
Section 9

ADDITIONAL REQUIREMENTS FOR RADIOACTIVE MATERIALS LABORATORIES

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A. Scope

All radioactive materials and their uses are governed by the terms and conditions of the UW Radioactive Materials License, issued by the State of Washington Department of Health, Division of Radiation Protection (DOH). Most of the requirements were taken directly from the Washington Administrative Code (WAC) 296-800-150 with supporting information from American National Standards Institute (ANSI) Z358.1-2009 and a directive from the Washington State Department of Labor & Industries (L&I); these references are provided at the end of this chapter.

B. Basic Laboratory Design

1. A facility for handling radioactive material shall be located and designed so that the radiation doses to persons outside the facility can be maintained below applicable limits and are As Low As Reasonably Achievable (ALARA).
2. Sinks shall be constructed of impervious material such as stainless steel. Faucets should be foot-, elbow- or knee-operated. Plumbing should be smooth and easily cleaned.
3. When required, radiation shielding shall be approved by the UW Radiation Safety Office (RSO). This applies to high-energy gamma and x-ray emitters. Facility-designed shielding is not usually needed for alpha- or beta-emitters.
4. The UW RSO shall determine whether High, Very High or Airborne radiation areas exist and specify requirements that may result from these unusual levels of radioactive materials.
5. Floors should be smooth, nonporous, easily cleaned surfaces. Appropriate floor materials include sheet vinyl and sealed concrete.
6. Laboratory benches must have nonporous, easily decontaminated surfaces. Surfaces of high-quality plastic laminate or stainless steel are preferable.

C. Ventilation Considerations

1. The UW RSO shall evaluate facilities performing procedures that involve any unsealed radioactive materials having the potential to emit airborne radionuclides for compliance with State of Washington Air Emission Standards. Calculations may reveal that the facility needs to be equipped with ventilation that will limit air concentrations to levels that are ALARA and are lower than allowed limits. Ventilation systems shall prevent the escape of the airborne contaminants to adjacent non-use areas to assure that air concentrations in those areas do not exceed allowed limits. Facilities using radioactive materials may need to be approved by the State of Washington Department of Health and a Notice of Construction (NOC) may need to be filed with the DOH, depending on what air emission calculations reveal.

2. Hood inserts are only permitted for iodination procedures specifically approved by the UW RSO.
3. Radioactive air cleaning (filtration) systems on major installations shall be designed in accordance with ASME N509 or AG-1, and should be designed in accordance with N509 and AG-1 whenever possible for all installations. The radiation exposure of individuals from the radioactive materials retained on the filter(s) shall be evaluated. Each filter stage shall be designed and located to facilitate independent testing in accordance with ASME N510 or AG-1. HEPA filters used in the last stage of a system just prior to discharge into occupied locations or the environment shall comply with DOE-STD-3020-97 (be “nuclear grade”).
4. Each filter stage should be designed and located to facilitate independent testing according to applicable standards. Proper design will allow the filters to be changed easily while minimizing the potential for release of radioactivity and worker exposure. Push-through bag-in/bag-out systems are preferable. While closed-face filters appear to be convenient to use, proper in-place testing is virtually impossible, so they should not be used whenever the filter will be subjected to in-place testing. Higher efficiency filters, such as ULPA filters, are available, but they are not as rugged as a nuclear-grade HEPA filters and they should not be used for radioactive air cleaning.
5. In order to construct a new or modify an existing radionuclide air emission facility, a notice of construction (NOC) is required to be submitted to the Washington State Department of Health (DOH) early in the design phase. Within thirty days of receipt, the DOH will inform the applicant if additional information is required. Within sixty days of receipt of all required information, the DOH will issue an approval or denial to construct. When the new construction or modification is complete, the DOH will issue a license, or amend an existing license, authorizing operation of the emission units(s).

D. Radioactive Waste Management

1. Piping systems should be designed to minimize connections between sanitary and laboratory drains.
2. To reduce unnecessary exposure, radioactive waste should be stored in areas separate from work places. However, it is recommended that the transfer route of radionuclide to waste areas be over as short a distance as possible.

E. References

1. UW Radiation Safety Manual
2. Washington Administrative Code (WAC) 246

3. 10 Code of Federal Regulations (CFR) 20
4. 10 Code of Federal Regulations (CFR) 51
5. National Council on Radiation Protection and Measurements (NCRP) Report No. 127
6. Regulatory Guide 8.37, "ALARA Levels for Effluents from Materials Facilities," 1993
7. NUREG 1556 Vol. 7
8. UW Type A License of Broad Scope
9. Regulatory Guide 8.25, Revision 1, "Air Sampling in the Workplace," 1992
10. Regulatory Guide 4.20, "Constraints on Release of Airborne Radioactive Materials to the Environment for Licensees Other Than Power Reactors," 1996
11. DOE Specification for HEPA Filters Used by DOE Contractors, DOE-STD-3020-2005
12. ASME Code on Nuclear Air and Gas Treatment AG-1-2010
13. ASME Nuclear Power Plant Air-Cleaning Units and Components ASME N509-2002
14. ASME "Testing of Nuclear Air Treatment Systems" ASME N510-2007
15. ASME Code on Nuclear Air and Gas Treatment AG-1-2010
16. ASME Nuclear Power Plant Air-Cleaning Units and Components ASME N509-2002
17. NCRP Report No. 127 Section 4.6