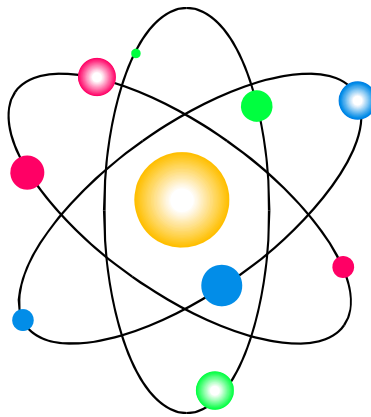




RADIOACTIVE MATERIALS REGULATORY GUIDE



EXTENDED INTERIM STORAGE



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REGULATORY GUIDE FOR EXTENDED INTERIM STORAGE OF RADIOACTIVE MATERIAL OR WASTE

The following identifies the information that the Minnesota Department of Health (MDH) considers pertinent to any request from a materials licensee to authorize extended interim storage of radioactive material or waste. Licensees whose storage circumstances do not dictate the need for license amendment may also find the information useful for a self-audit of the adequacy of their extended interim radioactive material or waste storage in conjunction with other licensed operations.

I. Identification of Radioactive Material or Radioactive Waste To Be Stored

- a. Licensees should provide the maximum amount of radioactive material or waste to be stored, both in terms of volume and activity, by radionuclide. Estimates should be based on licensed operations employing radioactive material and those that generate radioactive waste. Any anticipated changes to these practices and the best available assessment of external factors that will affect future disposal availability should be considered.
- b. Licensees must characterize the radioactive material or waste to be stored and submit the characterization, which should include:
 - 1) volume and activity of waste
 - 2) physical form of the waste (solid, liquid, or gas);
 - 3) any processing of the waste either in-house or by an external vendor (volume reduction, solidification, or other treatment);
 - 4) additional non-radiological properties of radioactive material or waste, if any (e.g., toxic, biologic, pathogenic, corrosive, flammable).
- c. Licensees should indicate the amount and type of radioactive material or waste currently being stored or processed and current disposition pathways (e.g., disposal by broker/processor, decay-in-storage).
- d. Any additional permits or approvals necessary for storage should also be considered. These may include U.S. Environmental Protection Agency hazardous waste permits, state approvals, and local approvals. The licensee may wish to assess the potential impact of such approvals on the future disposition of particular waste streams.

II. Plans for Final Disposition

Identification of the plans for final disposition of radioactive material or radioactive waste must be provided to MDH and should include:

- a. The volume, activity, and specific waste streams that must be stored because disposal capacity/disposition options do not currently exist for the waste streams.
- b. Disposition timeline and pathway for all waste streams likely to be stored for more than one calendar year for any discretionary reason (e.g., operational or business considerations).

For waste streams that are likely to be stored for more than a calendar year for nondiscretionary reasons (e.g., lack of disposal capacity) dependent on third-party actions, the licensee may wish to provide estimates by or on behalf of the third party of the potential timeline and pathway of disposition. If no such estimate exists, the licensee may provide an acknowledgement of the circumstance.

III. Physical Description of Storage Area or Storage Structure

The following information regarding the storage area or storage structure should be submitted:

- a. The location and description or diagram of the radioactive material or waste storage area (or storage structure). This may demonstrate where packages will be stored and how packages will be accessible for inspection purposes. The licensee may wish to include the locations of waste processing equipment (if applicable), air sampling stations, effluent filters, and any sources of flammable or explosive material and any sources of material that are mobile or could be rendered mobile (e.g., liquids, gases, sludges, ash, or fine-grained material) if the primary containment was compromised.
- b. The maximum volume of radioactive material or waste that can be stored in the proposed waste storage area related to the annual volume of waste generated.
- c. The type of building/structure or enclosure within which the waste will be stored. The licensee may wish to briefly describe the means (if not self-evident) by which waste will be protected from deleterious impacts of both chronic (e.g., precipitation, changes in temperature, humidity) and applicable extreme climatologic conditions (tornadoes, flooding, etc). The licensee may wish to identify aspects of the storage area that require periodic maintenance or testing (e.g., mechanical and electrical systems, gaskets, and seals) and the frequency of such maintenance.
- d. General measures to control access to the radioactive material or waste storage area and other methods, as applicable, to ensure security of the waste. It is not necessary for licensees that are implementing the increased controls requirements, to submit their increased controls documentation during the licensing process unless requested. MDH strongly recommends not submitting such information and will rely on MDH inspectors to review this documentation during licensee inspections. However, whenever a licensee believes that this information is needed in order to respond to the increased controls requirements or to respond to an apparent violation, then the document may be submitted, provided it is properly marked as "*Sensitive Unclassified Non-Safeguards Information*."
- e. The ventilation system to assure adequate ventilation of an enclosed storage area.
- f. The fire detection, protection, and suppression system to minimize the likelihood and extent of fire.
- g. Mitigation of the adverse effects of extremes of temperature and humidity, not climatologically induced or otherwise described according to item 3.c above, on waste and waste containers.
- h. The vulnerability of the waste to other hazards, both anthropologically induced (e.g., industrial accidents) and, to the extent beyond the scope of III.c above, natural (e.g., flooding, earthquakes).

IV. Packaging and Container Integrity

In order to ensure the integrity of packages and containers, licensees must address the following:

- a. The nature of packages or containers to be used for storage of radioactive material or waste. Licensees should be familiar with any hazards the waste may pose to package or container integrity (structural stability, containment of radioactive waste, contribution to shielding, and utility of handling and manipulation), and the projected storage life of the packages or containers.

- b. The program for periodic inspections of radioactive material or waste packages to ensure that they retain their integrity and containment of radioactive material or waste.
- c. The program for the identification and mitigation of damaged, leaking, or deteriorating waste packages or containers. This may include, if applicable, equipment for remote handling and/or repackaging damaged or leaking waste containers.
- d. Additional, information related to possible problem areas related to waste packages and waste forms is found in NUREG/CR-4062, "Extended Storage of Low-Level Radioactive Waste: Potential Problem Areas."

V. Radiation Protection

The licensee must address the following:

- a. The program for safe placement and inspection of waste in storage and maintaining occupational exposures as low as is reasonably achievable (ALARA). This program should include periodic radiation and contamination surveys of individual packages and the storage area in general, as well as posting the storage area in accordance with 4731.2310, "Posting Requirements." The radiation protection program, including the ALARA plan for the waste storage area or facilities, should be an integral part of the overall facility radiation protection program.
- b. Projected exposure rates, needs for shielding (if any), and any changes in personnel monitoring which will be required as a result of waste storage.
- c. If procedures for responding to emergencies are not otherwise described in overall facility licensing documentation, the licensee may wish to describe the procedures, including triggering mechanisms, responsibilities and authorities, internal and external notifications and notification of and coordination with local fire, police, and medical departments and/or other emergency service providers. The licensee may wish to consider formal agreements with emergency response providers that clearly define roles and responsibilities. The licensee may wish to consider periodic drills. As licensees that are implementing or will be implementing the increased controls requirements are aware, the specifics of a licensee's security program must be protected, and the specifics of the radioactive materials possessed are sensitive security-related information. This information can be shared only with those who are considered trustworthy and reliable and have a need to know.
- d. The system for maintaining accurate records of waste in storage (including any waste receipts or transfers from or to other licensees) to ensure accountability.

VI. Training and Qualifications

To ensure that staff are adequately trained to monitor and assess the safe storage of radioactive material and waste, the licensee should provide the following:

- a. The program for training personnel in procedures for packaging, handling, placement, inspection, surveying, and emergency response for radioactive material or waste storage.
- b. Qualifications for all personnel responsible for aspects of radioactive material or waste storage (if they differ from those responsible for management of other licensed radioactive material). In most cases, management of radioactive material or waste storage will represent only a portion of individual job responsibility for a number of facility personnel. Licensees may wish to estimate the percentage of each individual's time allocated to some aspect of radioactive material or waste storage.

VII. Financial Assurance

- a. Licensee should review the need for and adequacy of financial assurance in accordance with 4731.3080, titled "Financial Assurance and Recordkeeping for Decommissioning," based on any increases in possession limits mandated by nondiscretionary extended interim storage. If amended possession limits exceed the limits specified, MDH requires a decommissioning funding plan or certification of financial assurance. Licensee should demonstrate that financial resources are or will be in place not only to decommission the licensed operation but also to provide for the reasonable best estimated cost of handling, transport, and disposal of all radioactive material or waste stored on site.
- b. In addition, the adequacy of facility liability and/or comprehensive insurance given the added requirement for extended interim storage of radioactive material or waste should be evaluated.

VIII. Emergency Preparedness

MDH must evaluate the adequacy of licensee emergency preparedness with respect to increased possession limits as a result of requirements for radioactive material or waste storage to ensure that regulatory requirements regarding emergency preparedness are met. Licensee should either demonstrate that an emergency plan is not needed or develop and maintain a plan.

IX. Security and Increased Controls

Security measures consistent with the attractiveness and accessibility of the material and vulnerability to theft and sabotage. Chapter 4731.2290 requires licensees to:

- secure from unauthorized removal or access licensed materials that are stored in controlled or unrestricted areas; and
- control and maintain constant surveillance of licensed material that is in a controlled or unrestricted area and that is not in storage.

Low activity radioactive material inventories pose lower risk; however, MDH is issuing increased controls requirements to certain types of licensees based on their authorized possession limits. Specific activity thresholds were not established for categorical exclusion. Rather, implementation of the increased controls is based on possession of radionuclides of concern in quantities greater than or equal to the activity limits provided in Table 1, which is in Attachment 1. There is a process by which a licensee may request relief from the increased controls if compliance with any of the requirements is deemed unnecessary in specific circumstances.

MDH strongly recommends that licensees not submit their increased controls documentation during the licensing process. MDH inspectors will review this documentation during licensee inspections.

For licensees implementing the increased controls requirements, the specifics of a licensee's security system must be protected. Further, specific information related to the radioactive materials possessed is considered sensitive security-related information that can be shared only with those who are considered trustworthy and reliable and have a need to know. Licensees who need assistance in determining when such information can be appropriately shared with public officials should contact MDH.

Attachment 1

Table 1: Radionuclides of Concern

Radionuclide	Quantity of Concern ¹ (TBq)	Quantity of Concern ² (Ci)
Am-241	0.6	16
Am-241/Be	0.6	16
Cf-252	0.2	5.4
Cm-244	0.5	14
Co-60	0.3	8.1
Cs-137	1	27
Gd-153	10	270
Ir-192	0.8	22
Pm-147	400	11,000
Pu-238	0.6	16
Pu-239/Be	0.6	16
Ra-226	0.4	11
Se-75	2	54
Sr-90 (Y-90)	10	270
Tm-170	200	5,400
Yb-169	3	81
Combinations of radioactive materials listed above ³	See Footnote Below ⁴	

¹ The aggregate activity of multiple, collocated sources of the same radionuclide should be included when the total activity equals or exceeds the quantity of concern.

² The primary values used for compliance with this Order are TBq. The curie (Ci) values are rounded to two significant figures for informational purposes only.

³ Radioactive materials are to be considered aggregated or collocated if breaching a common physical security barrier (e.g., a locked door at the entrance to a storage room) would allow access to the radioactive material or devices containing the radioactive material.

⁴ If several radionuclides are aggregated, the sum of the ratios of the activity of each source, i of radionuclide, n , $A_{(i,n)}$, to the quantity of concern for radionuclide n , $Q_{(n)}$, listed for that radionuclide equals or exceeds one.

$$\frac{\text{(aggregated source activity for radionuclide A)}}{\text{(quantity of concern for radionuclide A)}} + \frac{\text{(aggregated source activity for radionuclide B)}}{\text{(quantity of concern for radionuclide B)}} + \text{etc. } \dots \geq 1$$

Use the following method to determine which sources of radioactive material require increased controls (ICs):

- Include any single source equal to or greater than the quantity of concern in Table 1
- Include multiple collocated sources of the same radionuclide when the combined quantity equals or exceeds the quantity of concern
- For combinations of radionuclides, include multiple collocated sources of different radionuclides when the aggregate quantities satisfy the following unity rule: [(amount of radionuclide A) ÷ (quantity of concern of radionuclide A)] + [(amount of radionuclide B) ÷ (quantity of concern of radionuclide B)] + etc..... ≥ 1