Annual Report

Highlights from 2023

The University of Pennsylvania's Office of Environmental Health & Radiation Safety (EHRS) promotes health, safety, and environmental protection in teaching, research, health care, and administrative activities by providing services, advice, and compliance.

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We are excited to present to you the University of Pennsylvania Office of Environmental Health & Radiation Safety (EHRS) Annual Report for CY 2023. This past year has seen an increase in our research sphere, particularly with biological, animal, and clinical research. Our EHRS team has been involved with a wide range of services from inclusive planning and design, to permitting of new constructions, to maintaining a safe, compliant, and vibrant research and clinical environment across our many campuses.

As work has continued to surge past pre-pandemic levels, our EHRS team has a reinvigorated focus on hazard communications, training, outreach events, and relationship building between our team and the community. Our radiation team supports workers, patients, and environmental safety and compliance for the clinical side, spanning not only the Hospital of the University of Pennsylvania, Children's Hospital of Pennsylvania, but also the Penn Medicine/University of Pennsylvania Health System that includes locations, such as the Chester County Hospital in West Chester, Presbyterian Hospital, Pennsylvania Hospital and 35 outpatient and ambulatory care facilities. EHRS is also proud to support the research of 771 principal investigators involving the over 21,000 faculty and staff and approximately 29,000 students at Penn, as well as our tradespeople, animal care staff, librarians, housekeeping, and dining services staff.

Our office maintains Penn's broad scope radiation license, ensuring the safety and compliance of one of the largest clinical and research enterprises in the US. Our Environmental Health & Safety (EHS) team reviews biosafety, environmental hazards, laboratory safety, and occupational safety concerns. We are available for consultation on tasks ranging from chemical and biological experiments to cage washing, from ergonomics to equipment installation and maintenance and many more. Our team consulted in the planning, design, and permitting of new construction: notably 1UCity Square, Discovery Labs in King of Prussia, 3600 Civic Center Blvd, the Ott Center for Track & Field, and the Vagelos Laboratory for Energy Science and Technology. We work closely with federal, state, and local authorities as well as on campus partners to provide seamless operations, responsible construction, environmentally mindful waste disposal, safe working conditions, and 24/7 emergency response for radiological and laboratory incidents.

This report provides highlights of major projects completed this past year, as well as a look at the scope of our office's day-to-day operations, at a glance. We hope to share our accomplishments, triumphs and commitment to our ongoing mission at the University of Pennsylvania. We thank you for your enthusiastic and ongoing support of the work done at EHRS.

Sincerely,

Maureen O'Leary, PhD, MBA, CBSP
Associate Vice Provost for Research
Environmental Health and Radiation Safety
EHRS By The Numbers

Our 55 EHRS team members support the University's research and clinical enterprise. Here's a look at what that means!

- 30,522 Trainings
- 2,501 Lab Audits
- 1,125,044 lbs, up 15% Regulated Medical Waste/Sharps
- 195,914 lbs, up 22% Regulated Hazardous/Non-Haz
- 25,000 lbs, up 29% Radioactive

- 220,914 pounds of chemical and radioactive waste processed on-site
- 134,564 unique users on website
- 25,764 chemical material containers inventoried (total inventory = 147,545)
- 1,546 IACUC (Institutional Animal Care & Use Committee) protocols reviewed by EHRS
- 1,448 Material Transfer Agreements reviewed
- 771 research principal investigators
- 659 incident responses
- 84 laboratory close-outs
- 42 major construction projects

Waste Managed by EHRS:

- 2022: 1,125,044 lbs, up 15%
- 2023: 195,914 lbs, up 22%
- 2023: 25,000 lbs, up 29%
Scheduled to open in 2024, the EHRS team has lent their expertise to VLEST Project Managers, architects, and engineers to assess laboratory needs for the new facility, including a special emphasis on energy efficiency and accessibility. Our team has consulted on permitting, gas monitoring sensors, fume hoods, biosafety cabinets and much more!

Our team participates in early design meetings to ensure proper compliance and safety requirements are met from the outset of the project.

EHRS oversees the implementation of engineering controls, equipment, and infrastructure to support safe operations over the course of a construction project.

We check, verify and document safety equipment, infrastructure, and procedures as part of the commissioning of laboratory spaces and certify them suitable for work.

Ongoing work with this state-of-the-art building has involved steps to commission new labs for occupancy including permitting, consultation for monitoring systems, equipment checks and verification that all systems are functioning for safe and effective research in the new spaces. As more research spaces open, our EHRS team is committed to supporting and maintaining safe research.
Above: Biosafety Awareness Month engages students and staff

**Biosafety Awareness Month**

Biosafety staff teamed up to bring Biosafety Awareness Month to all departments involved in biological research. Through the month of October, the events featured hands-on activities, safety flair, and the opportunity to ask questions. With several hundred attendees across 10 events, researchers appreciated having a chance to interact with staff, establish relationships, win some prizes, and learn about PPE and waste disposal.

**Animal Hazard Briefings**

The Biosafety Programs provide support for animal research. Animal Hazard Briefings were created to ensure collaboration and promote a safe workplace among researchers and staff in Penn vivaria.

**New Faculty Visits**

To ensure a smooth transition for new Principal Investigators, EHRS offers customized new PI welcome visits. Lab safety, compliance, waste management, and required training are reviewed.

**Discovery Labs**

EHRS has continued to play a vital role in commissioning of new laboratory spaces in our Discovery Labs Facility in King of Prussia. Major projects have focused on laboratory ventilation, management of hazardous waste, gas monitoring systems, permitting, and support of researchers as they have begun to occupy the spaces in this facility.

**Biosafety Program Registration and Management**

- **801**: Biological Agent Registrations Reviewed
- **153**: Institutional Biosafety Committee Registrations
- **1171**: Biosafety Cabinets Managed
- **272**: Researchers Trained in Shipping of Hazardous Materials

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Environmental Programs

Ensuring environmental compliance, emergency response, and waste management across Penn’s campuses

Consultation

Environmental Programs provide comprehensive services encompassing a wide range of activities, ranging from simple odor complaints to tackling complex real estate and development issues. Real estate development matters often involve negotiations with multiple regulatory agencies and corporate partners, with a careful strategic approach to ensuring safe and sustainable practices that are seamlessly woven into the core operations of the University and Health System.

Compliance

The Environmental Programs group maintains Environmental Protection Agency air permit compliance (Title V) for the entire University and Hospital system.

With over 22,000 gallons of fuel in campus generators, we conducted over 300 inspections to verify compliance with underground and above ground storage regulations and wastewater permitting.

The EHRS team has contributed to 75 lab renovations, including renovations for new faculty, new building constructions, ADA compliance in laboratory settings, as well as countless projects associated with equipment installations.

Controlled Substances Disposal

Our Environmental Programs team hosted two events to allow for safe and responsible disposal of controlled substances from laboratory and clinical sources. A total of 70 registrants submitted 78 containers of controlled drugs for disposal, with additional services for our New Bolton Center and Discovery Labs campuses.

Waste Services

Our in-house waste collection team made 2,840 chemical hazardous waste collection visits, a 15% increase from last year, collecting and processing 195,914 pounds of hazardous and non-hazardous waste, a 22% increase from 2022. In these waste pick-ups, 26,176 waste containers were processed by the EHRS team.
Laboratories across campus use various gases and cryogenic liquids to support their research. Some gases and cryogens are inherently hazardous - toxic, flammable, oxidizing, or corrosive. Other gases are not inherently hazardous, but can displace oxygen, leading to an asphyxiation hazard. The Industrial Hygiene group reviews and assesses cryogen use on campus and works with researchers, Building Administrators, and FRES Project Managers to recommend appropriate gas monitoring systems, as appropriate. In 2023, we assessed 79 spaces for gas and cryogen monitoring systems as part of the 1U City, Discovery Labs, and Vagelos Laboratory for Energy Science and Technology (VLEST) projects.

Laboratory work presents sustainability challenges due to high levels of energy use, water consumption, consumables, and waste generation. In 2023, a Sustainable Labs Manager position was created to provide full-time support in addressing these challenges. This position is shared with our partners in Facilities & Real Estate Services (FRES) in the Penn Sustainability Office. Together with the Green Labs Executive Committee and Green Labs Working Group, we are excited to implement energy efficiency and waste minimization best practices through education and collaboration with Penn researchers.

New wearable color-changing sensors have been introduced to determine the effectiveness of chemical gloves and garments under actual use conditions. Using these new sensors, Industrial Hygienists tested gloves used in gross anatomy laboratories for their ability to protect against phenol while handling cadavers. No chemical breakthrough was detected, on the inside of the gloves, confirming that the gloves provide protection from dermal exposure to phenol during this activity. Additional sensors are available for solvents, acids, bases, and other common chemicals used on campus. Further glove assessments can be performed for employees all across campus, including facilities, housekeeping, and other laboratories.

The use of hazardous compressed gases (flammable, toxic, corrosive, oxidizing), explosive compounds, pyrophoric materials, and other high hazard materials, processes, or equipment requires a formal risk assessment and the development of a Hazard Control Plan (HCP). The HCP details the controls needed to minimize the risks of exposure, injury, or damage. The Lab Safety group focused on Hazard Control Plans in 2023, including revising the HCP template and identifying 68 labs where these plans were required, but not in place. HCPs are written by the lab group and reviewed by the EHRS Lab Safety and Environmental groups.

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Collaborating with the Penn community to maintain a healthful and safe place to work and learn

INCIDENT TRACKING FOR NEW BOLTON CENTER

The Occupational Safety group developed an incident reporting system for New Bolton Center.

Employees can scan a QR code that brings up a questionnaire to easily capture details. The responses are maintained in a database where a live dashboard keeps track of all the details. The database can be accessed by New Bolton Center senior administrators and EHRS. The data is valuable to identify trends and helps us to target resources to reduce injuries and illnesses. This system served as a model for reporting safety concerns at Quattrone Nanofabrication Facility, a multi-user facility serving the Penn community and external users.

CONTRACTOR SITE SPECIFIC SAFETY PLAN PROGRAM

A new checklist style contractor site specific safety plan (SSSP) form was developed and implemented. The SSSP requires construction/renovation contractors working at Penn to consider the hazards associated with the work they will be performing and document how the hazards will be mitigated. The program minimizes the potential for injuries to the contractors’ personnel and the Penn community.

WILDFIRE SMOKE RESPONSE

In response to unprecedented hazardous air quality caused by Canadian wildfires, Occupational Safety developed a wildfire smoke response matrix to aid University Groups to manage their operations during air quality alerts. EHRS took the lead and coordinated with senior leadership at Penn to develop the appropriate response actions for the various Penn groups. EHRS posted continually updated Air Quality Alerts, forecasts, and response recommendations on our website.
RADIATION SAFETY

Partner with research and clinical faculty, staff, and students to manage risks associated with radiation use

RADIOACTIVE MATERIAL SECURITY

Radiation Safety partnered with the Department of Energy’s Office of Radiological Security through an Irradiator Replacement Project to replace radiological sources with non-isotopic alternatives as part of the ongoing efforts to reduce radioactive materials. We also coordinated a tabletop exercise for the Philadelphia region with local, state, and federal emergency response agencies. Local drills involving the Hospital Emergency Response Teams and training on radiological emergency preparedness are ongoing.

ENERGIZED EQUIPMENT

Our staff work closely with Radiology and Radiation Oncology departments to provide quality control, compliance testing, and to support accreditation. Our team is charged with ongoing safety and compliance for 854 x-ray systems used diagnostically or in research and licensed for 16 accelerators for external beam therapies.

RADIOACTIVE MATERIAL USE

The Radiation Safety team provides support to Authorized Users who are using and developing radiopharmaceuticals in research, diagnostic, and therapy procedures. We also support the Cyclotron activities involving production of radioactive drugs. Therapies, such as Lu-177 Lutathera, Lu-177 Pluvicto, Ra-223 Xofigo, I-131 NaI and MIBG are performed by Nuclear Medicine departments. Y-90 Spheres procedures are performed in Interventional Radiology. In 2023, Radiation Safety participated in about 200 therapies, a 14% increase in 2022.

- **EMPLOYEES WHO RECEIVE DOSIMETERS TO MONITOR EXPOSURE**: 4,400
- **ACTIVE RADIOACTIVE MATERIAL RESEARCH LICENSES**: 101
- **IRB HUMAN SUBJECTS RESEARCH APPLICATIONS REVIEWED**: 1,575
- **PREGNANT WORKER COUNSELING SESSIONS HELD**: 58
- **HOSPITALS AND OUTPATIENT CARE FACILITIES SERVED**: 40

Above: Rooms prepared for radiopharmaceutical therapies

Partner with research and clinical faculty, staff, and students to manage risks associated with radiation use
The EHRS team has traveled locally and far away to share their expertise and learn from others.

Left: construction safety training for Trades Experience Program in the School District of Philadelphia; Center: Biosafety team attends and presents at Association for Biosafety and Biosecurity (ABSA) conference; Right: Industrial hygienists expand and share their professional knowledge at the American Industrial Hygiene Conference & Expo (AIHce)

This year, our team focused tremendously on connecting with our community: laboratory researchers, clinicians, Public Safety, Human Resources, and more.