Radiation Safety Program

Office of Environmental Health and Safety

2024
Cleveland State University
Radiation Safety Program

Purpose and Scope

The Cleveland State University (CSU) Radiation Safety Program is designed to provide information to applicable personnel and the public regarding the organization and management of radioactive materials on campus. It identifies regulations set forth by the Ohio Department of Health (ODH) and United States Nuclear Regulatory Commission (USNRC), and policies developed by CSU as safe, reasonable and enforceable. The manual is designed to conform closely to the Code of Federal Regulations (10CFR20) – "Standards for Protection Against Radiation" and similar regulations of the ODH as specified in the Ohio Administrative Code (OAC) Chapters 3701-38, 3701-39 and 3701-40. Copies of these regulations are on file in the Radiation Safety Office, located in the Department of Safety and Environmental Services, Plant Services Building, Room PS 233.

ALARA Goal

The main goal of the CSU Radiation Safety Program is to minimize exposure to radioactive materials, and to the radiation levels they may produce, to a level that is AS LOW AS REASONABLY ACHEIVABLE (ALARA). As identified in the NRC Regulatory Guides 8.10 and 10.2, three objectives of the ALARA program are:

1. Reduce occupational exposure to levels as low as reasonably achievable through good radiation planning and practice.

2. Reduce radiation exposure to the public as low as reasonably achievable.

3. Management commitment to encourage good radiation safety planning, by establishing and enforcing radiation safety practice, and to remain vigilant to improving the radiation safety program.

Program Administration/Authority

The Radiation Safety Program is administered by the University Radiation Safety Officer (RSO) through the Office of Environmental Health and Safety. The RSO is assigned the responsibility and authority to administer and enforce applicable regulations set forth by the Nuclear Regulatory Commission (NRC) and the Ohio Department of Health (ODH). The RSO is charged with making ultimate institutional decisions regarding all aspects of the radiation safety program. The RSO has authority to halt immediately any activity judged to be a threat to safety, health or the environment, or a violation of regulations or conditions of the University's Radioactive Materials License. The RSO reports to the Vice President for Business Affairs and Finance.

Radiation Safety Officer (RSO) Duties

The RSO is responsible for the following duties:

General health physics surveillance; includes environmental and personal monitoring;

Advisory services to personnel at all levels of responsibility on all aspects of radiation safety;

Receipt, delivery and shipment of all radioactive materials to and from the Cleveland State University (CSU) campus;

Monitoring of all material and equipment capable of producing ionizing radiation.

Receipt, review and approval of all applications for use of radiation sources to assess if proposed experiments can be safely accomplished within the existing license and isotope possession limits.

Instruction of personnel in proper use of radioactive materials.

Approval of all purchase requisitions for radioactive materials assuring receipt is in compliance with license possession limits prior to issuance.

Administration of the radioactive waste disposal program, including acquisition of required federal, state and local waste permits, and maintenance of program records.

Performance of leak tests on all sealed sources every six months as per the University's License;

Maintenance of inventory for radiation survey meters, and recalibration on an annual basis;

Maintenance of inventory of radioactive materials to be updated on an annual basis

Maintenance of permanent records for:

Receipt of radioactive materials
Disposal of radioactive materials
Laboratory monitoring
Personal occupational exposures

Maintenance of radiation storage and waste facility

Performance of air quality/ventilation surveys of authorized areas as needed

Performance of periodic audits of laboratory inventories and monitoring records

Serves as a member of the University's Radiation Safety Committee in an ex-officio capacity

The RSO will meet with the Assistant Vice President of Facilities and Safety and/or Vice President for Business Affairs and Finance on an annual basis to review the University Radiation Safety Program.

Radiation Safety Personnel

In addition to the RSO, an Assistant Radiation Safety Officer (ARSO) has been appointed and can perform the duties of the RSO in his/her absence. Radiologic Technician duties are performed by an Environmental Health and Safety Officer. Under supervision of the RSO, this individual may act as a designee of the RSO in the performance of surveys, inspections and radiation badge exchange. The Training requirement for this duty is a certification in Radiation Safety Technician or some other comparable training Authorized by the Department of Transportation in conjunction with the Nuclear Regulatory Commission.

Radiation Safety Committee

A Radiation Safety Committee is required by the University's Radioactive Materials license. The Radiation Safety Committee is an administrative committee whose members are appointed by the University President on a septimus basis (every seven years). The Radiation Safety Committee is charged with ensuring all necessary functions of the University's Radiation Safety Program are being adhered to within the required intervals and performs the following functions:

Receives and reviews periodic reports from the RSO on monitoring, contamination and personal exposures.

Receives and reviews requests from individuals desiring to work with radioisotopes. Individuals must receive authorization from the Radiation Safety Committee prior to ordering or beginning any work with radioisotopes. Authorization will depend on each candidates training, knowledge and experience.

Provides RSO with advice on University policies and technical matters regarding radiation safety

Conducts an annual audit of the Radiation Safety Program to determine that all requirements are being adhered to, and all records are up to date. The Committee will report its findings to the Assistant Vice President of Facilities and Safety. A copy of the audit will be forwarded to the RSO.

The members of the Radiation Safety Committee will be selected as follows:

Two authorized users actively working with radioisotopes, one individual selected from departments within the Administration Division, one individual selected from departments within the Academic Division, and a representative from the Vice Provosts Office for Research. The Radiation Safety Officer serves on the committee in an ex-officio capacity. The committee meets at a minimum of twice a year or more frequently as needed.

Cleveland State University Policy Governing NRC/ODH Violations

The RSO has the right to investigate a possible hazard at any time, and has authority for making institutional decisions regarding violations of the NRC/ODH regulations, or CSU policies involving the safe use of radioactive materials. Violations of safety regulations can range from incidental and non-serious to being life threatening. The RSO will determine the severity of the violation and the appropriate action. The RSO has the right to immediately halt any activity found to be threatening to life or property. Any individual found to commit serious or frequent violations of established safety regulations and/or policies will have their privilege to use radioactive materials revoked. If necessary, an individual user may appeal the RSO's decision to the Radiation Safety Committee. In the event of a disagreement between the RSO and the Radiation Safety Committee, the appropriate regulatory agency will be contacted to review the situation. Penalties at Cleveland State University are addressed in Appendix M.

Personnel involved in Using Radioactive Materials

1. Authorized Users (Investigators)

   All individuals who intend on using radioisotope or any other form of ionizing radiation must provide a summary of their past experience and training in handling radioactive materials (See Appendix A). This summary must be submitted to the RSO for consideration by the University Radiation Safety Committee in order to authorize new investigators.

   Authorized users are responsible for ensuring the health and safety of all personnel in the laboratory. They must ensure that the procedures used to accomplish intended research goals are as safe as possible. Specifically, they are responsible for:

   1. Ensuring all individuals working in their laboratory has completed the required Radiation Safety Training Course prior to handling radioactive materials.

   2. Provide and document individual, site-specific training for each of their laboratory workers on the processes and procedures specific to their laboratory operation that are required to comply with the University's Radiation Safety Program.

   3. Assure all personnel working in their laboratory are included in the personnel monitoring program, if necessary.

   4. Obtain written RSO approval before ordering radioisotopes.

   5. Securing written RSO approval before transferring radioisotopes to another authorized user's laboratory and ensuring safe transfer.

   6. Monitoring laboratory conditions as often as necessary to assure their exposure to radiation is ALARA.

   7. Labeling of all areas and laboratory equipment with proper warning signs, and assure all documentation is accurate and up to date.

   8. Properly disposing of radioactive wastes and preventing accumulation of excessive quantities of waste in the laboratory.

   9. Notifying the RSO when there is any change of personnel, procedures or lab techniques, or physical facilities from those previously approved.

2. Authorized User activity status
   1. ACTIVE – the laboratory is currently using radioactive materials or has stocks, samples, waste or other materials in use. Monthly surveys are required, inventory records must be kept up to date, and retraining is required annually. All requirements in the rad safety manual must be maintained and all labeled rooms/areas are to be controlled as rad use rooms/areas (i.e. no eating or drinking, etc.)
   2. ACTIVE WITH ZERO INVENTORIES – the laboratory will not be using radioactive materials for a period of less than approximately 6 months and has no stocks, waste or other permitted RAM. All waste has been removed and all inventory sheets have been accounted

for. The permit holder is relieved of the responsibility for performing and recording monthly surveys and record-keeping duties. However, all other requirements in this Radiation Safety Manual must be maintained: refresher training is required annually, and all labeled rooms/areas are to be controlled as radiation use rooms/areas (i.e. no eating or drinking, etc.) The permit and laboratories are maintained so that work with radioactive materials may start with the next receipt of radioactive chemicals.

3. INACTIVE – when the laboratory will not be using radioactive materials for a period of more than 6 months, the Authorized User is strongly encouraged to make the permit inactive. Essentially this is a "temporary termination" where the laboratory is released for work not involving radiation, but the Authorized User may re-activate the permit by contacting EH&S. A laboratory will be ready for work involving radiation within 2 weeks of EH&S receiving the restart request. All the requirements for a termination must be met (no stock vials, waste is removed, and a termination survey). See Section D below. Once inactive, there are no restrictions on laboratories and no paperwork or retraining requirements. A permit may be inactive for 3 to 5 years after which radiation safety retraining may be required or the permit may be terminated.
4. TERMINATED – see Section D below. Depending on the amount of time elapsed since termination, a terminated authorization will need a new application submittal or if the time line is short it can be reauthorized.. Radiation safety retraining may also be required.

When an Authorized User is expected to be away for up to six weeks, the Authorized User must designate another Authorized User to act in his/her place. The Alternate Contact will be in charge of the laboratory work involving radiation on behalf of the Authorized User. The Alternate Contact will be contacted for authorization-related issues and will perform most of the Authorized User's responsibilities and functions, including minor requests for permit amendments such as adding/deleting users. The Authorized User will, upon return, countersign all those items which required signatures during the absence. When the Authorize User and the Alternate Contact are expected to be away at the same time, the permit holder must advise the Radiation Safety Officer of an alternate arrangement.

C: Authorization Termination

When authorization is expected to be terminated, the Authorized User must notify the Radiation Safety Officer as far in advance as possible. This is particularly important when the termination is due to the permit holder's leaving the University. The Authorized User will assist Radiation Safety Program personnel to ensure that:

1. All radioactive materials still in the possession of the authorized holder are properly transferred, or disposed of.
2. Personnel monitoring is discontinued, where applicable.
3. The laboratory area is free of radioactive contamination and radiation caution signs, labels and other postings are removed.
4. EH&S will perform an exit survey of the laboratory and equipment to ensure all spaces and items are free of contamination.

D: Authorized Assistants

All individuals who intend to use radioisotopes or other forms of ionizing radiation under the supervision of an authorized user must provide a summary of their past experience and training in handling radioactive materials (Appendix A) to the RSO. The RSO will review the credentials and

determine whether or not they are sufficient. Authorized assistants are required to complete a Radiation Safety Training Course that includes passing a written examination.

Authorized Assistants must work under the supervision of an Authorized User. Authorized Assistants are responsible outlining and completing their assignments in as safe a manner as possible. They are to report any unsafe condition to the authorized user responsible for the area or to the RSO.

A. Students

ALL STUDENTS SHALL WORK UNDER THE DIRECT SUPERVISION OF AN AUTHORIZED USER.

Prior to students handling radioactive materials, the following procedures will be followed:

1. Specific procedures to be performed by students are to be submitted to the RSO for review and approval. The Radiation Safety Training Form and Radiation Worker Application shall be filled out and returned to the RSO or ARSO.

2. Students must be provided and with the radiation safety rules and policies for general laboratory safety. Each authorized worker shall review these rules and policies with each student worker.

3. The following aspects of the radiation safety program are to be reviewed and demonstrated to each student:

    a. Procedures for proper ordering and transfer of radioactive materials

    b. Techniques specific to the laboratory experiment being performed

    c. Techniques for monitoring physical facilities and personnel

    d. Procedures for proper disposal of radioactive waste

    e. Procedures for handling spills and emergencies

B. Ancillary Personnel

All ancillary personnel (campus police, building services and maintenance) who enter laboratories containing radioactive materials will receive training initially upon employment, and annually thereafter by the RSO. Training topics include:

1. Types and location of all radioactive materials on campus

2. Recognition of packages containing radioactive materials, and procedures to be adhered to in the event of identifying a damaged package

3. Specific meaning and intent of radiation signage and labels

4. Routine safety procedures for working near radioactive materials

5. Procedures to be followed in the event of an emergency involving radioactive materials

Policies and Procedures

A. Authorization of Radioactive Materials Location

All areas where radioactive materials or radiation producing equipment is to be used or stored must be specifically approved for that purpose by the Radiation Safety Officer. Such approval will consider the following aspects: type of isotope to be used, volatility and subsequent dispersability of radioactive materials, and the particular procedures to be performed in the proposed area. Additional factors are amount of available bench space, presence of fume hoods, bio-safety cabinets, storage and waste handling areas.

All rooms approved for use of radioactive materials must be under the direct control and supervision of an authorized user of radioisotopes. This investigator shall accept full responsibility for maintaining safe conditions in the laboratory.

Definitions: The Ohio Department of Health (OAC 3701:1-38-01) defines areas as follows:

1. Unrestricted Area – "an area, access to which is neither limited nor controlled by the licensee."
2. Restricted Area - "an area, access to which is limited by the licensee for the purpose of protecting individuals against undue risks from exposure to radiation and radioactive materials."
3. Controlled Area – "an area, outside of a restricted area but inside of the site boundary, access to which can be limited by the licensee for any reason."
4. Radiation Area – "an area, accessible to individuals, in which radiation levels could result in an individual receiving a dose equivalent in excess of 0.005 REM (0.05 mSv) in 1 hour at 30 centimeters from the radiation source or from any surface that the radiation penetrates."
5. High Radiation Area – "an area, accessible to individuals, in which radiation levels could result in an individual receiving a dose equivalent in excess of 0.1 REM (1 mSv) in 1 hour at 30 centimeters from the radiation source or any surface that the radiation penetrates."
6. Very High Radiation Area – "an area, accessible to individuals, in which radiation levels could result in an individual receiving an absorbed dose in excess of 500 RADs (5 Greys) in 1 hour at 1 meter from a radiation source or from any surface that the radiation penetrates.

All Cleveland State University Radioisotope Laboratories are regulated as Controlled – Type B Broad Scope License.

B. Prior to Experimentation in an Approved Area

Prior to actual experimentation with radioactive materials, all personnel must be authorized as outlined above, and have arranged for personal dosimetry services (including bioassay, if warranted) with the RSO. The authorized investigator supervising the research project is responsible for the safety and health of all personnel participating in the project. The investigator must also assure that all conditions and preparations have been addressed prior to assigning someone to work with radioactive materials or radiation producing equipment. All laboratory personnel must be familiar with the emergency procedures, and for contacting the RSO both in emergency and non-emergency situations.

Before beginning any new procedures with radioactive materials, a "dry-run" must be carried out using non-radioactive substances. This is done to ensure all possible hazards are anticipated and planned for.

C. Purchasing Radioactive Materials

All purchase requisitions for radioactive materials must be submitted to the RSO for approval prior to placing any order. This is done by submitting a copy of the purchase requisition directly to the Office of the RSO (Department of Safety and Environmental Services). Such requisitions usually can be processed the same day, but may take anywhere from 24-48 hours.

Small Purchase Orders (Small Order Forms) can be utilized to order radioactive materials for those authorized investigators who require frequent shipments. Unless each delivery date is specified, the RSO must approve all subsequent shipments. This is vital to ensure that all materials will be properly received, and that licensed quantity limits will not be exceeded.

No radioactive materials may be ordered without prior approval from the RSO.

D. Receipt of Radioactive Materials

All packages containing radioactive materials will be delivered to the Receiving Department, Plant Services Building, during regular business hours (8:00 am -4:30 pm). No shipment of radioisotopes will be accepted by CSU during off hours.

When a package of radioactive materials arrives on campus, receiving personnel will visually inspect the package for signs of damage together with the shipping representative, but will not handle it. If the package is damaged, the RSO must be immediately notified. The RSO (or his or her designee) will survey the package, the receiving area, the carrier's vehicle, and all personnel who handled the package to assess the existence and extent of contamination.

If there are no signs of damage (wet, torn or opened package due to leaks), Receiving personnel will sign for its receipt and instruct the shipping representative to place the package in a cabinet in the dock area, specifically intended for radioisotope use only. This cabinet is a lockable cabinet to which only Receiving personnel and Radiation Safety personnel have keys. They will then ensure the appropriate signage indicating that the cabinet contains radioactive materials is viewable and immediately notify the Radiation Safety Office of its presence on campus. As soon as possible, the RSO or his or her designee, will proceed to the Receiving Area, survey the package and record the readings on a Receipt of Radioactive Materials Form (See Appendix B). The package will be then taken to the Radiation Safety Laboratory, Room 288A Science and Research Building.

The RSO, or his or her designee will inspect all packages of radioactive materials received on campus. Such inspections are performed in accordance with OAC 3701:1-38-18 in accordance with the following:

> "Each licensee shall monitor the external surfaces of a package known to contain radioactive material for radioactive contamination and radiation levels if the package:
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> 1. Monitor external surfaces of a labeled package for radioactive contamination unless package contains quantities of radioactive material less than or equal to the type A quantity, or unless otherwise specified as defined in rule 3701:1-38-01 of the Administrative Code

2. Monitor all packages known to contain radioactive material for radioactive contamination and radiation levels if there is evidence of degradation of package integrity, such as a package that is wet, crushed or damaged.

This commonly includes all Radioactive Material-Exempted Limited Quantity, N.O.S.; Radioactive White I; Radioactive Yellow II; or Radioactive Yellow III-labeled packages.

Monitoring shall be comprised of the performance of surveys and wipe tests as follows: moisten filter paper discs using de-ionized water, and wipe a 300 cm^2 area of the exterior and interior package. Surveys shall be performed with calibrated instruments and recorded in mRem/hr. If removable contamination in excess of 10^{-5} ui/cm^2 (22 dpm/cm^2 or 6,600 dpm for 300 cm^2); or radiation dose levels in excess of 200 mRem/hr at the surface or 10 mRem/hr at 1 meter are detected, the RSO will immediately notify the carrier and the NRC/ODH.

All radioactive packages shall be inspected and wipe tested as soon as possible, but no later than three (3) hours from the time of arrival on campus.

C. Storage

All radioactive materials must be stored in an approved area of controlled access to prevent unauthorized removal. **Each area must be locked when personnel authorized to handle the material are not present.** Only approved laboratory areas will be used for storage.

The authorized investigator is responsible for assuring that all items containing radioactive materials are marked with the approved label bearing the isotope symbol and the words "Caution Radioactive Material".

D. Use

All radioactive materials must be handled in approved areas only. Radioactive materials should at all times be treated as hazardous substances, and handled with caution. Normal precautions should include the following safety measures:

1. All orders for radioactive materials, and any transfer of radioactive materials between authorized users must be approved by the RSO.

2. All use of radioactive materials must be supervised by an authorized user.

3. All solid radioactive waste must be placed in appropriate containers in accordance with ODH licensing requirements. A Radioactive Waste Log – Solids Form (Appendix D) is required to be affixed to or near the waste disposal container at all times.

4. Allowable amounts of liquid radioactive waste may be put to sewer in accordance with guidelines set forth in Appendix H. All such discharges are to be immediately recorded on the Sink Disposal of Radioactive Waste – Liquids (Appendix E). This form is to be posted near the sink used and labeled for radioactive liquid waste.

5. NO eating, drinking, smoking, chewing gum, applying cosmetics, or any other procedure that could lead to the inadvertent exposure of radioactive materials is permitted.

6. Film badges must be worn when using gamma, x-ray, or high-energy beta producing isotopes or equipment.

7. Lab coats and disposable gloves should be worn when handling radioactive materials. Care must be taken not to contaminate other surfaces when working gloved. Traces of radioactive material are often inadvertently transferred to refrigerator handles, phones, faucets and lab equipment when handling with a "hot" glove. Be sure to monitor such surfaces following use to assure no contamination has taken place.

8. Glassware, tongs, pipettors, and other similar lab equipment used for working with radioisotopes should be marked as such and must be decontaminated before being used in a non-radioactive area. "Hot" glassware should be either decontaminated or disposed of promptly.

9. Work should be confined to as small an area as possible to facilitate confinement and shielding, and also serves as an aid in limiting the affected area in the event of contamination.

10. All work involving the likelihood of aerosols, dusts, or gaseous products, must be conducted in hoods, glove boxes or similar protective devices. All releases from these systems shall be ALARA, and may never exceed the maximum permissible concentration in air outlined in OAC 3701:1-38.

11. Work surfaces shall be covered with an absorbent paper with waterproof backing. Procedures involving high activity liquids should be confined to a tray impervious to absorbing contamination. Change paper and wash trays frequently to prevent the spread of radioactive contamination.

12. Pipetting radioactive materials by mouth is expressly prohibited.

13. There is to be no food or drink present in University laboratories (including storage in refrigerators or freezers) under any circumstances.

14. Each laboratory or area utilizing high energy beta, gamma, or x-ray radiation shall have available a portable survey meter available to monitor work and storage areas before, during and following an experiment.

15. Minimize the exposure to high activities of gamma, x-ray and high-energy beta emitting radioisotopes. Confine such isotopes to a suitably shielded box in a remote spot of the laboratory (e.g. back corner of a hood or refrigerator). Use long handled forceps or tongs when possible to reduce potential of hand exposure.

16. Any equipment used with radioactive materials (refrigerators, ovens, centrifuges, etc...) shall not be removed from its authorized area until demonstrated to be free of contamination. No potentially contaminated equipment shall be repaired by maintenance or other personnel without first being demonstrated to be free of contamination prior to servicing. These regulations also apply to any equipment being returned to the manufacturer for servicing.

E. Animal Use

The University's License from the Ohio Department of Health authorizes the use of radioactivity in animal studies. All research proposals identifying the need for working with radioactivity in animals must be reviewed and approved by the Radiation Safety Officer, who will then submit the proposal to the Radiation Safety Committee for approval. The proposal shall include specific procedures to be utilized, and shall adhere to the following protocol:

1. General Animal Care Procedures

    a. The use of radioactivity in conjunction with animal subjects shall be conducted in accordance with regulations as described in the CSU Radiation Safety Program
    b. Animals must be housed in the Animal Care Facility located in the Science Research Building in accordance with Institutional Animal Care and Use Committee (IACUC) standards
    c. Animals, cages and bedding used in radioactive experimentation must be segregated from non-radioactive animals, cages and bedding
    d. Animals, cages and bedding used in radioactive experimentation shall be assumed to be contaminated.
    e. Cages used in radioactive experiments shall be constructed of a material that lends itself to be easily decontaminated
    f. Wear eye protection, gloves and a lab coat when handling animals or cages, or when bedding is being changed
    g. These guidelines shall be posted in all rooms where use of radioactive materials with animal subjects takes place

2. Physical Handling of Animals, Cages and Bedding

    a. Use of radioactive materials in animals shall be performed by or under the supervision of the approved Principle Investigator in a controlled area.
    b. The controlled area shall be clearly labeled "CAUTION RADIOACTIVE MATERIALS" sign or equivalent tape on the outside door.
    c. Work with volatile radioactive materials shall be performed in a laboratory hood labeled as containing radioactive materials
    d. Cages used in conjunction with radioactive materials shall be clearly labeled with a "CAUTION RADIOACTIVE MATERIALS" sign or equivalent tape
    e. Cages used in conjunction with radioactive materials shall be wipe tested by or under the supervision of the Principle Investigator

3. Waste Disposal

    a. Animal excreta must be considered as radioactive waste
    b. Radioactive carcasses and parts of carcasses shall be wrapped in absorbent paper, double-bagged and sealed in watertight bags and placed in a yellow bag bearing the radioactive materials symbol
    c. The yellow bag is to be labeled to include the name and form of the radioisotope, current activity and the name of the Principle Investigator
    d. When packaging, care is to be taken to ensure sharp edges (teeth, claws, etc…) do not puncture the bag

e. Place waste bags in a freezer labeled “CAUTION RADIOACTIVE MATERIALS” sign or equivalent tape on the outside door.
f. Contact the Radiation Safety Officer to facilitate disposal via a licensed radioactive waste hauler.

F. Inventory

The RSO is responsible for ensuring that the possession limits for each specific isotope are not exceeded. Authorized investigators are responsible for maintaining up-to-date records, including an inventory (See Appendix C) of the receipt, use and disposal of radioactive materials under their supervision. This is accomplished by calculating the activity of each isotope lost by decay using the following formula (note that the duration of a month is taken as 30.5 days, an annual average number of days per month):

$$A = A_0 e^{\frac{(-6.93 \times 30.5)}{T1/2}}$$

The RSO shall maintain an inventory of all radioisotopes received on campus and associated activity.

Investigators may not transfer radioactive materials to other investigators without approval of the RSO.

G. Transportation of Radioactive Materials Off Campus

Limited quantities of radioactive materials may be transported off campus to another facility licensed by the NRC or licensed agreement state agency to receive the radioactive material (e.g. to a consortium university or hospital). All such transportation OFF CAMPUS MUST BE PROCESSED AND HANDLED BY THE RADIATION SAFETY OFFICER. Transfers will only be arranged to occur from the Radiation Safety Office of Cleveland State University, to the Radiation Safety Office of the other institution. All transfers must comply with all applicable regulations found in OAC 3701:1-50 and 49 CFR Part 173.

Safety Monitoring Program

The goals of the monitoring program are to assure the safe working conditions for all personnel in restricted and unrestricted areas. Frequent monitoring of laboratories and personnel serves as an aid in assuring that individuals will not exceed their maximum permissible exposure limits, and that radiation levels remain as low as reasonably achievable (ALARA).

The RSO shall maintain all required records of personnel occupational exposure histories and laboratory working conditions.

A. Personnel Film Badge Dosimetry Program

CSU contracts with an accredited firm for a quarterly radiation film badge program. The standard badge issued is a whole body badge. Special monitors such as ring badges are available for situations when handling strong beta or gamma emitters. Doses are reported monthly to the Radiation Safety Office. Any individual receiving a dose above 10 mRem/month will be immediately notified.

All individuals handling x-ray, gamma ray, or high energy beta emitting isotopes (e.g. ^{32}P, ^{60}Co, ^{125}I) or x-ray producing equipment must wear a film badge. Individuals working exclusively with low energy beta emitters (e.g. ^{3}H, ^{14}C) need not wear a badge. Finger extremity monitoring badges must be worn when working with ^{32}P.

The Radiation Safety Office also has a limited number of spare badges which may be issued in emergency situations (i.e. when individuals not normally issued a badge, such as maintenance personnel who must enter a radiation area to perform maintenance work). The maximum permissible exposures for CSU personnel are:

Maximum Permissible Dose (Annual)

Dose Type	REM	Sieverts
Total Effective Dose	5.0	0.05
Deep Dose + Equivalent Committed Dose to Organs (non-eye)	50	0.5
Dose Equivalent to Eye	15	0.15
Shallow Dose Equivalent to skin or extremities	50	0.5
Declared Pregnant Women	0.5	0.005

Should an exposure report indicate an individual has received an exposure in excess of 20 mRem, the RSO will notify the individual as soon as possible. The RSO will make every effort to identify the cause of the exposure and take corrective action to eliminate the source. All whole body exposures indicated in excess of 200 mRem for a reporting period will result in the RSO immediately halting further use of radioisotopes until the cause of the reported exposure is determined. Corrective action may include, but is not limited to revising specific standard operating procedures in an individual lab, the use of additional shielding, and reducing the amount of time a worker handles a radioisotope.

Exposure reports are available for individual review their values by making an appointment with the RSO. Upon receipt of a signed release, an individual may request a transfer of their exposure history to another facility by filling the appropriate release form.

B. Bioassays

Specific radioisotopes, under certain circumstances, require in a bioassay programs be implemented. This program is designed to prevent the inhalation, absorption, or ingestion of these specific radioisotopes. Such assays are performed as the situation in a laboratory dictates. All efforts will be taken to reduce the need to implement a bioassay program on campus.

Bioassays are required to be performed if an individual working with a specific quantity and type of radioisotope exceeds 10% of the Annual Limits of Intake (ALI). Whether a bioassay will be required or not will be determined by the RSO in conjunction with the authorized user and the Radiation Safety Committee during the experiment review. Given the current usage of radioisotopes on campus, it is not anticipated, with the exception of ^{3}H or ^{125}I , that bioassay will be required. Should a bioassay be necessary, the RSO will develop a procedure and seek the approval of the ODH Bureau of Radiation Protection prior to permitting any experimentation to commence.

C. Gamma Emitters and High Beta Emitters (quantities >1mCi)

Authorized investigators using gamma emitters or high energy Beta Emitters in activities of greater than 1mCi are to perform daily surveys and daily wipe tests. Such measures are specified to ensure that radiation levels in all areas shall prevent exposures in excess of:

Unrestricted Areas……..0.2 mRem/hour
Controlled Areas……2.0 mRem/hour
Restricted Radiation Areas 5.0 mRem/hour

Activities less than 1 mCi require monthly wipe tests of the laboratory. Wipe tests are performed to detect removable surface contamination. Using moistened filter paper, areas of approximately 100 cm^2 are wiped and counted by liquid scintillation. Records of monitoring and wipe tests are maintained in the User's Book.

All contamination identified at levels that are in excess of twice the background levels is to be removed. Should contamination be detected in excess of 2500 dpm, physical demarcation of the area will be made until such time when indications are received that the contamination has been successfully removed. If contamination is detected in excess of 10,000 dpm, all activities in the area are to be terminated. The RSO will supervise the immediate decontamination of the area.

Soap and water, *RadCon* or other similar cleaning agents shall be used promptly to decontaminate any areas identified as contaminated; cleaning procedures will be performed until evidence of decontamination is obtained. Surveys and monitoring will be repeated to verify decontamination procedures have been successful. All incidents of spills and decontamination activities will be recorded on the appropriate forms and kept in the User's Book.

All users are responsible for monitoring their own facilities and operations.

D. Survey Meters

The RSO maintains an inventory of all survey meters and ensures that such equipment is calibrated on an annual basis.

E. Sealed Source Leak Test

All sealed sources shall be wiped checked for leakage every six months by the Radiation Safety Office. Samples shall be taken from the surface of the sealed source, or from surfaces of the container(s) in which the sealed source is mounted where contamination is likely to accumulate. If contained inside instrumentation or devices, the unit must be de-energized prior to performing the test.

Moistened filter paper is used to wipe the surface of the sealed source and counted by liquid scintillation. When testing the surface of the container(s) in which a sealed source is mounted, areas of approximately 100 cm^2 are wiped and counted by liquid scintillation. Removable contamination shall not exceed 0.005 uCi.

Pregnant Workers

Specific guidelines are set forth by the ODH (OAC 3701:1-38-01, 3701:1-38-12 and 3701:1-38-14) to ensure protection of pregnant individuals who work with radioisotopes, and their developing fetus. All female employees who work with radioisotopes will be informed during radiation safety training that should they become pregnant, they may voluntarily notify the University in writing of their pregnancy. IN addition to ODH regulations, the University requests any declared pregnant woman to provide a written document from her primary care physician stating she may work with radioactive materials. Any doses reported for the declared pregnant worker, or doses recorded from an embryo and fetal monitoring will be evaluated to ensure any dose received is within ODH guidelines. All documentation pertaining to the health status of all workers will be held in strictest confidence.

Laboratory Inspections

The RSO shall conduct quarterly inspections of all laboratories where radioisotopes are used or stored to evaluate compliance with license requirements. Such inspections include monitoring with survey meters and wipe tests, and will be recorded on a Radiation Laboratory Inspection Form (See Appendix F). In addition, when activities involving radioisotopes cease, the RSO will remove any active radioisotopes remaining as waste, and perform a final inspection.

Radioactive Waste Disposal

All wastes that contain, or are contaminated with, any radioactive material (liquids, solids, animal carcasses, infectious materials, etc…) is considered radioactive waste. It is prohibited to place non-radioactive waste in containers labeled as containing radioactive waste. Radioactive waste is stored in the Radioactive Waste Storage Area, Science Research Building, Room 288A. Material will either be decayed on site (see Short Half-Life Material), or disposed of by transportation to a licensed radioactive disposal facility.

Liquids – All solvent (organic) based waste is to be collected in containers bearing the label – CAUTION RADIOACTIVE MATERIAL – and stored in sealed containers under a fume hood approved for use with radioisotopes, and labeled as such. Aqueous based liquids with certain activity levels may be released to the sanitary sewer system, provided those activity levels are less than amounts put forth by the ODH (OAC 3701:1-38-12 Appendix C and 3701:1-38-19) and the substance is readily soluble. Volume and activities of radioisotopes discharged to sewer are recorded on the appropriate form by the user, and placed in the User's Book. See Appendix F for allowable discharge amounts.

Scintillation fluid that has been demonstrated as having at or below background radioactivity is poured off into approved waste containers for non-radioactive hazardous waste, and processed in accordance with regulations for hazardous waste. Contaminated organic-based liquid is collected and removed by an approved radioactive waste transporter to a licensed radiation disposal facility.

Dry Solids – Such waste is collected and maintained in containers containing yellow radioactive bags. These containers must be labeled – CAUTION RADIOACTIVE MATERIAL- on the exterior. No liquids are to be placed in these containers whatsoever.

Animal – Currently no animals are used with radioactive materials. Should there be usage, carcasses and excreta containing radioactive material are frozen after being placed in yellow plastic radioactive waste bags. The freezer they are stored in shall bear the label – CAUTION RADIOACTIVE MATERIAL.

Short Half-Life - Short half-life (defined as radioisotopes having a half-live of less than 70 days) material will be transported to the Radioactive Waste Storage Area (Science Research 288A) for decay on site. Decay on site is performed by properly storing the waste for at least ten (10) half-lives, and monitored to ensure no activity remains. The material is then disposed of in regular solid waste stream. For longer half-lived material, the waste is collected and removed by an approved radioactive waste transporter to a licensed radiation disposal facility.

Emergency Procedures

All spills, contamination, or any other accident/incident involving radioactive materials shall be reported immediately to the RSO. Failure to do so can result in considerable hazards to a worker and any surrounding personnel, as well as to facilities. De-authorization from use of radioisotopes may result for any individual who fails to promptly report a radioactive material emergency.

A. Low-Level Spill – defined as a spill confined to a limited area and does not result in an increase in radiation levels in that area greater than 2 mRem/hr, and meets both of the following criteria:
    1. No contact was made with any part of the body
    2. Radiation levels measured at 1 meter from the center of the spill are not in excess of 2 mRem/hr

    Notify the authorized investigator supervising the laboratory where the spill occurred as soon as possible. The investigator is responsible for assuring that the spill is properly cleaned up and disposed of. Decontamination procedures are located below.

B. Minor Spill of Liquids and Solids

    1. Immediately notify all other persons in the area that a spill has occurred
    2. Take action to prevent spread
        a. Cover liquids with absorbent paper
        b. Dampen dry material thoroughly, taking care not to spread the contamination. Water should be used unless an adverse chemical reaction would generate an air contaminant. Use oil instead.

    3. Using disposable gloves, carefully decontaminate by folding absorbent paper with the clean side out place in a plastic bag for transfer to a

radioactive waste container. Also, put contaminated gloves and any other contaminated disposable material in the bag.

4. Perform a survey using a low range radiation survey meter. Be sure to include the area immediately around the spill, as well as the affected area. Survey hands shoes, and clothing for contamination.
5. Report the incident to the RSO and place appropriate documentation in the User's Book.

C. Major Hazardous Spills

1. Immediately notify all persons to vacate the immediate area, but to not leave the premises
2. If possible, make an attempt to prevent the spread of contaminants by covering the spill with absorbent paper – do not make any attempt to clean up the spill at this time.
3. If possible, shield the source, provided this can be accomplished without further contamination
4. Close and secure (lock) the room, and deactivate all fans and hoods on your way out.
5. Place a call for help. Notify the Radiation Safety Officer immediately upon discovery of a major radioactive spill.
6. Decontamination of personnel will be performed by the RSO.
7. The RSO is responsible for directing the decontamination and assuring that the area is as free of contamination as reasonably achievable when decontamination procedures are completed. The authorized investigator is responsible for promptly executing all decontamination procedures deemed necessary by the RSO

   The RSO shall determine the extent of the spill by conducting monitoring in the areas surrounding the spill. The contaminated area will be labeled and isolated to prevent an inadvertent entry into the area. Only authorized personnel may enter the area until the decontamination procedures are completed.

   The RSO will complete a Radioactive Spill Report (see Appendix G).

   The RSO will report the incident to the ODH (OAC 3701:1-38-21).

D. External Bodily Contamination

Radioactive materials coming into contact with body surfaces should be promptly removed using soap and gentle scrubbing, and rinsing with water.

Take care to not use excessive caustic soaps or use an abrasive scrub brush to ensure that the skin is not abraded resulting in the potential transfer of radioactive material internally. The RSO will determine whether or not decontamination can be performed on site, or whether transportation to St. Vincent Charity Hospitals is required.

Should decontamination be performed on site, the RSO shall arrange bioassays to ensure decontamination. The authorized investigator will complete the Radioactive Contamination Report and submit to RSO.

E. Internal Bodily Contamination

Ingestion or injection of radioactive materials shall immediately be reported to the RSO. The RSO shall facilitate the transport of the individual to St. Vincent's Charity Hospital

Radiation Emergency Information

All Radiation Emergencies should be reported immediately to the Public Safety Answering Point (Campus Safety Dispatch) by DIALING 9-1-1 OR 8,9-1-1. Cell phone users should also dial 9-1-1 and tell the operator to connect you to CSU Police.

Contact:

Radiation Safety Officer
Robert Howerton
Office (216) 687-3715
Cell (216) 276-4324

Assistant Radiation Safety Officer
Dr. Valentin Boerner
Office (216) 523-7557

Medical Occupational Health:

St. Vincent Charity Hospital
2351 East 22nd Street
Cleveland, Ohio 44115

Medical Emergencies:

MetroHealth System
2500 Metrohealth Drive,
Cleveland , Ohio 44109

Appendices

A. Training and Experience of Users Form

B. Receipt of Radioactive Materials Form

C. Radioisotope Inventory Form

D. Radioactive Waste Log (Solids) Form

E. Sink Disposal of Radioactive Waste (Liquids) Form

F. Laboratory Inspection Form

G. Radioactivity Spill Report Form

H. Allowable Discharge to Sewer

I. Radiation Safety Laboratory Rules

J. Radiation Survey Equipment

K. Radioactive Materials Inter Laboratory Transfer Form

L: Radiation Safety Training Form

M: Penalties for Radiation Safety Violations

N: Radiation Worker Application

Appendix A

Application for Authorized Use of Radioactive Materials (RAM) Form

Cleveland State University
Radiation Safety Office
2121 Euclid Avenue, PS 233, Cleveland, Ohio 44115
(216) 687-9306 Fax (216) 687-9346

Application for Authorized Use of Radioactive Materials (RAM)

Applicant Information

Name_____
Department_____
Division_____
Position_____
CSU Office Location_____
Phone Extension_____

Highest degree:_____B.S._____M.S._____Ph.D._____M.D._____Other

If previously authorized for RAM uses on an NRC or State license, provide name and location of the institution:_____
_____

Specific Education, Training and Experience with RAM

Coursework: Title	Location:	Date(s)	Hours
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____

Experience: Radionuclide	Activity	InVivo/Vitro	Locations
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____

Total Hours of training experience _____

Appendix B

Receipt of Radioactive Materials Form

Shipment Receipt Form

SHIPMENT RECEIPT FORM

PURCHASE ORDER#_____

1. Authorized User:_____Survey Date_____Time_____
   Isotope and Activity:_____Surveyor:_____

2. Condition of Package:
   _____O.K._____Punctured_____Stain_____Wet
   _____Crushed _____Other
3. Smear Survey Required per NRC? _____Yes _____No
4. Radiation Label:
   _____White-I _____Yellow-II _____Yellow-III
5. Transportation Index:_____(0.25mR/hr at 3 feet)
6. Measure Radiation Levels:
   a. Package Surface:_____mR/hr
      200 mR/hr?_____Yes_____No (Yes requires notification)
   b. 3 feet from surface_____mR/hr
      10 mR/hr?_____Yes_____No (Yes requires notification)

7. Do Packing Slip and Vial Contents Agree?
   a. Radionuclide:_____Yes_____No_____Difference
   b. Amount:_____Yes_____No_____Difference
   c. Chemical Form_____Yes_____No_____Difference

8. Wipe Result Form:
   a. Outer:_____cpm=_____dpm
      Eff=_____
   b. Final Source Container:_____cpm = _____dpm
      Eff=_____

9. Survey Results of Packing Material and Cartons:
   a. _____mR/hr
   b. Bkg._____mR/hr

10. If package was shipped with dry ice, was dry ice present in package at time of receipt?
    _____Yes _____No _____N/A

11. Disposition of Package after Inspection:
    _____

12. If NRC/Carrier Notification Required:
    Time:_____ Date:_____
    Persons Notified_____
13. Receipt of radioactive shipment:
    Name:_____ Date:_____

Appendix C

Radioactive Materials (RAM) Use Log Inventory Form

CLEVELAND STATE UNIVERSITY
RADIOACTIVE MATERIALS (RAM) ON HAND
(USE LOG)

Primary Investigator_____Room#_____

Date Received	Isotope	Inventory Date	Estimated RAD Level when Inventoried	Date Depeleted

Revised 1/07

Appendix D

Radioactive Waste Log
(Solids)

RADIOACTIVE WASTE LOG
(SOLIDS)

Location_____ Building_____

Date	Isotope	Type of Waste	Amount (uc)	Department	Disposed By	Phone

Revised 1/07

Appendix E

Sink Disposal of Radioactive Waste (Liquids)

SINK DISPOSAL OF RADIOACTIVE WASTE
(LIQUIDS)

User_____ Bldg_____ Lab Number_____

Dumping Limits: Not greater than 30 uci/day

Date	Radionuclide	Volume	Estimate of Activity Level	Initials

Revised 1/07

Appendix F

Radiation Laboratory
Inspection Form

Cleveland State University
Office of Environmental Health and Safety
Radiation Laboratory Inspection Form

Date:_____ Authorized User:_____

Laboratory Location:_____ Isotope(s) Present_____
(Building/Room Number)

Item	Present	Not Present	Not Applicable
Radiation Signage – Door			
Radiation Signage – Eqmt.			
Radiation Safety Lab Regulations			
ODH Notice			
Emergency Notifications			
List of Badged Employees			
Gloves, Lab Coats, etc…			
Shielding			
Badges (if required)			
Use Log			
Lab Diagram			
Training Performed by Authorized User			
Monthly Lab Survey/Wipes			
Waste Disposal Log (Liquids-Sink)			
Waste Disposal Log (solids) (Affixed to Waste Container)			
Material Transfer			
Hoods			

Comments:

Wipe Location	Survey Reading	Wipe Location	Survey Reading
1.		7.	
2.		8.	
3.		9.	
4.		10.	
5.		11.	
6.		12.	

See attached printout for counts
Background:_____mRem/hr Average Background Count:_____cpm

Survey Meter:_____Bicron Surveyor 50
Performed by: _____
RSO

Revised February, 2012

Appendix G

Radioactive Spill Report Form

RADIOACTIVE SPILL REPORT

Spill Occurred at____:____am/pm on / / in Bldg_____
Room_____

Instrument used to check for personnel contamination:

Meter Model _____ Meter S/N _____

Probe Model _____ Probe S/N _____

Personnel Present	Contamination Results
_____	_____
_____	_____
_____	_____

On the back of this sheet, indicate any personnel decontamination measures, additional monitoring, or care instituted.

Survey the spill area to identify hot spots, then begin decontamination. When finished, conduct a post cleaning contamination wipe-test.

Radioisotopes present or suspected in the spill:

_____uCi of_____as _____

_____uCi of_____as _____

_____uCi of_____as _____

Give a brief description of the accident: _____

_____

_____

Describe any follow-up actions taken to prevent a recurrence:

_____

_____

_____

NAME_____
DATE_____

Appendix H

Allowable Release to Sewer of Radioactive Materials (RAM)

SINK DISPOSAL*

Revised 07/04 to reflect change in regulatory authority only from Nuclear Regulatory Commission to the Ohio Department of Health Bureau of Radiation Protection regulations found in *OAC 3701:1-38

AVERAGE MONTHLY SEWAGE RELEASE QUANTITY (uCi/ml) CANNOT BE EXCEEDED:

CLEVELAND STATE UNIVERSITY RADIOACTIVE DISCHARGE

Radioisotope	1995	1996	1997	1998	1999	2000	Total
P^{32}	93.3	49.2	43.3	296.8	466.0	332.0	1280.6
I^{125}	38.2	-	-	-	-	-	38.2
S^{35}	436.0	86.5	3.75	21	-	-	547.25
H^{3}	-	10.0	-	-	-	-	10.0
C^{14}	-	2.8	-	-	-	-	2.8

Total: 1878.85

Unit of measure is uCi

The level of radioactive sewerage discharge for six years was 1878.85 uCi. Based on our past discharge and using Reference (1) – The total monthly radioactive discharge of Others (P^{32}, S^{35},I^{125}, Cr^{51}, and Ca^{45}), cannot exceed 83,000 uCi. Because of our small number of radioactive research laboratories, it seems warranted to self restrict our sewerage of others to 1% of the maximum or 830 uCi. We have consistently been well below the maximum discharge limits for all radioactive isotopes. If research dictates exceeding the 1% level, the Radiation Safety Officer must be notified prior to discharge.

NOTE: Regulatory guidelines (*OAC 3701:1-38-12)* can be difficult to understand for many readers. The following summarizes as references the two primary sewerage discharge requirements. A general rule is to use the most restrictive regulatory requirement, which is Reference (1). We have further reduced this release limit. For example, the same limit applies at Case Western University. If Case Western has 500 laboratories and we have 5, it would seem appropriate to keep this release to 1% of theirs.

Reference (1): *OAC 3701:1-38-012, 3701:1-38-13, 3701:1-38-19.*

The total quantity of licensed and other radioactive material that the licensee releases into the sanitary sewerage system in a year does not exceed 5 curies (185 GBq) of hydrogen-3, 1 curie of (37GBq) of Carbon-14 and 1 curie (37 GBq) of all other radioactive materials combined.

Radioactive Isotope	Annually	Monthly	Maximum Curies	UCuries
Hydrogen-3	5 Curies	5/12	.417	417,000
Carbon-14	1 Curie	1/12	.083	83,000
Others	1 Curie	1/12	.083	83,000
	7 Curies	7/12	.583	583,000

Rev 07/04

The quantity of licensed or other radioactive material that the licensee releases into the sewer in one month divided by the average monthly volume of water released into the sewer by the licensee does not exceed the concentration listed in *OAC 3701:1-38-12 Appendix C*; and

If more than one radio nuclide is released, the following conditions must be satisfied.

a. **The licensee shall determine the fraction of the limit in *OAC 3701:1-38-12 Appendix C* represented by the discharges into sanitary sewerage by dividing the actual monthly average concentration of each radio nuclide released by the licensee into**

the sewer by the concentration of that radio nuclide listed in *OAC 3701:1-38-12 Appendix C*; and

b. The sum of the fractions for each radio nuclide required by paragraph (i) does not exceed unity.

Radioactive Isotope	*OAC 3701:1-38-12 Appendix C*	**Water
Hydrogen-3	1E-2	3,203,305,000.00
Carbon-14	3E-4	48,049,575.00
Phosphorous-32	9E-5	14,414, 872.50
Sulfur-35	1E-3	160,165,250.00
Calcium-45	2E-4	32,033,050.00
Chromium-51	5E-3	800,826,250.00
Iodine-125	2E-5	3,203,305.00
Iodine-131	1E-5	1,601,652.50
Total		4,263,598,955.00

****NOTATION:**

1. **The values in the above table are presented in computer "E" notation. In this notation a value of 6E-02 represents a value of 6×10^{-2} or 0.06, 6E+2 represents 6×10^{2} or 600, and 6E+0 represents 6×10^{0} or 6.**
2. **Volume of water at CSU.**

Annual Water Usage 14,451 MCF
=14,451,000 Cubic Feet
(.133 Cubic Meter equals 1.0 Cubic Feet)
=1,921,983 Cubic meters
=1,921,983,000 Liters
=1,921,983,000,000 milliliters

Average Water Usage per month = 1,921,983,000,000/12
=160,165,250,000 ml.

Sample Using Hydrogen-3
Monthly Average Concentration=1E-2
Maximum uCi concentration=Monthly average concentration x average water usage per month.
=0.01 x 160,250,000
=1,601,625,000 uCi

Rev 07/04

Appendix I

Radiation Safety Laboratory Rules

Radiation Safety Laboratory Rules

1. All users of radioactive material must be approved by the Authorized User in this laboratory and first complete a radiation safety training program which includes passing a written exam. No student is permitted to handle radioactive material or to participate in an experiment otherwise

2. Laboratory coats and gloves must be worn when working with radioactive materials. Bench covering must be also used. Pipetting by mouth is forbidden.

3. Eating, drinking, chewing gum and application of cosmetics is expressly forbidden in the laboratory.

4. Open chemical operations should be normally avoided. The hood should be checked to establish the presence of airflow. In the event the amount of radioactive material will possibly exceed 100 uCi (microcuries) a hood must be used.

5. A radiation survey must be performed weekly in labs where radioactive material is used in amounts greater than 200 uCi (microcuries) at one time. Monthly surveys are required for amounts less than 200 uCi (microcuries) at one time. Radioactive material must be contained within the designated bench area or hood for radioactive experiments.

6. The movement of radioactive material outside the radiation laboratory is strictly forbidden. Transfer of radioactive materials between laboratories is permitted only with prior authorization by the Radiation Safety Officer.

7. It is required that all radioactive material be identified as to the radionuclide, amount of radioactivity (in uCi), and the date of assay. It is also required that the authorized user be identified on the label or storage area. Contaminated articles or glassware must be rinsed in the radioactive sink following the normal procedures for minimizing aerosol generation.

8. Film badges and/or ring badges must be worn if indicated at all times while the radioactive materials are being used. Film badges should remain in the pre-designated area when not worn and should never be taken off the premises. The Radiation Safety Office shall replace badges on a quarterly basis.

9. The Authorized User shall provide guidance and information on the proper disposal of radioactive waste in conjunction with the Radiation Safety Program. Contact the Radiation Safety Office for removal of radioactive waste from the lab.

10. All uses, transfers and disposition of radioactive material must be recorded in the radiation safety logbook in the laboratory.

11. All users of radioactive materials shall wash their hands with Rad-Con or another radioactive decontaminant upon leaving the laboratory for any reason.

Revised Oct, 2011

Appendix J

Radiation Survey Meters

Radiation Survey Equipment

Below is a list of equipment available for use in performing radiation safety surveys as part of the University's Radiati survey meters are calibrated on annual basis by a company certified to calibrate such meters. Calibration of all meters shall Radiation Safety Officer (RSO).

Manufacturer	Model #	Serial	Probe	User	Provided by CSU	Cal Due Date
Bicron	**Surveyer 50**	I-825A	PGM I-639	Howerton	yes	**3/7/2025**
Bicron	**Microrem**	E014A	N/A	Howerton	yes	**3/29/2025**
Victoreen	**493**	4098	GM tube 489-110C	Howerton	yes	**11/9/2024**
Ludlum	**Model 3**	187041	GM tube 44-7, PR 193066	Komar	yes	**1/18/2025**
Ludlum	**Model 3**	200690	GM tube 44-9	Mazumder	yes	**8/25/2024**
Wm B Johnson	**GC-5000**	11035	GM tube p-101, 1047	Sam-Yellowe	yes	**8/5/2020**
Ludlum	**Model 3**	275436	GM tube 44-9	Komar	yes	**11/9/2024**
Ludlum	**Model 3**	224506	GM tube 44-9	Boerner	no	**8/25/2024**
Ludlum	**Model 3**	254212	PR328776,Model 44-9	Howerton	yes	**11/14/2024**
Ludlum	**Model 3**	284332	GM-Tube 44-9, pr306594	LI	yes	**8/31/2024**
Johnson	**GSM-500**	3507	J-GSM, 5974	Berdis	No	**3/29/2025**
Johnson	**GSM-110**	6660	J-HP-265, 7184	Berdis	No	**10/5/2023**
Ludlum	**Model 3**	342443	GM-Tube 44-9, PR385384	Howerton	yes	**1/18/2025**

Appendix K

Radioactive Materials Inter Laboratory Transfer Form

CLEVELAND STATE UNIVERSITY
Office of Environmental Health and Safety

RADIOACTIVE MATERIAL
INTER LABORATORY TRANSFER FORM

Authorized User_____ Date_____

Original Location (Building/Laboratory Number)_____

Isotope/Activity Transferred _____

Amount transferred_____

AuthorizedUser Receiving material_____

New Location (Building/LaboratoryNumber) _____

NOTE: *The radioactive wasteshould be recorded on the wastelog of the user* ***receiving*** *the RAM. This form should be put in the Note Book with the Use Logs.*

AuthorizationRSO /ARSO _____

Date_____

Appendix L

Radiation Safety Training Form

Cleveland State University

Environmental Health and Safety

Radiation Safety Training

Student Name: _____ Date:_____

CSU ID #: _____

Areas of Concentration:

□	Fundamentals of Radiation	□	Effects of Radiation
□	Radiation Exposure	□	Biological Effects
□	Dosimetry	□	Radiation Safety (ALARA)
□	Monitoring	□	Shielding

Cleveland State University Radiation Safety Procedures:

□	Ordering	□	Receipt
□	Storage and Use	□	Waste Disposal
□	Monthly Inventories/ Wipes	□	Lab Inspections
□	Spills	□	Emergency Procedures

Exam Taken Date: _____ Score: _____

I have been trained and understand the radiation safety policies and procedures for using radioactivity at Cleveland State University.

_____ _____

Student Name Date

_____ _____

RSO/Assistant RSO (trainer) Date

Appendix M

PLEASE POST

Penalties for Radiation Violations-Cleveland State University

Major Violations:

1. Release of radioisotope material into environment
2. Unreported spills of >100 microcuries of radioisotope that result in significant breach of containment, i.e. isotopes in non-radioactive trash, spills outside of PI's laboratory, etc.).
3. Unauthorized shipment of radioisotopes.
4. Ordering and/or receiving radioisotope not authorized by Radiation Safety Officer (RSO).

Any violation will result in an immediate suspension of radioisotope use and confiscation of all radioisotopes.

Moderate Violations:

1. Unauthorized transfer of radioisotopes between authorized labs. Transfer must be requested via INTER-LABORATORY TRANSFER FORM to Radiation Safety Officer (RSO). Both donor and recipient labs are responsible.
2. Unauthorized personnel using radioisotopes.
3. Food and/or drinks in the laboratory.
4. Evidence of eating and/or drinking in the laboratory.
5. Performing experiments not approved by user agreement.
6. Unreported spills of radioisotope greater than 100 microcuries.

One (1) violation within a twelve (12) month period will result in an official reprimand from the Safety Office indicating that the lab is placed on probation.
More than one (1) violation within a twelve (12) month period will result in an immediate suspension of radioisotope use and confiscation of all radioisotopes.

Minor Violations:

1. Unsecured radioisotopes (unlocked lab door or unlocked storage for radioisotopes)
2. Incomplete / inaccurate documentation including but not limited to the receipt of radioisotopes, post-experiment surveys, and disposal of radioactive waste (solid and liquid).
3. Performing experiments with inadequate personal protective equipment (PPE).
4. Performing experiments outside of areas designated for radioisotope use.
5. Use of Geiger counters or other safety devices that are not properly calibrated.

Two (2) violations within a twelve (12) month period will result in an official reprimand from the Radiation Safety Office indicating that the lab in violation is on probation.
More than two (2) violations within a twelve (12) month period will result in an immediate suspension of radioisotope use and confiscation of all radioisotopes.

Suspension: Any laboratory that is suspended for radioisotope use will be eligible to re-apply for radioisotope use no sooner than six (6) months from notification of violation. In order to be re-approved for radioisotope use, the PI and all lab members must undergo extensive training and testing to verify that further violations will not occur. The RSO and committee will make final decisions regarding the approval of radioisotope use for laboratories that have been suspended due to various safety infractions and violations.

Probation: Any laboratory that is placed under probation will remain under intensive safety reviews over the next twelve (12) months from notification of the violation. Any violation denoted within that twelve (12) month period will result in an immediate suspension of radioisotope use and confiscation of all radioisotopes.

Hearing: For moderate and major violations, the PI has the right to request a hearing by the Radiation Committee.

Appendix N

Cleveland State University

Environmental Health and Safety

Radiation Worker Information and Application Form

Employee: _____ Date:_____

Date of Birth: _____

CSU Identification Number: _____

Previous location where radioactive materials were used:_____

(exposure data will be requested)

Radioisotope(s) that will be used at CSU:

Short description of protocols for which radioisotopes will be used: