Radiation Machine Authorization

**POLICY**

Departments and personnel must acquire, install, operate, use, and dispose of all equipment located at or owned by the University that is capable of producing ionizing radiation in accordance with the requirements of the following:

- University Radiation Protection Program
- *Washington Administrative Code (WAC)* regulations (WAC 246)
- Directives of the Washington Department of Health (WA DOH)

The Radiation Safety Committee must approve all equipment capable of producing ionizing radiation that is put into active use at a University facility.

**PURPOSE**

The purpose of the policy and procedures in this section (*SPPM 9.60*) is to:

- Assist authorized users with adherence to appropriate procedures for acquiring, installing, and using such equipment to ensure safety and compliance.

- Ensure that personnel operate all facilities where equipment capable of generating ionizing radiation is used in a manner that is safe for both radiation workers and members of the general public.

**RESPONSIBILITIES**

**Radiation Safety Office**

**Maintenance of State Registrations**

The Radiation Safety Office (RSO) maintains a state facility (business location) and state machine registration for all machines listed on active and current authorizations, if the machines remain in active use.

**Safety and Compliance Inspections**

The RSO must perform the following:

- Inspection and appropriate radiation field surveys of each machine and facility prior to the commencement of routine use and after each repair or modification.

- Annual inspection of each radiation machine and the facility where the equipment is operated; and
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Safety and Compliance Inspections (cont.) • Annual audit of each authorization supervising the operation of radiation-generating machines to ensure:
  ○ Proper operator training
  ○ Safe operation
  ○ Proper records management
  ○ Adherence to compliance requirements

Authorized Users • The authorized user must notify the RSO of any of the following:
  • Changes in personnel (approved operators or service technicians)
  • Change in machine beam orientation, maximum energy, or location
  • Machine malfunction and/or required repair
  • Permanent cessation of use of the equipment
  • Planned removal or replacement of the equipment
  • Planned remodeling of a radiation machine facility

PROCEDURES • The following procedures are designed to ensure the proper maintenance of this policy.

Preapproval to Acquire and/or Install a Radiation Machine • The authorized user or department must prenotify the RSO of any intent to take possession, attempt to fabricate, or install a radiation-generating machine at a University-affiliated facility. The method of procurement does not alter the requirement for RSO preapproval.

The Purchasing Office coordinates with the RSO to ensure that all radiation-generating equipment and machines are preapproved by the RSO and/or the Radiation Safety Committee.

NOTE: Departments may not use Departmental Orders or purchasing cards to procure radiation machines. (See BPPM 70.07, 70.08, and 70.10).
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Radiation Safety Committee Authorization

Radiation Safety Committee authorization approval must precede any of the following (see SPPM 9.40):

- Equipment procurement
- Equipment installation
- Utilization of a radiation machine at a University facility
- Off-site use by University employees of radiation-generating equipment for a University-approved activity

Machine Registration

State Registration

The RSO must register all machines (e.g., analytical, clinical and experimental) capable of producing ionizing radiation through the Washington State Business Licensing Service.

The RSO must register any facilities housing equipment with x-ray tubes or other ionizing radiation generating machines through the Business Licensing Service. Such machines include clinical veterinary diagnostic and therapeutic equipment and machines used for educational, security, analytical research, and industrial purposes.

University Registration

The authorized user must submit a Machine Registration form to the RSO for each machine to be included under an authorization. The registration form is available at RSO Forms on the RSO website.

The authorized user must include the following with the machine registration:

- Facility shielding plans
- Equipment installation plans
- Equipment operating procedures
- Equipment safety procedures

Machine Records and Inventory

The RSO records and tracks the following information about each radiation machine:

- Location (including use locations, if portable)
- Installation status
- Final disposition

The Controller's Office inventories all University equipment with an acquisition cost of more than $5000 (see BPPM 20.50).
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Supervision by Authorized User

An approved authorized user must supervise and control all equipment capable of producing ionizing radiation that is used in activities sponsored by the University. Permanent faculty and staff may apply to be authorized users by submitting authorization applications to the Radiation Safety Committee for review and approval (see SPPM 9.40).

The authorization application form is available at RSO Forms.

Facility and Machine Security and Control

Open-Beam Radiation Machines

When not in use or during unattended operation, a room devoted solely to an open-beam radiation machine must be locked or have access restricted to authorized personnel only. (See SPPM 9.95 for definition of open-beam configuration.)

Each machine is to have a key-operated power switch as follows:

- The lock is to be constructed so that the key cannot be removed during operation without shutting down the machine.
- The key must not be left in the lock when the machine is not in operation.
- The authorized user or department must assign a key custodian with the responsibility of controlling access for operation of the radiation machine.

Non-Open-Beam Radiation Machines

The beam enclosure for non-open-beam systems (e.g., cabinet and enclosed systems) must be a closed in a chamber that cannot be entered by any part of the body during routine operation.

The enclosure is to be interlocked with the tube high voltage supply or shutter, so that the beam cannot be available unless the enclosure is in place and unoccupied.

Facility and Machine Hazard Postings

The department or authorized user must ensure that the following postings are in place and maintained in readable condition:

- Notice to Employees, WA DOH form RHF-3, in any room where a radiation machine is located. The form is available at RSO Forms.
- Radiation Use Area hazard sign on the outside of all entry doors to rooms where open-beam radiation equipment are installed.
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Hazard Postings (cont.)

- Appropriate warning placards for the following types of areas, as defined in the *RPPM*:
  - Radiation areas
  - High radiation areas
  - Very high radiation areas

- Appropriate labels posted on all equipment capable of generating ionizing radiation (with the exception of electron microscopes):
  - Near the X-ray housing affix a posting that bears the radiation trefoil symbol and the words: *CAUTION–High intensity X-ray beam;* and
  - Near any switch or control that directly energizes the unit affix a posting that bears the radiation trefoil symbol and the words: *CAUTION–This equipment produces radiation when energized."

Safety Devices

Requirements

Certain safety devices are required for each radiation machine. Such safety devices are:

- Usually manufacturer-installed components of the machine operating system.
- To function as a backup rather than a replacement for proper procedure or caution.
- NOT to be disabled or bypassed.

Examples

Examples of such safety devices include:

- Beam enclosures
- Interlocks
- Shielding
- Warning lights, including one or more beam-on indicators

A beam-on indicator is a conspicuous failsafe light or device near the X-ray tube assembly or the power switch, which indicates when the tube is energized.
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Safety Device Failure  If a safety device appears to be nonoperational, fails on a
preoperational test, or becomes inoperable during the use of a
machine, the authorized user or department must:

- Take the machine out of use immediately.
- Have a qualified service technician complete a repair and
  safety device verification prior to putting the machine back
  into service.
- Maintain a log of all safety device failures and repairs. The log
  must be available for inspection.

RSO Preapproval  Preapproval from the RSO is required in order to make machine
modifications that alter or modify manufacturer-installed or
regulatory-required safety devices, such as the following:

- Shields or shielding
- Safety interlocks
- Beam-on visual indicators

General Operation
Guidelines and Requirements

Written Operational and
Safety Procedures  The authorized user ensures that the machine is operated in
compliance with all applicable regulations and the conditions of
the authorization; and prepares and provides written operating
procedures explaining the use of each radiation machine under his
or her control.

The authorized user must post such written procedures near the
operating controls of each machine. The procedures must include
all of the following information:

- Safety hazards and preoperational protocols
- Required operator personal protective equipment, including
dosimetry
- Proper use of built-in safety devices
- Proper operation protocols
- Proper maintenance of required records
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Approved Machine Operators

The following requirements apply to approved machine operators:

- Only an approved operator may use a radiation machine or directly supervise the use of the machine.
- Approval to be an operator must be contingent on the operator demonstrating to the authorized user, or a trained designee, an adequate knowledge and ability for safe use of the machine.
- The authorized user is required to maintain a detailed training log, which includes written certification by the authorized user that the individual approved as an operator is adequately trained.

Machine Operation and Use Records

Machine operators must maintain a documentation of the use of each radiation machine. The following records must be available for inspection:

- Current authorization approving the conditions of use of the equipment
- List of the trained and approved operators
- Function-specific training records for each operator
- Parameters to be used (e.g., exposure time and intensity)
- Date, time, and operator for each use
- Purpose of the use

Emergency Procedures

The authorized user must post written procedures for operator responses to emergency situations. The operator must note any potential unplanned or unexpected (misfire) exposure in the service log and post the machine as out-of-service until it can be serviced by a qualified service technician.

If unusual circumstances occur, such as malfunctioning controls, indicator lights, interlocks, or an above-normal radiation exposure (operational malfunction), the operator must immediately:

- Shut down the machine.
- Make an entry into the service log.
- Post an out-of-service notice on the machine.
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**Emergency Procedures**

- Notify the authorized user or designated supervisor.
- Note the machine operational parameters and configuration that resulted in the suspected malfunction. The operator is to provide this information to the service technician.

**Transfer, Removal and/or Disposition of Radiation Machines**

**Transfer of Equipment to an Alternate User**

The authorized user may transfer a radiation machine to another authorized user in either of the following cases:

- The recipient is an authorized user at the University supervising the use of similar type equipment and the Radiation Safety Committee reviews and approves an amendment authorization application.
- The recipient is a permanent staff member who has knowledge, training, and experience operating and using the equipment and the Radiation Safety Committee reviews and approves a new authorization application.

**Inactive or Defective Radiation Machines**

The RSO locks out a machine to prevent its operation in any of the following cases:

- The machine is inoperable and in need of repair for more than two months.
- The authorization is terminated prior to the removal of the machine.
- The machine or authorization is placed into inactive status.

The RSO does not renew the state registration for a machine if the machine has been in a locked-out status for more than three months.
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Termination of Radiation Machine Authorization and Removal of Equipment

The following requirements apply to the termination of radiation machine authorizations and removal of the equipment:

- An authorized user must remain in control of all radiation machines listed on his or her authorization until the RSO officially terminates the authorization.

- The authorized user and/or supporting department remain responsible for arranging and paying for the costs of removal and proper disposition of the equipment.

- The authorized user and/or supporting department must follow the protocols for the surplus and/or transfer of radiation machines or X-ray tubes that are described in the RPPM.

- The authorized user and/or supporting department must prenotify the RSO of the intent to dispose of a radiation-generating device by any of the following methods:
  - Transfer to the manufacturer
  - Transfer to an alternate, properly-licensed individual (internal or external)
  - Sale through Surplus Stores (see BPPM 20.76 and 20.77)

- The University may not allow transfer of a radiation-generating device to an unqualified entity or individual that may create a hazard to the general public or to the receiving individual.