

**California Polytechnic State University  
San Luis Obispo**

**Radiation Safety Manual**

Revised February 2019, April 2019  
Reviewed, revised November 2018  
Original: November 2016

## **1. ADMINISTRATIVE PROCEDURES AND RESPONSIBILITIES**

The purpose of the Radiation Safety Program is to assure the safe use of ionizing radiation through training, consultation, and surveillance consistent with government regulations. The Radiation Safety Program will be reviewed for effectiveness on an annual basis. Records of audits, self-assessments, peer assessments, or similar review processes can be used singly or in combination to satisfy the annual review requirement.

Sources of radiation shall be secured from unauthorized removal or use through the use of locked storage. Locked storage includes safes, locking cabinets, or locked rooms or enclosures. Access to keys to radioactive materials storage is strictly controlled by the Radiation Safety Officer (RSO) or designated Authorized Users (see Section 2.2)

The California Polytechnic State University, San Luis Obispo, (hereinafter referred to as “CPSU”) Radiation Safety Manual sets the standards of operations for the Radiation Safety Program. This guide is prepared for Authorized Users as an aid in complying with the University’s License for use of radioactive materials.

Requests for records should be directed to:

California Polytechnic State University  
Office of Environmental Health & Safety  
Building 80  
San Luis Obispo, CA 93407

## **2. DEFINITIONS**

### **2.1. Radiation Safety Officer (RSO)**

The Radiation Safety Officer (RSO) is responsible for the review of campus performance with respect to University and campus policies on radiation and radiation protection, and for informing management of program issues. The RSO is assigned the responsibility for surveillance of departmental activities and for providing services in radiation safety in conformity with policies and standards set forth in this manual. The RSO is part of the Department of Environmental Health and Safety. The RSO is responsible for all aspects of radiation control on the campus. Each application for use of radiation is reviewed and approved by the RSO. See Appendix A for the full duties of the RSO.

Radiation Safety Officer, Vivian Longacre, 805-756-6628

appointed 12/7/2016

### **2.2. Authorized User**

The Authorized User is personally responsible for compliance with campus and governmental regulations as they pertain to the authorized use of ionizing radiation for the authorization they are issued. The Authorized User must be qualified by training and experience, as determined by the RSO. The Authorized User shall provide a copy of their Radiation Use Authorization (RUA) to each coworker and ensure that each person has received training appropriate to the level of operations carried out prior to the first use of radioactive materials or entry into areas restricted by the licensee to protect individuals from exposure to ionizing radiation. The Authorized Users must ensure that each individual on that RUA has read the appropriate sections of the Radiation

Safety Manual and their respective RUA.

Specific responsibilities include:

- A. Instructing all personnel listed on the Radiation Use Authorization (RUA), in good radiation safety practices prior to their entry into restricted areas including:
- B. Control and measurement of contamination.
- C. Proper use of protective clothing and equipment.
- D. Operating and emergency procedures specific to their tasks.
- E. Proper maintenance of records on receipt, use, transfer, and disposal.
- F. ALARA (as low as reasonably achievable) considerations and goals.
- G. Ensuring that only work authorized by the approved RUA is carried out.
- H. Ensuring that operations involving radioisotopes or radiation producing machines are performed by properly trained and authorized personnel.
- I. Maintaining records of receipt, transfer current inventory, and disposal of all radioactive materials.
- J. Maintaining records of radiation fields and contamination monitoring.
- K. Posting warning labels, guidelines, and other appropriate postings as requested by the Environmental Health and Safety Office. See Appendix D for required postings.
- L. Notifying the Environmental Health and Safety Office of all changes in the RUA such as changes in location, personnel, experiments, etc.
- M. Notifying the Environmental Health and Safety Office immediately in the case of an accident involving radiation or potential excessive exposure.
- N. Ensuring the use of personnel dosimetry and survey instruments as applicable.

### **2.3. Audits or Reviews**

Reviews of radioactive material use areas (e.g. laboratories, storage areas) should be performed at least annually by the RSO.

Radioactive material use areas that are considered part of a field study or a temporary work area should be assessed at least once while work is in progress.

### **2.4. Records**

The records maintained by the Environmental Health and Safety Office are classified as First Class Records and are considered vital as stated in the CPSU Vital Records Protection Plan.

### **3. LICENSE REQUIREMENTS**

#### **3.1. University Broad Scope License**

The University possesses a specific license of broad scope issued by the State of California, Department of Health Services in agreement with the U.S. Nuclear Regulatory Commission, which authorizes the use of radionuclides for education and research. The License can be reviewed at the Environmental Health and Safety Office. The License describes the possession limits for each radionuclide and location for use, and provides for the internal issuance of Radiation Use Authorizations (RUAs). The Environmental Health & Safety Office shall make requests for amendments to the License. Authorized activities, unless expressly noted otherwise, shall take place in facilities or on property owned or otherwise controlled by CPSU. Activities, such as field studies, shall be clearly identified so that additional, special controls can be specified.

#### **3.2 RUA for Research Use**

Application for RUA and a Statement of Training and Experience ([RH 2050 A](#)) are required. All completed applications and forms are to be submitted to the RSO. The application must include the following:

- A. All locations of use
- B. Names of individuals who will use the material
- C. Isotopes, activity per use, per order, possession limit for each
- D. Description of use
- E. Special hazards (ex. volatile or dispersible)
- F. Availability of safety equipment, such as shielding, ventilation equipment, survey meters etc.

#### **3.3 RUAs for Classroom Use**

RUAs are issued for the use of radioactive materials for teaching or demonstration in academic courses. Such applications shall be submitted for review and approval to the RSO at least two weeks prior to the commencement of the quarter in which radionuclide use is desired. An RUA must be renewed by the RSO if there is any change in the isotope, quantity, or procedures. The following information is required to supplement the standard RUA:

- A. Laboratory personnel in charge of the course/lab.
- B. Availability of safety equipment, such as shielding, ventilation equipment, survey meters etc.
- C. Number and type of monitoring instruments needed for routine use in the Laboratory.
- D. Descriptions of Proposed use and procedures for each isotope stated on the application, including:
- E. Radiation Safety instruction for students; and
- F. Extent to which students will be handling isotopes.

#### **3.4 Submission of RUA Applications for Approval**

The completed application shall be sent to the RSO who will evaluate the Statement of Training and Experience, hazards of the work, and safety protocols (see Section 3.6).

### 3.5 RSO Review

The RSO reviews the completed application form and conducts a detailed review of the proposed project. Normally this review includes a personal interview with the applicant and an inspection of the proposed workplace(s). Where applicable, the following specific factors are evaluated and recorded in a project analysis:

- Training and experience of the applicant and assistants.
- The radioisotope, its activity, and its chemical and physical form.
- Experimental protocol and specific methods for conducting the phase of the experiment involving radioactive materials or ionizing radiation.

Safety requirements for the RUA are set by the RSO, based on the evaluation (use of fume hoods or other effluent containment, use of shielding, dosimetry requirements, and special procedures. The workplace is evaluated with respect to:

- A. Storage facilities, security
- B. Hoods, glove boxes, other special equipment
- C. Effect of radiation use on surrounding areas
- D. Housekeeping levels in proposed areas
- E. Waste disposal
- F. Storage and labeling
- G. Environmental control:
- H. Monitoring methods, frequency, and records
- I. Radiation detection equipment
- J. ALARA: Appropriate quantities and procedures to keep occupational and public radiation doses as low as reasonably achievable

As part of the review, the RSO discusses campus radioactive waste-minimization methods and makes suggestions for waste reduction under the RUA. The user is provided information on the segregation, labeling, packaging, and pickup of radioactive wastes.

### 3.6 Approval of RUA

Prior to use of radionuclides all applications must be approved by the RSO. Hazard rating categories are based on the criteria listed below. All radiation safety costs shall be borne by the researcher. Such costs shall include:

- A. New construction or major alterations;
- B. Acquisition of special monitoring equipment;
- C. Off-campus waste disposal as determined by the Environmental Health and Safety Office.

RUAs are approved for 3 years.

### 3.7 Renewal of RUAs

The RUA will be renewed if work on the project is to be continued. A re-evaluation of the project will be performed by the RSO, with respect to the items listed in the initial evaluation and the compliance record.

### **3.8 Amendments to the RUA**

All amendment requests must be submitted in writing to the RSO. Any change in personnel, protocols, locations, isotopes, or activities of the radionuclides used will require an amendment. An evaluation will be made per Section 3.5 and an amended RUA will be issued.

### **3.9 Termination of RUA**

Any applicant found to be willfully or negligently violating any of the CPSU, State, or 10CFR30.10 of the NRC regulations governing the use of radionuclides may have their RUA suspended or revoked by the RSO, and any radionuclides in their possession will be transferred to the possession of the Radiation Safety Officer. The applicant has the right to appeal this decision. RUAs will ordinarily be terminated upon:

- A. completion of project;
- B. expiration of RUA without renewal.

Upon termination of an RUA, all radionuclides must be accounted for. Unused amounts must be transferred to another active RUA or disposed of as Radioactive Waste.

## **4. ACQUISITION, TRANSFERS, AND DISPOSAL**

### **4.1 Procurement Policy**

All purchases of radioactive materials shall be accomplished through established campus purchasing channels and with the approval of the Radiation Safety Officer and by the RSO.

### **4.2 Purchasing Procedure**

Purchases shall only be initiated by the RSO. An email will be sent by the requestor at least 30 days of when the material is required to the Radiation Safety Officer. The email will include the following information:

- A. Indicate the identity, part number, vendor and amount of radioactive material desired.
- B. A copy of the RUA.
- C. Indicate any special instructions for shipping and handling.
- D. Indicate the account that the purchase will be charged to after it is received by Environmental Health and Safety (RSO).

Purchase endorsements will not be approved if the requested radionuclides and amounts are not identified on the RUA or if purchase of the requested radionuclide would exceed license-based possession limits as determined by the Radiation Safety Officer.

### **4.3 Delivery of Radionuclides**

Receiving Procedures are as follows:

- A. Radioactive Materials are received at the CPSU warehouse and at the CPSU Corporation Receiving Department.
- B. Upon receipt of any radioactive materials bearing the U.S. Department of Transportation labels (White I or Yellow II or Yellow III) and, for Yellow 2 or Yellow 3 packages, a corresponding Transport Index (1 to 10), the RSO is notified.
- C. Within 3 hours of receipt during normal business hours or within 3 hours of the start of business when a package is received after normal working hours the Radiation Safety personnel perform a visual inspection of any labeled package to evaluate the condition of the shipping container and perform a radiation survey (reference 10CFR20.1906).
- D. Shipping receipts or bills of lading are checked to verify contents.
- E. The package is opened and the radioactive material is surveyed to determine radiation levels. The source is leak-tested if required and added to the campus inventory. The package is then delivered by the Radiation Safety Personnel to the user lab.
- F. Upon completion of checking the package containing radioactive material, the material then becomes the responsibility of the Authorized User. The Authorized User is responsible for the safe use and storage as required.
- G. Should any radioactive material arrive over the weekend or at night, the University Police are instructed to receive it unopened and place it in the Environmental Health and Safety Office until the RSO is notified.

### **4.4 Custody of Radioactive Materials**

The users named on the RUA shall be continuously responsible for the custody of any radioactive material acquired under the RUA. They shall be responsible for the proper storage, labeling, inventory, accounting, use, and disposal of the material. The licensee shall also be responsible for documenting spills or mishaps that may be important in the formulation of

decommissioning plans.

#### **4.5 All Shipments of Radioactive Material Must Be Specifically Approved by the RSO**

All packaging and labeling of shipping containers must conform to the Department of Transportation regulations contained in 49CFR173 and any other appropriate regulations. The Environmental Health and Safety Office must be consulted for the appropriate regulations prior to shipping. After proper packaging and approval, shipments shall be made through the State Warehouse or the Foundation Warehouse Shipping and Receiving. Special arrangements may be made with the RSO where applicable control shipments are made by outside professional agencies or Institutes. Improper packaging, labeling, and certification can result in a monetary fine from the Department of Transportation as well as a citation from the State Department of Health Services.

#### **4.6 Transfer of Radioactive Materials**

Radioactive materials shall not be transferred from any person, department, or project to another without specific, prior approval of the RSO. This includes transfers to other licensees. A copy of the receiver's license to which transfer is being made must be reviewed prior to completing such a transaction. The shipping procedures shall comply with the Department of Transportation regulations.

#### **4.7 Radioisotope Inventory**

Inventory shall be determined once per year. For RUAs receiving material, the RSO will update the campus inventory before delivery. All RUA holders must keep proper inventory of radioactive material in their possession and report any change in inventory to the RSO.

#### **4.8 Radioactive Waste Disposal Policy**

All potentially contaminated material must be disposed of as radioactive waste.

Radioactive waste must be stored in approved containers and sealed prior to pickup by the Radiation Safety Staff. The following labeling will be used to comply with campus regulations:

- A. All containers must be labeled with a "Caution (or Danger)-Radioactive Materials" label indicating the isotope(s), amount (activity), and date of assay.
- B. Liquid waste containers shall additionally identify the chemical composition present.

The Authorized User is responsible for verifying the chemical compatibility of all solutions placed in the liquid waste container.

No Authorized User will be authorized by the RSO to generate radioactive waste unless provisions are in the research grant or department funding to pay for off campus waste disposal. See Section 4.11 on how to deal with off campus waste disposal.

#### **4.9 Radioactive Waste Containers**

ALL radioactive waste material shall be contained as follows:

##### **A. Dry Waste:**

1. All dry waste must be deposited in a two-cubic foot box or another container approved by the Environmental Health and Safety Office
2. Each box must be lined with a clear plastic bag.
3. Vials containing liquid are not to be discarded into the dry waste.
4. Needles must be placed in an impermeable, approved sharps container prior to being



- placed into dry waste.
5. Short radiological half-life radionuclides (half-life of less than 90 days) shall be segregated.
  6. Radioactive labels shall be defaced prior to putting them in the dry waste.
- B. **Aqueous Liquid Waste Only:** Absorbed liquid waste shall be put into 1 gallon jugs or other suitable intermediate containers approved by the Environmental Health and Safety Office. Short-life radionuclides with a physical half-life of less than 90 days shall be segregated.
- C. **Scintillation Vials:** Full vials are to be placed in the original honeycomb containers in which they were received.
- D. **Animal Carcasses:** Individual researchers shall have access to freezer storage for animal carcasses with the scheduled waste collection date. Notify the Environmental Health and Safety Office when you have animal carcasses for disposal. Special arrangements for disposal of large animal carcasses must be made with the Environmental Health and Safety Office prior to administering radioactive materials.

#### 4.10 Disposition of Radioactive Waste

The Environmental Health and Safety personnel will pick up all waste. The containers must be properly labeled and sealed. Twenty-four (24) to forty-eight (48) hour notification should be given to allow time for pickup of containers. Modes of disposal may include:

- A. Disposal through the Sanitary Sewer: Disposal of liquid radioactive waste through the sanitary sewer system is prohibited unless specifically approved by the RSO. If approved, the Authorized User shall limit the concentration of any radionuclide released to sewers to those values tabled in 10CFR20 Appendix B, Table 3. Releases will be intermittent batch releases and not continuous releases. Therefore, monthly averaging provisions are satisfied by assuming a default 5 gallons (18,926.5 ml) of dilution flush water is used per occasion. The activity of a radioactive waste approved for disposal by release to sewers shall be limited such that the following expression is satisfied:

10CFR20 App B, Table 3 value  $\geq$   $\mu\text{Ci}$  for release / 18926 ml

Example:

Phosphorus-32 Table 3 value =  $9 \text{ E-}5 \text{ } \mu\text{Ci/ml}$

Dilution flush water = 18926 ml

$X \text{ } \mu\text{Ci} / 18926 = 9 \text{ E-}5 \text{ } \mu\text{Ci/ml}$

Max activity =  $9 \text{ E-}5 \text{ } \mu\text{Ci/ml} * 18926 \text{ ml}$

Max activity =  $1.7 \text{ } \mu\text{Ci}$

Other dilution flush volumes may be prescribed at the discretion of the RSO.

- B. Disposal by Burial: Disposal by burial on site is prohibited.
- C. Unusual Radioactive Waste Disposal Problems. The RSO will assist in the development of disposal for unusual wastes or wastes with off-normal composition or configuration. The method must be developed and defined on the RUA.

#### **4.11 Off Campus Waste Disposal**

The Environmental Health & Safety Office will collect all radioactive waste from individual laboratories where waste is generated by the RUAs. These wastes shall be stored in the central Radioactive Waste Storage facility located at the Radiation Safety laboratory. The Radioactive Waste Storage Building is locked and only authorized personnel are allowed access. When stored radioactive waste accumulates enough to warrant off campus disposal, Environmental Health and Safety or an authorized Radioactive Waste contractor shall do the packaging and shipping.

Personnel involved in the packaging and transport of radioactive materials shall be trained in accordance with 49CFR – Subpart H -172.702. Training topics include the general provisions of the transportation regulations, identification of hazardous materials, specific requirements for radioactive material transport, emergency response information, self-protection measures and accident prevention methods.

If approved by the Radiation Safety Officer, byproduct material with a physical half-life of less than 120 days may be held for decay-in-storage before disposal without regard to its radioactivity if:

- A. Byproduct material is monitored at the surface before disposal and it is determined that the radioactivity cannot be distinguished from the background radiation level with an appropriate radiation detection survey meter set on its most sensitive scale and with no interposed shielding; and
- B. All radiation labels are obliterated or removed, except for radiation labels on materials that are within containers and that will be managed as biomedical waste after they have been released from the licensee.

A licensee shall retain a record of each disposal permitted under paragraph (A) of this section in accordance with 10 CFR35.2092.

The above specified determination and subsequent release of material from decay in storage will not be approved by the Radiation Safety Officer until a period equal to 10 times the longest radiological half-life of radioactive materials contained in the mixture has elapsed.

No RUA will be authorized by the RSO to generate radioactive waste unless provisions are in the research grant or department funding to pay for off campus waste disposal.

## 5. EXPOSURE STANDARDS AND DOSIMETRY

### 5.1 Radiation Exposure Goals

The California Polytechnic State University goal is to maintain human radiation exposure levels to as low as reasonably achievable (ALARA). The annual exposure limits for personnel over the age of 18 years are shown in table 5.1. Minors are not allowed to work with radioactive material unless special permission is given by the RSO (projected dose within limits for the general public)

**Table 5.1 - Annual Limits**

Total Effective Dose Equivalent (TEDE)	5 rem (0.05 Sv)
Sum of the Deep Dose ( $H_d$ ) and Committed Dose Equivalent (CDE, $H_{T-50}$ ) to any Individual Organ or Tissue (except the lens of the eye)	50 rem (0.5 Sv)
Lens of the Eye (LDE)	15 rem (0.15 Sv)
Skin (Shallow Dose, $H_s$ )	50 rem (0.5 Sv)
Extremities	50 rem (0.5 Sv)

The administrative goals for annual exposure are shown in table 5.2.

**Table 5.2 - Administrative Goals for Annual Exposure**

Total Effective Dose Equivalent (TEDE)	3 rem (0.03 Sv)
Sum of the Deep Dose ( $H_d$ ) and Committed Dose Equivalent (CDE, $H_{T-50}$ ) to any Individual Organ or Tissue (except the lens of the eye)	10 rem (0.1 Sv)
Lens of the Eye (LDE)	5 rem (0.05 Sv)
Skin (Shallow Dose, $H_s$ )	10 rem (0.1 Sv)
Extremities	10 rem (0.1 Sv)

The exposure limit for an embryo / fetus, due to tasks or activities performed by a declared pregnant woman shall not exceed 0.5 rem (500 milli-rem) during the entire pregnancy. The Radiation Safety Officer or Authorized User shall make efforts to avoid substantial variation above a uniform monthly exposure rate to a declared pregnant woman so as to satisfy the limit of 500 milli-rem.

The dose to an embryo/fetus shall be taken as the sum of:

- A. The deep-dose equivalent to the declared pregnant woman; and
- B. The dose to the embryo/fetus from radionuclides in the embryo/fetus and radionuclides in the declared pregnant woman.

If the dose to the embryo/fetus is found to have exceeded 0.5 rem (5 mSv), or is within 0.05 rem (0.5 mSv) of this dose, by the time the woman declares the pregnancy to the licensee, the licensee shall be deemed to be in compliance with paragraph (a) of this section if the additional dose to the embryo/fetus does not exceed 0.05 rem (0.5 mSv) during the remainder of the pregnancy. *The declaration of pregnancy by a female employee to the radiation safety officer is an individual choice of the employee.* For more information, see NRC guidance in Appendix B: Instruction Concerning Prenatal Radiation Exposure.

### **5.7 Dosimetry and Bioassay**

Bioassay and other internal dose assessment techniques should be initiated in all cases where it is known or suspected that an individual has received an uptake of radioactive material in excess of 10% of the applicable Annual Limit on Intake (ALI) for any single radionuclide or mixture of radionuclides.

Likewise dosimetry will be issued if it is known or suspected that an individual will receive exposure in excess of 10 per cent of any limit. Typically dosimetry is issued for routine use of millicurie amounts of high-energy beta-gamma emitters, material or sealed sources. Any radiation worker may request dosimetry.

### **5.4 Personnel Exposure Records**

Personnel exposure data shall be part of the permanent records of Environmental Health and Safety Office including Radiation Exposure Record (Form 10, 10A and/or 10B), TLD Ring Exposure Record (Form 11), and any related documents furnished by outside contractors for film badges and TLD rings. Upon written request by any employee or student, Environmental Health and Safety will provide a copy of the individual's exposure history. In addition, in any case where exposures of an individual to radiation must be reported to the NRC and/or the State Department of Health Services pursuant to regulations, such individuals will be notified in writing of the nature and extent of their exposure. Previous exposure history requirements and personnel notification of routine exposure will be followed according to State regulations.

### **5.5 Exposures**

The RSO must be notified immediately if any person is known or suspected of receiving internal or external exposure to radiation in excess of the limits specified in table 5.1.

## 6. RADIATION PROTECTION REQUIREMENTS

### 6.1 Inventory of Radioactive Materials/Leak Tests

A central inventory of radioactive material on campus is maintained by the RSO. Each user must keep reasonable records of the amounts and kinds of radioactivity under his supervision so that the central inventory may be updated. The RSO or designee, in accordance with 17 CCR 30275, twice yearly on sources other than those listed in table 6.1, shall do leak tests of sealed sources.

**Table 6.1 Sources Exempted From Twice Yearly Leak Testing**

Tritium (H-3)
Krypton-85 (Kr-85)
Source Material
Sources containing radioactive material with a half life of <b>30 days or less</b>
Sources of <b>beta and/or gamma</b> emitting radioactive material with an activity of <b>100 micro-curies</b> or less
Sources of <b>alpha and/or neutron</b> emitting radioactive material with an activity of <b>10 micro-curies</b> or less
Sources of beta and/or gamma emitting radioactive material which are not in use and which are securely stored and labeled as not to be used. These sources shall be leak tested prior to returning to service.

No source will be put into use unless it has been certified by the manufacturer as having passed a leak test or the Radiation Safety Officer has confirmed a leak test.

Contamination and leak tests shall be capable of determining the presence of 0.005 micro-curies of removable contamination.

### 6.2 Storage of Radioactive Materials

Radioactive materials shall be stored so as to prevent unauthorized access or removal from their place of storage. The Storage shall not create a “radiation area”(see below) and will be shielded or sealed to keep exposures as low as reasonably achievable.

### 6.3 Posting and Labeling

Rooms in which radioactive materials are used or stored shall be posted with a sign bearing the radiation symbol and “*caution (or danger)- radioactive material*”.

- A. **Areas** in which there exists a radiation level in excess of 5 milli-rem per hour shall be posted with a sign bearing the radiation symbol and “*caution (or danger)- radiation area*”.
- B. **Areas** in which there exists a radiation level in excess of 100 milli-rem in 1 hour at 30 centimeters (1 foot) shall be posted with a sign bearing the radiation symbol and “*caution (or danger)-high radiation area*”
- C. **Containers** holding radioactive materials for storage or during processing and use shall be clearly labeled with a sign bearing the radiation symbol and “*caution (or danger)- radioactive material*”, and shall state the quantities and identify the isotope and the date.
- D. “Notice to Employees” State of California Form RH-2364 shall be posted permanently

and conspicuously in all areas where work with radioactive materials or radiation producing machines is being carried out.

#### **6.4 Protective Clothing**

Personnel working with open sources of radioisotopes must wear protective garments. Open-toed shoes and sandals are not permitted. The usual laboratory coat and disposal gloves are considered minimum fulfillment of this requirement. Persons working with greater than 1 mCi of an open source of radioactivity must cover their legs with pants or garment to protect them against absorption of radioactivity in the case spill. Additional protective garments may be required by the RSO. The RSO may grant exceptions.

#### **6.5 Storage and Consumption of Food and Smoking**

The storage and consumption of food and smoking are prohibited in locations authorized for the storage and use of radioactive materials except in designated “clean areas.” Upon the request of the Authorized User, clean areas will be posted by the Environmental Health and Safety Office after a critical evaluation of the potential for maintaining the area free of radioactive contamination.

Approval of the “clean area” will depend in part on the radioisotopes, amounts, physical forms as well as the types of operations being conducted.

Refrigerators used for storage of radioactive materials shall not be used for storage of food and beverages.

#### **6.6 Personal Hygiene**

Mouth pipetting is not permitted while working with radioactive materials. Personnel completing the manipulation of radioactive materials shall wash their hands thoroughly before leaving the laboratory.

#### **6.7 General Monitoring**

Immediately following the use of unsealed radioactive materials, personnel directly involved with the project shall monitor the work area and equipment for contamination and radiation fields. At minimum, wipe tests must be done once every month if work with unsealed radioactive material has been carried out. Clean up criteria (clean and retest) is 200 dpm/100 square centimeters. The results of radiological monitoring must be kept for subsequent review by the Radiation Safety Office and/or by the State Department of Health Services. Documented monitoring results may be required more frequently at the discretion of the RSO.

Some RUAs require the use of survey instruments. These instruments shall be continuously available for routine monitoring and for hazard surveys following a radiation incident. These instruments shall be calibrated at least annually or following repair by an accredited calibration service.

## 6.8 Monitoring by Radiation Safety

Radiation Safety shall conduct periodic surveys of all areas in which significant quantities of radioactive materials may be present, and institute or recommend appropriate corrective measures in cases where contamination, dose rates or other sources of potential hazards are detected.

## 6.9 Animal Use

### A. Caging and Labeling:

Small animals given radioactive materials shall be caged separately from non-radioactive animals. Cages shall be labeled with appropriate radiation warning signs. Information on the label shall include the name of the Authorized User responsible for the experiment, the radioisotope, quantity, and date of administration. Special arrangements through Environmental Health & Safety will be required prior to relocation of any such animals.

### B. Contamination Control:

Radioactive excreta, animal carcasses and tissue, contaminated cage bedding, etc., must be handled in accordance with radioactive waste disposal procedures. Projects likely to produce large quantities of waste or involving unusual contamination potentials will be reviewed by the RSO prior to the start of work to assure that facilities are adequate.

### C. Instruction of Caretakers:

Authorized Users are responsible for assuring that animal caretakers and custodians are aware of potential hazards and are adequately trained and supervised in the observance of necessary precautions.

## 6.10 Safe Work Practices

The following rules of good radiation protection practice should be scrupulously observed by all radiation workers to prevent unnecessary radiation exposure and minimize contamination.

1. Wear lab coats and impermeable gloves when working with unsealed radioactive material.
2. Work with radioactive material in an exhaust-ventilated enclosure when required.
3. Store and transport containers of radioactive solutions in closed containers on trays or tubs that will hold the contents of the primary container in the event of breakage.
4. Line trays and working surfaces with absorbent paper with an impermeable backing.
5. Clearly label all containers of radioactive material and post all radiation and storage areas with the standard radiation warning symbol. Labels on containers should bear the legend, "**Caution - Radioactive Materials**", preferably with an indication of the nuclide and quantity of radioactive material. Placards for posting of radiation and storage areas should bear the legend, "Caution- Radioactive Materials". Areas with a radiation level exceeding 5 mR/hr at 1 foot must have appropriate labeling. Contact the RSO for assistance.
6. Use remote handling tools when needed to reduce hand exposure (P-32, gamma emitters).
7. Shield stored P-32 and gamma emitters appropriately.

8. Always use assigned dosimeters when handling material requiring them.
9. Conduct work with radioactive material in accordance with written radiation safety and operating procedures.
10. Monitor work areas, hands and clothing during procedures and at the end of the day. Perform required periodic documented wipe and meter surveys.
11. Report and/or clean spills and contamination promptly.
12. Do not eat, drink, smoke or apply cosmetics in areas where unsealed radioactive materials are used.
13. Do not pipette by mouth.



## **7. TRAINING**

Title 17, California Code of Regulations, Section 30280, requires that a Licensee instruct his personnel regarding health and safety rules and problems applicable to the use of sources of radiation. Where re-training (refresher training) is specified and appropriate, the frequency will be annual unless otherwise specified.

### **7.1 Formal Training of new radiation users**

Training materials with tests and formal instruction by the RSO are required. The following topics are covered:

- A. Specific requirements under Cal Poly's License
- B. Annual dose limits.
- C. Radioactive material use area identification.
- D. Policy for exposure control for pregnant radioactive material users.
- E. Current applicable laws and regulations.
- F. Standards set by regulations and license conditions.
- G. Operating and emergency procedures.
- H. Current issues and experience relevant to a research or University setting.
- I. Applicable audit or corrective action items.
- J. The duty to report unsafe conditions.
- K. Topics considered timely and relevant by the RSO
- L. Radiations Basics

### **7.2 Refresher training**

Annual refresher training, when appropriate, should be presented by Authorized User (or RSO) and would include instruction in:

- A. Changes in regulations, State license conditions, RUA conditions and their consequences to the operations.
- B. Changes in operating procedures.
- C. Emergency procedures and problems.
- D. Lessons learned and corrective actions.

### **7.3 CPSU Employees**

The campus Injury and Illness Prevention Program (IIPP) assigns responsibility for safety training of campus faculty and staff to department chairs / heads and to Deans. Custodial or service personnel are provided training by the Authorized User or the RSO and are instructed on appropriate procedures for working in authorized areas.

## 8. RADIATION ACCIDENT PROCEDURE

For campus emergencies involving radioactive materials, the following is required.

### 8.1 For any spill or contamination detected outside the papered work area:

- A. Stop work, cover the area with paper or plastic to prevent spread. Use moist material for dry contamination.
- B. Warn others in the area and restrict movement.
- C. The RSO must be notified at ex 66628 immediately, during normal working hours. Call Ext. 62281 during other hours and have the police contact the RSO.
- D. Start monitoring personnel and have them remain in the area until the RSO arrives.
- E. If there is a potential inhalation hazard assemble in a safe area until the RSO arrives. Turn off the room ventilation, if possible, and close the windows and doors.

### 8.2 For fires and/or injuries involving radioactive materials:

- A. Call 911. Advise the Dispatcher of the involvement of radiation. Ask the Dispatcher to contact the RSO.
- B. It is the responsibility of the Dispatcher to notify the responding agency (Fire Department and/or ambulance) of the involvement of radioactive materials, however the person reporting the accident should remain near the scene and advise these agencies of any pertinent information concerning this involvement.

### 8.3 For minor spills of radioactive materials with no significant skin contamination or physical injuries (contamination only in the controlled, papered work area), the following procedures should be used to decontaminate experimental equipment and facilities:

- A. Monitor to determine the level and location of contamination.
- B. Mark off contaminated areas with radioactive caution tape.
- C. Dispose of anything that does not need to be reused into the radioactive waste. Clean items to be reused with appropriate decon material.
- D. Dispose of cleaning all material into the radioactive waste.
- E. Wipe items and release only if <200 dpm per 100 sq. cm. and non-detect with a meter.

For assistance in monitoring, contact the RSO.

The Regulatory Agency numbers are 916-327-5106 (State RHB Office) and 800-852-7550 (24-hour radiological emergency number)

## **APPENDIX A: RSO Duties and Responsibilities**

The RSO's duties and responsibilities include ensuring radiological safety and compliance with California and Federal NRC regulations and the conditions of the license. These duties and responsibilities include ensuring the following:

- Activities involving licensed material that the RSO considers unsafe are stopped
- Radiation exposures to personnel are ALARA
- Follows all applicable parts of 10 CFR Part 20 and dose investigational levels
- Up-to-date radiation protection procedures in the daily operation of the licensee's radioactive material program are developed, distributed, and implemented
- Possession, use, and storage of licensed material is consistent with the limitations in the license and the regulations
- Individuals installing, relocating, maintaining, or repairing devices containing sealed sources are trained and authorized by an NRC or Agreement State license
- Personnel training is conducted and is commensurate with the individual's duties regarding licensed radioactive material (initial and refresher training)
- Documentation is maintained to demonstrate that individuals are not likely to receive, in one year, a radiation dose in excess of 10% of the allowable limits or that personnel monitoring devices are provided
- When necessary, personnel monitoring devices are used and exchanged at the proper intervals, and records of the results of such monitoring are maintained. The results are given the employee at least annually.
- Licensed material is properly secured
- Documentation is maintained to demonstrate, by measurement or calculation, that the total effective dose equivalent to the individual likely to receive the highest dose from the licensed operation does not exceed the annual limit for members of the public
- Proper authorities are notified of incidents such as loss or theft of licensed material, damage to or malfunction of sealed sources, or fire (emergency phone numbers are kept current)
- Audits of the radiation protection program are performed at least annually and documented
- If violations of regulations, license conditions or program weaknesses are identified, effective corrective actions are developed, implemented, and documented
- Licensed material is transported in accordance with all applicable DOT requirements
- Licensed material is disposed of properly
- Appropriate records are maintained
- Up-to-date license is maintained, amendment and renewal requests are submitted in a timely manner
- Provide periodic on-site direct supervision over the implementation of the Radiation Safety Program in technical and administrative issues
- Dose records and surveys are reviewed quarterly to ensure safe operations, adequate staff training and engineering controls and to look for trends
- ALARA practices are being followed
- Ensure new users and uses of radioactive material are reviewed prior to first use

## **APPENDIX B: INSTRUCTION CONCERNING PRENATAL RADIATION EXPOSURE**

Adapted from: U.S. NUCLEAR REGULATORY COMMISSION REGULATORY GUIDE 8.13  
(Draft was issued as DG-8014)

### **A. INTRODUCTION**

The Code of Federal Regulations in 10 CFR Part 19, "Notices, Instructions and Reports to Workers: Inspection and Investigations," in Section 19.12, "Instructions to Workers," requires instruction in "the health protection problems associated with exposure to radiation and/or radioactive material, in precautions or procedures to minimize exposure, and in the purposes and functions of protective devices employed." The instructions must be "commensurate with potential radiological health protection problems present in the work place."

The Nuclear Regulatory Commission's (NRC's) regulations on radiation protection are specified in 10 CFR Part 20, "Standards for Protection Against Radiation"; and 10 CFR 20.1208, "Dose to an Embryo/ Fetus," requires licensees to "ensure that the dose to an embryo/fetus during the entire pregnancy, due to occupational exposure of a declared pregnant woman, does not exceed 0.5 rem (5 mSv)." Section 20.1208 also requires licensees to "make efforts to avoid substantial variation above a uniform monthly exposure rate to a declared pregnant woman." A declared pregnant woman is defined in 10 CFR 20.1003 as a woman who has voluntarily informed her employer, in writing, of her pregnancy and the estimated date of conception.

This regulatory guide is intended to provide information to pregnant women, and other personnel, to help them make decisions regarding radiation exposure during pregnancy. This Regulatory Guide 8.13 supplements Regulatory Guide 8.29, "Instruction Concerning Risks from Occupational Radiation Exposure" (Ref. 1), which contains a broad discussion of the risks from exposure to ionizing radiation.

Other sections of the NRC's regulations also specify requirements for monitoring external and internal occupational dose to a declared pregnant woman. In 10 CFR 20.1502, "Conditions Requiring Individual Monitoring of External and Internal Occupational Dose," licensees are required to monitor the occupational dose to a declared pregnant woman, using an individual monitoring device, if it is likely that the declared pregnant woman will receive, from external sources, a deep dose equivalent in excess of 0.1 rem (1 mSv). According to Paragraph (e) of 10 CFR 20.2106, "Records of Individual Monitoring Results," the licensee must maintain records of dose to an embryo/fetus if monitoring was required, and the records of dose to the embryo/ fetus must be kept with the records of dose to the declared pregnant woman. The declaration of pregnancy must be kept on file, but may be maintained separately from the dose records. The licensee must retain the required form or record until the Commission terminates each pertinent license requiring the record.

The information collections in this regulatory guide are covered by the requirements of 10 CFR Parts 19 or 20, which were approved by the Office of Management and Budget, approval numbers 3150-0044 and 3150-0014, respectively

## **B. DISCUSSION**

As discussed in Regulatory Guide 8.29 (Ref. 1), exposure to any level of radiation is assumed to carry with it a certain amount of risk. In the absence of scientific certainty regarding the relationship between low dose exposure and health effects, and as a conservative assumption for radiation protection purposes, the scientific community generally assumes that any exposure to ionizing radiation may cause undesirable biological effects and that the likelihood of these effects increases as the dose increases. At the occupational dose limit for the whole body of 5 rem (50 mSv) per year, the risk is believed to be very low.

The magnitude of risk of childhood cancer following in utero exposure is uncertain in that both negative and positive studies have been reported. The data from these studies "are consistent with a lifetime cancer risk resulting from exposure during gestation which is two to three times that for the adult" (NCRP Report No. 116, Ref. 2). The NRC has reviewed the available scientific literature and has concluded that the 0.5 rem (5 mSv) limit specified in 10 CFR 20.1208 provides an adequate margin of protection for the embryo/fetus. This dose limit reflects the desire to limit the total lifetime risk of leukemia and other cancers associated with radiation exposure during pregnancy.

In order for a pregnant worker to take advantage of the lower exposure limit and dose monitoring provisions specified in 10 CFR Part 20, the woman must declare her pregnancy in writing to the licensee. A form letter for declaring pregnancy is provided in this appendix or the licensee may use its own form letter for declaring pregnancy. A separate written declaration should be submitted for each pregnancy. The declaration of pregnancy must be sent to the department chair/head with the radiation safety officer copied.

## **C. REGULATORY POSITION**

### **1. Who Should Receive Instruction**

Female workers who require training under 10 CFR 19.12 will be provided with the information contained in this guide. In addition to the information contained in Regulatory Guide 8.29 (Ref. 1), this information may be included, as part of the training required under 10 CFR 19.12.

### **2. Providing Instruction**

The occupational worker will be given a copy of this guide with Appendix C: Question and Answers Concerning Prenatal Radiation Exposure, an explanation of the contents of the guide, and an opportunity to ask questions and request additional information. The information in this guide and Appendix C will also be provided to any worker or supervisor who may be affected by a declaration of pregnancy or who may have to take some action in response to such a declaration. Any questions regarding this material or concerns regarding prenatal radiation

exposure can be submitted to the Radiation Safety Officer or they may call the EH&S office at 805-756-6628.

### **3. Licensee's Policy on Declared Pregnant Women**

The instruction provided should describe the licensee's specific policy on declared pregnant women, including how those policies may affect a woman's work situation. In particular, the instruction should include a description of the licensee's policies, if any, that may affect the declared pregnant woman's work situation after she has filed a written declaration of pregnancy consistent with 10 CFR 20.1208.

### **4. Duration of Lower Dose Limits for the Embryo/ Fetus**

The lower dose limit for the embryo/fetus will remain in effect until the woman withdraws the declaration in writing or the woman is no longer pregnant. If a declaration of pregnancy is withdrawn, the dose limit for the embryo/fetus would apply only to the time from the estimated date of conception until the time the declaration is withdrawn. If the declaration is not withdrawn, the written declaration may be considered expired one year after submission.

### **5. Substantial Variations Above a Uniform Monthly Dose Rate**

According to 10 CFR 20.1208(b), "Cal Poly shall make efforts to avoid substantial variation above a uniform monthly exposure rate to a declared pregnant woman so as to satisfy the limit in paragraph (a) of this section," that is, 0.5 rem (5 mSv) to the embryo/fetus. The National Council on Radiation Protection and Measurements (NCRP) recommends a monthly equivalent dose limit of 0.05 rem (0.5 mSv) to the embryo/ fetus once the pregnancy is known (Ref.2). In view of the NCRP recommendation, any monthly dose of less than 0.1 rem (1 mSv) may be considered as not a substantial variation above a uniform monthly dose rate and as such will not require licensee justification. However, a monthly dose greater than 0.1 rem (1 mSv) should be justified by the licensee.

## **D. IMPLEMENTATION**

The purpose of this section is to provide information to licensees and applicants regarding the NRC staff's plans for using this regulatory guide.

Unless a licensee or an applicant proposes an acceptable alternative method for complying with the specified portions of the **NRC's** regulations, the methods described in this guide will be used by the **NRC** staff in the evaluation of instructions to workers on the radiation exposure of pregnant women.

## **APPENDIX C: QUESTIONS AND ANSWERS CONCERNING PRENATAL RADIATION EXPOSURE**

### **1. Why am I receiving this information?**

The NRC's regulations (in 10 CFR 19.12, "Instructions to Workers") require that licensees (Cal Poly State University) instruct individuals working with licensed radioactive materials in radiation protection as appropriate for the situation. The instruction below describes information that occupational workers and their supervisors should know about the radiation exposure of the embryo/fetus of pregnant women. The regulations allow a pregnant woman to decide whether she wants to formally declare her pregnancy to take advantage of lower dose limits for the embryo/ fetus. This instruction provides information to help women make an informed decision whether to declare a pregnancy.

### **2. If I become pregnant, am I required to declare my pregnancy?**

No. The choice whether to declare your pregnancy is completely voluntary. If you choose to declare your pregnancy, you must do so in writing and a lower radiation dose limit will apply to your embryo/fetus. If you choose not to declare your pregnancy, you and your embryo/fetus will continue to be subject to the same radiation dose limits that apply to other occupational workers.

### **3. If I declare my pregnancy in writing, what happens?**

If you choose to declare your pregnancy in writing, the licensee must take measures to limit the dose to your embryo/fetus to 0.5 rem (5 millisievert) during the entire pregnancy. This is one-tenth of the dose that an occupational worker may receive in a year. If you have already received a dose exceeding 0.5 rem (5 mSv) in the period between conception and the declaration of your pregnancy, an additional dose of 0.05 rem (0.5 mSv) is allowed during the remainder of the pregnancy. In addition, 10 CFR 20.1208, "Dose to an Embryo/ Fetus," requires licensees to make efforts to avoid substantial variation above a uniform monthly dose rate so that all the 0.5 rem (5 mSv) allowed dose does not occur in a short period during the pregnancy. This may mean that, if you declare your pregnancy, the licensee may not permit you to do some of your normal job functions if those functions would have allowed you to receive more than 0.5 rem, and you may not be able to have some emergency response responsibilities.

### **4. Why do the regulations have a lower dose limit for the embryo/fetus of a declared pregnant woman than for a pregnant worker who has not declared?**

A lower dose limit for the embryo/fetus of a declared pregnant woman is based on a consideration of greater sensitivity to radiation of the embryo/fetus and the involuntary nature of the exposure. Several scientific advisory groups have recommended (References 1 and 2) that the dose to the embryo/fetus be limited to a fraction of the occupational dose limit.

### **5. What are the potentially harmful effects of radiation exposure to my embryo/fetus?**

The occurrence and severity of health effects caused by ionizing radiation are dependent upon the type and total dose of radiation received, as well as the time period over which the exposure was received. See Regulatory Guide 8.29, "Instruction Concerning Risks from Occupational Exposure" (Ref. 3), for more information. The main concern is embryo/fetal susceptibility to the harmful effects of radiation such as cancer.

## **6. Are there any risks of genetic defects?**

Although radiation injury has been induced experimentally in rodents and insects, and in the experiments was transmitted and became manifest as hereditary disorders in their offspring, radiation has not been identified as a cause of such effect in humans. Therefore, the risk of genetic effects attributable to radiation exposure is speculative. For example, no genetic effects have been documented in any of the Japanese atomic bomb survivors, their children, or their grandchildren.

## **7. What if I decide that I do not want any radiation exposure at all during my pregnancy?**

You may ask your employer for a job that does not involve any exposure at all to occupational radiation dose, but your employer is not obligated to provide you with a job involving no radiation exposure. Even if you receive no occupational exposure at all, your embryo/ fetus will receive some radiation dose (on average 75 mrem (0.75 mSv)) during your pregnancy from natural background radiation.

The NRC has reviewed the available scientific literature and concluded that the 0.5 rem (5 mSv) limit provides an adequate margin of protection for the embryo/fetus. This dose limit reflects the desire to limit the total lifetime risk of leukemia and other cancers. If this dose limit is exceeded, the total lifetime risk of cancer to the embryo/fetus may increase incrementally. However, the decision on what level of risk to accept is yours. More detailed information on potential risk to the embryo/fetus from radiation exposure can be found in References 2-10.

## **8. What effect will formally declaring my pregnancy have on my job status?**

In most cases, you can continue in your present job with no change and still meet the dose limit for the embryo/fetus. For example, most commercial power reactor workers (approximately 93%) receive, in 12 months, occupational radiation doses that are less than 0.5 rem (5 mSv) (Ref. 11). Cal Poly may also consider the likelihood of increased radiation exposures from accidents and abnormal events before making a decision to allow you to continue in your present job. The RSO will conduct an evaluation of the dosage received while during the normal working duties; provide fetal dosimeters and a lead apron.

If your current work might cause the dose to your embryo/fetus to exceed 0.5 rem (5 mSv), the licensee has various options. It is possible that the licensee can and will make a reasonable accommodation that will allow you to continue performing your current job, for example, by having another qualified employee do a small part of the job that accounts for some of your radiation exposure.

## **9. What information must I provide in my written declaration of pregnancy?**

You should provide, in writing, your name, a declaration that you are pregnant, the estimated date of conception (only the month and year need be given), and the date that you give the letter to the licensee. A form letter that you can use is included at the end of these questions and answers. You may use that letter, use a form letter the licensee has provided to you, or write your own letter.

## **10. To declare my pregnancy, do I have to have documented medical proof that I am**



**pregnant?**

NRC regulations do not require that you provide medical proof of your pregnancy. However, NRC regulations do not preclude the licensee from requesting medical documentation of your pregnancy, especially if a change in your duties is necessary in order to comply with the 0.5 rem (5 mSv) dose limit.

**11. Can I tell the licensee orally rather than in writing that I am pregnant?**

No. The regulations require that the declaration must be in writing.

**12. If I have not declared my pregnancy in writing, but the licensee suspects that I am pregnant, do the lower dose limits apply?**

No. The lower dose limits for pregnant women apply only if you have declared your pregnancy in writing. The United States Supreme Court has ruled (in *United Automobile Workers International Union v. Johnson Controls, Inc.*, 1991) that "Decisions about the welfare of future children must be left to the parents who conceive, bear, support, and raise them rather than to the employers who hire those parents" (Reference 7). The Supreme Court also ruled that your employer may not restrict you from a specific job "because of concerns about the next generation." Thus, the lower limits apply only if you choose to declare your pregnancy in writing.

**13. If I am planning to become pregnant, but am not yet pregnant and I inform the licensee of that in writing, do the lower dose limits apply?**

No. The requirement for lower limits applies only if you declare in writing that you are already pregnant.

**14. What if I have a miscarriage or find out that I am not pregnant?**

If you have declared your pregnancy in writing, you should promptly inform the licensee in writing that you are no longer pregnant. However, if you have not formally declared your pregnancy in writing, you need not inform the licensee of your nonpregnant status.

**15. How long is the lower dose limit in effect?**

The dose to the embryo/fetus must be limited until you withdraw your declaration in writing or you inform the licensee in writing that you are no longer pregnant. If the declaration is not withdrawn, the written declaration may be considered expired one year after submission.

**16. If I have declared my pregnancy in writing, can I revoke my declaration of pregnancy even if I am still pregnant?**

Yes, you may. The choice is entirely yours. If you revoke your declaration of pregnancy, the lower dose limit for the embryo/fetus no longer applies.

**17. What if I work under contract at a licensed facility?**

The regulations state that you should formally declare your pregnancy to the licensee in writing. The licensee has the responsibility to limit the dose to the embryo/fetus.

## 18. Where can I get additional information?

The references to this Appendix contain helpful information, especially Reference 3, NRC's Regulatory Guide 8.29, "Instruction Concerning Risks from Occupational Radiation Exposure," for general information on radiation risks. The licensee should be able to give this document to you.

## References for Appendix

1. National Council on Radiation Protection and Measurements, *Limitation of Exposure to Ionizing Radiation*, NCRP Report No. 116, Bethesda, MD, 1993.
2. International Commission on Radiological Protection, *1990 Recommendations of the International Commission on Radiological Protection*, ICRP Publication 60, Ann. ICRP 21: No. 1-3, Pergamon Press, Oxford, UK, 1991.
3. USNRC, "Instruction Concerning Risks from Occupational Radiation Exposure," Regulatory Guide 8.29, Revision 1, February 1996.1 (Electronically available at [www.nrc.gov/NRC/RG/index.html](http://www.nrc.gov/NRC/RG/index.html))
4. Committee on the Biological Effects of Ionizing Radiations, National Research Council, *Health Effects of Exposure to Low Levels of Ionizing Radiation* (BEIR V), National Academy Press, Washington, DC, 1990.
5. United Nations Scientific Committee on the Effects of Atomic Radiation, *Sources and Effects of Ionizing Radiation*, United Nations, New York, 1993.
6. R. Doll and R. Wakeford, "Risk of Childhood Cancer from Fetal Irradiation," *The British Journal of Radiology*, 70, 130-139, 1997.
7. David Wiedis, Donald E. Jose, and Timm O. Phoebe, "The Rock and the Hard Place: Employer Liability to Fertile or Pregnant Employees and Their Unborn Children-What Can the Employer Do?" *Radiation Protection Management*, 11, 41-49, January/February 1994.
8. National Council on Radiation Protection and Measurements, *Considerations Regarding the Unintended Radiation Exposure of the Embryo, Fetus, or Nursing Child*, NCRP Commentary No. 9, Bethesda, MD, 1994.
9. National Council on Radiation Protection and Measurements, *Risk Estimates for Radiation Protection*, NCRP Report No. 115, Bethesda, MD, 1993.
10. National Radiological Protection Board, *Advice on Exposure to Ionising Radiation During Pregnancy*, National Radiological Protection Board, Chilton, Didcot, UK, 1998.
11. M.L. Thomas and D. Hagemeyer, "Occupational Radiation Exposure at Commercial Nuclear Power Reactors and Other Facilities, 1996," Twenty Ninth Annual Report, NUREG-0713, Vol. 18, USNRC, 1998.

## **FORM LETTER FOR DECLARING PREGNANCY**

This form letter is provided for your convenience. To make your written declaration of pregnancy, you may fill in the blanks in this form letter, or you may write your own letter.

### **DECLARATION OF PREGNANCY**

To: (Dept Chair/Head)  
CC: Vivian Longacre, RSO

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.

\_\_\_\_\_  
(Your signature)

\_\_\_\_\_  
(Your name printed)

\_\_\_\_\_  
(Date)

## APPENDIX D: REQUIRED POSTINGS

The following informational sheets (2) must be posted in areas where radioactive materials are used or stored. Links are below, copies on the following pages.

[RH 2364 Notice to Employees](#)

[§ 17-30255. Notices, Instructions, and Reports to Personnel.](#)

Notices must be posted in a sufficient number of places in every establishment where employees are employed in activities regulated by the California Radiation Control Regulations, to permit employees working in or frequenting any portion of a restricted area to observe a copy on the way to or from their place of employment.

## **Required Posting:**

## **26 CCR § 17-30255**

### **§ 17-30255. Notices, Instructions, and Reports to Personnel.**

(a) This section establishes requirements for notices, instructions, and reports by users to individuals engaged in work under a license or registration and options available to such individuals in connection with Department inspections of licensees or registrants to ascertain compliance with the provisions of the Radiation Control Law and regulations, orders, and licenses issued thereunder regarding radiological working conditions. The requirements in this section apply to all persons who receive, possess, use, own or transfer material licensed by or registered with the Department.

(b) Each user shall:

(1) Inform all individuals working in or frequenting any portion of a controlled area of the storage, transfer, or use of radioactive materials or of radiation in such portions of the controlled area; instruct such individuals in the health protection problems associated with exposure to such radioactive materials or radiation, in precautions or procedures to minimize exposure, and in the purposes and functions of protective devices employed; instruct such individuals in, and instruct them to observe, to the extent within their control, the applicable provisions of Department regulations and license conditions for the protection of personnel from exposures to radiation or radioactive materials occurring in such areas; instruct such individuals of their responsibility to report promptly to the licensee or registrant any condition which may lead to or cause a violation of department regulations or license conditions or unnecessary exposure to radiation or radioactive material, and of the inspection provisions of Section 30254; instruct such individuals in the appropriate response to warnings made in the event of any unusual occurrence or malfunction that may involve exposure to radiation or radioactive materials; and advise such individuals as to the radiation exposure reports which they may request pursuant to this section. The extent of these instructions shall be commensurate with potential radiological health protection problems in the controlled area.

(2) Conspicuously post a current copy of this regulation, a copy of applicable licenses for radioactive material, and a copy of operating and emergency procedures applicable to work with sources of radiation. If posting of documents specified in this paragraph is not practicable the user may post a notice which describes the document and states where it may be examined.

(3) Conspicuously post a current copy of Department Form RH-2364 (Notice to Employees) in a sufficient number of places to permit individuals working in or frequenting any portion of a controlled area to observe a copy on the way to or from such area.

(4) Conspicuously post any notice of violation involving radiological working conditions or any order issued pursuant to the Radiation Control Law and any required response from the user. Department documents posted pursuant to this paragraph shall be posted within two working days after receipt of the documents from the Department; the user's response, if any, shall be posted within two working days after dispatch by the user. Such documents shall remain posted for a minimum of five working days or until action correcting the violation has been completed, whichever is later.

(5) Assure that documents, notices, or forms posted pursuant to this section shall appear in a sufficient number of places to permit individuals engaged in work under the license or registration to observe them on the way to or from any particular work location to which the document applies, shall be conspicuous, and shall be replaced if defaced or altered.

(6) Provide reports to any individual of their radiation exposure data and the results of any

measurements, analyses, and calculations of radioactive material deposited or retained in the body of that individual as specified in this section. The information reported shall include data and results obtained pursuant to Department regulations, orders, or license conditions, as shown in records maintained by the user pursuant to Department regulations. Each notification and report shall: be in writing; include appropriate identifying data such as the name of the user, the name of the individual, the individual's Social Security number; include the individual's exposure information; and contain the following statement:

"This report is furnished to you under the provisions of the California State Department of Public Health Regulations: Standards for Protection Against Radiation. You should preserve this report for future reference."

These reports shall be provided as follows:

(A) Each user shall advise each worker annually of the worker's dose as shown in records maintained by the user pursuant to title 10, Code of Federal Regulations, part 20, (10 CFR 20), section 20.2106 as incorporated by reference in section 30253. The user shall provide an annual report to each monitored individual pursuant to section 20.1502, incorporated by reference in section 30253, of the dose received in that monitoring year if:

1. The individual's occupational dose exceeds 100 mrem total effective dose equivalent or 100 mrem to any individual organ or tissue; or
2. The individual requests his or her annual dose report.

(B) At the request of a worker formerly engaged in work controlled by the user, the user shall furnish to the worker a report of the worker's exposure to radiation or radioactive material as shown in records maintained by the user pursuant to 10 CFR 20, section 20.2106 that has been incorporated by reference in section 30253, for each year the worker was required to be monitored pursuant to section 20.1502 and for each year the worker was required to be monitored under the monitoring requirements in effect prior to March 3, 1994. Such report shall be furnished within 30 days from the time the request is made, or within 30 days after the exposure of the individual has been determined by the user, whichever is later. This report shall cover the period of time that the worker's activities involved exposure to radiation from radioactive material licensed by, or radiation machines registered with, the Department and shall include the dates and locations of work under the license or registration in which the worker participated during this period.

(C) When a user is required pursuant to 10 CFR 20, sections 20.2202, 20.2203, or 20.2204, as incorporated by reference in section 30253, to report to the Department any exposure of an individual to radiation or radioactive material, the user shall also provide the individual a report on his exposure data included therein. Such reports shall be transmitted at a time not later than the transmittal to the Department.

(D) At the request of a worker who is terminating employment with the user that involved exposure to radiation or radioactive materials, during the current calendar quarter or the current year, each user shall provide at termination to each worker, or to the worker's designee, a written report regarding the radiation dose received by that worker from operations of the user during the current year or fraction thereof. If the most recent individual monitoring results are not available at that time, a written estimate of the dose must be provided together with a clear indication that this is an estimate.

Note: Authority cited: Sections 114975, 115000, 131051, 131052, 131055 and 131200, Health and Safety Code. Reference: Sections 114940, 114965, 115000, 115060, 115110, 115230 and 115235, Health and Safety Code.

## HISTORY

1. Renumbering and amendment of former section 30280 to section 30255 filed 3-3-94 as an emergency; operative 3-3-94 (Register 94, No. 9). A Certificate of Compliance must be transmitted to OAL by 7-1-94 or emergency language will be repealed by operation of law on the following day.
2. Certificate of Compliance as to 3-3-94 order transmitted to OAL 6-7-94 and filed 7-14-94 (Register 94, No. 28).
3. Amendment of subsections (a)(6)-(a)(6)(D) and amendment of Note filed 11-9-2010; operative 12-9-2010 (Register 2010, No. 46).

This database is current through 1/18/19 Register 2019, No. 3            26 CCR § 17-30255, 26 CA ADC § 17-30255



CALIFORNIA DEPARTMENT OF PUBLIC HEALTH

# NOTICE TO EMPLOYEES

STANDARDS FOR PROTECTION AGAINST RADIATION

CALIFORNIA RADIATION CONTROL REGULATIONS (CALIFORNIA CODE OF REGULATIONS, TITLE 17, SECTION 30255)

The California Radiation Control Regulations include standards for protection against radiation hazards. The California Department of Public Health has primary responsibility for administering these standards which apply to both employers and employees. Enforcement is carried out by the California Department of Public Health or its authorized inspection agencies.

## EMPLOYEES' RESPONSIBILITIES

You should know and understand those California radiation protection standards and your employer's operating and emergency procedures which apply to your work. You should comply with these requirements for your own safety and the safety of others. Report promptly to your employer any condition which may lead to or cause a violation of these standards or employer's operating and emergency procedures.

## SCOPE OF THE STANDARDS

The Standards for Protection Against Radiation define:

1. Limits on exposure to radiation and radioactive materials;
2. Actions to be taken after accidental exposure;
3. Working conditions requiring personnel monitoring, safety surveys, engineered controls, and safety equipment;
4. Proper use of caution signs, labels, and safety interlock devices;
5. Requirements for keeping worker exposure records and reporting of such exposures;
6. The requirement for specific operating and emergency procedures for radiation work; and
7. The rights of workers regarding safety inspections.

## EMPLOYERS' RESPONSIBILITIES

Your employer is required to:

1. Comply with the requirements of the California Radiation Control Regulations, departmental orders, and license conditions;
2. Post or make available to you copies of the Radiation Control Regulations, any license issued thereunder, and your operating and emergency procedures;
3. Post any notice of violation of radiological working conditions; and
4. Provide you with information on your exposure to radiation.

## REPORTS ON YOUR RADIATION EXPOSURE HISTORY

1. California Radiation Control Regulations require your employer to give you a written report if you receive an exposure greater than the limits set in the radiation safety standards. Basic limits for occupational radiation exposure can be found in section 30253 referencing title 10, Code of Federal Regulations, part 20 (10 CFR 20). Limits on exposure to radiation and exposure to concentrations of radioactive material in air are specified in 10 CFR 20, subpart C.
2. If the radiation protection standard, under 10 CFR 20 (subpart F) requires that your radiation exposure be monitored, your employer must, upon your request, give you a written report of your exposures upon termination of your employment, and make available to you the information in your dose records (as maintained under the provisions of 10 CFR 20.2108).
3. Your employer is required to provide you with an annual report of the dose you received in that monitoring year if the dose exceeds 100 millirem, or if you request an annual report.

## INSPECTIONS

The Department or one of its contractors will inspect your workplace from time to time to ensure that health and safety requirements are being followed and that these requirements are effective in protecting you. Inspectors may confer privately with you at the time of inspection. At that time you may direct the inspector's attention to any condition you believe is or was a violation of the safety requirements.

In addition, if you believe at any time that any health and safety requirements are being violated, you or your workers' representative may request that an inspection be made by sending a complaint to the Department of Public Health or other official agency. Your complaint must describe the specific circumstances of the apparent violation and must be signed by you or your workers' representative. The Department is required to give your employer a copy of any such complaint. Names may be withheld at your request. You should understand, however, that the law protects you from being discharged or discriminated against in any way for filing a complaint or otherwise exercising your rights under the California Radiation Control Regulations.

## POSTING REQUIREMENTS

Copies of this notice must be posted in a sufficient number of places in every establishment where employees are employed in activities regulated by the California Radiation Control Regulations, to permit employees working in or frequenting any portion of a restricted area to observe a copy on the way to or from their place of employment.

FOR RADIOLOGICAL EMERGENCY ASSISTANCE (24/7), PHONE 1-800-852-7550

To contact the Radiologic Health Branch, phone (916) 327-5106  
or go to the [Radiologic Health Branch \(https://www.cdph.ca.gov/rh/b\)](https://www.cdph.ca.gov/rh/b)