



Western
University
OF HEALTH SCIENCES

RADIATION POLICY & SAFETY MANUAL

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The Radiation Safety Officer is responsible for the contents and documentation of this manual. Questions regarding radiation regulations and/or information contained herein should be directed to this Office (909-469-5592).

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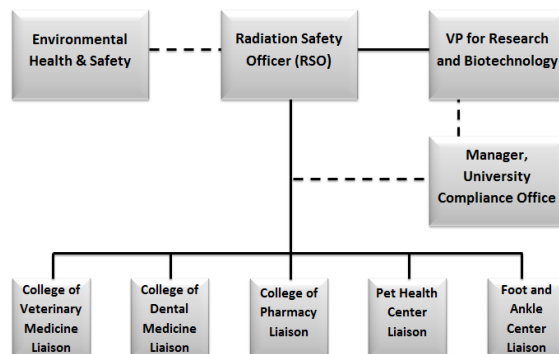
Section I. Overview

Sources of ionizing radiation, in the form of radioisotopes, are frequently utilized in research and clinical practice. Although radioisotopes have beneficial effects when used in these applications, these same sources of ionizing radiation can present a hazard to individual users and others in the immediate environment. Because of the potential hazardous effects of radiation on individual health and the potential for genetic effects, it is imperative that the amount of radiation exposure that is received by an individual be kept to a minimum.

This Radiation Safety Manual serves as a guide for faculty and healthcare providers at Western University of Health Sciences (WesternU) who are interested in becoming licensed by the State of California for on-campus use of unsealed sources of radioactive material in research or for sealed sources of radioactivity for clinical or research use. This manual is also intended to provide an overview of the radiation safety procedures and obligations that are mandated by the Radioactive Material License for permit holders.

The use of all radioactive materials and radiation-producing machines is governed by the provisions of the Code of Federal Regulations Title 10, Part 20 ([10 CFR 20](#)): Standards for Protection Against Radiation, and by the California Code of Regulations, [CCR Title 17](#) (Public Health), Subchapter 4 (Radiation). These regulations require WesternU to specify a Radiation Safety Officer (RSO) whose duties include ensuring radiological safety and compliance with California and Federal regulations and the conditions of the Radioactive Material License. They also require WesternU to establish a Radiation Safety Committee (RSC) which must evaluate all proposals for, and maintain surveillance over, all uses of radioactive materials.

Each College/Patient Care Center (Center) in which this Manual is applicable shall appoint an RSO liaison who must be knowledgeable and experienced in pertinent kinds of radioactive material use and in radiation safety and shall be a member of the Radiation Safety Committee (RSC). The RSO liaison shall serve as the contact person for the college/center in which they were appointed and shall oversee the day-to-day uses of radioactive material in their respective departments. The RSO liaison shall report any adverse incidents involving the use of radioactive material or any violation of radiation safety policies to the RSO who, in turn, shall report them to the RSC. Serious violations shall be reported to the appropriate university officials as necessary.



The RSO is solely responsible for the management of the radiation safety program and has full authority to make necessary decisions, in consultation with the RSO liaisons, to ensure success of the program. The RSO shall oversee the development of written detailed instructions covering each of the basic units in this program and is the sole person authorized to amend these policies and guidelines. WesternU has expressly authorized the RSO to halt any operation of the University where there is danger of serious personal injury or that puts the University in violation of its Radioactive Material License or radiation machine registrations.

Section II. ALARA Policy

This is WesternU's operational plan for implementing ALARA, an acronym for As Low As Reasonably Achievable. It is based on the Nuclear Regulatory Commission's definition of ALARA, which is maintaining exposures as far below the regulatory limits as practical considering economics, state of technology, and other societal and socioeconomic considerations. WesternU follows the policy of minimizing radiation exposures to individuals and releases of radioactivity to the environment resulting from work with radioactive materials. The policy seeks to establish goals which are accepted by all levels of management and those involved in the use of radioactive material, e.g., diagnostic radiology machines and research radioisotopes.

Exposure Limits Standards: State and Federal regulators set low-risk annual exposure limits so that an exposed person shall not exceed the safe industry risk limits while working with radiation (at the annual exposure limit for a 50-year period). The Radiation Safety Committee (RSC) may set lower exposure goals based on the principle of ALARA.

Standards for achievement of ALARA goals are given in Table 1. This table gives measurement levels at which actions are to be taken by the Radiation Safety Officer (RSO). If the results from a measurement period (defined as quarterly or semi-annually) are below Level I, no additional action shall be required. If the result from a specified period of time exceeds acceptable levels (see Table 1 below) additional steps shall be taken in consultation with the Principle Investigator/Clinician, to reduce the exposure risk. An investigation shall try to determine the location and circumstances that led to the increased exposure. Results of any investigation and actions taken, which may include, but not be limited to radiation safety retraining and/or equipment maintenance, shall be reported to the RSO. **Declared pregnant workers** have lower limits that include additional considerations for the embryo/fetus.

Table 1: ALARA Plan Goals and Investigation Levels

	Regulatory Limit	Goal	Level I	Level II
Whole body (head and trunk), active blood forming organs, gonads	5000 mrem/yr	500 mrem/yr	125-374 mrem/qtr	375 or > mrem/qtr
Whole body four year cumulative maximum	1000 mrem/yr rolling average of 4 years	1000 mrem/yr rolling average of 4 years	1000 mrem/yr rolling average of 4 years	1000 mrem/yr rolling average of 4 years
Lens of the Eye	15000 mrem/yr	1500 mrem/yr	375 mrem/qtr	1125 mrem/qtr
Skin and/or Extremity	50000 mrem/yr	5000 mrem/yr	1250 mrem/qtr	3750 mrem/qtr
Minors (whole body)	100 mrem/yr	50 mrem/yr	10 mrem/qtr	30 mrem/qtr
Embryos/Fetus	500 mrem/9 month gestation	50 mrem/in 9 month gestation period	10 mrem/qtr	30 mrem/qtr
Member of Public onsite (EPA)	100 mrem/yr whole body exposure	20 mrem/yr	5* mrem/qtr	15* mrem/qtr
Member of Public offsite (EPA)1	10 mrem/yr with less than 3 mrem due to radioiodine from airborne releases	3 mrem/yr	1* mrem/qtr	3* mrem/qtr
Environmental Releases2	10 CFR 20 Appendix B averaged over one year at the unrestricted area boundary.	10% of 10 CFR 20 Appendix B averaged over one year at the boundary; or listed value at the stack	10% of 10 CFR 20 Appendix B averaged over the calendar quarter at the boundary; or listed value at the stack.	30% of 10 CFR 20 Appendix B averaged over the calendar quarter at the boundary; or listed value at the stack.

* Mathematical models are used to calculate dose based on releases to the environment.

1 - EPA regulations apply to airborne exposure to a member of the public while NRC regulations apply to all sources of radiation from the institution to the highest exposed member of the public.

2 - Values based on total effective dose equivalent of 50mrem per year.

Definition of Terms	
Mrem	Refers to a unit of measure, "millirem", which measures the amount of dose to human tissue.
Extremities	Are those parts of the body located from the elbows and knees down.
Trunk	Is that part of the body from the knees and elbows up. This includes the internal organs within, as well as the reproductive organs.
Whole Body	Refers to the trunk of the body and the head.

Section III. Radiation Safety Committee and Radiation Safety Officer

Radiation Safety Committee

State and federal radiation safety statutes require that a policy-determining Radiation Safety Committee (RSC) and a Radiation Safety Officer (RSO) be specified for each license. Regulations also require the following:

1. "The RSC must have at least three members which must evaluate all proposals for, and maintain surveillance over, all uses of radioactive material. Committee members shall be knowledgeable and experienced in pertinent kinds of radioactive material use and in radiation safety."

The current members of the RSC include the RSO, Alternate RSO (ARSO), a liaison RSO for each clinical unit, the Director of Environmental Health and Safety and one or more individuals listed as approved users of radioactive material under item #12 of the Radioactive Material License for research.

2. Per [10 CFR 20.1101\(c\)](#), The RSC "shall periodically (at least annually) review the radiation protection program content and implementation" to determine if it complies with state and federal regulations.

The review of the radiation protection program shall include a review of measures to achieve ALARA (See Section II, Table 1 for ALARA Plan Goals and Investigation Levels).

Meetings may be scheduled more frequently if necessary. Documentation of all meetings of the RSC will include an agenda, a sign-up sheet signed by all members present and minutes to the meeting. Copies of these documents will be kept on file by the RSO.

Radiation Safety Officer (RSO)

[Title 10, CFR 35.24\(b\)](#) and [CCR Title 17 § 30195\(b\)\(2\)](#) require WesternU to have an RSO. This section of the California code also requires the RSO to be a member of the radiation safety committee. As stated in the [Delegation of Authority](#), the RSO is directly responsible for the radiation safety program. The RSO reports to the VPRB and will bring issues related to radiation safety to the attention of the VPRB as necessary. The RSO is responsible to the Radiologic Health Branch of the Department of Public Health Services for the state of California.

The [duties and responsibilities](#) of the RSO include ensuring radiological safety and compliance with California and Federal Nuclear Regulatory Commission regulations and the conditions of the Radioactive Material License. These duties and responsibilities include, but may not be limited to, the following:

1. Ensuring that the Annual Meeting of the RSC includes the agenda, minutes and sign-up sheet.
2. Ensuring that an audit of the Radiation Protection Program is performed and documented at least annually and that the results of the review are presented to the RSC for review.
3. Ensuring that Wipe-tests of the laboratories using radioactive materials are completed in compliance with the Radioactive Material License and its amendments. Copies of the wipe-tests will be maintained in the

laboratory by the authorized user (AU) listed in item #12 of the Radioactive Material License and a copy will be maintained by the RSO. Wipe tests surveys will normally occur on a monthly basis. However, during long-term storage of radioactive material without any actual use, surveys may occur on a quarterly basis.

4. Confirming that calibration of the survey meter(s) and scintillation counters is completed annually. Copies of the calibration documents will be maintained in the AU's laboratory and by the RSO. Account for all calibration tracer sources for calibration of the scintillation counters.
5. Confirming that all documents required by state and federal regulations are conspicuously posted in the laboratories and patient care delivery areas such as notices explaining where personnel may examine State and Federal regulations, WesternU's Radioactive Material License and emergency procedures applicable to radioactive material.
6. Immediately terminating all activities following any unsafe condition or activity that is found to be a threat to public health and safety.
7. Providing radiation protection information to personnel at all levels of responsibility and ensuring that up-to-date radiation protection procedures in the daily operation of the licensee's radioactive material program are developed, distributed and implemented.
8. Confirming that the possession, use and storage of licensed material are consistent with the limitations in the license, the regulations, the National Sealed Source and Device Registry (NSSDR) Certificate(s) and the manufacturer's recommendations and instructions.

The procedures for receipt of radioisotopes are described on page 11, Section V, C, of the Radiation Safety Manual. The radioisotope receipt record should include the following information:

- a. Date of receipt of the isotope
 - b. The isotope and its' activity
 - c. The shipping vendor
 - d. Exposure at 1 meter from, and on the external surface of, the shipping container
 - e. Wipe-test of the outside surface of the shipping container
 - f. Physical appearance and/or damage to the shipping container
 - g. Wipe-test of the shielded receptacle that contains the isotope
 - h. Following a determination that the shipping container is not contaminated, all radiation labels attached to the container should be removed and disposed of in the radiation waste barrel and the transport container either returned to the vendor or disposed of as non-radioactive waste.
9. Confirming individuals installing, relocating, maintaining or repairing devices containing sealed sources are trained and authorized by an NRC or Agreement State License.
 10. Ensuring personnel training (initial and refresher) is conducted and is commensurate with the individual's duties regarding licensed radioactive material.

The training will be appropriate for the isotopes used in each laboratory. Records documenting the date of the training, its content and signed by the authorized user (AU) and his/her laboratory personnel will be kept on file by the AU responsible for the laboratory personnel. A copy will also be kept by the RSO.

Radiation safety training is covered on page 13, Section V, H, of the Radiation Safety Manual. **It is the authorized user's responsibility to inform the RSO each time a new person is hired to work on a project wherein they will be exposed to radiation or radioactive materials.** An authorized user is someone whose name appears in item #12 of WesternU's Radioactive Material License.

11. Ensuring that radiation exposures to personnel are ALARA, that ALARA practices are being followed and that 10 CFR 20 and investigational levels are followed.
12. When necessary, providing and exchanging at the proper intervals personnel monitoring devices that are in good working order to each person working with radioactive material. Records of the results of such

monitoring are maintained by the appropriate college/department liaison. The results are given to the employees/students upon written request.

Documentation is maintained that individuals are not likely to receive in one year a radiation dose in excess of 10% of the allowable limits and that, by measurement or calculation, the total effective dose equivalent to the individual does not exceed the annual limit for members of the public as specified by Title 10, Code of Federal Regulations, [Part 20, Subsection C](#) (Sections 20.1201 through 20.1208).

13. Notifying the proper authorities of incidents such as loss or theft of licensed material or machines, damage to or malfunction of sealed sources or fire (emergency phone numbers are kept current).
14. Ensuring that if violations of regulations, license conditions or program weaknesses are identified, effective corrective actions are developed, implemented and documented as needed. All findings of noncompliance issues, including those by the California Department of Public Health or the County of Los Angeles, will be reported to the VPRB.
15. Ensuring that incidents are responded to, investigated and cause(s) and appropriate corrective action(s) are identified and timely corrective actions(s) are taken.
16. Ensuring that licensed material is transported in accordance with all applicable Department of Transportation (DOT) requirements.
17. Ensuring licensed material is stored, secured, transferred and disposed in accordance with the Radioactive Material License and that all documents that describe the storage, transfer and disposal of all radioactive materials and radiation equipment received by any licensee at WesternU are available for review. Disposal of radioactive materials will be in accordance with the Radioactive Material License.
18. Ensuring that appropriate records are maintained.
19. Verifying that up-to-date licenses are maintained and amendment and renewal requests are submitted in a timely manner.
20. General surveillance is provided over all activities involving radioactive material including routine monitoring, special surveys and responding to events. In addition, periodic on-site direct supervision over the implementation of the Radiation Safety Program in technical and administrative issues is provided.
21. Reviewing, at least quarterly, dose records and surveys to ensure safe operations, adequate staff training and engineering controls and to look for trends.
22. Confirming that the qualifications of new users and uses of radioactive material are reviewed prior to their first use.
23. Maintaining an organized record of official correspondence and documents pertaining to the Radioactive Material License. This will include documents distributed within WesternU to authorized users, occupationally exposed workers and administration.
24. Maintaining an organized record of copies of State and Federal regulations.
25. Providing direction, leadership and assistance during radiation emergencies.
26. Ensuring that fume hoods and glove boxes used for volatile radioactive material work are monitored for proper operation.
27. An inventory of all radioactive materials is maintained and the types and quantities of radionuclides at the facility are limited to the forms and amounts authorized by the license.
28. Sealed sources are leak-tested at required intervals.
29. There is an effective management of the radioactive waste program including effluent monitoring.

Section IV. Radiation Use Approval

1. WesternU employees interested in the use of radioisotopes or instruments emitting radiation shall consult with the Radiation Safety Officer (RSO) prior to submitting an application for a Radioactive Materials License or obtaining radiation emitting devices.
 - a. Faculty interested in on-campus use of tracer radionuclides listed in items #6, 7 and 8 of WesternU's Radioactive Materials License should request an amendment to Item #12, which lists authorized users, for their inclusion on the current license. If additional tracers are needed for use in biological or chemical studies, an amendment to Items #6, 7 and 8 should be requested.
 - b. Faculty interested in off-campus use of ^{99m}Tc labeled radiopharmaceutical for use in human or animal diagnostic imaging studies may be required to submit a new application to the Department of Health Services in Sacramento, CA.
2. **Institutional Application for Radiation Use Authorization:** Information contained in this section is intended for use only by the institution applying for a Radioactive Material License. The [California Department of Public Health's webpage](#) provides links to all of the forms needed to apply for an institutional Radioactive Material License. Individuals within the institution interested in using radioactive materials in bench research are referred to section (4) below. Faculty members who wish to use radioactive nuclides or instruments emitting radiation must have the proper completed forms on file for inspection by the County of Los Angeles.
 - a. [RH 2050 – Radioactive Material License application form \(Institutional\)](#) - An institution wishing to obtain a Radioactive Material License must complete this form.
 - b. **Use of Radioactive Materials for Veterinary Use:** Form RH 2050 above is also the form used for veterinary licensing.
 - c. **Use of Radioactive Materials in Bench Research:** Persons interested in using radioactive materials in bench research must complete and **submit the following document to the RSO** (Note: Submit all forms to the RSO. Do NOT send forms directly to the Department of Public Health):

[RH 2050 A – Statement of Training and Experience](#)

3. The prospective users will be issued a copy of this Radiation Safety Manual by the RSO.
4. The Application for Radiation Use Authorization form RH 2050 is required for any project, investigation or student laboratory involvement including those using license exempt quantities of unsealed radionuclides.
5. Individuals who are proposed as authorized users of unsealed sources of radioactive material or who will supervise the use of unsealed sources of radioactive material by others must have their names listed under item #12 of the Radioactive Material License. They must complete the Statement of Training and Experience (See section IV.2 (4) above). This form will be submitted by the RSO in the request for amendment to the Radioactive Material License.

Section V. Use of Radioactive Materials in Bench Research by Authorized Users

- A. Sources of Overexposure: Overexposure to radiation can arise from external radiation fields, surface contamination and air-borne contamination.
 - (1) **Dose Limits:** The California Department of Public Health amended all Radioactive Material Licences to follow the federal guidelines established by the Nuclear Regulatory Commission on January 1, 1994.
 - (a) **Occupational Dose Limits:**
 - (1) [Annual Dose Limits for Adults:](#)
 - (i) Total effective dose equivalent (total of the external dose equivalent and the weighted sum of the committed effective dose equivalent to

- all internal organs and tissues).....5 rem
- (ii) Dose equivalent to the lens of eyes.....15 rem
- (iii) Dose equivalent to the skin of body and extremities.....50 rem
- (iv) Committed dose equivalent to individual internal organs and tissues.....50 rem
- (2) Annual Dose limits for minors are 10% of limits listed in a (1) above.
- (3) Dose limits to “Declared” [pregnant women](#)0.5 rem
- (4) Annual dose limit for unrestricted areas and [public](#) at large
Total effective dose equivalent.....0.1 rem
- (b) External Radiation: If gamma emitting radionuclides are used, dose rates in adjacent unrestricted areas will be measured with a Geiger counter during routine monthly surveys if radiation levels are measured within the radioactive material laboratory which exceed a deep dose equivalent rate of 2 mrem/h at 30 cm from any unshielded source, vial, cabinet, refrigerator, freezer or waste container.
- (c) Surface Contamination: Removable surface contamination, which often results from spills and/or leaks, is a serious safety hazard because it can lead to ingestion or skin absorption of radioactive materials. Therefore, direct measurements and wipe tests should be performed periodically and whenever a spill or leak is suspected.
- (1) Direct measurements for surface contamination should be performed with a thin window Geiger counter (with a pancake probe if available) in any area where high energy beta and gamma emitters are used. The action level for direct measurements is 1,000 cpm measured 0.5 cm above the surface.
- (2) Dry wipe tests using a surface-loading filter (such as a membrane filter) or Q-tip should be taken over an area of 100 cm². Wipes containing low energy emitters (e.g. ³H, ¹⁴C) should be analyzed using a liquid scintillation counter. High energy beta emitters (e.g. ³²P) or gamma emitters (e.g. ¹²⁵I) can be analyzed with a liquid scintillation counter or a thin window Geiger counter.
- (i) Action levels for removable contamination due to beta or gamma emitters from environmental surfaces are 200 dpm/100cm² for radionuclides other than ³H and ¹⁴C and 2,000 dpm/100cm² for ³H and ¹⁴C.
- (ii) Action levels for removable contamination due to beta or gamma emitters on actual vials containing radioactive material are 2,000 dpm/100 cm² for radionuclides other than ³H and ¹⁴C and 20,000 dpm/100cm² for ³H and ¹⁴C.
- (3) If these levels are exceeded, then decontamination procedures should be initiated immediately and the source of contamination should be isolated. The RSO should also be informed promptly so that RSO may evaluate the situation and clear the facility for use.
- (d) Airborne Contamination also poses a serious health hazard because it can be inhaled or absorbed through the skin. The allowed concentration limits of airborne radioactivity are given in **Appendix A**, Section 30355 of Title 17 of the California Code of Regulations (not Appendix A of this manual). It is the user's responsibility to assure that these limits are not exceeded by monitoring for airborne contamination during critical stages of their operation. Details concerning the type of monitoring system to use, etc., will be discussed with the RSO before radiation use authorization is granted.

B. Licensee Obligations – The licensee shall ensure that:

1. Radioactive materials shall be used by occupational workers in such a manner that complies with all guidelines, rules and regulations set forth herein;
2. The laboratory surveys are conducted at the appropriate frequency;

3. Records of the surveys are maintained within the laboratory for inspection.

C. Receipt of Radioisotopes:

1. Purchasing (Shipping/Receiving) Department

a. WesternU will provide and document training in the handling of radioactive material for those individuals in the shipping/receiving department who will be receiving the radioisotopes.

(1) The individuals receiving the radioisotopes will perform a cursory inspection of the package to determine if they are intact or damaged. Shipping/receiving will then contact the AU to pick up the packages. The RSO and purchaser will be notified immediately if there are any problems with the package.

(2) Upon receipt of a radioisotope, an isolation area should be set up for temporary storage of the radioactive isotopes prior to pick-up by the AU. This area should be separated from other storage sites and activities in the shipping/receiving department **and posted** with a sign containing the universal symbol for radioactive material and the words "Caution, Radioactive Material".

(3) The Director of the Purchasing Department will be notified to direct all new personnel to meet with the RSO before beginning their assigned duties to undergo training on the receipt and inspection of radioisotopes.

2. Authorized User (AU) – An authorized user is someone whose name is listed under item #12 of WesternU's Radioactive Material License which may be examined by contacting the RSO.

a. All incoming packages of radioactive material must be picked up by the AU immediately upon receipt. The Receiving Department will not deliver radioactive material. The AU will perform the following procedures to ensure the package and its contents are within allowable limits for surface contamination:

(1) Confirm that the package is undamaged.

(2) Record the following on the radioisotope receipt log:

- i. date of receipt of the isotope
- ii. isotope and its' activity
- iii. shipping vendor
- iv. exposure at 1 meter from the shipping container
- v. wipe-test of the outside surface of the shipping container
- vi. wipe-test of the shielded receptacle containing the isotope

Maximum allowable levels of radiation and removable surface contamination are found in 10CFR20, section 20.205. Maximum surface radiation level = 200 mrem/hour. Maximum level 3 ft. from surface of package = 10 mrem/hour. Maximum activity of removable surface contamination = 22,000 dpm/100 cm².

(3) Following a determination that the shipping container is not contaminated, the radiation label attached to the container should be removed and disposed of in the radiation waste barrel and the transport container either returned to the vendor or disposed of as non-radioactive waste.

b. The AU must also keep a careful record of all receipts, uses and disposals of radioactive materials. Copies of these records must be provided to the RSO for future review by authorized inspectors.

D. Radioactive waste policies, records and disposal procedures

1. The AU will keep records on all radioactive waste storage and disposal, copies of which will be provided to the RSO for inclusion into a central file for review by the local County inspectors.

2. Only radioisotopes with a $T^{1/2}$ less than or equal to 120 days may be stored for decay for at least 10 half-lives and the radioactive waste is at a background level as surveyed by a Geiger counter.

- a. The material to be stored for decay will be kept in barrels at least 5 meters away from any regular employee's workstation such that continuous exposure to students or staff is minimal.
- b. Separate containers will be provided for each isotope. Laboratory personnel will be instructed to place all waste in the appropriately labeled container.
- c. Each waste item will be further identified by:
 - (1) Date of placement in container
 - (2) The isotope
 - (3) The physical and chemical form
 - (4) The activity at the time of use
 - (5) The exposure rate at the surface of the container and at 1 meter
 - (6) The date at which 10 half-lives will be completed
 - (7) Special handling precautions or hazards.
- d. Each container will be maintained until the last item added is at least 10 half-lives old and then surveyed with a Geiger counter to ensure it is at background levels of radiation. If activity is still detected, the waste will be held longer until it has decayed to background levels of radiation.

3. A radioactive waste logbook will be maintained in which records of all information about each item placed in the container are recorded.
4. All records pertaining to radioactive waste will be maintained for at least 3 years by the RSO.
5. All wastes within the containers are to be labeled with radioactive warning signs. These labels will be removed prior to disposal when the level of exposure is at background levels as surveyed by a Geiger counter.
6. Isotopes with a $T^{1/2}$ greater than 120 days are not considered for decay by storage and arrangements must be made for appropriate disposal.
7. The AU shall organize the waste in the following manner prior to submitting it for disposal:
 - a. Each isotope shall be kept in a separate container and identified so that it includes the isotope, activity, date placed in the container, physical and chemical form.
 - b. Dry waste must be separated from liquid waste.
 - c. Liquid scintillation vials must be packaged separately from other liquid wastes.
 - d. Surface contamination levels and radiation levels must be within acceptable limits to protect the health of personnel handling the waste.
 - e. All containers must be sufficiently strong and durable to retain their contents even if they are dropped or otherwise abused.
 - f. The AU shall notify the Director of EH&S when the containers are full and ready for disposal. Waste must never be stored in a non-radioactive material laboratory or faculty office, etc.

E. Identification and Security of Radiation Material, Work and Storage Areas

1. Each area or room in which an isotope is stored or used will be posted, in accordance with federal regulation 10CFR835, with a sign bearing the radiation caution symbol colored magenta or black on a yellow background and the words **CAUTION RADIOACTIVE MATERIALS**.
2. Access to the storage area is by one door kept locked at all times when personnel are not present. Security is further provided by an electronic card key lock system that automatically locks each time the door is opened and then closed. This area will be posted with a **CAUTION RADIOACTIVE MATERIAL** sign.

- a. Every room containing radioactive materials must be locked when the authorized user is not present.
- b. All other personnel who have legitimate access to this room must be informed by the AU of the location of all radioactive materials present and of any risks or hazards involved.
- c. Students and staff are not allowed to use or have access to radioactive materials except under the direct supervision of an approved user.
- d. Contaminated objects (pipettes, vials, etc.) must NEVER be given to technicians or other unauthorized personnel for cleaning, disposal, etc.

F. Intra-Campus Transportation of Radioisotopes

Before transporting radioactive material through corridors or between buildings, it must be enclosed in an unbreakable container with a tight-fitting lid that will prevent spillage if the container is overturned, dropped or otherwise disrupted. Plastic (but not glass) liquid scintillation vials with screw-on caps constitute an "unbreakable container" as specified in this paragraph.

G. Disposal of ^3H and ^{14}C in liquid scintillation medium as hazardous, non-radioactive, materials may be done as follows:

1. ONLY ^3H and ^{14}C at concentrations of less than 0.05 microcurie per gram can be disposed of as hazardous, non-radioactive, materials.
2. All labels indicating the presence of radioactive material must be removed from the containers.
3. The RSO or Director of EH&S, through a hazardous waste broker, will handle disposal of this hazardous material.
4. Records of these disposals must be kept separate from those for Radioactive Waste Disposal as this material is considered "non-radioactive" and can be found in the RSO or EH&S Office.

H. Training

1. Anyone at WesternU who wishes to work with radioactive material in bench research must first successfully complete the on-line radiation safety training. The applicant is referred to the [Radiation Safety webpage](#) for instructions on how to obtain this training.

- (a) **It is the AU's responsibility to inform the RSO each time a new person is hired to work on a project wherein they will be exposed to radiation or radioactive materials.** Again, they must take the on-line radiation safety training mentioned above before working with radioactive materials.
- (b) The person will be issued a copy of the Radiation Safety Manual and must sign and return the Radiation Safety Manual Receipt Form (**Appendix H**) to the RSO.
- (c) The student researcher will not be allowed to use or have access to radioactive material except under the direct supervision of an approved user.

2. Trainees must certify that they have received, read and understand the material in a self-study handout and have been provided an opportunity by the trainer to ask any questions that they may have regarding the information contained in the document. Topics covered include:

- | | |
|--|---|
| (a) radioactivity and radiation | (g) radiation monitoring devices |
| (b) radiation safety procedures | (h) animal care personnel |
| (c) security of radioactive materials | (i) eating and drinking in rooms designated for the use of radioactive material |
| (d) posting and labeling | (j) how to obtain additional radiation safety training |
| (e) shielding | |
| (f) radioactive contamination monitoring | |

3. Annual refresher training will be required for all persons approved to handle radioactive materials. The training will be limited to isotopes approved by the Radioactive Material License and for which the user is approved. The training material will be compiled by the RSO. Trainees must sign a form stating they have completed the refresher training and return this form to the RSO.

I. Use of Radioactive Material in Animals

The *in vivo* use of radioactive material in animals must be approved by the Radiation Safety Committee (RSC) AND the Institutional Animal Care and Use Committee (IACUC).

1. If the investigator's name is not listed under item #12 of WesternU's Radioactive Material License, they must submit a request to the RSO to be added to the license as an Authorized User (AU). The RSO must submit the request to the State along with the investigator's [RH 2050 A – Statement of Training and Experience](#) as described in Section IV.2.d. This process can take several months so investigators are encouraged to apply early.
2. Once the investigator has been approved by the State as an AU, the investigator must submit to the IACUC, along with a completed Institutional Animal Care and Use Protocol Application, documentation to this effect AND documentation that they have successfully completed the required on-line radiation safety training. The applicant is referred to the [Radiation Safety webpage](#) for instructions on how to obtain this training. The Institutional Animal Care and Use Protocol Application may be obtained from the [IACUC website](#).
3. If radioactive material is administered *in vivo*, the animal itself is now radioactive, as is the cage in which it is housed and the bedding material lining the floor of the cage due to the presence of contaminated excrement. Therefore, all animals administered radioactive material must be housed in disposable cages. At the end of their use, these cages and bedding material must be double bagged and disposed of in the proper containers approved for this use. Contaminated animal carcasses and tissues must be kept in a properly labeled freezer designated for storage of such material until picked up by a vendor licensed to dispose of such material.
4. All other policies, rules and regulations pertaining to the use of the vivarium remain in effect.

J. Personnel Monitoring: Required use of Monitoring Devices

1. Each user of radiation-producing machines and/or large quantities of radioactive isotopes, other than ^3H and ^{14}C , must wear a thermoluminescent dosimeter (TLD) body and/or TLD ring device as appropriate. The devices shall normally be worn for a period of 3 months. If significant doses are routinely recorded on an assigned device, that person's device will be worn for a reduced period of 1 month and results obtained.
 - a. The TLD device should be worn at the position on the body where the exposure is expected to be greatest. If the exposure is uniform, then the device should be worn on the trunk since the blood-forming organ and gonads are the critical organs. If a lead apron shields the torso, then the thyroid glands and lenses of the eyes become the critical organs. In this case, the device should be worn on or near the neck collar.
 - b. The working areas should also be monitored monthly for surface contamination using a Geiger counter. Users of ^3H and ^{14}C will monitor themselves and their work areas by performing wipe tests each month and anytime there is reason to believe that contamination exists. An up-to-date log should be kept to indicate the results of each test (location, date, isotope, level of contamination).
 - c. Students, long-term visitors and other non-occupationally exposed personnel will receive a monitoring device if there exists a significant chance that they may receive more than 10% of the dose limits described above in the ALARA policy. A permanent record of each individual's dose will be maintained by the RSO.

d. Prior to being issued a dosimeter monitoring device, users must sign the Use of Dosimeter Monitoring Device form (**Appendix A**) attesting that they will comply with the rules and regulations pertaining to their use. Regulations also require that the University maintain a record of occupational- and/or educational-related life-time exposure to radioactive material. Faculty and students must therefore complete the Declaration of Previous Dosimetry Monitoring form found in **Appendix B**. If you have been enrolled in a dosimetry monitoring program at an institution other than WesternU, it will be necessary to obtain a copy of your exposure report from each of the other institutions in whose program you were enrolled. A Release of Exposure Report Request form may be found in **Appendix C**. Copies of each of these forms may be obtained from the Radiation Safety Office at 909-469-5592.

2. The AU is responsible for providing the monitoring devices and the following guidelines apply to their use:
 - a. The monitoring device should be worn at all times on the job or in the radiation area unless all sources of radiation or radioactive material in the laboratory are in shielded storage.
 - b. The devices should not be stored in the radiation area.
 - c. The monitoring device should not be taken home; nor should it be worn during non-job-related radiation exposures such as medical or dental x-ray procedures or kept in one's car due to sun exposure.
 - d. The monitoring device should be worn in an appropriate manner. Body TLD devices are to be worn on the trunk of the body at the waist or chest level. The body device must always be worn with the open window of the device holder facing away from the body. TLD finger monitors must be worn with the TLD turned toward the palm of the hand when exposure potential results from picking up or handling radioactive materials with the hands.
 - e. Do not intentionally expose personnel monitoring devices to radiation, contaminate it with radioisotopes, or damage it in any way. TLD devices must not be stored in areas of excessive heat or moisture.
 - f. It is the responsibility of the wearer to change his or her dosimeter during designated change periods. Information on the time period for changing dosimeters will be provided when a dosimeter is issued.
 - g. If the monitoring device is lost or damaged (broken clip or lost filter, etc.) contact the RSO for replacement.
 - h. If an individual terminates employment at WesternU, the monitoring device must be returned to the approved user for final processing. A copy of the report will be sent to the individual once received by the University.

K. Dosimetry Records: The RSO will maintain permanent records of the dose accumulation by each individual monitored at WesternU. The AUs are responsible to provide the RSO with the quarterly exposure records. Any individual may request information on his or her exposure dose history from the AU or RSO. The RSO will review the radiation dosimetry reports on each individual for each time period. If the radiation dose-limit for that period, or if any unusual dose, is reported, the RSO will notify the individual wearer and make a complete investigation of the circumstances involved in the dose received by the individual.

L. Radiation Laboratory Safety Rules

1. Eating, drinking and smoking are prohibited in the laboratory.
2. Use tongs or thumb forceps when handling radioisotopes.
3. Experiments that use significant amounts of radioactive materials should undergo a "dry run" to reduce exposure time.
4. Hands and clothing should be monitored when leaving the laboratory.
5. Consult with the RSO to determine if a monitoring device, such as a TLD device, should be worn when working in the lab.

6. Potential radiation exposure should be evaluated before embarking on an experiment.
7. When working with unsealed sources, the following additional precautions should be taken:
 - a. Wear a lab coat, impermeable gloves and fully enclosed shoes (Personal Protective Equipment). Disposable lab coats and disposable shoe covers are strongly recommended.
 - b. **Never pipette by mouth!**
 - c. Line working surfaces with absorbent paper having an impermeable base.
 - d. Store and transport containers of radioactive materials on trays with a lip that will hold all of the materials if the container breaks. The trays should be covered with aluminum foil which will be discarded as solid radioactive waste after each use.
 - e. Significant amounts of unsealed sources must be used only in exhaust ventilated enclosures such as a fume hood. The quantity of radioactive material that constitutes a significant amount depends on the isotope used, its physical form and how readily it is absorbed through the skin.
 - f. Store liquid forms of radioactive materials in sealed containers.
 - g. Properly label all containers, storage and use areas in accordance with 10 CFR 20, Subpart J.
 - h. Store high-energy beta and all gamma emitters in properly shielded containers and/or enclosures.
 - i. Work with radioactive materials in accordance with radiation safety operating and emergency procedures.
 - j. Monitor work areas, hands and clothing whenever there is a possibility of contamination and after each day of use.
 - k. Clean up spills promptly in accordance with written instructions and then perform hand hygiene with soap and warm running water.

M. Radiation Emergency Procedures

1. Radiation emergencies occur when there is a) a spill of a radiopharmaceutical or isotope on a surface; b) internal uptake of radioactive materials or c) accidental needle punctures from a needle used to transfer radioactive material. **IN ANY RADIOLOGICAL EMERGENCY, IMMEDIATELY NOTIFY** your Instructor or Supervisor and the RSO or ARSO and, as appropriate, outside agencies as listed on the emergency call list posted in each radioactive material laboratory.
2. In the event of contamination of an individual, area or work location by radioactive materials or suspected radiation exposure, the following procedures must be immediately initiated:
 - a. Employ every effort to reduce or restrict spread or dispersion of radioactive materials. For example, apply absorbent material over a spill. If personal clothing is contaminated, e.g., laboratory coat, remove and place in plastic container.
 - b. Restrict access to the contaminated area.
 - c. Identify the precise radioactive contaminant.
 - d. If radioactive material reaches any skin surfaces, wash with soap and warm running water. Also see the following section for detailed personnel decontamination procedures.
 - e. Do not leave the scene until instructed by supervisor, RSO or county emergency responders.

f. If exposure is suspected from radiation generation, medical attention may be necessary. Notify your Instructor, Supervisor or emergency personnel.

3. Reporting Radiological Emergencies

- a. **If the radiological emergency is associated with a life threatening or serious physical injury, contact emergency assistance by dialing 911.** Emergency medical treatment takes precedence over radioactive contamination.
- b. Because it is difficult for personnel in the laboratory to determine the extent of radiation exposure resulting from radiation emergencies, it is necessary that the RSO, ARSO and/or the Director of EH&S be contacted **IMMEDIATELY**.
- c. It is important that the laboratory personnel not assess the severity of the radiation emergency as minor and inconsequential. A minor spill might have more serious implications. The RSO and the Director of EH&S will be able to determine the magnitude and seriousness of the emergency.
- d. When reporting an emergency, give your name, phone number, the radionuclide, physical and chemical form, activity level and location of the spill (building, room, area within the room, etc.)

N. Personnel Decontamination: Personnel are referred to the U.S. Department of Health & Human Services [Radiation Emergency Medical Management](#) for additional information.

1. External Contamination with Radioactive Materials

- a. **Intact Skin:** Immediately notify the RSO, ARSO or EH&S.
 1. If incorporation (absorption) is suspected, get nose swab and sputum sample.
 2. Avoid spread of contamination.
 3. Remove contaminated clothing from the affected person.
 4. Using a waterproof marker, mark areas of high level contamination as determined by Geiger survey.
 5. Ensure that meter-to-skin distance is consistent in all Geiger surveys to minimize inter-survey errors.
 6. **Record initial and follow-up Geiger survey results on a body chart (See Appendix D).**
 7. **Decontaminate affected area of skin with mild soap (neutral pH), tepid running water and a soft brush for 2-3 min. Do not abrade or damage skin. Do not use cold water as it can close skin pores thus trapping radioactive material. Do not use hot water as it can enhance absorption of radioactive material through vasodilation and increased skin blood flow.**
 8. Direct the contaminated waste water away from the person. Measure radiation levels and repeat the process if necessary recording the results on the body diagram each time.
 9. Use serial washcloths, gauze pads or surgical sponges to avoid recontamination.
 10. Place all contaminated cloths, pads or sponges used into a property bag and label the bag with
 - i. contaminated person's name
 - ii. date and time of collection
 - iii. location of collection
 - iv. radiation warning label
 11. Store the property bag in a secure location until approval is given by the RSO or ARSO for disposal.
 12. **The goal is to decrease external contamination to a level no more than 2 times background radiation level.**
 13. It might not be feasible to remove all contamination from the skin. Do not attempt vigorous decontamination as it may cause loss of normal intact skin and increase the risk of internal contamination.
- b. **Contaminated Hair**
 1. Position victim with head deflected backwards to avoid spread of contamination from run-off water.

2. Wear gloves and shampoo hair using tepid water and mild shampoo without conditioners because conditioners can bind radioactive material to hair protein making decontamination more difficult. Repeat process as necessary **until external contamination is no more than 2 times background radiation level** per Geiger survey. Record survey results **on a body chart (See Appendix D)**.
3. Contaminated hair can be clipped if shampooing is ineffective.
4. Do not shave hair as it might create nick, abrasions and breaks in the skin.
5. Dry hair with clean, uncontaminated towels.
6. Place all contaminated towels into a property bag and label the bag as for intact skin in the preceding section and store the bag in a secure location until approval is given by the RSO or ARSO for disposal.

c. Contaminated Eyes

1. Spread eyelids and irrigate the eyes gently with copious amounts of saline or warm water if corneal contamination is present and the eye globe is intact.
2. Do not irrigate a ruptured eye globe.
3. Direct the irrigation stream away from the inner canthus and toward the outer canthus (from the nose towards the side) to avoid contamination of the nasolacrimal duct.
4. Observe for conjunctivitis after decontamination.
5. Periodically Geiger survey collected irrigation fluid for residual radioactivity.
6. Obtain medical assistance.

d. Whole Body contamination

1. Remove all clothing and place it in a property bag and label and store the bag as in the section on intact skin above.
2. Using a waterproof marker, mark areas of high level contamination as determined by Geiger survey.
3. Ensure that meter-to-skin distance is consistent in all surveys to minimize inter-survey errors.
4. **Record initial and follow-up survey results on a body chart (See Appendix D)**.
5. Update or use a new body diagram for each decontamination cycle.
6. Using mild soap (neutral pH) and tepid water, decontaminate in the following order.
 - a. whole body
 - b. open wounds
 - c. body entrance cavities (nose, mouth, ears)
 - d. localized contaminated skin starting with the highest contamination noted on the body survey.
7. Direct contaminated waste water away from the victim rather than over the rest of the body.
8. Perform **two decontamination cycles** if feasible with a whole body radiation survey after each cycle. **The goal is to decrease external contamination to a level no more than 2 times the background radiation level**.
9. **Use tepid water as cold water can close skin pores thus trapping radioactive material and hot water can enhance absorption of radioactive material through vasodilation and increased skin blood flow.**
10. It might not be feasible to remove all contamination from the skin. Do not attempt vigorous decontamination as it may cause loss of normal intact skin and increase the risk of internal contamination. Radioactivity trapped in the outermost layer of the skin (stratum corneum) will remain until normal sloughing occurs in 12-15 days.
11. Towel dry and repeat Geiger survey.
12. If decontamination is unsuccessful, seek emergency medical treatment.

2. Incorporation of Radioactive substances

- a. Uptake may occur by ingestion (swallowing, smoking, eating, drinking, pipetting), inhalation (breathing radioactive dusts, aerosols, gases) or absorption through intact or injured skin (acne, wounds, etc.).
- b. Counter Measures
 - i. Determine time of accident, type of uptake, kind of radionuclide, physical and chemical form and level of activity of contaminant.
 - ii. Notify the RSO or ARSO and EH&S.

- iii. Only in ingestion should mouth be rinsed and vomiting induced. If unsure what to do, call Poison Control at 1-800-222-1222
 - iv. Any decision to treat with chelating agents should be made by experts. Chelation should be started within one hour of ingestion in order to be effective.
3. Contaminated Wounds: Consider all open wounds contaminated until proven otherwise and assume that there will be internal contamination.
- a. Cover skin surrounding the wound with waterproof dressings to limit the spread of radioactivity by water run-off during wound irrigation.
 - b. Irrigate wound gently with copious amounts of normal saline or water.
 - c. Monitor wound with a radiation survey meter after each irrigation and record the results.
 - i. Gently swab wound with sterile cotton-tipped applicator and survey it for level of radioactivity.
 - ii. If monitoring wound with a survey meter, remove contaminated dressings before conducting survey.
4. If contamination remains high, apply a sterile dressing and seek advice from a medical expert before suturing or excising vital tissue.

O. Non-compliance

When serious noncompliance issues are observed and documented, enforcement actions must be taken to ensure compliance with federal and state regulations as well as with WesternU policies. A “serious” radiation safety finding is noncompliance involving a contamination incident, food and drink in radioactive material use areas or noncompliance with the personal protective equipment policy describe in Section V.M.7a. above. WesternU follows the **3 STRIKES POLICY** described below. A repeat noncompliance issue may result in escalation of the significance of the event and require reporting of the incident to the Director of Environmental Health and Safety, the Department Chair, and the appropriate Dean of the respective college. All other documented noncompliance issues will require a repeat inspection by the RSO within 30 or 90 days depending on the nature of the issue. The strike categories are defined below.

Persons named in item 12 of WesternU’s Radioactive Material License, hereafter referred to as Authorized Users (AUs), are ultimately responsible for the proper handling of radioactive material by themselves and persons using radioactive material under their supervision.

STRIKE ONE

When a repeat or egregious issue of noncompliance by the PI, or someone under the PI’s supervision, has been identified by the RSO, a Strike One Memorandum may be issued to the PI. The Memorandum will indicate the item(s) of noncompliance and request a response from the PI within 15 calendar days of the date of issue describing the corrective action(s) to be taken and the time frame in which the corrective action(s) are to be completed. The RSC will review the proposed correction action(s) and determine if the response is adequate and offer guidance as appropriate. The RSC will also determine if the time frame proposed by the PI is appropriate and, if not, make appropriate recommendations. Failure to respond to the Memorandum within the stated time period may escalate the memorandum level to Strike Two. All Strike One Memoranda will be effective for a period of 6 months, unless a Strike Two occurs while Strike One is still in effect.

STRIKE TWO

Failure to respond to a Strike One Memorandum within the stated time period of 15 calendar days, documentation of the reoccurrence of a finding that had been resolved following a Strike One Memorandum or documentation of a new noncompliance issue may result in the issuance of a Strike Two Memorandum. The PI will be informed of the reason for the Strike Two Memorandum. The PI must provide a written response to the RSO as to the reasons why the previous corrective action(s) was/were ineffective and what further corrective action(s) will be taken to prevent recurrence. Failure to respond within 15 calendar days from the date of issue may escalate the memorandum to Strike Three. The RSC will review the proposed corrective action(s) and shall determine if the response is adequate and offer assistance to ensure future compliance. A notice shall be sent to the Department Chair to inform them of the potential for suspension of the PI’s radiation use authorization. If a Strike Two Memorandum is issued while a Strike One is in effect, the Strike Two

Memorandum will take precedent over the Strike One violation. Strike Two will be in effect for 12 months from date of issuance.

STRIKE THREE

Failure to respond to a Strike Two Memorandum within the stated time period, documentation of the recurrence of a finding during the subsequent inspections or documentation of a new noncompliance issue may result in the issuance of a Strike Three Memorandum. This notice will be sent to the PI informing him/her of the continuing noncompliance and that the PI's radiation use authorization will be suspended for a minimum of 15 calendar days, effective immediately. During the suspension period, the PI must appear before the RSC to explain why their radiation use authorization should be reinstated. A notice shall be sent to the Department Chair, Dean and VPRB to inform them of the suspension and they may decide to take further actions. If a Strike Three Memorandum is issued while a Strike Two is in effect, the Strike Three Memorandum will take precedent over the Strike Two violation. The duration of a Strike Three violation will be determined by the RSC.

In the event of significant disregard for safety by a PI or the PI's laboratory personnel, the PI's radiation use authorization may be suspended by the RSO or RSC without instituting the Three Strikes Policy. Should this occur, the PI will be required to appear before the RSC.

Section VI. Proper Operating Procedures for Clinical Radiographic Units

A. General Guidelines

1. Signs indicating the presence of radiation-producing equipment will be posted on each door of the radiology rooms, e.g. CAUTION: X-ray in Use.
2. Administrative radiographs will not be taken.
3. Radiographs taken for clinical research required prior approval from the Institutional Review Board (IRB).
4. A faculty member/licensed healthcare provider **must** approve the radiographs(s) ordered BEFORE the patient is taken to have the radiographs taken.
5. A valid prescription **must** be entered into the E H R system. The order for the x-rays will include the images to be taken and the indication(s) for the images.
6. A faculty member/licensed healthcare provider who has current certification by the California Department of Public Health Radiologic Health Branch as an X-ray Supervisor and Operator **must** be present while the image is being taken.
7. All current Operator and Supervisor certificates must be clearly posted in the radiology room in accordance with state regulations. If the certificate is expired, the faculty or staff member will not be allowed to operate the radiology equipment until a valid certificate is obtained.
8. Asepsis will be practiced at all times in accordance with Patient Care Center policies and procedures pertaining to infection prevention and control.

B. X-Ray Equipment Operators

1. Animal Radiographic Units

1. Limit the X-ray primary beam limited to the smallest area possible consistent with the objectives of the clinical examination.
2. Align the X-ray beam properly with the animal and the image receptor.
3. Remain behind a protective barrier (i.e., a leaded glass wall, a leaded door, etc.) during the entire radiographic exposure.

4. Whenever possible, use restraining, supporting, or positioning devices for the animal, or use film for radiation exposures.
5. No Individual may be regularly employed to hold or support animals or hold film or hold the x-ray tube head during radiation exposures. Occupationally exposed individuals may not perform this service except in cases in which no other method is available. An individual holding or supporting an animal or film during radiation exposure shall wear protective leaded gloves and a lead apron having a lead equivalent of not less than 0.5 millimeter and shall be positioned so that no part of that individual's body will be struck by the x-ray beam. The exposure of an occupationally exposed individual used for this purpose shall be monitored through the use of dosimetry monitoring devices.
6. Protective garments (lead aprons/shielding) shall be provided for everyone whose presence is necessary during the radiographic exposure.

2. Dental Radiographic Units

1. ONLY the x-ray equipment operator and the patient are permitted in the radiology cubicle/area when radiographs are taken. Children of adult patients must remain outside in the reception area.
2. Thyroid collar and lead apron will be used on EACH patient for all intra-oral radiographic procedures, regardless of age. For panoramic radiography, only the lead apron will be used and it will be positioned in such a way so that it will not interfere with the diagnostic value of the radiograph.
3. The operator of the x-ray equipment will remain COMPLETELY behind the designated barrier during each radiographic exposure.
4. The operator of the x-ray equipment WILL NOT, under any circumstances, hold films in a patient's mouth during a radiographic exposure.
5. Under exceptional circumstances, it may be necessary for someone to hold a film in a patient's mouth (never on a mannequin). When these circumstances arise, it will be necessary to consult with and receive permission from the radiology faculty member in charge of the clinic. During these special circumstances, the patient's guardian or parent may be used to assist in holding the film in a patient's mouth **if** they are draped with a lead apron. Faculty, students and staff will NOT, under any circumstances, be asked to hold film in a patient's mouth.
6. X-ray equipment operators WILL NOT hold or stabilize the x-ray tube head during a radiographic exposure. If the equipment is not stable, immediately notify the x-ray technician in charge and move to an x-ray unit that is stable. The machine that is not in working order must be reported to the Director of Clinical Operations so that the appropriate repairs can be made.
7. X-ray equipment operators WILL NOT stand in a direct line with the central ray.
8. Doors of the x-ray cubicle may be left open during radiographic procedures unless prohibited by the x-ray technician or radiology faculty. When the door IS left open, the central ray (C-R) of the x-ray unit should NEVER be directed out the door; the C-R should ALWAYS be directed toward the inside walls and not toward the door.
9. When Radiography students use the radiology cubicle in pairs or small groups, the partners must remain outside the cubicle clear of the doorway during the actual exposure of the radiograph.

3. Foot & Ankle Center Radiographic Units

1. Appropriate images will be created by students under the direct supervision and guidance of a clinical faculty member. The clinical faculty member **must** be a certified x-ray Supervisor and Operator by the California Department of Public Health Radiologic Health Branch.

2. The student taking the images will confirm the patient's identity, using two patient identifiers such as name and date of birth; images being taken; and the correct side for imaging (left, right or bilateral) to prevent excessive and unnecessary radiation exposure.
3. Appropriate technique to limit radiation exposure must be used for all x-ray examinations.
4. Collimation of the beam will be used to limit exposure to the anatomic area being examined.
5. Lead shielding will be used.
 - i. All patients will wear lead aprons or, when appropriate, gonadal shielding.
 - ii. Providers and students will wear lead aprons and gloves when exams, such as stress tests, require provider/student involvement.
6. After positioning the patient, personnel taking the image will leave the room to stand behind the barrier prior to taking the image.
7. Digital sensors may be chosen to accommodate image need. As a general principal, exposure settings comparable to the fastest speed film (F-speed) will be used. Radiation hygiene and minimizing the dose to the patient mandate the routine use of collimation, lead aprons, thyroid shield, film holders and digital sensors. During exposure, the operator must step out of the room. Radiographs will be digitally acquired, mounted and saved on the PACS system and will follow the DICOM protocol for storage and retrieving.
8. Since children are more susceptible to the development of radiation-induced cancers than adults, the radiation dose shall be adjusted accordingly. The dose adjustment shall be individualized for each patient and account for the child's size or weight to ensure adequate image quality while optimizing the radiation dose.

C. Shielding

Radiation exposure levels can be controlled by four basic methods:

1. Maximizing the distance from the radiation source.
 2. Minimizing the radiation exposure time.
 3. Proper shielding of the radiation source.
 4. Proper shielding of personnel.
1. **Personnel Shielding:** For personnel who remain in the room during examinations, they must be protected by proper shielding, such as the following:
 - a. A leaded apron must be worn any time personnel are in a room during an exposure.
 - b. Thyroid shield: Anyone likely to be exposed to high levels of scattered radiation to the thyroid during any procedure must wear a thyroid shield.
 - c. Leaded glasses: In fluoroscopy, the lens of the eye can often be exposed to high levels of scattered radiation. The use of leaded glasses can greatly reduce this exposure.
 - d. Leaded gloves: Anyone who must have his/her hand near the primary beam (e.g. when no other means is available to immobilize an animal) must wear leaded gloves to reduce exposure to the extremities.
 2. **Structural Shielding:** Each radiographic room has been designed with sufficient shielding in the walls to provide protection to anyone on the outside of the room. It is important that the integrity of the shielded walls not be tampered with. Therefore, if any personnel notice structural changes, such as holes drilled into walls, the RSO should be notified as soon as possible.

D. Pregnant Student/Employee Worker Policy

Regulations limit a pregnant woman's occupational radiation exposure to 500 mrem in the gestation period. However, for this limit to apply, women who are pregnant or who are trying to become pregnant **must declare their pregnancy in writing by completing the Confidential Pregnancy Declaration form in Appendix E and the Pregnancy Consultation Record form in Appendix F.**

Nevertheless, **this declaration is voluntary.** In accordance with University, College, state and federal regulations, **individuals are considered *not* pregnant, regardless of outward appearance, unless the individual has informed, in writing, the University RSO and the College's RSO liaison otherwise.** Individuals that have declared their pregnancy, as *recommended* by the university, state and federal regulations, will be issued an additional dosimetry monitoring device to be worn under protective equipment at abdomen level. This additional device must be read *at least monthly* to determine any additional radiation exposure. Records from the monthly reports should be sent to the Student-Employee Health Office and RSO. When no longer pregnant, the individual must declare this change in writing by completing a Request for Withdrawal from Confidential Pregnancy Declaration form (**Appendix G**).

Copies of the necessary forms may be obtained from the Radiation Safety Office or the RSO liaison.

E. Badging and Dosimetry Policy

1. **Personnel Dosimeter:** Personnel dosimeter monitoring devices must only be worn by the individual to whom the device has been issued and only worn at WesternU facilities.
2. Dosimetry device monitoring is the method used by the Radiation Safety Office to identify inadequate or improper radiation safety practices and potentially serious radiation exposure situations. The RSO or their designee will issue radiation dosimetry monitoring devices to all faculty, staff and students that routinely operate radiation-producing devices. All radiation workers must conscientiously wear the radiation monitoring devices provided by the Radiation Safety Office. These devices may include the following:
 - a. A film monitoring device to monitor doses to the whole body.
 - b. A Ring Dosimeter to monitor extremity doses.
 - c. A TLD (thermoluminescent dosimeter) monitoring device for whole body measurements.

Monthly dosimetry reports will be maintained in the Student-Employee Health Office. Excessive or abnormal exposure will be investigated in collaboration with the RSO. Based on the findings, appropriate reports will be made in accordance with all state and federal regulations.

3. Dosimeter Placement

- A. Interpretation of the measured dose is dependent upon the placement of the dosimeter. It is therefore important that all personnel wear their dosimeters correctly. The following list indicates where the dosimeters are to be worn:
 - i. Film monitoring device with no TLD: wear the device above any protective clothing at collar level.
 - ii. Film device with a TLD device: wear the film device under the lead apron and the TLD above the apron at collar level.
 - iii. Ring Dosimeter: wear ring dosimeters so that the employee's name is facing source of radiation.
- B. Do not expose personnel monitoring devices to extreme heat or humidity. If any dosimeter has received a dose higher than the values shown below, the employee will be notified and the reason for the high reading will be investigated. Measures will be taken to keep radiation doses below these limits whenever possible.

It is very important that all personnel follow all manufacturers' guidelines on the proper use of the radiation exposure monitoring device.

4. **Dose Reports:** Dose reporting frequency is based on dosimeter type:

- Dose reports are provided upon request to individual wearers. The Radiation Safety Office sends dose summary reports to the Student-Employee Health Coordinator for each wear period and on an annual basis. These reports will be available in the RSO's office.
- Results that will trigger an investigation are:

	Radiology
Whole Body	125 mrem/calendar quarter
Extremities	5,000 mrem/calendar quarter

5. **Issuance of dosimeters:** Dosimeters will be issued prior to the potential exposure to ionizing radiation by the specific College/Center designee. The RSO will be given a copy of the distribution list.

F. Radiation-Emitting/Producing Equipment and Protective Garment Monitoring

1. Inspection of equipment and maintenance of the radiation-emitting equipment will be performed on a regular schedule by a vendor licensed in the State of California to perform such services. These activities will be in accordance with applicable statutes of the State of California, the federal nuclear regulatory agency and other federal regulations. Logs will be maintained of this inspection and maintenance by the University Radiation Safety Office.
2. Radiation-producing equipment shall be tested after each repair or modification and annually by a vendor licensed in the State of California to perform such services. The parameters to be tested include radiation output (including beam intensity and quality), modes of operation e.g. exposure controls, image quality, accuracy of patient dose, typical patient dose for usual imaging studies compared to national reference levels and a review of overall technical quality control.
3. Protective equipment, e.g. lead aprons, thyroid/gonad shields and gloves, shall be monitored at time of delivery to WesternU and at least yearly thereafter to ensure integrity of the lead and ability to protect against radiation exposure. Any protective equipment that does not pass must be immediately removed from service and a replacement must be ordered.
4. A written or electronic record of equipment inspections, deficiencies or failure and the subsequent correction(s) shall be maintained by the University Radiation Safety Office.

G. Diagnostic Equipment Registration (Assistance with some of the forms mentioned below may be found [here](#))

1. **Registration of Diagnostic Units and License Fees:** According to the California Health and Safety Code, all radiation-producing equipment must be registered with the Radiation Health Branch of the California Public Health Department and a fee paid. Registration will be in the name of the Western University of Health Sciences, with the University Compliance Office as point of contact. The college/department where the device is housed pays for the initial registration fees and all future renewals as long as the equipment is in use. The RSO and Environmental Health & Safety must be notified of the acquisition, transfer, or disposal of any radiation producing machine. The Compliance Office and the RSO maintain a listing of all units currently registered.

Colleges who wish to operate a radiation-producing machine must submit an [Radiation Machine Registration form for New Registrants](#) to the Radiation Safety Office. Each application must be completed in sufficient detail for evaluation. The University Compliance Office can assist in the application/licensing process. Applications must include a description of the machine, including maximum operating parameters, description of proposed use and, for machines operating above 100 kV, a description of the facility in which the machine will be used. Accelerators, diagnostic or radiographic x-ray machines or other radiation-producing machines which may present special hazards, require operating conditions beyond those listed in this instruction. For additional information, refer to Section IV.2 of this Manual.

2. **Acquisition of New Diagnostic Units:** It is the responsibility of clinical personnel to notify the RSO upon acquisition of any new diagnostic equipment. A radiation safety survey is conducted by authorized RSO personnel on all new units prior to their use. This survey will include reviewing barriers, shielding

requirements, training on the use of devices and ensure policies fit or apply to the radiation devices being used.

3. **Disposal of Diagnostic Units:** It is the responsibility of clinical personnel to notify the University RSO of any diagnostic equipment intended for disposal. The RSO and/or clinic will work in cooperation with the Environmental Health & Safety Office to ensure safe disposal of diagnostic units. The University compliance Office will work with the clinical personnel to complete the required documentation that must be submitted to the state to show the University no longer uses and/or owns the device.
4. **Amendment To Registration:** A request for amendment to an approved application is submitted on a [Radiation Machine Registration form for Changes to Registrant or Machine Information](#) form. Amendment requests may be made for the following changes:
 - Change in location of machine (<100 kV)
 - Change in facility design (>100 kV)
 - Change in proposed use
5. **Permit Authorization:** All applications for the use of radiation-producing machines are first submitted to the University Compliance Office for review before being sent to the State of California Radiation Health Branch (RHB). Upon RHB approval, a numbered permit is issued listing any special conditions specified. Applications for the use of radiographic x-ray units operating above 100 kV which have not been previously approved for operation require State of California RHB approval.
6. **Authorized Users:** Equipment licensee/RSO/supervisor/College designated dosimetry officer is responsible for ensuring that only authorized users are allowed to operate their machines. Authorized users are those individuals listed on the original application or added using appropriate forms and approval channels. Contact equipment licensee/RSO/supervisor/College designated dosimetry officer for further information.
7. The University Compliance Office is responsible for reviewing all applications related to radiation emitting devices.

H. Radiation Exposure Safety Tips

Time

- Minimize time exposed to radiation.
- Use technique charts to decrease repeat exams.
- Rotate available personnel so that no one spends a disproportionate amount of time producing radiographs.
- Use tape, sandbags and restraint devices to limit manual positioning of the patient.
- Plan the radiographic procedure carefully to avoid repeat films.
- Use film screen systems to minimize the time of exposure.

Distance

- Maximize the distance between the worker and the x-ray beam.
- Remove nonessential personnel from the radiology room during exposure.
- Do not hold a film by hand even if it is a gloved hand.

Shielding

- Utilize all available protective equipment such as lead aprons, gloves and thyroid shields, especially when film is being exposed to the radiation beam.
- Never allow any part of your body to enter the primary beam.

Common sense

- Avoid the primary beam.
- Don't allow pregnant women or personnel in the radiology room without appropriate safety measures being followed, e.g. wearing of lead apron.
- When possible, collimate the primary beam so there is a one-inch unexposed area at the periphery of your radiograph to reduce scatter.

I. New Student/Employee Orientation: Supervisors will ensure that new or transferred employees are given appropriate orientation. New and returning employees will be gradually integrated into a full work schedule as appropriate for specific jobs and individuals. Employees will be assigned to an experienced trainer for job training and evaluation during the break-in period. Employees reassigned to new jobs should also have a break-in period. **Important** - Supervisors will closely monitor employees that fall into this category throughout their probationary period.

Each College will ensure that new or transferred students are allowed an appropriate orientation period.

J. Radiation Safety Training: All new, transferred or returning (after a period of greater than one year) faculty, staff or students who engage in activities that may result in exposure to ionizing radiation are required to complete a WesternU-approved radiation safety course and examination demonstrating the acquisition of knowledge regarding the effects of ionizing radiation and appropriate protective measures. Competence in this knowledge must be demonstrated **annually** through completion of online training courses.

Training in Diagnostic X-Ray Radiation Safety: Dental students receive didactic and [online instruction](#) in Radiation Physics and Biology; however, the online instruction requires prior authorization to access the site. Podiatric students receive didactic training in radiation safety whereas veterinary students receive initial didactic training and then must complete an online radiation safety course.

All new personnel must be trained by qualified persons and must satisfactorily demonstrate knowledge of operating and safety procedures before independently operating machines that produce ionizing radiation. Depending on prior experience and the type of machine to be operated, new personnel may be required to attend an orientation and/or complete a short written test to demonstrate knowledge of operating and safety procedures.

Contact the RSO for information on training courses specific to your areas.

K. Off-Campus Students/Faculty

- a. Students from the College of Osteopathic Medicine of the Pacific involved in clinical off-campus rotations in radiology services in affiliated hospitals will obtain their personnel monitoring devices from that facility.
- b. Students from the College of Podiatric Medicine involved in clinical off-campus rotations.
- c. Students in the College of Veterinary Medicine (CVM) involved in off-campus clinical practices will obtain their personnel monitoring devices from the RSO liaison or Director of Student Affairs in the CVM. These personnel TLD monitoring devices will be issued to the 1st and 2nd year students the first week of class and are exchanged every six (6) months. Third and 4th year students receive the Instadose monitoring devices and are directed to read them monthly. CVM staff is able to access the Instadose reports and they are reviewed the CVM RSO liaison. It will be the responsibility of the students to wear the dosimetry devices in the practice when obtaining radiographs of patients and to promptly return them to the RSO liaison and/or CVM Director of Student Affairs, for each time period designated.

L. Ionizing Radiation Hazards and Biological Effects: X-rays produced by diffraction machines are readily absorbed in the first few millimeters of tissue, and therefore do not contribute any dose to the internal organs of the body. However, the lens of the eye can receive a dose from x-rays of this energy. Overexposure of lens tissue can lead to the development of lens opacities and cataracts. Absorbed doses of a few hundred Rad may produce an erythema of the skin which is transitory in nature. Higher doses -- 10,000 Rad and greater -- may produce significant cellular damage resulting in pigment changes and chronic radiation dermatitis. Exposure to radiation may not result in immediate skin erythema. The latent period may be from several hours to several days. (Note: Devices used for diagnosis are about one order of magnitude shorter in wavelength. Diagnostic x-rays are designed for tissue penetration and are carefully filtered to avoid x-ray damage to the skin caused by the longer, more readily absorbed wavelengths).

M. Sources of Ionizing Radiation: The primary beam is not the only source of ionizing radiation. Any high voltage discharge is a potential source of x-rays. Faulty high-voltage vacuum-tube rectifiers may emit x-rays of twice the voltage applied to the x-ray tube. Other sources of ionizing radiation are:

- Secondary emissions and scattering from the sample, shielding material, and fluorescent screens.
- Leakage of primary or scattered x-rays through gaps and cracks in shielding.
- Penetration of the primary beam through or scattering from faulty shutters, beam traps or collimator couplings.

N. Safety Precautions: The shielding, safety equipment and safety procedures prescribed for X-Ray diffraction equipment are applicable only for up to 100 kV-peak X-Rays. Greater precautions may be necessary for machines operating at higher voltages. The equipment licensee has the responsibility for providing a safe working environment by ensuring that equipment is operationally safe and that users understand safety and operating procedures. The equipment operator is responsible for his or her own safety and the safety of others when using an analytical X-Ray machine.

1. **Shield Removal:** Prior to removing shielding or working in the sample area, the operator must check both the warning lights and the current (mA) meter on the console. Never trust a warning light unless it is on! Always use a survey meter to check that the shutters are actually closed if current is still being supplied to the tube. It is possible for a shutter to be stuck partially open even when the indicator shows that it is shut. The best way to avoid an accidental exposure is to turn the machine off before working in the sample area.
2. **Repairs or Malfunctions:** Never put any part of the body in the primary beam. Exposure of any part of the body to the collimated beam for even a fraction of a second may result in damage to the exposed tissue. A person not knowledgeable about x-ray equipment should not attempt to make repairs or remedy malfunctions. If you suspect a machine is malfunctioning, turn it off or unplug it. Place an "out of order" note on the control panel and contact the appropriate supervisor to coordinate with the university Purchasing Department for the necessary repairs.
3. Bare feet are not permitted in any patient care areas, laboratories or around electrical equipment. Even slightly moist skin is an excellent electrical conductor and contact with faulty, ungrounded equipment may result in severe injury or death.

O. "X-RAY ON" Indicators: When present, there must be a visual indication located on or near the tube head to indicate when x-rays are being produced. This is usually an assembly consisting of two red bulbs wired in parallel and labeled X-RAYS ON. If one of the lights is burned out, the operator should put in a work request to have the light replaced. Always check the control panel.

P. Safety Devices: Interlock switches are used to prevent inadvertent access to the beam. They should not be bypassed. Interlocks should be checked periodically to insure that they are functioning properly. Interlocks and other safety devices and warning systems are not foolproof or fail-safe. A safety device should be used as a back-up to minimize the risk of radiation exposure -- never as a substitute for proper procedures and good judgment.

Q. Warnings and Postings: A sign bearing the radiation symbol and the words CAUTION X-RAYS must be posted at the entrance to each room/laboratory containing a radiation producing machine. The sign must include the name and after-hours phone number of the equipment licensee/RSO/supervisor/College designated dosimetry officer or designee if the device is not located in a patient care area. A label bearing the words CAUTION THIS EQUIPMENT PRODUCES RADIATION WHEN ENERGIZED (or similar wording) must be affixed to the control device of each machine. A label bearing the words CAUTION HIGH INTENSITY X-RAY BEAM (or similar wording) must be affixed on or near the tube of an X-Ray unit. An X-RAYS ON warning light, labeled as to its meaning, shall be located on or near an X-Ray tube to indicate when X-Rays are being produced.

R. Access Control: Key control must be maintained for each machine. For older machines which do not have a keyed control device, this requirement may be fulfilled by controlling access to the room/laboratory. While any open system is in operation, an operator must be present or the room/laboratory must be kept locked.

S. Operating Procedures: Operating procedures for each machine must be available near the machine. For open systems, these procedures must specifically include:

- Means to control and limit exposures, including controlling access to the area.
- The use of radiation survey instruments and film monitoring devices.

T. Equipment Safety Surveys: For open systems, the equipment licensee/RSO/supervisor/College designated dosimetry officer must provide a radiation survey meter to indicate the presence of unwanted radiation and to trace the origin of leaks. The recommended instrument is a Geiger-Mueller survey meter which must be calibrated at least yearly with a thin window probe. After a change in experimental set-up and before energizing the machine, the operator must visually inspect ports, cameras, shielding, etc. After the machine is energized, a radiation survey should be performed to check for scattered or leakage radiation.

U. Radiation Safety Surveys: The RSO, or RSO liaison, performs inspections of radiation producing machines on the campus of WesternU when first installed, at yearly intervals, and whenever significant changes to the machine, facility, or operating procedures are made.

V. Unused Ports: All unused x-ray ports must be permanently blocked or be interlocked so that x-ray production is stopped if the port is opened. Material used to block unused ports must be of sufficient density and thickness to attenuate the primary beam to acceptable levels.

W. Protective Shielding: Protective barriers and/or shielding must be used in open x-ray systems to ensure exposure rates in accessible areas are less than 2 mR/hr at 5 cm from any exterior surface. It is important to avoid cracks and gaps in the shielding.

X. Log Book: For open systems, a log book must be kept which records the following information:

- Means to control and limit exposures, including controlling access to the area.
- The use of radiation survey instruments and film monitoring devices.
- Operator
- Voltage
- Exposure time
- Date
- Current
- Radiation survey Results

Y. Dosimetry: Dosimetry requirements will be established by the RSO upon a review of each facility. Users of radiographic units, or open system x-ray diffraction units will be issued a personnel dosimeter (TLD monitoring device). This dosimeter should be worn while in the facility when the machine is in operation. The film monitoring device will only measure scattered radiation; it will not indicate personnel dose from exposure to the primary beam. Additional dosimeters may be posted at various locations in the facility. These dosimeters should not be moved by laboratory personnel.

Z. Emergencies Involving Radiation Producing Machines: In the event of an accident or incident involving a radiation-producing machine:

- Turn off the machine. If possible, also unplug or shut off the circuit breaker for the machine.
- If there is a serious injury or fire, call 911 and request paramedic or the fire department.
- Notify the Security Office at extension 3000. If an emergency occurs after normal working hours, call 909-706-3000 and the clinical dean of the college/department/center involved as soon as it is safe to do so.
- Notify the laboratory supervisor.
- Record information about the incident e.g. operating voltage and current, exposure time, distance from radiation source.



APPENDIX A

Use of Dosimetry Monitoring Device

I, _____, am aware that the privileges granted to me for using ionizing radiation require that I strictly adhere to the rules as mandated by the state and federal regulatory agencies or my privileges may be revoked.

Use of Monitoring Device

I understand that I must adhere to the following safety practices while using the monitoring device by:

- wearing only my designated device so that monitoring is optimized (usually on the collar) when using the radiation device.
- leaving it in designated location when not in use and not taking the device home.
- not laundering the device or getting it wet.
- not exposing it to heat, such as in a car in the summer or exposing the device to other sources of radiation.
- not wearing the device for personal x-ray or nuclear medicine exam.
- turning the device in for processing in a timely manner.
- wearing protective equipment, such as a lead apron, while operating the radiation device.

Lost or Damaged Monitoring Device

I understand I must report it immediately to the appropriate departmental representative and will be advised regarding the replacement device. I understand that a missing or invalid dosimeter reading creates a gap in my radiation dose record and affects the monitoring program's ability to provide accurate exposure readings.

- Written notification must also be given to the RSO liaison for the college/department.

My signature below indicates that I have read this document and will comply with the rules and regulations.

Printed Name

Date

Signature

Device Number

This form, once signed, must be returned to the appropriate departmental representative.



APPENDIX B

**Declaration of Previous Dosimetry Monitoring
(Excluding WesternU-Provided Monitoring)**

Western University of Health Sciences returning student/faculty:

In accordance with University policy, State, and Federal regulations, the University is required to maintain a record of your occupational- and/or educational-related lifetime ionizing radiation exposure to ensure your safety.

Student/Faculty/Staff information:

Name (print): _____

Date of Birth: _____

ID Number (student/faculty/staff) _____

Social Security Number (last 4 digits only) _____

OR if you do not have an SSN, a federally issued identification number

Unique Dosimetry Monitoring Identifier
(as used by the monitoring company) _____

With the submission of this document, I certify that *since the completion of my last Declaration of Previous Dosimetry Monitoring:*

- I have **not** been enrolled in a dosimetry monitoring program other than the program administered by WesternU.
- I have been enrolled in a dosimetry monitoring program other than that administered by WesternU **since completion of my previous Declaration of Previous Dosimetry Monitoring**. I have listed those below and will submit a Release of Exposure Report Request form for each monitoring program in which I was enrolled.
- I have been enrolled in a dosimetry monitoring program other than that administered by WesternU **since completion of my previous Declaration of Previous Dosimetry Monitoring**, but do not remember where. I have listed the information that I recall below.

Below, please declare any previous dosimetry monitoring programs you were enrolled in. Complete a Release of Exposure Reports Request form for each location if not previously done.

Rec'd	Inclusive Dates	Institution/Facility/Practice	Mailing Address and Phone Number

Please complete additional forms if needed.

Signature: _____ Date: _____



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APPENDIX C

Release of Exposure Reports Request

Attention: Radiation Safety Officer

California state law requires that we monitor levels of radiation exposure in the performance of job duties/educational training. In accordance with California State and Federal regulations, please accept this letter as an official request for the occupational exposure history of the person named below.

Name: _____

Social Security Number: _____ Date of Birth: _____
 (last 4 digits only) (or the ID code used for your monitoring at the facility)

OR if you do not have an SSN, a federally issued identification number

Unique Dosimetry Monitoring Identifier: _____
 (as used by the monitoring company)

Date of Employment or enrollment: _____

College or Department: _____

I hereby authorize that my exposure history be released to Western University of Health Sciences.

Name: _____
 (Printed)

Signature: _____ Date: _____

Please mail the information to:

Radiation Safety Officer
 309 E Second Street
 Pomona, CA 91766-1854

Thank you very much for your help. Please call Western University's Radiation Safety Officer at 909-469-5592 if you have any questions or need of further information.



APPENDIX D

BODY CHART FOR RECORDING RESULTS OF RADIATION CONTAMINATION SURVEY

Contaminated Person's Name: _____

Date of Incident: _____

Time of Incident: _____

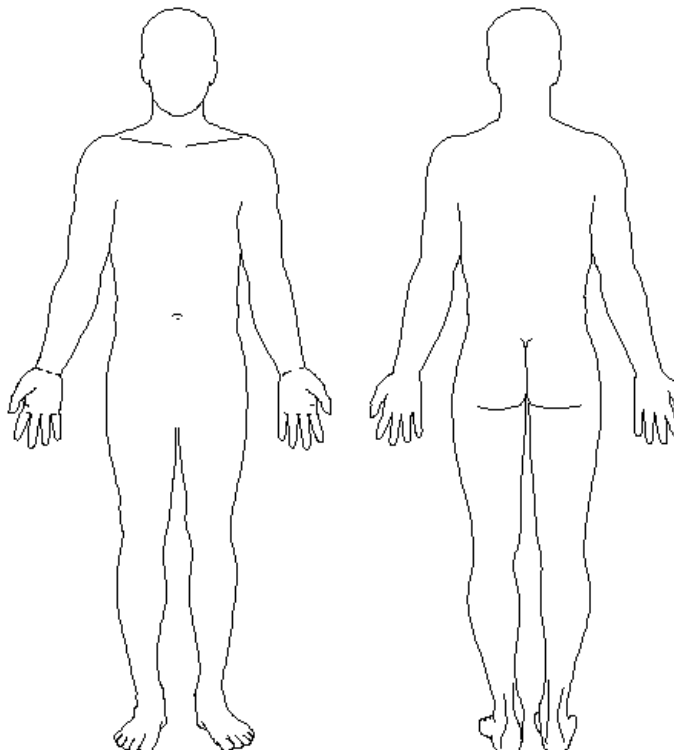
1. Mark areas of high level contamination as determined by survey on the chart below.
2. Record the initial survey results below.
3. Ensure that meter-to-skin distance is consistent in all surveys to minimize inter-survey errors.

Initial Survey Results: _____

Decontamination Cycle #1
Survey Results: _____

Decontamination Cycle #2
Survey Results: _____

The goal is to decrease external contamination to no more than 2 times background radiation level.





APPENDIX E

Confidential Pregnancy Declaration

In January, 1994, the Nuclear Regulatory Commission (NRC) issued a rule limiting fetal radiation dose received as a result of a pregnant worker's occupational exposure to 500 mrem in the gestation period¹. For this limit to apply, the regulation requires the woman to declare pregnancy in writing and give the estimated date of conception. If a woman chooses not to declare her pregnancy, the normal occupational dose limit of 5,000 mrem per year would be in effect with the provision to maintain occupational radiation exposure "as low as reasonably achievable" (ALARA)².

A woman working with radioactive material who decides to declare a pregnancy would do so by submitting this form to the Radiation Safety Office (RSO) or designee in the individual College and, at the woman's discretion, to her supervisor. As required by law³, the University maintains this declaration and any dose records to the embryo/fetus with those of the declared pregnant worker, which are protected from public disclosure. This notification will initiate a process by which the RSO will assess potential doses, evaluate potential exposures from ionizing radiation, and review the individual's radiation exposure history. If this process identifies exposure potential to the embryo/fetus that is not in concert with the ALARA Plan, the individual will be contacted, even if the Declaration Form did not request consultation with the RSO. Recommendations on minimizing radiation exposure may be made on an individual basis after this review.

Anyone with questions relating to radiation protection measures for the embryo/fetus, the Radiation Protection Program or procedures on the declaration of a pregnancy is encouraged to contact the Radiation Safety Office at 469-5592 (or extension 5592) or the college/department Radiation Safety Liaison.

1 - The Code of Federal Regulations, Standard for Protection Against Radiation 10 CFR 20.1208

2 - *ibid* 10 CFR 20.1003

3 - *ibid* 10 CFR 20.2106

To _____:

In accordance with the NRC's regulations at 10 CFR 20.1208, "Dose to an Embryo/Fetus," I am declaring that I am pregnant. I believe I became pregnant in _____ (only the month and year need be provided).

I understand the radiation dose to my embryo/fetus during my entire pregnancy will not be allowed to exceed 0.5 rem (5 millisievert) (unless that dose has already been exceeded between the time of conception and submitting this letter). I also understand that meeting the lower dose limit may require a change in job or job responsibilities during my pregnancy.

Date: _____

From (print): _____ **Signature:** _____

Employee/Student ID No. _____ **College/Department** _____

Telephone: _____ **Social Security Number:** _____
(last 4 digits only)

Place this form in an envelope, seal it closed, write the word "Confidential" on the outside of the envelope and then submit it to:

Student-Employee Health
Western University of Health Sciences
309 E. Second St.
Pomona, CA 91766-1854



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APPENDIX F

Pregnancy Consultation Record

Date of Consultation: _____

I had the opportunity to review the risks of working with radiation while pregnant and have received a copy of the US Nuclear Regulatory Commission (NRC) Regulatory Guide 8.13. I have also been given a copy of the University's ALARA policy, which includes safe practices when working with or around radioactive material. I understand that a copy of any of my radiation exposure records must be provided to the Radiation Safety Officer for review.

I was given an opportunity to ask questions and receive answers to my satisfaction. My signature below confirms that I will comply with all of the University's Radiation Safety policies and protocols.

Declared Pregnant Woman's Name (print): _____

Declared pregnant Woman's Signature: _____

Radiation Safety Officer's Name (print): _____

Radiation Safety Officer's Signature: _____

Appropriate Use of Fetal Monitoring Device

Wearing your new device: In addition to the individual monitoring device you already have, the fetal device is to be worn at your waist *underneath* your apron whereas your normal monitoring device should continue to be worn at your collar level on the *outside* of your apron. This change in monitoring, as well as the associated dose restrictions, will remain in effect until you complete a Request for Withdrawal from Confidential Pregnancy Declaration form and submit it to Student-Employee Health.

Maximum exposure limits: for protection of the embryo/fetus of a declared pregnant woman, the dose to the fetus shall remain less than 500 mrem (0.5 rem) during the entire pregnancy. The fetus is very sensitive to high doses of ionizing radiation especially during the first three months of fetal development.

What to do now:

- Read your new fetal monitoring device immediately upon receipt.
- Wear your fetal monitoring device as directed above.
- Read your fetal monitoring device monthly.
- Contact the appropriate departmental representative or Student-Employee Health immediately if you have any questions.
- Limit your exposure to all forms of ionizing radiation until your pregnancy is complete.
- Complete and return the Request for Withdrawal from Confidential Pregnancy Declaration form and the monitoring device to the appropriate departmental representative or Student-Employee Health when your pregnancy is complete.



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APPENDIX G

Request for Withdrawal from Confidential Pregnancy Declaration

I no longer wish to be monitored under the lower dose limit for declared pregnant status. I understand that I must continue to comply with the ALARA policy of the University if I continue to work with or around radioactive material.

I understand that I will be notified by the Radiation Safety Office when I have been removed from the monitoring program.

Name (printed)

Social Security Number (last 4 digits only)

College/Department _____

Signature _____

Place the form in an envelope, seal it closed, write the word "Confidential" on the outside of the envelope and then submit it to:

Student-Employee Health
 Western University of Health Sciences
 309 E Second Street
 Pomona, CA 91766-1854



APPENDIX H

RADIATION SAFETY MANUAL RECEIPT FORM

To: Radiation Safety Officer, WesternU

I hereby certify that I have received a copy of the WesternU Radiation Safety Manual. As an individual using or having the responsibility for the use of radiation, I have read and agree to comply with all sections of the Manual pertinent to me. I understand that failure to follow the procedures in the Manual may result in my being prohibited from working with radiation.

Signature: _____

Print Name: _____

Date: _____

Acknowledgement by Radiation Safety Officer
Donald E. Walters, Ph.D.4-37