Waste & Environmental Considerations (Gaps 2, 3, 15, 16, and 19)

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Topic Overview

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- Reprocessing facility considerations
  - Storage of spent nuclear fuel (SNF)
  - Management of high-level waste (HLW)
  - Clarify low-level waste (LLW) materials
  - Control and monitoring of effluents
- Regulatory goals
  - Develop a regulatory framework to license an SNF reprocessing facility that is safe and secure
  - Resolve high priority technical issues that support rulemaking for reprocessing

Gaps Discussed

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- Gap 2: Independent Storage of HLW
- Gap 3: Waste Incidental to Reprocessing
- Gap 15: Waste Confidence
- Gap 16: Waste Classification
- Gap 19: Effluent Controls and Monitoring

Gap 2 Waste Storage: Issue

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- New regulations needed for storage of commercial HLW from reprocessing
- Current regulations allow commercial SNF storage, but not HLW storage, at licensed reactors or independent storage installations
- Legacy of monitored retrievable storage program for HLW

Gap 2 Waste Storage: Proposal

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- General license authority similar to nuclear power plants (Parts 50 & 72)
- Regulatory requirements parallel those used for SNF storage
  - General design criteria (new Part 7x)
  - Applicable Part 50, Appendix F (new Part 7x)
  - General license (revised Part 72, Subpart K)
  - Certified cask (revised Part 72, Subpart L)

Gap 2 Waste Storage: Alternatives

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- Incorporate all requirements into new Part 7x
  - Part 72 rulemaking still needed

- Concerns
  - Ensure waste removed from site
  - Ensure safe onsite storage

Gap 2 Waste Storage: Stakeholder Input

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- Need for a government plan to deal with nuclear waste storage and disposal
- Concern about adding additional reprocessing waste to current waste inventory

Gap 3 Incidental Waste: Issue

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- What wastes resulting from reprocessing would be considered HLW or LLW?

- HLW is "*highly radioactive* material resulting from the reprocessing of spent nuclear fuel, *including* liquid waste produced directly in reprocessing and any solid material derived from such liquid waste that contains fission products in *sufficient concentrations*." (Nuclear Waste Policy Act of 1982, as amended)

Gap 3 Incidental Waste: Proposals

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- NRC staff believes reprocessing wastes that are not "highly radioactive" can be safely disposed of in a near-surface disposal facility if requirements for disposal specified in 10 CFR Part 61 are met.

- Need to develop a practicable approach to distinguish
  - Highly radioactive materials that require deep geologic disposal
  - Lower activity materials that could be safely disposed in a near-surface facility that met the radioactive disposal requirements of Part 61

Gap 3 Incidental Waste: Proposals

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1. Seek clarification of “highly radioactive” and “in sufficient concentrations” from Congress
   - Add to NRC proposed legislative agenda
   - Timeliness with Part 7x rulemaking?

2. Clarify through rulemaking the terms
   - “Highly radioactive”
   - “Sufficient concentrations”

3. Take no action

Gap 3 Incidental Waste: Stakeholder Input

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- Include definition of “Waste Incidental to Recycling (WIR)”
  - Added to clarify what would not be HLW
  - Derived from Commission decision regarding West Valley (67 FR 5003) and National Defense Authorization Act of 2005

Gap 15 Waste Confidence: Issue

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- NRC has determined that SNF from any reactor can be stored safely and without significant environmental impacts for at least 60 years beyond the licensed life for operation (75 FR 81032)
- Can NRC staff make a generic finding of no significant environmental impacts for the long-term storage of HLW from reprocessing?
- Or will applicants need to address these impacts as part of their environmental report?

Gap 15 Waste Confidence: Proposal

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- Applicant will need to evaluate environmental impacts from HLW storage
  - Should consider the post-licensed-life timeframe evaluated for SNF in the Waste Confidence Decision and Rule: 60 years after licensed life

- NRC staff would evaluate the environmental impacts of the long-term HLW storage in its environmental assessment or environmental impact statement

Gap 15 Waste Confidence: Alternative

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- Expand the existing Waste Confidence Rule in 10 CFR 51.23
  - Confidence a licensed facility can safely manage HLW
  - Storage of HLW might be bounded by SNF storage
- Concerns
  - 1984 rule preceded by decades of reactor licensing
  - Insufficient technical information on HLW storage
  - Casks not certified for HLW storage

Gap 15 Waste Confidence: Stakeholder Input

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- A facility license application will address environmental impacts of storage of solidified HLW
- Reprocessing increases waste volume (versus not reprocessing) and would therefore have implications for waste confidence

Gap 16 Waste Classification: Issue

- Some radionuclides in reprocessing wastes might not be in 10 CFR 61.55 classification tables
  - Examples: krypton-85, certain noble metals, and some isotopes from the lanthanide series
- Would default to Class A waste and need not require stabilization, but may not be suitable for near-surface disposal at some sites under Part 61

Gap 16 Waste Classification: Proposal

- Issue is now part of task for NRC staff to consider a comprehensive revision to 10 CFR Part 61
  - SECY-10-0165

- Alternatives being considered
  - Risk inform Part 61 waste classification framework
  - Comprehensive revision to Part 61
  - Site-specific waste acceptance criteria
  - International alignment
  - Rulemaking only for unique waste streams (SECY-08-0147)

Gap 16 Waste Classification: Stakeholder Input

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- Overall view that treatment of large quantities of radionuclides, which were not discussed in the EIS for Part 61, will be needed
- Some views that the rule on low-level waste rule needs to be rewritten before a reprocessing plant can be considered
- Support for developing a hazards-based approach to classifying waste

Gap 19 Effluents: Issue

- Regulations needed for effluent monitoring and control for reprocessing facilities because of increased source term and greater potential for emissions
- Radionuclides in potentially mobile forms such as liquids and gases
- Isotopes of concern include krypton-85, hydrogen-3 (tritium), iodine-129 and carbon-14

Gap 19 Effluents: Proposal

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- Use 10 CFR Part 50 regulations as basis for developing requirements

- Consider developing criteria similar to those in 10 CFR Part 50, Appendix I, which provide numerical guidance in meeting as low as reasonably achievable (ALARA) requirements
  - Need risk-informed, performance-based approach to determining release limits

Gap 19 Effluents: Alternatives

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- NEI White Paper: Similar to NRC approach; derive regulations from existing Part 50 requirements
- ACNW&M letter to Chairman Klein (ADAMS No. ML072840119): Recommended that NRC should hold interagency discussions with EPA on whether
  - Existing release limits for krypton-85 and iodine-129 need to be reexamined to reflect current technology and
  - Release limits need to be established for tritium and carbon-14
- Consider using aged (e.g., greater than 5 years) SNF to reduce releases of krypton-85 and tritium

Gap 19 Effluents: Stakeholder Input

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- Requirements should be up to date with latest radiation protection science
- Applicants would not want fuel aging or siting attributes specified by regulatory requirements
- Reasonable to impose limits on certain radionuclides due to collective impacts
- Siting important
- Individual radionuclides releases should be considered

Gap Integration

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- Integrated waste management strategy
  - Require safe onsite storage of SNF and HLW
  - Plan for appropriate disposal pathways
  - Establish confidence in longer term waste storage
  - Ensure appropriate treatment of low-level wastes
  - Develop criteria for effluent monitoring and control

Questions

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- Should storage of solidified HLW from reprocessing be regulated as part of the general license for a potential reprocessing facility (similar to a nuclear power plant)?
- Should NRC establish the amount of SNF that could be stored at a reprocessing facility?
- What waste disposal options should NRC consider for the management of waste generated by a commercial SNF reprocessing facility?

Questions

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- Should potential radionuclides in reprocessing waste be incorporated directly into Part 61.55 classification tables?
- Would using site-specific waste acceptance criteria be an appropriate approach for disposal of low activity reprocessing wastes?
- Should Part 50, Appendix I-type regulations regarding ALARA be developed?
- Should NRC, in coordination with EPA, develop release limits for carbon-14 and tritium?