

**Section 6.0 RADIATIVE MATERIALS**

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**A Regulations Codes, Standards, and References*****Regulations:***

Arizona Radiation Regulatory Agency, Title 12

Arizona Radiation Regulatory Agency license 07-37, 7-E-1371A, 7-489, 7-LI-390

***University Policies:***

ASU Policy EHS 113: Radiation Safety in Research and Teaching

**B. Scope**

1. All radioactive materials used at Arizona State University are governed by the terms and conditions of the Arizona State University Radioactive Materials License, issued by the Arizona Radiation Regulatory Agency.
2. Deviations from the Design Guideline must be reviewed and approved by EHS.
3. This document does not relinquish the owner or contractor from adhering to any and all applicable codes and standards for this project, requirements presented by the ASU Environmental Health and Safety (EHS), and including the requirements set forth in the ASU Design Guidelines.

**C. Design Features for Radiological Labs**

1. Approval Process
    - a. Proposals for new facilities must be submitted to the Radiation Safety Office for review.
  2. Architectural Considerations
    - a. Benches in laboratories must be capable of supporting weight of necessary shielding for gamma rays.
    - b. When work involves gamma emitters (especially gamma irradiators) the floors and coatings must be able to support the gamma shielding.
    - c. When applicable, lead shielding must be incorporated in the structure. Based on the proposed type and quantities of radioactive materials, the Radiation Safety Program will determine the need for the shielding.
    - d. Areas where radioactive materials or other radiation sources are used or stored shall be provided with adequate security (e.g., locks) to prevent removal or use by unauthorized personnel.
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- e. High radiation areas or very high radiation areas (as defined in 10 CFR 20.1602-2) shall be equipped with means to prevent inadvertent access and restrict access to only authorized personnel.

Means to reduce exposure levels in the area may be required via an interlock device. In some applications, means to monitor the radiation levels in the areas shall be provided.

- f. High radiation areas or very high radiation areas (as defined in 10 CFR 20.1602-2) shall be equipped with a control device that energizes a conspicuous visible or audible signal so that an individual entering the area and the operator of the device are made aware of the entry.

### 3. Waste Storage

- a. Adequate space must be available for radioactive waste generated by projects within the lab. Most radioisotope projects will need about 10 sq. ft. of floor space for containers and shields within a lockable area. Radioactive waste must be properly segregated by half-life categories.

## D. Laser Radiation Items

1. Class IIIb and IV Laser facilities must be equipped with adequate shielding (e.g., thermal curtains using materials approved by the University's Fire Marshall, window glass that does not transmit direct laser radiation or the specular or diffuse reflections of the laser radiation (shutters or filters)). Portals and viewing windows must be designed to prevent any exposure above the permissible threshold limit value.
2. Class IIIb and Class IV laser facilities must be in rooms secured by locks. Class IV laser installations must be provided with interlocked warnings that indicate the status of the laser prior to entering the facility.
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4. Electrical outlets need to be positioned in such a manner that leakage of water or coolant will not lead to risks of electrocution.

## E. Ventilation Considerations

1. Ventilation requirements for the laboratories utilizing radioactive materials are dependent upon the types of materials used. Facilities that use radioactive gases shall be equipped with ventilation to adequately maintain concentrations to below allowable occupational exposure levels and to not permit escape of the gas to adjacent non-use areas such that concentrations exceed those allowed for uncontrolled areas. These range from no special requirements to those requiring separate exhaust systems equipped with "panic button" shut down switches. The Radiation Safety Program will review the proposed uses and make specific recommendations appropriate for each facility.

2. Depending on the type and quantities of radioactive materials or the location of the facility, fume hoods used with volatile radioactive materials have specific design requirements. These are detailed in the Fume Hoods Section of this Design Guide.
3. Laser Ventilation Considerations
  - a. Appropriate ventilation to remove laser generated airborne contaminants must be provided for Class IIIb and IV lasers.
  - b. Gas cabinets and adequate ventilation must be provided to mitigate the hazards associated with excimer laser gases *or* other lasers using toxic gases.