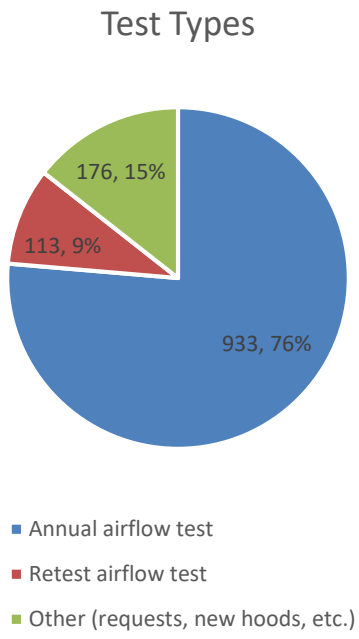
OSHA standard 1901.132(a) states, "Protective equipment, including personal protective equipment for eyes, face, head, and extremities, protective clothing, respiratory devices, and protective shields and barriers, shall be provided, used, and maintained in a sanitary and reliable condition wherever it is necessary." EHS safety advisors and chemical safety staff provide support for the PPE program in research labs. Safety advisors review PPE hazard assessments and training documents during each annual laboratory review. Chemical safety staff provide consultations, coaching,

and education for individual laboratories on all manner of PPE assessments and use. Staff also routinely review and recommend PPE as part of hazard evaluations, spill consultations, and post-incident follow-ups. The Lab Safety Committee approved a new policy on appropriate laboratory attire.

Ventilation and Fume Hood Program

The ventilation and fume hood program focuses on the fume hood as the major engineering control for chemical use 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 (FM). Consultation support is provided to research and FM for laboratory ventilation issues pertaining to new installations and building/HVAC renovations. A total of 1,222 fume hood tests were completed in FY19; the types of tests and results are provided in the charts below.





Materials Management - Regulatory Reporting

Chemical safety staff are responsible for creating and distributing several annual reports on hazardous material located throughout the institution; reporting responsibilities are not limited to research laboratories. The various reports are detailed below.

Emergency Response Right-To-Know (ER-RTK)

The ER-RTK report provides maps for emergency responders outlining hazardous material locations for chemicals belonging to the University. Locations surveyed includes property owned or leased by the University of Iowa. Details on the FY2019 report are included in the table, below.

Updated in AutoCAD	Number of Buildings	Number of Floor Plans	Number of New Maps*
East Campus	75	359	166
Hawkeye Campus	35	49	14
Off Campus Coralville	13	15	5
Off Campus Iowa City	18	21	10
Off Campus Lake MacBride	9	10	2
Off Campus Muscatine	1	1	1
Off Campus North Liberty	4		0
University Research Park	35	65	25
West Campus	87	468	334
Residence	34	67	4
Totals for ER-RTK	**311**	**1,055**	**561**

*New maps could be newly acquired buildings, remodeled floors, etc.

Tier II

The Tier II report outlines large quantities of stored chemicals or extremely hazardous substances throughout campus. Currently 31 chemical inventory users (active participants) meet annual review criteria, of which, 30 had chemicals of reportable quantities. Forty-five Tier II reports were filed with Department of Natural Resources.

DHS Chemical Facility Anti-Terrorism Standards (CFATS)

The Department of Homeland Security (DHS) regulates the use, storage, and shipment of 325 chemicals of interest (COIs). EHS tracks any change in amounts of COIs throughout the University by utilizing the EHS Assist chemical inventory system combined with a listserv of chemical users/owners. No material was determined to exceed a threshold reportable quantity in FY19.

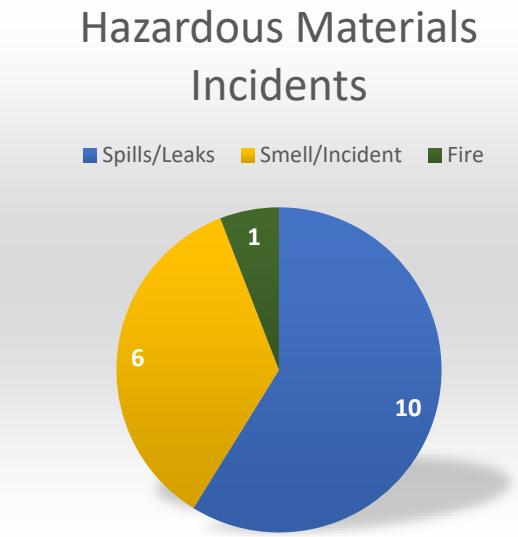
Emergency Preparedness

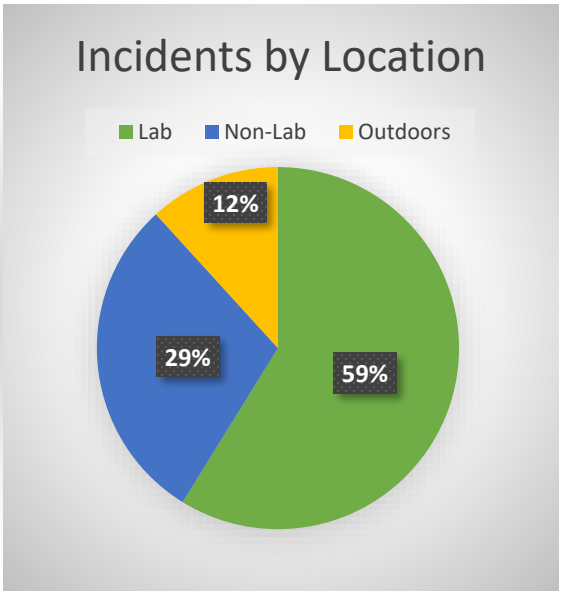
Building Emergency Teams (BETs) were dissolved in FY19 to be replaced by the Emergency Action Plan (EAP) which will be implemented by the Office of Emergency Management (OEM) under the Department of Public Safety. Members of the former BETs may become incorporated into the EAP, once established. The Emergency Management Advisory Group, of which the Chemical Hygiene Officer is a member, is currently tasked with the creation and implementation of the EAP.

Spill Resource Group (SRG)

The University Spill Resource Program was instituted in 1993 as a resource unit to provide coherent support services within the University's Emergency Preparedness Program. The four members of the SRG provide consultation and advice on safe and appropriate response actions when spills are reported to EHS. EHS staff also work with other departments when spills could impact employee/student health and or the environment. SRG members complete an eight-

hour HAZWOPER refresher training annually. The type and location of spills are included in the charts below.





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.

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 ofPublic Health-Bureau of Radiological Health (IDPH-BRH), Iowa Department of Natural Resources (DNR), and 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.

EHS oversees contractor collection and disposal of biohazardous 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 FY19:

- Hazardous chemical waste: a total of 32,936 containers were collected from 642 waste generators during 3,445 visits. Waste amounts varied in size from a few milligrams to 55 gallons.
- Radioactive waste: a total of 500 containers were collected from 49 waste generator sites during 152 visits. Waste consisted of liquids, solids, and patient therapy waste.
- Biohazardous waste: a total of 23,836 containers were collected (excludes waste generated at UIHC); 21,741 collected by contractor; 2,095 collected by EHS.
- Unknown analysis: 93 unknowns from 25 locations were analyzed and identified.
- Cleanouts: completed 94 laboratory cleanouts generating 13,425 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 Environmental Safety 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 FY19:

Hazardous Chemical Waste

- Processing:
  - Bulking – 22,380 items were commingled together into 608 drums last fiscal year.
  - Recycling program - recycled 1,296 lbs. of mercury and mercury containing devices; 7,211 lbs of used oil; 821 lead-acid batteries weighing 13,515 lbs.; 2,274 other hazardous batteries weighing 1,137 lbs.; and 1,241 pieces of lead shielding weighing 2,683 lbs. Additionally 2,882 lbs. of hazardous waste were processed to recover and reuse solvents, and 49,887 lbs. of hazardous waste processed for energy recovery.
  - DEA Controlled Substance destruction – 77 containers of controlled substances were disposed of through a DEA-approved method and required reporting.
- 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:

	FY17		FY18		FY19	
Process	**Weight (kg)**	**Items**	**Weight (kg)**	**Items**	**Weight (kg)**	**Items**
Neutralization	901	878	943	915	1,052	751
Non-hazardous	95	37	170	74	151	84
Non-hazardous-	1,341	1,367	1,371	1,660	1,259	1,268
Sewered	3,671	3,346	4,166	3,216	4,358	2,462

- Contractor Shipments and Disposal:
  - Seven shipments of hazardous chemical waste were completed and sent to off-site EPA permitted facilities.
  - Six shipments of bulk drums/labpacks totaling 726 drums.
  - One shipment of used oil totaling 20 drums.
- See attachments section for statistical and graphical information.

Radioactive Waste

- Saved approximately $12,440 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, 130 containers commingled in 4 drums along with 41 individual smaller containers were discharged for a total of 269 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.

- Lead shielding is surveyed for contamination and recycled through the hazardous waste program if no contamination is present. Last year, 1,074 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 of inappropriate items prior to disposal in the Iowa City Landfill. Last year 27 drums of short- lived waste were processed.
- Completed three radioactive waste shipments of 23 shipping containers, including:
  - 1 – Animals containers;
  - 13 – non-hazardous scintillation cocktail vials;
  - 17 –source vials;
  - 30 – sealed sources;
  - 6 – dry waste in yard-boxes, and
  - 1 – sharps in yard boxes.
- See attachments for statistical and graphical information.

Biohazardous Waste

- Disposed of 23,836 containers of waste (excludes waste generated at UIHC); 21,741 collected by contractor; 2,095 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 FY19:

- 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 – 1,241pieces.
- 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 FY19:

- 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-resource conservation and recovery act (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 requires 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 Environmental Safety Manager submitted the "Annual Report to EPA on the Status of Waste Reduction Techniques" and a signed Certification that a program is in place.

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, and 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 that have been identified during waste collection.

Activities and Accomplishments for FY19:
- The Environmental Protection Agency conducted its most recent compliance inspection on the Oakdale Campus on August 7-8, 2018. No violations were found.
- Implemented additional procedural changes to meet compliance with EPAs electronic manifesting system.
- 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 452 audits of laboratories that generate hazardous waste.

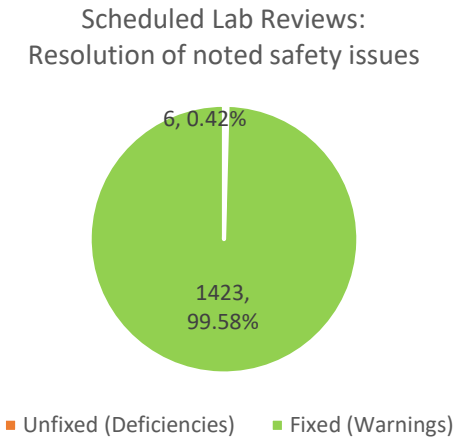
- Completed 220 audits of non-laboratory areas that generate hazardous waste.
- Completed 258 audits of areas where Universal Waste is accumulated.

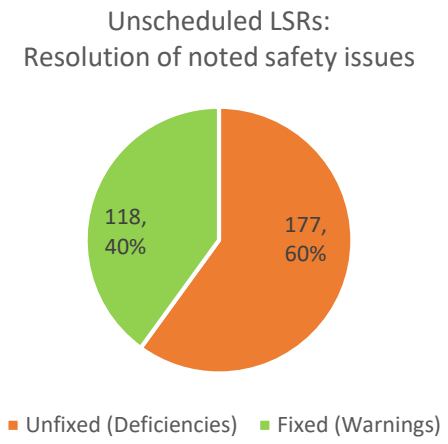
- SDS solicitations: over 2,000 SDS were solicited from manufacturers; currently, over 29,000 separate SDS are maintained by EHS.

Laboratory Review Program

This program was developed to support the University'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, radiation safety, and waste management. Each principal investigator's (PI's) research area is reviewed annually 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.

Eight EHS staff from various program sections comprise the Safety Advisor Team. Members of the team are cross trained in safety and regulatory requirements for biological, chemical, occupational, radiation and environmental safety. The research laboratories are divided among advisors who are responsible for annual, scheduled reviews of the laboratories and unscheduled lab safety rounds (LSR). The Safety Advisor Team performed a total of 358 laboratory and 296 LSRs for FY19. Since the LSRs are not set to a required time frame, some LSRs may be completed during the next FY and therefore the count differs from laboratory reviews. The number of safety/regulatory concerns, as well as the percentage of those that were resolved, are identified in the charts below.





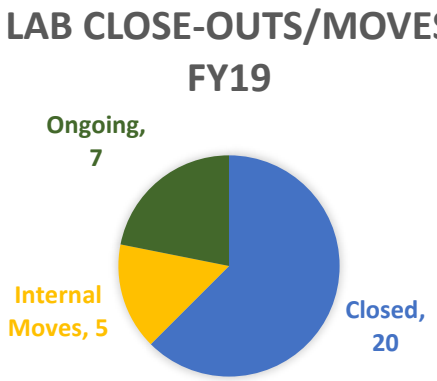
Of 358 laboratories reviewed, only three labs did not resolve all deficiencies noted during the scheduled lab reviews. A new process will be implemented to address outstanding deficiencies identified during the LSR.

Notable projects during FY19:

- Four new safety advisors were added to the team and began training. One advisor completed training during FY19.
- Staff completed beta testing and transitioned to the new audit module of the EHS Assist database system.
- Seminars were held across campus to inform laboratory personnel of changes to the audit for calendar year 2019 and train new staff on general laboratory safety practices.
- SAT and Occupational Safety staff reviewed and edited their respective audits to standardize their inspection processes.

Laboratory Close-Out Program

The purpose of the Laboratory Close-Out Program is to allow EHS to track the closing and moving of laboratory spaces. This in turn ensures proper handling, disposal, transfer, or moving of hazardous materials and equipment during the closure process. It also enables EHS to track changes in personnel, chemical inventories and lab space assignments. This program was reimaged in July 2018. Close-outs are now submitted through an online request form in workflow which is sent to the Chemical Hygiene Officer for review. The form is distributed among other EHS personnel, as appropriate, and EHS staff meet with lab and administration personnel to discuss the move. The complete close-out of a lab can take six or more months before being finalized. The number and status of lab close-out are included in the chart below.



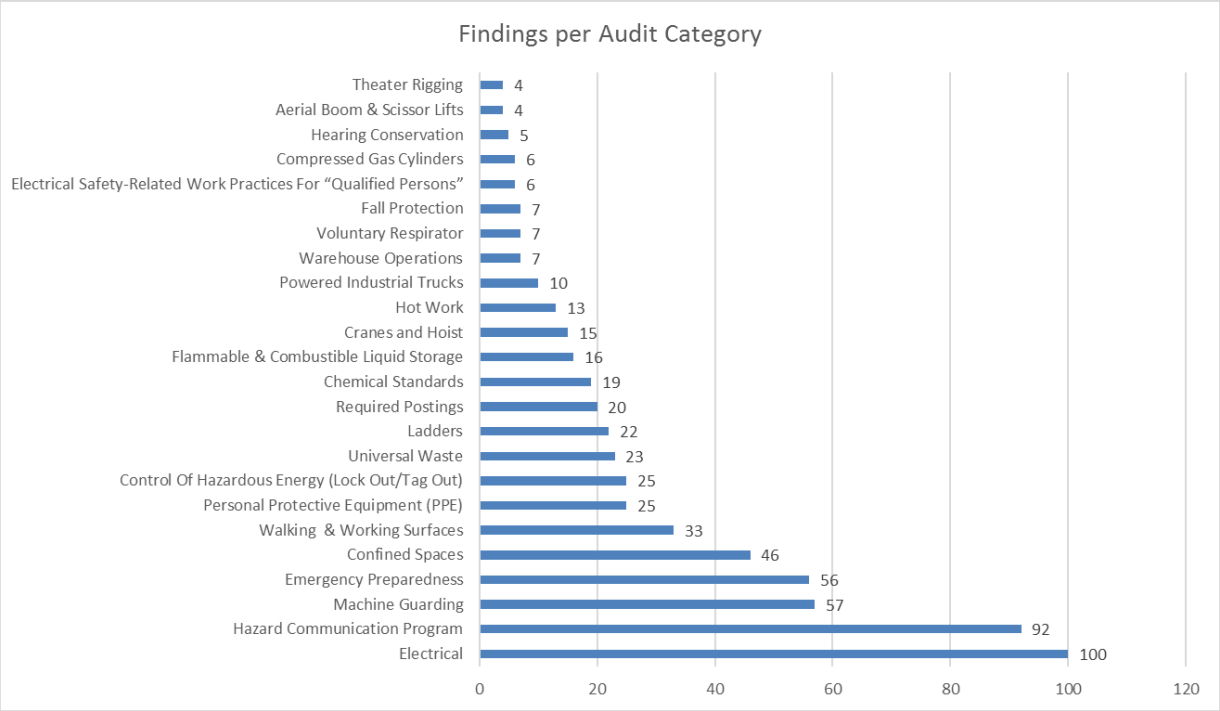
Occupational Safety Section

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

The Occupational Safety Section provides services to a broad range of departments and staff on campus. The 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.

Safety Reviews

Occupational safety staff 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. There was a total of 111 reviews completed this fiscal year. The review is divided into 35 categories, the graph below shows the number of findings in the top 24 categories.



Injury and Illness Analysis

Occupational safety staff, with assistance from other EHS subject matter experts, investigates injuries and illnesses that occur at the University in order to ensure proper follow-up, identify root causes and implement effective corrective actions. The goal is to:

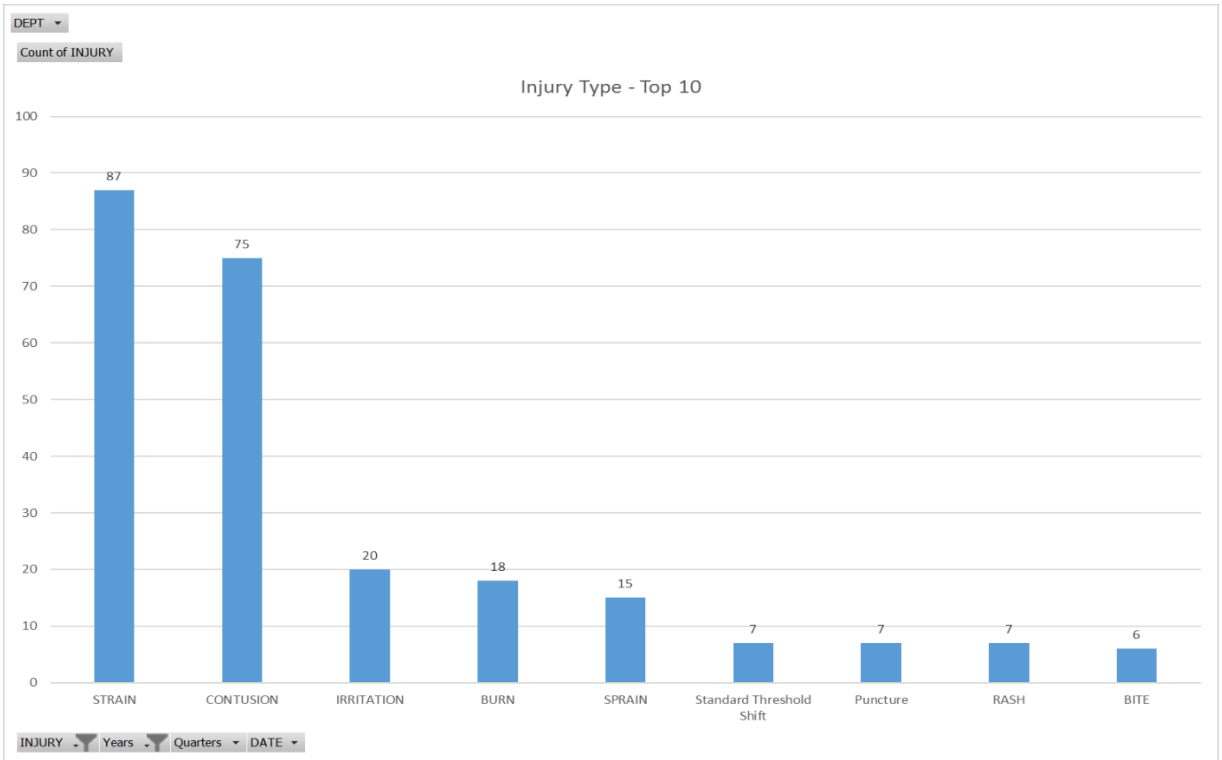
- Reduce the number of injuries and illnesses that occur;
- Reduce the likelihood that a similar incident will happen in the future; and
- Limit the severity of these incidents.

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 in a number

of ways including the cause of injury, outcome, and the department in which they have occurred. During a department's annual safety review, the injury records and trends are discussed. A positive trend shows that the department has good results regarding the implementation of their safety program. If there is a negative injury trend, we discuss how they can put effective measures in place in order to keep their employees safe and injury free while on the job.

Incident investigation reviews. Occupational safety staff meets with safety representatives from Facility Management, Housing & Dining, and UI Ergonomics on a monthly basis to review the FROIs and incident investigations for the prior month. The ultimate goal of the investigation process is to identify corrective actions and help lower the incident rate over time.

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



Occupational Safety staff 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 over time and severity as well as a measure of the effectiveness of the current safety programs.

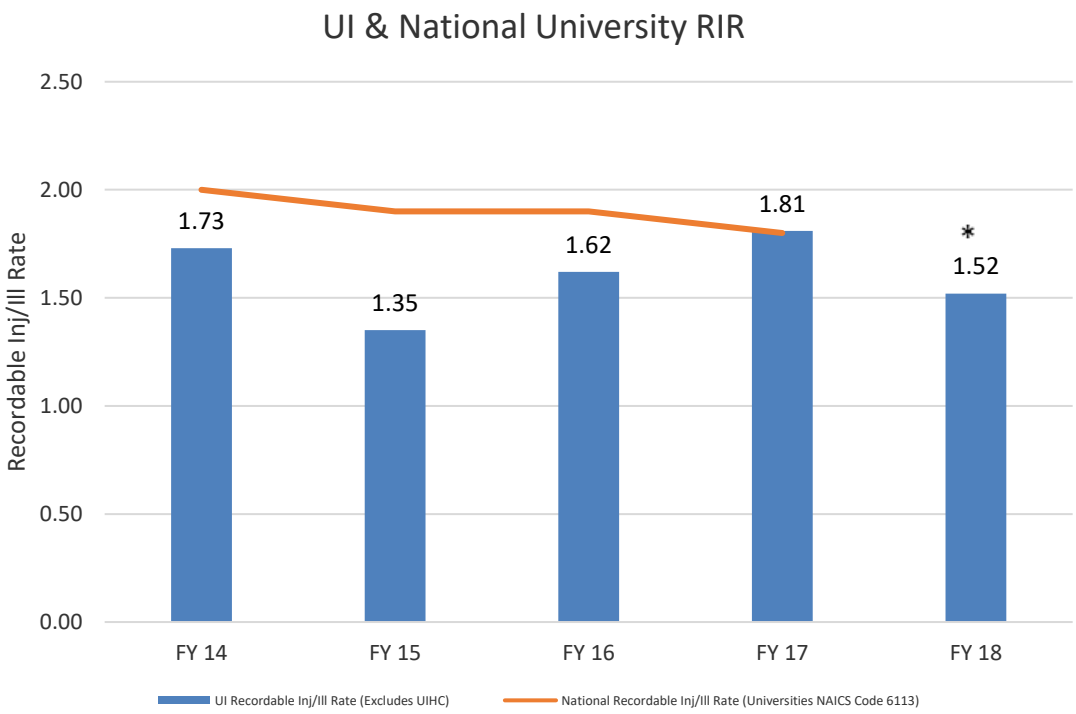
The Recordable Incident Rate (RIR) represents the total recordable cases for a given year per 100 full-time employees (FTE). The incident rate is a metric to standardize the year's safety performance against the national average. The equation is as follows:

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

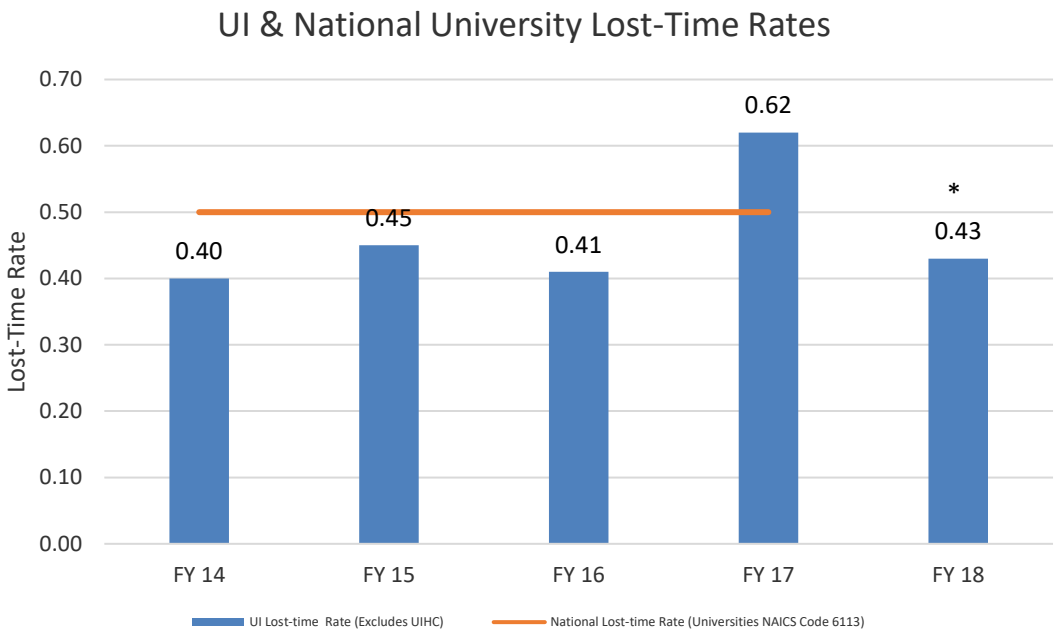
Lost Time Cases (LTC) represents the number of OSHA recordable injuries that resulted in lost time. The LTC rate is the number of cases in a given year per 100 full-time employees. The rate is calculated using the OSHA Incident Rate calculation outlined above; however, the total number of injuries are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

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

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



**National Data was not available for FY18 at the time of this report.*



**National Data was not available for FY18 at the time of this report*

In comparing the 5-year Recordable Injury/Illness and Lost-Time Rates for UI to the average rates for universities nationwide (NAICS Code 6113), UI's rate is below the national average. While we are encouraged that this trend indicates an effective program, we are constantly striving to improve and see these rates go down over time.

Industrial Hygiene

The Industrial Hygiene Program took over responsibility for industrial hygiene tasks in research labs in October of 2018. Prior to this, the work was conducted by the Chemical Safety Section.

Chemical Sampling, Respirators, and Engineering Controls

The industrial hygiene program oversees all chemical air sampling on campus, the evaluations for respirator use, and evaluation of engineering controls (except fume hoods); staff can also assist with fit testing of respirators.

- Thirteen exposure assessments were conducted with 224 samples collected for chemicals; two departments have required periodic monitoring to comply with OSHA standards.
- Fourteen lab respirator use assessments were conducted with 17 respirator fit tests. There are currently 14 departments/labs with required use respirators and more than 175 with voluntary use programs.
- Two evaluations of ventilation systems for controlling employee exposures were also conducted.

Hearing Conservation Program
There are 13 departments in the University's hearing conservation program. Sixteen investigations were conducted for noise issues with 12 area samples and 54 personal samples being collected.

Indoor Air Quality Assessments
Twenty investigations were conducted into the concerns of air quality in office areas; 214 samples were collected for IAQ parameters (temperature, relative humidity, carbon dioxide, carbon monoxide, dust as PM_{10}, and total volatile organic compounds) and 17 samples were collected for mold.

Confined Spaces
Seven confined spaces were added to the inventory this year bringing the total to more than 1,300 spaces currently in use on campus.

Radiation Safety Section

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 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 FY19:

- Approved a number of additional authorized users for the Leksell Gamma Knife to help better meet the regulatory requirement of having an authorized user present during each treatment.
- Engaged in extensive cross-training of EHS staff related to their new roles within the Radiation Safety Section.
- Completed Joint Commission inspections at University of Iowa Hospital and Clinics (UIHC) and Veterans Affairs Medical Center (VAMC) with no significant issues noted.

License Inspection Activities for FY19

- EHS Radiation Safety staff participated in the IDPH inspections of the University's radiation safety program and mammography operations. Violations related to the

Increased Controls were noted and addressed. Radiation Safety staff have taken measures to prevent these types of violations in the future.

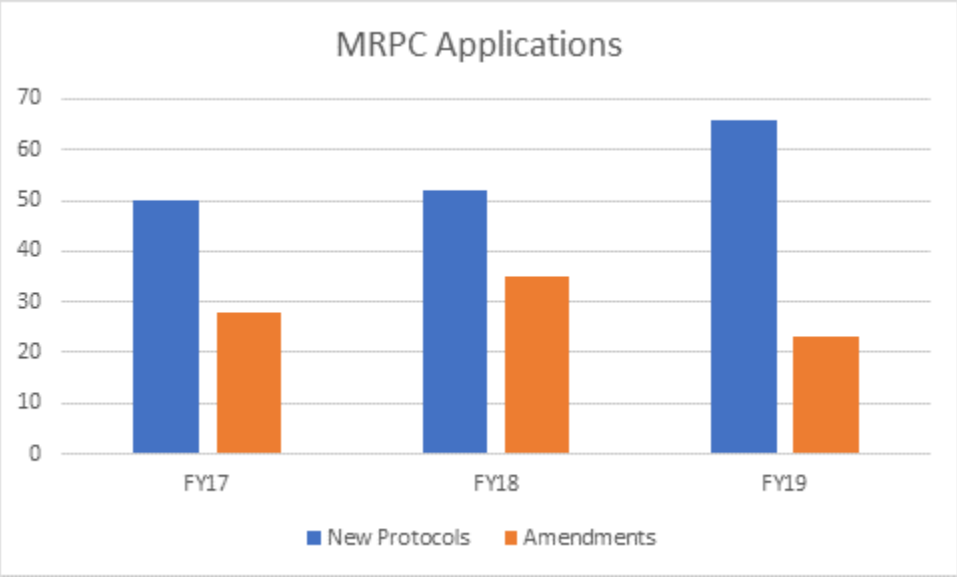
- Completed National Health Physics Program radioactive materials license inspection with no violations cited.

Radiation Safety Committees

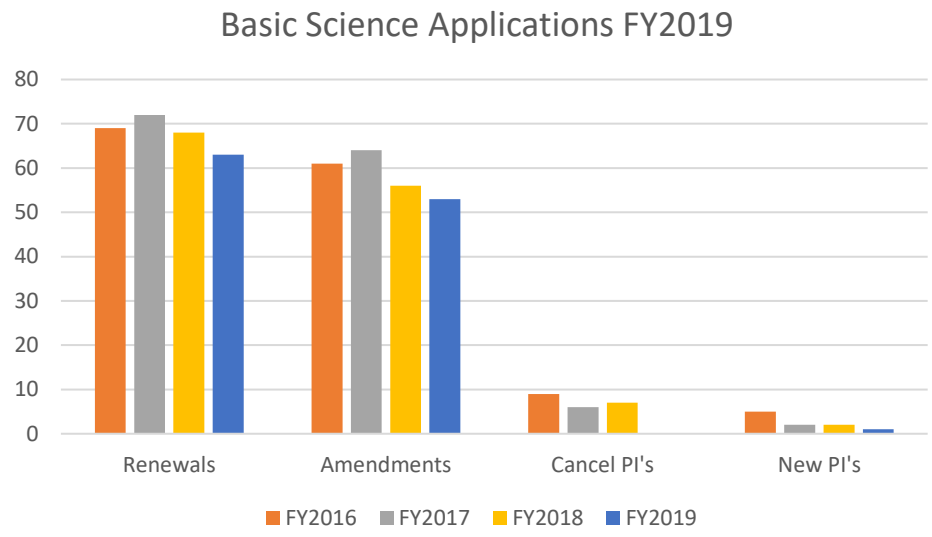
The University's Radiation Safety Committee (RSC) is comprised of five interrelated committees that function to provide radiation protection program oversight, review, policy development, and radioactive materials use authorization under the management of the Associate Vice President for Research. The 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.

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. Staff maintained the application files for 296 active medical research-use applications. The table below compares this fiscal year's medical use application activities with that of past years.



Additionally, staff maintained and managed 65 active authorizations for radioactive material (RAM) use in the basic sciences. The graph below compares this fiscal year's non-medical use application maintenance activities with that of past years.



Operational Safety and Compliance Programs

University Audit Program

EHS audits the radiation safety program to assess its performance and provides its 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 following is a list of the audits performed by Radiation Section staff throughout the year:

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. The Radiation Oncology audits include separate audits for brachytherapy, linear accelerator (LINAC), High Dose Rate, Positron Emission Tomography, Intra-operative radiation therapy, and gamma knife.
   - 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- Annual audit for film-screen, digital and stereotactic mammography operations.
   - UIHC Family Care Clinics (Southeast Iowa City, North Liberty, and River Crossing) – Annual audit of their x-ray programs.

2. **Basic Science**
   - Radiation Research Gamma Irradiation Facility – Annual audit during use authorization application renewal.
   - Non-medical research labs – Audited monthly, quarterly, or semi-annually according to radioactive materials use.
   - 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.

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.

Activity	FY17	FY18	FY19
Dosimeters Issued (annual total)	22,069	22,322	23,806
Individual Participants (monthly average)	1151	1174	1257
Lost/Late Dosimeters (annual average %)	4.9%	5.2%	5.7%
Percentage Issued to UI Personnel	4.4%	4.3%	4.0%
Percentage Issued to UIHC Personnel	95.6%	95.7%	96.0%

The increase in badges and participants in FY19 was due to additional dosimeter groups in the Stead Family Children's Hospital, Orthopedics, a research project in PET Imaging, and nursing staff for the lead-lined patient therapy room. Badges lost or returned late climbed to 5.7% this year but cannot be pinpointed to any specific group.

ALARA Program

Dosimetry and bioassay results are reviewed each month by EHS to maintain exposures As Low As Reasonably Achievable (ALARA). Personnel exposures in excess of established monthly ALARA limits are investigated by EHS. Quarterly ALARA reports, compiled by EHS, are distributed to the Radiation Executive Committee and the Hospital Radiation Safety Review Group for their review.

1. **External Radiation Exposures**
   The following table reflects the UI and UIHC department demographics of exposures in excess of the University ALARA levels.

Number Reports Exceeding ALARA Level I Action Levels

Whole Body Deep Dose Equivalent	Interventional Radiology (improper use)	3
	Adult Cardiac Cath Lab (improper use)	3

	Surgery (improper use)	4
	PET Imaging Center	1
Lens of Eye Dose Equivalent	Interventional Radiology	3
	Surgery	1
Shallow Dose Equivalent	Surgery	1
Extremities Dose Equivalent	PET Imaging Center	8
Total Level I ALARA Exposures (10 falsely elevated due to improper dosimeter use)		24

Number Reports Exceeding ALARA Level II Action Levels

Whole Body Deep Dose Equivalent	Interventional Radiology (improper use)	1
	Surgery (improper use)	5
	Diagnostic X-Ray	1
Lens of Eye Dose Equivalent	Surgery	2
Extremities Dose Equivalent	Pathology Lab	1
Total Level II ALARA Exposures (6 falsely elevated due to improper dosimeter use)		10

2. Internal Radiation Exposures - Bioassays

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.

- Thyroid Bioassays: EHS performed 52 thyroid bioassays. None of the thyroid bioassay results exceeded 10% of our 125 mrem committed effective dose equivalent ALARA limit.
- Urine Bioassays: EHS performed 21 urine bioassays. None of the urine bioassays 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 members of 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.

Based on the University's total annual radioactive material inventory from January 1 through December 31st, 2018, the CAP88 Program calculated an effective dose equivalent (EDE) of 0.0017 mrem to the nearest potentially exposed individual residing outside the University's

facilities. This result demonstrated that airborne emissions from the University's radioactive material usage did not exceed 0.017% of the 10 mrem/year regulatory limit.

Emergency Response and Preparedness

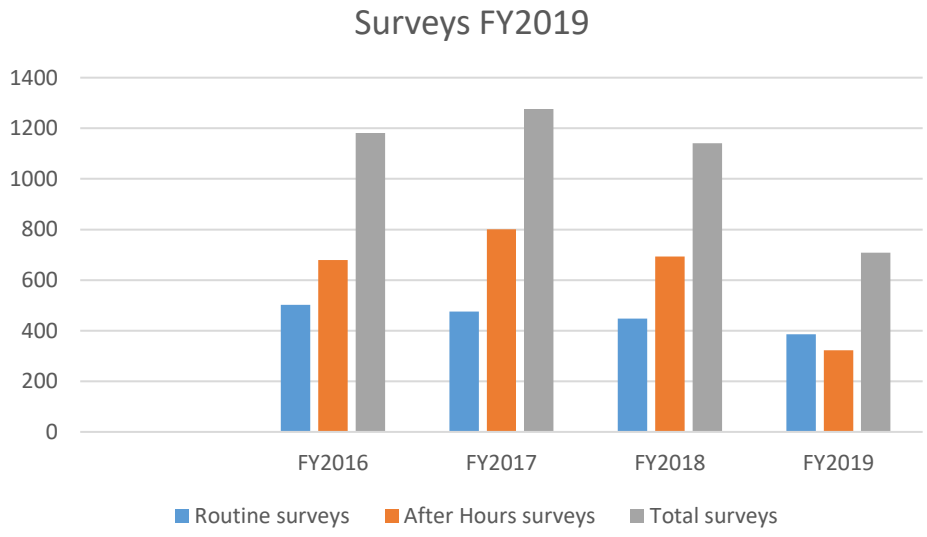
EHS serves as a resource unit for the UI, UIHC (including the Emergency Trauma Center (ETC)) and the Johnson County HazMat Team for emergencies involving sources of ionizing radiation. Two EHS staff members participated in an exercise to test the readiness of the UIHC ETC to handle a patient contaminated with radioactive materials. The exercise is part of the Duane Arnold Energy Center's (DAEC) emergency response plan required by the Federal Emergency Management Agency (FEMA). Representatives from FEMA, Iowa Emergency Management, and DAEC management evaluated the exercise

Health Physics Monitoring Support

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

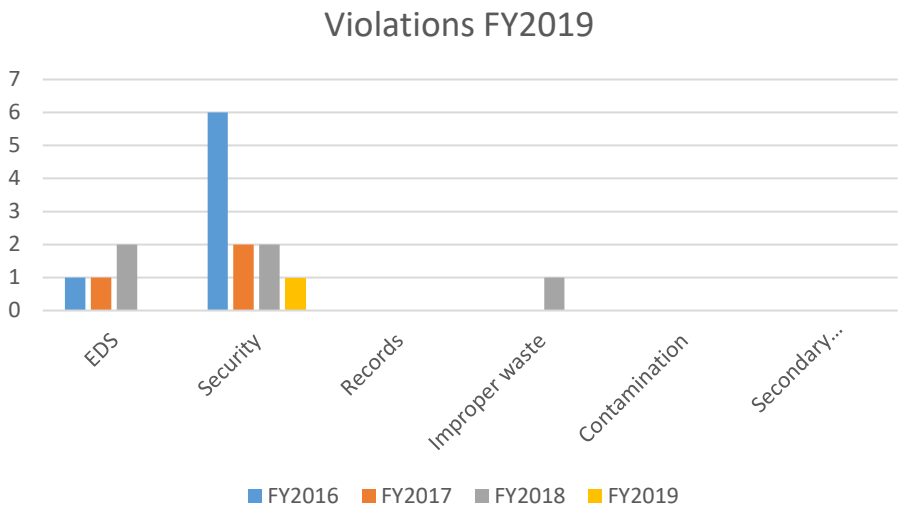
1. **Room Survey Program**

   Radiation safety staff performed a total of 742 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 four fiscal years is provided below.



2. **Compliance Assessment Program**

   Currently there are 153 UI labs posted for non-medical use of radioactive material. A total of 5 regulatory compliance violations were observed by EHS during 448 routine surveys and 693 after-hours security checks of non-medical use research labs conducted.



Sealed Source Leak Testing Program

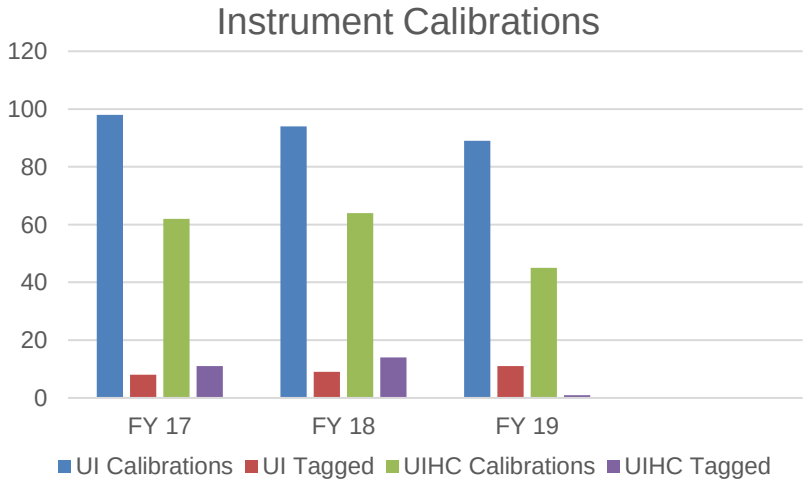
The sealed source leak testing program includes wipe testing to ensure sealed source structural integrity, ambient radiation level surveys in areas where the sources are used and/or stored, and physical inventories to assure sealed source accountability and security.

Activities and Accomplishments for FY19:

- Performed 139 ambient radiation level surveys and 259 physical inventories.
- A total of 26 new sources were added to the inventory during FY19, while 8 sources were properly disposed of or returned to the original manufacturer.
- All sources were accounted for and all 232 leak tests were negative (< 0.005 uCi of removable radioactive material).

Instrument Calibration Program

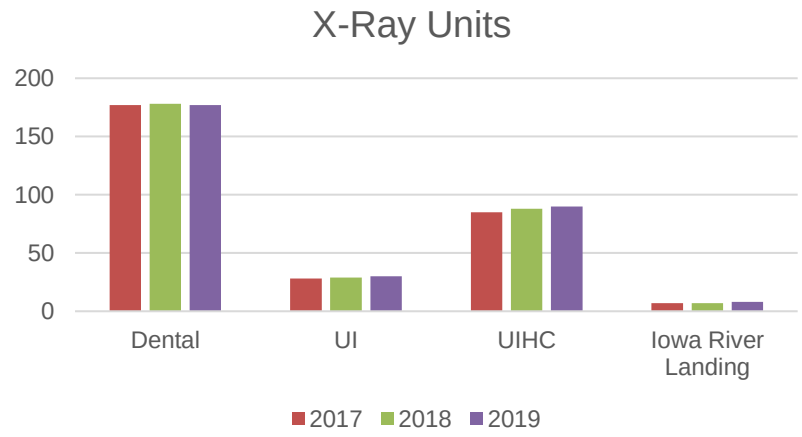
Annual calibration is required for survey instruments used for quantitative radiation measurement. EHS continues to provide this service for the UI and UIHC. A total of 134 instruments were calibrated and 12 instruments were tagged out of service. A comparison of the last three fiscal years is given below.



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 322 registered x-ray units in the UI and UIHC inventory.

Activities and Accomplishments for FY19:

- Continued to provide mammography and computed tomography physicist services to UIHC.
- Assisted Breast Imaging staff in completing American College of Radiology accreditation application.
- Provided physicist testing following mammography unit upgrades.
- Conducted X-ray compliance inspection surveys of all medical and dental diagnostic X-ray units in service as well as the 30 research related X-ray units and 7 bone densitometer units in the University's X-ray inventory. The current inventory of x-ray units by type is shown below:



Radiation Shielding Design and Construction Analysis
EHS provides radiation shielding evaluations for new construction planning and existing facilities to ensure all facilities designed for radiation producing machines and radioactive material use and storage meet applicable standards and regulations. Post construction shielding verification surveys are also performed for all new construction and renovations based on recent regulatory requirements.

Activities and Accomplishments for FY19:

- Consulted and provided construction shielding plans for a number of x-ray, fluoroscopy, and CT installations at UIHC.
- Completed shielding verification and oversight for shielded patient room on 3JCP.
- Provided post construction shielding verification measurements for new and remodeled

x-ray procedure rooms.

- Consulted on design and required shielding specifications for the new Radiochemistry Lab on 3JPP.
- Provided required shielding specifications and verifications for all three off-site clinics and all Radiology rooms for the VAMC.

Radioactive Materials Procurement and Shipping Program

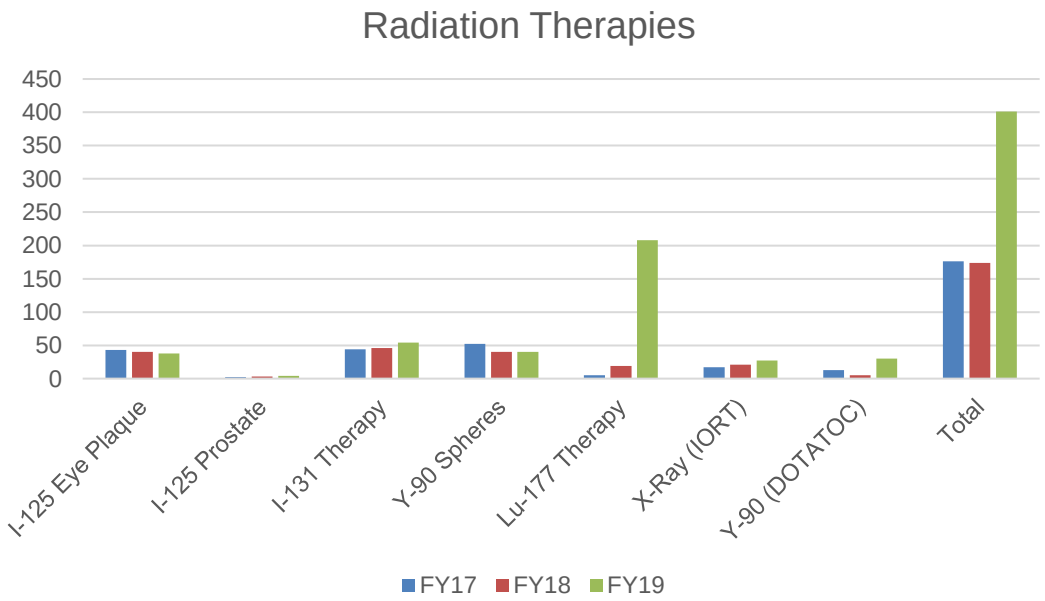
This program oversees the receipt, distribution and documentation for all radioactive materials delivered to the University. EHS provides shipping services for UI and UIHC to minimize the burden on users of radioactive materials. Shipping services involve completing required documentation, obtaining 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 FY19:

- A total of 293 items of radioactive material were processed and delivered to UI or UIHC facilities.
- EHS made 11 shipments of radioactive material for UI and UIHC.

UIHC Therapy Patient Monitoring Program

EHS provides health physics support and radiation safety monitoring services for UIHC departments administering therapeutic amounts of radioactive materials to patients. Support services include room preparation, post-administration radiation surveys, staff and family/visitor education and training, after hours on-call, facility decontamination, and radioactive waste services. Therapy patient activities and historical comparisons are provided below. All therapies were delivered as prescribed. No reportable medical events occurred during FY19.



Laser Safety Program
EHS provides laser safety support to UI and UIHC laser users. The program includes training, consultation, unit registration, purchase approvals and safety audits. Currently there are 112 research lasers registered with 45 investigators at the UI and 39 medical lasers registered to 9 departments at UIHC and IRL.

Activities and Accomplishments for FY19:

- Transitioned to a new Laser Safety Officer for UI/UIHC; the Assistant Radiation Safety Officer serves as University's & UIHC's Laser Safety Officer.
- The Assistant Radiation Safety Officer also serves as chair of the UIHC Laser Safety Panel.
- Performed laser safety audits of all UIHC departments utilizing lasers.
- Evaluated the need for a respirator fit test program for laser users.
- Continued to identify and equip a limited number of main operating rooms with fully functional laser area entry control systems.
- Provided equipment and area audits for new and trial use lasers.
- Continued work on implementing a laser competency program for UIHC physicians.

Radioactive Waste Management Program
EHS staff 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.

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. Cost saving resulting from in-house processing and/or material segregation of radioactive materials is listed below:

# Processed	**FY17**	**FY18**	**FY19**
Patient Linens Decay-In-Storage (containers)	3	8	11
Sharps Decay-In-Storage (containers)	68	39	41
Dry Waste Decay-In-Storage (drums)	35	35	27
Dry Waste Incineration (containers)	110	63	111
TOTAL	216	145	190
# of Drums Eliminated from Radioactive Waste Burial	**FY17**	**FY18**	**FY19**
Dry Waste Decay-In-Storage	35	35	27
Sharps	4	2	2
Dry Waste Incineration	7.5	4	6

Total	46.5	41	35
Waste Processing Cost Savings	**FY17**	**FY18**	**FY19**
Dry Waste Decay-In-Storage	$16,860	$14,850	$9,970
Sharps Decay-In-Storage	$1,650	$1,700	$2,470

Radiation Safety Program Goals for FY19

- Complete transitions to new staff roles within the Radiation Section.
- Continue to work with UIHC regarding appropriate EHS funding levels.
- Evaluate the possibility of switching all UIHC staff to a single dosimeter for dose monitoring.
- 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.
- Provide radiation safety support to forthcoming research projects involving long hospital stay times for subjects receiving radioactive materials therapy.
- Complete three-year maintenance on dose calibrator.
- Begin work developing security system testing plans for EHS and Medical Laboratory units.

Administrative Services Section

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.

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. There were 30,644 course completions; see the table below for individual course information. These data reflect UI faculty/staff only and do not include students. Additionally, there were 180 course completions recorded by Veterans Affairs staff.

ICON Course	Number	ICON Course	Number
Advanced Biological Safety	424	Lockout/Tagout Procedure Writing	0
Aerial Lifts	121	Lockout/Tagout Safety	203
Analytical X-Ray Equipment	15	Machine Guarding	479
Antineoplastic Agents Safety	18	Methlylene Chloride Safety	0
APP Refresher of Radiation Safety for Fluoroscopy	16	Nanomaterials Research Safety	31

Asbestos Awareness	693	Nuclear Medicine Staff	9
Basic Biological Safety	1176	Office Safety	38
BBP for FM, Housing and Dining	941	P.E.T. Imaging Staff	22
Beryllium Safety (New 2018)	1	Pandemic Influenza Dust Mask	0
Biohazardous Waste Management	1786	Performing a Qualitative Fit Test	0
Biological Safety Cabinets	151	PPE Awareness for Labs	1434
Bloodborne Pathogen Refresher	1397	PPE Awareness for Non-Labs	1271
Bloodborne Pathogens, Lab	857	Rad Material Patient Safety - Basic	520
Bloodborne Pathogens, Non-Lab	626	Rad Safety 3JPP Staff	144
Bone Densitometer	0	Rad Safety CRU Staff	9
BSC Awareness for FM	0	Rad Safety for FM Staff	193
Chemical Fume Hoods	987	Radiation Awareness for Labs	236
Chemical Storage Safety	173	Radiation Oncology Staff	88
Compressed Gas Safety	636	Radiation Safety CS Staff	0
Confined Space - Reclass and Alt Entries	245	Radiation Safety I-131 MIBG	1
Confined Space Administrator	3	Radiation Safety, Basic	150
Confined Space Evaluators	4	Radiation Safety, Refresher	202
Confined Space Full Permit Entry	7	Radioactive Materials Shipping	9
Confined Space Prohibited	67	Radioactive Waste Management	15
Contingency Plan Training	7	RDNA Research, NIH Guidelines	535
Controlled Substances Research	25	Respirable Crystalline Silica Safety	0
Dual Use Research of Concern	1	Respirator Dust Mask	40
EHS Staff OSHA Chemical Specific Standard	5	Respirator PAPR Hood or Helmet	24
Electrical Panel Breaker Resetting	87	Respirator PAPR Tight Fit Face	69
Electrical Safety	414	Respirator Tight Fit Facepiece	93
Electron Capture Detector	11	Respirator Voluntary Use	494
Environmental Management Facility Safety Orientation	101	Safety Leadership	99
Ergonomics - Back Safety	699	SAIC Radiation Safety	0
Ergonomics - Computer Use	171	Sealed Sources Radiation Safety	9
Fall Protection	188	Shipping Infectious Substances	287
Fire Extinguishers	655	Shipping with Dry Ice	259
Forklifts	68	SPCC: Oil Spill Prevention	8
Formaldehyde Safety	667	Spill Preparedness Response	135
Hand Safety	93	Stem Cell Research	13
Hazardous Waste for Labs	1643	SWPP Plan (Storm Water Pollution Prevention Plan)	7
Hazardous Waste for Non-Labs	19	Tool Safety	488
HazCom with GHS	2453	Toxins, Select Agent Quantity	55
Hearing Conservation	280	UIHC Radiation Awareness	0
Hexavalent Chromium Safety	2	UIHC Radiation Safety, Security	0
Incident Investigation Training	126	Universal Waste Management	521
Indoor Cranes	72	Walking and Working Surfaces	477
Intro to RCRA Training	0	Welding and Cutting	323
Job Safety Analysis	3	X-Ray Safety - General	40
Lab Chemical Safety	2111	X-ray Safety for Fluoro Staff	60

Ladders	723	X-Ray Safety Limited	5
Laser Safety - Research	257	X-Ray Safety, Anesthesia Staff	1
Laser Safety - UIHC	40	X-Ray Safety, Fluoroscopy Practitioners	9
Lead Safety Awareness	263	Y-90 Microspheres Rad Safety	11

Attachment A

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

	1991	1992	1993	1994	1995	1996	1997	1998	1999
Chemical Waste									
Stops	1,931	2,541	2,992	2,728	2,831	2,786	2,819	3,026	3,277
Containers	11,893	12,326	13,556	12,556	15,913	18,853	21,054	21,198	22,077
Weight (kg)	52,868	60,259	62,531	75,810	70,768	77,162	66,444	86,113	103,611
Radiation Waste									
Stops	2,533	2,756	2,596	2,104	1,816	1,581	1,358	1,177	1,117
Containers (excludes lead)*				6,283	5,259	4,738	4,153	3,703	3,373
Lead shielding (pieces)				61	2,120	3,651	4,283	2,843	3,333
Total containers	7,759	8,159	8,578	6,344	7,379	8,389	8,436	6,546	6,706
Weight (kg) (excludes lead)	57,667	58,654	62,324	38,951	33,577	28,787	26,526	22,102	21,648

	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
Chemical Waste										
Stops	3,454	3,511	3,633	3,464	3,735	3,593	3,324	3,702	3,517	3,783
Containers	25,519	25,275	29,211	22,108	26,047	26,872	24,216	27,543	28,950	26,847
Weight (kg)	121,134	119,960	127,095	118,038	119,888	130,177	117,494	118,446	118,192	103,980
Radiation Waste										
Stops	942	934	798	659	644	556	451	412	365	336
Containers (excludes lead)*	2,745	2,786	2,523	2,092	1,904	1,812	1,468	1,366	1,225	1,129
Lead shielding (pieces)	2,629	3,198	3,270	2,356	2,818	3,532	2,386	2,097	2,444	2,192
Total containers	5,374	5,984	5,793	4,448	4,722	5,344	3,854	3,463	3,669	3,321
Weight (kg) (excludes lead)	20,802	19,811	17,163	17,560	15,830	14,194	11,502	10,178	9,886	8,017
Biohazardous Waste"										
Total Containers									28,846	27,873
Total Weight (lb)									1,018,432	930,921

	2010	2011	2012	2013	2014	2015	2016	2017	2018
Chemical Waste									
Stops	3,903	4,039	3,824	3,951	3,807	3,408	3,540	3,380	3,535
Containers	21,739	27,166	22,514	24,865	29,103	26,524	30,614	31,574	34,730
Weight (kg)	88,744	90,974	88,479	93,122	80,210	76,562	94,566	93,192	86,520
Radiation Waste									
Stops	292	249	238	189	205	196	205	182	157
Containers (excludes lead)*	925	865	776	664	731	822	805	730	549
Lead shielding (pieces)	2,061	2,532	1,773	984	901	1,549	1,233	1,263	1,794
Total containers	2,986	3,397	2,549	1,684	1,631	2,371	2,038	1,993	2,343
Weight (kg) (excludes lead)	5,766	6,174	5,918	4,764	4,836	5,581	4,755	4,355	3,420
Biohazardous Waste"									
Total Containers	27,671	26,417	26,001	26,142	25,171	25,205	27,439	26,646	27,798
Total Weight (lb)	842,858	783,722	804,263	780,305	744,022	745,885	771,030	722,154	717,924

*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

Attachment B

Radioactive Waste Generation Statistics - University of Iowa Environmental Health & Safety

Units = Drums (Unless Otherwise Noted)

Waste Type	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999
Animal	375	303	329	325	322	210	183	161	210	153	87	68	45	3	11
Ash							43	78	4	3	7	5	5	5	2
Bactec Vials															
Dry (Box) - 0.1 Yard Box													115	105	131
Dry (Box) - Yard Box															
Dry (Drum)-Long	143	177	150	160	192	184	121	78	66	49	38	30	18	11	12
Dry (Drum)-Short	2	5	11	35	5	6	90	148	153	139	122	105	97	88	87
Dry (Drum)-Total	145	182	161	195	197	190	211	226	219	188	160	135	115	99	99
Liquids-Aqueous					133	163	191	188	81[a]	48	53	45	36	42	34
Liquids-Mixed					26	11	9	17	14	18	20	17	12	15	10
Liquids-Total					158	174	200	205	95	66	73	62	48	57	44
LSC (Vials)							117	114	122	107	92	74	58	51	37
Sharps-Long							26	25	18	10	3	3	2	1	3
Sharps-Short							0	0	8	0	5	3	3	2	2
Sharps-Total							26	25	26	10	8	6	5	3	5
Sealed Source										1	0	2	3	3	2
Total							778	808	676	528	428	353	394	326	331
Waste Containers (excludes lead)										6,282	5,265	4,738	4,153	3,703	3,373
Lead shielding (pieces)										61	2,120	3,651	4,283	2,843	3,333
Incoming Packages								4,238	3,776	3,932	3,693	3,329	3,417	3,424	3,284

Waste Type	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
Animal	1	9	2	4	0	17	7	0	5	7
Ash	0	2	0	0	0	0	0	0	0	0
Bactec Vials							2	1	0	1
Dry (Box) - 0.1 Yard Box	90	123	129	103						
Dry (Box) - Yard Box				2	15	8	7	5	6	5
Dry (Drum)-Long	7	9	7	3	3	5	3	5	5	4
Dry (Drum)-Short	61	63	48	45	42	36	29	30	20	20
Dry (Drum)-Total	68	72	55	48	45	41	32	35	25	24
Liquids-Aqueous	29	37	28	26	35	25	21	18	17	16
Liquids-Mixed	9	10	8	5	6	6	4	1	1	0
Liquids-Total	38	47	36	31	41	31	25	19	18	16
LSC Vials (Mixed)	28	20	18	15	13	13	14	13	8	8
LSC Vials (Nonhaz)										19
Sharps-Long	2	2	3	1	2	3	3	2	1	1
Sharps-Short	1	6	1	2	1	1	0[b]	0	0	0
Sharps-Total	3	8	4	3	3	4	3	2	1	1
Sealed Source	1	1	2	1	1	2	1	1	0	1
Total	229	282	246	207	118	116	91	76	63	82
Waste Containers (excludes lead)	2,745	2,186	2,523	2,092	1,904	1,812	1,468	1,366	1,255	1,129
Lead shielding (pieces)	2,629	3,198	3,270	2,356	2,818	3,532	2,386	2,097	2,444	2,192
Incoming Packages	3,008	2,308	2,137	1,843	1,442	1,207	1,254	1,147	1,001	817

Waste Type	2010	2011	2012	2013	2014	2015	2016	2017	2018
Animal	5	5	12	0	1	0	5	6	2
Bactec Vials	0	1	0	0	0	1	0	0	0
Dry (Box) - Yard Box	4	5	4	5	5	5	4	5	3
Dry (Drum)-Long	3	3	3	2	1	1	2	1	1
Dry (Drum)-Short	13	13	10	6	20	25	28	26	25
Liquids-Aqueous	11	8	6	5	5	4	5	4	6
Liquids-Mixed	1	0	1	1	0	1	2	1	1
LSC Vials (Mixed)	3	9	0	0	1	1	0	0	0
LSC Vials (Nonhaz)	15	19	19	18	21	33	19	19	9
Sharps-Long	1	0	0	1	1	2	3	2	1
Sealed Source	0	0	0	0	0	1	0	0	1
Total	57	63	55	38	55	74	68	66	56
Waste Containers (excludes lead)	925	865	776	664	731	822	805	730	550
Lead shielding (pieces)	2,061	2,532	1,773	984	901	1,549	1,233	1,263	1,794
Incoming Packages	766	385	501	264	390	366	362	303	262

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