11/12/2020

CASE WESTERN RESERVE UNIVERSITY

DEPARTMENT OF ENVIRONMENTAL HEALTH & SAFETY

RADIATION SAFETY
ANNUAL REPORT 2019-2020

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INTRODUCTION

Submission of this report is to the president and designated members of the senior administration of the University as required by the Radiation Safety Committee (RSC) Operating Guidelines and Case Western Reserve University's State of Ohio (Nuclear Regulatory Commission Agreement State) Broad Scope License. The report summarizes the activities of the Radiation Safety Office (RSOF) of the Department of Environmental Health & Safety (EHS) at Case Western Reserve University (CWRU). Its contents cover the period from 7/1/2019 – 6/30/2020.

SUMMARY

DEPARTMENT STRENGTHS

The RSOF is comprised of a staff with extensive and diverse backgrounds who can address and resolve a wide range of issues faced in radiation safety at CWRU. The RSOF has developed programs that meet or exceed regulatory requirements. These programs proactively anticipate new safety requirements by promulgation of new programs. The success of these agendas is enhanced by excellent administrative support.

DEPARTMENT OPPORTUNITIES

The RSOF enjoys excellent interaction with other departments that are developing safety-related initiatives and outside agencies that are dedicated to improving environmental quality in our facilities.

RADIATION SAFETY ACCOMPLISHMENTS FOR 2019-2020

Over the past year, the Radiation Safety division of EHS continued to improve the effectiveness of the Radiation Safety program. Notable new accomplishments included:

- Dosimetry: the reduction of unreturned badges is ongoing.
- X-Ray: the transfer and disposal of old Dental equipment is ongoing.
- Waste Program: visit of waste disposal sites has been postponed due to COVID-19.
- Generated in-house savings accrued from meter calibration, recycling and decay-in-storage programs amounting to more than **$18,530 in 2019-2020** through its services to the research community at CWRU.

RADIATION SAFETY GOALS FOR 2020-2021

The continuing goal of the Radiation Safety program is to position EHS for more effective interaction with the educational and research goals of the University through training and training development. A secondary goal is to increase the positive impact of CWRU safety programs on the surrounding community through educational and programmatic interaction with local partners and emergency responders. Specific efforts currently address:

- Dosimetry: Cost savings by reducing quantity of unreturned badges. Operations review of badge program through virtual tour of Landauer Facilities
- X-ray program: Monitor Ecology Services by virtual visits of Waste Facilities.
- Training: Improve Zoom virtual training by a hands-on demonstration shown via WebCam.

- Meet virtually with Cleveland Clinic radioactive materials (RAM) program leaders to examine new joint program interfaces that may arise in the new medical school. Follow up with individual tours of specific operational areas.
- Joint inclusion of a Cleveland Clinic program representative on the CWRU Radiation Safety Committee to complement opening of new Facilities at Cleveland Clinic location.
- Examine and evaluate status of joint program relationships with University Hospitals (UH) Radiation Safety with necessary changes in dual user relationships.
- Assist with development of new radiation and irradiator usage programs as the Cancer Center Irradiator usage program evolves under new leadership.
- Integration of radiation generating equipment training and usage at the new Dental School at its Cleveland Clinic location
- Finish decommissioning of radiation generating equipment at old Dental School location on CWRU Campus.

OHIO DEPARTMENT OF HEALTH LICENSE

CWRU has one Ohio Department of Health (ODH) Broad Scope license. The license covers possession and use of both nuclear accelerator-produced radioactive material (RAM) and naturally occurring RAM for experimental purposes. It also facilitates licensed use of four irradiators. A Broad Scope license site visit was last conducted by ODH on 10/16-17/2019.

The University has two ODH RGE registrations. The registration covers the receipt, possession, use, storage and disposal of radiation generating equipment including dental X-ray machines, X-ray diffraction units, and fluoroscopy units. The last ODH RGE (X-ray) inspection was conducted on 7/21-22/2020.

ODH LICENSE	EXPIRATION DATE	PURPOSE
011-011800-11	January 1, 2025	Broad Scope License
09-M-06944-12	May 31, 2021	Radiation-Generating Equipment Registration (All)
06-E-06944-020	May 31, 2021	Radiation-Generating Equipment Registration (Mobile Units)

DECOMMISSIONING FUNDING PLAN

The Broad Scope license and the Decommissioning Funding Plan became effective 2/25/2020. The University was required to maintain a standby letter of credit to cover possible costs if the University's Broad Scope license is required to undergo rapid decommissioning. The expiration date for the standby letter of credit was 2/28/2020. Funds required for this letter of credit depended on the kind and amounts of RAM maintained in active use or waste by the University. Experimental procedures now use more sensitive methods that increasingly require less RAM and the University now operates under an agreement with ODH that requires no letter of credit but is dependent on the University good financial standing. This agreement covers all possible decommissioning costs for RAM located at the University as long as the University's credit rating is maintained.

RADIOACTIVE MATERIAL USE AND STORAGE LOCATIONS

RAM is located at the following facilities:

- Main campus of Case Western Reserve University, 10900 Euclid Avenue, Cleveland, Ohio
- University Hospitals (UH), 2065 Adelbert Road, Cleveland, Ohio
- Wolstein Research Building (WRB), 2103 Cornell Road, Cleveland, Ohio

- Health Education Campus (HEC) Dental Clinic, 9601 Chester Ave., Cleveland, OH 44106
- Health Education Campus (HEC) Main Bldg, 9501 Euclid Ave., Cleveland, OH 44106

RAM is received and/or stored at the following sites:

- Shipping and receiving, 2232 Circle Drive, Cleveland, Ohio
- Wolstein Research Building, 2103 Cornell Road, Cleveland, Ohio
- Health Education Campus (HEC) Dental Clinic, 9601 Chester Ave., Cleveland, OH 44106
- Health Education Campus (HEC) Main Bldg, 9501 Euclid Ave., Cleveland, OH 44106

PURPOSE FOR RAM USE

The majority of isotope used at the University is for biomedical research. The most typical isotopes used are ^{14}C, ^{3}H, ^{125}I, ^{32}P, and ^{35}S. Isotopes used in sealed sources contained within irradiators, scintillation counters, gamma counters, check sources and calibration standards are most commonly ^{137}Cs, and ^{133}Ba.

RADIATION SAFETY PROGRAM – RESPONSIBLE PARTIES

RADIATION SAFETY COMMITTEE

The RSC sets policy for the use of RAM for the University Committee. Members of this Committee are appointed by the president of the University and have responsibility for monitoring and enforcing compliance with the University's Radiation Safety Program as outlined in the University's Ohio Department of Health (ODH) Broad Scope license. Radiation Safety Committee members are chosen from diverse disciplines to provide comprehensive expertise. The Committee reviews all applications for use of RAM.

The 2019-2020 Radiation Safety Committee membership and their affiliations are listed below. The ODH is informed of committee membership changes. The Committee is also aided by input from ex-officio (non-voting) and visiting members (non-voting).

VOTING MEMBERS

Dr. Thomas McCormick Dept. of Dermatology BRB 530 LC - 4926 Term Expires: 10/15/2020 Chairperson Term Expires: 10/15/2020	Dr. W. David Sedwick Radiation Safety Officer (RSO) Dept. of Medicine Emeritus EHS - Service Building, First Floor LC – 7227 Term Expires: ongoing	Dr. Tomoaki Ogino Dept. of Molecular & Microbiology HG Wood 207F LC - 4960 Term Expires: 10/17/2021 (Left CWRU 4/1/2020)
Dr. Colleen Croniger Dept. of Nutrition BRB 925 LC - 4954 Term Expires: 10/1/2022	Dr. Eckhard Jankowsky Dept. of RNA Center HG Wood 137 LC - 4973 Term Expires: 10/1/2022 (Left RSC 7/1/2020)	Dr. Donny Licatalosi Dept. of RNA Center HG Wood 106 LC - 4973 Term Expires: 10/17/2021
Dr. William Schiemann Dept. of Comprehensive Cancer Ctr WRB 2131 LC - 7284 Term Expires: 10/15/2020 (Left RSC 7/1/2020)	Dr. Saba Valadkhan Dept. of Molecular & Microbiology HG Wood 210A LC - 4960 Term Expires: 10/1/2022	Dr. Suhrim Fisher Animal Resource Center BRB RB5P LC - 4925 Term Expires: 10/15/2020

EX-OFFICIO MEMBERS

Richard Jamieson Vice President Dept. of Campus Services Administration Adelbert Hall 229 LC - 7173	Felice T. Porter EHS Asst. Dir./Asst. RSO Quality Assurance Specialist Service Bldg., First Floor LC – 7227	Marc Rubin EHS Senior Director Service Bldg. First Floor LC – 7227
Bruce DeMeza University Hospitals Asst. RSO Bishop S621 LC - BSH 5056	R. Michael Sramkoski Senior Research Associate & Laser Specialist Comprehensive Cancer Ctr WRB 3405 LC – 7285	Joseph Nikstenas EHS Laser Safety Officer & Safety Specialist Service Bldg. First Floor LC - 7227

SUPPORT STAFF

Naomi Boles Department Assistant Service Bldg. First Floor LC - 7227

The Radiation Safety Committee acts as an advisory and enforcement body to ensure that all RAM are safely used in accordance with the 'As Low As Reasonably Achievable' (ALARA) principles. The Committee conducts audits each trimester which address programmatic compliance. The RSC also conducts an annual audit in which the entire program is reviewed. The audits ensure:

- Specific program components conform to the licensed program as described in the CWRU Radiation Safety Manual and License.
- Maintenance of accurate documentation of program conformance and license compliance is maintained.
- Adequate training is provided for all classes of workers.
- Oversight for RSOF activities is maintained through RSC familiarity with the daily function of the University Radiation Safety Program.

The Committee met on 4 occasions during the 2019-2020 fiscal years to review applications for radioisotope use and action on other business. Eight RSC meetings were cancelled because agenda items did not require immediate address. Three of these meetings were canceled during the COVID-19 school closure of March to June 2020. The minutes of the RSC meetings and executive committee actions are available in the RSOF, through the RSC, or through the University's administration.

APPLICATIONS	**19/ 20**	**18/ 19**	**17/ 18**	**16/ 17**	**15/ 16**	**14/ 15**
New AU	0	2	3	3	1	3
Additional Isotopes	2	1	2	0	2	2
Radioisotope use in Animals	1	0	2	2	4	1
Sealed Sources	0	0	1	5	0	6
Sealed Sources Update	2	2	1	0	0	0
AU Reactivation	0	0	0	0	0	0
Possession Limit Increase	0	0	0	0	0	2
AU Protocol Update	3	16	4	7	2	7
TOTAL APPROVALS	8	21	13	17	9	21

Major topics acted upon or discussed by the RSC:

- Dr. Tomoaki Ogino resigned from the Radiation Safety Committee and left CWRU effective 3/31/2020. (3/2020)
- The Chairperson and RSO conducted a search for new committee members. (3/2020)
- The CWRU Broadscope License was timely renewed by Ohio Department of Health. (3/2020)
- Quarterly audits are in April 2020. (3/2020)
- Although the University has planned and continues execution of its response to the Coronavirus Pandemic, CWRU Research will ramp down. This effort will continue for students and staff. (3/2020)
- Non-essential personnel were told to work from home.
- No high doses and no fetal monitoring. (1/2020)
- RSC Quarterly Audits are due January 28, 2020. (1/2020)
- ODH Broadscope License is Timely Renewed. (1/2020)
- Radiation Order Incident spurned review of P-cards for the last two years. (1/2020)
- IRR Quarterly check in progress. (1/2020)
- IRR Door repair. (1/2020)
- Past due Radiation/Ancillary Radiation Training follow-up is going well. (1/2020)
- HEC Dental, Old Dental School, & HEC Main X-Ray Inventory review was in progress. (1/2020)
- Laboratory signage update was in progress. (1/2020)
- ODH Safety Culture Brochure handout was reviewed. (1/2020)
- Presentation of Annual Report for 7/1/2018-6/30/2019. (11/2019)
- Joseph Nikstenas attended the LSO refresher training in September 2019. (11/2019)

- Laser power equipment arrived. (11/2019)
- Enclosed Laser instruments were logged into the database. These are eye-safe and not maintained by the owner. EHS tracks these instruments in inventory only, and Laser training is not necessary for their use. (11/2019)
- October 2020 meeting was canceled due to Ohio Department of Health (ODH) inspections. (11/2019)
- 63rd Health Physics meeting was held with approximately 1000 in attendance. (11/2019)
- The Radiation Waste facility was cleaned out of disposable waste and unusable radiation safety equipment. (11/2019)
- EHS has switched its software from Blackboard to Canvas. (11/2019)
- Several Construction projects are going well including the new Residents hall, Fribley Commons. (11/2019)
- A laser powered meter was ordered for the new Dental School. (9/2019)
- The Radiation Generating Equipment State inspection was scheduled for October and will involve 2 new inspectors. (9/2019)
- There were no high dose reports. (9/2019)
- Dental School notices were submitted to ODH. We are tracking new and refurbished equipment, while also tracking units taken from old Dental School. (9/2019)
- The HEC main area now has room with medical beds and units. It was suggested that the HEC conference room glass be frosted for confidentiality. (9/2019)
- Visits will be made to the laboratories prior to state inspections. (9/2019)

SENIOR MANAGEMENT

The Radiation Safety Program monitors, inspects, and audits RGE and source used by AUs and their personnel. Senior management oversight and support of radiation safety-related activities is guaranteed by attendance of the vice president for campus security at all RSC meetings. The RSC conducts independent audits of the Radiation Safety Program. The RSOF staff immediately responds to audit findings. Audit findings and responses are reported to senior management and the Committee. Richard Jamieson, Vice President of Campus Services, continues to provide direct administrative representation for Radiation Safety Programs. In the absence of Richard Jamieson, Marc Rubin, EHS Senior Director provides administrative representation.

RSOF AND AUTHORIZED USERS (AUs)

The AU and RSOF share responsibility for safety. The AU is directly responsible for the safe use of RAM in the laboratory. The Radiation Safety Office is responsible for ensuring that appropriate safety procedures are implemented and that AUs are fulfilling their responsibilities for monitoring safety during experiments carried out in their laboratories. Audits of laboratories are conducted by the RSOF to ensure compliance with CWRU's license. The audit program includes routine unannounced inspections of each AUs' laboratory.

ADMINISTRATIVE CONTROLS

Administrative controls are established and approved by the RSC for laboratories where RAM are/is used. Controls include signage, training, laboratory access and dosimetry. Written procedures document procurement, use, and the disposal of all RAM at the University.

General safety compliance enforcement procedures prescribe sanctions for those who jeopardize safety or the continued favorable relationship between the University and the ODH. These procedures are designed to encourage the participation and cooperation of users of RAM and to promote safe use of such materials in a manner consistent with the rules and regulations of the ODH as interpreted by the RSC and the RSOF.

There are three classes of violations defined as minor, moderate, and major severity.

Minor severity violations are listed under the following categories:

- Improper laboratory records
- Noncompliant RAM use and storage
- Maintenance of an unsafe laboratory environment

Moderate severity violations include the following:

- Food/cosmetics in laboratory
- RAM unsecured
- RAM in unauthorized areas
- Unapproved radiation laboratories
- Unapproved disposal of radioactive materials
- Unidentified contamination
- Failure to respond to written notices from the Radiation Safety Office

Major severity violations include the following:

- Falsification of records
- Unreported loss or theft of RAM
- Unapproved transfer of RAM

There were no major severity violations assessed over this year. Of the moderate violations listed below, 2 were the result of unsecured RAM found during after-hours security checks and routine compliance reviews. No laboratories were assessed a moderate violation that had three or more minor violations during three compliance reviews by Radiation Safety during routine audits. Documented follow up and resolutions were completed for all major & moderate violations.

VIOLATIONS	19/20	18/19	17/18	16/17	15/16	14/15
Minor	19	38	43	70	78	81
Moderate	2	17	13	11	10	13
Major	0	0	0	0	0	0
Total	21	55	56	81	88	94

The assistant RSO, the RSOF staff and the RSO have updated and revised most of the department manuals, training, licenses, certificates and standard operating procedures in 2019/2020.

AU CATEGORIES:

RADIATION ACTIVE

AUs who actively use RAM are “radiation active” (RA). Laboratories of these AUs are inspected by the RSOF three times per year. Audits are more frequent if there are particular concerns in a laboratory. A listing of AUs and their RAM can be found in the Appendix.

RADIATION INACTIVE

These AUs do not currently use or possess RAM.

RADIATION ACTIVE STORAGE MODE

AUs who did not actively use RAM, but who wish to maintain their RAM inventory will, by their request have their inventory placed in storage mode status this fiscal year.

DEPARTED (D)

AUs who no longer carry out research at CWRU, and whose laboratories have been decommissioned for RAM use, have been placed in the departed category this fiscal year.

AUs	19/20	18/19	17/18	16/17	15/16	14/15
RA	44	47	49	50	54	62
SM	16	18	20	15	20	8
RI	2	2	7	5	5	3
D	2	3	5	5	2	6
Total in Program	64	70	69	65	74	70

MASTER ISOTOPE LIST

The master isotope (see APPENDIX) list shows the University’s isotope inventory, the sum of the AUs’ inventory (excluding sealed sources) and the sum of the AUs’ possession limits relative to the National Regulatory Commission/ODH registration limit.

AU RADIOISOTOPE INVENTORY

The Radioisotope Inventory Report (see APPENDIX) lists researchers along with the amount of RAM material each is authorized to use, each AUs’ possession limits and the activity of isotopes on hand.

RADIATION SAFETY OFFICE (RSOF)

STAFFING

The RSOF operated under University approval with the following positions:

RSO (1)
Department Assistant (1)
Student (1)
Specialist Positions (4)
Asst. Director/Asst. RSO/Quality Assurance Specialist (1)

Training and education are central to our department's goal in developing diversified skills among our personnel who are required to respond to safety incidents and for maintenance of regulatory mandates. Specialists are encouraged to attend training and continuing education. Seminars, training and conferences attended or completed during 2019-2020 included radiological instrument training, RCRA selected hazardous waste training, 8-hour HAZWOPER refresher training and hazardous materials transportation security awareness.

EHS staff are responsible for maintaining the EHS website that houses all online departmental training programs and schedules, safety manuals, safety newsletters, safety data sheets and safety information resources. The website is an essential resource for the campus community that requires continuous updating. The OnSite database monitors and backs up all departmental information.

EHS EMAIL

Since implementing the EHS email (https://case.edu/ehs/ and cwruehs@gmail.com), the number of inquiries and safety concerns raised by CWRU personnel has averaged fifteen emails per day. This communication has led to swift response and follow-up of safety concerns reported by our user community.

To report concerns of unethical activity, employees may contact the Integrity Hotline and provide information anonymously. They may call 866.483.9367 or go to https://www.caseintegrityhotline.com. They are encouraged to give the date, time, location and any other pertinent information concerning the incident.

TRAINING SESSIONS

It is the responsibility of the RSOF to ensure that individuals using RAM are adequately trained to keep doses to personnel and releases to the environment per ALARA. The RSOF provides training for all personnel that use RAM or RGE/X-ray. Initial training must be completed before use of any radioactive materials or RGE/X-ray equipment. Annual retraining is required for the continued use of RAM. Ancillary workers (non-radiation workers), who occasionally have contact with RAM, are retrained annually. Personnel that are trained include:

AU

An AU is a faculty member who has been approved by the RSC to use RAM.

RADIATION WORKER

A radiation worker is any person who uses RAM under the supervision of an AU.

ANCILLARY WORKER

An ancillary worker is a non-radiation worker who may have contact with laboratories or classrooms where RAM is used. This includes individuals working in facility services, protective services, In-house and contract custodial services, shipping/receiving, the ARC and research department assistants. During orientation, non-laboratory personnel are required to attend training that includes a radiation safety component.

RADIATION GENERATING EQUIPMENT (RGE) WORKER

An X-ray Worker is any person who uses RGE as part of the research program of an AU.

IRRADIATOR USERS

Personnel using irradiators are required to attend initial radiation safety training conducted by the RSOF and site-specific training with the manager of the irradiator. An irradiator worker is any person who has met the requirements for unescorted room access, including background and fingerprint checks, radiation safety training, and site-specific laboratory safety training.

TRAINING

The RSOF keeps a record of all dates of training, attendees, and content of training. Records of refresher training offered online are also maintained. Classes and online sessions attended are essential components of CWRU's safety philosophy. Training is audited on a monthly basis by the assistant RSO to ensure compliance.

New isotope user training classes are offered at least two times per month. Annual radiation safety retraining is done online. X-ray training classes are conducted once a month. AUs are responsible for machine and performance-specific annual refresher training for workers who use X-ray equipment in their laboratory programs. Fluoroscopy users are required to complete a fluoroscopy training module (kindly provided by UH Cleveland Medical Center) in addition to the general X-ray and site-specific trainings. Fluoroscopy Right-To-Know training is provided on an as-needed basis to individuals who desire to observe fluoroscopy procedures. Additionally, there are monthly training classes for users of Class 3B and Class 4 lasers. The RSOF requires annual retraining for all workers involved with these units and this training is offered online.

All non-laboratory personnel are required to attend hazard communication and ancillary radiation training. Groups trained now include custodial, plant, ARC, shipping, security departments, and contractor workers. Employees who do not complete training are restricted from working in areas where RAM are used.

TRAINING	19/20	18/19	17/18	16/17	15/16	14/15
Radiation	108	143	133	118	61	92
Online Retraining	298	398	342	349	563	615
X-ray	12	32	22	43	58	50
Ancillary	725	1561	710	741	619	279
Laser	58	66	59	40	46	41
Laser Online	48	40	68	22	67	27

Over 2,249 laboratory workers were trained through the Radiation Safety Program in 2019-2020.

FACILITIES AND EQUIPMENT

CWRU administration and the RSC ensure that appropriate facilities, equipment, and trained personnel are available for the safe operation, storage, and disposal of licensed material. The RSO and assistant RSO are responsible for overseeing the review of applications and inspection of all facilities, equipment, and personnel that use licensed material. Facilities that are available at CWRU for the use of licensed material include:

AW Smith	Bingham	Biomedical Research
Bishop	Bolwell	DeGrace
Old Dental	Glennan	HG Wood
Lerner Tower	Kent Hale Smith	Med East/Robbins
Millis	Olin	Pathology
RBC	Rockefeller	Service
Wearn	West Quad (CCSB)	White
Wickenden	Wolstein Research	Wood Research Tower
HEC Main	HEC Dental	

LABORATORIES

There are 267 laboratories on campus equipped to use licensed material and equipment. The laboratories typically include chemical safety hoods, survey meters, protective clothing, analytical detection and measurement equipment, waste receptacles, and decontamination supplies.

LABORATORY USE	# OF ROOMS
Radiation	92
X-ray	56
Laser	119

Radiation Safety Office (RSOF)

Facilities and equipment used by the RSOF to support laboratory inspection or isotope storage are located in the Service Building on the first floor, the School of Medicine (DOA990) and the Wolstein Building (1118, 1119, & 1120).

RSOF Laboratory:

The RSOF is located in the Service Building on the first floor, 2220 Circle Drive. The laboratory in the RSOF is equipped with a Perkin Elmer Tricarb 4910 liquid scintillation counter (additional machines are located in both radioactive waste facilities) and a Packard Cobra II Auto gamma counter. The RSOF maintains bioassay equipment consisting of a single-channel analyzer and a detector for monitoring thyroid uptake of ^{125}I. The department also has a multi-channel analyzer with a sodium iodide detector. These instruments are used for bioassays and the quantification of air samples for Environmental Protective Agency (EPA) audits as well as for identification of unknown isotopes found during radiation inspections. The RSOF laboratory also houses a chemical hood, survey meters, an MCA that was upgraded (2016) to a USB version, new software & computer, decontamination supplies and essential analytical and calibration equipment. A Perkin Elmer 2470 automatic gamma counter (Wallac Wizard 2) was acquired and is in process of getting set up.

Radioactive Waste Facilities:

Medical School Waste Facility (DOA990):

This facility has a separate office and a process/storage room for radioactive material and disposal activities. This facility is maintained at negative pressure and has a filtered air exhaust system, although the fans have not been used for years. It also has a waste compactor (in storage), waste shredder (in storage), chemical and walk-in hood, survey meters, liquid scintillation counter, air monitoring equipment, and emergency response equipment. The liquid scintillation counter was replaced due to water damage in 5/2018.

The storage area contains racks for the proper storage of solid and liquid waste. Waste streams consist of dry solid, bulk liquid, and liquid scintillation vials. Dry solid waste and the liquid scintillation vials are packed in 55-gallon poly/fiber drums. Liquid waste is stored in five-gallon carboys and placed in spill trays to contain leakage. The floor of the waste facility was repaired for cracks and resurfaced in 2/2016. Radioactive animal carcasses are kept in a designated freezer in the ARC until they are disposed. More than half of the racks, which were not being used, were disassembled in 2017. Also, old, broken, and unwanted equipment and materials were disposed.

Wolstein Building Waste Facility:

Room 1120 in this facility is a counting room that also contains a chemical hood. Room 1119 contains a walk-in chemical hood and liquid process/storage area, and Room 1118 is used for solid process/storage activities. The liquid process/storage area and solid process/storage areas are used for short-term storage only. This area maintains negative pressure relative to surrounding building spaces.

Room 1120 has also been developed as a combined chemical and RAM emergency response center. It contains spill supplies, a liquid scintillation counter, survey meters for both count and dose rates, a computer that provides access to our OnSite web database and safety data sheets in the event of radioactive/ chemical spills.

IODINATION EQUIPMENT

Special hoods, air pumps and activated charcoal-filter exhausts are placed in laboratories that conduct iodinations. Four iodination hoods are in storage. In 2014, one iodination hood was loaned to an associate facility and in 2016, the hood was donated to the Scripps Research Institute. Their locations are as follows:

WRB 1119 - Radiation Waste Facility Storage (1)
DOA 990 – Storage (3)

ANIMAL RESOURCE CENTER

Conventional animal care facilities are located in the Robbins Building, Wearn Building, MetroHealth Hospital, the Small Animal Imaging Research Center and the Wolstein Research Building. These facilities are used by AUs to conduct animal studies with radioactive, chemical, and biological materials. A variety of animals (mice, rats, hamsters, rabbits, groundhogs, ferrets and large animals such as sheep, dogs and pigs) are housed in the Robbins building as needed. The Wearn and Wolstein facilities predominantly house mice and rats. Contaminated items are stored in the ARC freezer in Robbins until disposal. Animals used in studies involving radioactive materials are not housed in the Wolstein facility. A major renovation was completed in the Robbins Building during 2009 which included the addition of an ultra-barrier facility. One irradiator behind the ultra-barrier is currently not in use.

EQUIPMENT CALIBRATION

Annual calibration procedures consist of an electronic assessment of survey instruments, plus a measurement of their performance using calibrated isotope reference standards. Survey meters that require dose rate calibrations or repairs are not calibrated by the RSOF. These instruments are sent to an appropriate vendor by the AUs' laboratory. Instruments requiring simple repairs are repaired in-house.

The Packard Auto Gamma 5000 counter in the Service Building's radiation laboratory was replaced by a Packard Cobra II auto gamma counter in 2016. Due to a water leak from the DOA990 ceiling, the LSC in DOA990 office sustained water damage and was replaced through the University insurance claim. The new Perkin Elmer Tricarb 4910 replaced the Packard 2100TR Liquid Scintillation Counter in 5/2018. The old LSC in the Radiation laboratory was moved to the WRB laboratory, while the WRB LSC was moved to DOA990 Office. The gamma counter calibrations are conducted monthly for the EHS radiation laboratory and as needed for the Liquid Scintillation Counters in the radiation laboratory, DOA 990 and WRB 1119. The continuous air monitor (CAM) and the connected air pump in DOA 990 are out of service and calibration is on hold. The LSCs in the radiation laboratory, WRB 1119 and in DOA 990 were serviced and cleaned.

RADIATION SAFETY PROGRAM

PURCHASE OF RADIOACTIVE MATERIALS

AUs and their approved designees purchase radioactive material. All radioactive isotope purchases must be approved by the RSOF before the order is processed through purchasing.

AUs must be approved for the isotope and the quantity of isotope ordered. The activity, when added to the AUs' existing inventory, cannot exceed the AUs' approved possession limit for that isotope. Replacement shipments, trial kits and free samples also must be approved by the RSOF. All deliveries are sent to the shipping and receiving for RSOF inspection and clearance before delivery to the AUs' laboratories.

TRANSFER OF RADIOACTIVE MATERIALS

The RSOF reviews and approves the transfer of all RAM internally (on campus) and externally (off campus) to, or from, an AU. Before initiating a transfer, either the internal or external transfer form must be completed and forwarded to the RSOF for approval. There were 63 isotope transfers approved this year.

RECEIPT OF RADIOACTIVE MATERIALS

Every package of radioactive material is inspected by the RSOF for contamination, dose rates and evidence of damage or breakage. If a package is contaminated or has dose rates greater than 10 mR/hr at 1 meter or 200 mR/hr at the surface, the package is held by the RSOF and the laboratory is contacted. An inspection sticker and the RAM package receipt form is placed on the package to confirm that inspection has been completed by the RSOF. The campus mail group delivers packages to most laboratories. Laboratories located across Adelbert Road or Cornell Road use direct pickup. Direct pickup by a laboratory designee alleviates the need to complete the Bill of Lading since the package is carried to the laboratory and not transported in a vehicle. The AU or designee is required to survey all radioactive material packages upon receipt for contamination and evidence of damage or breakage.

Radioisotope use, for biomedical research, results in frequent movement of radioactive materials to and from the campus. The Broad Scope license requires that shipments be surveyed within three hours of arrival. In the past year, 86 isotope shipments were inspected and approved by the RSOF upon receipt on the campus. A few shipments/transfers off campus were also made by laboratories. The RSOF assisted these laboratories by making sure that paperwork was properly prepared and proper labeling was used on the packages.

DISPOSAL OF RADIOACTIVE MATERIALS

Exclusive of decay of isotope in laboratories and minor inventory changes, isotopes were removed from laboratories by either 100 isotope waste pickups by the RSOF staff or by 35 AU-directed disposals into the sanitary sewers. The following table presents a breakdown by isotope of radioactive materials entering and leaving laboratories.

ISOTOPE	ORDERS		TRANSFERS	
	#	mCi	#	mCi
^{133}Ba	0	0	0	0
^{11}C	0	0	12	129
^{14}C	2	0.25	0	0
^{109}Cd	0	0	0	0
^{57}Co	2	7.37	0	0
^{60}Co	0	0	0	0
^{137}Cs	0	0	0	0
^{18}F	0	0	26	230
^{68}Ga	0	0	17	111.8
^{68}Ge	3	0.36	0	0
^{3}H	1	0.002	0	0
^{124}I	1	1.6	0	0
^{125}I	0	2.0	3	0.346
^{54}Mn	0	0	0	0
^{22}Na	0	0	0	0
^{32}P	73	292.8	2	0.4
^{33}P	0	0	0	0
^{35}S	4	32.58	0	0
^{99m}Tc	0	0	3	0.6
^{233}U	1	0.0005	0	0
^{238}U	1	0.00001	0	0
^{65}Zn	0	0	0	0
Total	86	335.2	63	471.55

RADIOACTIVE MATERIALS	19/20	18/19	17/18	16/17	15/16	14/15
Orders	86	131	137	164	193	241
mCi	335	444	363	383	578	732
Pickups	100	106	44	176	306	250
Sewer Disposals	35	37	21	53	69	50
Transfers	63	110	85	123	77	61
mCi	471	227	641	462	173	814

SEALED SOURCES

CWRU's sealed source inventory contains 84 sealed sources. Of these, 78 sealed sources are required to be inventoried every six months. Six sealed sources require six-month leak tests as stated in our ODH license. This includes six gamma sources.

There are three high-dose irradiators and two low-dose irradiators on campus. Both of the low-dose irradiators and one of the high-dose irradiators are not in use. There are two active high-dose irradiators. These irradiators are the only radioactive material sources that could produce significant external dose hazards should their shielding be compromised.

See the Appendix for a list of sealed sources on campus. These sources are not included in the general summary reports for radioactive materials. This fiscal year, three sealed sources were returned to the manufacturer, one sealed source was shipped to another university, thirteen sources were disposed by Ecology Services, and eleven new sources were received. The

RSOF has actively encouraged AUs to dispose of sealed sources for which there is no anticipated use.

INVENTORY	19/20	18/19	17/18	16/17	15/16	14/15
Sealed Sources	84	82	86	94	93	93
Exempt	78	76	79	89	88	88
Irradiator	3	3	3	3	3	3
Neutron	0	0	1	1	1	1

IRRADIATORS

Five licensed low-to-high activity radiation sources are possessed for biomedical and other research. These include three high dose irradiators that contain ^{137}Cs sources and two low dose irradiators when charged with ^{192}Ir and ^{60}Co (out of service). Currently, two high dose irradiators are in use and the third is out of service. The ^{60}Co irradiator is now considered low dose. There were 5 new sources added, one source shipped to another location, and 2 sources disposed. There were 19 irradiator users. Of these, 2 were new users and 6 had access removed.

The number of Individual workers authorized to use irradiators are shown in the following table.

IRRADIATOR	19/20	18/19	17/18	16/17	15/16	14/15
Total Workers	19	20	26	34	30	38
Total Active Irradiators	2	2	2	2	2	2

RADIATION SURVEY METER CALIBRATIONS

CWRU's ODH Broad Scope license requires annual calibration of portable survey meters. Properly calibrated meters are necessary for laboratories to perform accurate radiation surveys. AUs are responsible for the annual calibration, maintenance and repair of their survey instruments. Count rate calibrations on survey instruments and minor repairs are provided by the RSOF as a free service. The EHS provided in-house services that generated $9,600 in cost savings over the fiscal year in lieu of using outside vendors.

CALIBRATION/ SERVICE	COST PER SERVICE	COST SAVINGS
55 meters	$100/meter	$5,500
10 Rad Eye meters	$200/meter	$2,000
1 pumps	$100/pump	$100
16 thyroid assays	$100/assay	$1,600
4 pre-filter changes	$100/ set of 4/quarterly	$400
	TOTAL COST SAVINGS	$9,600

The RSOF calibrated 73 survey meters in the last fiscal year. There were fifteen meters removed from service. Certificates of calibration are kept in the RSOF for all meters in service at the University. Records for all meters include instrument efficiencies for isotopes used in laboratories. The DOA pre-filters are on a 90-day change out schedule. EHS no longer changes the pre-filters which are now handled by Facilities Services. Both fan units for the walk-in hood have not been changed since they do not run unless the walk-in hood is used. The HEPA filters for the walk-in hoods are two double filter units located in DOA Radiation Area. There are two single filter units for the chemical hood and decay area (located above the DOA office). The fan

for the compactor has been recently repaired. Currently, there are two pre-filters and two HEPA filters that are regularly changed for two units.

This year, one pump for radioactive materials was calibrated for use in an iodination hood. The CAM system is not in service and has not been calibrated.

CALIBRATION/ SERVICE	19/20	18/19	17/18	16/17	15/16	14/15
Meter Calibration	73	88	95	91	115	112

METERS IN USE	19/20	18/19	17/18	16/17	15/16	14/15
Hi-Q	1	1	1	2	2	1
Inovision	1	1	1	2	1	1
Ludlum	45	58	63	61	81	87
RPI Mini Monitor	2	4	6	10	13	8
Technical	1	1	1	1	1	1
Victoreen	2	3	2	4	6	4
WB Johnson	6	6	6	7	10	10
Fluke Biomedical	1	1	1	1	1	1
Research Product	2	1	1	1	1	1
Rad Eye	12	12	12	2	2	0

METER CALIBRATION BY MONTH	19/20	18/19	17/18	16/17	15/16	14/15
7/2019	10	13	24	12	18	17
8/2019	20	17	12	8	12	10
9/2019	9	15	9	7	8	6
10/2019	10	2	4	5	7	6
11/2019	0	5	4	4	6	1
12/2019	10	5	6	8	8	12
1/2020	1	0	1	0	7	9
2/2020	5	8	0	0	12	15
3/2020	1	1	23	8	10	13
4/2020	2	13	4	17	8	10
5/2020	2	8	7	9	7	12
6/2020	2	1	1	7	12	1

RAM SECURITY

RAM and potentially hazardous chemicals must be secured against unauthorized access or removal when unattended. All refrigerators, freezers or other storage units with RAM labels that are located in unsecured areas must either have a security lock to limit access to the refrigerator or freezer or must contain a secured and labeled lock box within the storage unit. Access to isotope inventory must also be controlled when no authorized individual is in the area and constant surveillance cannot be maintained. Security checks by the RSOF are conducted on a monthly basis after normal working hours to ensure that radioactive materials are properly secured. All buildings underwent radiation security inspections each month. Only minor violations of required security procedures were found. Involved AUs were notified, corrective actions recommended, and remediation was monitored at the next inspection.

RAM SECURITY CHECKS	19/20	18/19	17/18	16/17	15/16	14/15
Violations	2	15	10	10	7	13

PERSONNEL MONITORING

Personal radiation dosimeters are issued through the RSOF to radiation workers and personnel who have the potential to receive a measurable radiation dose while working at the University. All laboratory workers, visitors to the laboratory, maintenance workers and contractors working in a laboratory are candidates for inclusion in the dosimetry program. Other personnel may request dosimeters, which are provided by the RSOF. Radiation workers who are issued dosimeters must complete the new radiation worker training class and fill out an occupational exposure history form. Dosimeters are to be returned promptly at the end of each cycle of use so that the RSOF can take timely action consistent with implementation of ALARA in the event any significant exposure to radiation is detected by the dosimeter.

The contract for dosimetry was renewed with Landauer, Inc. which provides radiation monitoring services. The dates of the contract are for 7/1/2015 to 6/31/2018 with two one-year renewal options. We are on renewal option as of 7/1/2018. The contract was extended to 6/2021 due to COVID-19.

PREGNANT WORKER PROGRAM

Any radiation worker who is, or thinks she may be pregnant is advised to complete a declaration of pregnancy form found on the EHS website Error! Hyperlink reference not valid. under the 'radiation safety' link and send it to the RSOF. Counseling is provided and an additional dosimeter is issued to the worker that is read every month. This additional fetal dosimeter is worn to conservatively measure any dose to the developing baby. One woman did confirm her pregnancy and during her monitoring no fetal doses above background radiation levels were detected.

NEUTRON USERS

For experiments and procedures involving the use of neutron sources, personnel monitors sensitive to neutron radiation must be worn. These can be obtained from the RSOF. There were two neutron dosimeter users during the fiscal year.

USERS OF RGE/ X-RAY

The RSOF provides special dosimeters for individuals carrying out experiments and procedures involving the use of RGEX-ray (X-ray), such as fluoroscopy and X-ray diffractometers. The four fluoroscopy users had collar badges. This fiscal year, we issued 120 visitor badges to fluoroscopy observers.

Although only 20 percent of the workers currently monitored are required to wear dosimeters to comply with the terms of the CWRU's Broad Scope license or RGE programs, the use of

dosimeters is encouraged as it provides an excellent method for early detection of activities that might be dangerous to individual workers.

PERSONNEL MONITORING	19/20	18/19	17/18	16/17	15/16	14/15
Pregnant Workers	1	1	1	0	0	0
Neutron	2	2	2	2	2	2
RGE/ X-ray	175	76	251	32	25	37
Dental	38	35	41	27	37	28
General	325	284	347	485	460	473

CWRU uses Luxel badges, which are considered to be state-of-the-art detection technology for personnel dosimetry. Luxel badges can measure minimum detectable limits of 1.0 mRem. ODH regulations require that all monitored workers be advised annually of their occupational dose exposure. All workers were sent a copy of their prior calendar year's dose report in 2019.

RADIATION GENERATING EQUIPMENT

Machines that produce ionizing radiation (RGE) require safety labeling using appropriate warning indicator systems augmented by testing for radiation leakage during operation. Analytical research units include X-ray diffraction. As of 8/2015, X-ray registration is no longer required for electron microscopes. There are also X-ray units in use for health care and diagnostic research. There are currently 10 AUs of RGE with equipment in 19 laboratories. RGE is inventoried semi-annually and surveyed annually for leakage. Investigators in charge of RGE, not the RSOF, are required to provide site-specific training programs for workers using this equipment. The EHS provides general safety classes for individuals using RGE.

RADIATION-GENERATING UNITS (Not In Use)	19/20	18/19	17/18	16/17	15/16	14/15
Diagnostic units Disposed	0	0	0	0	2	0
Diagnostic units Purchased	0	0	0	0	1	3

The ODH has changed the Radiation Generating Units classification. There were 53 units purchased and no units disposed for 2019-2020. The table below reflects that change.

RADIATION GENERATING EQUIPMENT (IN USE)	19/20	18/19	17/18	16/17	15/16	14/15
Closed Beam Analytical	5	6	6	6	6	6
Dental Computer Tomography (CT)	5	5	2	2	2	1
Photoelectron Spectrometer (No longer under ODH)	4	0	0	16	16	10
Fluoroscopy	2	2	2	2	2	3
Hand-held Dental	8	13	4	3	2	3
Hand-held Dental (Inoperable)	1	1	0	1	1	0
Intraoral	73	72	30	30	28	27
Panoral (Only)	1	1	1	1	1	1
Cabinet System exclude admittance	3	3	3	3	3	3
Tube Only (Inoperable)	62	0	0	9	9	12
Radiographic (Mobile)	0	1	1	1	1	1
TOTAL TUBES	**165**	**103**	**49**	**71**	**71**	**74**

RADIOACTIVE MATERIAL RELEASES

SEWER EXPOSURE CONTROL and MONITORING

State and federal regulations permit CWRU to dispose of low levels of RAM into the sanitary sewers. The Northeast Ohio Regional Sewer District requires semiannual reports on RAM that is discharged into the sanitary sewer system. CWRU's sewer releases were in compliance with both federal and state regulations. The report for July through December 2019 was filed by 12/31/2019 and the report for January through June 2020 was filed by 6/30/2020. Twenty-one AUs in storage mode or using only sealed sources were exempt from completing this form. One hundred percent compliance with sewer disposal regulations was achieved for both reporting periods.

AIR EXPOSURE CONTROL & MONITORING

During the 2019 calendar year, RAM released into the air were less than 10 percent of the maximum levels set by the EPA. Therefore, CWRU had no reports to file and the University was in compliance with the air effluent releases stipulated by the EPA Clean Air Act, the NRC and the ODH.

With regard to airborne exposure control, the primary concern is to safeguard against exposure to airborne radioactive iodine that is used for protein iodination experiments. To control exposures, the RSOF requires that reactions involving use of volatile radioactive iodine isotopes be performed in an iodination hood that is housed in a chemical hood. The charcoal-filtered exhaust from the iodination hoods typically reduce radioactive material emissions by approximately 90 percent. Experiments requiring use of large amounts of iodine in especially volatile form are routinely carried out in closed systems to prevent airborne release of radioactive iodine. Although this program had been inactive since 2014, there was one experiment requiring the use of volatile iodine conducted this fiscal year.

BIOASSAY PROGRAM

Bioassays are required for employees who may receive an internal, measurable radiation dose. Bioassay procedures include, but are not limited to, thyroid screening and urinalysis. The RSOF can perform bioassays for radioactive iodine (thyroid scan) and tritium uptake (urinalysis). Bioassay records are retained in the RSOF and are available for review by the assayed individuals.

RADIOACTIVE IODINE

During 2019-2020, there was one active iodination laboratory. The RSO maintains an inventory of four iodination hoods to be deployed when needed. A bioassay is required when more than 1 mCi of radioactive iodine is used in volatile form. The RSOF must be notified prior to:

- Handling more than 1.0mCi of volatile radioactive iodine.
- The following must be completed prior to the procedure:

- Performance of a baseline bioassay for anyone involved in the procedure that does not have a baseline radioactive iodine bioassay on file
- Arrangements for monitoring of effluent releases to the atmosphere during the first iodination procedure using a new protocol to measure and mitigate any release to the environment

After an iodination procedure, individuals involved in the procedure must contact the RSOF and arrange for a bioassay to be completed by the end of the next business day. Bioassays were completed for the RSOF staff involved in radioactive waste handling. There was one iodination procedure performed this fiscal year. No workers exceeded 10 percent of the ODH limits.

IODINATION PROCEDURES	19/20	18/19	17/18	16/17	15/16	14/15
Total	0	1	0	0	0	0

^{125}I BIOASSAYS	19/20	18/19	17/18	16/17	15/16	14/15
RSOF Staff	16	16	16	16	16	16
Additional	0	2	0	0	0	0
Total	16	18	16	16	16	16

TRITIUM

Urine bioassays must be carried out for individuals using more than 10mCi of tritium, with a baseline bioassay required prior to experiment. There were no urine bioassays required during this fiscal year.

RADIOACTIVE MATERIALS INCIDENTS

EMERGENCY RESPONSE

Emergency response procedures have been developed and approved by the RSOF and RSC for spills, releases or loss of RAM, small fires, large fires, internalized contamination and medical emergencies. The goal during any emergency response is to protect people first and property second. The RSO or designee provides instruction, assistance and supervision of clean up as required. The RSO is authorized to act independently and take prompt remedial action in situations involving RAM that present imminent danger or threat to personnel, property, or the community at large.

INCIDENT/ SPILL RESPONSE

MAJOR INCIDENT/ SPILL

This is a spill that involves personnel contamination or results in contamination outside of the intended work area that cannot be easily and effectively contained and cleaned up.

MINOR INCIDENT/ SPILL

This is a spill that does not involve personnel contamination and that remains inside the intended work area; one that can be easily and effectively contained and cleaned up without

assistance from the RSOF. It also includes events that trigger irradiator alarms, most of which are caused by mechanical failures and installation of new high security equipment.

There were no major incidents and twenty minor incidents documented over the past year.

INCIDENTS	19/20	18/19	17/18	16/17	15/16	14/15
Major	0	0	0	0	0	0
Minor	7	11	20	21	22	30
TOTAL	7	11	20	21	22	30

DATE	INCIDENT	CONTAMINATION	ROOT CAUSE	FOLLOW UP
6/30/2020	Minor Incident	Lost Survey meter with sealed source	Researcher and staff cannot find lost meter with check source.	Researcher believes the meter was disposed years ago and RSOF just was not notified. The Database was updated and source archived.
6/3/2020	Minor Incident	DOA 990 Alarm	DOA 990 Chem waste room door opened without turning off the alarm.	Reviewed proper procedure with staff.
6/1/2020	Minor Incident	Rad Order	Unapproved sealed sources received.	Reviewed proper procedure with those involved, Orders placed on hold,
5/18/2020	Minor Incident	IRR Door Lock	Person unable to leave room.	System reset.
5/14/2020	Minor Incident	DOA 990 Alarm	DOA 990 Chem waste room door opened without turning off the alarm.	Reviewed proper procedure with staff.
10/19/2019	Minor Incident	IRR Alert	Connection loss with RMS & not Lenel	RSOF checked/documented the check sources and met with Authorized User & principal persons to review the proper purchase procedure for radioactive materials.
10/18/2019	Minor Incident	Unauthorized Pcard Ram Order	RAM ordered via Pcard and received directly. ROSF Secured RAM package.	Reviewed proper procedure with those involved, Orders placed on hold, Purchasing & Vendor contacted and PCard suspended.
9/19/2019	Minor Incident	Door Alarm	DOA 990 Chem waste room door opened without turning off the alarm.	Reviewed proper procedure with staff.

EHS WEBSITE & NEWSLETTER

The EHS home website (https://case.edu/ehs/) provides integrated web-based access to EHS services. Information on training classes, online retraining and safety manuals are available at this site.

The EHS newsletter is filled with articles that are designed to keep the campus community abreast of safety issues and concerns. It covers the latest government regulations, addresses various concerns that are found during laboratory inspections and provides answers to

questions frequently asked by laboratory personnel. Articles that were submitted during this year included:

- Polymer Radiation Shield May Replace Lead
- Non-Ionizing Radiation
- Radiation
- Radiation Therapy Basics — Part III
- Radiation Therapy Basics — Part II

LASER SAFETY PROGRAM

There are a total of 238 lasers/laser systems in our database for the campus used by 43 laser PIs in 16 buildings (38 Active, 4 Storage). The lasers of greatest concern are those labeled Class 3B and Class 4. There are 24 3B/4 PIs with a total of 144 Class 3B/4 lasers, as well as 12 1-3R PIs with a total of 92 lasers in other classes 1, 2, and 3A/3R.

There are 36 class 3B/4 enclosed laser systems that are considered eye-safe under normal use that decrease the hazard to the user. Twenty-six audits of laser systems were performed during this fiscal year. There were no laser incidents reported this year.

ULTRA VIOLET (UV) SAFETY PROGRAM

As noted by an Occupational Safety and Health Administration (OSHA) director, “OSHA has written two standards that cover employee exposure to radiation: Nonionizing Radiation (29 CFR 1910.97) and Ionizing Radiation (29 CFR 1910.1096). The non-ionizing radiation standard only covers the radio frequency region, including microwaves. The ionizing radiation standard covers alpha, beta, gamma, and X-rays; neutrons; high-speed electrons and protons; and other atomic particles; but does not include sound or radio waves, or visible, infrared, or ultraviolet light. Therefore, there are no OSHA-mandated employee exposure limits for ultraviolet radiation.”

CLEARANCES/ RELOCATION PROGRAM

The RSOF requires at least three weeks’ notice to decommission laboratories. An orchestrated effort between the RSOF, the Safety Services division of EHS, facilities services and AUs facilitates these operations. There were 1013 pieces of equipment and 19 rooms cleared in this reporting period.

WASTE MANAGEMENT

RADIOACTIVE WASTE FACILITY

Our radiation waste facility decay-in-storage licensing with the ODH specifies that we must dispose of any interim generated waste as soon as practical when a waste site is open. The CWRU Radioactive Waste Facility (RWF) is used to segregate waste streams and prepare the waste for disposal. The different waste streams include aqueous waste, sharps, animals, scintillation vials, beta plates and dry solid waste.

^{32}P solid waste is held for decay (for at least 10 half-lives) in the radioactive waste facility. The waste is surveyed and subsequently sent to Medwaste Ohio, a commercial disposal facility for incineration. Currently, only the outside of waste bags are surveyed (with approval from ODH) followed by immediate placement into a burn box. This simplifies handling by staff and provides for compliant and economical disposal of these materials. This procedure has greatly decreased hazard exposures to RSOF personnel handling radioactive waste at CWRU. Reducing the volume of waste to be disposed remains a continuing aim of the waste program. As part of the waste minimization program, isotope users are encouraged to reduce the volume of waste generated in the laboratory by minimizing the use of extraneous paper products. Short-lived, non-sewer (hazardous waste) is held for decay, resurveyed after ten half-lives and disposed by Chemtron, a commercial hazardous waste disposal company. ^{35}S and ^{125}I are no longer held for decay, but are shipped along with the long-lived solid waste. Long-lived solid waste (greater than 60-day half-life) and scintillation vials are disposed by Ecology Services, a commercial radioactive materials waste hauler.

Non-hazardous aqueous waste is no longer held for decay. This waste is picked up from laboratories by the RSOF staff for immediate sewer disposal. The procedure is carried out in the radioactive waste facility since the isotope activities are significantly below our established regulatory limits as per OAC 3701:1-38-12 Appendix C. A sewer disposal log is kept in the EHS offices. Total sewer disposals are reported semi-annually to the Northeast Ohio Regional Sewer District.

COLLECTION AND DISPOSAL OF ANIMAL REMAINS AND BIOHAZARDOUS WASTE

The RSOF maintains two -20°C freezers for storage of radioactive animal remains and waste. One is located at the ARC and the other in Wolstein 1118. Radioactive wastes are bagged and labeled in yellow bags in the same manner as dry solid waste. All waste placed in the freezer must be logged on the animal disposal sheet on the cold room door. A log sheet of animals disposed in this manner is also kept for inventory purposes by the laboratories generating the waste.

Any item that has come in contact with an etiologic agent is considered biohazardous. Etiologic agents include bacteria, viruses, and parasites and must be disinfected or decayed to background before disposal. Infected animal waste is placed in the ARC (BRB B05A) for disposal by the RSOF. Radioactive animal waste includes cage bedding, carcasses, viscera, excrement, serum, blood, or other animal tissue containing radioactive materials. All waste is tagged. Additional information regarding etiological agents is placed on the tag. All animal waste is disposed of by the RSOF.

WASTE GENERATED IN JULY 1, 2019 - JUNE 30, 2020

	GENERATED 7/1/2019-6/30/2020	**DISPOSED: MEDWASTE OHIO**	**DISPOSED: SEWER**	**DISPOSED: CHEMICAL SAFETY**	**DISPOSED: Ecology Services**	**IN STORAGE AS OF 6/30/2020**
Short-Lived Dry	14	0	0	0	0	4
Long-Lived Dry	6	0	0	0	5	1
Scintillation Vials	6	0	0	0	6	0
Animals	0	0	0	0	0	0
Long-Lived Sewer	25	0	25	0	0	0

Long-Lived Non-Sewer	1	0	0	0	0	1
Short-Lived Sewer	20	0	20	0	0	0
Short-Lived Non-Sewer	1	0	0	0	0	1

All values in the dry waste, vial and animal categories denote the number of 55-gallon drums. All values for the liquid waste categories are in gallons. The single asterisk (*) demarcates the number of drums generated prior to 7/1/2019, kept for decay in storage, and disposed during the period of 7/1/2019—6/30/2020. During this fiscal year, all long-lived hazardous aqueous waste was disposed.

Ecology Services animal waste cost = $22/lb. for 10-pound barrel = $220 per 10-pound barrel
Ecology Services dry waste cost = $470 per 55-gallon drum

The cost of disposal for one box of biomedical waste at Medwaste Ohio is $25 per container (average of 2 containers per 55-gallon drum). There were no drums of Decay-in-Storage dry waste surveyed and disposed of during 2019-2020. Thus, the indirect savings to researchers due to the decay in storage program was $0.

WASTE GENERATION	**19/20**	**18/19**	**17/18**	**16/17**	**15/16**	**14/15**
Short-Lived Dry	4	6	18	9	11	10
Long-Lived Dry	6	8	6	5	9	6
Scintillation Vials	6	6	6	12	9	10
Animals	0	0	0	1	0.25	1
Long-Lived Sewer	25	35	28	30	23.75	25
Long-Lived Non-Sewer	1	5	2	2	2	2
Short-Lived Sewer	20	30	25	21	18	20
Short-Lived Non-Sewer	1	1	2	0	4	5

The contract for radioactive waste disposal was renewed for 6/2016 to 6/2019 with two one-year renewal options with Ecology Services. This contract provides for disposal of all long-lived dry materials, scintillation vials and animal wastes. The contract was extended to 6/2021 due to COVID-19.

RECYCLING PROGRAM

The RSOF occasionally obtains laboratory equipment in very good condition from AUs who have either left the University or ceased to use RAM. The equipment includes radioactive waste containers (lead and Lucite), shielding (lead and Lucite) and survey meters. This equipment is offered to the AUs' to conserve funds otherwise needed to buy new RAM handling equipment. This cost saving from these recycling efforts resulted in re-use of equipment that saved AUs and EHS more than $8,930 during 2019-2020.

RADIATION SAFETY COMMITTEE AUDITS

The RSC audits are carried out in two different ways:

- Performance audits are conducted on-site at the RSOF by individual RSC members at various times throughout the year.
- A compliance inspection of RSOF records is conducted shortly after the end of each fiscal year by a team of RSC Members.

Performance audits of RSOF activities included the following areas:

AREA AUDITED	# OF INDIVIDUAL FILES EXAMINED
RAM Applications	10
Isotope Orders/ AU Possession Limits	10
RGE inventory/ training	10
Ancillary staff training	10
AU/ worker training	10
Radiation survey meters	10
Waste disposal facility	2
Shipping papers	10
RAM security checks	10
Bioassays	10
Semi-Annual mailings	10
Sealed sources	10
EHS Radiation Webpage	1
Irradiators	5
Room Surveys (Active/Decommissioned)	10
Compliance Reviews	10
Lasers	10
Licensing	10
Dosimetry	10
Incidents	10

These audits were conducted between October and December 2019 and between March and June 2020. This effort resulted in the review of more than 170 files in the program areas listed above.

RSC TRI-ANNUAL AUDITS FOR 2019-2020

RSC AUDIT COMMENT:

In October 2019, the RSC members conducted a bi-annual audit of the following components of the RSOF:

AU/Worker Training
Biassays
Compliance
Dosimetry Program

Incident Reports
Isotope Possession Limits
Laser Program
Licensing Status
Security Checks
Semi-Annual Mailings (Air/Sewer Inventory)
Support Staff Training
Valid RAM Applications
Waste Disposal Facilities

Each audit consisted of randomly selecting five to twenty files from the past year to ensure its contents were up-to-date, accurate and consistent with the database.

AU/Worker Training

Authorized users and worker training files were audited for up to date training on radiation safety procedures on October 25th, 2019. Dr. Schiemann reported ten (10) overdue workers, who were notified by RSOF to update their training status.

RSOF RESPONSE:

The workers were notified and training was completed.

Bioassays

An audit was performed to verify completion of bioassays for laboratories using >10mCi of ^{3}H and/or 1mCi ^{125}I on October 30th, 2019. Dr. Fisher noted that one (1) bioassay had been performed for this period with no deficiencies.

RSOF RESPONSE:

No response required.

Compliance

Compliance review audits were performed by Dr. McCormick on October 31st, 2019 to ensure that any non-compliance issues were appropriately resolved. Upon examination of ten (10) files, Dr. McCormick noted no deficiencies of any files not in the database.

RSOF RESPONSE:

No response required.

Dosimetry Program

An audit of Current Dose records held by the RSOF was performed on October 18th, 2019 to verify that AU laboratory workers were current in dose record and active radiation badges. Dr. Ogino audited ten (10) records and reported no deficiencies.

RSOF RESPONSE:

No response required.

Incident Reports

A review of monthly incident reports was performed by Dr. Fisher on October 30th, 2019 for verification and documentation of follow-up by the RSOF. During this period there were a total of five (5) incidents reported. All incidents were effectively resolved in a timely manner.

RSOF RESPONSE:

No response required.

Isotope Possession Limits

Dr. McCormick audited 10 files on October 31st, 2019 to verify that the amount of radioactive material (RAM) ordered was within the possession limits of the AU and that all orders placed were in the OnSite Database. Dr. McCormick noted three (3) deficiencies in the audited records regarding missing paperwork. The RSOF was notified of these missing order papers.

RSOF RESPONSE:

The three misfiled orders were placed in the correct files.

Laser Program

The Laser program was audited by Dr. Schiemann for accuracy regarding laser inspections, inventory, and status of personnel training on October 25th, 2019. Ten (10) files were audited. Three (3) deficiencies in inspection was noted and the RSOF was notified of the responsible PI to contact for follow up on worker training.

RSOF RESPONSE:

The laser users were notified and training completed.

Licensing Status

An audit was conducted to verify the licensing status of all ODH licenses and registrations on November 1st, 2019 by Dr. Valadkhan. Components of the audit include: Broadscope License, RGE License, Waste License, Radiation Manual, X-ray Manual, Laser Manual, Radiation Training, X-Ray Training, Radiation Online Training, UV online training, and RSC guidelines.

Dr. Valadkhan reviewed all license programs and noted that all licenses were current (no deficiencies).

RSOF RESPONSE:

No response required.

Security Checks

Verification and documentation of radioisotope security checks were performed on October 18th, 2019. Dr. Ogino reports that one (1) security check during this period showed a deficiency of a locked freezer. The follow up resolution was documented in the RSOF follow up.

RSOF RESPONSE:

No further response required.

Semi-Annual Mailings (Air/Sewer Inventory)

An audit of the air/sewer disposal inventory was on November 6th, 2019 by Dr. Jankowsky. Ten (10) files were reviewed by Dr. Jankowsky who noted three (3) questionable status updates. The Assistant RSOF was notified of these missing surveys.

RSOF RESPONSE:

The users were notified and inventory status was updated.

Support Staff Training

An audit was conducted to verify the training status of personnel encompassing ancillary segments of the radiation safety program including: Animal Resource Center (ARC), Shipping & Receiving, Custodial, Security, and Plant Security on October 23rd, 2019. Dr. Licatalosi reported ten (10) deficiencies in overdue worker training. These individuals overdue for training were identified to RSOF for notification of overdue training and the workers were sent notices.

RSOF RESPONSE:

The ancillary workers were notified and training completed.

Valid RAM Applications

RAM applications were audited on October 27th, 2019 to verify that the applications were complete and valid. Dr.Croniger audited ten (10) files and reported no deficiencies.

RSOF RESPONSE:

No response required.

Waste Disposal Facilities

The waste disposal facilities (DOA990/Wolstein) and RSOF Laboratory were inspected to ensure safe operation and maintenance as required by RSOF on November 6th, 2019. Dr. Jankowsky inspected the facilities and reported that all records of maintenance, housekeeping, records, waste storage, and handling were all in compliance.

RSOF RESPONSE:

No response required.

In January/February 2020, the RSC members conducted a tri-annual audit of the following components of the RSOF:

Active/Decommissioning Room Surveys
Compliance Reviews
Direct Package Pickup
Dosimetry Program
EHS Webpage
Incident Reports
Irradiator Program
Licensing Status
Radiation Generating Equipment (RGE) Inventory & Training
Sealed Sources
Support Staff Training
Survey Meters
Valid RAM Applications
Waste Disposal Facilities

Each audit consisted of randomly selecting 5 to 20 files from the past year to ensure its contents were up-to-date, accurate and consistent with the database.

Active/Decommissioning Room Surveys

An audit was performed on January 28th, 2020 to validate active RAM use files and decommissioned room files to verify that the laboratory was surveyed within the last six months as well as verification for any follow-up on non-compliance issues. Dr. Fisher examined 10 files and noted no deficiencies.

RSOF RESPONSE:

No response required.

Compliance Reviews

Compliance Review audits were performed by Dr. Valadkhan on February 3rd, 2020 to ensure that any non-compliance issues were appropriately resolved. Upon examination of ten (10) files Dr. Valadkhan noted no deficiencies.

RSOF RESPONSE:

No response required.

Direct Package Pickup

Isotope orders received within the last 3 months destined for direct pickup were reviewed by Dr. Valadkhan on February 3rd, 2020. Dr. Valadkhan audited ten (10) files to ensure that direct pickup was denoted in the files. Dr. Valadkhan noted seven (7) deficiencies, where no "direct pickup" was mentioned in the paperwork. The RSOF was notified of these occurrences.

RSOF RESPONSE:

The RAM Package Receipt form will be revised to show 'Direct pickup'.

Dosimetry Program

An audit of Current Dose records held by the RSOF was performed on January 27th, 2020 to verify that AU laboratory workers were current in dose record and active radiation badges. Dr. McCormick audited ten (10) records and reported three (3) deficiencies where badges were not picked up. The RSOF notified the individuals to retrieve their badges.

RSOF RESPONSE:

The workers were notified and badges were collected.

EHS Website

The website for the RSOF was audited to ensure proper operation, access and current links were operational on January 27th, 2020. Dr. Ogino reports all links within the Radiation Website were operational.

RSOF RESPONSE:

No response required.

Incident Reports

A review of monthly incident reports was performed by Dr. Jankowsky on February 14th, 2020 for verification and documentation of follow-up by the RSOF. During this period there were a total of five (5) incidents reported. All incidents were effectively resolved in a timely manner.

RSOF RESPONSE:

No response required.

Irradiator Program

An audit of the Irradiator Information Files was performed by Dr. Licatalosi to verify that the irradiators were audited by the RSOF within the past six months; the audit was performed on January 31st, 2020. Four Irradiators are on campus and each file was up-to-date and compliant. Dr. Licatalosi noted two (2) authorized users were overdue for training. The RSOF notified the overdue workers.

RSOF RESPONSE:

The users were notified and training was updated.

Licensing Status

An audit was conducted to verify the licensing status of all ODH licenses and registrations on January 31st, 2020 by Dr. Licatalosi. Components of the audit include: Broadscope license, RGE license, Waste license, Radiation Manual, X-ray Manual, Laser Manual, Radiation Training, X-Ray Training, Radiation Online Training, UV online training, and RSC guidelines. Dr. Licatolosi reviewed all license programs and noted that all licenses were current (no deficiencies).

RSOF RESPONSE:

No response required.

Radiation Generating Equipment (RGE) inventory and training

Quarterly inventory status and equipment surveys were examined by Dr. McCormick who examined 10 files on January 27th, 2020. Dr. McCormick noted three (3) instances of missing reports. The RSOF office was alerted to these missing reports.

RSOF RESPONSE:

The misfiled reports were filed correctly.

Sealed Source

Files verifying that sealed sources had been leak tested were audited on January 28th, 2020. Ten (10) files were examined by Dr. Fisher who reported no deficiencies noted.

RSOF RESPONSE:

No response required.

Support Staff Training

An audit was conducted to verify the training status of personnel encompassing ancillary segments of the radiation safety program including: Animal Resource Center (ARC), Shipping & Receiving, Custodial, Security, and Plant Security on January 28th, 2020. Dr. Croniger reported six (6) deficiencies in overdue worker training. These individuals overdue for training were identified to RSOF for notification of overdue training and the workers were sent notices. Dr. Croniger further noted that many files were missing, and the RSOF was notified of these missing files.

RSOF RESPONSE:

The ancillary worker was trained and the database updated.

Survey Meters

Compliant calibration of survey meters was audited on January 28th, 2020. Ten (10) files were examined by Dr. Schiemann who noted one (1) meter that was stated as “out of service”. The RSOF office followed up with the responsible PI for this meter.

RSOF RESPONSE:

The database was updated concerning the meter.

Valid RAM Applications

RAM applications were audited on January 27th, 2020 to verify that the applications were complete and valid. Dr. Ogino audited ten (10) files and reported one (1) deficiency where a worker was overdue for training. The RSOF notified the worker of their overdue training.

RSOF RESPONSE:

The worker was trained and the database updated.

Waste Disposal Facilities

The waste disposal facilities (DOA990/Wolstein) and RSOF Laboratory were inspected to ensure safe operation and maintenance as required by RSOF on January 28th, 2020. Dr. Croniger inspected the facilities and reported that all records of maintenance, housekeeping, records, waste storage, and handling were all in compliance.

RSOF RESPONSE:

No response required.

In April 2020, the RSC members did not conduct a tri-annual audit of the RSOF. Please note that due to the COVID-19 Pandemic and subsequent ramp down of academic activities on campus, the April Quarterly Radiation Safety audits were suspended temporarily. The Annual audit was performed as scheduled in person on campus with proper PPE and social distancing measures enacted.

Overall, this bi-annual part of the audit process was successful. Records were easily accessed and reviewed. The program was found to be efficient. Productive interaction among committee members and the RSOF staff during the audit process helped expedite the procedure. All corrections to the files and the OnSite database were made following each trimester audit.

ANNUAL RADIATION SAFETY PROGRAM AUDIT REPORT

The RSC conducted its annual audit of the RSOF the first week in June 2020. The committee reviewed the performance of 20 components of the RSOF. The areas were:

- Active/Decommissioning Room Surveys
- Ancillary Staff Training
- AU and Worker Training
- Bioassays
- Compliance Review
- Isotope Orders, AU Possession Limits and the database
- Dosimetry Program
- Incident Reports
- Irradiator Program Review
- Laser Program Review
- Licensing Status
- Radioisotope Security Checks
- Radiation Generating Equipment Inventory and Training
- Radiation Survey Meters
- EHS Radiation Webpage
- Sealed Sources
- Direct Pickup & Package Receipt
- Semi-Annual Mailings (air/sewer inventory)
- Valid RAM Application
- Waste Disposal Facilities (DOA990, Wolstein) & RSOF Laboratory

The Results of this audit are summarized in this report as follows:

Active/Decommissioning Room Surveys

An audit was performed to validate active RAM use files and decommissioned room files to verify that the laboratory was surveyed within the last six months as well as verification for any follow-up on non-compliance issues. Dr. McCormick examined rooms for the period: July 1st, 2019 - June 30th, 2020. Forty-three (43) files were examined and three (3) deficiencies were noted. The RSOF was informed of these and the deficiencies were corrected.

RSOF RESPONSE:

The misfiled surveys were filed correctly.

Ancillary Staff Training

An annual audit was conducted to verify the training status of Ancillary users and worker training files for a period from July 1st, 2019 - June 30th, 2020. The audit was conducted to verify the training status of personnel encompassing ancillary segments of the radiation safety program including: Animal Resource Center (ARC), Shipping & Receiving, Custodial, Security, and Plant Security. Dr. Fisher examined fifty (50) files and noted numerous deficiencies regarding missing sign-in sheets. The RSOF was notified of these deficiencies for follow-up.

RSOF RESPONSE:

The workers were notified and training was completed.

AU and Worker Training

An annual audit was conducted to verify the training status of Authorized Users and worker training files for a period from July 1st, 2019 - June 30th, 2020. Dr. Jankowsky reported that no deficiencies were found and all users were up to date.

RSOF RESPONSE:

No response required.

Bioassays

An audit was performed to verify completion of bioassays for laboratories using >10mCi of ^{3}H and/or 1mCi ^{125}I between July 1st, 2019 - June 30th, 2020. Dr. Licatalosi noted that no bioassays had been performed for this period.

RSOF RESPONSE:

No response required.

Compliance

Compliance Review audits were reviewed for the period July 1st, 2019 - June 30th, 2020 to ensure that any non-compliance issues were appropriately resolved. Upon examination of 50 files Dr. Schiemann noted three (3) files that needed to be reviewed/updated. The RSOF staff was informed of the records that needed to update and noted that the PIs had left the University.

RSOF RESPONSE:

Due to the unprecedented COVID-19 shutdown, the compliances were delayed and have been completed.

Direct Package Pickup

An audit was performed to cover the period of July 1st, 2019-June 30th, 2020 to verify that package receipts were completed with each transfer of material from site to site. Dr. Licatalosi audited 13 files and identified two (2) instances where no "direct pickup" was noted. The Requisition #'s were identified to the RSOF for follow up.

RSOF RESPONSE:

The RAM Package Receipt form was updated.

Dosimetry Program

An audit of Current Dose records held by the RSOF was performed to verify that AU laboratory workers were current in dose record and active radiation badges for the period July 1st, 2019-June 30th, 2020. Dr. Croniger audited 50 records and reported numerous inactive users with out-of-date files in the system. The RSOF was notified concerning the files.

RSOF RESPONSE:

The workers were notified and badges were collected.

EHS Webpage

Dr. Schiemann inspected the operation of the EHS web pages for the Radiation Safety section on June 23rd, 2020. Dr. Schiemann examined all of the Radiation Safety web sites within the web pages and associated links and reported no deficiencies.

RSOF RESPONSE:

No response required.

Incident Reports

A review of monthly incident reports From July 1st, 2019 - June 30th, 2020 was performed by Dr. Scheimann for verification and documentation of follow-up by the RSOF. During this period there were a total of seven (7) incidents reported. All but one incident was effectively resolved in a timely manner. One report of alarms in DOA990 required additional follow up by the RSOF.

RSOF RESPONSE:

RSOF followed up on the alarm and repaired one of the doors.

Irradiator Program

An audit of the Irradiator Information Files was performed by Dr. Croniger to verify that the irradiators were audited by the RSOF from July 1st, 2019 - June 30th, 2020. The audit was performed on June 18th, 2020. Four Irradiators were active on campus and each file was up-to-date and compliant.

RSOF RESPONSE:

No response required.

Isotope Orders, AU possession limits and the Helix Database

Dr. Croniger audited fifty-one (51) files to verify that the amount of radioactive material (RAM) ordered was within the possession limits of the AU and that all orders placed were in the OnSite Database covering the period July 1st, 2019 - June 30th, 2020. Dr. Croniger noted no deficiencies in the audited records.

RSOF RESPONSE:

No response required.

Laser Program

The Laser program was audited by Dr. Croniger for accuracy regarding laser inspections, inventory and status of personnel training in the period July 1st, 2019 - June 30th, 2020. Forty-two (42) files were audited. Numerous (overdue) deficiencies (26) were noted and the RSOF was notified of the responsible PI to contact.

RSOF RESPONSE:

The laser users were notified and the training was updated.

Licensing Status

An audit was conducted to verify the licensing status of all ODH licenses and registrations during the period July 1st, 2019 - June 30th, 2020. Components of the audit include: Broadscope license, RGE license, Waste license, Radiation Manual, X-ray Manual, Laser Manual, Radiation Training, X-Ray Training, Radiation Online Training, UV online training and RSC guidelines. Dr. Croniger reviewed all license programs and noted that all licenses were current. She notes that the UV Online Presentation was currently on-hold.

RSOF RESPONSE:

No response required.

Radiation Generating Equipment (RGE) inventory and training

Quarterly inventory status and equipment surveys were examined by Dr. Jankowsky who examined 16 files for the period July 1st, 2019 - June 30th, 2020. Dr. Jankowsky noted several deficiencies in equipment surveys that were in need of completion. The RSOF was notified of these overdue inventory reports.

RSOF RESPONSE:

The XRay users were notified and training was completed.

Sealed Source Leak Tests

Files verifying that sealed sources had been leak tested and inventories were audited for the period of July 1st, 2019 - June 30th, 2020. Fifty (50) files were examined by Dr. Licatalosi who reported twelve (12) overdue tests. The RSOF was notified of these deficiencies.

RSOF RESPONSE:

Due to the unprecedented COVID-19 shutdown, the leak tests and inventories of sealed sources were delayed and have been completed.

Radioisotope security checks

Verification and documentation of radioisotope security checks were performed for the period July 1st, 2019 - June 30th, 2020. Dr. Croniger audited twelve (12) security checks generated during this period. All incidents were noted to be resolved in an efficient and timely manner.

RSOF RESPONSE:

No response required.

Semi-Annual Mailings (Air/Sewer Inventory)

An annual audit of the air/sewer disposal inventory was performed for the period July 1st, 2019 - June 30th, 2020. Eighteen (18) files were reviewed by Dr. Fisher who noted one (1) non-current survey.

RSOF RESPONSE:

The Radiation User was notified and the inventory was updated.

Radiation Survey Meters

Compliant calibration of survey meters was audited for the period July 1st, 2019 - June 30th, 2020. Fifty (50) files were examined by Dr. McCormick who noted that no meters were due for calibration.

RSOF RESPONSE:

No response required.

Valid Ram Applications

RAM applications were audited for the period July 1st, 2019 - June 30th, 2020 to verify that the applications were complete and valid. Dr. McCormick audited fifty (50) files and reported six (6) deficiencies where no room designations were noted. The RSOF was informed of these instances and the notation was corrected.

RSOF RESPONSE:

No response required.

Waste Disposal Facilities

The waste disposal facilities (DOA990/Wolstein) and RSOF Laboratory were inspected to ensure safe operation and maintenance as required by RSOF for the period July 1st, 2019 - June 30th, 2020. Dr. Fisher inspected the facilities for Wolstein and the RSOF laboratory and reported all other records of maintenance, housekeeping, records, waste storage, and handling were in compliance. Dr. Fisher noted that one safety shower (DOA990) was overdue for calibration.

RSOF RESPONSE:

Facilities has been notified and the shower certified.

SUMMARY

No major problems exist in the RSOF program and the RSOF staff is functioning on a very competent level.

RSOF RESPONSE:

The RSOF thanks the RSC for its careful audit of safety activities over the past year. Deficiencies uncovered during the audit were referred to the RSOF auditor for increased scrutiny during the coming year. Identified deficiencies were all corrected as noted above.

EHS INTERNAL AUDITS

Three layers of audits are utilized by the RSOF on an ongoing basis to ensure that the radiation safety programs and procedures are working smoothly. In addition to audits conducted by the RSOF Staff and RSC, the assistant RSO conducts quality control reviews of all programs and records and assists with resolution. Full audit results of the program are available in the EHS office.

Sealed Source	RAM Security Checks	Bioassays
Shipping Papers	Semi-Annual Mailings	Dosimetry
Valid RAM Applications	RGE Inventory/ Training	Survey Meters
Isotope Orders/ AU Possession Limits	Ancillary Training	Compliances
AU/ Worker Training	Licensing	EHS Radiation Webpage
Waste Disposal Facility	Incidents	Liaison Program
Active/Decommissioned Room Surveys	Irradiator	Laser Program

Corrections to the files were made promptly. In response to internal audit findings, Radiation Safety continues to improve its procedures and programs.

This report was prepared by Felice T. Porter on 10/5/2020 and reviewed by Dr. David Sedwick. It covers fiscal years 7/1/2019-6/30/2020.

APPENDIX

AUTHORIZED USERS WITH STATUS CHANGE DURING FISCAL 2019-2020

RADIATION ACTIVE

STORAGE MODE
Hua Lou (9/11/2019)
Thomas McCormick (9/30/2019)

RADIATION INACTIVE
Ge Jin (8/29/2019)
Liem Nguyen (9/16/2019)

DEPARTED
Tomaki Ogino (3/10/2020)
Jeffrey Coller (6/18/2020)

X-RAY AUTHORIZED POSSESSOR LIST

AP NAME	CONTACT PERSON	UNITS
Gary Chottiner	Gary Chottiner	4
Fady Faddoul	Susan Opsitnick	90
Zhenghong Lee	Chris Flask	3
Suparna Mahalaha	Angel Henderson	3
Stephanie Piatt	Nan Avishai	4
Teresa Pizzuto	Teresa Pizzuto	1
Anna Samia	Anna Samia	1
Daniel Scherson	Daniel Scherson	1
Steve Schomisch	Steve Schomisch	3
Lei Zhu	Lei Zhu	6

LASER USERS

Ozan Akkus (1)	James Basilion (1)	Jesse Berezovsky (14)
Clemens Burda (3)	Carlos Crespo (6)	Liming Dai (2)
Diana Driscoll (16)	Dominique Durand (2)	Steven Eppell (7)
Roger French (1)	Jeffrey Garvin (1)	Stanton Gerson (1)
Brian Grimberg (10)	Alex Huang (2)	Hatsuo Ishida (6)
Michael Jenkins (14)	Kathleen Kash (10)	Chirag Kharangate (11)
Lydia Kisley (1)	Michael Martens (14)	James McGuffin Cawley (1)
Claudia Mizutani (1)	Svetlana Morozova (4)	Andre Paes (1)
Paul Park (1)	Rajesh Ramachandran (1)	Andrew Rollins (14)
Charles Rosenblatt (16)	Daniel Scherson (20)	Alp Sehirlioglu (6)
Rafick Sekaly (2)	Anirban SenGupta (1)	Scott Sieg (3)
Kenneth D. Singer (18)	Giuseppe Strangi (4)	Fumiaki Takahashi (4)
Nicole Ward (1)	Gary Wnek (6)	Christian Zorman (9)
Alan Diehl (Storage) (1)	Dominique Durand (Storage) (2)	Minh Lam (1) (Storage)
Heidi Martin (Storage) (1)	Edward Medof (Storage) (1)	John Mieyal (1) (Storage)
Eckhard Jankowsky (Storage) (1)		
Rigoberto Advincula (Departed)	Philip Feng (Departed)	Yoshikazu Imanishi (Departed)
James Jacobberger (Inactive)	Michael Lederman (Departed)	John Protasiewicz (Inactive)