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LTR-NRC-16-40

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Subject: Meeting Minutes for the NRC Combined Audit of WCAP-16182-P, Rev. 2, "Westinghouse BWR Control Rod CR 99 Licensing Report – Update to Mechanical Design Limits," and WCAP-17769-P, Rev. 0, "Reference Fuel Design SVEA-96 Optima3" (Non-Proprietary)

Attached are Westinghouse meeting minutes for the NRC combined audit of WCAP-16182-P, Rev. 2, "Westinghouse BWR Control Rod CR 99 Licensing Report – Update to Mechanical Design Limits," and WCAP-17769-P, Rev. 0, "Reference Fuel Design SVEA-96 Optima3."

This submittal does not contain proprietary information of Westinghouse Electric Company LLC.

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A handwritten signature in black ink, appearing to read "JA Gresham".

James A. Gresham, Manager
Regulatory Compliance

Enclosures

cc: Ekaterina Lenning
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NRR

Open items Identified

- Clarification of design requirements with regard to ASME Class 1 rules, including explanation of the 1.1 factor used in nonlinear analysis.
- Clarification needed regarding the treatment of cracking in the design.
- Adequacy of the surveillance plan – how is observed cracking addressed with regard to material integrity
- Adherence to Appendix F for analysis of SSE loading
- Treatment of SSE loads in the Level D analysis.

Actions resulting from Open Items

- A number of areas were identified in WCAP-16182 where changes and clarifications will be made to address various audit items (Action: Westinghouse)
- Collapse load analysis for SSE to be performed to demonstrate compliance with Appendix F limits. Modeling, approach, and LTR content were discussed. (Action: Westinghouse)
- Surveillance plan as presented in WCAP-16182 to be reviewed (Action: NRC)

Documents reviewed

- SES 12-091, Rev. 1, “Methodology of Helium Pressure Calculation in Westinghouse CR 99 BWR Control Rods with HIPed pins by Statistical Models”
- SES 15-005, Rev. 0, “Structural Verification of Control Rod CR99 Generation 3 for BWR/2-4 and BWR/6 Reactors with S- & D- Lattice”
- SES 15-011, Rev. 0, “Modeling of CR99 Control Rod Blade Swelling”
- SES 15-013, Rev. 0, “Structural Verification of Control Rod CR99 Generation 3 for BWR4/5 Reactors with C-Lattice”

WCAP-17769-P (SVEA-96 Optima3) Audit Items – May 19, and Draft RAIs – May 20

The meeting included a presentation and detailed discussion of the design of the SVEA-96 Optima3 fuel assembly, and the differences between the SVEA-96 Optima3 assembly and previously licensed Optima2. The Westinghouse responses to the SVEA-96 Optima3 audit items were reviewed and discussed. Reports and calculation packages were identified by Westinghouse in response to audit Items 1 and 2. Modeling and analysis results presented in the reports and calculation packages were reviewed and discussed. Additional documents were also reviewed as requested during the course of the audit. Also, Westinghouse draft RAI responses to the NRC’s draft RAIs were reviewed (responses to 11 of the 12 RAIs were reviewed; the response to RAI-09 was not available for the audit). The RAIs are in the concurrence process within NRC.

Open items Identified

- Use of Von Mises criteria.
- SSE as AOO (no, but OBE is).
- Source of Table 4.3.3-1 values.
- Question regarding OBE (Operating Basis Earthquake) analysis.

Actions resulting from Open Items

- A number of areas were identified in WCAP-17769 where changes and clarifications will be made to address various audit items and RAI responses (Action: Westinghouse)
- Additional question was identified: per NRC guidance, OBE is an AOO (anticipated operational occurrence). (Action: Westinghouse)
 - Identify the grid crush strength at in-reactor BOL and EOL conditions.

- Identify the lateral load capacity of all SVEA-96 Optima3 components under anticipated OBE loading conditions at BOL and EOL.
- Identify the range of lateral loads that are anticipated for all SVEA-96 Optima3 components under OBE conditions at BOL and EOL.

Documents reviewed

- SES 12-053, Rev. 1, “Plastic Analysis of SVEA-96 Fuel Channel Subjected to Internal Overpressure”
- SES 12-274, Rev. 1, “Stress Evaluation of Cladding in Light Water Reactors”
- SES 13-014, Rev. 2, “Stress Analysis of SVEA-96 Optima3 Fuel Rod”
- BTA 07-0053, Rev. 1, “SVEA-96 Optima3 Spacer Cell Mounted with a Fuel Rod. Analysis of Stresses and Displacements”
- BU 97-091, Rev. 3, “STAV7 Model Description”
- BK 93-779, Rev. 1, “Channel Fatigue – Evaluation of Low Cycle Fatigue for Fuel Channels”
- BTK 04-077, Rev 1, “Lateral Load Cycling Test of Optima3 Spacer Verifying Test”

Summary

All audit items for WCAP-16182, Rev. 2 (CR 99) and WCAP-17769, Rev. 0 (SVEA-96 Optima3) were reviewed. Appropriate follow-on actions were identified to resolve remaining open items. Also, 11 of the 12 draft RAIs for WCAP-17769 were reviewed. Specific changes identified will be addressed in the final RAI responses after the RAIs are formally issued.

Changes to both WCAP-16182 and WCAP-17769 were identified to address various audit items and several of the RAIs, as appropriate.

Westinghouse will formally provide the audit presentation materials to the NRC. Westinghouse will also provide an audit summary (meeting minutes) to the NRC.