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September 7, 2022

River Bend Station Pre-Submittal Meeting 10 CFR 50.69 and TSTF-505 License Amendment Requests

Agenda

- PRA Model Technical Adequacy
- 10 CFR 50.69 License Amendment Request (LAR) Overview
- TSTF-505 LAR Overview
- Current Schedule
- Closing Remarks

PRA Model Technical Adequacy

Internal Events and Internal Flooding

- Full-scope peer review per Regulatory Guide (RG) 1.200, Rev. 2 (2011)
- Focused-scope peer review covering LERF and internal flooding related technical elements (2017)
- Finding closure review (per Appendix X to NEI 05-04/07-12/12-13) (2020)
- Finding closure review per Appendix X (2021)
- All internal events (including internal flooding) PRA model finding-level facts and observations (F&Os) are closed

PRA Model Technical Adequacy

Fire

- Full-scope peer review per RG 1.200, Rev. 2 and NEI 07-12 (2019)
- The full-scope peer review was conducted against all technical elements in Part 4 of the ASME/ANS PRA Standard
- Focused-scope peer review of the at-power internal events human reliability analysis high level requirements HLR-HR-D and HLR-HR-I for specific pre-initiator human error probabilities modified for the fire PRA (2019)
- Self-assessment and finding closure review per Appendix X (2020)
- All fire PRA model finding-level F&Os are closed

PRA Model Technical Adequacy

FLEX Strategies Credited in PRA Models

- FLEX diesel generators (DGs) support battery chargers for DC power and provide support for other functions (e.g., decay heat removal, hydrogen igniters)
- FLEX pumps are credited for supporting alternate decay heat removal strategies
- FLEX strategies were incorporated into the PRA models via the PRA maintenance process (not a PRA upgrade)
- FLEX equipment data was developed using generic values in PWROG-18042-P, Rev. 1 and NUREG/CR-6928
- Plan to submit the results of a FLEX sensitivity study
- Independent review of the FLEX modeling was performed in 2022

PRA Model Technical Adequacy

Uncertainty

- PRA models were reviewed for key sources of uncertainty using NUREG-1855 (Rev. 1), EPRI TR-1026511, and EPRI TR-1016737
- Each potential key source of uncertainty was evaluated specifically for each application (50.69 & RICT)

PRA Maintenance

- Regularly scheduled PRA updates will occur every two fuel cycles
- Categorization results and impacts to the RICT program will be evaluated for issues that result in significant impacts to the model (25% increase for CDF/LERF or a factor of three increase in the corrected Birnbaum value of a monitored MSPI train or component)

10 CFR 50.69 LAR Overview

Requested Change to the Operating License

Entergy is approved to implement 10 CFR 50.69 using the processes for categorization of Risk-Informed Safety Class (RISC)-1, RISC-2, RISC-3, and RISC-4 Structures, Systems, and Components (SSCs) using: Probabilistic Risk Assessment (PRA) models to evaluate risk associated with internal events, including internal flooding, and internal fire; the shutdown safety assessment process to assess shutdown risk; the Arkansas Nuclear One, Unit 2 (ANO-2) passive categorization method to assess passive component risk for Class 2 and Class 3 and non-Class SSCs and their associated supports; the results of the non-PRA evaluations that are based on the IPEEE Screening Assessment for External Hazards updated using the external hazard screening significance process identified in ASME/ANS PRA Standard RA-Sa-2009 for other external hazards except seismic; and the alternative seismic approach as described in Entergy's original submittal letter dated [DATE], and all its subsequent associated supplements as specified in License Amendment No. [XXX] dated [DATE].

10 CFR 50.69 LAR Overview

- Follows NEI 00-04
- PRA evaluations utilizing internal events, internal flooding, and fire PRAs
- Non-PRA evaluations such as external events screening and shutdown assessment
- Alternative approach for seismic risk categorization (Tier 1) using EPRI 3002022453
- Seven qualitative criteria in Section 9.2 of NEI 00-04
- Defense-in-depth assessments
- Passive categorization using ANO-2 methodology
- Incorporates industry learnings

10 CFR 50.69 LAR Overview

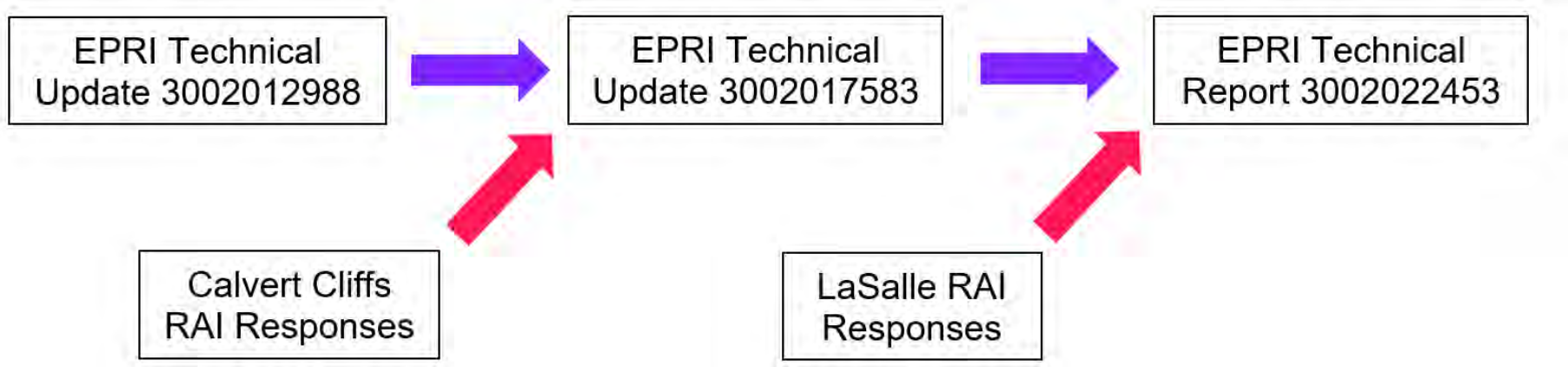
External Hazards

- Were screened in accordance with Generic Letter 88-20, NUREG/CR-2300, and NUREG-1407
- Updated using criteria in ASME/ANS PRA Standard RA-Sa-2009
- All external hazards screened from applicability except internal flooding, internal fire, and seismic activity
- Future identification of unscreened hazards will follow NEI 00-04, Figure 5-6

10 CFR 50.69 LAR Overview

Seismic Risk

- Approach for seismic categorization per EPRI Final Report 3002022453 issued in Sep. 2021
- RBS meets the criteria for Tier 1 methodology; for Tier 1 plants, the Ground Motion Response Spectrum (GMRS) is either very low or similar to the Safe Shutdown Earthquake (SSE) such that unique seismic categorization insights are expected to be minimal
- EPRI Report 3002022453 uses the same methodology for Tier 1 that was reviewed and approved by the NRC (Calvert Cliffs Amendment 332/ML19330D909)
- The development process for the EPRI Final Report is depicted below



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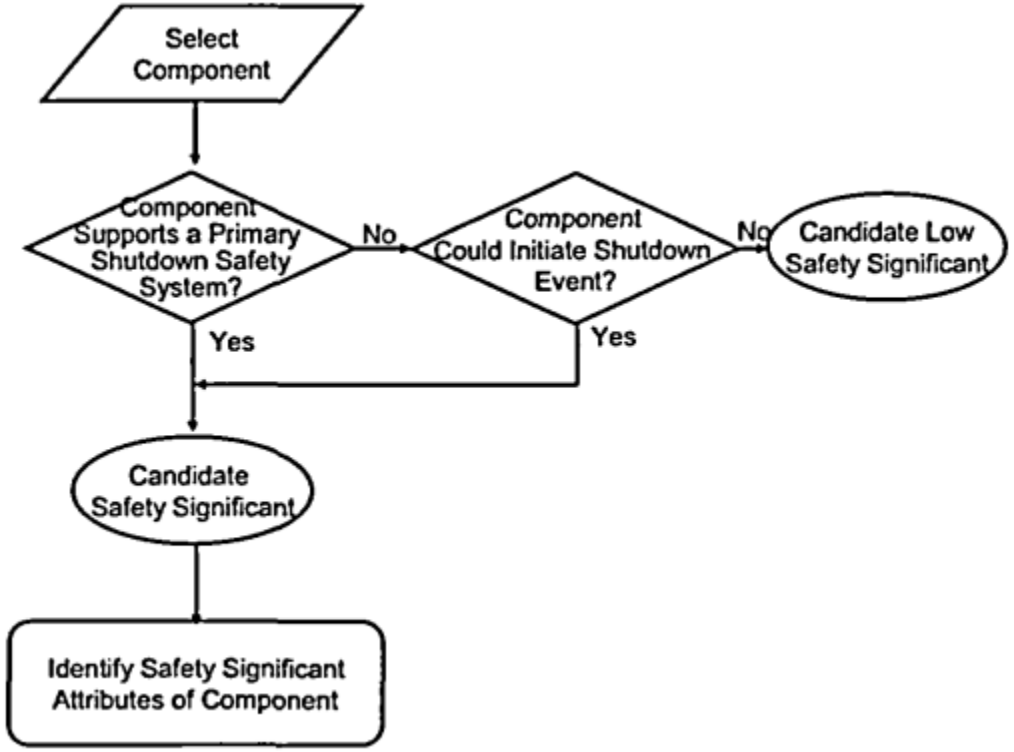
10 CFR 50.69 LAR Overview

Shutdown Risk and Integral Assessment

- Shutdown risk follows the process illustrated in NEI 00-04, Figure 5-7
- Will use the shutdown safety management plan described in NUMARC 91-06
- Integral Assessment performed manually using NEI 00-04, Section 5.6



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10 CFR 50.69 LAR Overview

Integrated Decision-Making Panel (IDP)

- Categorization results are used as inputs to arrive at a preliminary component categorization, which are presented to the IDP
- Once the IDP confirms the process was followed appropriately, the final Risk Informed Safety Class (RISC) can be assigned
- The IDP composition will be composed of a group of at least five experts and will have collective experience in plant operation, design, systems, safety analysis, and PRA
- At least three members will have a minimum of five years of experience at the plant
- At least one member will have a minimum of three years experience in the modeling and updating of the plant-specific PRA models

TSTF-505 LAR Overview

- Consistent with TSTF-505, Revision 2
- Risk-Informed Completion Time (RICT) program methodology consistent with NEI 06-09-A; adherence to NEI 06-09-A will be required by the RICT program
- Total CDF and LERF meet the guidelines in RG 1.174
- RICT will apply to MODES 1 and 2 only
- River Bend previously adopted TSTF-439 (elimination of second completion times), which is necessary to adopt TSTF-505, Rev. 2
- Incorporates industry learnings (admin. controls paragraph “e”, PRA maintenance, discussion on RMAs in Enclosure 12, etc.)

TSTF-505 LAR Overview

Request the Addition of TS 5.5.16 – Risk Informed Completion Time Program

- Refers to RG 1.200, Rev. 2 for PRA maintenance
- Administrative controls are consistent with TSTF-505, Revision 2 and incorporates improved phrasing for paragraph “e”, which is provided below:

e. The risk assessment approaches and methods shall be acceptable to the NRC. The plant PRA shall be based on the as-built, as-operated, and maintained plant; and reflect the operating experience at the plant, as specified in Regulatory Guide 1.200, Revision 2. Methods to assess the risk from extending the Completion Times must be PRA methods approved for use with this program in Amendment No. [###], or other methods approved by the NRC for generic use; and any change in the PRA methods to assess risk that are outside these approval boundaries require prior NRC approval.

TSTF-505 LAR Overview

Seismic Risk Addressed Using a Conservative Penalty

- RBS is more robust than was credited in the safety/risk assessment for Generic Issue 199 due to conservatisms in the NRC's assumption that the plant high confidence low probability of failure (HCLPF) is equal to the safe shutdown earthquake (SSE) (0.1g)
- RBS conducted a re-assessment of seismic CDF and calculated revised fragility values by two independent methods (1) hybrid method (HCLPF = 0.5g) and (2) separation of variables method (HCLPF = 0.3g)
- The revised plant-level fragility used in calculating SCDF is the more conservative fragility (HCLPF = 0.3g)
- The conservative estimate for SCDF uses a HCLPF of 0.3g and convolves the corresponding failure probabilities as a function of the seismic hazard level for RBS
- This is a commonly used approach to conservatively estimate SCDF when a seismic PRA is not available (Section 10-B.9 of the ASME/ANS PRA Standard)
- The CDF and LERF penalties will be applied to each RICT calculation

TSTF-505 LAR Overview

Real Time Risk Model

- The RICT program will utilize the Configuration Risk Model used for existing Maintenance Rule a(4) program
- PHOENIX Risk Analysis Software
- Incorporates RICT calculation feature
- Utilizes single fault tree, all hazard model, re-quantified for each configuration
- One-Top model will be validated to produce identical results to individual hazards

TSTF-505 LAR Overview

Variations from TSTF-505, Rev. 2

- RBS TS based on NUREG-1434, with some minor and administrative differences (e.g., numbering, formatting)
- Notes are added, where appropriate, to preclude use of RICT during a TS loss of function
- Improved phrasing for RICT program administrative controls in TS 5.5.16
- A RICT is proposed for some plant specific Limiting Conditions for Operation (LCOs) and justifications are included

TSTF-505 LAR Overview

Example Variation – TS 3.7.7 – Control Building Air Conditioning (CBAC) System

3.7.7 Control Building Air Conditioning (CBAC) System

LCO 3.7.7 Two Control Building Air Conditioning subsystems shall be OPERABLE.

APPLICABILITY: MODES 1, 2, and 3.

ACTIONS

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. One control building air conditioning subsystem inoperable.	A.1 Restore control building air conditioning subsystem to OPERABLE status.	72 hours OR In accordance with the Risk Informed Completion Time Program
B. Required Action and associated Completion Time of Condition A not	B.1 Be in MODE 3. AND	12 hours

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TSTF-505 LAR Overview

Example Variation – TS 3.6.1.6 – Low-Low Set (LLS) Valves

3.6.1.6 Low-Low Set (LLS) Valves

LCO 3.6.1.6 The LLS function of five safety/relief valves shall be OPERABLE.

APPLICABILITY: MODES 1, 2, and 3.

ACTIONS

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. One LLS valve inoperable.	A.1 Restore LLS valve to OPERABLE status.	14 days OR In accordance with the Risk Informed Completion Time Program
B. Required Action and associated Completion Time of Condition A not	B.1 ----------NOTE---------- LCO 3.0.4.a is not applicable when	

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Current Schedule

- Plan to submit 10 CFR 50.69 LAR by the end of September 2022
- Plan to submit TSTF-505 LAR by the end of November 2022
- Approval requested within 13 months (1 month NRC acceptance review, 12 month LAR review)
- Plan to implement the amendment within 60 days (50.69) and 180 days (TSTF-505) following approval

Closing Remarks

- 10 CFR 50.69 LAR
  - PRA models are technically adequate
  - SSC categorization follows NEI 00-04 and EPRI Tier 1 method for seismic

- TSTF-505 LAR
  - Consistent with TSTF-505, Rev. 2 and NEI 06-09-A
  - Minimal variations (e.g., RBS specific TS)
  - Uses same PRA models and PRA maintenance process
  - Will not use RICT during a TS loss of function
  - A penalty will be applied to each RICT to account for seismic risk

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Questions?