8-120B CoC Rev. 21

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Overview

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- Purpose- kick off 8-120B license amendment request 21
- Reason for Change
- Requested Changes
- Payload Specification Concept
  - Payload Specification 8-120B-1 (existing shielding analysis)
  - Payload Specification 8-120B-2 (Activated Steel)
  - Payload Specification 8-120B-3 (Reformed Residue)
  - Payload Specification 8-120B-4 (Resins)
- Conclusion

Reason For Change

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- CoC Revision 19 changed the way radiological qualifications are performed in the 8-120B.
  - Rev 19 was a precursor to RIS 2013-04.
    - Previous to Revision 19, payload radiological qualification was confirmed by pre-shipment measurement.
    - Revision 19 includes bounding evaluations for all contents.
- This change has caused significant consequences to the 8-120B allowable payloads.
  - Shipments that have previously been made safely and compliantly can no longer be shipped.
  - Some shipment campaigns or programs are significantly affected.

- ES identified that the most common shipments (resins) would be impacted by Rev 19.
  - Significant capacity loss for resin shipments forecasted due to conservatisms in new shielding approach.
  - Revision 20 was initiated to regain lost capacity for resin shipments.
- Other significant shipping impacts have been identified since then.
  - Zion decommissioning project- shipping campaign has ceased due to new qualification rules.
  - Studsvik reformed residue (RR) shipments will experience significant limitations due to new qualification rules.
  - Revision 21 is aimed at resolving these problems.

- Zion Project
  - 8-120B shipments include activated steel from reactor decommissioning .
  - Rev. 19 changes occurred after shipping campaign had begun.
    - Example shipment: RW-12-085, December 2012
    - Measured pre-shipment dose rates: 17/4 mrem/hr @ surf/2m
    - Fraction for Rev. 19 limits: 3.6 (vs. 0.95 limit)
    - Fraction for Rev. 20 limits: 2.4 (vs. 0.95 limit)
  - What happened?
    - “Credit” for steel in secondary container
    - Credit” for calculated source conservatisms
    - Conservative MCNP mass attenuation properties

- Reformed Residue Shipments
  - What is RR?
    - Highly inert, stabilized, 5:1 volume-reduced inorganic waste form created by proprietary pyrolysis/steam reforming technology
  - 8-120B RR has been shipping since 2000.
    - Example shipment: WCS-0513-01, May 2013
    - Measured pre-shipment dose rates: 71/4.4 mrem/hr @ surf/2m
    - Fraction for Rev. 19 limits: 2.1 (vs. 0.95 limit)
    - Fraction for Rev. 20 limits: 1.4 (vs. 0.95 limit)
  - What happened?
    - Conservative MCNP mass attenuation properties
    - “Credit” for calculated source conservatisms
    - “Credit” for polyethylene in secondary container

- Revise SAR Chapter 5 to restructure it for Payload Specifications:
  - Move current analysis material into Payload Specification 8-120B-1
    - Add one more energy group above the current group so as not to disqualify 15 nuclides from the list in § 173.435 (As-72, Ba-140, Bi-212, Br-76, Cl-38, Co-56, Ga-72, K-42, Kr-87, La-140, Na-24, Ru-106, Sr-82, Sr-92, Y-92).
    - No other changes to current analyses.
  - Add three new Payload Specifications and associated shielding analyses.

Payload Specification Concept

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- Each Payload Specification describes a radioactive payload plus any characteristics of the secondary container or liner credited in the safety analysis.

- Payload Specification 8-120B-1
  - Generalized case (essentially the current analyses)
  - No credit for secondary container
  - Bounding conservative mass attenuation coefficients across range of energies evaluated.
  - Bremsstrahlung conversion for pure beta emitters
  - Five columns of acceptable γ/sec or γ/sec·g for various sizes and shoring configurations.

- Payload Specification 8-120B-2 (Activated Steel)
  - Intended for decommissioning and similar waste
  - Take credit for steel secondary container - NCT only
    - Specify max combined hole area.
    - Require screens over drain holes.
    - Require lids with closures, double-verification
  - Use mass attenuation constant for steel.
  - Demonstrate that non-Co-60 sources and Bremsstrahlung not significant
  - Multiple columns of γ/sec·g limits for various secondary container thicknesses.
  - CRUD allowance included in limits.
  - Payload items not meeting this description can be qualified separately under 8-120B-1 and their fractions added.

Payload Specification Concept

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- Payload Specification 8-120B-3 (Reformed Residue)
  - Intended for Studsvik RR
  - Take credit for HIC- NCT only
  - Use mass attenuation coefficients for RR.
  - Model maximum density (conservative for γ/sec·g limits).
  - Bremsstrahlung not significant since pure beta emitters are negligible constituents.
  - One column of γ/sec·g limits for energy bands and selected nuclides (like current evaluations).

- Payload Specification 8-120B-4 (Resins)
  - Intended for resin shipments
  - Take credit for HIC- NCT only
  - Use proper mass attenuation coefficients for resin.
  - Model maximum density (conservative for γ/sec·g limits).
  - Bremsstrahlung not significant since pure beta emitters are negligible constituents.
  - One columns of γ/sec·g limits for energy bands and selected nuclides (like current evaluations).

Conclusions

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- CoC Rev. 19 has introduced shielding conservatisms that are impacting shipping campaigns.
- In addition to significant cost and schedule impacts, the results of the changes will mean many more required shipments, and the corresponding increases in public dose and risk that accompanies increased shipment frequencies.
- Amendment request 21 does not seek to ship new types of contents. These payloads have all been safely, compliantly shipped in the past.

Conclusions, continued

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- Time is of the essence.
  - Significant impacts for Zion decommissioning project and Studsvik RR shipments, even under Rev 20.
- Near term options
  - We will request that, in parallel with the normal license amendment request process, NRC
    - review ES shielding calculations for payload specifications -2 (Activated Steel) and -3 (RR)
    - grant authorization to ship under proposed payload specifications -2 (Activated Steel) and -3 (RR) until CoC Rev. 21 is approved.
- Discussion of alternatives and schedule