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RIVER BEND STATION
PRE-SUBMITTAL MEETING

Proposed License Amendment Request

Spent Fuel Pool Neutron Absorber Inserts
And
Criticality Safety Analysis

August 23, 2018

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OPENING REMARKS / AGENDA

Brian Jones
Licensing Engineer
River Bend Station

Purpose

- Discuss River Bend Station's plan to install NETCO's SNAP-IN® neutron absorber inserts into the spent fuel pool storage cells
- Describe the methodology for a new spent fuel pool criticality safety analysis, crediting the inserts and supporting the license amendment request
- Review the proposed license changes to credit the inserts
- Seek feedback from the NRC staff before making the submittal

Agenda (Non-Proprietary Session)

Introductions	Brian Jones – Licensing Engineer RBS
Background / Objective	Don Lomax – Entergy Project Manager
SNAP-IN Inserts Overview	Don Lomax – Entergy Project Manager
Criticality Analysis Overview	Brian Holman – Entergy Corporate Fuels Chris Kmiec – Global Nuclear Fuel (GNF)
Implementation Strategy	Don Lomax – Entergy Project Manager
Proposed License Changes	Don Lomax – Entergy Project Manager
Questions	All

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INTRODUCTIONS

Brian Jones

Licensing Engineer

River Bend Station

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BACKGROUND / OBJECTIVE

Don Lomax

Project Manager

Entergy Major Fleet Projects

Background / Objective

- Current RBS spent fuel pool criticality analysis credits Boraflex neutron absorber material
- Contracted with Curtiss-Wright Nuclear Division to design, manufacture, and install neutron absorber inserts
- Contracted with Global Nuclear Fuel-Americas to prepare new criticality analysis which removes credit for Boraflex and credits inserts
- Installation and long term monitoring of neutron absorber inserts satisfies commitments made to NRC as part of the license renewal application to remove dependence on Boraflex

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SNAP-IN® INSERTS OVERVIEW

Don Lomax
Project Manager
Entergy Major Fleet Projects

NETCO-SNAP-IN® Inserts

- Simple design; L-shaped (chevron), full length inserts
- Robust material, Rio Tinto Alcan's Boralcan™; a metal matrix of aluminum alloy with nuclear grade B_4C
- Similar inserts installed in BWR racks for Exelon's LaSalle, Peach Bottom and Quad Cities
- Ample neutron absorption
  - Nominal B_4C content = 21 vol%
  - Minimum certified B^{10} areal density = 0.0129 g B-10/cm^2

NETCO-SNAP-IN® Inserts

- Monitoring program will be implemented:
  - Complies with NEI 16-03, Rev. 0, “Guidance for Monitoring of Fixed Neutron Absorbers in Spent Fuel Pools”
  - Includes 3 different types of test coupons installed in the spent fuel pool (general, bend, and galvanic) and examined periodically
    - Inspections may include visual, dimensional, neutron attenuation, corrosion, stress relaxation, dependent on coupon type
  - Includes full insert in-situ and removal inspections
    - Visual for physical deformities (in-situ and removal)
    - Thickness and retention force (removal only)

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CRITICALITY ANALYSIS OVERVIEW

Brian Holman
Entergy Corporate Fuels Engineering

Chris Kmiec
Global Nuclear Fuel (GNF)

Criticality Analysis Overview

- Consistent with most current NRC and industry guidance
  - DSS-ISG-2010-01, Rev. 0, “Staff Guidance Regarding the Nuclear Criticality Safety Analysis for Spent Fuel Pools”
  - NEI 12-16, Rev. 3, “Guidance for Performing Criticality Analyses of Fuel Storage at Light-Water Reactor Power Plants”
- No credit for Boraflex neutron absorber; only credit for inserts
- Main codes were TGBLA-06 and MCNP-05P
- Standard BWR cold, in-core k_∞ peak reactivity methodology
  - No axial blankets credited
  - Established maximum in-core k_∞ so that $k_{\mathbf{max}} < 0.95$ for normal and credible accident conditions

Criticality Analysis Overview

- Addressed current fuel type (GNF2), future fuel product (GNF3), and all legacy fuel
- Uniform pool loading - all fuel storage locations loaded with an insert and the bundle with the highest rack efficiency
- Misload of fuel outside the rack was evaluated
- Missing insert evaluated to address removal during fuel movement and during periodic removal for inspection
- More detail to be provided in proprietary session

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IMPLEMENTATION STRATEGY

Don Lomax
Project manager
Entergy Major Fleet Projects

Implementation Strategy

- Inserts installed through 10 CFR 50.59 process but not credited until license amendment request approval from NRC
  - Installation scheduled June – October 2019
- License amendment request submission end of 3rd quarter 2018
  - Request 12 month review from NRC

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PROPOSED LICENSE CHANGES

Don Lomax
Project Manager
Entergy Major Fleet Projects

Proposed License Changes

- Design Features Technical Specification 4.3.1.1 (Spent Fuel Storage Racks Criticality)
  - Add new item to specify maximum fuel enrichment and k-infinity (to bring in alignment with Standard Technical Specifications)
  - Add new item to state that neutron absorbing inserts are installed
- Administrative Controls Technical Specification 5.5 (Programs and Manuals)
  - Add new section to describe the Spent Fuel Storage Rack Neutron Absorber Monitoring Program that will be implemented in accordance with NEI-16-03, “Guidance for Monitoring of Fixed Neutron Absorbers in Spent Fuel Pools”

Proposed License Changes (Draft)

4.3.1 Criticality

4.3.1.1 The spent fuel storage racks are designed and shall be maintained with:

a. Fuel assemblies having a maximum k-infinity of 1.28 in the normal reactor core configuration at cold conditions and a maximum average U-235 enrichment of 4.9 weight percent;

b. keff £ 0.95 if fully flooded with unborated water, which includes an allowance for uncertainties as described in Section 9.1 of the USAR;

c. A nominal fuel assembly center to center storage spacing of 7 inches within rows and 12.25 inches between rows in the low density storage racks in the upper containment pool; and

d. A nominal fuel assembly center to center storage spacing of 6.28 inches within a rack and 8.5 inches between cell centers of adjacent racks, with a neutron poison material insert within the storage cells, in the high density storage racks in the spent fuel storage facility in the Fuel Building.

Proposed License Changes (Draft)

5.5.15 Spent Fuel Storage Rack Neutron Absorber Monitoring Program

This program provides controls for monitoring the condition of the neutron absorber used in the spent fuel pool storage racks to verify the Boron-10 areal density is consistent with the assumptions in the spent fuel poo criticality analysis. The program shall be in accordance with NEI 16-03-A, “Guidance for Monitoring of Fixed Neutron Absorbers in Spent Fuel Pools,” Revision 0, May 2017.

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QUESTIONS

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CLOSING COMMENTS

Brian Jones
Licensing Engineer
River Bend Station

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END OF PUBLIC (NON-PROPRIETARY) MEETING