

**Staff Response to the February 19, 2014, Advisory  
Committee on Reactor Safeguards Letter on 10 CFR Part 61 - Revisions to Low-Level  
Radioactive Waste Disposal Requirements**

In a letter dated February 19, 2014, the Advisory Committee on Reactor Safeguards (ACRS) provided its recommendations (Agencywide Documents Access and Management System (ADAMS) ADAMS Accession No. ML14041A152) on the U.S. Nuclear Regulatory Commission (NRC) proposed revisions to the low-level radioactive waste disposal requirements in Title 10 of the *Code of Federal Regulations* (10 CFR) Part 61, as submitted to the Commission on July 18, 2013 (SECY-13-0075; ADAMS No. ML13129A268). On February 12, 2014, several days before the ACRS issued its letter, the Commission issued SRM-SECY-13-0075 (ADAMS Accession No. ML14043A371) approving publication of the proposed rule and the associated draft guidance for public comment, subject to the comments and changes noted in the SRM. These comments and changes have modified the proposed rule, including in some ways that are directly relevant to the discussion in this February 19, 2014, letter. Notwithstanding these changes, the staff is addressing three points from the Committee's letter.

**ACRS Discussion Point A:** "The risk associated with DU [depleted uranium] continues to grow well beyond 10,000 years. However, despite the long half-life and the in-growth of progeny, the risk from disposal of DU in oxide form which will result from the DOE's [U.S. Department of Energy's] processing will be small, and remain small, provided appropriate disposal practices are followed (e.g., no shallow disposal, arid sites, and robust radon barriers). We do not agree that a compliance period of 10,000 years is necessary, practical, reasonable, or consistent with Commission direction to establish a compliance period for the "reasonably foreseeable future."

**NRC Staff Response:** The Commission, in its recent Staff Requirements Memorandum (SRM), has provided direction to the staff to establish a compliance period of 1,000 years in the proposed rule, with an annual dose limit of 25 millirem per year (mrem/yr) for a member of the public and 500 mrem/yr to an inadvertent intruder and require a "protective assurance analysis" for the period between 1,000 years and 10,000 years with the goal of keeping doses below a 500 mrem/yr analytical threshold, which the staff is adopting. In principle, the staff agrees with the ACRS's conclusion that the risk from disposal of depleted uranium in oxide form "will be small, and remain small, *provided appropriate disposal practices are followed*" (emphasis added). However, adherence to the Committee's recommended 1,000 year compliance period will not alone ensure that appropriate disposal practices are followed.

Staff has performed probabilistic analyses in response to the Commission's request to evaluate the suitability of disposal of depleted uranium in the near-surface environment.<sup>1</sup>

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<sup>1</sup> U.S. NRC, SECY-08-0147, "Response to Commission Order CLI-05-20 Regarding Depleted Uranium," October 7, 2008, (ADAMS Accession No. ML081820762).

The risk from disposal of depleted uranium in the near surface will only be small, and remain small,<sup>2</sup> if appropriate disposal practices, based on technical analyses, are followed. The performance of appropriate technical analyses can only be ensured if those analyses are required by the 10 CFR Part 61 regulations consistent with the proposed revisions.

As discussed with the Committee, the risk from depleted uranium at 1,000 years is about 1/1000th of the peak risk, which would occur at approximately two million years once equilibrium with the decay products of uranium is achieved. The risk from depleted uranium at 10,000 years would reach about 1/10th of the peak risk. If a disposal facility demonstrates compliance with the proposed intruder dose limit of 500 mrem/yr at 1,000 years, the dose to an inadvertent intruder could be significantly larger (e.g., 50 rem/yr by 10,000 years). The Commission, in its SRM, precludes this possibility by providing a protective assurance analysis period with an analytical threshold.

Thus, a compliance period of 1,000 years is appropriate for analysis of the disposal of depleted uranium in the near surface low-level waste (LLW) disposal facility if there are additional regulatory requirements to ensure the development and implementation of appropriate inventory limits and design features. The Commission, in SRM-SECY-13-0075, has directed the staff to modify the proposed rule, to include an additional regulatory requirement in the form of a Protective Assurance Analysis Period with a 500 mrem/yr analytical threshold, to ensure that appropriate inventory limits and design features are developed and implemented.

**ACRS Discussion Point B:** “The staff has not identified any new or unreviewed safety issues with currently disposed LLW. The staff has reported that existing LLW facilities meet or exceed current Part 61 requirements and continue to show compliance with current safety requirements.”

**NRC Staff Response:** No safety concerns regarding LLW that has already been disposed of have been reported to staff by Agreement State regulators. The variety of LLW streams that are currently proposed for disposal (e.g., large quantities of depleted uranium, blended LLW) were not anticipated when 10 CFR Part 61 was developed. The performance objective for protection of inadvertent intruders (10 CFR 61.42) and the associated LLW classification tables were only developed for assumed LLW streams. Therefore, the application of the existing rule to the current and projected LLW streams could result in disposal of waste that might not meet the performance objective on inadvertent intruder protection. Further, the existing disposal facilities have accepted significantly more uranium for disposal, in some cases orders of magnitude more, than was assumed during the original development of 10 CFR Part 61 and the present LLW classification system. It is important that the proposed rule will have the necessary provisions to ensure the performance objectives are met for all LLW disposal.

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<sup>2</sup> As discussed with the Committee and noted in the Committee’s letter, the quantity of depleted uranium that could be disposed may be very large, exceeding one million metric tons. In addition, though the material is to be converted to an oxide form, it has finite solubility and high specific surface area. Depleted uranium is a challenge for disposal in these respects, because it can result in radiological and chemical releases in two primary ways: 1) by leaching into water pathways even at small fractional release rates, and 2) by emanation of radon and release into air pathways.

The staff, in SECY-08-0147, recommended to the Commission a range of options to address this potential issue, in that certain LLW could be disposed without requiring a licensee to perform the necessary technical analyses to demonstrate compliance with the performance objective on inadvertent intruder protection. In its decision on the proposed rule, the Commission elected to proceed with proposed requirements that licensees conduct site-specific analyses and develop technical requirements for the site-specific analyses. In this rulemaking effort, the proposed revisions are intended to ensure that licensees complete technical analyses sufficient to demonstrate there is reasonable assurance that the performance objectives will be met for proposed disposal actions. The NRC developed the proposed rule to close this potential regulatory gap.

**ACRS Discussion Point C:** “We understand that previously disposed wastes may need to be included in the revised performance and intruder assessments to comply with a revised Part 61 rule for future disposals. However, wastes already disposed in accordance with the current Part 61 rule should not have any added requirements placed on them by the revisions to Part 61, or be subject to any new compliance evaluations, even if the previously disposed wastes are included in a revised performance assessment or intruder analysis as proposed by the staff.”

**NRC Staff Response:** The objective of the proposed revisions is to ensure protection of the public, including an offsite member of the public and potential inadvertent intruders from both existing LLW inventories and potential future inventories authorized for disposal after promulgation of the regulations. Although 10 CFR 61.42 states that the inadvertent intruder must be protected at any time in the future, some stakeholders have assumed that sufficient protection would already be afforded by the current 10 CFR 61.55 LLW classification tables—even if the radiological source term is substantially different from that used to develop the tables. This assumption may not be correct. For waste streams different from those originally analyzed during the development of 10 CFR Part 61, sole reliance on the LLW classification system may not afford adequate protection of an inadvertent intruder; thus, analyses would need to be performed to ensure adequate protection and compliance with the performance objectives.

Currently, the regulations in 10 CFR Part 61 require a disposal facility to provide the results of analyses pertinent to the long-term containment of emplaced LLW within the disposal site prior to site closure; these analyses would include the entire inventory in order to demonstrate compliance with the performance objectives for members of the public and inadvertent intruders. The proposed rule will not change that requirement, although it does explicitly identify the technical analyses required in 10 CFR 61.13, and specifies a timeframe for the analyses that does not exist in the current rule. The explicit intruder assessment would be a new requirement. The assessment would allow disposal facility licensees to consider comingled LLW and actual site conditions. In addition, in order to use a waste acceptance criteria approach, which the Committee endorses, the total capacity of a disposal facility must be determined. Using this approach, the dose from past disposals would be estimated and subtracted from the overall capacity in order to determine that future disposals will meet the regulatory criteria.