



# **Reprocessing And Recycling: Safeguards and Security**

**U.S. Nuclear Regulatory Commission  
Reprocessing Workshop  
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Rockville, MD**

# Safeguards and Security

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- 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

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- 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              |
|--|--------------|-------------------------|---------------------------|
| <b>Plutonium</b>                                       | $\geq 2$ kgs | $< 2$ kgs and $> 500$ g | $\leq 500$ g and $> 15$ g |
| <b>Uranium 235</b><br>$\geq 20\%$                      | $\geq 5$ kgs | $< 5$ kgs and $> 1$ kg  | $\leq 1$ kg and $> 15$ g  |
| <b>Uranium 235</b><br>$< 20\% \ \& \ \geq 10\%$        |              | $\geq 10$ kg            | $< 10$ kg and $> 1$ kg    |
| <b>Uranium 235</b><br>$< 10\% \ \& \ > \text{Natural}$ |              |                         | $\geq 10$ kg              |
| <b>Uranium 233</b>                                     | $\geq 2$ kgs | $< 2$ kgs and $> 500$ g | $\leq 500$ g and $> 15$ g |

# Current Material Categorization for Materials Involved in Reprocessing and Recycling

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- All current U.S. nuclear power reactor fuels are Category III materials
- Reprocessing and recycling would introduce plutonium and other TRUs
  - Fuels containing  $\geq 2$  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

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- 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

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

## Key Security Requirements - FCFs

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



# Part 50: Previously Proposed Appendix Q

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- 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 18<sup>th</sup>, 1974
  - Indefinitely deferred on April 19<sup>th</sup>, 1984 until needed for NRC’s regulation of a reprocessing facility (49 Federal Register 16699, April 19<sup>th</sup>, 1984).
- 19 GDC in 3 categories