

**NUCLEAR REGULATORY COMMISSION**

**NRC-2009-0520**

**Notice of Public Meeting and Request for Comment  
on Blending of Low-Level Radioactive Waste**

**AGENCY:** Nuclear Regulatory Commission.

**ACTION:** Notice of Public Meeting and a Request for Comment on Issues Related to Blending of Low-Level Radioactive Waste.

**SUMMARY:** The U.S. Nuclear Regulatory Commission (NRC) plans to conduct a public meeting on January 14, 2009, in Rockville, MD, to solicit input on issues associated with blending of low-level radioactive waste (LLRW). Since the closure of the LLRW disposal facility at Barnwell, South Carolina on June 30, 2008 to out-of-compact generators, the issue of blending of LLRW has received increased attention from stakeholders, industry, and Agreement States, especially blending that results in a change in the classification of the waste, as defined by the radionuclide concentrations in 10 CFR Part 61.55. Blending, as defined here, refers to mixing of LLRW of different concentrations. It does not involve mixing radioactive waste with non-radioactive waste, (i.e., dilution) and concerns only disposal in a licensed facility, not release of radioactivity to the general environment.

Blending is not prohibited or explicitly addressed in NRC regulations. In addition, while NRC staff guidance discourages blending in some circumstances, it also recognizes that some blending--including blending that lowers the classification of a waste--may be appropriate in others. However, the closure of the Barnwell facility to LLRW generators in 36 States means that there is no disposal option for Class B or C LLRW generated in these States; LLRW generators have been storing Class B and C LLRW onsite since the closure of Barnwell. The lack of a disposal pathway for Class B and C LLRW from these generators has increased

interest in blending to reduce the radioactivity concentrations of wastes that might otherwise be classified as B or C waste. A disposal pathway exists for Class A waste, which means that Class A waste does not have to be stored at licensees' sites. While some blending of LLRW resulting in reduced waste classification has occurred in the past, the scale of blending being considered since the closure of Barnwell is potentially much larger than current practice.

On October 8, 2009, NRC Chairman Gregory B. Jaczko directed the staff to prepare a vote paper for the Commission to consider issues related to blending of LLRW, including the following:

- Issues related to intentional changes in waste classification due to blending, including safety, security, and policy considerations.
- Protection of the public, the intruder, and the environment.
- Mathematical concentration averaging and homogeneous physical mixing.
- Practical considerations in operating a waste treatment facility, disposal facility, or other facilities, including the appropriate point at which waste should be classified.
- Recommendations for revisions, if necessary, to existing regulations, requirements, guidance, or oversight related to blending of LLW.

The staff is holding a public meeting to obtain additional information on these and other related issues. Stakeholder views will be presented in the vote paper that the staff prepares for the Commission.

**DATES:** Members of the public may provide feedback at the transcribed public meeting or may submit written comments on the issues discussed in this notice. Comments on the issues and questions presented in this notice and discussed at the meeting should be postmarked no later than January 29, 2010. Comments received after this date will be considered if it is practical to do so. NRC plans to consider these stakeholder views in the development of a vote paper for the Commission's consideration. Written comments may be sent to the address listed in the

**ADDRESSES** Section. Questions about participation in the public workshops should be directed to the facilitator at the address listed in the **ADDRESSES** Section. Members of the public planning to attend the workshops are invited to RSVP at least ten (10) days prior to each workshop. Replies should be directed to the points of contact listed in the **FOR FURTHER INFORMATION CONTACT** section.

The public meeting will be held in Rockville, Maryland on January 14, 2010, from 8:00 a.m. to 5:30 p.m. at:

The Legacy Hotel & Meeting Centre

The Georgetown Room

1775 Rockville Pike

Rockville, MD, 20852

240-283-1116

The final agenda for the public meeting will be noticed no fewer than ten (10) days prior to the meeting on the NRC's electronic public workshop schedule at <http://www.nrc.gov/public-involve/public-meetings/index.cfm>. Please refer to the **SUPPLEMENTARY INFORMATION** section for questions that will be discussed at the meeting.

**ADDRESSES:** You may submit comments by any one of the following methods. Please include Docket ID **NRC-2009-0520** in the subject line of your comments. Comments submitted in writing or in electronic form will be posted on the NRC website and on the Federal rulemaking website Regulations.gov. Because your comments will not be edited to remove any identifying or contact information, the NRC cautions you against including any information in your submission that you do not want to be publicly disclosed.

The NRC requests that any party soliciting or aggregating comments received from other persons for submission to the NRC inform those persons that the NRC will not edit their comments to remove any identifying or contact information, and therefore, they should not include any information in their comments that they do not want publicly disclosed.

**Federal Rulemaking Website:** Go to <http://www.regulations.gov> and search for documents filed under Docket ID **NRC-2009-0520**. Address questions about NRC dockets to Carol Gallagher 301-492-3668; e-mail [Carol.Gallagher@nrc.gov](mailto:Carol.Gallagher@nrc.gov).

**Mail comments to:** Michael T. Lesar, Chief, Rulemaking and Directives Branch (RDB), Division of Administrative Services, Office of Administration, Mail Stop: TWB-05-B01M, U.S. Nuclear Regulatory Commission, Washington, DC 20555-0001, or by fax to RDB at (301) 492-3446.

Questions regarding participation in the public meeting should be submitted to the facilitator, Francis Cameron, by mail to Mail Stop O16-E15, U.S. Nuclear Regulatory Commission, Washington, DC 20555-0001, by telephone at 240-205-2091, or by e-mail at [fxcameo@gmail.com](mailto:fxcameo@gmail.com).

**FOR FURTHER INFORMATION CONTACT:** Brooke Traynham, Office of Federal and State Materials and Environmental Management Programs, U.S. Nuclear Regulatory Commission, Washington, DC 20555-0001; telephone 404-729-3366; e-mail [Brooke.Traynham@nrc.gov](mailto:Brooke.Traynham@nrc.gov).

The public may examine and have copies for a fee, publicly available documents at the Public Document Room, One White Flint North, 11555 Rockville Pike, Rockville, Maryland. Publicly available documents created or received at NRC after November 1, 1999, are available electronically at the NRC's Electronic Reading Room at <http://www.nrc.gov/reading-rm/adams.html>. From this site, the public can gain entry into the NRC's Agencywide Documents Access and Management System (ADAMS), which provides text and image files of NRC's public documents. If you do not have access to ADAMS, contact the Public Document Room at 1-800-397-4209, 301-415-4737, or by e-mail at [pdr.resource@nrc.gov](mailto:pdr.resource@nrc.gov).

Existing NRC guidance on blending of LLRW is contained in the NRC's 1995 "Final Branch Technical Position on Concentration Averaging and Encapsulation" (CA BTP), Section 3.1 (ADAMS Accession No. ML033630732). The staff has recently issued several letters that describe NRC's position on blending of LLRW that should also be useful to interested persons. These include letters to EnergySolutions (ADAMS Accession No.

ML092170561), Studsvik (ADAMS Accession No. ML092930251), and Waste Control Specialists (ADAMS Accession No. ML092920426). Multiple meetings are being scheduled for the week of December 14, 2009, to better understand the positions of these three companies on blending of LLRW. Additional information on these meetings will be posted on the NRC public web site in the near future at <http://www.nrc.gov/public-involve/public-meetings/index.cfm>. The public is invited to participate. Chairman Jaczko's October 8, 2009, memorandum to the staff on blending of LLRW can be found in ADAMS (Accession No. ML093070605).

## **SUPPLEMENTARY INFORMATION:**

### **I. Background**

On June 30, 2008, the Barnwell disposal facility closed to most LLRW generators in the U.S. Now, only generators in the Atlantic Compact — the States of South Carolina, Connecticut, and New Jersey — are able to dispose of their waste at that facility, and generators in 36 States must store their Class B/C waste onsite until a new disposal option becomes available.<sup>1</sup> In the meantime, the EnergySolutions' disposal facility in Clive, Utah, remains available for Class A waste disposal by these generators that lost access to the Barnwell facility for their Class B/C wastes.

To help mitigate the impact of Barnwell's closure, industry is exploring the blending of LLRW that would otherwise be Class B and C into a homogeneous Class A mixture that could be disposed of as Class A waste. Such blending would eliminate the need for indefinite onsite storage of these wastes, while furthering the goal of permanent waste disposal. Not all LLRW can be blended into a homogeneous mixture suitable for disposal as Class A waste: irradiated reactor components, reactor pressure vessels, and other types of solid waste are not amenable to blending. Other reactor waste streams, particularly ion exchange resins, which account for about half of the volume of Class B and C waste generated each year, can be blended into a homogeneous mixture with a relatively uniform concentration of radioactivity, and some of these

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<sup>1</sup> Generators in the Northwest Compact (WA, ID, MT, HI, AK, OR, WY, and UT) and Rocky Mountain Compact (CO, NM, and NV) can dispose of their LLRW at a commercial disposal facility in Hanford, WA.

Class B and C resins could be blended with resins having radioactivity concentrations well below the Class A limits to produce a Class A final mixture.

Blending, as the staff uses the term in this context, is the mixing of LLRW having different concentrations of radionuclides to form a relatively homogeneous mixture for disposal in a licensed facility. The concentration of the resulting mixture is total radioactivity in the mixture divided by its volume or weight.

Blending may be done for a variety of reasons: 1) to consolidate wastes from a number of different sources within a plant for reasons of operational efficiency; 2) to reduce radiation exposures to workers; and 3) to lower the waste classification of some of the waste by averaging its concentration over a larger volume. Because it is more efficient to combine wastes in a single tank in a facility, licensees may also mix certain wastes such as ion exchange resins that are removed from various locations in their plants, rather than characterize and classify individual batches of resins. Blending may also be performed to keep radiation exposures to workers as low as reasonably achievable, since the doses from a mixture of two or more streams of LLRW with different radiation levels may result in a combined mixture that has lower radiation levels. Waste disposal may also be facilitated by blending. For example, if two batches of waste are blended together, they may meet the waste acceptance criteria for a specific disposal facility, but the higher concentration batch by itself would not. With respect to waste class reduction, it may result from mixing for operational reasons or efforts to reduce worker exposures, or could be performed solely for the purposes of reducing the classification to enable prompt disposal, rather than storage.

A particular topic of interest to some stakeholders is blending that reduces the classification of the waste. Waste classification is one of the requirements in NRC's LLRW disposal regulations in 10 CFR Part 61. 10 CFR Part 61 establishes the procedures, criteria, and terms and conditions for the issuance of licenses for the disposal of LLRW. Four performance objectives, including protection of an inadvertent intruder into the waste disposal

site, define the overall level of safety to be achieved by disposal.<sup>2</sup> Intruder protection is provided in part by the waste classification concentration limits in 10 CFR 61.55, which are designed to ensure that an inadvertent intruder does not receive an unsafe exposure to radiation. Any blended LLRW must meet the concentration limits in the waste classification tables. If batches of waste were not blended into a relatively homogeneous final mixture, hot spots above the concentration limits for a particular waste class might expose an inadvertent intruder to unacceptable levels of radiation. Any blended waste must also not affect a facility's ability to meet the other performance objectives in 10 CFR Part 61.

Waste classification is also addressed in NRC's regulations in 10 CFR Part 20 specifying requirements for the preparation of shipping papers for LLRW. 10 CFR Part 20, Appendix G, Section III.A allows waste generators to defer classifying waste until the time that waste is ready for disposal and does not require generators to classify waste before it is shipped from a generator to a processor. In practice, generators often classify waste before it is shipped for disposal, even though waste classification need not occur until the waste is ready for disposal. As noted above, the 10 CFR 61.55 waste classification tables are based on protection of an inadvertent intruder into waste at a disposal facility at some future time after the disposal facility is closed. The classification of the waste in accordance with 10 CFR 61.55 is not directly related to the safety of the waste at intermediate points in its management.

While recognizing that some blending is unavoidable and even desirable for efficiency or dose reduction purposes, NRC has historically discouraged blending to lower the waste classification, while acknowledging that it is appropriate in some circumstances. The maxim "dilution is not the solution to pollution" appears to have been a factor in developing agency positions that discourage, but do not prohibit, the mixing of wastes. Dilution can increase the amount of waste by mixing clean and contaminated materials together, and may enable the mixture to be released to the general environment where members of the public will be exposed

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<sup>2</sup> The others are protection of the general population from releases of radioactivity; protection of individuals during the operation of the facility (as opposed to after the facility is closed), and stability of the disposal site.

to the hazard, however small. Blending, as defined in this FRN, involves the mixing of higher and lower concentrations of contaminated materials, not clean materials, and disposal in a licensed disposal site, not release to the general environment. Thus, the undesirable characteristics of dilution are not present in this kind of blending, while safety and efficiency may be improved by selection of appropriate criteria to be applied to such blending. Some LLRW stakeholders have noted that there may be potential adverse impacts from and issues with blending, particularly large scale blending. For example, blending can be contrary to volume reduction principles.<sup>3</sup> Waste with Class B and C concentrations of radionuclides is often processed to reduce its volume. If this waste were instead mixed with Class A wastes, these reductions in volume would not be achieved. Blending may also be viewed by some as equivalent to disposing of Class B or C waste in a Class A disposal facility. The purpose of the public meeting and NRC's solicitation of public comments is for NRC to better understand these impacts and issues.

NRC's 1995 CA BTP recommends limits on blending of LLRW by applying a "factor of 10" rule, whereby the concentrations of batches of LLRW to be mixed must be within a factor of 10 of the average concentration of the final mixture. The safety benefit of the "factor of 10" rule is unclear for final mixtures that are homogeneous, since any concentrated materials that go into a mixture are blended down to lower concentrations that are relatively uniform over the volume of the material. By placing limits on the amount of mixing, however, the "factor of 10" rule furthers the agency's policy that discourages mixing to reduce waste classification. It should be noted that some waste class reduction could occur when waste is mixed in accordance with the "factor of 10" rule, since some the waste classes of some radionuclides differ by a "factor of 10." The mixing constraint in the CA BTP specifies that batches of greater than a factor of 10 difference in concentration can be mixed. The CA BTP also includes in an appendix with staff responses to public comments received on an earlier draft of the CA BTP.

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<sup>3</sup> NRC issued a "Policy Statement on Low-Level Waste Volume Reduction" on July 16, 1981, which encourages licensees to reduce the volume of waste for disposal. See July 16, 1981, Federal Register Notice, 46 FR 51100.

The appendix states that wastes should not be intentionally mixed solely to lower the waste classification. The staff positions in the CA BTP itself do not contain this guidance, however.

The CA BTP allows important exceptions from the “factor of 10” rule when operational efficiency or worker dose reductions can be demonstrated, and one of the current industry blending proposals relies on these exceptions to conduct expanded blending operations. Although not explicitly stated, the CA BTP positions appear to be based on a combination of practical considerations in the operation of a facility, whereby wastes are routinely combined or mixed for operational efficiency and ALARA reasons, and NRC’s general position that discourages mixing for the purposes of reducing the waste class. These two objectives are not fully compatible, but the CA BTP attempts to provide positions that balance them.

NRC guidance for other programs similarly discourages blending, while recognizing that it may be appropriate in some circumstances. In a document for the decommissioning program, “Consolidated Decommissioning Guidance” (NUREG-1757, Volume 1, Revision 2), NRC staff states that mixing of soils to meet the waste acceptance criteria of an offsite disposal facility “should not result in lowering the classification of the waste.” As a practical matter, contaminated soils from sites undergoing decommissioning are rarely Class B/C concentrations. At the same time, the guidance allows for blending to reduce the classification of the waste from licensable material that must be disposed of in a licensed disposal facility to exempt material suitable for disposal in landfills. This decommissioning guidance also recognizes that mixing of clean and contaminated soils may be appropriate under certain very limited circumstances to meet the dose standard in 10 CFR Part 20, Subpart E.

## **II. Questions Related to Blending of LLRW**

This section identifies questions associated with blending of LLRW that results in lower waste classification of components of the mixture. These questions are not meant to be a complete or final list, but are intended to initiate discussion. These questions will help to focus

the discussion at the public meetings. All public feedback will be used in developing options for NRC consideration.

1. *What safety and security considerations are associated with blending of LLRW, particularly large scale blending that result in a change in waste classification?*
2. *What are the practical considerations in operating a facility that bear on blending of LLRW?*
3. *What policy issues are raised by blending of LLRW that lowers the waste classification?*
4. *What are the potential blending policies/positions that NRC could take and the advantages and disadvantages of each?*
5. *How should NRC implement a position on blending of LLRW (i.e., by rulemaking, guidance, policy statement or other means)?*
6. *If a rule were to be promulgated, what compatibility category should it be; i.e., how strictly must Agreement States follow any NRC rule?*
7. *NRC regulations only require waste to be classified when it's ready for disposal. What advantages or disadvantages might there be to classifying it earlier?*
8. *If blended waste could not be attributed to the original generator of the waste, what issues does this raise that NRC should address, if any?*
9. *What would be a risk-informed, performance-based approach to addressing blending?*
10. *Given that Agreement States are not required to adopt NRC's guidance on blending, how are different States addressing this issue? What are the advantages and disadvantages of these approaches?*
11. *NRC is budgeting resources to initiate a long-term rulemaking to revise the waste classification system. How might alternative waste classification systems be affected by blending?*
12. *What oversight might be needed to ensure that blending is performed appropriately?*

13. *What other issues should NRC staff consider in developing options for Commission consideration related to blending?*

Dated at Rockville, Maryland this 23rd day of November, 2009.

FOR THE NUCLEAR REGULATORY COMMISSION

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Gregory F. Suber, Acting Deputy Director  
Environmental Protection  
and Performance Assessment Directorate  
Division of Waste Management  
and Environmental Protection  
Office of Federal and State Materials  
and Environmental Management Programs.