



Reprocessing And Recycling: Safeguards and Security

**U.S. Nuclear Regulatory Commission
Reprocessing Workshop
September 7th and 8th, 2010
Rockville, MD**

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

SNM

Special Nuclear Material

- 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 Material 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

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

Potential Points For Discussion

- Risk informing Parts 73 and 74
- Include a gradient or attractiveness levels
- Alternate diversion path analyses

Key Security Requirements - FCFs

Facility Type	DBT/ FoF	Fixed Site Rule	Trans. Rule	Post 9-11 Orders	Key 10 CFR Requirements for Fixed Sites
Category I	Yes	10 CFR 73.45, 73.46	10 CFR 73.25, 73.26	Yes	<ul style="list-style-type: none"> Broad performance requirement (73.45) Armed security organization w/Appendix B training Physical fitness standards Tactical Response Team (TRT) Physical barrier systems for PA, MAAs, vaults Isolation zones for PA, with illumination Vaults for material storage Tamper indicating containers Access controls, access authorization to PA, MAA; 2-person rule in MAAs Badging system Vehicle access control, entry / exit search Entry/exit search of personnel and packages Drum scanning of waste Separate shipping, waste packaging areas Escorts for visitors, visitor log Key, lock and combination control Alarmed MAA and vault when unoccupied CCTV on vaults, elsewhere CAS/ SAS Back-up power Dual communications capability Contingency plan per Appendix C Deadly force policy
Category II	No	10 CFR 73.67 (d)	10 CFR 73.67 (e)	No	<ul style="list-style-type: none"> Use and store material in CAA Monitor CAA with intrusion alarm Conduct screening prior to access Badging / lock system Access control to CAA Escort visitors On-site watchperson(s) with at least one responder Communications to responders Written response procedures
Category III	No	10 CFR 73.67 (f)	10 CFR 73.67 (g)	Yes	<ul style="list-style-type: none"> Store material in CAA Monitor CAA with intrusion alarm Watchperson or offsite response force Written response procedures

Part 50: Previously Proposed Appendix Q

- Proposed GDC for physical protection and MC&A of reprocessing facilities
- 50.34(a)(3) (i) footnote: “GDC for chemical processing facilities are being developed”
- “Design Criteria for Protection of Fuel Reprocessing Plants and Licensed Material Therein”
 - 39 Federal Register 26296, July 18th, 1974
 - Indefinitely deferred on April 19th, 1984 until needed for NRC’s regulation of a reprocessing facility (49 Federal Register 16699, April 19th, 1984).
- 19 GDC in 3 categories