



# **Reprocessing And Recycling: Design And Operational Requirements**

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

# NRC Regulatory Approach

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- Three general areas, with ALARA
  - Prescriptive requirements
  - Risk informed/performance based
  - Minimum criteria or areas for review
- Minimum criteria include, among others:
  - Design criteria, GDC/BDCs
  - Technical specifications
  - Training and qualifications of personnel
- These support redundancy, diversity, and defense in depth, and safety functions

# What Are GDC/BDC?

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The NRC establishes minimum requirements for proposed facilities or applications of licensed radioactive materials that provide:

- assurance that important to safety SSCs will have the ability and reliability to perform their intended safety functions
- assurance that uncertainties and errors, from design and analysis, and unknowns, are adequately addressed
- adequate defense in depth
- redundancy and diversity
- assurances that balance of plant and unanalyzed situations do not negatively impact safety

SSC = Structure, System, or Component

NRC regulations frequently identify these minimum requirements by terminology:

- General Design Criteria (GDC) or Baseline Design Criteria (BDC)
- Where used, GDC and BDC are essentially synonymous, although the GDC term is more prevalent in the regulations and tends to be more specifically stated.

# Currently ...

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- Reprocessing and recycling (R&R) facilities are production facilities
- Regulated under 10 CFR Part 50
  - GDC in 50.34 and Appendix A
    - Analogs might apply to R&R facilities
  - Other sections of Part 50 imply additional GDC (e.g., Appendix F, Appendix I, Appendix S)
- GDC specific to R&R are needed to address the large quantities and types of radionuclides at these facilities

# Part 50: Previously Proposed Appendix P

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- 50.34(a)(3) (i) footnote: “GDC for chemical processing facilities are being developed”
- “General Design Criteria for Fuel Reprocessing Plants”
  - 39 Federal Register 26293, 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).
- 27 GDC in 7 categories

# Part 50: Previously Proposed Appendix Q

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- 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

# NRC Staff Review and Status

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- Reviewed the existing GDCs/BDCs and relevant documents
  - Regulations have no thresholds for applying existing GDCs/BDCs
- Identified
  - 10 potential categories of GDCs/BDCs
  - 77 potential areas within the ten categories
- Found significant fraction of areas could become draft GDCs

# Ten Potential Draft GDC/BDC Categories

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- Overall/General
- Multiple Confinement and Containment Barriers, and Systems
- Process Safety Features
- Nuclear Criticality Safety
- Radiological Protection
- Physical Security
- MC&A
- Fuel and Radioactive Waste
- Siting
- Decommissioning



# Technical Specifications

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- Required for reprocessing facilities
  - By law – AEA – Atomic Energy Act
  - Part 50.36 has specifics for reprocessing
- Extensive documentation for Tech Specs
  - For Part 50 and reactor facilities
  - FRN 10815, May 2, 1973, “Technical Specifications for Fuel Reprocessing Plants”
- No technical specifications in Part 70
  - Uses ISA and IROFS
- GDPs (Part 76) have Technical Safety Requirements (TSRs) which are similar to technical specifications

# Technical Specifications

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- Derived from safety analyses to protect people from uncontrolled releases (50.36 – 50.36a for effluents)
- Five Categories
  - Safety limits (event level - uncertainty allowances etc.) and limiting control settings (alarm/correction level – margin for alarm/response uncertainties/inaccuracies and system responses)
  - Limiting conditions for operations (minimum equipment performance)
  - Surveillance requirements (inspect, test, maintain)
  - Design features (e.g., types of steels, geometry)
  - Administrative controls (e.g., minimal staffing, calibration)
- Include both technical (engineered) and administrative matters

# Operator Training

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- AEA requires NRC to
  - Establish criteria for operators of production and utilization facilities
  - Determine the qualifications of individuals applying for licenses
  - Issue licenses, as appropriate
- Codified in 10 CFR Part 55
- As with Part 50, regulations and associated guidance now focus more on power reactors
- Appropriate level for R&R facilities needs to be determined, and included in Part 55 revision or new R&R regulation

# Potential Points For Discussion

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- Do any standard criteria apply universally (e.g., SNF burnup, time after discharge)?
- Any thresholds for applying criteria and requirements?
- Appropriate level of detail for GDC
- Specific areas or categories for Technical Specifications
- Specific training requirements, by area or risk