



Reprocessing And Recycling: Safeguards and Security

**U.S. Nuclear Regulatory Commission
Reprocessing Workshop
October 19th and 20th, 2010
Albuquerque, NM**

Safeguards and Security

- 10 CFR 73 – Physical Protection Of Plants And Materials
- 10 CFR 74 – Material Control And Accounting (MC&A) Of Special Nuclear Material

Special Nuclear Material (SNM)

- SNM comprises:
 - Plutonium
 - Uranium-235
 - Uranium-233
- NRC divides SNM into three categories, for security and MC&A, based upon potential for:
 - Direct use for nuclear fissile explosive
 - Indirect use – for the production of materials to be used for a nuclear fissile explosive
- Categories based upon:
 - Mass quantities
 - Enrichment levels (for U-235)

Three SNM Categories (defined in 73.2)

Nuclide and % Enrichment Level	Category I	Category II	Category III
Plutonium	≥ 2 kgs	< 2 kgs and > 500 g	≤ 500 g and > 15g
Uranium 235 $\geq 20\%$	≥ 5 kgs	< 5 kgs and > 1 kg	≤ 1 kg and > 15g
Uranium 235 < 20% & $\geq 10\%$		≥ 10 kg	< 10 kg and > 1 kg
Uranium 235 < 10% & > Natural			≥ 10 kg
Uranium 233	≥ 2 kgs	< 2 kgs and > 500 g	≤ 500 g and > 15g

Current Categorization for Materials Involved in Reprocessing and Recycling

- All current U.S. nuclear power reactor fuels are Category III materials
- Reprocessing and recycling would introduce plutonium and other TRUs
 - Fuels containing ≥ 2 kg Pu would be Category I regardless of isotopics, form, or the presence of other materials (i.e., different “attractiveness”)
 - Other TRUs (e.g., Np, Am) have SNM-like characteristics
- Current regulations do not consider the other TRUs
- Pu is categorized without consideration of form or isotopic composition

Part 73 Fuel Cycle Security Rulemaking



“...engage a broad range of stakeholders as it develops the rulemaking package, including the international community...”

- Public meetings
- Initial discussions with licensees, OGAs, international colleagues
- Further technical discussions with OGAs
- Future bilateral / multilateral international discussions

Part 73 Fuel Cycle Security Rulemaking



“This security-related rulemaking should not focus on the categorization of material associated with reprocessing. Instead, as a separate effort, and not on the same priority of this rulemaking, ...”

- Categorization approach for reprocessing
 - Due Date to be associated with date of reprocessing rulemaking
- MOX transport
 - Rulemaking for Transport Security for SNM will be closely coordinated with fuel cycle security rulemaking
- Applications that use large quantities of americium / neptunium
 - Analysis to be provided concurrent with reprocessing rulemaking

Part 73 Fuel Cycle Security Rulemaking



“The staff should determine the proposed quantity values as part of the development of the technical basis for the rulemaking to update special nuclear material and fuel cycle facility security-related regulations and these values should be presented to the Commission in the proposed rule package.”

- Informed by
 - Current regulations and international guidelines
 - Feedback from international and domestic outreach
 - Ongoing NRC studies

Reprocessing Exclusion

- 10 CFR Part 74.51 currently excludes reprocessing facilities from Category I MC&A requirements
 - Thus, Category I reprocessing facilities would not have the same MC&A requirements as other Category I materials
- Appropriate and predictable requirements are needed

Discussion Questions

- Are there any aspects of NRC's current regulatory requirements for physical protection and for MC&A that need to be revised or augmented to ensure the secure use and handling of nuclear materials at a reprocessing facility?
- What issues should NRC staff consider for revising mixed oxide fuel transportation requirements?
- What issues or alternatives should the NRC consider for establishing a diversion path analysis requirement for reprocessing facilities?
- What issues or approaches should NRC consider for reprocessing facility material accounting management, including inventories and holdup materials?