

Radiation Safety Program
California State University Bakersfield
Rev: 7/98

INTRODUCTION

The California Department of Health Services, Radiological Health Branch (DOHS RHB) has the responsibility for evaluating and approving each proposed use of radioactive materials subject to specific licensing requirements. General licenses are provided under the CA Code of Regulations (17 CCR 30191). An application may be required for general licensing of non-exempt sealed sources. The sealed radioactive sources currently in use or in storage on the CSUB campus are either exempt from the regulations or are covered under the general licensing provisions. Radiation producing machines must be registered with DOHS RHB.

The use of radioactive materials and machines capable of producing ionizing radiation must be conducted in a manner that protects health and eliminates danger to life and property. Each user of radioactive materials or radiation producing equipment is responsible for the proper storage, labeling, inventory accounting, use and disposal of the materials.

ACQUISITION

All prospective users of radioactive materials or radiation generating equipment should review their plans with the Campus Safety and Risk Manager (ext. 2066) prior to the procurement process. A review of the regulations will be conducted to determine licensing, registration and safety requirements.

INVENTORY

Each user must keep an accurate record of the amount, isotope and chemical form of each radioactive material and of all radiation producing machines under his/her supervision. Science Stockroom or Safety and Risk Management (S&R) staff will periodically request this information for use in updating the CSUB radiation inventory.

STORAGE

All radioactive materials must be secured against unauthorized removal from places of storage. Protection against loss, leakage or dispersion by the effects of fire or by water hose stream will be provided.

Users who anticipate permanent or extended absence from the University must notify the Safety and Risk Manager, in advance of departure, of the name of the person who will become responsible for their radiation sources.

LABELING

All containers, refrigerators or equipment containing radioactive materials must bear a label stating "Caution - Radioactive Material" and the radiation symbol as described in 10 CFR 20.1901. The label must also bear the name of the person responsible for the radioactive materials, identity and quantity of the radionuclide and the date the label was applied.

Post all rooms in which radioactive materials are in use or in storage "Caution - Radioactive Material".

Post State Form RH 2364 "Notice to Employees" in areas where radioisotopes or radiation producing equipment is used.

Generally licensed sealed sources used in gauging, controlling or analytical instruments must bear a label containing the following or substantially similar statement:

"The receipt, possession, use and transfer of this device, Model _____, Serial No. _____ are subject to a general license or equivalent and the regulations of the United States Nuclear Regulatory Commission (US NRC) or of a state with which the US NRC has entered into an agreement for the exercise of regulatory authority. Removal of this label is prohibited."

"Caution - Radioactive Material"

(Name of Equipment Supplier)

EXPOSURE LIMITS

Annual occupational exposures to radiation for adults shall not exceed a total effective dose equivalent to 5 rem. Total effective dose is the sum of the deep dose for external exposures and the committed dose for internal exposures.

Annual occupational exposures to radiation for minors shall not exceed 0.5 rem.

Annual occupational exposures to radiation for embryo/fetus shall not exceed 0.5 rem due to exposure of a declared pregnant woman. Fetuses are particularly sensitive to radiation exposure during the first trimester. Declaration of pregnancy is voluntary but strongly encouraged. Upon receipt of a written declaration of pregnancy which includes the approximate date of conception, the supervisor or instructor shall limit required activities to those which will not generate a total exposure of 0.5 rem for the term of the pregnancy. An employee who has declared pregnancy

has the right to request reassignment to work that does not involve radiation. Copies of declarations of pregnancy should be sent to the R&S Office.

EXPOSURE MONITORING

Personal dosimeter devices must be worn by all individuals likely to receive, from sources external to the body, a dose in excess of 0.5 rem for minors and 5 rem for adults. A personal dosimeter will be worn during all work involving the use of radioactive materials or radiation producing machine by a declared pregnant woman.

Dosimeters are not required for routine operation of X-ray producing machines protected by cabinets and equipped with functional interlocked safety devices which de-energize the X-ray tube when the cabinet is opened. The key for safety interlock over ride will be controlled by the Instrument Technician responsible for maintenance of the equipment.

A finger ring dosimeter will be worn whenever safety interlocks are defeated on X-ray producing equipment and during alignment or maintenance procedures in which a person places his or her hand inside a protective cabinet while the X-ray tube is on. Contact the Office of Safety and Risk Management at ext. 2066 to arrange for dosimeters when needed.

INSTRUMENT SURVEYS

Yearly surveys will be made to evaluate potential hazards from radiation producing machines. Additional surveys will be performed following any of the maintenance, alignment or instrument reconfiguration actions described in the Area Requirement - Survey section of Appendix A.

LEAK TESTING

Reportable sealed sources shall be leak tested in accordance with the instructions provided by the manufacturer or by a person holding an appropriate license for this work. The frequency of leak testing will be determined for each device based upon the general or specific licensing requirements. Proper operation of the on - off mechanism and indicators shall be tested at the time of leak testing.

DOCUMENTATION

Records must be kept which document receipt, transfer, leak testing, maintenance or disposal of all sources of radiation. Manufacturers will supply documentation of regulatory exemption with shipment of exempt sources. Never discard written verification of exemption. All records will be stored in the Office of Safety and Risk Management for at least three years.

RELEASE/DISPOSAL/LOSS/THEFT

Radioactive materials may not be released to air, land or water in any uncontrolled area. Contact the Safety and Risk Manager to arrange for disposal or transfer of radioactive materials. Do not mix radioactive wastes with other types of hazardous waste.

Transfer of radioactive materials and radiation producing equipment is regulated and should not be carried out without verification that the recipient is an approved user at a properly licensed institution.

Report lost radioactive materials or equipment capable of producing radiation to the Safety and Risk Manager immediately. Thefts should be reported immediately to CSUB Public Safety and the Office of Safety and Risk Management. S&R will make the required regulatory notifications.

EQUIPMENT REGISTRATION REQUIREMENTS

Instruments that produce radiation must be registered with the DOHS RHB. Registrants are required to establish rules for radiation safety and insure that each operator receives proper training prior to usage. Attachment A of the CSUB Radiation Safety Program provides safety instructions which must be posted in laboratories where X-ray producing equipment is used. An instrument operation log (Attachment B) must be maintained to document use of each piece of radiation producing equipment.

TRAINING

Authorized users are responsible for assuring that adequate instruction in basic radiation safety concepts is given to every employee or student who may be exposed to ionizing radiation. Instruction in the prevention of personal exposure and spread of radioactive contamination is particularly important. Yearly refresher training must be provided. Radiation safety training must be documented for each person who uses radiation producing equipment. Training records should be maintained by the trainer. Copies of training logs should be forwarded to the Office of Safety and Risk Management.

EMERGENCY PROCEDURES

Confine spills immediately. Wear a lab coat and protective gloves. Drop an absorbent paper on liquids or a wet paper or towel on dry material. Cover the entire area of the spill. Work quickly.

Turn off room ventilation, if possible, and close the windows and doors.

Leave the contaminated area, remove any contaminated clothing and leave it just inside the contaminated area.

Call 2111 to notify the Campus Police and ext. 2066 to notify the Safety and Risk Manager.

If skin is contaminated, flush with large quantities of water . Use a catch basin or sewer drain to collect contaminated run off keeping it off of the floor or ground if possible.

Isolate and deny entry into the contaminated area.

Report all spills and exposures to your supervisor. Seek medical attention if an exposure to radiation has occurred.

Attachment A
CSUB Radiation Safety Program

X-RAY PRODUCING EQUIPMENT
RADIATION SAFETY INSTRUCTIONS

Pursuant to the California Radiation Control Regulations, the University is responsible for radiation safety and for assuring that only competent persons operate the X - ray machines under his or her jurisdiction. The registrant must establish rules for radiation safety and insure that each operator receives proper training prior to usage.

DEFINITIONS

Safety Device - A device that prevents the entry of any portion of an individual's body into the primary X - ray beam or which causes the beam to be shut off upon entry into its path should be provided on all open beam configurations.

Warning Device - Open beam devices shall be provided with a readily discernible indication of:

- a. The X - ray status (on/off) located near the radiation source housing; and/or
- b. The shutter status (open/closed) located near each port on the radiation source housing.

Ports - Unused ports on radiation source housings shall be secured in the closed position in a manner that will prevent casual opening.

Labeling - All X - ray equipment shall be labeled with a readily discernible sign or signs bearing the radiation symbol and the following words. "CAUTION: RADIATION - THIS EQUIPMENT PRODUCES RADIATION WHEN ENERGIZED".

Shutters - On open beam configurations, each port on the radiation housing shall be equipped with a shutter that cannot be opened unless a collimator or a coupling has been connected to the port.

Warning Lights - A readily visible warning light labeled with the words "X - RAY ON", shall be located near any switch that energizes an X - ray tube. The warning light should illuminate only when the tube is energized. Operations must be suspended if the on/off indicator fails.

Generator Cabinet - Each X - ray tube housing shall be so constructed that it is not capable of producing a dose in excess of 0.25 millirem in one hour. Take leakage radiation measurements with all shutters closed and at a distance of 5 cm from its surface.

Lock Requirements - Rooms containing X - ray equipment must be locked except during periods when access or use is required.

AREA REQUIREMENTS

Radiation Levels

The local components of an X - ray system shall be located, arranged and shall include sufficient shielding or access control such that no radiation levels exist in any area surrounding the local component group that could result in a dose to an individual present in excess of the dose limits specified in 10 CFR 20. For systems utilizing X - ray tubes, regulatory exposure limits shall be met at any specified tube rating.

Surveys

Radiation surveys of all X - ray producing systems sufficient to show compliance with 17 CCR shall be performed:

- a. Upon installation;
- b. Following any change in the initial arrangement, number or type of local components in the system;
- c. Following any maintenance requiring the disassembly or removal of a local component of the system;
- d. During the performance of maintenance and alignment procedures if the procedures require the presence of a primary X - ray beam when any local component in the system is disassembled or removed;
- e. Any time a visual inspection of the local components in the system reveals an abnormal condition; or
- f. At least once per year.

Posting

Each area or room containing X - ray equipment shall be conspicuously posted with a sign bearing the radiation symbol and the words "CAUTION: X - RAY EQUIPMENT". Form RH - 2364 "Notice to Employees" must be posted and a current copy of the Radiation Control Regulations must be available. Posting of a sign indicating where a copy of the regulations may be found is acceptable.

OPERATING REQUIREMENTS

Procedures

This document and the manufacturer's operating instructions shall be available to all X - ray workers. No person shall be permitted to operate X - ray equipment in any manner other than specified in the operating instructions unless such person has obtained written approval from the Radiation Safety Officer (RSO).

Bypassing

No person shall by-pass a safety device unless such person has obtained the approval of the RSO. When a safety device has been bypassed, a readily discernible sign bearing the words "SAFETY DEVICE NOT WORKING", or words having a similar intent shall be placed on the radiation source housing.

Personnel Monitoring

Each supervisor or instructor shall provide appropriate personnel monitoring equipment to individuals and shall require the use of such equipment by those individuals who are subject to radiation levels specified in 10 CFR 20 and referenced in the CSUB Radiation Safety Program sections titled exposure limits and exposure monitoring.

TRAINING

No person shall be permitted to operate or maintain X - ray equipment unless such person has received instruction in and demonstrated competence in:

- a. Identification of radiation hazards associated with the use of the equipment;
- b. Significance of the various radiation warning and safety devices incorporated into the equipment, or the reasons they have not been installed on certain pieces or equipment and the extra precautions required in such cases;
- c. Proper operating procedures for the equipment;
- d. Symptoms of an acute localized exposure;
- e. Proper procedures for reporting an actual or suspected exposure; and
- f. Proper use of personnel monitoring devices.

Training records will be maintained by the trainer. Copies of radiation safety training records must be forwarded to the Office of Safety and Risk Management.