



Standard Practice RSP 1	Radiation Safety Training for Individuals Working with or Exposed to Sources of Ionizing Radiation Effective Date January 31, 1999
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I. PURPOSE

To provide training requirements for individuals who may work with or be exposed to radiation sources licensed or registered by the North Dakota Department of Health. The training program is intended to apprise individuals of the risks of radiation, the steps that they must take to minimize their exposure, and their rights and responsibilities under the North Dakota Radiological Health Rules and UND’s radioactive material license and x-ray registrations.

II. POLICY

Individuals working with or exposed to ionizing radiation sources must either be trained in radiation safety commensurate with their potential exposure risk, or be under the direct supervision of a trained individual.

III. SCOPE

This standard practice applies to employees of UND, outside contractors, students, fellows, volunteers, and visiting scholars.

Individuals that require training under this policy include: users of unsealed radioactive material, users of fixed and portable sealed sources, users of non-medical x-ray producing devices, Central Receiving staff and departmental office personnel who may receive shipments of radioactive material, UND personnel who may perform maintenance on or in the vicinity of radioactive material or devices, and specifically includes Facilities personnel employed in the following work areas:

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|----------------------|------------|-----------|--------------|----------------|
| Academic Maintenance | Carpenters | Custodial | Electricians | Electronics |
| Grounds | Lock Shop | Painters | Plumbers | Systems (HVAC) |

Students who may use radiation producing machines or observe the use of radioisotopes as a part of normal course work are not covered under this Procedure. However, the instructor of the course must be approved as an authorized user and assumes the responsibility for the safe use of the radiation source. In those courses where students are required to use and handle radioactive materials, the students must be trained in accordance with this Procedure.

IV. REFERENCE

- A. Chapter 10 of the North Dakota Radiological Health Rules (Article 33-10 of the North Dakota Administrative Code)
- B. UND’s radioactive material license application committing the University to training

- C. The Consent Agreement between UND and the North Dakota State Department of Health stemming from the State's 1996 radioactive material safety program inspection.
- D. US Department of Transportation (DOT) regulations: 49 CFR 172 Subpart H - Training

V. DEFINITIONS

- A. Authorized User: An individual approved by the Radiation Safety and Hazardous Materials Committee to use radiation sources.
- B. Radioactive Material License (license): Issued by the North Dakota Department of Health authorizing UND to possess and use radioactive material
- C. X-Ray Registration (registration): Issued by the North Dakota Department of Health to each Department using x-ray producing machines authorizing the use of the devices.
- D. Radiation: Gamma or x-rays, alpha, beta or other particles capable of producing ions. For purposes of this procedure, radiation is equivalent to ionizing radiation, and does not include nonionizing radiation, such as lasers, radio waves or microwaves, or visible, infrared, or ultraviolet light.
- E. Source of Radiation: means any radioactive material, or any device or equipment emitting or capable of producing ionizing radiation.

VI. PROCEDURES

- A. Individuals working in laboratories with unsealed radioactive material as an Authorized User or under the supervision of an Authorized User**
 - 1. Individuals working in laboratories with unsealed radioactive material as an Authorized User or under the supervision of an Authorized User must attend UND's "Laboratory Use of Radioactive Material" class prior to being approved as an Authorized User or working independently with radioactive material. The Radiation Safety Officer will schedule classes as appropriate to ensure that new laboratory workers have timely access to the class.
 - 2. Individuals working in laboratories with unsealed radioactive sources under the supervision of an Authorized User must receive instruction from the Authorized User prior to working independently with radioactive material. The instruction must include laboratory specific information on the storage, transfer, and use of radioactive materials including written procedures.
 - 3. Individuals cannot work independently with radioactive material until they have completed the "Laboratory Use of Radioactive Material" class, received laboratory specific instruction from the Authorized User, and submitted form UND-RSP-7 to the Radiation Safety Officer. In addition, females must also review the U.S. Nuclear Regulatory Commission's (NRC) Regulatory Guide 8.13 and submit a completed form UND-RSP-8 to the Radiation Safety Officer.

4. The “Laboratory Use of Radioactive Material” class will use the current version of UND’s “Radiation Safety Training Manual” and must include the following topics:
 - I. Administration
 - A. UND’s License and State Regulations
 - B. University Radiation Safety Program
 - II. Basics of Radiation
 - A. Ionizing Radiation, occupational exposure/ background radiation
 - B. Atomic Structure: Molecule/Element/Atom/Particles
 - C. Types of Radiation α, β, γ, n
 - D. Shielding
 - E. Units of Radiation/Radioactive Material
 - F. Biological Effects: Ionizing Radiation
Exposure to embryo/fetus
 - G. Radiation detection instruments: Survey meters/Sample counters
 - III. Personnel Protection
 - A. As Low As is Reasonably Achievable (ALARA)
 - B. Safe use and handling rules
 - C. Material Security, Restricted Areas
 - D. Time, Distance, Shielding
 - E. Contamination Control and Laboratory surveys
 - F. Personnel Monitoring
 - G. Declared Pregnant Woman
 - IV. Radiation Emergency Procedures
 - V. Procurement, transfer, and storage of material
 - A. Ordering procedure, RSP-3
 - B. Receipt procedures
 - C. Inventory
 - VI. Radioactive waste handling procedures, RSP-14
 - VII. The class must include a written test, with a passing score of 70%
5. Individuals working in laboratories with unsealed radioactive material as an Authorized User or under the supervision of an Authorized User must receive annual refresher training. The refresher training will be developed by the Radiation Safety Officer to reinforce basic radiation safety principles and to highlight those areas identified by the RSO during the past year as needing additional training.

B. Individuals actively working with moisture/density, moisture/depth or level/density gauges containing radioactive material as an Authorized User or under the supervision of an Authorized User.

1. Individuals working with gauges containing radioactive material as an Authorized User or under the supervision of an Authorized User must attend a radiation safety class from either the vendor or the UND Safety Office prior to being approved as an Authorized User or working independently with radioactive material. The Radiation Safety Officer shall tailor course content and schedule classes as appropriate to ensure that new workers have timely access to classes.
2. Individuals working with gauges containing radioactive material under the supervision of an Authorized User must receive instruction from the Authorized User prior to working independently with radioactive material. The instruction must include specific information on the storage, transfer, and use of gauges including written operating procedures.
3. Individuals cannot work independently with radioactive material until they have completed the appropriately tailored radiation safety class, received specific instruction from the Authorized User, and submitted form UND-RSP-7 to the Radiation Safety Officer. In addition females must also review Nuclear Regulatory Commission (NRC) Regulatory Guide 8.13 and submit a completed form UND-RSP-8 to the Radiation Safety Officer.
4. Although the courses will be tailored to meet the specific needs of a particular use, the courses will include the following topics as appropriate:
 - I. Administration
 - A. UND's License and State Regulations
 - B. University Radiation Safety Program
 - II. Basics of Radiation
 - A. Ionizing Radiation, occupational exposure/ background radiation
 - B. Atomic Structure: Molecule/Element/Atom/Particles
 - C. Types of Radiation , n
 - D. Shielding
 - E. Units of Radiation/Radioactive Material
 - F. Biological Effects: Ionizing Radiation
Exposure to embryo/fetus
 - G. Radiation detection instruments: Survey meters/Sample counters
 - III. Personnel Protection
 - A. As Low As is Reasonably Achievable (ALARA)
 - B. Safe use and handling rules
 - C. Material Security, Restricted Areas
 - D. Time, Distance, Shielding
 - E. Personnel Monitoring
 - F. Declared Pregnant Woman
 - G. Dose to the General Public

- IV. Radiation Emergency Procedures
- V. Procurement, transfer, and storage of material, Inventories
- VI. Transportation of radioactive material
 - A. Labeling and Marking
 - B. Shipping Papers
 - C. R.Q. amounts
 - D. Notification of accidents
 - E. Blocking and Bracing, Material Security
- VII. Radioactive waste handling procedures
- VIII. The class must include a written test, with a passing score of 70%

- 5. Individuals working with gauges containing radioactive material as an Authorized User or under the supervision of an Authorized User must receive annual refresher training. The refresher training will be developed by the Radiation Safety Officer to reinforce basic radiation safety principles and to highlight those areas identified by the RSO during the past year as needing additional training.

C. Individuals working with non-medical x-ray producing devices as an Authorized User or under the supervision of an Authorized User.

- 1. Individuals working with non-medical x-ray producing devices as an Authorized User or under the supervision of an Authorized User must attend an x-ray radiation safety class prior to being approved as an Authorized User or working independently with the x-ray producing device. The Radiation Safety Officer will schedule classes as appropriate to ensure that new x-ray users have timely access to the class.
- 2. Individuals working with non-medical x-ray producing devices under the supervision of an Authorized User must receive instruction from the Authorized User prior to working independently with the radiation producing device. The instruction must include machine specific information on the use of the x-ray producing devices including written procedures.
- 3. Individuals cannot work independently with x-ray producing devices until they have completed a x-ray radiation safety class, received specific instruction from the Authorized User, and submitted form UND-RSP-7 to the Radiation Safety Officer. In addition females must also review Nuclear Regulatory Commission (NRC) Regulatory Guide 8.13 and submit a completed form UND-RSP-8 to the Radiation Safety Officer.

4. The x-ray radiation safety class must include the following topics:
 - I. Administration
 - A. X-ray registration, State and Federal Regulations
 - B. University Radiation Safety Program
 - II. Basics of Radiation
 - A. Ionizing Radiation, occupational exposure/ background radiation
 - B. Characteristics of x-ray radiation
 - C. Shielding
 - D. Units of Radiation
 - E. Biological Effects: Ionizing Radiation
Exposure to embryo/fetus
 - F. Radiation detection instruments
 - III. Personnel Protection
 - A. As Low As is Reasonably Achievable (ALARA)
 - B. Time, Distance, Shielding
 - C. Personnel Monitoring
 - D. Declared Pregnant Woman
 - IV. The class must include a written test, with a passing score of 70%

D. Central Receiving staff and office personnel working in Departments that regularly receive shipments of radioactive material.

1. This section only applies to Central Receiving staff and office personnel working for Departments that regularly receive shipments of radioactive material including but not limited to:

Biology	Physiology
Anatomy	Microbiology
Biochemistry	Pharmacology

2. Every two years the Radiation Safety Officer will give radiation safety and package receipt training to all Central Receiving staff and office personnel working in Departments that regularly receive shipments of radioactive material. New employees will be trained on a case by case basis by the Radiation Safety Officer. New employees who will have to receive radioactive packages, such as Department receptionists, will be trained within 3 months of their date of employment. New employees who will not have to receive radioactive packages, such as Central Receipt personnel, will be trained at the next scheduled training session.

3. The radiation safety and package receipt training must include the following topics:
 - I. General awareness of the US Department of Transportation Regulations and How to recognize hazardous material.
 - A. Excepted packages, no external labels required
 - B. White I, Yellow II and III labels
 - II. Function specific training. Procedures that the employee must follow to comply with the DOT regulations
 - A. Labeled packages can only be handled by couriers and trained lab personnel
 - B. Labeled packages must be placed in an isolated, secure area
 - C. Labeled packages must be surveyed and opened within 3 hours
 - III. Safety training, including familiarization with the hazards, procedures to protect the employee, and emergency response information.
 - A. Biological effects of radiation: Cancer causing agent.
 - B. ALARA and time, distance and shielding
 - C. emergency response: isolate the area, call the safety office, wash contaminated skin with mild soap and water, and remove and collect contaminated clothing.
 - IV. The training program must include a written test to comply with the Department of Transportation Regulations.

E. UND personnel who may perform maintenance on or in the vicinity of radioactive material or devices including specific Facilities work areas.

- 1 This policy applies to any UND personnel performing maintenance in the vicinity of radioactive material or devices, including the following Facilities employees:

Academic Maintenance	Carpenters	Custodial	Electricians	Electronics
Grounds	Lock Shop	Painters	Plumbers	Systems (HVAC)

2. Individuals who may be required to perform job related duties in the vicinity of radiation sources will receive training in the radiation hazards associated with their work and the appropriate actions to prevent unnecessary exposure. The training will be performed approximately every twelve months. Individuals who have not received training will be allowed to work in the vicinity of radiation sources only when accompanied by a trained individual. This allowance only applies to individuals hired after the last scheduled training session.
3. Radiation safety training for Facilities employees will include the following topics.
 - I. Introduction to radiation and review of gamma and beta radiation
 - II. Biological effects of radiation and estimated risks to workers.

- III. Locations of radiation sources on campus and identifying signs and labels.
- IV. Safety precautions to be taken including ALARA and time/distance/shielding
- V. Locations of potential contamination in the laboratory
- VI. Emergency procedures, in all cases except for injury, evacuate immediately.
- VII. Who to contact with questions or concerns, also information on regulations and UND's radioactive material license.

F. Supervision of untrained individuals working in the vicinity of radiation sources. At no time shall an untrained individual be allowed in an area where radioactive material is used or stored, or in an area where radiation producing machines are operating without the presence of a trained individual to provide specific instructions.

G. Individuals working with miscellaneous radiation sources as an Authorized User or under the supervision of an Authorized User.

1. Miscellaneous sources are those sources not previously covered in sections A through C that are usually sold as generally licensed devices. Miscellaneous sources on UND's campus include but are not limited to:

- Gas chromatograph electron capture detectors
- Anti static devices
- Radium water standards for environmental sampling
- Depleted Uranium turnings for pure Hydrogen production

2. Authorized users of miscellaneous devices will receive initial radiation safety training tailored to the source(s) being used.
3. Authorized Users of miscellaneous sources will be responsible for safety training of individuals working under their supervision. Generally licensed devices are inherently safe and do not pose significant exposure risk to the user.
4. The Radiation Safety Officer will provide refresher training to the Authorized Users of miscellaneous sources every two years.