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NUCLEAR REGULATORY COMMISSION

[NRC-2012-0218]

Final Comparative Environmental Evaluation of Alternatives for Handling Low-Level Radioactive Waste Spent Ion Exchange Resins from Commercial Nuclear Power Plants

AGENCY: Nuclear Regulatory Commission.

ACTION: Final report; issuance.

SUMMARY: The U.S. Nuclear Regulatory Commission (NRC) is issuing the Final Comparative Environmental Evaluation of Alternatives for Handling Low-Level Radioactive Waste Spent Ion Exchange Resins from Commercial Nuclear Power Reactors (Final Report).

ADDRESSES: Please refer to Docket ID **NRC-2012-0218** when contacting the NRC about the availability of information regarding this document. You may access publicly-available information related to this action by the following methods:

- **Federal Rulemaking Web site:** Go to http://www.regulations.gov and search for Docket ID **NRC-2012-0218**. Address questions about NRC dockets to Carol Gallagher; telephone: 301-287-3422; e-mail: Carol.Gallagher@nrc.gov. For technical questions, contact the individual listed in the FOR FURTHER INFORMATION CONTACT section of this document.

- **NRC's Agencywide Documents Access and Management System (ADAMS):**

You may access publicly available documents online in the NRC Library at http://www.nrc.gov/reading-rm/adams.html. To begin the search, select "ADAMS Public Documents" and then select "Begin Web-based ADAMS Search." For problems with ADAMS, please contact the NRC's Public Document Room (PDR) reference staff at 1-800-397-4209, 301-415-4737, or by e-mail to pdr.resource@nrc.gov. The Final Report is available in ADAMS under Accession No. ML13263A276.

- **NRC's PDR:** You may examine and purchase copies of public documents at the NRC's PDR, Room O1-F21, One White Flint North, 11555 Rockville Pike, Rockville, Maryland 20852.

- **NRC's Blending of Low-Level Radioactive Waste Web Site:** The Final Report is available online, at http://www.nrc.gov/waste/llw-disposal/llw-pa/llw-blending.html.

FOR FURTHER INFORMATION CONTACT: Mr. Stephen Lemont, Office of Federal and State Materials and Environmental Management Programs, U.S. Nuclear Regulatory Commission, Washington, DC 20555-0001; telephone: 301-415-5163; e-mail: Stephen.Lemont@nrc.gov.

SUPPLEMENTARY INFORMATION:

Background Information

In the Final Report, the NRC staff identifies and compares potential environmental impacts of six alternatives for managing low-level radioactive waste (LLRW) spent ion exchange resins (IERs) generated at commercial nuclear power plants (NPPs). This comparative environmental evaluation has been conducted consistent with Option 2 in the NRC staff's paper for the Commission, SECY-10-0043, "Blending of Low-Level Radioactive Waste," April 7, 2010 (ADAMS Accession No. ML090410246), which identified policy, safety, and regulatory issues

associated with LLRW blending, provided options for an NRC blending position, and proposed that the NRC staff revise the Commission position on blending to be risk-informed and performance based. Option 2 of SECY-10-0043 was approved by the Commission in the October 13, 2010, Staff Requirements Memorandum, SRM-SECY-10-0043, "Staff Requirements - SECY-10-0043 - Blending of Low-Level Radioactive Waste" (ADAMS Accession No. ML102861764) and instructed staff on addressing blending in the rulemaking setting; this is not a licensing action.

Additionally, in consideration of stakeholder concerns expressed regarding potential environmental impacts associated with the blending of certain LLRW, as documented in the NRC's Official Transcript of its January 14, 2010, "Public Meeting on Blending of Low-Level Radioactive Waste" (ADAMS Accession No. ML100220019), in SECY-10-0043, Option 2, the NRC staff also proposed that "…disposal of blended ion exchange resins from a central processing facility would be compared to direct disposal of the resins, onsite storage of certain wastes when disposal is not possible and further volume reduction of the Class B and C concentration resins." The Final Report addresses this comparison of IER waste handling alternatives. The six alternatives evaluated in the report include the four identified by the NRC staff in SECY-10-0043, plus two additional alternatives that represent variations on the disposal of blended ion exchange resins from a central processing facility and volume reduction of the Class B and C concentration resins alternatives. The assumptions and methodologies used in the staff's evaluation and the evaluation results are documented in the report. Additional information regarding the Final Report is presented in the "Final Report Overview" section of this document.

On September 20, 2012 (77 FR 58416), the NRC staff published a notice in the *Federal Register* requesting public comments on the Draft Comparative Environmental Evaluation of

Alternatives for Handling Low-Level Radioactive Waste Spent Ion Exchange Resins from Commercial Nuclear Power Plants (Draft Report) (ADAMS Accession No. ML12256A965). The 120-day public comment period ended on January 18, 2013. The NRC received comments from six commenters in response to the notice, including one governmental agency, four nongovernmental organizations, and one member of the general public. Appendix B of the Final Report presents all of the comments received and the staff's response to each of those comments. The Final Report has been prepared in consideration of all the comments received, and includes revisions to the Draft Report based on some of these comments.

Final Report Overview

In the comparative environmental evaluation presented in the Final Report, the alternatives are described and potential environmental impacts of the alternatives are: (1) identified for a range of resource or impact areas (e.g., air quality, ecological resources, public and occupational health, transportation, waste management, water resources); and (2) compared in terms of their relative potential effects on human health and the environment. For reasons discussed in the report, the six alternatives are generic and not location-specific, and the comparative environmental evaluation of the alternatives is largely qualitative. An exception is that potential transportation impacts are assessed both quantitatively and qualitatively.

Furthermore, the evaluation is based on conservative, often bounding assumptions regarding the alternatives and various aspects of the analysis. This approach is consistent with the assessment of generic, non-location-specific alternatives, for which exact data and information would not be available. Consequently, the staff used its professional knowledge, experience, and judgment to establish reasonable technical considerations, estimations, and

approximations with regard to how the alternatives were described, would be implemented, and would potentially affect human health and the environment. The NRC staff also took care not to underestimate potential environmental effects and instead worked to bound the possible range of outcomes in most cases. Thus, the potential impacts of the six alternatives, if implemented in actual practice, would be expected to be of lesser magnitude than described in the report.

Ion exchange resins are powdered or small, bead-like materials used at commercial NPPs to capture radioactive contaminants dissolved in water used in plant operations. Over time, the IERs lose their ability to remove the contaminants from the water and the resins become "spent" and must be removed and replaced. The NRC defines three classes of LLRW—Class A, Class B, and Class C—in its regulations in section 61.55 of Title 10 of the *Code of Federal Regulations* (10 CFR), "Waste classification." Of the three classes, Class A LLRW is the least hazardous and Class C is usually the most hazardous and contains the highest activity. Disposal facilities for LLRW are licensed to accept one or more of these classes of waste. Waste that exceeds the Class C limits is not generally acceptable for near-surface disposal. Licensees do not allow IERs to exceed the Class C limits, and waste at greater-than-Class C limits is not considered in the Final Report. Spent IERs are managed as LLRW, and are classified as Class A, Class B, or Class C when shipped for disposal, depending on the concentrations and radioactivity levels of radionuclides present.

Currently, there are four licensed, operating LLRW disposal facilities in the United States. One of these facilities is licensed to dispose of, and could accept, Class A LLRW from all 50 states. Two facilities are licensed to dispose of Class A, B, and C LLRW, but can accept these wastes only from a limited number of states. Finally, the fourth facility can accept Class A, B, and C LLRW from Texas and Vermont and from individual generators outside the Texas compact on a case-by-case basis and subject to annual limits. As a result, all 65 U.S.

commercial operating NPPs (which currently include 104 operating nuclear reactors at 65 NPP locations) can dispose of their Class A LLRW spent IERs, and potentially have access to a disposal facility for their Class B and C LLRW spent IERs at this time. Note, however, that the scope of the evaluation presented in the Final Report was established at an earlier time when the majority of NPPs had no access, or limited access, to Class B and C disposal.

LLRW processing and waste disposal companies are exploring alternatives for managing Class B and C concentration spent IERs. One of these alternatives is to use a centralized processing facility to blend small volumes of higher-activity Class B and C concentration spent IERs with larger volumes of low activity Class A concentration spent IERs to produce Class A waste. Potential environmental impacts of this alternative, as compared to potential impacts of the other alternatives, are described in the report.

Specifically, the six alternatives evaluated in the Final Report are:

- Alternative 1A—Direct disposal of blended Class A, B, and C spent IER LLRW from a central processing facility where mechanical mixing would be used to blend the spent IERs to produce Class A waste;
- Alternative 1B—Direct disposal of blended Class A, B, and C spent IER LLRW from a central processing facility where thermal processing would be used to blend the spent IERs to produce Class A waste;
- Alternative 2—Direct disposal of the Class A, B, and C spent IER LLRW (without blending);
- Alternative 3—Direct disposal of the Class A spent IERs, with long-term onsite storage of the Class B and C concentration spent IERs at the NPPs (including construction to expand the existing waste storage facilities at the NPPs), followed by disposal of the Class B and C spent IERs at the end of the long-term storage period;

- Alternative 4A—Direct disposal of the Class A spent IERs, with volume reduction (by thermal processing) of the Class B and C concentration spent IERs, followed by long-term storage of the volume-reduced Class B and C concentration spent IERs (including construction of a storage facility at an existing LLRW disposal site), and then disposal at the end of the long-term storage period; and
- Alternative 4B—Direct disposal of the Class A spent IERs, with volume reduction (by thermal processing) of the Class B and C concentration spent IERs, then disposal of the volume-reduced Class B and C spent IERs.

As mentioned earlier, the comparative environmental evaluation is based on a number of assumptions. For example, the baseline for the evaluation is current land use. This means that, with the exception of the construction of the long-term waste storage facilities considered in Alternatives 3 and 4A, the evaluation assumes that no new spent IER handling, processing, and disposal facilities will be constructed and, therefore, does not revisit the impacts of construction of any of these facilities. In addition, the evaluation assumes that these facilities operate under licenses from the NRC or an Agreement State, and that all activities conducted in the alternatives would be in compliance with all applicable Federal, State, and local legal and regulatory requirements.

Additionally, each alternative is considered individually in the evaluation (i.e., each alternative is assumed to be implemented at the exclusion of all the other alternatives). There is no mix of alternatives, and all spent IERs generated at all 65 NPPs are assumed to be managed under each alternative. The NRC staff recognizes that Agreement State requirements and other factors could prevent some NPPs from using some alternatives, and that in actual practice, all spent IERs generated at all 65 NPPs would not be managed under any single alternative.

Therefore, the assumption that all spent IERs are managed under each alternative results in conservative estimates of the potential impacts of each alternative.

The assumptions used in this evaluation, such as those previously described, are reasonable and consistent with SECY-10-0043, Option 2, which established the basis for the comparative environmental evaluation.

The potential environmental effects of the six alternatives were evaluated for the following resource or impact areas: air quality, ecological resources, historic and cultural resources, noise, public and occupational health, soil, transportation, waste management, and water resources. The following resource and impact areas were eliminated from detailed consideration for reasons discussed in the report: accidents and other off-normal conditions, environmental justice, geology and minerals, land use, socioeconomics, and visual and scenic resources. In addition, to the extent practicable, the evaluation of potential environmental impacts identifies and accounts for generally accepted impact mitigation measures in each resource or impact area that would typically be employed in general industry practice. In accordance with the standard of significance that has been established by the NRC for assessing environmental impacts, using the standards of the Council on Environmental Quality's regulations in 40 CFR 1508.27 as a basis, each impact for each alternative was assigned one of the following three significance levels:

- SMALL. The environmental effects are not detectable or are so minor that they would neither destabilize nor noticeably alter any important attribute of the resource.
- MODERATE. The environmental effects are sufficient to noticeably alter, but not destabilize important attributes of the resource.
- LARGE. The environmental effects are clearly noticeable and are sufficient to destabilize important attributes of the resource.

The evaluation concludes that the potential environmental impacts of all six alternatives in all resource and impact areas would be SMALL, with the exception of potential impacts on historic and cultural resources from construction of long-term waste storage facilities in Alternatives 3 and 4A, which could be SMALL to MODERATE. Reasons for the mostly SMALL impacts, by resource or impact area, are discussed in the report.

Dated at Rockville, Maryland, this 20th day of September 2013.

For the Nuclear Regulatory Commission.

/RA/

Aby Mohseni, Deputy Director,
Environmental Protection and
Performance Directorate,
Division of Waste Management and
Environmental Protection,
Office of Federal and State Materials
and Environmental Management Programs.