IOWA

Annual Report: FY 2021-2022

Environmental Health and Safety
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Environmental Health and Safety Office

Mission Statement

The mission of the Environmental Health and 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 and 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

As campus returned to normal operations, EHS fully transitioned to in-person services including lab/area reviews and new Principal Investigator orientations. Departmental staffing was challenging due to several retirements and resignations in addition to prior positions remaining unfilled due to decreased workloads with the pandemic ramp downs. However, the department continued to recruit new staff while maintaining services to campus. Administration worked with current staff to implement a hybrid work arrangement, where possible based on job functions. Refinement of the hybrid schedules continued throughout the pilot period.

Biological Safety Section

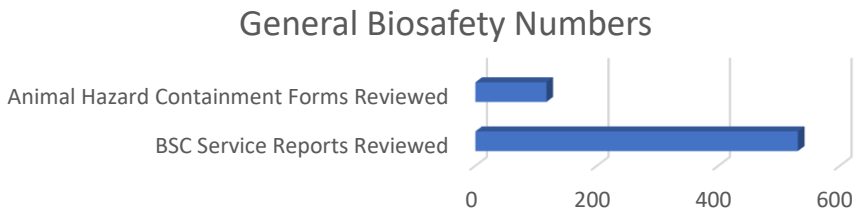
The Biological Safety Section is responsible for the administration of programs in the research and non-research community that involves the management of biological or infectious agents and biohazardous materials used at The University of Iowa. Administration is accomplished by developing, recommending, 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. The Biological Safety Officer (BSO) and Associate BSO (ABSO) also participate in laboratory inspections by United States Department of Agriculture (USDA), Centers for Disease Control and Prevention (CDC), and other federal agencies, as required for permitting purposes.

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 materials are used in animals. Additionally, biosafety staff review biosafety cabinet (BSC) service reports to confirm actively used cabinets are maintained and certified, as necessary.



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 70 active programs over the course of a year.

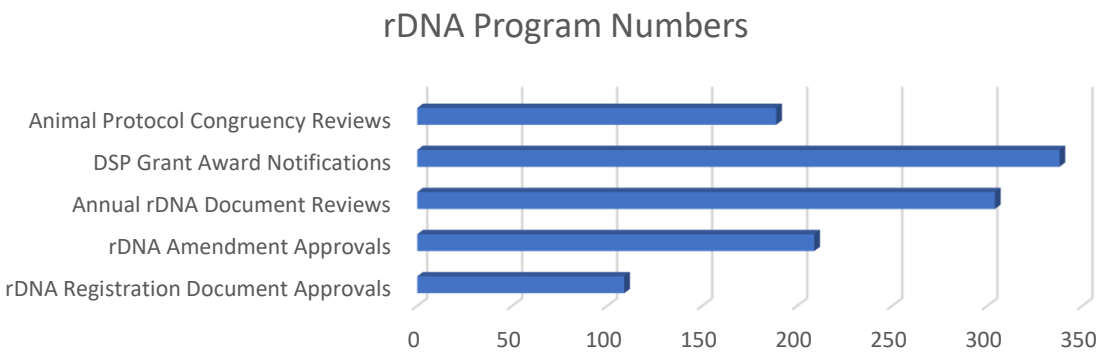
DOT Transportation Compliance Program

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 rDNA Registration Document and coordinate the

committee's review and approval process. Additionally, the BSO 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 University has designated the BSO, as the Responsible Official (RO) and the ABSO and EHS Director as the alternate ROs (AROs). These individuals oversee the University's registration with FSAP 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.

Chemical Safety Section

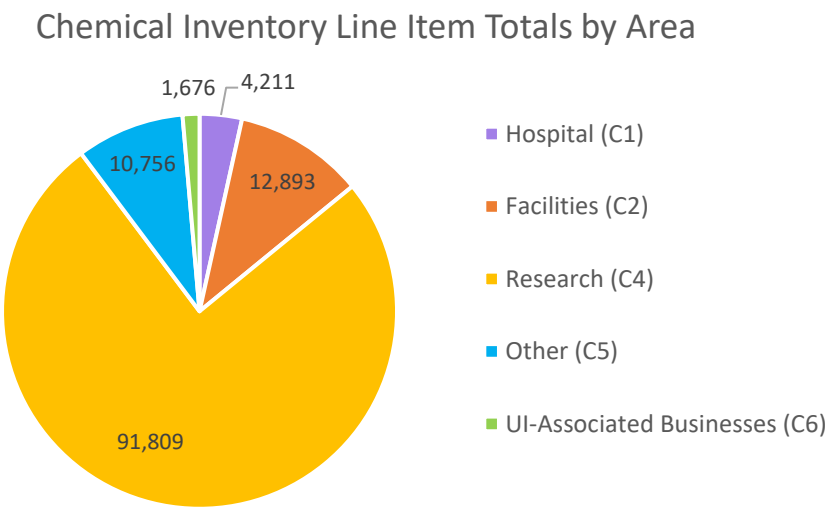
The Chemical Safety Section is responsible for the administration of programs in the research and non-research community that involves the management of chemicals or chemically hazardous materials used at the University of Iowa. Hazard assessments are conducted to evaluate safe material handling practices 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. Continual oversight of chemical use involves: (1) annual review of the Chemical Hygiene Plan (CHP) by the Laboratory Safety Committee (LSC); (2) review of chemical hazard containment forms in coordination with the Institutional Animal Care and Use Office; (3) developing standard operating procedures for the use of certain hazardous chemicals; and (4) investigation of all chemically related first report of injuries to ensure proper follow- up, when necessary, and identification of root causes.

Chemical Inventory System

EHS Assist (EHSA) 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, as needed. There are 723 accounts, 3382 locations tracked, and 1,899 users in the system. A total of 121,345 chemicals are maintained in EHSA. The graph below indicates use by area.



Safety Data Sheet (SDS) Program

This program facilitates the collection, storage, and upkeep of SDSs for the University of Iowa, as required by OSHA's hazard communication. The UIowa Chemwatch library currently consists of 59,809 SDSs. SDS entry has been completed for 94.02% of the research laboratories and 97.56% of non-laboratory areas. University Hospitals and Clinics are not included in the non-laboratory area and they continue to reevaluate their process. There are currently 4 labs that have opted out of submitting SDS for Chemwatch access, and in doing so they accept full responsibility for all regulations regarding their chemicals and SDS.

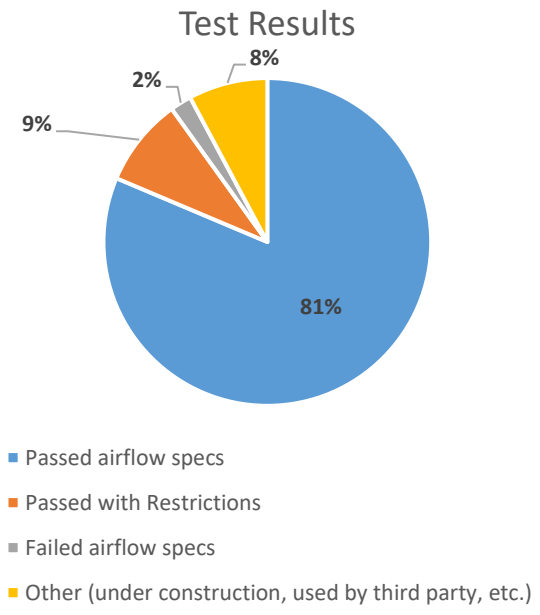
Personal Protective Clothing and Equipment (PPE) Program for Laboratories

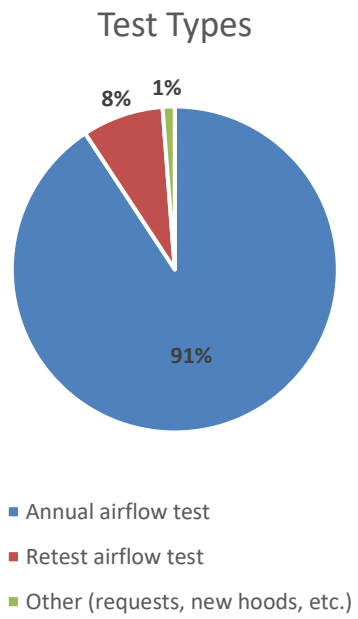
OSHA standard 1901.132(a) states, "Protective equipment, including personal protective equipment for eyes, face, head, and extremities, protective clothing, respiratory devices, and protective shields and barriers, shall be provided, used, and maintained in a sanitary and reliable condition wherever 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 also provide personal consultations, coaching, and education for individual laboratories on all manner of PPE assessments and use. Staff also routinely review and recommend types of PPE needed as part of hazard evaluations, spill consultations, and post- incident follow-ups. FY22 addressed additional questions regarding specific types of clothing that are appropriate for the lab and adhere to the policy concerning appropriate dress in labs regarding skin coverage and protection. The current policy now aligns with that of the teaching labs in the Department of Chemistry.

Ventilation and Fume Hood Program

The ventilation and fume hood 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. A total of 1,079 fume hood tests were completed in FY22; the types of tests and results are provided in the graphs 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. Various reports are detailed below.

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

The ER-RTK report outlines hazardous material locations for emergency responders both within and outside of the University. Due to layout changes, every floor plan and cover sheet was modified this year. Details on the FY22 report are included in the table, below.

Updated In AutoCAD	Number of Buildings	Number of Floor Plans*	Number of New Maps**
East Campus	65	383	74
Hawkeye Campus	14	25	10
Off Campus Coralville	16	24	1
Off Campus Iowa City	16	23	7
Off Campus Lake MacBride	2	3	0
Off Campus Muscatine	1	1	0
Off Campus North Liberty	3	0	0
University Research Park	33	63	11
West Campus	66	424	66
Residence	7	19	4
TOTALS for ER-RTK AutoCAD	223	965	173

* Does not include the "cover sheet" for each building.
**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 37 chemical inventory users (active participants) meet annual review criteria, of which, 31 had chemicals of reportable quantities. Forty-four 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 chemical inventory system combined with a listserv of chemical users/owners. No material was determined to exceed a threshold reportable quantity in FY22.

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 complete an eight- hour HAZWOPER refresher training annually and 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. There were a total of 9 incidents reported in FY22 with 5 of those being spills/leaks and 3 smells/incidents (one was a false natural gas leak that resulted from a hydrogen sulfide release during an experiment done in a chemical fume hood); 4 incidents occurred in non-lab areas and 5 occurred within a laboratory.

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 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), 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.

Biohazardous waste is collected and disposed of by a contractor at major UI research, academic and support facilities (~ 10-15 areas); EHS oversees contractor activities. EHS collects waste from the remaining facilities and subsequently disposes of those through contractor collection. EHS does not participate in the collection or disposal of biohazardous waste generated at University of Iowa Hospitals & Clinics.

Activities and Accomplishments:

- Hazardous chemical waste: a total of 28,707 containers were collected from 490 waste generators during 2,369 visits. Waste amounts varied in size from a few milligrams to 55 gallons.
- Radioactive waste: a total of 281 containers were collected from 44 waste generator sites during 85 visits. Waste consisted of liquids, solids, and patient therapy waste.
- Biohazardous waste: a total of 23,113 containers were collected (excludes waste generated at UIHC); 12,216 collected by contractor; 1,897 collected by EHS.
- Unknown analysis: 63 unknowns from 17 locations were analyzed and identified.
- Cleanouts: completed 84 generator cleanouts generating 7,319 items of hazardous chemical waste.

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 (UNI), 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:

Hazardous Chemical Waste

- Processing:
    - Bulking – 21,041 items were commingled together into 546 drums last fiscal year.
    - Recycling - 222 lbs. of mercury and mercury containing devices; 1,029 lead-acid batteries weighing 13,085 lbs.; 5,687 other hazardous batteries weighing 1,798 lbs.; 793 lbs of PCB ballasts; 10,820 lbs of used oil; and 1,843 pieces of lead shielding weighing 1,728 lbs. Additionally 1,292 lbs. of hazardous waste were processed to recover and reuse solvents, and 51,746 lbs. of hazardous waste processed for energy recovery.

    - DEA Controlled Substance destruction – 91 containers of controlled substances were disposed of through a DEA-approved method and completion of the required reports.
- Waste processing generates a large amount of regular trash to be disposed of at a landfill. Last year 20 truckloads containing such waste were taken to the Iowa City Landfill.
- Other:

	FY20		FY21		FY22	
Process	**Weight (kg)**	**Items**	**Weight (kg)**	**Items**	**Weight (kg)**	**Items**
Neutralization	1,124	744	1,018	466	1,124	494
Non-hazardous gas cylinders Vented	117	70	18	63	71	42
Non-hazardous-to IC landfill	1,172	1,088	702	704	1,360	860
Sewered	4,173	2,922	4,375	1,974	4,648	1,633

- Contractor Shipments and Disposal:
    - Fourteen shipments of hazardous chemical waste were completed and sent to off-site EPA permitted facilities.

Radioactive Waste

- Aqueous liquids are held for varying periods of isotope-dependent decay times prior to being discharged to the sanitary sewer. Last year, 100 containers commingled in 4 drums along with 35 individual smaller containers were discharged for a total of 288 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 large cost savings.
- Lead shielding is surveyed for contamination and recycled through the hazardous waste program if no contamination is present. Last year, 1,849 pieces were collected, a portion of which was recycled, as mentioned above.
- Refuse is created during the extensive waste processing which is disposed of through landfilling.
- A sorting station is used to sort dry waste for review and removal, if necessary, of inappropriate items prior to disposal in the Iowa City Landfill. Last year 16 drums of short- lived waste were processed.
- Completed two radioactive waste shipments of 16 shipping containers, including:
    - 2 – sealed sources;
    - 4 – non-hazardous scintillation cocktail vials;
    - 3 – mixed waste;
    - 1 – dry waste in drums;
    - 5 – dry waste in yard-boxes, and
    - 1 – sharps in yard boxes.

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:

- Surveys - more than 8,000 surveys are performed annually.
    - Vehicle – surveyed after each use – 103 times – using >1,000 wipes.
    - Facility – surveyed on a weekly basis – 52 surveys – using > 1,500 wipes.
    - Containers – surveyed > 800.
    - Lead shielding – surveyed prior to disposal – 1,843 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:

- Daily review of data collected during waste collections and 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 process of Permit Closure for Oakdale Storage K (the Batcave) continues. Closure was completed late-Winter 2022. Closure will necessitate EPA approval of a waste storage permit modification, expected to be completed by Fall 2022.

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 that have been identified during waste collection.

Activities and Accomplishments:

- The U.S. Environmental Protection Agency conducted inspections on both the Oakdale and Main Campuses. Several minor violations were noted and have been addressed.
- SDS solicitations: over 1,000 SDS were solicited from manufacturers; currently, over 30,000 separate SDS are part of the EHS' collection of this information.

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.

The laboratory audit procedure is reviewed annually. Changes made in FY22 included:

- Updating the chemical permit locations and approved users
- Updating the definition of standard attire which must be worn in the lab
- Creation of an audit specifically for inactive labs

There were a total of 390 laboratory reviews completed in addition to 10 inactive lab reviews. Four labs did not resolve the identified deficiencies by the 30-day follow-up period. However, three of those labs eventually addressed all deficiencies and EHS continues to work with the PI and departmental administration for the one remaining laboratory. Due to significant EHS staff changeover, Lab Safety Rounds remain suspended.

Laboratory Close-Out Program

The purpose of the University 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 or equipment during the closure procedures. It also enables EHS to track changes in personnel, chemical inventories and lab space assignments through meetings with lab and administrative personnel. Finalizing a laboratory close-out can take over six months of EHS involvement.

A total of 17 lab close-outs were submitted in FY22. Of these, twelve labs were closed, including two of which EHS was notified after the space had been reassigned and in use by another PI, four are still being processed, and one is on hold. One open close-out from prior years was finalized in FY22.

Occupational Safety Section

The Occupational Safety (OS) 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 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 perform 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 were a total of 156 reviews completed and all areas addressed identified deficiencies within the 30-day follow-up period.

Housing & Dining food safety program

This year EHS received a request from the Executive Chef of University Dining to create a new program around food safety with the intent to prepare staff for The Johnson County Public Health inspections. Our Division of Student Life (DSL) Occupational Safety Specialist developed a safety review program that went into effect in February 2022 and will be completed bi-annually. By the end of FY22, all 21 DSL food service locations had received their first review.

Work-Related Injury and Illness Investigation Program

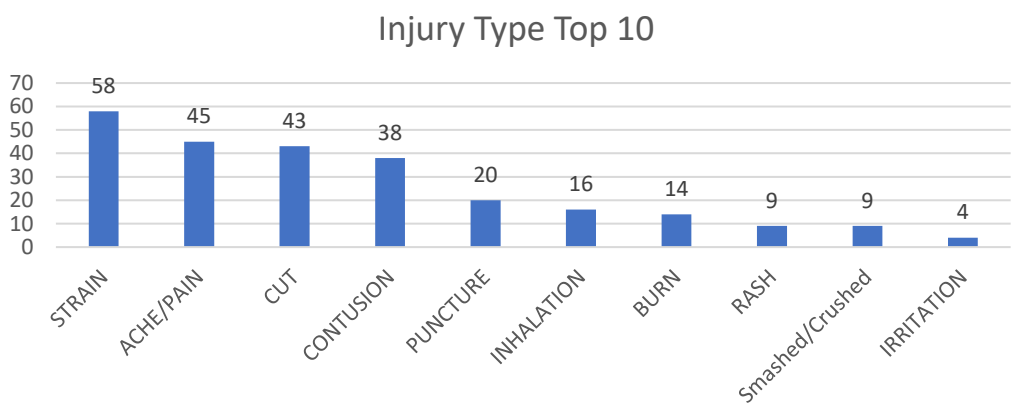
The goals of the work-related injury and illness incident investigation program are to:

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

To accomplish these goals, Occupational Safety staff, with assistance from EHS staff in other sections, work with the injured employee as well as their supervisor to ensure the incident that caused the

injury is investigated. The purpose of the investigation is to discover the root cause and identify and implement effective corrective actions that will prevent a similar event from happening in the future.

During a department's annual safety review, their injury records and trends are discussed. A positive trend shows that the department is effectively implementing their safety program. Listed below is a comparison of the most frequently reported types of injuries by UI employees (Note: UIHC uses a different investigation process and is excluded from the graph):

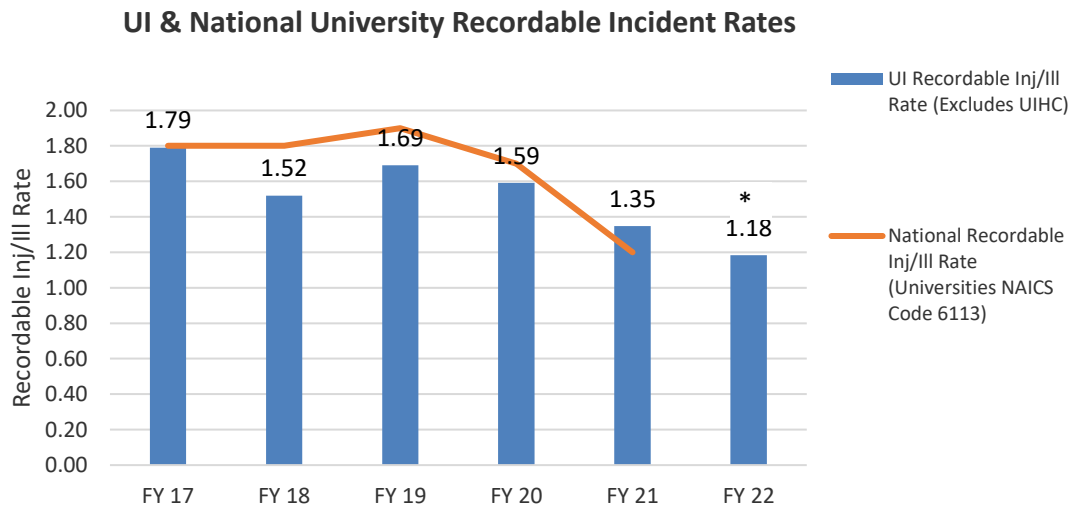


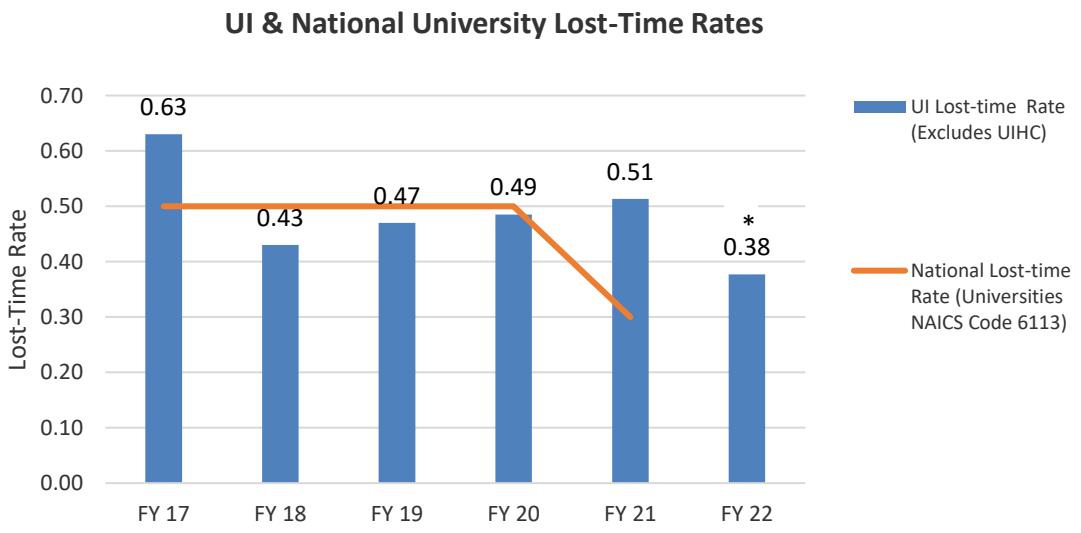
The number of OSHA recordable injuries by year was reviewed in comparison to the number of recordable injures with lost time only. These comparisons allow for the identification of trends over time and severity as well as a measure of the effectiveness of the current safety programs. The Recordable Incident 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 days away from work. 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 Recordable Injury/Illness and Lost-Time Rates for UI to the average rates for universities nationwide (NAICS Code 6113).





**National Data was not available for FY22 at the time of this report*

Staff continually strive for improvement and seek to decrease both the RIR and Lost-Time rates over time.

Lockout/Tagout Procedures

EHS staff work with multiple departments across campus to assist in the development of lockout/tagout procedures for equipment in their areas. Once the procedures are complete, they are posted to a UI SharePoint site and can be linked to maintenance workorder systems. This allows maintenance personnel to quickly access procedures needed while they are working on the equipment. There are currently over 1,600 procedures posted to SharePoint, with more being developed all of the time. This is an ongoing project.

Confined Spaces

There are 811 confined spaces currently in use on campus. Each department that owns a space is asked to review their inventories annually to ensure they are complete and up to date, assessments are current and correct, entry permits have been reviewed, and all spaces are correctly labeled.

Industrial Hygiene

The industrial hygiene (IH) program oversees chemical air sampling on campus, respirator use evaluations, evaluation of local exhaust ventilation (LEV) (except fume hoods and biosafety cabinets), and performs noise monitoring and indoor air quality (IAQ) investigations.

Chemical Sampling

Six quantitative exposure assessments were conducted with 87 samples collected for 41 chemicals. Fourteen qualitative exposure assessment were conducted as part of respirator use assessments.

Respirators

Eighty-two respirator fit tests were completed. There are currently 12 departments/labs with required use respirators and more than 160 with voluntary use programs. In order to increase efficiency, fit tests are now only offered on set days each month and employees can book a time online using the Microsoft Bookings app.

Local Exhaust Ventilation (LEV)

The LEV program is new this year and was created to track and test LEV systems in a way similar to how fume hoods are handled. There are currently 525 LEV systems in the database. Testing of the systems began in June 2022 and 30 tests were performed this fiscal year.

Hearing Conservation Program

There are 10 departments/labs in the University's hearing conservation program and 83 that use some form of hearing protection on a voluntary basis. Nine investigations were conducted for noise issues with 12 area samples and 28 personal samples being collected.

Indoor Air Quality (IAQ) Assessments

Two investigations were conducted into air quality concerns in office areas. Fourty-two samples were collected for IAQ parameters (temperature, relative humidity, carbon dioxide, carbon monoxide, dust as PM_{10}, and total volatile organic compounds) and 3 samples were collected for mold.

Over the course of the COVID-19 pandemic, there has been a steady decline in the number of requests for IAQ assessments. This is likely due to fewer employees working on campus along with an increase in air flow and filtration in building ventilation systems. The drop from FY21 to FY22 is wholly due to UIHC hiring additional safety staff to complete their IAQ investigations. UIHC previously accounted for approximately 60% of yearly IAQ assessments.

Radiation Safety Section

The Radiation Safety Section is responsible for administrating the University's radiation safety program. This includes maintaining the radioactive material (RAM) 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 Radiation Safety Section maintains the University's single academic/medical radioactive materials (RAM) 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 routine IDPH-BRH on-site inspection and five-year renewal.

Activities and Accomplishments:

- Approved new authorized users and medical physicists in Radiation Oncology and Nuclear Medicine. In addition, several additional new Radiation Therapy staff were cleared for the Leksell Gamma Knife, to help ensure adequate staffing for increasing use of this unit.
- Responded to several non-routine events involving radioactive material use.
- Continued to refine EHS hybrid work schedules in order to meet the needs of our end users in the face of a staff shortage in the Radiation Section.
- Hired and continue to train a new staff member to take the place of a long-term employee that resigned.
- Continued to revise the electronic human use application form (eMRPC) based on experience and user feedback with the goal of improving functionality, particularly for non-routine scenarios.
- Oversaw installation of shielded O-15 gas line running from PET to MRI.
- Oversaw the implementation of additional safety features for the Gamma Knife security system and incorporated these upgrades into the periodic audits for this system.
- Worked with PNNL to extend their contract with SEI to perform quarterly security system testing at UI.
- Replaced the Chair and one other MRPC Committee members, due to staff retirements.

License Inspection Activities:

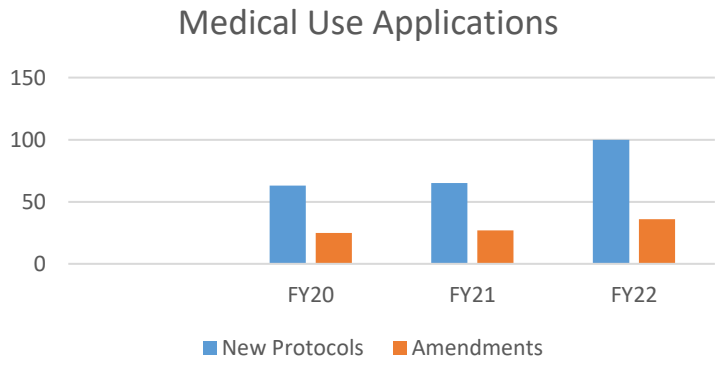
- IDPH conducted a license inspection in October 2021, with no violations cited. The mammography program was inspected during FY21, with no violations issued.
- Joint Commission did not inspect UIHC during FY21 but is due to inspect UIHC at any time.
- Radiation Section staff participated in NHPP and Joint Commission surveys at VA Medical Center. No findings related to radiation safety were noted during either survey.
- No license amendments were filed during the past year.

Radiation Safety Committees

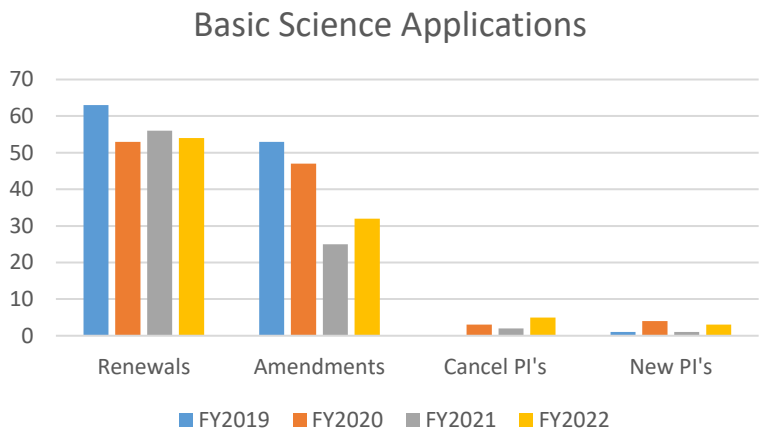
The University's Radiation Safety Committee (RSC) is comprised of five interrelated committees that function to provide radiation protection program oversight, review, policy development, and radioactive materials use authorization under the management of the Associate Vice President for Research. The 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 328- 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.

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.

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.

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 regulations.

Activity	FY19	FY 20	FY 21	FY 22
Dosimeters Issued (annual total)	23,806	23,565	19,579	21,522
Individual Participants (monthly average)	1257	1236	1319	1453
Lost/Late Dosimeters (annual average %)	5.7%	7.4%	10.3%	8.9%
Percentage Issued to UI Personnel	4.0%	3.8%	4.9%	3.6%
Percentage Issued to UIHC Personnel	96.0%	96.2%	95.1%	96.4%

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.

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
	Surgery (improper use)	1
Lens of Eye Dose Equivalent	Surgery	2
Extremities Dose Equivalent	PET Imaging Center	2
Total Level I ALARA Exposures (4 falsely elevated due to improper dosimeter use)		8

Number Reports Exceeding ALARA Level II Action Levels

Whole Body Deep Dose Equivalent	Interventional Radiology (improper use)	1
Total Level II ALARA Exposures (1 falsely elevated due to improper dosimeter use)		1

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 personnel declaring a pregnancy who work in areas where radioactive materials are actively used.

- Thyroid Bioassays: EHS performed 8 thyroid bioassays. None of the thyroid bioassay results exceeded 10% of our 125 mrem committed effective dose equivalent ALARA limit.
- Urine Bioassays: EHS performed 1 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.

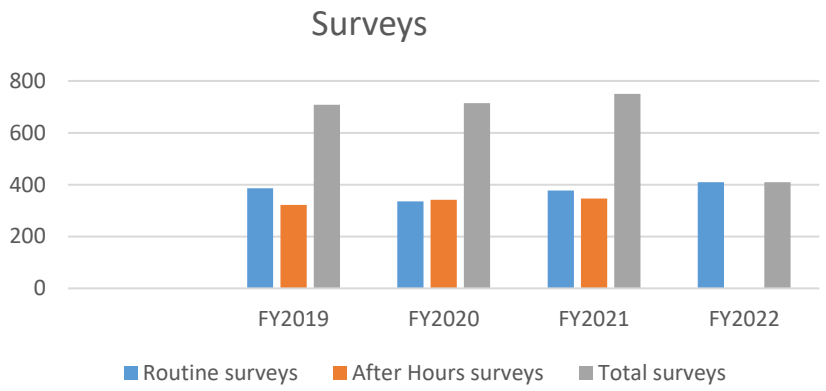
Based on the University's total annual radioactive material inventory from January 1 through December 31st, 2021, the CAP88 Program calculated an effective dose equivalent (EDE) of 4.97E-3 mrem to the nearest potentially exposed individual residing outside the University's facilities. This result demonstrated that airborne emissions from the University's radioactive material usage did not exceed 0.05% 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. With the recent shutdown of DAEC, it is unclear if these exercises will continue in the future.

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.

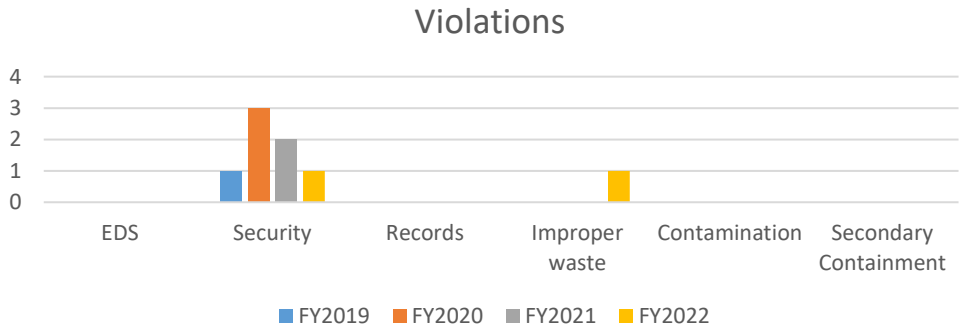
Room Survey Program

Radiation safety staff performed a total of 750 area and equipment monitoring surveys for academic labs and the UIHC. Surveys include routine laboratory audits, facility-decommissioning, posting/de-posting, pre-maintenance, spill response and post-iodination activities. After hours security checks were discontinued after speaking with IDPH; most labs are using card access and EHS staff were not finding issues. A comparison of the last four fiscal years is provided below.



Compliance Assessment Program

Currently there are 154 UI labs posted for non-medical use of radioactive material. A total of 2 regulatory compliance violations were observed by EHS during 409 routine surveys of non-medical use research labs conducted in FY22. The number and type of violations are noted in the chart below.



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.

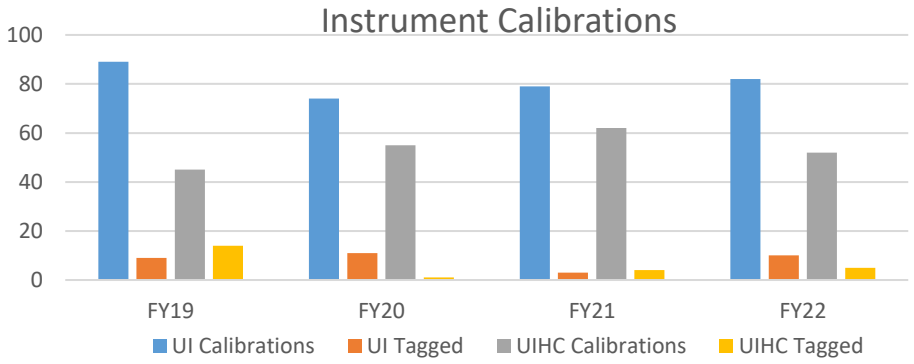
Activities and Accomplishments:

- Performed 141 ambient radiation level surveys and 283 physical inventories.
- A total of 12 new sources were added to the inventory while 19 sources were properly disposed of or returned to the original manufacturer.

- All sources were accounted for, and all 264 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 15 instruments were tagged out of service. A comparison of the last three fiscal years is given below.

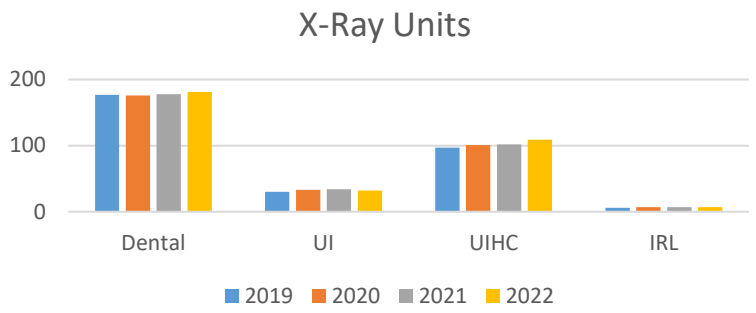


Machine-Produced Ionizing Radiation Safety Program

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

Activities and Accomplishments:

- Continued to provide mammography and computed tomography physicist services to UIHC annually and as needed following maintenance.
- Successfully completed American College of Radiology accreditation of Stead Family Children's Hospital CT unit. This will be due again in three years.
- Provided in-person fluoroscopy safety training for several departments at UIHC.
- Training new staff member in conducting x-ray unit compliance surveys at UIHC and UI.
- Received no violations during annual inspection of the mammography program by IDPH.
- Conducted X-ray compliance inspection surveys of medical and dental diagnostic X-ray units in service as well as the research related X-ray units and 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:

- Consulted and provided construction shielding plans for several x-ray rooms, including South Ortho Clinic, CT Room 8, and North Dodge Clinic which added a procedure room for doing mammography and fluoroscopy.
- Completed shielding plans and verification surveys for four new Adult Cath Labs.
- Performed initial x-ray unit and shielding verification surveys for the x-ray unit at the new UIHC Outpatient Clinic in Cedar Rapids.
- Provided shielding plans for a remodel and new equipment for OR Room 8 and OR 9.
- Provided shielding plans for 15 new x-ray rooms at the UIHC hospital under construction in North Liberty.

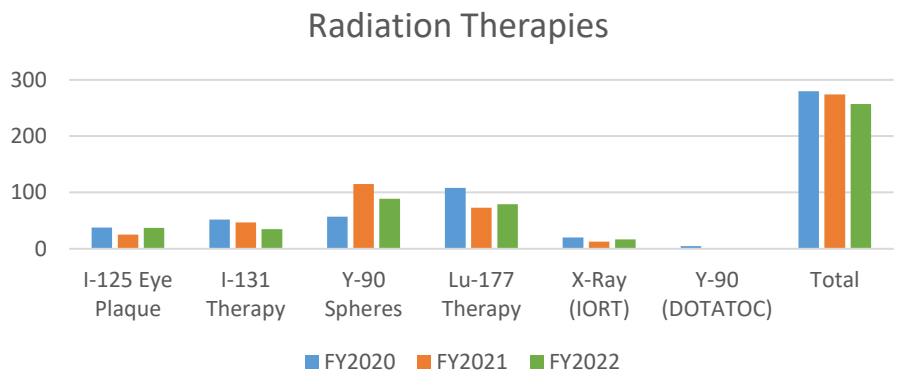
Radioactive Materials Procurement and Shipping Program
This program oversees the receipt, distribution and documentation for all radioactive materials delivered to the University. EHS provides shipping services for UI and UIHC to minimize the burden on users of radioactive materials. Shipping services include 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:

- A total of 156 items of radioactive material were processed and delivered to UI or UIHC facilities.
- EHS made 21 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 this FY.



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 134 research lasers registered with 55 investigators at the UI and 45 medical lasers registered to 12 departments at UIHC and IRL.

Activities and Accomplishments:

- The Assistant Radiation Safety Officer also serves as chair of the UIHC Laser Safety Panel.
- Performed laser safety audits for UIHC departments utilizing lasers.
- Continued work on implementing a standard Area Entry Control system for laser use areas within UIHC.
- Working to resume audits of basic research labs utilizing lasers.
- Working on a means to standardize the information from laser cases into EPIC.

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.

Number Processed	FY20	FY21	FY22
Patient Linens Decay-In-Storage (containers)	6	9	13
Sharps Decay-In-Storage (containers)	35	32	30
Dry Waste Decay-In-Storage (drums)	15	19	16
Dry Waste Incineration (containers)	50	52	78
TOTAL	106	112	137
Number Drums Eliminated from Radioactive Waste Burial	**FY20**	**FY21**	**FY21**
Dry Waste Decay-In-Storage	15	19	16
Sharps	2	2	2
Dry Waste Incineration	3	6	6
Total	20	27	24

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 and Administrative Services Coordinator with oversight provided by the OVPR 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 33,719 course completions. Additionally, there were 136 course completions recorded by Veterans Affairs staff; a slight decrease from the prior FY due to decreasing research staff, hospital retirements and areas being short-staffed.