

# OHSU RADIATION SAFETY REGULATIONS VOLUME 1

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# FOREWARD

Oregon Health & Science University (OHSU) is committed to an effective radiation protection program designed to eliminate unnecessary exposures to radiation and to reduce occupational exposures to levels that are As Low As Reasonably Achievable (ALARA). The specific policies in this document are designed to maximize benefits of the safe use of radiation sources and minimize the risk to personnel, visitors, patients, as well as our general environment and the community.

To administer the use of radionuclides, OHSU has been granted the status of a "Broad Scope" licensee by the State of Oregon Radiation Protection Services Section of the Health Division. This carries strict and broad responsibilities for radionuclide procurement, use, storage, and disposal. Responsibility for assuring compliance with State of Oregon Regulations for safe use of radionuclides and equipment-produced radiation sources is vested with the OHSU Radiation Safety Office (RSO) and the OHSU Radiation Safety Committees (RSC).

Individuals at OHSU in charge of use of radioactive materials and radiation-producing equipment work under licenses and authorizations granted to them by the Radiation Safety Committees and the Radiation Safety Office.

OHSU Radiation Safety Regulations are divided into three volumes:

**Volume I** regulates use of radionuclides and radiation-producing equipment in research not involving human use. The use of radionuclides is governed by the State of Oregon License ORE-90731.

**Volume II** pertains to the medical use of radionuclides under the Broad Type A Medical Use License ORE-90013. These guidelines also incorporate requirements of the Joint Commission on Accreditation of Healthcare Organizations (JCAHO), which sets standards governing Radiation Oncology and Nuclear Medicine.

**Volume III** relates to medical and dental radiation producing equipment. These radiation safety requirements meet the JCAHO medical standards, and comply with Oregon Administrative Rules (OAR), Chapter 333 (Rules for the Control of Radiation).

Albert J. Castellane  
Research Radiation Safety Officer

Janet Franco  
Clinical Radiation Safety Officer

# **VOLUME I - PREFACE**

The OHSU Radiation Safety Regulations, Volume I, are the official policies of the Oregon Health & Science University for the control of all sources of, and exposure to, ionizing radiation in non-human-use research. The Regulations define responsibilities for radiation control, and provide safety rules for users of radionuclides and radiation-producing equipments. Radionuclides include sealed and unsealed sources, those used for internal equipment calibration, and any equipment, which normally contains an ionizing radiation source but may not be so identified, e.g., gas chromatographs. Ionizing radiation-producing equipment includes x-ray cabinets, and crystallography units.

The protection of the health and welfare of the faculty, staff, students, the general public, and our community is of primary importance. OHSU rules and procedures for the safe use, disposal, and transportation of ionizing radiation sources shall comply with the corresponding regulations and requirements of state and federal agencies.

Technical assessments, evaluations and interpretations shall also be consistent with Oregon Administrative Rules, Chapter 333 (Div. 100-120) and the recommendations of advisory bodies such as:

1. State of Oregon Department of Human Resources, Health Division, Radiation Protection Services through their supplemental Advisories and Bulletins
2. The Joint Commission on Accreditation of Healthcare Organizations (JCAHO)
3. The National Council on Radiation Protection and Measurements (NCRP)
4. The Nuclear Regulatory Commission (NRC)
5. The Environmental Protection Agency (EPA)
6. Federal Department of Transportation (DOT)
7. The International Commission on Radiological Protection (ICRP)
8. The National Academy of Sciences Committee on the Biological Effects of Ionizing Radiation (BEIR)
9. The American National Standards Institute (ANSI)

Oregon Health & Science University will obtain and maintain **all** licenses, Site Use Permits, Registration Certificates, and Certificates of Insurance, which are necessary or useful for the conduct of the radiation safety program. The University will, insofar as possible, obtain and maintain copies of applicable federal, state, and local laws and regulations pertaining to our radiation safety program.

Copies of OHSU licenses ORE-90013 and ORE-90731, and other applicable parts of the Oregon Administrative Rules are accessible in the OHSU Radiation Safety Office. The licenses are administered for the Radiation Safety Committee by the Radiation Safety Office.

If there is any conflicting information between the OHSU Radiation Safety Regulations and a license, permit, instruction, procedure, or any other document generated at OHSU, the information in the OHSU Radiation Safety Regulations will take precedence.

**Any radiation user may communicate directly, in confidence and without prejudice, with the OHSU Radiation Safety Officer, the Oregon State Health Division Radiation Protection Services or the U.S. Nuclear Regulatory Commission on any matter concerning radiation protection.**

# OREGON HEALTH AND SCIENCE UNIVERSITY

## RADIATION SAFETY REGULATIONS

### FOR RESEARCH & NON-HUMAN USE

#### PURPOSE OF THE RADIATION SAFETY COMMITTEE

#### Appointment, Membership, and Organization of the Radiation Safety Committee

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#### **1 RADIATION SAFETY COMMITTEE (RSC)**

- 1.1 The purpose of the RSC at OHSU shall be to promote the best practices in the use of ionizing radiation in experimental, instructional and research programs. Ionizing radiation refers to any electromagnetic or particulate radiation capable of producing ions, directly or indirectly through its interaction with matter. Sources of such radiation include radionuclides, x-ray generating equipment and any other devices capable of producing ionizing radiation.
- 1.2 Committee members and the chairperson are appointed by the President of OHSU or his/her designee.
  - 1.2.1 Committee meetings will be held at least quarterly and at the discretion of the chairperson or by verbal or written petition of any member. Interim business will be conducted by the chairperson and the Radiation Safety Officer.
  - 1.2.2 One-half of the committee members is required for a quorum and must include the Radiation Safety Officer, or his/her designee, and a representative of management.

**Responsibilities of  
the Radiation Safety  
Committee**

- 1.3 The Radiation Safety Office (RSO) shall provide each member with a copy of the minutes, which must include:
  - The date of the meeting
  - Members present
  - Members absent
  - Summary of deliberations and discussions
  - Recommended actions
  - All reviews required by the As Low As Reasonably Achievable (ALARA) Program.
- 1.4 OHSU radiation policies and procedures shall be reviewed and approved by the RSC to ensure that ionizing radiation on the OHSU campus is used in accordance with the requirements of the regulatory bodies.
- 1.5 Review, on the basis of safety and with regard to training, and approve or reject applications for authorizations to use radionuclides.
- 1.6 Review and approve, with advice and consent of the Radiation Safety Officer, procedures and radiation safety program changes.
- 1.7 Review quarterly radiation exposure records and all incidents involving radioactive material.
- 1.8 Review the radiation safety program annually.
- 1.9 Establish a table of occupational dose that requires investigation and consideration of actions by the Radiation Safety Officer.

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**RADIATION  
SAFETY OFFICER**

**APPOINTMENT,  
AUTHORITY &  
FUNCTIONS**

**RADIATION  
SAFETY OFFICE**

**RADIATION  
SAFETY OFFICER  
RESPONSIBILITIES**

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**2 RADIATION SAFETY OFFICER**

- 2.1 The Radiation Safety Officer is appointed by the President of the University or his/her designee. The training and experience of the Radiation Safety Officer must be in accordance with state and federal requirements.
- 2.2 The Radiation Safety Officer is the authorized representative of the Radiation Safety Committee in implementing radiation protection and control for the OHSU, and is administratively responsible to the President of the University or his/her designee. The Radiation Safety Officer is the liaison official in all contacts with the Radiation Protection Services Section of the Oregon State Health Division. In the RSO's absence, a Radiation Safety Office Health Physicist shall act on his/her behalf.
- 2.3 The Radiation Safety Office (RSO) consists of staff members with assigned technical and administrative duties related to the Radiation Safety Program and to the responsibilities of the Radiation Safety Officer.
- 2.4 The Radiation Safety Officer is responsible for:
- 2.4.1 Implementing the radiation safety program.
  - 2.4.2 Investigating any deviation from approved radiation safety practice and implementing corrective actions as necessary. Refer to [RSOP 201](#).
  - 2.4.3 Reporting all incidents involving radiation hazards to the RSC.

- 2.4.4 Assisting the Radiation Safety Committee with its duties.
- 2.4.5 Ensuring that ALARA practices are followed.
- 2.4.6 Distributing new Radiation Safety Operating Procedures (RSOP) and revisions to appropriate users.
- 2.4.7 Implementing written policy and procedures for:
- Radioactive material purchase authorizations.
  - Receiving and surveying radioactive material packages.
  - Storing radioactive material.
  - Maintaining radioactive material inventory records.
  - Using radioactive material safely.
  - Taking emergency action if control of radioactive material is lost.
  - Periodic radiation surveys.
  - Calibration of radiation survey instruments.
  - Disposing of radioactive material.
  - Training personnel who work in or frequent areas where radioactive materials are used or stored.
  - Maintaining copies of all records and reports required by the Oregon Administrative Rules and the OHSU Radiation Safety Policies.
  - External and internal dosimetry.
  - All other activities required by State regulations.

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### **3 RESPONSIBLE USER (RU)**

#### **DEFINITION**

3.1 A Responsible User is an individual who has obtained a radioactive materials license. This individual is authorized by the Radiation Safety Committee to acquire and use specific radioactive sources, as well as supervise their use by others.

#### **RESPONSIBILITIES**

3.2 The Responsible User is responsible for all work with radionuclides in the work areas listed on his/her license. The Responsible User shall:

#### **Compliance**

3.2.1 Ensure compliance with all OHSU radiation safety regulations.

#### **Training**

3.2.2 Ensure that personnel have received proper **radiation safety training** in accordance with [Section 9](#) of these regulations and [RSOP 901](#) and [RSOP 902](#). The RU shall also arrange for special training for visitors, minors (14-18 yrs. old) and administrative staff members. Arrangements for minors will be in accordance with OHSU Administrative Policy 32-06.05.

#### **Security**

3.2.3 Ensure that there are proper security measures to prevent unauthorized access, use, or loss. Refer to [Section 14](#) of these regulations.

3.2.4 Ensure that acquisition of radionuclides is in accordance with Section 17 of these regulations

#### **Nuclide Acquisition**

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## Exposure Monitoring

- 3.2.5 Ensure that exposure monitoring is conducted in accordance with [Section 8](#) of these regulations and [RSOP 801](#).
- 3.2.6 Ensure that lab surveys are performed in accordance with [Section 11](#) of these regulations and [RSOP 1101](#).
- 3.2.7 Ensure that radioactive material is disposed of in accordance with [Section 18](#) of these regulations and [RSOP 1801](#), [RSOP 1802](#), [RSOP 1803](#), and [RSOP 1804](#).
- 3.2.8 Ensure that all research radiation detection instruments are calibrated at least biennially (every 2 years) and used in accordance with [Section 13](#) of these regulations and [RSOP 1301](#).
- 3.2.9 Ensure that radioactive materials and work areas have proper postings and labels in accordance with [Section 12.2](#) of these regulations.
- 3.2.10 Notify the Radiation Safety Office when assistance is needed to handle an unusual occurrence with radioactive materials or radiation-producing equipments, in accordance with Section 21 of these regulations and [RSOP 2101](#).
- 3.2.11 Notify the RSO and complete license amendments prior to making changes in the laboratory radiation program, in accordance with Section 7 of these regulations and [RSOP 702](#).

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**Terminations**

3.2.12 Notify the RSO to terminate the laboratory license, in accordance with Section 7 of these regulations. The requirements of [RSOP 705](#) must be completed by the RU and RSO.

**Combined Hazards**

3.2.13 Ensure that the use of radionuclides or radiation-emitting equipment with animals, infectious agents, or hazardous materials will be in accordance with [Section 18](#), Section 19, and Section 20 of these regulations.

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**5 AUTHORIZED RADIONUCLIDE USER (S)**

**DEFINITION**

- 5.1 Authorized Users are individuals who work for a Responsible User and have met the training requirements.
  
- 5.2 Each authorized user shall follow the policies in this manual and applicable procedures, when working with radiation sources.

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## 6 EXCLUSIONS

Personnel who are prohibited from working with radiation sources or in laboratories where radiation sources are present are:

- Employment agency temporary workers
- Children under age of 14
- **Unsupervised** youths between the ages of 14 and 18 years who are employed at OHSU under appropriate child labor laws

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## **7 RADIOACTIVE MATERIALS LICENSE**

### **REQUIREMENTS**

7.1 Possession or use of any radionuclides, except for the exemptions listed in Section 7.6, at any OHSU location must be in accordance with a written Radioactive Materials License issued by the OHSU Radiation Safety Committee. Refer to [RSOP 701](#).

### **Validity**

7.2 The radioactive materials license or subsequent amendments become valid when signed by the Radiation Safety Officer or his/her designee.

### **License Amendments**

7.3 License amendments are required for changes to the current license. Refer to [RSOP 702](#).

### **License Status Change**

7.4 A license status change will occur when:

7.4.1 any Responsible User that is found to be willfully or negligently, violating university, state or federal regulations may have his/her license suspended by the RSC. Use of radioactive materials or radiation-producing equipment will be prohibited until formal action is taken by the RSC to cancel, modify and reissue, or reinstate the license. Refer to [RSOP 705](#).

### **Suspension**

7.4.2 the licensed Responsible User requests cancellation or leaves OHSU.

### **Cancellation**

7.4.3 inactivation will occur if the Radiation Safety Officer deems it appropriate or the RU requests it. Eligibility is based on no radioactive material on hand and infrequent use.

### **Inactivation**

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## Exemptions

- 7.5 Some radioactive materials, based on specific uses, do not require a license. These exemptions are:
- 7.5.1 Electron microscopes, electron beam welders, and other similar devices exempt from state registration in accordance with state regulations.
- 7.5.2 Uranium and thorium compounds procured as chemicals; however, RSO must be contacted for disposal.
- 7.5.3 Readily available commercial items containing radioactive materials e.g. gas lantern mantles, smoke detectors, small static eliminators, thoriated welding rods, and other commercial devices using radionuclides for illumination, etc., as long as radioactive materials will not be separated or used for experimental purposes.
- 7.6.1 Naturally occurring radioactive materials in unprocessed form i.e., ore samples, rock samples etc., in modest quantities.

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## 8 RADIATION MONITORING

Exposures shall not exceed the recommended limits in Table 8.1 under normal conditions.

### 8.1 Individual External Exposure Monitoring

8.1.1 Dosimeters must be worn only by the individual to whom they were issued.

8.1.2 Dosimeters will be obtained, worn, and cancelled in accordance with [RSOP 801](#).

8.1.3 Whole body dosimeters will be issued:

- When whole body dose could exceed 60 mrem/quarter

8.1.4 Extremity dosimeters will be issued:

- When extremity doses could exceed 600 mrem/quarter
- To users who handle  $^{32}\text{P}$ , or other beta emitters with maximum energies greater than 600 keV.

8.1.5 The RSO will issue dosimetry on a case-by-case basis for all other situations.

### 8.2 Pregnant Workers

8.2.1 Workers who have declared their pregnancy in writing will be issued an extra dosimeter for abdominal (fetal) monitoring if they continue working where they may expect exposures greater than 20 mrem/month.

8.2.2 Workers who do not declare their pregnancy in writing will be provided an additional dosimeter upon request.

8.2.3 Under the provisions of Oregon rules, pregnant workers may request reassignment if their appropriate health care provider deems it necessary.

## INDIVIDUAL MONITORING

### Dosimeter Issue

### Requirements

### Whole Body Dosimeters

### Extremity Dosimeters

### Other Dosimetry

## PREGNANT WORKERS

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## TABLE 8.1

### OCCUPATIONAL RADIATION DOSE EQUIVALENT GUIDELINES

(Sum of Internal & External Sources)

Category	Federal/State Annual Limit #		OHSU Annual Limit		OHSU Quarterly ALARA Limit		OHSU Monthly ALARA Limit	
	mSv	mrem	mSv	mrem	mSv	mrem	mSv	mrem
Whole Body <sup>1</sup>	50	5000	25	2500	<b>6</b>	<b>600</b>	<b>2</b>	<b>200</b>
Lens of Eye <sup>2</sup>	150	15000	75	7500	<b>18</b>	<b>1800</b>	<b>6</b>	<b>600</b>
Skin & Extremities <sup>3</sup>	500	50000	250	25000	<b>60</b>	<b>6000</b>	<b>20</b>	<b>2000</b>
Declared Pregnant Worker <sup>4</sup>	5	500	2.5	250	<b>0.6</b>	<b>60</b>	<b>0.2</b>	<b>20</b>
Youthful Worker <sup>5</sup>	1/10 of the above Federal/State, OHSU and ALARA adult limits							

<sup>1</sup>Whole body is defined as the head, trunk, and arms above elbow, legs above knee. Deep dose equivalent at tissue depth of 1 cm.

<sup>2</sup>Eye dose equivalent is the dose equivalent at tissue depth of 0.3 cm.

<sup>3</sup>Extremities include elbows and knees, arms below the elbow, and legs below the knee. Shallow dose to depth 0.007 cm.

<sup>4</sup>Dose is for exposure over the entire pregnancy.

<sup>5</sup>Youthful worker is defined as minors over 14 and under 18 years of age. Child labor laws prohibit youths under 14 years from working in areas where radiation hazards exist.

#Ref. Code of Federal Regulations Parts 0-50: 10CFR20.1003, 20.1201, and 20.1208

Ref. Oregon Rules for the Control of Radiation: OAR 333-120-100, -160, and -170

## BIOASSAYS

### Bioassay Program

## VISITORS

## DOSIMETRY RECORDS

### Lost or Damaged Dosimeters

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### 8.3 Individual Internal Dose Estimation – Bioassays

8.3.1 All workers who handle volatile forms of radioiodine must participate in the bioassay program unless other arrangements have been made. Refer to [RSOP 831](#). Personnel using 100mCi or more per month of tritium must also participate in the bioassay program. Workers handling bound forms may participate on a voluntary basis.

### 8.4 Visitors

Visiting radiation workers will be issued dosimeters under the guidelines of Section 8.1.

### 8.5 Records of Exposure

8.5.1 Dosimetry reports are readily available for review by workers at the Radiation Safety Office. Annual summaries based on a calendar year will be sent to each monitored OHSU employee. Refer to [RSOP 805](#).

8.5.2 Any user may obtain a summary of his/her radiation exposure records and bioassay results upon termination of employment or at any other time by written request to the RSO.

8.5.3 The RSO will provide estimated exposures to the dosimeter company for individuals with lost or damaged dosimeters.

**TABLE 8.3.1**

**ACTIVITY LEVELS OR CONCENTRATIONS<sup>a</sup> ABOVE WHICH TRITIUM BIOASSAYS WILL BE PROVIDED**

(Adapted from NRC 713-4, Div. 8, June 1983)

<b>Types of Operation</b>	<b>HTO<sup>b</sup> &amp; Other Tritiated Compounds (Including Nucleotide Precursors)</b>	<b>Tritium (HT or T<sub>2</sub>)<sup>c</sup> Gas in Sealed Process Vessels<sup>d</sup></b>	<b>HTO Mixed with More Than 10 kg of Inert H<sub>2</sub>O or Other Substances</b>
Processes in open room or bench with possible escape of tritium from process vessels	0.1Ci	100Ci	0.01Ci/kg
Processes with possible escape of tritium carried out within a fume hood of adequate design, face velocity, and performance reliability.	1Ci	1000Ci	0.1Ci/kg
Processes carried out within glove boxes that are ordinarily closed but with possible release of tritium from process vessels and occasional exposure to contaminated box and box leakage.	10Ci	10,000 Ci	1Ci/kg

<sup>a</sup>Quantities present (<10kg) may be considered to be either the amount processed by an individual at any one time (when accidental intake is more likely) or the amount of activity that entered into the process (throughput) during any one month (when routine handling of repeated batches is more likely source of exposure). Concentrations in the right-hand column may be used when activity in process is always diluted in more than 10kg of other reagents, as in nuclear coolant reactor coolant systems.

<sup>b</sup>HTO is a symbol for a water molecule in which a tritium atom (T) is present in place of a normal hydrogen atom (H).

<sup>c</sup>A molecule of hydrogen gas contains two hydrogen atoms. Either one of these atoms may be replaced with T to form HT, or two atoms may combine to form T<sub>2</sub> gas.

<sup>d</sup>This assumes that adequate air monitoring has established that there is no tritium leakage or that no significant amount of tritium gas can be covered to HTO before intake.

**8.6 Environmental Monitoring**

- 8.6.1 The RSO will exchange work area dosimeters at selected locations to measure ambient radiation levels.
- 8.6.2 Portable air monitors will be provided by the RSO for situations where it may be necessary to check for airborne contamination.
- 8.6.3 The Responsible User must contact the RSO for hood monitoring before starting an iodination program if the activity used per iodination exceeds 10 mCi.
- 8.6.4 Other monitoring of environmental releases may be done where calculations show that allowable concentrations in air or water could be realistically exceeded.

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## 9 TRAINING

### SCOPE

9.1 The radiation safety-training program should ensure that all personnel receive proper instruction which is at least commensurate with the degree of potential hazards to be encountered. Training records will be maintained by the RSO.

### Radiation -Producing Equipments

9.2 Workers who use radiation-producing equipment must have appropriate training prior to operating equipment.

### New Radioactive Materials Users

9.3 OHSU radiation safety training for radioactive material handlers is required within 60 days of initial use of radioactive materials. Interim instruction must be provided by an authorized user to new users before they work with radionuclides.

### RU Training Prior to Licensure

9.4 A new Responsible User must have received OHSU radiation safety training prior to becoming licensed. Exceptions must be approved by the RSC.

### Other Required Training

9.5 Authorized users and existing RUs must receive refresher training at intervals not exceeding three years. There is a grace period of 120 days for OHSU trained personnel. Personnel requiring use of the Cesium Irradiator must have additional training. Refer to [RSOP 901](#).

### Exam

9.6 An exam must be passed to receive credit for radiation safety training. This does not apply to administrative or irradiator training.

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**TABLE 9**

**RADIATION SAFETY OFFICE**

**TRAINING GUIDELINES FOR RESEARCH LABS**

<b>TRAINING TYPE</b>	<b>WHO</b>	<b>WHEN</b>
Introductory	New to OHSU and have never received radiation safety training	Within 60 days of initial use*
Refresher	Prior training at OHSU	Every 3 years**
	Prior training at other organizations	Within 60 days of initial use at OHSU*
Equivalency	Prior Refresher training at OHSU.	Every 3 years**
Administrative	Responsible User who does not handle radioactive materials and has attended at least one training session at OHSU.	Every 3 years***
Irradiator	Personnel who require access to cesium irradiator	Prior to use

\*Interim instruction required by authorized user before working with radionuclides.

\*\*120 - day grace period

\*\*\*Must request training material from RSO and complete before 120-day grace period is over.

## INSPECTION REQUIREMENTS

### 10 INSPECTIONS

10.1 Laboratories of responsible users will be inspected within 15 months of the previous inspection. Delays will be documented in the Responsible User's file. Refer to RSOP 1001.

New licensees will be inspected within a year after initial licensure.

10.2 Inspections will not be performed if radioactive materials have not been ordered or used since the previous inspection. This will be noted in the license file.

10.3 Reports of inspection findings will be sent to the Responsible Users who must describe corrective actions, when necessary.

10.4 Reinspections will take place to ensure that the corrective actions have been implemented. Multiple unannounced reinspections will take place when warranted by the Radiation Safety Office.

10.5 The Responsible User or any lab personnel is expected to **cooperate fully** during compliance inspections by the Nuclear Regulatory Commission, the State of Oregon Radiation Protection Services Section and/or the OHSU Radiation Safety Office representative.

**When Not Required**

**Reports**

**Reinspections**

**Cooperation**

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**INDIVIDUAL  
LABORATORY  
SURVEYS**

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**11 SURVEYS**

11.1 Documented radiation safety surveys must be performed monthly. Instructions for performing wipe tests, meter surveys, and the minimum detectable activity requirements are found in [RSOP 1101](#).

## **12 RADIATION SAFETY PRACTICES**

### **12.1 Handling Radioactive Material**

12.1.1 Radioactive material must be handled to keep personnel doses and contamination levels **ALARA** considering the nature of the activities being performed.

Refer to [RSOP 1201](#).

12.1.2 Appropriate gloves are required when handling unsealed radionuclides. Additional personal protective equipment should be used when deemed necessary.

12.1.3 A survey of the area must be performed with an appropriate operating, calibrated survey instrument whenever an individual handles radionuclides.

12.1.4 Radioactive material work surfaces must be covered to prevent contamination.

12.1.5 Containers of volatile forms of radionuclides must be opened and radioactive materials used, in an operating fume hood.

12.1.6 All volumes of radioactive liquids require a secondary container. Radioactive materials transported through hallways must be securely contained, adequately shielded and properly marked. Radioactive material must not be left unattended.

Refer to [RSOP 1801](#).

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12.1.7 Radioactive materials may not be transported on any campus or public conveyance.

## Signs

### 12.2 Postings and Labeling

12.2.1 Radiation signs must be posted to denote areas of radioactive material use, storage and the presence or potential presence of radioactive materials or equipment.

12.2.2 Each refrigerator and freezer where radioactive materials are stored must have a “Caution-Radioactive Materials” sign and a “Store No Edibles”, or equivalent sign visibly displayed.

12.2.3 Radiation labels must be affixed to all items associated with the use of radioactive material.

## Container Labels

12.2.4 Any radiation signs or labels must be removed or obliterated when no longer applicable.

12.2.5 Each RU must post a copy of “Oregon Notice to Employees” and “Notice to Radiation Workers” in a visible laboratory location.

## Notices

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**13 INSTRUMENT CALIBRATIONS**

13.1 Each radiation survey meter must be calibrated at least biennially (every two years), and after repairs, which may have affected the calibration.

13.1.1 Calibration of count rate survey instruments may be performed by the RSO. Refer to [RSOP 1301](#).

13.1.2 Survey instruments calibrated off-campus must be sent only to appropriately licensed calibration facilities.

13.2 Instruments that are used to interpret laboratory wipe surveys or bioassays (liquid scintillation counters and gamma counters) must be calibrated annually and documented. Daily calibration checks made as a normal course of operation may be used in lieu of the above, if the results are documented.

**Counters**

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**CONTROL OF  
ACCESS &  
CUSTODY**

**14 SECURITY**

14.1 Laboratories or radiation work areas must be locked when unoccupied and radioactive materials are present.

14.2 Any known or suspected loss of radioactive material must be reported immediately to the RSO.

14.3 Stock vials of radioactive materials stored outside the laboratory must be locked when not in use.

14.4 Access to a restricted area shall be limited to individuals with appropriate training.

**Restricted Area**

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15.1 Sealed sources must be leak tested every six months when in use or as required. A record of the test results must be kept.

15.2 Sealed sources containing 100 microcuries or less of beta and/or gamma emitting material or 10 microcuries or less of alpha emitting material are exempt from the leak test requirements.

**Equipment**

15.3 Any equipment or analytical device containing a sealed source of radioactive material must have the radioactive source removed only by the RSO prior to pick up by the surplus property department. This requirement must also be met if the device or equipment is not to be used for its intended purpose.

**Industrial  
Radiography**

15.4 OHSU sponsors of industrial radiographers and other contractors or individuals who intend to bring radiation sources to OHSU must notify the RSO in advance, allowing time to make appropriate arrangements.

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**INVENTORY  
REQUIREMENTS**

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**16 RADIONUCLIDE INVENTORY**

- 16.1 Each Responsible User must submit periodic radionuclide inventories to the RSO in accordance with [RSOP 1601](#).
- 16.2 The RSO will maintain semi-annual inventory records in accordance with state regulations

## **17 ACQUISITION, RECEIPT, AND TRANSFER OF CUSTODY OF RADIONUCLIDES**

### **ACQUISITION OF RADIONUCLIDES**

17.1 Acquisition of any radioactive material either from off-campus or from another lab on campus must be in accordance with a valid OHSU radionuclide license, except for uncontrolled items listed in Section 7. Refer to [RSOP 1705](#) for ORACLE ordering procedures.

### **Delivery & Transfer of Custody**

17.2 Incoming radionuclide packages must be delivered to the RSO receiving area. Refer to [RSOP 1701](#). An RSO staff member will accept custody, survey as required and transfer the packages to the intended user. Refer to [RSOP 1702](#).

### **Delivery without RSO Processing**

17.3 If a package bypasses the RSO and is delivered directly to the intended user, the RSO must be notified as soon as possible.

### **Outgoing Shipments**

17.4 Each outgoing package containing radionuclides must have proper documentation and packaging in accordance with [RSOP 1704](#). The RSO must be contacted before shipping any radioactive material off-campus.

### **Off-Campus Transfer**

17.5 Transfers of radioactive materials between OHSU locations require appropriate documentation and proper transportation arrangements. Contact the RSO in advance.

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## 18 RADIOACTIVE WASTE DISPOSAL

### **RADIOACTIVE WASTE DISPOSAL**

18.1 Radioactive waste shall be disposed of by decay, drain, or picked up by the RSO. Refer to [RSOP 1802](#).

### **Drain Disposals**

18.2 Aqueous wastes may be disposed of down the drain and must be documented. Refer to [RSOP 1803](#).

### **Off Campus Disposal**

18.3 All radioactive waste disposals off campus must be handled by the RSO.

### **Disposal Not Allowed**

**18.4 Radioactive material must not be disposed of with normal trash. Fines imposed by City or State agencies will be passed back to the responsible laboratory.**

### **Holding for Decay <90 Days**

18.5 Radionuclides with half-lives less than 90 days may be held in lab/work areas for decay or disposal. Refer to [RSOP 1801](#), [RSOP 1802](#), [RSOP 1803](#), or [RSOP 1804](#).

### **>90 Days**

18.6 Radionuclides with half-lives greater than 90 days must be disposed of appropriately. Refer to [RSOP 1802](#), [RSOP 1803](#), or [RSOP 1804](#).

### **Mixed Wastes**

18.7 Chemically toxic and/or hazardous radioactive waste will be handled by the RSO only by prior arrangement and on a case-by-case basis.

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## Biological Waste

### 18.8 Radioactive Biological Wastes

18.8.1 Radioactive biohazard waste will not be picked up by the RSO unless the biological agent has been deactivated. Refer to [RSOP 1801](#).

18.8.2 Animal carcasses containing tritium or carbon-14 may be incinerated if below regulatory limits and with approval of the RSO.

Refer to [RSOP 1801](#) and [RSOP 1802](#).

18.8.3 Radionuclides in biological wastes that cannot be incinerated or held for decay must be shipped off-site by the RSO to a licensed radioactive waste disposal site.

18.9 The RSO will arrange for off-site disposal by commercial contractor. Final packaging and labeling will be inspected by the contractor to ensure compliance with Federal D.O.T. standards.

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**ANIMAL  
HANDLING  
PERMISSION**

**Cages**

**Animal Wastes**

**Ventilation**

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**19 LIVE ANIMAL HANDLING**

19.1 Authorization to use radioactive materials in or on animals requires approval of the Institutional Animal Care and Use Committee (IACUC) in addition to authorization by the RSC. Refer to [Rad-Animal Form](#).

19.2 All cages housing animals injected with radioactive material must be appropriately marked and labeled.

19.3 Radioactive animal wastes will be collected and disposed of in accordance with [RSOP 1801](#) and [RSOP 1802](#).

19.4 Adequate ventilation or air filters to remove airborne contaminants must be provided where animals are housed after they are injected with volatile radioactive material.

**RADIATION-  
PRODUCING  
EQUIPMENTS**

**Acquisition**

**Registration**

**Inspection**

**Safety Training**

**Security**  
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**20 RADIATION-EMITTING EQUIPMENT USED IN RESEARCH**

- 20.1 X-ray or gamma-emitting equipment must comply with specific registration and safety requirements in Chapter 333, Oregon Administrative Rules, and be acquired, used, stored, transferred, and disposed of in accordance with these rules.
- 20.2 Acquisition of radiation-emitting equipment requires authorization by the RSC, which is specific for the equipment to be acquired.
- 20.3 If applicable, radiation-emitting equipment shall be registered with the State Health Division before being put into use. Registration will be arranged by the RSO.
- 20.4 Radiation-emitting equipment shall be inspected by the RSO after acquisition, relocation, modification, or repair. The equipment shall not be put into use until found to comply with all applicable State and University regulations. Equipment Owners are responsible for notifying the RSO of completion of any of the above activities and arranging for the survey.
- 20.5 Each approved operator and each person working with or near radiation-emitting equipment shall be given radiation safety training commensurate with the degree of hazard involved. Documentation shall be maintained by the equipment owner and copies sent to the RSO. For Cesium Irradiator operation, refer to [RSOP 2001](#).
- 20.6 Radiation-emitting equipment shall be adequately secured against unauthorized use or relocation.

**Records**

20.7 Shielding and survey records will be maintained by the RSO.

**Operator Safety**

20.8 All safety precautions will be included in the operating procedure for the equipment and must be strictly followed.

**Transfer Approval**

20.9 Transfer to a non-OHSU entity requires prior approval of the RSO signifying that the equipment meets applicable regulatory requirements for legal transfer and ensuring that the transaction will be properly reported per State regulations.

**Internal Transfer**

20.10 Internal transfer of equipment must be approved by the RSC.

**Disposal**

20.11 Disposal requires prior approval from the RSO to ensure compliance with applicable regulations.

**Deactivation**

20.12 Deactivation and storage of radiation-emitting equipment require that the equipment be properly labeled and secured by the RSO to prevent operation without authorization. This equipment must continue to be registered with the State.  
(Not applicable for cesium irradiators)

**Analytical X-Ray  
Equipments**

20.13 Applicable provisions of OAR 333, Chapter 108, "Radiation Safety Requirements for Analytical X-Ray Equipment" shall be strictly followed. A copy of the applicable regulations shall be available at or near the equipment.

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## INCIDENTS

### Policy

### Radiation Incidents & Abnormal Situations

### Reportable Incidents

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## 21 RADIATION INCIDENTS

21.1 In life-threatening situations the first priority is preservation of human life; however, it is essential that personnel minimize radiation doses and contamination spread to the extent reasonable under the circumstances.

21.2 **Radiation incidents** and other **abnormal situations** involving radionuclides or radiation-emitting equipment shall be handled in order to:

21.2.1 Minimize actual, potential, and perceived harm to persons, equipment, facilities, and to the environment.

21.2.2 Provide proper notification to authorities.

21.2.3 Provide proper information to appropriate parties.

21.3 A **reportable radiation incident** is a situation specified in state regulations that requires the RSO to notify state or federal regulatory agencies. The two levels of incidents are:

- Immediate Notification
- Twenty-Four Hour Notification

A written follow-up from the RSO to state officials is required within 30 calendar days.

**Accident  
Management –  
Minor Spills**

21.4 A **minor spill** is one in which the contamination **does not present an immediate health hazard** or risk of widespread contamination.

Laboratory personnel who work in that laboratory where the spill occurred should clean it up in accordance with [RSOP 2105](#).

**Major Spills**

21.5 A **major spill** is one in which there is **an immediate health hazard** or widespread contamination. This type of spill requires RSO advice and/or assistance. Refer to [RSOP 2105](#).

**Lost or Stolen  
Radioactive Material**

21.6 The RSO must be notified immediately:

- In the event of lost or stolen radioactive material.
- When a suspected or known excessive radiation exposure has occurred.

**Other Accidents**

21.7 In the event of personal injury, fire, flood, or other accident in any radiation restricted area, the RSO shall be notified as soon as circumstances permit

**RSO available for  
Radiation Emergencies**

21.8 Upon being notified of a suspected or known radiation occurrence, a radiation incident, or similar situation, an RSO representative will provide assistance in evaluating radiological aspects of the situation.

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**RECORD KEEPING**

**22 GENERAL RECORDS MAINTENANCE**

**RADIATION USER RECORDS**

22.1 Individual laboratory records will be maintained by the Responsible User for the indicated period of time:

- Responsible User applications, evaluations and authorizations 3 years
- Radiation Safety Training certificates for radiation workers 3 years
- Surveys
  - Laboratory Survey Records 2 years
- Radionuclide Use Evaluations
  - Inventory Summaries 2 years
  - Receipt/Use Log Sheets 1 year after final disposal
- Off-campus Shipping Documents 2 years
- Disposal Records
  - Disposal to sanitary sewer (sink logs) 2 years
  - Disposal by incineration While facility operates
  - Transfers Next inventory period
  - Container waste logs 2 years
- Instrument Calibration Records 4 years

**Facility or Equipment Surveys**

**Radioactive Materials**

**Disposal Records**

**Instrument Calibrations**

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**RSO IS THE  
SOURCE OF  
PROCEDURES**

**RSC REVIEWS  
PROCEDURES**

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## **23 PROCEDURES FOR RSO PROGRAM ELEMENTS**

23.1 Procedures, which are written to assure the safe use of radiation sources, are prepared by the RSO and its staff. It is the responsibility of the Radiation Safety Officer to ensure that these procedures are appropriate and timely with respect to new knowledge and changes in local policies, State Rules and Regulations, Federal Codes, and standards of practice established within the radiation safety community as a whole.

(See [Appendix B: List of Procedures](#))

23.2 These Procedures are subject to review and approval by the Radiation Safety Committee. Detailed Operating Methods/Guides do not require RSC approval.