

APPENDIX M

DISPOSAL OR TRANSFER OF RADIOACTIVE MATERIAL

General Information

Paragraphs RH-1400 through RH-1407 of the Rules and Regulations for Control of Sources of Ionizing Radiation, address the transfer and disposal of radioactive material. In accordance with Paragraph RH-1400, radioactive material must be disposed of in accordance with Department requirements by:

- Transfer to an authorized recipient
- Decay-in-storage
- Release in effluents within the limits in RH-1210, or
- As authorized under RH-1402 through RH-1405.

Also, a company or person (Service Vendor) must be specifically licensed to receive radioactive waste from Licensees for the following:

- Treatment prior to disposal
- Treatment or disposal by incineration
- Decay in storage, or
- Taking possession (and ownership) of sealed sources or devices containing sealed sources.

The Applicant must thoroughly describe the waste transfer or disposal program that will be used to manage the radioactive waste generated during licensed operations. All phases of the waste transfer or disposal program must be addressed in written operating procedures. Like all operating procedures, these procedures will be incorporated into the Radioactive Material License.

Specific Guidance and Information

Applicants are reminded to consider the following information when they develop procedures (as applicable):

- Except for material suitable for decay-in-storage and some animal carcasses handled by the licensee, solids are transferred to an authorized recipient licensed to receive such waste in accordance with RH-1400, RH-1406, or in applicable regulations in Section 2, RH-407. Follow the packaging instructions received from the transfer agent and the burial site operator. Keep the consignment sheet from the transfer agent as the record of disposal.

- When setting up a program for decay-in-storage, consider short-term and long-term storage. Consider designing long-term storage to allow for segregation of wastes with different half-lives (e.g., the use of multiple shielded containers) and use of containers with shielded covers to maintain occupational exposure at ALARA levels. Storage areas must be in a secure location.
- Waste from *in vitro* kits (except mock iodine-125) that are generally licensed under RH-402.h is exempt from waste disposal regulations in Section 3, as set forth in RH-1402. Radioactive labels should be defaced or removed. There is no need to keep any record of release or make any measurement.
- Consider the monitoring and control mechanisms in place to ensure compliance with the appropriate requirements regarding the release of material into air and water under RH-1210 and RH-1402, respectively.
 - Regulations for disposal in the sanitary sewer appear in RH-1402. Material must be readily soluble or dispersible in the water. There are also monthly and annual limits, based on the total sanitary sewerage release of the facility. (Excreta from patients undergoing medical diagnosis or therapy are not subject to these limitations; see RH-1402).
 - Limits on permissible concentrations in effluents to unrestricted areas are enumerated in RH-2792. These limits apply at the boundary of the restricted area.
 - Liquid scintillation-counting media containing 0.05 μCi (1.85 kBq) per gram of H-3 or C-14 may be disposed of without regard to its radioactivity (RH-1405).
- If applicants/licensees propose to treat or dispose of licensed material by incineration, they must comply with RH-1404. Contact the Department for guidance on treatment or disposal of material by incineration.
- Applicants that wish to use waste volume reduction operations (e.g., compactors) must provide a detailed description (as outlined below), along with their response to Item 16, Facilities and Equipment:
 - A description of the compactor to demonstrate that it is designed to safely compact the waste generated (e.g., manufacturer's specifications, annotated sketches, photographs);
 - The types, quantities, and concentrations of the waste to be compacted;
 - An analysis of the potential for airborne release of radioactive material during compaction activities;
 - The location of the compactors in the waste processing area(s), as well as a description of the ventilation and filtering systems used in conjunction with the compactors, and procedures for monitoring filter blockage and exchange;

- Methods used to monitor worker breathing zones and/or exhaust systems;
- The types and frequencies of surveys that will be performed for contamination control in the compactor area;
- The instructions provided to compactor operators, including instructions for protective clothing, checks for proper functioning of equipment, method of handling uncompacted waste, and examining containers for defects.

Nuclear pacemakers

Medical licensees are often the first to encounter plutonium-powered pacemakers or the first to be contacted by nursing homes and funeral homes when a patient with an implanted pacemaker dies. In such cases and when the licensee is not responsible for control or disposal of the pacemaker, notify the Department and attempt to contact the hospital where the pacemaker was implanted to arrange for explantation. The licensee who implanted the device is responsible for the follow-up, explantation, and return of the pacemaker to the manufacturer for proper disposal. (NRC Information Notice 98-12, "Licensees' Responsibilities Regarding Reporting and Follow-up Requirements for Nuclear-Powered Pacemakers", provides additional technical information.)

Model Procedures for Waste Disposal by Decay-In-Storage, Generator Return, and Licensed Material Return

This model provides acceptable procedures for waste disposal. Applicants may either adopt these model procedures or develop alternative procedures to meet the requirements of RH-1400-1407, RH-1004, and RH-8410.

Model Procedure for Decay-In-Storage

Paragraph RH-8410 describes the requirements for decay-in-storage. Storage should be designed to allow for segregation of wastes with different half-lives (e.g., multiple shielded containers). Containers should have shielded covers to maintain occupational exposure at ALARA levels. Storage areas must be in a secure location.

- If possible, use separate containers for different types of waste, e.g., needles and syringes in one container, other injection paraphernalia such as swabs and gauze in another, and unused dosages in a third container. Because the waste will be surveyed with all shielding removed, the containers in which the waste will be disposed of must not provide any radiation shielding for the material.
- When the container is full, seal it and attach an identification tag that includes the date sealed and the longest-lived radionuclide in the container. The container may then be transferred to the decay-in-storage area.
- Prior to disposal as in-house waste, monitor and record the results of monitoring of each container as follows:

- Use a survey instrument that is appropriate for the type and energy of the radiation being measured;
- Check the radiation detection survey meter for proper operation and current calibration status;
- Monitor in a low-level radiation (<0.05 millirem per hour) area away from all sources of radioactive material, if possible;
- Remove any shielding from around the container or generator column;
- Monitor, at contact, all surfaces of each individual container;
- Remove or deface any radioactive material labels (unless the containers will be managed as biomedical waste after they have been released from the licensee as described in RH-8410);
- Discard as in-house waste only those containers that cannot be distinguished from background radiation. Containers may include trash bags full of waste, generator columns, and biohazard (needle) boxes. Record the disposal date, the survey instrument used, the background dose rate, the dose rate measured at the surface of each waste container, and the name of the individual who performed the disposal;
- Containers that can be distinguished from background radiation levels must be returned to the storage area for further decay or transferred to an authorized radioactive material recipient.

Model Procedure for Returning Generators to the Manufacturer

Used Mo/Tc-99m generators may be returned to the manufacturer. This permission does not relieve licensees from the requirement to comply with 10 CFR Part 71 and DOT regulations. Perform the following actions when returning generators:

- Retain the records needed to demonstrate that the package qualifies as a DOT Specification 7A container;
- Assemble the package in accordance with the manufacturer's instructions;
- Perform the dose rate and removable contamination measurements;
- Label the package and complete the shipping papers in accordance with the manufacturer's instructions;
- Retain records of receipts and transfers in accordance with RH-600.

Model Procedure for Return of Radioactive Material to Authorized Recipients

Perform the following steps when returning licensed material to authorized recipients:

- In accordance with RH-500-502, confirm that persons are authorized to receive radioactive material prior to transfer (e.g., obtain a copy of the transferee's Department, NRC, or Agreement State license that authorizes the radioactive material);
- Retain the records needed to demonstrate that the package qualifies as a DOT Specification 7A container;
- Assemble the package in accordance with the manufacturer's instructions;
- Perform the dose rate and removable contamination measurements;
- Label the package and complete the shipping papers in accordance with the manufacturer's instructions;
- Retain records of receipts and transfers in accordance with RH-600.