

NRC Part 61 Update and PA Implications

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DOE Performance Assessment Community of
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Background



- **SRM-SECY-08-0147 (ML090770988)** - proceed with the proposed rulemaking in 10 CFR Part 61 to specify a requirement for a site-specific analysis for the disposal of large quantities of DU and the technical requirements for this analysis.
- **2009 Public Workshops (ML092580469, ML092580481, ML092890511, ML092890516)**
- **Purpose of proposed rule** - to specify site-specific analysis requirements to demonstrate compliance with performance objectives in 10 CFR Part 61 and to strengthen and clarify existing regulations to reduce ambiguity, facilitate implementation, and to better align the requirements with current health and safety standards.

Proposed Amendments to Part 61 Regulations



- Waste Stream Neutral
 - Site specific analyses requirements would apply to all wastes
- Site-Specific Analyses:
 1. Performance assessment (§ 61.41)
 2. Intruder assessment (§ 61.42)
 3. Long-Term analysis (§ 61.13(e))
 4. Update analyses at facility closure (§§ 61.28 and 61.52)

Proposed Amendments to Part 61 Regulations (cont.)



- Other Supporting Changes:
 1. New definitions, concepts, and technical analysis (§§ 61.2, 61.7, and 61.13)
 2. Use of total effective dose equivalent (TEDE) (§ 61.41)

Site-Specific Analyses: Performance Assessment

- § 61.41 Protection of the general population from releases of radioactivity.
 - (a) Concentrations of radioactive material **that** may be released to the general environment in ground water, surface water, air, soil, plants, or animals must not result in an annual dose exceeding an equivalent of 25 millirems **total effective dose equivalent to any member of the public**. Reasonable effort should be made to maintain releases of radioactivity in effluents to the general environment as low as is reasonably achievable.
 - (b) Compliance with paragraph (a) of this section must be demonstrated through a performance assessment that evaluates peak annual dose up to 20,000 years following closure of the disposal facility.

Site-Specific Analyses: Intruder Assessment

- § 61.42 Protection of **inadvertent intruders**.
 - **(a)** Design, operation, and closure of the land disposal facility must ensure protection of any **inadvertent intruder** into the disposal site who occupies the site or contacts the waste at any time after active institutional controls over the disposal site are removed. **The annual dose must not exceed 500 millirems total effective dose equivalent.**
 - **(b)** Compliance with paragraph (a) of this section must be demonstrated through an intruder assessment that evaluates peak annual dose up to 20,000 years following closure of the disposal facility.

Site-Specific Analyses: Long-Term Analysis

- § 61.13 Technical analyses
 - (e) (1) Analyses that discuss how the design of the facility considers the potential long-term radiological impacts, consistent with available data and current scientific understanding. The analyses must identify and describe the features of the design and site characteristics that will reduce long-term impacts.
 - (2) Analyses of long-lived waste must calculate the peak annual dose that would occur 20,000 or more years after site closure. No dose limit applies to the results of these analyses, but the analyses must be included to indicate the long-term performance of the land disposal facility.

Performance Assessment

- Staff do not view this as a new requirement.
- Update to modern terminology (from technical analyses).
- Specifically mention:
 - Uncertainty
 - Geomorphology and geochemistry
 - Features, events, and processes

Intruder Assessment

- Development of waste classification tables did not include all wastes (today).
- Intruder Assessment is a new requirement for NRC.
- Some Agreement States have evaluated intruders.
- Guidance on selecting receptors and scenarios.

Long-Term Analyses

- New requirement designed to provide information on facility and site performance for long-lived waste.
- Requirement to provide peak dose but no dose limit.
- Goal is to ensure transparency of information with stakeholders.

Period of Performance

- Period of performance is one of many important elements in the safety evaluation of low-level waste (LLW) disposal.
- Different approaches are used within the US and internationally for LLW.
- Diverse views among stakeholders.

General Objectives

- Provide protection to present and future generations
- Consider uncertainties
- Communicate long-term impacts
- Facilitate decision making

Period of Performance Selection Process

- Literature review:
 - Characteristics of waste
 - Analysis framework
 - Uncertainties (societal, natural, engineering, technology)
 - Socioeconomic considerations (transgenerational equity, discounting)

Options Considered

- 1) No Change
- 2) Peak Dose
- 3) Regulatory Precedent (two tiers)
- 4) Uncertainty Informed Approach – three tiers,
Compliance, Assessment, Performance (CAP)
- 5) Industrial Metals

Recommendation

Tier 1



- A compliance period of no less than 20,000 years, with a peak annual dose limit of 25 mrem TEDE.

Tier 2



- A requirement to perform a calculation of peak annual dose that occurs after 20,000 years as an indicator of long-term facility performance. No dose limit would apply to this analysis.



- A requirement to provide analyses that demonstrate how the facility was designed to mitigate long-term impacts.

- Associated changes to the regulations to highlight the uncertainties associated with disposing of long-lived waste and that limitations on the disposal of those materials may be needed to properly manage the uncertainties.

Basis for 20,000 years

- Near-surface disposal is not geologic disposal – the stability issues are much more challenging.
- Natural cycling of climate is known/expected.
- A value of 10,000 years is much more likely to be in the period of climate transition.
- Including climate cycling within the compliance period will encourage disposal of long-lived waste at more stable sites.

Basis for 20,000 years

- While 20,000 years does not capture peak risk for all wastes, it captures more than shorter values. Possibly within 10x for DU.
- A value of 20,000 years better captures radionuclide transport characteristics (compared to 10k).
- Diminishing returns for longer periods (affected by increasing uncertainty).

Basis for No Dose Limit for Second Tier

- Impacts can be better placed in proper context (NRC would complete environmental analysis of impacts for disposal licensing actions taking place in non-Agreement States).
- Approach better aligned with long-term decision making in other programs (e.g. disposal of industrial metals).
- Impacts better aligned with uncertainties.

Guidance on POP

- Risk-informed, performance-based guidance:
 - Would allow flexibility for short-lived waste or low concentrations of long-lived waste.
 - Would allow to go longer for high-concentrations of long-lived waste.
- Expectations for long-term analysis.

Questions?