

CHAPTER 3

RADIATION PRODUCING DEVICES

I. AUTHORIZATION TO USE RADIATION PRODUCING DEVICES

All devices and apparatus capable of producing ionizing and nonionizing radiation in potentially hazardous quantities must be approved by the Radiation Control Office. The following types of devices and apparatus are among those requiring approval:

- x-ray machines (medical, dental, veterinary, other)
- x-ray diffraction units
- electron microscopes
- particle accelerators
- static eliminators functioning by emitting ionizing radiation
- beta ray gauges and gas chromatographs with ECD
- devices using sealed gamma radiation sources (e.g., teletherapy units, irradiators, moisture density gauges, etc.)
- lasers and equipment incorporating a laser

Contact the Radiation Control Office to determine if a device is exempt from these requirements.

A. Initial Approval

Any University faculty or staff member wishing to utilize a radiation producing device in research studies, must obtain approval of the Radiation Control Committee. Approval is obtained by submitting a proposal to the Committee through the Radiation Control Office describing such items as: (a) the facility where the radiation producing device will be used, (b) the type of device which will be used, and (c) the procedures which will be followed in using the device. This proposal should point out radiation safety precautions which will be taken to protect University personnel .

No request for approval to use a radiation producing device will be denied by the Radiation Control Committee before the investigator is given an opportunity to discuss his application with the Committee.

Investigators wanting to conduct studies involving human subjects must submit proposals to the Human Use of Radioisotopes and Radiation Committee. A set of forms, separate from those used for the Radiation Control Committee proposals, must be used and can be obtained by contacting the Radiation Control Office at 392-7359. The Institutional Review Board's Investigators Manual also contains the application forms (846-1494).

The following form must also be completed and submitted with the proposal:

1. *Statement of Training and Experience* (RC-IX Form), [Appendix J](#), for each investigator, staff member and student who will be using a radiation producing device under the proposal.

or

2. *Statement of Training and Experience* (RC-1L Form), [Appendix K](#), for each investigator, staff member and student who will specifically be using a laser under the proposal.

Prior to Committee approval and usage of the device, facilities will be inspected by Radiation Control and Radiological Services personnel. The Radiation Control Office will also screen submitted RC-1X and RC-1L Forms. If it is determined an individual needs additional training or insufficient information is submitted, a Documentation of Training Form, [Appendix J](#) or [K](#), as appropriate, will be sent. This form offers three options of training for consideration by the RCO.

NOTE: (See Appendix J for the non-human use of x-ray devices and Appendix K for the non-human use of lasers for content and suggested format for proposals).

B. Renewal of Authorization to use Radiation Producing Devices

Renewal of authorization to use radiation producing devices is required on a two year frequency. A renewal notice will be sent from the Radiation Control Officer 15 days prior to expiration of current approval.

C. Amendment to Proposals

If radiation producing devices other than those which were included in the initial proposal and approval are requested, an amendment to the proposal must be submitted to the Radiation Control Officer describing the additional device, how, why and where it will be used.

D. Transfer of Responsibilities

Prior to extended leaves of absence and sabbaticals, the Principal Investigator must obtain Radiation Control Office approval for transfer of responsibility for the day to day supervision of work involving the radiation producing device. The individual assuming the responsibility must be a Principal Investigator approved for the use of the same radiation producing device.

E. Procurement and Registration of Radiation Producing Devices

Principal Investigators may obtain devices which produce ionizing or nonionizing radiation after their proposal has been approved by the Committee. To comply with inventory and control requirements of the NRC and DOH, the Radiation Control Office shall approve all device requisitions and purchase orders prior to placement of orders. These devices include x-ray diffraction units, research irradiators, radiographic units, gas chromatographs (EC detector), electron microscopes, and lasers. For additional purchasing information, call the Radiation Control Office at 2-7359.

1. Approval

Purchasing Division will withhold issuing purchase orders for a radiation producing device unless the Requisition or Purchase Order has been stamped as approved by the Radiation Control Office. The original Requisition to Purchase or Purchase Order must be submitted to Radiation Control. Upon approval, the original requisition or purchase order will then be returned to Purchasing for further processing.

2. Receipt of Device

The Radiation Control Office maybe required to perform acceptance testing of the device to ensure proper operation and safety. Off-Campus device procurement and receipt should be coordinated with the Radiation Control Office.

F. Facilities

Radioactive producing devices are not to be used in any University facility without approval of the Radiation Control Committee and/or the Radiation Control Officer from the standpoint of radiation safety. Plans for all new buildings and modifications of existing structures, where devices are to be used, must be approved by the Radiation Control Committee prior to the construction or modification of the structure.

Upon termination of activities involving the device, the Radiation Control Office must be notified in order to assure that transfer of the device is in accordance with regulations.

II. TRAINING IN THE USE OF RADIATION PRODUCING DEVICES

The Radiation Control Officer and Radiation Control Committee are required to assure that all individuals approved to use a radiation producing device are competent to do so. The following standards are established in this regard.

A. Responsibility

The Principal Investigator is the individual primary responsible for planning, initiating and ultimately interpreting the results of the particular research or project employing the radiation producing device. In addition, there may be experienced assistants or trainees associated with the work. Any of these individuals might be faculty, staff, students or approved visitors to the University.

B. Training and Experience Requirements

The Principal Investigator (PI) must possess formal course or preceptor (on the job) training in all categories called for in the Statement of Training and Experience form. If the above requirement is not met, a faculty associate already approved as a PI for the device to be used who does have this training and experience and will take responsibility for the radiation safety aspects of planning and execution of the experiment, must be added to the professional team undertaking the work. The level and extent of training and/or experience

must be commensurate with the type of device to be employed, extent of hazard involved and sophistication of the techniques being employed. No individual may work independently with the device unless he has been approved by the Radiation Control Committee in regard to training and experience. Trainees (whether students or otherwise) may utilize the device only under the direct supervision of an approved experienced worker. Experienced, approved workers may undertake to train previously inexperienced individuals in the use of the device using the traditional, well accepted Preceptor Method ("on the job training"). However, the individual in question must possess appropriate general technical experience and education to undertake the work, and his credentials must be registered with the Radiation Control Officer.

Furthermore, the nature of the initial experimental work undertaken must be appropriate for the training of the inexperienced individual. Since preceptor training alone has limitations, formal or informal coursework may be required in some cases (see C. below).

C. Formal or Informal Coursework

Individuals applying to use a radiation producing device may be required by the Radiation Control Committee to successfully pursue a formal course, short course or other organized training session, in the following circumstances:

1. When the Principal Investigator has neither formal or preceptor training in utilizing the device, and no appropriate Co-Principal Investigator can be located.
2. When the duration or degree of sophistication of the work suggest that preceptor training alone may be inadequate. In general, the Principal Investigator should require inexperienced associates to obtain some formal training if the duration of the work will exceed three months or if the procedures used will obviously be hazardous or difficult.
3. Where the initial level of training and experience of the trainee is inadequate to begin the preceptor training.

III. PERSONNEL MONITORING PROGRAM

The Principal Investigator is responsible for assuring that personnel monitoring is provided in all radiation facilities for which he is responsible.

A. Personnel Monitoring Requirements

Personnel monitoring devices must be worn by personnel as specified below.

1. Whole Body Luxel/Film/TLD Badges shall be worn when:
 - a. working with any ionizing radiation producing device.
 - b. specified by the Radiation Control Officer and/or the Radiation Control Committee.

When a lead apron or thyroid shield is worn, the whole-body monitoring device shall be worn at the collar outside the apron or shield.

2. Extremity badges or rings are available upon request.

All monitoring devices shall be obtained from the Radiation Control Office. See [Appendix A](#) for "[Personnel Monitoring Device Application](#)". Each Luxel/film/TLD badge shall be assigned to and worn by only one individual. Luxel/film/TLD's may be exchanged monthly, bi-monthly, or quarterly depending upon monitoring device wear location and expected radiation exposure. Delivery, exchange and pickup of badges shall be the responsibility of the Radiation Control Office; however, these functions are performed in cooperation with Film Badge Coordinators in some work areas. In the event that a monitor is damaged, lost, or accidentally exposed, it is the responsibility of the Principal Investigator to notify the Radiation Control Office immediately for monitor replacement or processing. Permanent records of monitor readings are maintained by the Radiation Control Office. A copy of the monthly readings is mailed to the Film Badge Coordinator in each work area.

3. Pocket Dosimeters

Pocket dosimeters may be required to be worn in addition to the Luxel/film/TLD badge if other types of monitors are inadequate in the judgment of the Radiation Control Officer or the Radiation Control Committee. This shall apply where the investigator is working in a high radiation area. When these devices are used, the Principal Investigator is responsible for maintaining daily pocket dosimeter records. Copies of these records shall be submitted quarterly to the Radiation Control Office.

- B. Exposure Reports

The Radiation Control Office may provide annual radiation exposure reports to those individuals who have been assigned a Luxel/film/TLD badge or other monitoring device. Termination radiation exposure reports will be provided to those badged individuals who terminate employment requiring personnel dosimetry. Forwarding addresses must be available to facilitate this mailing.

IV. ANNUAL RADIATION SAFETY INSPECTION

The Radiation Control Office will perform an annual radiation safety inspection of ionizing radiation producing devices, where appropriate. A series of standardized tests will be conducted to evaluate the operating condition of the x-ray generator and components in order to verify proper operation of the unit and its compliance with regulations.

V. RADIATION PRODUCING DEVICE INVENTORY

The Radiation Control Office will perform an annual physical inventory of all radiation producing devices to confirm registration with DOH. Each Principal Investigator is responsible for notifying the Radiation Control Office if there is any change which would render the registration inaccurate. Such information includes:

change of use location, sale, transfer or disposal of any radiation machine or major component thereof.

VI. TRANSFER OF RADIATION PRODUCING DEVICES

A. On Campus Transfers

Since approval for the procurement and use of a radiation producing device was initially given for the original working area and proposed research under the supervision of the approved Principal Investigator, devices shall not be transferred from one area to another or to another individual without approval of the Radiation Control Office.

B. Off-Campus Transfers

Radiation producing devices shall not be shipped or transferred to, or from any University facility, or outside organization without prior approval of the Radiation Control Office.

C. Disposal of Radiation Producing Device

Prior to the disposal of obsolete or irreparable equipment, the Radiation Control Office must be notified in order to amend inventory lists.