

GUIDANCE DOCUMENT
On
EXTENDED INTERIM STORAGE
Of
LOW LEVEL RADIOACTIVE WASTE

Revision 1
December 2008



ILLINOIS EMERGENCY MANAGEMENT AGENCY
Bureau of Environmental Safety
1035 Outer Park Drive
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EXTENDED INTERIM STORAGE OF LOW-LEVEL RADIOACTIVE WASTE BY RADIOACTIVE MATERIALS LICENSEES/APPLICANTS

PURPOSE

Due to the denial of access to the Barnwell, South Carolina disposal site for low-level radioactive waste (LLRW), Illinois radioactive material licensees/applicants may need to store their LLRW or extend the length of time they currently store LLRW. This document provides guidance to licensees intending to amend their licenses to include, or to extend, authorization for interim storage of LLRW.

BACKGROUND

The Low-Level Radioactive Waste Policy Amendments Act of 1985 (LLRWPA) established a series of milestones, penalties and incentives to ensure that states or regional compacts make adequate progress toward managing their LLRW. Until recently, the Central Midwest Compact, comprised of Illinois and Kentucky, had arrangements with the Atlantic Compact to permit continued use of the Barnwell, South Carolina disposal facility. The Atlantic Compact has decided to prohibit waste from outside their compact effective July 1, 2008. No new arrangements or agreements have been secured to provide access to a disposal site for most sealed sources, Class B, C, or greater than Class C wastes for Illinois waste generators.

Licensees who need to store LLRW onsite must be licensed to do so. If the license does not currently authorize storage, or if current possession limits specified in a license need to be increased, or if the terms and conditions of a license otherwise restrict LLRW storage, a licensee must apply for a license amendment. This document identifies information which licensees must provide to the Illinois Emergency Management Agency, Division of Nuclear Safety (Agency) in such requests.

The Agency does not advocate storage of LLRW when disposal capacity is available to licensees. However, the Agency recognizes that storage may be necessary as an interim measure when disposal options are unavailable, and this guidance has been developed to assist licensees in their interim storage planning. In the interest of public health and safety, as well as maintaining exposures as low as reasonably achievable (ALARA), the length of time LLRW is placed in storage should be kept to a minimum.

Some licensees will need to store LLRW which also contains hazardous waste as specified under the Resource Conservation and Recovery Act (RCRA), as amended.

These "mixed wastes" are regulated both by the Agency - for the radioactive component of the waste, and the Illinois Environmental Protection Agency (IEPA) - for the hazardous component of the waste. The information and guidance contained herein apply to Agency regulations only. Licensees should contact the IEPA for information pertaining to storage of the hazardous component(s) of the waste.

CONSIDERATIONS

The following considerations are central to extended storage and are the basis of the information included in Appendix A.

1. Licensees can not receive LLRW from another licensee for processing or storage unless their license specifically authorizes such receipt. Stated in reverse, a licensee can not send LLRW to another licensee for processing or storage unless the recipient is specifically licensed to provide such services.
2. Storage is not a substitute for disposal. Other than storage for radioactive decay, LLRW should be stored only when disposal capacity is unavailable. Since a disposal site for most sealed sources, Class B, C, greater than Class C, and unprocessed biological waste is currently not available, Illinois licensees should project how much storage space they will need for an extended period. Projections should include an estimate of how long their storage capacity will suffice.
3. In general, LLRW should be processed before storage, packaged in a form suitable for transport and disposal at the end of the storage period, in accordance with waste packaging specifications in 32 Ill. Adm. Code Section 340.1055. Each package of waste should be clearly labeled in accordance with Section 340.940 and Section 340.1057. Adequacy of the waste form or package may have to be reassessed before disposal to ensure the package meets the most recent standards.



4. The storage environment (temperature, humidity, exposure to the elements) should be evaluated to ensure integrity of packaging and maintenance of waste form.
5. LLRW should be stored in an area which allows for ready visual (direct or remote) inspection on a routine basis. Licensees should plan to conduct and document such inspections at intervals not to exceed three months (quarterly) (or on an alternative

schedule as justifiable by an overall assessment of the inherent safety, stability, and security of the LLRW storage system, approved by the Agency).



6. Licensees should make provisions for repackaging the waste, should the need arise. Licensees may need to have procedures and equipment in place, or readily available.
7. Decomposition and chemical reaction of incompatible waste materials over time can result in gas generation or other reaction products. Licensees should evaluate potential byproducts, and employ measures to prevent these reactions. Further, licensees should determine if the need exists for additional ventilation or fire protection/suppression systems.
8. For most waste forms, storage of LLRW in containers suitable for disposal will not represent a direct radiation exposure potential to workers. However, licensees should review their waste storage plans and determine if additional shielding or other actions are warranted to keep exposures as low as reasonably achievable (ALARA).
9. Stored LLRW should be located in a restricted area and secured against unauthorized removal for the term of storage. If locked rooms or enclosures are proposed, access to keys must be limited to authorized personnel. The possibility of access by cleaning, maintenance or other unauthorized personnel must be considered; provisions must be established to prevent unauthorized access, tampering, removal, or disposal.

CONTACT

For any questions regarding the process, the licensee or his representative may contact the Chief, Bureau of Environmental Safety at (217) 782-1329 or the Manager of Radioactive Materials, Bureau of Radiation Safety at (217) 785-9947. Correspondence may be addressed to either representative at 1035 Outer Park Drive, Springfield, Illinois 62704.



APPENDIX A

**INFORMATION NEEDED IN AN AMENDMENT REQUEST TO AUTHORIZE
EXTENDED INTERIM STORAGE OF LOW-LEVEL RADIOACTIVE WASTE**

APPENDIX A
Information Needed In an Amendment Request for
Extended Interim Storage of Low-Level Radioactive Waste

The following paragraphs identify the information which the Agency considers necessary to authorize extended interim storage of low-level radioactive waste (LLRW).

1. Identification of waste to be stored
 - (a) Review your current license authorization limits to identify the types and characteristics of LLRW that will need to be stored. Specify any possession limit increases needed for extended interim storage of LLRW.
 - (b) Identify the estimated maximum amount of LLRW to be stored, both in terms of volume and activity, by radionuclide. Estimates should be based on the current year and the four previous years. Estimates should be adjusted to reflect any increases/decreases that are projected in the next five years. Submit this data (past generation and future projections) to support your amendment request.
 - (c) Characterize the LLRW to be stored:
 - (1) Volume of waste by class, as defined in 32 Ill. Adm. Code Section 340.1052.
 - (2) Physical characteristics and form of the waste
 - a) solid - describe (e.g., finely divided, suspension as an aerosol if disturbed)
 - b) liquid - describe (e.g., volatility, containment)
 - c) gas - describe (e.g., containment, leakage through materials)
 - (3) Additional hazardous non-radiological properties of the waste (e.g., toxic, biologic, pathogenic, corrosive, flammable)
 - (4) Any waste processing performed (e.g., volume reduction, solidification)
 - (d) Describe the amount of, and characterize, the LLRW currently being stored or processed. [See (b) and (c) above for content.]
 - (e) Identify any additional permits or approvals necessary for storage (e.g., EPA hazardous waste permit) and the status of each required approval.
2. Schedule for storage - Final disposal of LLRW is partially dependent on the date the Illinois LLRW disposal facility becomes operational, however, the licensee should remain informed about developing disposal options. Commit to periodically evaluate your LLRW program to:

- (a) Project when remaining storage capacity will no longer be adequate.
- (b) Examine newly-developing options for interim storage or permanent disposal.

3. Physical description of storage area

- (a) Specify the address of the storage location. Provide a diagram of the LLRW storage area which demonstrates where LLRW containers will be stored and how the containers will be accessible for periodic inspection. Include the locations of any waste processing equipment (compactors, shredders, etc.), air sampling stations, effluent filters and any sources of flammable or explosive material. The diagram should be to scale, and should provide facility dimensions and a detailed floor plan. The description should indicate the use and occupancy of adjacent properties (e.g., licensee-controlled facility, vacant land, business, residence) and the distance of the proposed storage facility to the property line and adjacent businesses or residences. The site description should also indicate the location of, and distance from, creeks, culverts and drainages. Specify whether the proposed storage facility/property is owned or leased by the licensee. If leased, submit a letter from the property owner granting approval.
- (b) Specify the maximum volume of LLRW that can be stored in the proposed waste storage area and correlate this to annual volume of waste generated. If waste volume reduction methods are employed, specify the expected reduction percentage.
- (c) Specify the type of building/structure in which the waste will be stored and demonstrate that the waste will be protected from weather at all times. On the facility floor plan, identify intended uses and occupancy of areas adjacent to areas where LLRW will be located. Identify and describe LLRW handling, processing and storage areas. If stored in the same facility, wastes stored for decay should be segregated from LLRW stored for later disposal.
- (d) Describe the measures and procedures for controlling access and security of the LLRW storage area.
- (e) Describe the ventilation system and how it will provide adequate ventilation of the storage area. Include flow rates, air volume exchange rates, area(s) serviced, periodic operational tests, filter surveys, filter changing precautions.
- (f) Describe construction details, including building materials, foundation details, drainage plumbing, security systems, and shielding (if necessary).

- (g) Describe the fire protection and suppression system to minimize the likelihood and extent of fire.
 - (h) Describe environmental controls for the storage facility which limit the adverse effects of extremes of temperature and humidity on waste and waste containers.
 - (i) Describe vulnerability to other hazards such as floods, tornados, industrial accidents, etc. The applicant should indicate if the facility is in a 100-year floodplain and describe how the engineering design of the facility will serve to minimize and control potential LLRW migration into surface and ground waters through direct runoff or uncontrolled releases to flood control systems or sanitary sewers, and soils.
4. Packaging and container integrity - Describe the packages or containers to be used for storage of LLRW.
- (a) Provide specifications for each type of container [i.e., size, corrosion resistance, type of coating (if metal), type of closure, seals, liners, certification(s)].
 - (b) Describe the projected storage life of the packages or containers. Identify and describe the effects of the components (both radioactive and chemical) of the LLRW and the LLRW decay products on the containers.
 - (c) Describe any hazards the waste may pose to container integrity. Include any expected gases generated by chemical interactions or biological or radioactive decay. Describe the effects on the containers and the proposed method(s) for management of the gaseous products.
 - (d) Identify and describe the effects of temperature and humidity on the storage containers.
 - (e) Describe the labeling to be used on containers of LLRW. Labeling must include identification of contents by radionuclide, date of closure, etc. (Refer to 32 Ill. Adm. Code Section 340.940 and Section 340.1057.)
 - (f) Describe the administrative control procedures to ensure that containers are of the type specified in 4.(a) and are labeled according to the description in 4.(e).
 - (g) Describe procedures and instructions to workers pertaining to the placement of waste containers, including stacking and stability precautions, provision of access for periodic visual inspection and surveys, shielding higher-activity containers with lower-activity containers, and prevention of container deformation.

- (h) Describe your program for periodic inspections of LLRW packages to ensure that they retain their integrity and containment of LLRW.

5. Waste processing

- (a) Describe your program and any equipment used for packaging, remote handling, and compaction of waste, and repackaging of damaged or leaking waste containers.
- (b) If you plan to send waste to another licensee for processing and return to your storage facility, provide the name and license number of the processing licensee. Specify what services will be provided by this licensee (e.g., provision of proper containers, packaging, consolidation and compaction of waste, labeling, and periodic audits and inspections of your storage program and facility.)

6. Radiation protection

- (a) Describe the radiation surveys, including wipes, that will be performed. Specify the areas surveyed, personnel monitoring, frequency of surveys, who will conduct the surveys, types of instruments used, and action levels. Include details on recording the results of surveys, action levels, and procedures to be followed when action levels are exceeded.
- (b) Describe your program for safe placement and inspection of waste in storage and maintaining occupational exposures as low as is reasonably achievable (ALARA).
- (c) Describe your program for periodic radiation and contamination surveys of LLRW containers and the storage area. The program should include surveys, wipes of containers and storage areas, inventories, inspection documentation, general review of safety protocol, and maintenance of postings of caution signs and employee notices.
- (d) Describe projected exposure rates, needs for shielding (if any) and any changes in personnel monitoring which will be required as a result of waste storage. If changes to your personnel monitoring program are required, describe the type of monitoring device(s) used, the exchange frequency, the monitoring service provider, when and how worn, and where the devices will be maintained when not being worn.
- (e) Describe procedures employed to meet the requirements for demonstrating compliance with dose limits to individuals of the public, as specified in 32 Ill.

Adm. Code Section 340.320. Address in your description the evaluation of direct exposure and concentrations of radioactive material in effluents released to water and air.

- (f) Describe the procedures employed to prevent or reduce the probability of contamination of equipment, areas and personnel, or the release of material to unrestricted areas. Procedures may be described separately as preventative and remedial measures.
- (g) Describe your procedures for responding to emergencies, including notification of and coordination with local fire, police and medical departments. Include transportation accidents, tornados, spills, loss of power, ventilation system failure, and fire, describing procedures to be followed in each event.
- (h) Describe your system for maintaining accurate inventory records of waste in storage, demonstrating accountability during receipt, handling, storage and transfer. Requirements for record content may be found in 32 Ill. Adm. Code, Section 340.1060.
- (i) Specify who is responsible for records management and where the records will be kept.
- (j) Describe the inspections performed by licensee management to ensure that operating and emergency procedures are being conducted according to stated procedures.
- (k) Describe the management audits made of records to ensure that the required information is being recorded and maintained in accordance with procedures and the requirements of regulations, and that the radiation safety program is operating properly.
- (l) Describe procedures for waste collection, consolidation, packaging and, if applicable, processing.

7. Training

Describe your program for training personnel who will have access to the LLRW storage areas and who will be involved in the handling of LLRW in the procedures for packaging, handling, placement, inspection, surveying, and emergency response for LLRW storage. (Note that hazardous material constituents of mixed waste may require additional training to satisfy EPA or OSHA requirements.)

8. Financial assurance

Review the relevant requirements of Part 326 regarding financial assurance. If your activities are in a category requiring financial assurance and your proposed maximum possession limits exceed the defined limits, submit with your amendment request a Reclamation Plan and Cost Estimate. A guidance document describing financial surety arrangements is available on the Agency's web site (<http://iema.illinois.gov/radiation/pdf/fassur.pdf>).

9. Emergency Preparedness

Review the requirements of Part 330.250 e) regarding Emergency Plans. If your revised limits are going exceed the requirements, submit the necessary procedures as required by Part 330.290: Requirements for Emergency Plans.

10. Security/Increased Controls

Take prudent security measures consistent with the attractiveness and accessibility of the material and vulnerability to theft and sabotage. Agency regulations in Part 340.810 "Security and Control of Licensed or Registered Sources of Radiation" require licensees (1) to secure licensed radioactive material from unauthorized removal or access, and (2) to maintain constant surveillance of licensed material that is in a controlled or unrestricted area and that is not in storage.

Implementation of the increased controls is based on possession of radionuclides of concern in quantities greater than or equal to the activity limits provided Table 1 of the increased controls orders (see, e.g., 70 Federal Register 72128 (December 1, 2005)). 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.

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