

# RIS: Content Specification and Shielding Evaluations for Type B Transportation Packages

Veronica Wilson & Mike Call  
NRC/NMSS/SFST

Criticality Shielding and Dose Assessment  
Branch

# ***Presentation***

- Current Status
- What happened?
- Why is this a problem?
- Which packages are affected?
- Why increased NRC attention?
- What's in the RIS?
- When is action needed?

# ***Current Status***



- September 2012 – Issue for Public Comment
- November 2012 – End of comment period
- December 2012 – Issuance of RIS

# ***What Happened?***



- CoC amendment request for contents change
  - Package evaluation did not correspond to the maximum proposed contents
  - Reliance on pre-shipment measurement; no Normal Condition of Transport (NCT) evaluation (10 CFR 71.47)
  - Analysis for Hypothetical Accident Condition (HAC) evaluation (10 CFR 71.51(a)(2))
- Other applications with similar evaluation strategy
- Recent incidents indicating evaluation inadequacy

# ***Why is this a Problem?***

- Insufficient documentation of original approval basis
- Current regulatory guidance
- Pre-shipment measurement: not sole means of determining of regulatory compliance for Type B packages
  - Pre-shipment measurement does not account for any changes to the geometry during transport
  - Packages with artificially high content limits can give a false sense of shielding capability
- Recent incidents

# ***Which packages are affected?***

- Any Type B packages with allowable contents that are not bounded by the shielding analysis
- Type B packages with “difficult to define” contents, such as waste material

# ***Why increased NRC attention?***



- Evaluation strategy intended for low level (LSA-like) waste
- Addition of different contents types
- Margin reductions
- Misinterpreted CoC content descriptions
- Recent incidents

# ***What's in the RIS?***



- Staff Expectations for:
  - Content Specification
  - Shielding Evaluation
    - Pre-shipment measurements
- Clarifies existing regulatory guidance
  - NUREG-1609 SRP for Transportation of Radioactive Material
  - SFST ISG-20



# ***Content Specification***

- 10 CFR 71.33(b), Contents description:
  - chemical and physical form
  - identification and maximum quantity of radioactive constituents
- Identification:
  - Radionuclides OR
  - Radiation types and spectra
- Maximum quantity:
  - Number of Type A quantity alone is insufficient
  - Consistent w/ (i.e., bounded by) application evaluations

# ***Shielding Evaluation***

- Acceptable evaluation methods
  - Calculation
  - Measurement (not a pre-shipment measurement)
  - Correspond to the maximum allowed contents
- SFST ISG-20
  - Representative loading(s) w/ normal conditions dose rates
  - Justify representative nature of loading(s)

# ***Pre-Shipment Measurement***



- Value of the pre-shipment measurement
  - (Main purpose) Verify proper loading and shipment preparation
  - (Potential purpose) Compensate for evaluation method uncertainties
- Pre-shipment measurement in lieu of NCT evaluation – potentially acceptable instances
- Level of reliance on measurement affects needed rigor of measurement procedure

# ***When is Action Needed?***



- Applicants are expected to address the issues outlined in the RIS in future certificate actions
  - Important but not urgent safety significant issues
  - Relatively good track record

# ***Questions or Comments?***



# Regulations



- 10 CFR 71.33 “The application must include a description of the proposed package in sufficient detail to identify the package accurately and provide a sufficient basis for evaluation of the package. The description must include –(b) With respect to the contents of the package – (1) Identification and maximum radioactivity of radioactive constituents”
- 10 CFR 71.31(a)(2) requires that an application for package approval must include a package evaluation as required by 71.35
- 10 CFR 71.35 states that a package evaluation must include a demonstration that the package satisfies the standards specified in subparts E and F of this part
- Subpart E includes 10 CFR 71.47 and 71.51(a)(2) which have dose rate limits for NCT and HAC (respectively)

# SFST Regulatory Guidance



- SFST ISG-20 “Transportation Package Design Changes Authorized Under 10 CFR Part 71 Without Prior NRC Approval”
  - Contents specification – “The description of the contents should be complete with respect to the chemical and physical form of the material, as well as the radioactive content (radionuclides and quantity) of the material. The content description must be consistent with respect to assumptions made about the contents in the package evaluation (e.g., in the containment, shielding, and criticality evaluations).”
- Regulatory Guide 7.9 “Standard Format and Content of Part 71 Applications for Approval of Packages for Radioactive Material”
  - 1.2.2 Contents – “The description should include ... identification and maximum quantity (radioactivity or mass) of the radioactive material”
  - 5.2 Source Specification – “This section should specify the quantity of radioactive material included as contents”
- NUREG-1609 “Standard Review Plan for Transportation Packages for Radioactive Material”
  - 5.5 Review Procedures “The shielding review should ensure that the package design has been described and evaluated to meet the external radiation requirements of 10 CFR Part 71 under normal conditions of transport and hypothetical accident conditions.”
  - 5.5.2 Radiation Source “Confirm that the contents used in the shielding analysis are consistent with those specified in the General Information section of the application. If the package is designed for multiple types of contents, ensure that the contents producing the highest external dose rate at each location are clearly identified and evaluated.”
  - Appendices by package type: “The shielding review confirms that the package meets the allowable radiation levels during both normal conditions of transport and hypothetical accident conditions”