POLICY ISSUE
(Information)

August 1, 1994

SECY-94-198

FOR: The Commissioners

FROM: James M. Taylor
Executive Director for Operations

SUBJECT: REVIEW OF EXISTING GUIDANCE CONCERNING THE EXTENDED STORAGE OF LOW-LEVEL RADIOACTIVE WASTE

PURPOSE:

To provide the Commission with results of a review of U.S. Nuclear Regulatory Commission guidance concerning on-site storage of low-level radioactive waste (LLW), and to inform the Commission of needed changes.

SUMMARY:

On June 30, 1994, the Barnwell LLW radioactive waste disposal facility closed to waste generators in 28 States and the District of Columbia, in addition to Puerto Rico and the three States that had already been denied access. An estimated several thousand licensees in the United States are now forced to store LLW until new disposal capacity is developed. NRC licensees that store LLW will be relying on NRC guidance in fulfilling their obligations to ensure protection of the public health and safety and the environment.

In this paper, the staff describes revisions to the existing guidance for LLW storage and related issues in light of the closing of the Barnwell site to many LLW generators and the resulting widespread storage of LLW. Specifically, the revised guidance in this paper: (1) consolidates all

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previous staff guidance into a single document addressing different aspects of managing LLW after access to a licensed disposal facility is denied; (2) clarifies the meaning of the 5-year "limit" for on-site storage; (3) removes the statement that power reactor licensees need a 10 CFR Part 30 license to store LLW beyond 5 years, because they are already authorized under Part 30, within the limits of their facility operating licenses, to possess and store LLW on-site; (4) clarifies when 10 CFR 50.59 evaluations need to be used by nuclear power reactors for LLW storage; and (5) states that licensees need only place waste into storage in a form suitable for disposal (the current staff position) when they have assurance that the future disposal site will accept the waste in that form. Because the 5-year "limit" has been removed, the staff reviewed the guidance for its applicability to longer periods of time. No specific hazards or technical considerations unique to storage periods greater than 5 years were identified, and thus no other changes to the guidance are required at this time.

BACKGROUND:

The Low-Level Radioactive Waste Policy Amendments Act of 1985 (LLRWPAA) allows compacts with operating LLW disposal sites to deny access to generators in States and compacts that have not developed disposal capacity of their own. In accordance with this authority granted by the LLRWPAA, on January 1, 1993, the Rocky Mountain Compact closed the Beatty, Nevada site permanently, and the Northwest Compact restricted access to the Hanford, Washington LLW disposal facility to generators in the Northwest and Rocky Mountain Compacts. The Southeast Compact and South Carolina allowed the Barnwell, South Carolina site to accept LLW from most States past the January 1, 1993, date set forth in the LLRWPAA, but effective July 1, 1994, restricted access to the site to generators in the Southeast Compact only. The result is that generators in 31 States plus the District of Columbia and Puerto Rico no longer have access to disposal. For these generators, on-site storage is usually the only option for managing their LLW, other than terminating the use of licensed radioactive materials. At the same time, States are making limited progress in developing new disposal facilities, with most new facilities scheduled to begin operating near the turn of the century. The forthcoming increase in the number of generators storing waste on site, combined with the reality that waste may need to be stored for extended periods while new sites are being developed, warrants a thorough review of NRC guidance regarding on-site storage.

Several other considerations have caused the staff to review the existing guidance for LLW storage at this time. First, LLW generators in Michigan have been storing their waste since November 1990, and in November 1995 will reach the end of the 5-year storage period specified in existing NRC guidance. Second, generator experiences in storing LLW and the staff's experience in inspecting their storage programs have identified portions of the guidance that need to be clarified and improved. Third, the staff has participated in approximately 20 workshops and meetings on LLW storage with States and generators in the last several years, making presentations on the guidance, explaining the Commission's policy on storage, and describing the results of NRC's licensing and inspection program. From these meetings and workshops,

certain questions and issues have often been raised, and where appropriate, these are being addressed in proposed revisions of NRC guidance.

In SECY-93-323, "Withdrawal of Proposed Rulemaking to Establish Procedures and Criteria for On-Site Storage of Low-Level Radioactive Waste After January 1, 1996," dated November 29, 1993, the staff committed to review and assess the existing guidance and licensing requirements for storage of LLW, especially beyond 5 years. The staff also committed to delete a provision in the guidance for storage of LLW generated on-site by nuclear power reactors, that required these licensees to submit a Part 30 license application for storage beyond 5 years. In the February 1, 1994, Staff Requirements Memorandum (SRM) resulting from the storage rulemaking paper, the Commission directed the staff to make the proposed changes to the guidance identified in SECY-93-323. The Commission also directed that if new requirements for any specific hazards or technical considerations were needed, the staff is to develop them using a systems approach.

DISCUSSION:

This section describes the criteria against which the current NRC LLW storage guidance was evaluated in this review, discusses the content of the existing guidance, outlines the approach used for conducting the review and identifying areas that did not fulfill the criteria, and discusses the specific issues that were identified and how, in the staff's view, they should be addressed.

Guidance Objectives:

The primary goal of NRC's storage guidance is to assist reactor, fuel cycle, and materials licensees in their efforts to store LLW on-site in a manner that ensures protection of public health and safety, including workers and the environment, and that facilitates compliance with NRC regulations. To meet this end, the guidance should:

- Define safety features, criteria, hazards and issues which need to be addressed for safe storage.
- Inform licensees when a license amendment is required for on-site storage, as well as what such an amendment request should contain.
- Reflect NRC's policy on LLW storage.
- Be consistent with NRC's regulations.
- Inform LLW generators of alternative waste management practices, such as decay-in-storage, that can reduce their waste storage requirements.

Present Guidance:

Present NRC guidance is largely contained within two documents, Generic Letter (GL) 81-38, "Storage of Low-Level Wastes at Power Reactor Sites," and Information Notice (IN) 90-09, "Extended Interim Storage of Low-Level

Radioactive Waste by Fuel Cycle and Materials Licensees." GL 81-38 applies to power reactor licensees only, and provides guidance for increases in storage capacity for LLW generated by normal reactor operation and maintenance. IN 90-09 provides guidance to fuel cycle and materials licensees on information needed in license amendment requests to authorize extended interim storage of LLW. Two other guidance documents also address LLW storage and management when disposal capacity is not available. IN 89-13, "Alternative Waste Management Procedures in Case of Denial of Access to Low-Level Waste Disposal Sites," informs generators of other ways of managing their waste if access to disposal facilities is denied. GL 85-14, "Commercial Storage at Power Reactor Sites of Low-Level Radioactive Waste Not Generated by the Utility," describes safety concerns and licensing aspects of commercial storage of LLW (i.e., storage of LLW generated off-site) on the site of a nuclear power reactor.

Review Approach:

The task of identifying issues for possible revision or addition to NRC storage guidance began with a thorough review of all present guidance, along with other documents relating to LLW storage. The staff has also been involved in approximately 20 meetings and workshops with generators and State officials on LLW storage in the last several years, and issues and concerns raised in these meetings were also considered in this review. The general consensus is that present NRC guidance is adequate, but some additions and clarifications would be worthwhile.

Issues:

a. Consolidation Into a Single Document

The previous guidance addressed in separate documents different aspects of LLW storage given the denial of access to disposal sites. These included measures that need to be taken to help ensure safe storage of LLW; other ways of managing waste, in addition to storage; emergency access to disposal sites; centralized storage of many generators' waste at a single facility; and other issues. In the revised guidance, the staff has attempted to address, in a more systematic and efficient way, provisions for ensuring safe storage of LLW, licensing procedures related to extended storage and alternatives for mitigating the impact of losing access to disposal sites. The consolidated guidance is meant to be easier for licensees and others to understand, consistent in the positions that it takes, and comprehensive in its coverage of regulatory issues related to extended storage.

The staff may later separate the guidance into two documents, one each for reactor and materials licensees. The staff has consulted with the Committee to Review Generic Requirements (CRGR) and a decision on whether a formal CRGR review is required has been deferred by staff until later. If a CRGR review is needed, and in the interest of publishing final guidance for materials licensees as soon as possible, two documents may be prepared.

b. Five-Year "Limit" for On-Site Storage

The most controversial issue in present NRC storage guidance is the reference to a 5-year maximum period for on-site storage. The 5-year "limit" is not clearly defined, and is frequently a source of confusion for licensees and others in meetings with the staff. Although the limit appears only as guidance and does not have the force of regulation, LLW generators are naturally concerned about not meeting any NRC guideline, even if it is not a requirement. At the current pace of disposal site development, generators in some States will likely have no option other than storing waste on site beyond 5 years. Members of the public and others have also questioned the meaning of the 5-year limit and NRC's intentions for regulating LLW storage beyond 5 years. One State (Delaware) has adopted a law which prohibits storage of LLW beyond 5 years; however, the staff has not been able to establish a definite link between NRC's 5-year limit and the State's passage of such a law.

Several different positions related to the 5-year limit are contained in NRC's guidance:

- GL 81-38 states that waste should not be stored for a duration that exceeds 5 years without obtaining a Part 30 license.
- GL 81-38 directs licensees to apply for a Part 30 license if the *design capacity* for a new storage facility exceeds the waste generation projected for 5 years. In the review of the Part 30 application, GL 81-38 states that the staff would consider the planned capacity of the storage facility and projected waste generation rates in determining whether the provisions of the generic letter were satisfied.
- IN 90-09 states that NRC's approval of requests by materials and fuel cycle licensees will generally be for a period of time not greater than 5 years.

Several lines of reasoning first led to the inclusion of the 5-year limit in GL 81-38 and IN 90-09. First, in 1981, when GL 81-38 was issued, it was expected that 5 years of storage would be sufficient for most, if not all, generators, as States and compacts were expected to establish additional disposal capacity within the upcoming 5-year period. The Low-Level Radioactive Waste Policy Act of 1980 (LLRWPA) stipulated that regional compacts could exclude waste from outside the region's borders after January 1, 1986. The 5 year provision in GL 81-38 was consistent with the expectations for the national program at the time. Subsequent experience has shown that assumption to be optimistic because there was little progress in developing new disposal facilities in the ensuing 5-year period. Although the LLRWPA was amended in 1985 to add milestones, incentives, and penalties for the development of new disposal facilities, States continue to make slow progress, and storage for greater than 5 years will in all likelihood be needed by some generators.

Second, in two Commission papers, SECY-81-383, "Storage of Low-Level Radioactive Wastes at Power Reactor Sites (SECY-80-511)," a precursor to GL 81-38, and SECY-90-318, "Low-Level Radioactive Waste Policy Amendments Act Title Transfer and Possession Provisions," the staff observed that a position allowing storage of waste on-site for greater than 5 years could lead to de facto disposal at generators' sites by removing an incentive for States to develop new facilities. Although significant storage of waste for more than 5 years has not yet occurred, experience to date shows that, contrary to the staff's prediction, the NRC position has apparently not been a factor in States' willingness to develop new sites. Michigan, for example, has no firm plans for developing a facility, in spite of the fact that its generators will reach the end of the 5-year storage period in a little more than a year. On the other hand, other States have license applications under active review and are making significant efforts to develop new facilities and the 5-year limit has apparently not been a factor in their willingness to proceed. All of the States with applications are Agreement States and do not have to adopt the 5 year limit in NRC's guidance. Also, States and generators are aware that NRC's authority is limited to protection of the public health and safety and that tying this broad responsibility to a 5-year storage term limit is not possible. In SECY-90-318, "Low-Level Radioactive Waste Policy Amendments Act Title Transfer and Possession Provisions," the staff stated that "...no law or regulation prohibits storage of wastes for periods of time in excess of five years..." The responsibility for developing new disposal capacity given to States under the LLRWPAA, and interest by generators in these States to encourage development of new capacity, have apparently been sufficient incentive for most States to proceed with siting and development programs.

A third factor in choosing the 5-year period was that the standard renewal period for a Part 30, 40 or 70 materials license is 5 years. The end of the license term was a convenient point for limiting future storage terms or revisiting the need for additional storage as part of the safety and environmental reviews that accompany renewals. The staff, however, did not have an established policy as to whether and under what conditions storage would be allowed after 5 years.

Fourth, SECY 81-383 mentions potential concerns with container integrity and occupational exposures as justification for limiting on-site storage to 5 years, although the paper did not present the technical basis for these concerns. A subsequent study of storage by nuclear power reactors in NUREG/CR-4062, "Extended Storage of Low-Level Radioactive Waste: Potential Problem Areas," identified no hazards or concerns unique to storage beyond 5 years. A number of different concerns were addressed, such as radiolytic gas generation, corrosion of container materials, and radiation embrittlement of polyethylene containers. Some of these may appear early in the storage phase (the first few years) and others may appear later, depending on the specific conditions. All are considered in the existing NRC guidance for LLW storage.

In summary, the staff's primary intention in prescribing the 5-year limit in 1981 was to encourage the development of new facilities. In retrospect, it has not been an important factor in achieving this objective.

In the revised guidance, the staff has eliminated any language that implies that the 5-year term is a "limit," beyond which storage would not be allowed, or which imposes any special review requirements. The guidance now calls for the staff to review LLW storage at the end of every 5-year renewal period for materials licensees, consistent with the review of other activities in the materials program. At the time of renewal, the staff would consider previous experience with LLW storage, both generally and by the specific licensee. Additional storage safety features could be required through the renewal process, based on operating experience up to that time and any incremental safety hazard because of accumulation of waste on-site. The license possession limits would also be adjusted to accommodate planned storage of waste, and, if required, financial assurance provisions for decommissioning would be applied if the amount of radioactive waste possessed exceeded the limits in the regulations. A licensee would be authorized to store for an additional 5-year period if disposal were not an option, if adequate safety features were in place for the subsequent term, and if the storage period projected was generally consistent with the status of the generator's State or compact disposal facility development program. The staff would assess the reasonableness of the storage planning period.

For nuclear power reactors, the 5-year "limit" is associated with the need to obtain a separate Part 30 license to store LLW. In the following section, the staff discusses eliminating the need for a Part 30 license at the end of five years, and thus, the 5-year provision becomes moot for power reactors.

c. Need for a Part 30 License

GL 81-38 states that, under certain conditions, Part 50 licensees should obtain a Part 30 materials license to store LLW. These conditions are: 1) there exists an unreviewed safety question with the proposed storage facility; 2) the existing license conditions or technical specifications prohibit increased storage; or 3) the planned storage time exceeds five years. NRC regulations, however, do not require a separate Part 30 license for power reactors for LLW storage, because power reactor licensees are already authorized under Part 30 to possess byproduct materials produced by the operation of the facility within the limits of their operating license. GL 81-38 states that the application for a Part 30 license "is for the administrative convenience of the Commission and is not intended to be substantively different than an application for amendment of the facility operating license," (i.e., the Part 50 license). Because Part 50 licensees are already authorized under Part 30 to possess their LLW, the staff has revised the guidance to state that these licensees should amend their Part 50 licenses when the storage of LLW is not within the limits of their current operating license. In the February 1, 1994, Commission response to SECY-93-323, recommending withdrawal of the on-site storage rulemaking, the Commission directed the staff to eliminate the requirement for power reactor licensees to obtain a separate Part 30 license. The guidance enclosed has been revised to reflect this direction, for the reasons stated above.

d. 10 CFR 50.59 LLW Storage Evaluations

GL 81-38 states that, for proposed increases in storage capacity for LLW generated by normal reactor operation and maintenance, the licensee must evaluate the safety of the proposal under the provisions of §50.59. 10 CFR 50.59(a)(1), however, states only the following as the conditions where such an evaluation may be performed:

> "...the holder of a license authorizing operation of a production or utilization facility may (i) make changes in the facility as described in the safety analysis report, (ii) make changes in the procedures as described in the safety analysis report, and (iii) conduct tests or experiments not described in the safety analysis report, without prior Commission approval, unless the proposed change, test, or experiment involves a change in the technical specifications incorporated in the license or an unreviewed safety question."

The existing staff guidance in GL 81-38 that a §50.59 evaluation is required for storage of LLW is not always appropriate. As noted earlier, Part 50 licensees are already authorized under Part 30 to possess byproduct materials produced by the operation of their facility, within the limits of their operating license. Further, licensees may already have addressed storage of LLW in their safety analysis reports. In instances where no changes in the facility or procedures as described in the safety analysis report are involved in the storage of LLW, then a §50.59 evaluation would not be required. Thus, the guidance in the enclosure has been revised to acknowledge this possibility, and §50.59 evaluations are no longer required for all cases, but only where the conditions in §50.59 apply.

The staff's interest in this area is to ensure that licensees perform an evaluation of the safety of LLW storage, document that evaluation, and make it available for NRC staff inspections. To this end, the guidance has been revised to state that licensees should either: 1) amend their licenses where necessary to allow storage of LLW; 2) perform a §50.59 evaluation, document the evaluation, and report it to the Commission annually; or 3) conduct an evaluation under §20.1501 and maintain a record of the results in accordance with §20.2103(a). These revisions to the guidance are consistent with the regulations and will help ensure the consistent and appropriate use of §50.59 evaluations by Part 50 licensees. It should be noted that commercial storage of LLW generated by other licensees on the reactor site would still require a separate Part 30 license for the operation of that facility.

e. Waste Form

NRC's existing guidance on waste forms for storage does not adequately consider storage and disposal as a system for waste management, especially considering long-term storage and changing requirements for waste forms for disposal. IN 90-09 states that, "In general, waste should be processed before storage, packaged in a form ready for transport and disposal at the end of the storage period, and clearly labeled in accordance with 10 CFR Subsection

20.203(f) and Section 20.311. Adequacy of the waste form or package may have to be reassessed before disposal." The intention of this provision was to ensure that waste could be stored in a stable form and to eliminate double handling of the LLW, and the resultant increase in radiation exposures, from processing waste into one form for storage and then into another for disposal. In hindsight, the guidance was too optimistic in expecting disposal authorities to set disposal criteria in time for licensees to take them into account for storage. Once a site is selected and a performance assessment conducted, it may be necessary to establish special requirements for waste forms to reduce leaching of certain radionuclides, or to limit the concentration of these radionuclides in the waste form, so that the overall release limits for the facility may be met. If waste forms designed to meet the current waste form acceptance criteria were later unable to meet the new facility requirements, the doses from reworking the waste form could be significant. The current provision contains no guidance on whether deviations might be acceptable, or even explicit acknowledgment that they may be necessary. Putting waste into a form suitable for disposal when it goes into storage could also discourage development of new technology for processing and stabilization.

The staff continues to believe that placing waste into storage in a form suitable for disposal is desirable, but only if there is sufficient assurance that the waste form will be ultimately acceptable for disposal. Because that assurance is in many cases not available, the staff is proposing to revise the guidance in IN 90-09 to allow generators to have additional flexibility when waste form requirements for individual facilities have not been established. Generators are advised to consult with their States/compacts before deciding on a waste form for storage. In some cases, generators will be able to have a high degree of assurance that a waste form will be acceptable for disposal in the future. In others, they can choose forms, such as high-integrity containers, that are acceptable by today's standards, but allow the waste to be easily removed and placed into a form meeting new acceptance criteria, if necessary. In others, they may choose to store in a form that allows for safe storage, but that does not attempt to meet any disposal facility waste form standards.

The changes the staff has adopted are also consistent with the International Atomic Energy Agency's (IAEA) standard "Pre-disposal Management of Radioactive Waste," dated January 1993. Their position is that, "In the absence of acceptance criteria for disposal, the waste form and waste package shall comply with the waste management principles and any special requirements for storage, and preliminary acceptance requirements for waste disposal where a repository is available." The IAEA document further states, "(W)here a disposal route has not yet been defined, then the main objective must be to ensure that the waste can be processed and stored safely in a form that will not unreasonably foreclose the options for final disposal."

f. Level of Specificity in Guidance

NRC regional staff have expressed a desire for more detailed design guidance to review licensees' evaluations of waste storage facilities. Regional staff

have noted that the review of the 10 CFR 50.59 evaluation prepared by the Perry Nuclear Power Plant staff for a LLW storage facility required significantly more staff time than regional inspectors are budgeted for such reviews, in part because detailed guidance was not available to conduct the review.

To address this need, the staff intends to develop additional guidance for Core Inspection Procedure 84750, "Radioactive Waste Treatment and Effluent and Environmental Monitoring," and, where necessary, in the companion procedure 65051, "Low-Level Radioactive Waste Storage Facilities," so that inspectors can more easily determine whether a licensee's safety analysis of a storage facility is acceptable. The staff will also revise, as necessary, the training course H-202, "Radwaste Management Course," to better address these issues. Where inspectors need assistance, for unusual situations, they can request headquarters' staff assistance through the technical assistance procedure currently in place.

g. Other Issues

Several other minor changes have been made to the guidance. It now includes the latest Commission statements on LLW storage from the February 1, 1994, SRM, withdrawing the proposed on-site storage rulemaking. The guidance also states that it can be used for storage of Greater-Than-Class C LLW; that the Commission policy of opposing any non-reactor related activities at a power reactor site applies to shutdown reactors, not just operating reactors or reactors under construction; and that all Part 50 licensees are included within the scope of the guidance, not just power reactors.

h. Role of Agreement States

Agreement States have several interests in NRC's LLW storage guidance. Although this guidance, like all NRC guidance, is not a matter of compatibility, States may use it in developing their own storage guidance. In addition, the staff guidance in Attachment 4 on licensing of commercial LLW storage at a power reactor site addresses licensing by Agreement States.

In the past, Agreement States have generally indicated that NRC storage guidance is adequate, as reported in a staff memorandum to the Commission dated October 27, 1992. As noted below, the staff is planning to send the revised storage guidance to the Agreement States for review and comment.

RESOURCE IMPACTS

The resources to implement the changes to the guidance are minimal or already included within budgeted activities. The proposed changes will be sent to the Agreement States for review and comment. The staff does not expect significant comments from the States, as noted above.

COORDINATION

The Office of the General Counsel has reviewed this paper and has no legal objection.

CONCLUSION

The staff plans to issue the revised LLW storage guidance included in the Enclosure to address the issues discussed above. After review and comment by the Agreement States, it will subsequently be issued for review and comment by the public before the final guidance is published.

James M. Taylor
Executive Director
for Operations

Enclosure: Generic Letter
on "Extended Interim
Storage of Low-Level
Radioactive Waste"

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June XX, 1994

NRC GENERIC LETTER YY-##: EXTENDED INTERIM STORAGE OF LOW-LEVEL RADIOACTIVE WASTE

Addressees

All NRC licensees

Purpose

The U.S. Nuclear Regulatory Commission is issuing this generic letter to update and consolidate previous generic letters and information notices addressing storage of low-level radioactive waste (LLW). NRC staff has revised the original guidance based on staff and licensees' experience with LLW storage, and the current status of the national program for developing new LLW disposal capacity. It is expected that licensees will review the information contained in this letter for applicability to their facilities, and consider actions, as appropriate, to ensure safe storage of their LLW. However, suggestions contained in this generic letter are not NRC requirements; therefore, no specific action or written response is required.

Background

The information contained in this letter updates and supersedes NRC guidance previously contained in the following:

- Generic Letter 81-38: Storage of Low-Level Radioactive Waste at Power Reactor Sites.
- Generic Letter 85-14: Commercial Storage at Power Reactor Sites of Low-Level Radioactive Waste Not Generated by the Utility.
- Information Notice 89-13: Alternative Waste Management Procedures in Case of Denial of Access to Low-Level Waste Disposal Sites.
- Information Notice No. 90-09: Extended Interim Storage of Low-Level Radioactive Waste by Fuel Cycle and Materials Licensees.

Description of Circumstances

The Low-Level Radioactive Waste Policy Amendments Act of 1985 (LLRWPAA) established a series of milestones, penalties, and incentives for States and

Enclosure

compacts to establish and operate new LLW disposal facilities. One of these is the ability of compacts and/or certain States with operating disposal sites to close or limit access to their facilities. On January 1, 1993, and in accordance with the authority provided under the LLRWPAA, the State of Nevada closed the Beatty, Nevada, site permanently, and the State of Washington limited access to the Hanford, Washington, site to LLW generators in the Northwest and Rocky Mountain Compacts only. On June 30, 1994, the State of South Carolina closed the remaining facility in Barnwell, South Carolina, to all out-of-compact generators. The State plans on closing the facility permanently on December 31, 1995.

While access to disposal facilities has diminished, the progress of States and compacts in developing new LLW disposal facilities in accordance with the LLRWPAA has been slower than originally expected. Many States hosting new facilities are not anticipating operation of these until late in the 1990's, years after the Barnwell facility closes. Thus, generators of LLW in many of these States will have to store their LLW for an extended interim period until new facilities are in operation.

In recognition of the need for alternatives for managing LLW without a disposal option, NRC staff has issued guidance, beginning in 1981, to help ensure that licensees take appropriate actions to manage and store LLW safely. Four principal documents addressing storage of LLW have been published by the staff, as identified in the background section of this letter. Based on staff and licensee experience in using these documents, and in recognition of the fact that LLW storage is expected to be the principal means for managing LLW for at least the next several years, the staff has made several revisions to this guidance. The four documents have now been consolidated into this single document, which supersedes the previous documents. This document addresses the overall management of waste when disposal facilities are not yet available.

Discussion

NRC Position on LLW Storage

NRC continues to encourage the development of new disposal capacity by the States and the prompt disposal of LLW wherever possible, consistent with the goals and objectives of the LLRWPAA and the protection of the public health and safety and the environment. NRC expects LLW disposal sites to be sited and developed in a timely manner and that stakeholders, including waste generators and States, will continue to take all reasonable steps to assure that LLW disposal capacity is available in the near future.

NRC's position continues to be that storage is not a substitute for disposal. Other than storage for decay, LLW should be stored only when disposal capacity is unavailable and for no longer than is necessary. Licensee planning should consider a specific date by which storage is projected to end and disposal of LLW should begin, based on the current status of the State or regional compact program for developing new disposal capacity. While it may be prudent and/or necessary to establish additional onsite storage capability, waste should not be placed in contingency storage if the ability to dispose of waste at a

licensed disposal site exists. The shipping of waste at the earliest practicable time minimizes the need for eventual waste reprocessing due to possibly changing disposal facility requirements, reduces occupational and non-occupational exposures and potential accident consequences, and in the event of disposal facility closure, maximizes the amount of storage space available for use.

Staff Guidance on LLW Storage

Previous staff guidance identified in the background section has been revised and consolidated into this single Generic Letter. Attachment 1 addresses alternative steps that licensees can take to better manage their LLW when disposal in a licensed disposal site is no longer an option. It is based on Information Notice (IN) 89-13. Attachment 2 contains information for materials and fuel cycle licensees to consider for on-site storage of LLW and is based on IN 90-09. Attachment 3 contains information for 10 CFR Part 50 licensees, and is based on Generic Letter (GL) 81-38. Attachment 4 contains NRC guidance on storage of other persons's LLW at nuclear power reactors, and is based on the previous GL 85-14 on this subject. Attachment 5 contains a list of recently issued NRC generic letters.

Need for a License Amendment

In planning for and implementing a LLW storage program, licensees should consider the information presented in this letter. In some cases, storage will be authorized under the existing license and therefore not all licensees who will need to store LLW on-site will need amendments to their licenses to do so. In other cases, the possession limits specified in the license (for materials licensees) may need to be increased, or the license terms and conditions may otherwise need to be modified to permit the storage of LLW. In such cases, licensees will need to apply for an amendment to their license.

Mixed Waste

Some licensees will need to store LLW that also contains hazardous wastes, as specified under the Resource Conservation and Recovery Act (RCRA), as amended. These mixed wastes, as they are called, are regulated both by NRC - for the radioactive component of the waste - and the U.S. Environmental Protection Agency (EPA) - for the hazardous component of the waste. The guidance contained in this letter applies to materials being stored in accordance with NRC's regulations only. For information on permitting of storage by EPA, licensees should contact the appropriate EPA regional office or, in those States with approved mixed waste programs, the appropriate State regulatory authority, to identify additional considerations for the hazardous component of the mixed waste.

Greater-Than-Class C Waste LLW

The information in this letter is generally applicable to the management and storage of Greater-Than-Class C (GTCC) LLW. IN 93-50, "Extended Storage of Sealed Sources" addresses storage of a specific type of (GTCC) waste and should be consulted for additional information.

Emergency Access

A number of parties have inquired about the granting of emergency access under the provisions of Section 6 of the LLRWPAA. Under this provision, "Any generator of low-level radioactive waste, or any Governor...may request that the Nuclear Regulatory Commission grant emergency access to a regional disposal facility...for specific low-level radioactive waste." As a precondition to requesting an emergency access determination from NRC, a LLW generator or governor must be denied access to all existing LLW disposal facilities. On February 3, 1989, NRC issued a new rule, 10 CFR Part 62, in the Federal Register (54 FR 5409) which establishes criteria and procedures to be used in determining whether emergency access should be granted. These criteria and procedures, consistent with Congressional intent, view the granting of emergency access as a last resort. Therefore, waste generators should be aware that only under the most limited and rare circumstances would generators be granted such access. IN 91-65, "Emergency Access to Low-Level Radioactive Waste Disposal Facilities," contains additional information on NRC's consideration of such requests.

Related Generic Communications

1. IN 91-65, "Emergency Access to Low-Level Radioactive Waste Disposal Facilities," October 16, 1994.

2. IN 93-50, "Extended Storage of Sealed Sources," July 8, 1994.

3. IN 94-23, "Guidance to Hazardous Radioactive and Mixed Waste Generators on the Elements of a Waste Minimization Program," March 25, 1994.

This generic letter requires no specific action or written response. If you have any questions about this matter, please contact the technical contact listed below or the appropriate regional office.

James M. Taylor
Executive Director
for Operations

Attachments: As stated

Technical Contact: James E. Kennedy
(301)-415-6668

ALTERNATIVE WASTE MANAGEMENT PROCEDURES IN
CASE OF DENIAL OF ACCESS TO LOW-LEVEL WASTE DISPOSAL SITES
(Based on Information Notice 89-13)

General

The objective of this staff position is to describe different methods of managing low-level radioactive waste (LLW) when access to a disposal site is no longer available. Storage of LLW is not the only method for managing wastes when disposal is not an option. Licensees can manage their LLW and improve the protection of public health and safety by considering the measures described here and implementing them where possible. These steps include minimizing the generation of LLW by reducing the use of radioactive materials, processing of the waste to minimize its volume, and disposing of the LLW by alternative methods authorized in NRC regulations.

Staff Guidance

Following are examples of suggested actions to be considered which should help to mitigate the impact of storing LLW.

1. Determine how much of your waste goes to a licensed disposal site, either directly or indirectly through a "waste broker," and thus will have to be stored or otherwise managed when access to a disposal facility is denied.

2. Evaluate potential safety problems and technical difficulties that might result if radioactive waste remains in storage at your facilities for long periods of time, e.g., package deterioration, inventory control, and fire hazards. Attachments 2 and 3 identify specific hazards and other considerations for ensuring that LLW is stored safely for materials and fuel cycle, and reactor licensees, respectively.

3. Review alternatives to minimize generation of waste shipped to disposal sites. NRC Information Notice 94-23, "Guidance to Hazardous Radioactive and Mixed Waste Generators on the Elements of a Waste Minimization Program" provides guidance prepared by Environmental Protection Agency (EPA) on waste minimization for hazardous waste that may be applicable to LLW as well. Some alternatives for waste minimization include:

   a. Carefully segregating long-lived radioactive waste from short-lived and non-radioactive waste.

   b. Stopping unnecessary work that generates waste.

   c. Changing processes, procedures, or radionuclides, to reduce volume of generated waste.

   d. Using volume-reduction techniques, such as compaction.

4. Review alternative waste management and disposal methods. Other authorized disposal methods are identified in 10 CFR Part 20, Subpart K,

"Waste Disposal." Some specific alternatives for managing and disposing of LLW are:

a. Transfer of unneeded sealed sources to their respective manufacturers.

b. Release of radioactive effluents in accordance with §20.2003, "Disposal by release into sanitary sewerage."

c. Decay-in-storage.

d. Incineration in accordance with §20.2004, "Incineration."

e. Interim storage pending transfer to a licensed disposal site, if access is restored in the future.

f. Other disposal methods, as authorized by NRC under the provisions of §20.2002, "Method for obtaining approval of proposed disposal procedures."

5. For waste management measures that are not currently authorized by your NRC license, consider requesting an amendment to your license to authorize additional waste management actions in the event of restricted access to disposal facilities. Examples would be amendments to authorize increased possession limits, decay-in-storage, incineration, or use of interim storage facilities.

The above suggestions would not be a permanent solution to waste disposal restrictions, but would better ensure that licensees have contingency plans in place to avoid safety violations and to minimize disruption of licensed activities.

GUIDANCE ON EXTENDED INTERIM STORAGE
OF LOW-LEVEL RADIOACTIVE WASTE BY
FUEL CYCLE AND MATERIALS LICENSEES
(Based on Information Notice 90-09)

General

The objective of this staff position is to provide guidance to materials and fuel cycle licensees for the safe storage of low-level radioactive wastes (LLW). The information contained in this attachment can be used as the basis for an amendment to a license, when an amendment is required, or for internal reviews assessing the safety of LLW storage. The duration of the intended storage, the type and form of waste, and the amount of radioactive material present will dictate the safeguards and the level of complexity required to assure public health and safety and minimal risk to operating personnel. The longer the intended storage period, the greater the degree of controls that will be required for radiation protection and accident prevention.

In the interest of public health and safety, as well as maintaining exposures as low as reasonably achievable (ALARA), the length of time LLW is placed in storage should be kept to a minimum. Accordingly, the Nuclear Regulatory Commission's approval of requests by materials and fuel cycle licensees for extended interim storage will generally be for a period of time no greater than 5 years, consistent with current license terms. Additional 5 year terms will be considered based on need in conjunction with license renewal reviews. Additional safety features may be required by NRC at the start of a new term, based on the experiences with storing LLW and safety and environmental reviews that accompany renewal reviews.

The information presented here may also be useful to persons considering applying for a license to construct a centralized storage facility to receive waste from others until State or regional compact disposal capacity is available.

The following considerations are central to extended interim storage and are the basis for the guidance in the following section:

- To ensure integrity of packaging and maintenance of waste form, stored waste should be shielded from the elements and from extremes of temperature and humidity.

- Waste should be stored in an area that allows for ready visual (direct or remote) inspection on a routine basis. Licensees should plan to conduct and document such inspections at least quarterly.

- Depending on the specific waste involved, licensees may need to have procedures and equipment in place or readily available to repackage the waste, should the need arise.

- Decomposition and chemical reaction of incompatible waste materials over time can result in gas generation or other reaction products. Licensees should evaluate what they are planning to store and use measures to prevent these reactions. Further, licensees should determine if the need exists for additional ventilation or fire protection/suppression systems.

- For most waste forms, storage of waste will not represent a significant increase of direct radiation exposure potential to workers. However, licensees should consider their specific waste and storage plans and determine if additional shielding or other actions are warranted to keep exposures ALARA.

- Stored waste should be located in a restricted area and secured (e.g., in a locked room) against unauthorized removal for the term of storage.

- Where possible, waste should be processed before storage, packaged in a form ready for transport and disposal at the end of the storage period in accordance with the requirements in 49 CFR Parts 170-189 and 10 CFR Part 61, respectively, and clearly labeled in accordance with 10 CFR 20.1904(a) and 20.2006. Adequacy of the waste form or package may have to be reassessed before disposal. In the absence of waste acceptance criteria for disposal, the waste form and waste package should comply with any special requirements needed for safe storage, and preliminary acceptance requirements for waste disposal, where there is assurance that these will not change. Where a disposal route has not yet been defined, waste should be processed and stored safely in a form that will not unreasonably foreclose future options.

Staff Guidance

The following paragraphs identify the information that NRC considers necessary in an amendment request from a materials or fuel cycle licensee to authorize extended interim storage of LLW. The information presented here can also be used in licensee's internal reviews and analyses for the storage of LLW.

1. Identification of Waste to be Stored

   a. Specify any possession limit increases needed for extended interim storage of LLW.

   b. Identify the estimated maximum amount of LLW to be stored, both in terms of volume and activity, by radionuclide.

c. Characterize the LLW to be stored:

(1) Volume of waste by Class (A, B, or C)

(2) Physical form of the waste: solid; liquid; or gas

(3) Waste processing to be performed: volume reduction, solidification, or other treatment.

(4) Additional non-radiological properties of LLW (if any): hazardous; biologic/pathogenic; corrosive; flammable; etc.

d. Describe the amount and type of LLW currently being stored and/or processed.

e. Identify any additional permits or approvals necessary for storage (e.g., U.S. Environmental Protection Agency hazardous waste permit, and State or local approvals) and the status of each required approval.

2. Plans for Final Disposal

a. Specify when disposal capacity will no longer be available and on-site storage will begin.

b. Specify the State/regional disposal facility to be used for ultimate disposal of your LLW and when that facility is scheduled to begin accepting LLW. Your regional compact or State LLW authority should be able to provide this information if you do not have it.

c. Specify when you will begin shipping LLW to that facility and how long it will take for your estimated storage inventory to be moved out.

3. Physical Description of Storage Area

a. Identify the location and provide a diagram of the LLW storage area that demonstrates where packages will be stored and how packages will be accessible for inspection purposes. Include the locations of waste processing equipment (if applicable), air sampling stations, effluent filters, and any sources of flammable or explosive material.

b. Specify the maximum volume of LLW that can be stored in the proposed waste storage area and relate this to annual volume of waste generated.

c. Specify the type of building/structure in which the waste will be stored and describe vulnerability to hazards such as tornado, hurricane, flood, and industrial accidents. Describe the State and

local building codes it will be required to meet. Demonstrate that the waste will be adequately protected from weather at all times.

d. Describe the measures to control access to the LLW storage area and thereby ensure security of the waste.

e. Describe the ventilation system and how it will ensure adequate ventilation of the storage area.

f. Describe the fire protection and suppression system, to minimize the likelihood and extent of fire.

g. Describe how the adverse effects of extremes of temperature and humidity on waste and waste containers will be avoided.

4. Packaging and Container Integrity

a. Describe the packages or containers to be used for storage of LLW, any hazards the waste may pose to their integrity, and the project storage life of the packages or containers.

b. Describe your program for periodic inspections of LLW packages to ensure that they retain their integrity and containment of LLW.

c. Describe your program and equipment (if applicable) for remote handling and/or repackaging damaged or leaking waste containers.

5. Radiation Protection

a. Describe your program for safe placement and inspection of waste storage and maintaining occupational exposures 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 10 CFR 20.1901.

b. Describe projected exposure rates, needs for shielding (if any) and changes in personnel monitoring that will be required as a result of waste storage.

c. Describe your procedures for responding to emergencies, including notification of and coordination with local fire, police, and medical departments.

d. Describe your system for maintaining accurate records of waste in storage (including any waste receipts or transfers from or to other licensees) to ensure accountability.

6. Training

   a. Describe your program for training personnel in procedures for packaging, handling, placement, inspection, surveying and emergency response for LLW storage.

7. Financial Assurance

   a. Review the relevant sections of 10 CFR Parts 30, 40 and 70 regarding financial assurance for decommissioning. If your proposed maximum possession limits exceed the limits specified in 10 CFR 30.35, 40.36 or 70.25, submit with your amendment request a decommissioning funding plan or certification of financial assurance, as appropriate. In either case, this submittal should demonstrate that financial resources are or will be in place not only to decommission the licensed operation, but also to provide for the estimated costs of handling, transport, and ultimate disposal of all LLW stored on-site.

8. Emergency Preparedness

   a. Review the relevant sections of Parts 30, 40 and 70 regarding emergency preparedness. If your proposed maximum possession limits exceed the limits specified in 10 CFR 30.32(i)(1), 40.31(j)(1) or 70.22(i)(3), you will be required to either demonstrate that an emergency plan is not needed or to develop and maintain a plan that meets the requirements of the aforementioned sections.

GUIDANCE ON EXTENDED INTERIM STORAGE
OF LOW-LEVEL RADIOACTIVE WASTE
BY 10 CFR PART 50 LICENSEES
(Based on Generic Letter 81-38)

General

The objective of this technical position is to provide radiological safety guidance for the storage of low-level radioactive waste (LLW). It applies to the design and operation of extended interim LLW storage facilities constructed and operated by 10 CFR Part 50 licensees. Necessary design features and administrative controls for LLW storage will be dictated by such factors as the waste form, concentrations of radioactive material in individual waste containers, total amount of radioactivity to be stored, and retrievability of waste. This guidance should be used in the design, construction and operation of your storage facility.

The information contained here can be used as the basis for an amendment to a license, when one is required, or, if an amendment is not needed, for internal reviews assessing the safety of LLW, including those conducted under 10 CFR 50.59.

Safety and Licensing Reviews

For proposed increases in storage capacity for LLW generated by normal reactor operation and maintenance, the safety of the proposal must be evaluated. Generally, Part 50 licensees are already authorized under 10 CFR Part 30 to possess byproduct materials produced by the operation of their facility, within the limits of their operating license, and will have described storage of LLW in their safety analysis report. In cases where no changes in the facility or procedures, as described in the safety analysis report are involved for storage of LLW, the licensee should prepare safety evaluations of such storage in accordance with 10 CFR 20.1501 and maintain a record of the results in accordance with 10 CFR 20.2103(a).

In cases where the provisions of 10 CFR 50.59 apply, the licensee may provide the added capacity, document the §50.59 evaluation and report it to the Commission annually or as specified in the license. When §50.59 evaluations are required, note that Inspection and Enforcement Circular No. 80-19, dated August 22, 1980, provides information on preparing §50.59 evaluations for changes to radioactive waste treatment systems.

If you determine that an unreviewed safety question exists, or that a change in the technical specifications is required, as specified in §50.59, or that an existing license condition needs to be changed to accommodate LLW storage, authority for storage should be requested through application for an amendment to your §50 license to the Office of Nuclear Reactor Regulation (NRR), accompanied by an environmental evaluation that considers the incremental impact as related to reactor operations. Application should also be accompanied by a showing that the storage provisions will not impact on the safety of reactor operations and will not foreclose alternatives for disposal of the wastes.

NRR will notice the receipt of application in the Federal Register, offer opportunity for public hearing, and will perform an environmental assessment to determine if the proposed activity will significantly affect the quality of the environment. Facility construction before the staff's determination would be carried out at the licensee's risk. Nuclear Regulatory Commission jurisdiction will be retained in Agreement States in accordance with 10 CFR 150.15(a)(1) for storage of LLW generated and stored on-site. Indemnity coverage will be provided under and in accordance with your existing indemnity agreement with the Commission.

Planning for temporary waste storage should be for a period of time based on the status of the licensee's State or regional compact disposal facility program.

Before any implementation of additional on-site storage, necessary safety review and environmental assessments should be conducted to assure adequate public health and safety and minimal environmental impact. The acceptance criteria and performance objectives of any proposed storage facility, or area, will need to meet minimal requirements in areas of design, operations, safety considerations and policy considerations. For purposes of this technical position, the major emphasis will be on safety considerations in the storing, handling and eventual disposition of the radioactive waste. Design and operational acceptability will be based on minimal requirements which are defined in existing Standard Review Plans (SRPs), regulatory guides, and industry standards for proper management of radioactive waste. Considerations for waste minimization and volume reduction will also have to be incorporated into an overall site waste management plan and the onsite storage alternative. Additional waste management considerations for as low as reasonably achievable (ALARA), decontamination, and decommissioning of the temporary storage facility, including disposal, should be performed as early as possible. Facility design and operation should ensure that radiological consequences of design basis events (fire, tornado, seismic event, flood) should not exceed a small fraction (10 percent) of 10 CFR Part 100, i.e., no more than a few rem whole body dose.

Where possible, waste should be processed before storage, packaged in a form ready for transport and disposal at the end of the storage period in accordance with the requirements in 49 CFR Parts 170-189 and 10 CFR Part 61 respectively, and clearly labeled in accordance with 10 CFR 20.1904(a) and 20.2006. Adequacy of the waste form or package may have to be reassessed before disposal. In the absence of waste acceptance criteria for disposal, the waste form and waste package should comply with any special requirements needed for safe storage, and preliminary acceptance requirements for waste disposal, where there is assurance that these will not change. Where a disposal route has not yet been defined, waste should be processed and stored safely in a form that will not unreasonably foreclose future options.

Guidance similar to that provided here has been incorporated in NUREG-0800, NRC/NRR Standard Review Plan, July 1981, as Appendix II.4-A to SRP 11.4, Solid Waste Management Systems. NUREG/CR-4062, "Extended Storage of Low-Level Radioactive Waste: Potential Problem Areas," also contains useful information

on safety hazards associated with the storage of LLW and can be considered in safety reviews and analyses.

Staff Guidance

I. General

a. The quantity of radioactive material allowed and the shielding configuration will be dictated by the dose rate criteria for both the site boundary and unrestricted areas onsite. The 40 CFR Part 190 limits will restrict the annual dose from direct radiation and effluent releases from all sources of uranium fuel cycle and 10 CFR 20.1301 limits the exposure rates in unrestricted areas. Off-site doses from onsite storage must be sufficiently low to account for other uranium fuel cycle sources (e.g., an additional dose of $\leq$ 1 mrem/year is not likely to cause the limits of Part 190 to be exceeded). On-site dose associated with temporary storage will be controlled per 10 CFR Part 20, including the ALARA principle of 10 CFR 20.1101.

b. Compatibility of the container materials with the waste forms and with environmental conditions external to the containers is necessary to prevent significant container corrosion. Container selection should be based on data that demonstrate minimal corrosion from the anticipated internal and external environment for a period well in excess of the planned storage duration. Container integrity after the period of storage should be sufficient to allow handling during transportation and disposal without container breach.

Gas generation from organic materials in waste containers can also lead to container breach and potentially flammable/explosive conditions. To minimize the number of potential problems, the waste form gas generation rates from radiolysis, biodegradation, or chemical reaction should be evaluated with respect to container breach and the creation of flammable/explosive conditions. Unless storage containers are equipped with special vent designs that allow depressurization and do not permit the migration of radioactive materials, resins highly loaded with radioactive material, such as boiling water reactor water cleanup system resins, should not be stored for a period in excess of approximately 1 year.

A program of at least periodic (quarterly) visual inspection of container integrity (swelling, corrosion products, breach) should be performed. Inspection can be accomplished by use of TV monitors; by walk-throughs if storage facility layout, shielding, and the container storage array permit; or by selecting waste containers that are representative of the types of waste and containers stored in the facility and placing them in a location specifically designed for inspection purposes. All inspection procedures developed should minimize occupational exposure. The

use of high integrity containers (300-year lifetime design) would permit an inspection program of reduced scope.

c. If possible, the preferred location of the additional storage facility is inside the plant protected area. If adequate space in the protected area is not available, the storage facility should be placed on the plant site and both a physical security program (fence, locked and alarmed gates/doors, periodic patrols) and a restricted area for radiation protection purposes should be established. The facility should not be placed in a location that requires transportation of the waste over public roads unless no other feasible alternatives exist. Any transportation over public roads must be conducted in accordance with NRC and Department of Transportation (DOT) regulations.

d. For Dry LLW and Solidified LLW Storage:

1. Potential release pathways of all radionuclides present in the solidified waste form shall be monitored as per Part 50, Appendix A. Surveillance programs shall incorporate adequate methods for detecting failure of container integrity and measuring releases to the environment. For outside storage, periodic direct radiation and surface contamination monitoring shall be conducted to ensure that levels are below limits specified in 10 CFR 20.1502 and 20.1906, and 49 CFR 173.397. All containers should be decontaminated to these levels or below before storage.

2. Provisions should be incorporated for collecting liquid drainage, including provisions for sampling all collected liquids. Routing of the collected liquids should be to radwaste systems if contamination is detected or to normal discharge pathways if the water ingress is from external sources and remains uncontaminated.

3. Waste stored in outside areas should be held securely by installed hold-down systems. The hold-down system should secure all containers during severe environmental conditions up to, and including, the design basis event for this waste storage facility.

4. Container integrity should be ensured against corrosion from the external environment; external weather protection should be included where necessary and practical. Storage containers should be raised off storage pads, where water accumulation can be expected to cause external corrosion and possible degradation of container integrity.

5. Total curie limits should be established, based on the design of the storage area and the safety measures provided.

6. Inventory records of waste types, contents, dates of storage, shipment, etc., should be maintained.

II. Wet LLW Storage

a. Wet radioactive waste is defined as any liquid or liquid/solid slurry. For storage considerations, wet waste is further defined as any waste that contains free liquid in amounts which exceed the requirements for disposal as established by the disposal facility licensing authority.

b. The facility supporting structure and tanks should be designed to prevent uncontrolled releases of radioactive materials because of spillage or accident conditions.

c. The following design objectives and criteria are applicable for wet radioactive waste storage facilities:

1. Structures that house liquid radwaste storage tanks should be designed to seismic criteria as defined in the SRP, Section 11.2. Foundations and walls shall also be designed and fabricated to contain the liquid inventory that might be released during a container/tank failure.

2. All tanks or containers should be designed to withstand the corrosive nature of the wet waste stored. The duration of storage under which the corrosive conditions exist shall also be considered in the design.

3. All storage structures should have curbs or elevated thresholds, with floor drains and sumps to safely collect wet waste, assuming the failure of all tanks or containers. Provisions should be incorporated to remove spilled wet waste to the radwaste treatment systems.

4. All tanks and containers shall have provisions to monitor liquid levels and to alarm potential overflow conditions.

5. All potential release pathways of radionuclides (e.g., evolved gases, breach of container, etc.) shall be controlled, if feasible, and monitored in accordance with Part 50, Appendix A (General Design Criteria 60 and 64). Surveillance programs should incorporate adequate methods for monitoring breach-of-container integrity or accidental releases.

6. All temporarily stored wet waste will require additional reprocessing before shipment offsite; therefore, provisions should be established to integrate the required treatment with the waste processing and solidification systems. The interface and associated systems should be designed and tested in accordance with the codes and standards described in the SRP Section 11.

III. Solidified LLW Storage

a. Solidified radwaste for storage purposes shall be defined as that waste which meets disposal facility solidified waste criteria. For purposes of this document, resins or filter sludges dewatered to the above criteria should be considered under the waste classification/criteria in Section (d) which follows.

b. Any storage plans should address container protection as well as any reprocessing requirements for eventual shipment and burial.

c. Casks, tanks, and liners containing solidified radioactive waste should be designed to State and local codes to preclude or reduce the probability of occurrence of uncontrolled releases of radioactive materials because of handling, transportation or storage. Accident mitigation and control for design basis events (e.g., fire, flooding, tornadoes, etc.) must be evaluated and protected against unless otherwise justified.

d. The following design objectives and criteria are applicable for solidified waste storage containers and facilities:

1. All solidified radwaste should be located in restricted areas where effective material control and accountability can be maintained. Although structures are not required to meet seismic criteria, protection should be afforded to ensure the radioactivity is contained safely. State and local building codes should be met. In addition, other measures, such as the use of curbs and drains to contain spills of dewatered resins or sludges, should be utilized.

2. If liquids exist that are corrosive, proven provisions should be made to protect the container (i.e., special liners or coatings) and/or to neutralize the excess liquids. If deemed appropriate and necessary, highly non-corrosive materials (e.g., stainless steel) should be used. Potential corrosion between the solid waste forms and the container should also be considered. In the case of dewatered resins, highly corrosive acids and bases can be generated that will significantly reduce the longevity of the container. The Process Control Program should implement steps to ensure the above does not occur; provisions on container material selection and precoating should be made to ensure that container breach does not occur during temporary storage periods.

3. Provision should be made for additional reprocessing or repackaging because of container failure and/or, as required for final transporting and disposal as per DOT and disposal facility criteria. Contamination isolation and decontamination capabilities should be developed. When significant handling and personnel exposure can be anticipated, ALARA methodology should be incorporated as per Regulatory Guides 8.8 and 8.10.

4. Procedures should be developed and implemented for early detection, prevention and mitigation of accidents (e.g., fires). Storage areas and facility designs should incorporate good engineering features and capabilities for contingencies so as to handle accidents and provide safeguard systems such as fire detectors and suppression systems (e.g., smoke detector and sprinklers). Personnel training and administrative procedures should be established to ensure both control of radioactive materials and minimum personnel exposures. Fire suppression devices may not be necessary if combustible materials are minimal in the area.

IV. Dry LLW Storage

a. Dry LLW is classified as contaminated material (e.g., paper, trash, air filters) that contains radioactive material dispersed in small concentrations throughout large volumes of inert material and contains no free water. Generally, this consists of dry material such as rags, clothing, paper, and small equipment (e.g. tools and instruments) that cannot be easily decontaminated.

b. Licensees should implement controls to segregate and minimize the generation of dry LLW to lessen the impact on waste storage. Integration of volume reduction hardware should be considered to minimize the need for additional waste storage facilities.

c. The following design objectives and criteria are applicable for dry LLW storage containers and facilities.

1. All dry or compacted radwaste should be located in restricted areas where effective material control and accountability can be maintained. Although structures are not required to meet seismic criteria, protection should be afforded to ensure that the radioactivity is contained safely by use of State and local codes.

2. The waste container should be designed to ensure radioactive material containment during normal and abnormal occurrences. The waste container materials should not support combustion. The packaged material should not cause fires through spontaneous chemical reactions, retained heat, etc.

3. Containers should generally comply with the criteria of 10 CFR Part 71 and 49 CFR Part 170 to minimize the need for repackaging for shipment.

4. Increased container handling and personnel exposure can be anticipated; consequently, methodology for maintaining exposures ALARA should be consistent with Regulatory Guides 8.8 and 8.10.

COMMERCIAL STORAGE AT POWER REACTOR SITES
OF LOW-LEVEL RADIOACTIVE WASTE
NOT GENERATED BY THE UTILITY
(Based on Generic Letter 85-14)

General

Interest has from time to time been expressed in some States regarding commercial storage of low-level radioactive waste (LLW). Commercial storage is storage of LLW, usually from at least several different generators by an organization different from the generators of the LLW, and usually for the purpose of making a financial profit. It could be performed by a company such as a waste broker, or by organizations which already generate waste and are willing to store others waste in their facilities. While the Nuclear Regulatory Commission recognizes that storage is necessary in States where disposal facilities are not available, commercial storage facilities should not become de facto disposal sites. NRC will require for commercial storage under its jurisdiction that, in addition to safe siting and operation, commitments and assurances be made for eventual disposition of all waste stored at commercial storage locations. This includes provisions for repackaging (if necessary), transportation and disposal of the waste, as well as decommissioning of the facilities.

Some of the concepts for commercial storage involve using nuclear power reactor sites to store LLW not generated by the utility licensee. As a matter of policy, NRC is opposed to any activity at a nuclear reactor site that is not generally supportive of activities authorized by the operating license or construction permit and which may divert the attention of licensee management from its primary task of safe operation or construction of the power reactor and implementation of other activities affecting public health and safety. Accordingly, interim storage of LLW within the exclusion area of a reactor site, as defined in 10 CFR 100.3(a), will be subject to NRC jurisdiction, regardless of whether or not the reactor is located in an Agreement State, pursuant to the regulatory policy expressed in 10 CFR 150.15(a)(1). Within Agreement States, for locations outside the exclusion areas, the licensing authority is in the Agreement State.

Guidance

For NRC to consider any proposal for commercial storage at a reactor site, including commercial storage in existing LLW storage facilities, it must be convinced that no significant environmental impact will result and the commercial storage activities will be consistent with and not compromise safe implementation of the licensee's activities, including diverting reactor management attention from the continued safety of reactor operations and decommissioning. A 10 CFR Part 30 license is required for the storage of LLW not generated by the utility and a 10 CFR Part 50 license amendment may also be required. The application must include:

By the Utility

- A determination by the utility licensee that the proposed LLW commercial storage activities do not involve a safety or environmental question, and that safe operation or decommissioning of the reactor will not be affected. In making this determination, the licensee shall consider:

  a. Direct impacts of the commercial storage operation on reactor operations during normal and accident conditions;

  b. Diversion of utility management and personnel attention from safe reactor operation and decommissioning;

  c. Combined effects of on-site and off-site dose during normal and accident conditions;

  d. Influence on effectiveness of reactor emergency plans;

  e. Influence on effectiveness of reactor security plans;

  f. Financial liability provisions, including impact on indemnity coverage; and

  g. Environmental impact of the storage facility, including potential interaction with the generating station.

By the Applicant (the Utility or Another Person):

- Information relating to the safety of the commercial storage operation, consistent with the guidelines in Attachment 2 of this Generic Letter;

- Information relating to the environmental impact of the storage operation in sufficient detail to allow staff to establish the need for preparation of an Environmental Impact Statement (EIS);

- Financial assurance to provide for the commercial storage operation and decommissioning, including any necessary repackaging, transportation, and disposal of the waste; and

- Written agreement from the jurisdiction responsible for ultimate disposal, the State, that provisions are sufficient to ensure ultimate disposal of the stored waste.

The Office of Nuclear Reactor Regulation (NRR) will conduct an environmental review and review the application to determine whether the LLW commercial storage activities on a reactor site impact the safe operation of the reactor or other activities affecting safety. After NRR review, the licensing authority for commercial storage on a reactor site under NRC jurisdiction (all locations in non-Agreement States and locations within reactor exclusion areas in Agreement States) is the Office of Nuclear Material Safety and Safeguards. NRC will assess environmental impact and will issue an EIS, if appropriate, in accordance with provisions of 10 CFR 51.20, 51.21 and 51.25. As part of the

procedures, NRC will provide notice in the Federal Register of receipt and availability of any application received for commercial storage activities. The public notice will also indicate the staff's intent regarding preparation of an Environmental Assessment (EA) and its circulation for public review and comment. An EIS will most likely be needed based on the EA.

Because NRC has not yet received or reviewed an application for a centralized commercial storage facility intended to store large amounts of LLW, NRC will consider applying the criteria described above to such commercial storage facilities whether they be on a reactor site or not. Interim storage of utility licensee-generated LLW will continue to be considered according to the provisions stated in Attachment 3 of this generic letter.

LIST OF RECENTLY ISSUED NRC GENERIC LETTERS

(to be added after this letter has been reviewed by the Commission and is ready to be published)

Attachment 5