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RAJ-II Safety Analysis Report Amendment

Pre-submittal Meeting

September 7, 2022



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Agenda

- Purpose - Expand Existing RAJ-II Safety Basis (public)
- Description of the requested additional payload and SAR amendment (public)
- Overview of SAR Changes (non-public)
- Overview of Proposed CoC Changes (non-public)
- Timeline (non-public)



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Purpose

Introduce and provide NRC with technical information regarding an amendment for Revision 11 of the Safety Analysis Report (SAR) to expand payload content parameters of the RAJ-II container, Certificate of Compliance (CoC) 9309.



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Summary of RAJ-II SAR Amendment

- No package or hardware modifications.
- Increase allowed Uranium-235 (U-235) enrichment up to 8 wt.% for GNF 10x10 fuel bundle and loose light water rod contents.
- Increase Criticality Safety Index (CSI) for increased U-235 enrichment content (>5 wt.%).
- New content will be introduced as an amendment to the RAJ-II SAR.
- Minor administrative SAR updates will also be provided.
- A proposed RAJ-II CoC mark-up will be provided as part of the amendment submittal.



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END OF PUBLIC DISCUSSION



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LEU+ Contents

Low Enriched Uranium Plus (LEU+)

Increase in allowed maximum U-235 content

- Current RAJ-II CoC 9309 Rev.12 allows:
 - 5.00×10^{-2} g/gU
- RAJ-II SAR NEDE-33869 Rev. 11 Amendment requests:
 - 8.00×10^{-2} g/gU



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Changes by Chapter

Chapters 1, 2, 3, 7, 8

- Updates to incorporate new LEU+ contents

Chapter 4

- Updated leak rate calculation and evaluation based on LEU+ contents

Chapter 5

- Updated shielding calculation and evaluation based on LEU+ contents



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Chapter 6

General Changes

- $CSI = 1.6$ for an 8x8 package array with 5 – 8 wt.% U-235 range

Minimalistic Approach

- Supporting calculations are performed to ensure criticality safety
- If the current conclusions in the subsections of Chapter 6 hold, no update to the section is made



Chapter 6

Fuel Assembly Loading Criteria (SAR Table 6-1)

- Increase in minimum number of gad rods in the 5 – 8 wt.% U-235 range
- Determination of lattice enrichment for a CSI 1.6 with no gadolinia

Loose Rods

- Confirming the number of LEU+ rods for safe shipment



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Chapter 6

Validation

- No update is made to the SCALE 6.1 & KENO-VI validation as it already covers the 5 – 8 wt.% U-235 range

SCALE User Notices

- Notice regarding h-poly: Clarification is made that all polyethylene is modelled as poly(h₂o)
- Notice regarding SCALE 6.2.2 - 6.2.4 with KENO-V: Not applicable as SCALE 6.1 & KENO-VI are used



Proposed CoC Changes

- Update to the revisions of some RAJ-II drawings
- Authorized contents for 8 wt% fuel
- Allowance of up to 8 wt% for GNF 10x10 fuel
- Gadolinia requirements for the 5 – 8 wt.% U-235 range
- Addition to maximum quantity of material per package
- Clarification of CSI and applicable contents
- Administrative updates



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Submittal Schedule

- GNF-A plans to submit RAJ-II SAR, Revision 11, amendment request in the 3rd quarter 2022.
- NRC approval is requested within one year after submittal.