

Radioactive Materials Safety Management Program

References:

- 1.) Oklahoma Administrative Code (OAC) Title 252 Department of Environmental Quality (DEQ), Chapter 410 Radiation Management (OAC 252:410).
- 2.) Code of Federal Regulation (CFR) Title 10 Energy, Part 20 Standards for Protection Against Radiation (10 CFR Part 20).
- 3.) Nuclear Regulatory Commission (NRC) Consolidated Guidance About Materials Licenses. Program-Specific Guidance About Fixed Gauge Licenses. NUREG-1556 Vol. 4.
- 4.) DEQ Materials License #OK-06776-06.

Introduction:

The University of Tulsa (TU) is licensed to possess and use non-exempt quantities of radioactive material only as part of a manufactured device used for process control or monitoring. All such devices, which are commonly referred to as “fixed gauges,” are used under the supervision of the university’s Radiation Safety Officer (RSO), Scott A. Holmstrom, Ph.D., who chairs the Radiation Safety Committee (RSC) and, in this roll, reports to Dr. Janet A. Haggerty, Vice Provost for Research, the certifying authority for the university’s radioactive materials license. Exempt quantities of radioactive material may be possessed and used outside the scope of the university’s DEQ license under the supervision of the RSO. Exempt quantities of specific radionuclides can be found in 10 CFR § 30.71 Schedule B.

No person shall operate a fixed gauge until that individual has received radiation safety training and been trained to use the gauge in a safe and competent manner. The RSO is responsible for making sure that each gauge user is properly trained and competent. Employees and students whose job description does not include gauge use, but calls for them to work in the vicinity of gauges, shall be given a site orientation by the RSO and encouraged to attend the radiation safety training session.

Training:

Initial in-person training by the RSO is required to become an authorized gauge user. This radiation safety training will include:

- The basics of nuclear physics and radioactive particle theory (alphas, betas, and gammas), including how they’re produced and how they’re described using energy, including comparisons with other forms of radiation.
- Propagation, transmission, scattering, and absorption of radioactive particles and how each depends on energy.

- The known effects of ionizing radiation on human tissue, the difference between chronic and acute exposure, and administrative and engineering controls used to limit both.
- Proper operating and emergency procedures.

Refresher training is required for each gauge user annually. Refresher training shall consist of a review of the initial training topics and any changes to the radiation management plan. Refresher training may be conducted in-person, via email, or using online learning software.

Records of radiation safety training shall be maintained for at least three years.

Audit:

At intervals not to exceed 12 months, the RSC shall review the contents and implementation of this safety management program guided by the applicable sections of NUREG-1556 Vol. 4, Appendix H, "Suggested Fixed Gauge Audit Checklist."

Material accountability:

The RSO has the sole authority to purchase, take receipt, transfer, or dispose of gauges containing radioactive materials.

Physical inventories must be conducted by the RSO at intervals not to exceed six (6) months. The inventory list must contain the following:

- 1.) Name of the radionuclide;
- 2.) inventory number;
- 3.) activity and assay date (or procurement date);
- 4.) Location,
- 5.) Disposition (in use or stored); and
- 6.) Date of last wipe test.

Records related to the receipt of licensed material, including transfer forms, source test reports, initial wipe tests, etc., must be maintained for as long as the material is possessed and until three (3) years after transfer or disposal.

Records related to the transfer of a licensed material to another licensee must be maintained until three (3) years after the transfer.

Records related to the disposal of a licensed material must be maintained until the terminus of the license.

Monitoring:

At least one calibrated instrument used for quantitative measurement of ionizing radiation (a survey meter) shall be available at all times. Each survey meter shall:

- 1.) Be calibrated for the type(s) of ionizing radiation emitted from the licensed gauges at intervals not to exceed 12 months; and
- 2.) Have the sensitivity and range necessary to determine proper area signage according to subsection 10 CFR § 20.1902.

Occupational dose:

For each gauge, area surveys shall be performed and analyzed with gauge users' routine time and motion information to ensure that no user is likely to receive in excess of 10% of the maximum allowable dose limits defined in 10 CFR § 20.1201.

Training must include information on how workers can reduce their dose to As Low As Reasonably Achievable (ALARA).

Public dose:

Gauges shall be used and stored in restricted areas such that only trained gauge users are allowed routine access.

Training of gauge users shall include the use of administrative controls to reduce non-user access to area where gauges are used or stored. Appropriate signage shall clearly indicate the presence of radioactive material. Site orientation for non-users will include the location of gauges and instruction to limit time around and proximity to radiation sources.

Operating and emergency procedures:

The RSC shall maintain and ensure the implementation of operating and emergency procedures for each type of fixed gauge. The RSO shall ensure that each gauge user is provided a copy of the operating and emergency procedures document and that it is posted in proximity to the gauge or located in the gauge's control room.

Leak tests:

Leak test, also known as wipe tests, shall be performed by the RSO, using an appropriately calibrated instrument capable of detecting 0.005 μCi (185 Bq), on all in-use gauges at intervals not to exceed six (6) months and following NUREG-1556 vol. 4, Appendix M, Model Leak Test Program.

Maintenance:

The non-radiological aspect of the gauge shall be maintained and repaired as needed and following the manufacturer/distributor's written recommendations and instructions. This is limited to routine external cleaning, lubrication, calibration, and electronic repairs.

Non-routine activities that involve or potentially affect components related to the radiological safety of the gauge, including, but not limited to, installation, repair, or alignment, must be performed by the manufacturer/distributor or a person specifically authorized by the Oklahoma DEQ.

Gauges may be removed from service (unmounted from an installed, fixed position) and placed in storage by the RSO. The RSO shall use procedures consistent with the manufacturer/distributor's instructions and recommendations regarding radiation safety.

Transportation:

Transportation of gauges that are designated as "in storage" within the property limits of a licensed address shall be done under the supervision of the RSO.

All off-site transportation of gauges shall be conducted by an appropriately licensed entity and shall be arranged and/or approved by the RSO.

Temporary job sites:

Fixed gauges shall not be used at any sites other than those listed on the DEQ Radioactive Materials license.