



Standard Practice RSP 5	<b>Radioactive Waste Management and Disposal</b> Effective Date May 18, 2000
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**I. PURPOSE**

To establish procedures for handling and disposal of radioactive waste generated from material possessed under the authority of the University of North Dakota’s radioactive material license.

**II. POLICY**

Radioactive waste must be disposed of in accordance with the North Dakota Radiological Health Rules. The Safety Office will collect radioactive waste and will be responsible for ensuring the proper disposal. Authorized users will maintain records of all radioactive material that they obtain, and will account for the disposal of 100% of the material.

Authorized users may dispose of certain H-3 and C-14 liquid scintillation wastes themselves, but they must obtain authorization from the Safety Office, maintain records of the disposals, and submit disposal records to the Safety Office.

**III. SCOPE**

This standard practice applies to all radioactive material obtained under authority of the University of North Dakota’s radioactive material license.

**IV. REFERENCES**

- A. North Dakota Radiological Health Rules, Section 33-10-04.1-14, “Waste Disposal”

**V. RESPONSIBILITIES**

- A. The Safety and Environmental Health Office will:
  - 1. Collect radioactive waste from Authorized Users.
  - 2. Maintain a record of all radioactive waste collected, including, the isotope, activity, date that the container was sealed, name of the authorized user who generated the waste, and the final disposal method and date.
  - 3. Determine the proper disposal method for all radioactive waste generated on campus, and perform all final disposals, with the exception of liquid and solids contaminated with 0.05 Ci per gram or less of H-3 or C-14 used for liquid scintillation counting.

- B. Department Chair/Director or designee is responsible for ensuring that each department has safe secure location(s) for interim storage of radioactive waste.
- C. Authorized Users
  - 1. Maintain a record of waste disposal in their laboratory inventory. This record will give the name of the isotope, chemical compound, and activity disposed.
  - 2. Authorized users may dispose of liquid and solids contaminated with 0.05 Ci per gram or less of H-3 or C-14 used for liquid scintillation counting. Records of the disposed isotope, activity, and disposal date must be submitted to the Safety Office.
- D. Each affected individual is responsible for adhering to the following work practices:
  - 1. Radioactive waste must be segregated by isotope and placed in proper, radioactive waste containers.
  - 2. Radioactive waste must not be released to the environment in any known quantity.
  - 3. Caution labels and symbols must be removed or defaced prior to placing items in radioactive waste containers.

## VI. WASTE DISPOSAL METHODS

- A. Solid Waste Disposal: Materials contaminated with radioactive material (paper towels, scintillation vials, table covers, trays, gloves, and carcasses of laboratory animals) will be turned over to the RSO. A "Waste Disposal Form/Manifest" UND-RSP-14 must be completed and submitted to the RSO. The RSO will then collect the waste containers, and place them in storage. The RSO will either store the waste until activity is at background radiation levels (at least 10 half-lives) and then dispose of it as non-radioactive waste or, if isotope contamination is long-lived, the RSO will arrange to have the waste disposed of by a commercially licensed radioactive waste disposal firm.

Records must be kept showing the kind and amount of material, in each waste container (Form UND-RSP-5 may be used). These records will be available to the RSO upon request.

- 1. Dry Waste: Radioactive dry waste will be placed in containers labeled with the accepted radiation symbol and marked with "Caution Radioactive Material" signs. Care should be taken to place possible contaminated paper towels, tissues, etc. in the radioactive waste containers. Strong oxidizing chemicals or non-radioactive wastes should never be placed in these containers. All hazard warning labels including the radiation symbol and "Caution Radioactive Material" wording must be removed or otherwise defaced prior to disposal.
- 2. Animal Waste: Arrangements for the disposal of animals used for experiments involving radioactive material must be made through the RSO. If activity is less than 0.05 uCi/gram for tritium or carbon 14, burial as non-radioactive waste at a regular waste disposal site will be used to dispose of the animal carcass. Animals contaminated with short lived isotopes will be held for at least 10 half-lives and until no measurable radioactive material remains, then disposed of as if they were non-radioactive. For other isotopes, if possible, the animal

or organs will be ground in a garbage disposal to form a readily dispersible biological material and flushed down the sanitary sewer with water. The upper limits on concentration for a given isotope to use this method of disposal are given in Table III in Appendix B of 33-10-04.1 of the North Dakota Department of Health's Rules. All other animal waste will be disposed of through a certified radioactive waste disposal firm.

While awaiting pickup by the waste disposal firm or Radiation Safety Officer, the animal tissue must be frozen or chemically preserved to prevent decomposition.

- B. Liquid Waste Disposal: Liquid waste shall be collected in containers to be turned over to the RSO. A "Waste Disposal Form/Manifest" UND-RSP-14 must be completed and submitted to the RSO. The RSO will then collect the waste containers and place them in storage. The RSO will either store the waste until activity is at background radiation levels (at least 10 half-lives) then dispose of the liquid without regard to radiation, solidify the liquid and dispose of it through a licensed radioactive waste disposal firm, or dispose of it in the sewer as outlined below. Authorized Users can obtain permission to dispose of liquid scintillation waste containing less than 0.05 Ci of H-3 or C-14 themselves as long as they maintain records of the disposal activity and date, and submit the records to the Safety Office.

Only carboys or bottles approved by the RSO may be used for storage of liquid waste. The RSO supplies Nalgene carboys and bottles that are suitable for most uses. These liquid containers must possess securely fitting covers, and must be kept closed. In addition, they must be conspicuously marked with appropriate radiation signs.

The RSO or his/her designees will dispose of radioactive material into a sanitary sewer system. To dispose of radioactive material into the sewerage system, the waste must be readily soluble, or readily dispersible biological material, in water, and the following regulations and procedures must be followed:

1. Use of Sanitary Sewers

Disposal records should be kept in the inventory log Form UND-RSP-6. Disposal to the sanitary sewer system is permissible for discharge of materials of appropriate concentration which are soluble or dispersible in water. No organic solvent such as toluene, used for liquid scintillation counting, can be discharged into the sanitary sewer. The volume of water leaving the building via sewers is a factor in determining the total quantity of radioactive materials which may be released. Water usage should therefore be metered and recorded so that permissible quantities and rates may be determined. Only those sinks specifically approved by the Committee are to be used for waste disposal. These should be clearly marked with a radiation warning sign.

2. Limits on Disposal into Sanitary Sewers

The cumulative quantity of materials released by the University may not exceed five hundred (500) millicuries per year. Records of total University releases will be maintained by the RSO on Form UND-RSP-6. No radioactive material shall be discharged into the sanitary sewer system at a concentration greater than that listed in Table III, Column 2 of Appendix B of 33-10-04.1 of the North Dakota Department of Health's Rules.

3. Disposal by Contractor

The RSO will arrange for a contractor to dispose of any liquid wastes at the user's expense in those cases where disposal by a licensed commercial radioactive waste disposal firm is the only approved method for disposal.

C. Gaseous Waste Disposal

1. Released Gaseous Activity

All materials or machines which may release activity as a gas (or a fine dust) must be used in a properly functioning hood, glove box or other device which exhausts through a stack to the atmosphere. These hoods or glove boxes must be conspicuously labeled and not used for general non-radioactive purposes. The exhaust ducts should be filtered and where possible not interconnected with other ducts.

2. Limits on Gaseous Disposal

No user shall possess, use, or transfer materials or machines in such a manner as to release into the air in any unrestricted area any concentration of radioactive material in excess of the limits specified in Table II, Column 1, Appendix A of 33-10-04.1 of the North Dakota Department of Health's Rules. Concentrations must be determined at the point where the material leaves the conduit.

D. Unusual Waste Disposal Problems

Plans for proper disposal of infectious agents, highly toxic, corrosive, or hazardous substances shall be made early in the design stage of the experiment. Proposed procedures involving unusual waste disposal problems will be considered individually by the Radiation Safety Committee when reviewing the application.