NRR-DMPSPEm Resource

From: Saba, Farideh
Sent: Friday, June 15, 2018 3:04 PM
To: Hess, Thomas A (tahess@tva.gov); Williams, Gordon Robert (grwilliams1@tva.gov)
Cc: Schrull, Edward Dustin (edschrull@tva.gov); Driver, Adrienne; Clayton, Beverly; Jordan, Natreon; Venkataraman, Booma
Subject: BROWNS FERRY UNITS 1, 2, AND 3 – 2ND ROUND RAI RELATED TO LAR TO REVISE TECHNICAL SPECIFICATION 5.5.12 "PRIMARY CONTAINMENT LEAKAGE RATE TESTING PROGRAM" (CAC NOS. MG0113-5; EPID L-2017-LLA-0292)
Attachments: MG0113-5 (L-2017-LLA-0292) Round 2 APLA RAIs for BFN Primary Containment LAR.docx

Importance: High

Gordon and Tom,

By letter dated August 15, 2017 (Agencywide Documents Access and Management System (ADAMS) Accession No. ML17228A490)), as supplemented by letters dated February 5 and March 27, 2018 (ADAMS Accession Nos. ML18036A901 and ML18087A426, respectively) Tennessee Valley Authority submitted a license amendment for Browns Ferry Nuclear Plant Units 1, 2, and 3. The proposed amendment would revise Browns Ferry's Technical Specification 5.5.12 "Primary Containment Leakage Rate Testing Program," by adopting Nuclear Energy Institute 94-01, Revision 3 A, "Industry Guideline for Implementing Performance-Based Option of 10 CFR [Title 10 of the Code of Federal Regulations] Part 50, Appendix J," as the implementation document for the performance-based Option B of 10 CFR Part 50, Appendix J. The proposed changes would allow the licensee to extend the Type A containment integrated leak rate testing interval from 10 to 15 years and the Type C local leakage rate testing intervals from 60 to 75 months.

The U.S. Nuclear Regulatory Commission (NRC) staff reviewed the licensee's submittals and determined that a second round of request for additional information (RAI), as described in the attached document, is needed to complete its review. On May 23, 2018, the NRC staff emailed you the draft RAIs. On May 24, 2018, the NRC staff discussed draft RAIs to confirm your understanding of the information that the NRC staff needs to complete the evaluation. Consequently, you informed the project manager for Browns Ferry you have decided to provide response to option "a" in APLA RAI 2-1. Therefore, you have proposed to submit your responses by July 31, 2018 (longer than usual 30 days for response time). The NRC staff agreed with your proposed response date of July 31, 2018.

Please call me at 301-415-1447, if you have any questions.

Thanks,

Farideh

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PROBABILISTIC RISK ASSESSMENT LICENSING BRANCH (APLA)

REQUEST FOR ADDITIONAL INFORMATION (RAI) REGARDING

BROWNS FERRY NUCLEAR POWER PLANT UNITS 1, 2, AND 3

LICENSE AMENDMENT REQUEST TO REVISE TECHNICAL SPECIFICATION 5.5.12

"PRIMARY CONTAINMENT LEAKAGE RATE TESTING PROGRAM"

APLA RAI 02-01

In review of the licensee's response to APLA RAI 02, dated March 27, 2018 (Agencywide Documents Access and Management System (ADAMS) Accession No. ML18087A426), the licensee updated the total large early release frequency (LERF) risk values across Units 1, 2, and 3 in Table 34 to incorporate the approved NRC methodology that provides guidance to address the credit taken for very early warning fire detection system (VEWFDS) in NUREG-2180, "Determining the Effectiveness, Limitations, and Operator Response for Very Early Warning Fire Detection Systems in Nuclear Facilities (DELORES-VEWFIRE), Final Report" (ADAMS Accession No. ML16343A058). The licensee stated that incorporation of NUREG-2180 identified three fire areas impacted in the fire probabilistic risk analysis (FPRA) model where the incipient fire detection failure rate was increased from 0.0199 using guidance in NUREG/CR-6850, Supplement 1, "Fire Probabilistic Risk Assessment Methods Enhancements" (ADAMS Accession No. ML103090242), to 0.53 using the guidance in NUREG-2180.

The licensee under Table 34 (NUREG-2180) in its response dated March 27, 2018, provided the total LERF values with NUREG-2180 considered. The total LERF results for internal events (IE) and external events (EE) combined were 1.20E-05/year, 1.31E-05/year, and 1.13E-05/year for Units 1, 2, and 3, respectively. The risk contribution from EE includes the effects of internal fires, seismic events, high winds, floods, and other external hazards. Table 33 in the response provides the risk metrics for increase in total LERF for IE and EE combined. The increase in total LERF, which included incorporation of NUREG-2180, was 3.05E-07, 3.38E-07, and 2.27E-07 for Units 1, 2, and 3, respectively. While the increase in total LERF remains within the acceptance criteria range of 1.0E-07 per reactor year to 1.0E-06 per reactor year, Regulatory Guide (RG) 1.174, Revision 3 (ADAMS Accession No. ML17317A256), Section 2.4, "Acceptance Guidelines," provides further guidance that states, in part,

- When the calculated increase in LERF is in the range of 10^{-7} per reactor year to 10^{-6} per reactor year (i.e., the increase in LERF falls within Region II of Figure 5), applications are considered only if it can be reasonably shown that the total LERF is less than 10-5 per reactor year.

These guidelines are intended to provide assurance that proposed increases in CDF [core damage frequency] and LERF are small and are consistent with the intent of the Commission's Safety Goal Policy Statement.

RG 1.174, Section 6.3.1, “Risk Assessment Methods,” further states:

> To generate confidence in the risk assessment used to support the proposed change, the licensee should submit a summary of the risk assessment methods used. Licensees should submit the following information to show that the engineering analyses conducted to justify the proposed licensing basis change are appropriate to the nature and scope of the change. [The RG provides such information to include:]
>
> - Information related to the assessment of the full-scope base LERF (the extent of the information needed depends on whether the analysis of the change in LERF is in Region II or Region III of Figure 5).
>
> - Results of sensitivity analyses showing that the conclusions as to the impact of the licensing basis change on plant risk do not vary significantly under a different set of plausible assumptions; and
>
> - Information related to issues identified in Section C.2.6 if the risk metrics approach the acceptance guidelines.

a. The licensee in response to APLA RAI 02 discussed conservative treatment of the 3 fire compartments impacted, and potential modifications of the FPRA modeling practices that include: (1) refinements of the ignition sources of the fire compartments that are expected to produce significant risk reductions, and (2) additional walkdowns that could result in further refinement of cabinet grouping and decreased heat release rates. To address the exceedance of the total LERF for IE and EE combined, the licensee stated that “TVA expects that the current on-going refinements will reduce the CDF and LERF values to close to those originally submitted in the LAR.” The total LERF values for IE and EE combined provided in the LAR submittal, dated August 15, 2017 (ADAMS Accession No. ML17228A490), were within the RG 1.174 acceptance criteria (i.e., less than 1.0E-05) for applications where the calculated increase in LERF for the change were in the small range.

   Provide a summary and results (i.e., ΔLERF, conditional containment failure probability (CCFP), population dose rate (PDR), total LERF) of a sensitivity analysis as described in the RG 1.174 excerpt above that addresses the potential FPRA modeling refinements described in the response to APLA RAI 02 where it can be reasonably shown quantitatively that either the increase in LERF is in the very small range (less than 1.0E-07) or the increase in LERF is in the small range (10^{-7} per reactor year to 10^{-6} per reactor year) and the total LERF is below 1.0E-05. The sensitivity analysis should include incorporation of the NRC-accepted methodology described in NUREG-2180 and all other applicable changes made in response to RAIs provided in the letters dated February 5, 2018 (ADAMS Accession No. ML18036A901), and March 27, 2018 (ADAMS Accession No. ML18087A426), to ensure use of the state-of-art methodology consistent with the 1995 Commission’s PRA Policy Statement for the “Use of Probabilistic Risk Assessment Methods in Nuclear Regulatory Activities (60 FR 42622, August 16, 1995).

   Note, if the sensitivity analysis credits compensatory measures, such as deployment of FLEX equipment, discuss how these compensatory measures were credited in the

sensitivity analysis consistent with RGs 1.174, 1.177 and 1.200, and NRC's assessment, dated May 30, 2017, of Nuclear Energy Institute (NEI) 16-06, "Crediting Mitigating Strategies in Risk-Informed Decision Making" (ADAMS Accession No. ML17031A269), including:

- Discuss the conservatisms in the analysis.
- Discuss which accident scenarios were credited for the compensatory measures.
- Discuss the systems, structures, and components (SSCs) and operator actions associated with the credited compensatory measures, including whether the equipment needs to be relocated and installed before using.
- Discuss the procedures and guidance associated with employing the credited compensatory measures.
- Explain how the failure rates/probabilities of SSC failures (e.g., random failures, unavailability due to testing and maintenance) associated with the compensatory measures' setup and operation were estimated.
- Explain how the timelines for operator actions were established. Describe the cues or indications operators will use to initiate use of credited compensatory measures and how the time available and time required to complete operator actions were estimated.

OR

b.1 Section V, "Guidelines for Regulatory Implementation," of the 1986 Commissioner's Safety Goal Policy Statement (51 FR 28044; August 4, 1986 as corrected and republished at 51 FR 30028; August 21, 1986) explicitly states, in part, "if pursuant to these guidelines, information is developed that is applicable to a particular licensing decision, it may be considered as one factor in the licensing decision." In addition, RG 1.174 states in part, "[w]hen the assessments of the risk implications from different hazard groups must be combined, it is important to understand the relative level of realism associated with the modeling of each of the hazard groups."

In review of the risk metrics provided by the licensee in Table 34 (NUREG-2180) in response to APLA RAI 02 for total LERF, the NRC staff has considered a holistic and complete approach of the Browns Ferry Nuclear Plant (BFNP) facility operating licensing changes for Units 1, 2, and 3 as a result of other regulatory initiatives to assure the PRA reflects the appropriate level of realism to support the ILRT extension.

Clarify whether the internal events PRA (IEPRA) and FPRA models used to perform the risk evaluation to support the ILRT extension credit FLEX equipment. For the FLEX equipment not credited in the IEPRA and FPRA models, discuss how the equipment provides an additional layer of defense-in-depth relative to CDF/LERF. Include in this discussion whether the FLEX equipment is applicable to a specific unit or all three units and the modification to install the equipment has been completed. In addition, confirm whether the Emergency High Pressure Injection system has been credited in the IEPRA and FPRA models used for this evaluation.

AND

b.2 It can be presumed that one of the postulated worst case scenario(s) for large early release with vessel failure occurrence is predominately driven by events that result in station blackout (SBO) sequences with an extended loss of offsite power.

Provide discussion of sequences resulting in SBO occurrences that lead to LERF and include the contribution to total LERF (percentage) for each PRA hazard as a result of those sequences modeled in the IEPRA and FPRA models. In the summary, include the model revision(s)/name used to determine the contribution to LERF percentage in the IEPRA and FPRA models.

AND

b.3 In response to APLA RAI 06.b in letter dated February 5, 2018, TVA proposed a license condition that stated,

> Prior to extending the frequency for the Integral Leakage Rate Testing described in TS 5.5.12, the licensee shall implement the modifications, that are modeled in the Fire PRA and described in Table S-2, "Plant Modifications," of Tennessee Valley Authority letter CNL-17-024, dated June 7, 2017.

RG 1.174 states, in part,

> However, licensees should not consider that the acceptance guidelines have been met if the risk metrics exceed the acceptance guidelines when implementing self-approval processes. If the risk associated with changes identified in self-approval processes exceeds the acceptance guidelines, licensees may submit additional information for NRC review and approval consistent with this guide.

Supplement the above proposed license condition to include incorporation of the planned FPRA changes for (1) refinements of the ignition sources of the fire compartments that are expected to produce significant risk reductions, and (2) additional walkdowns that could result in further refinement of cabinet grouping and decreased heat release rates discussed in the licensee's response to APLA RAI 02 (in letter dated March 27, 2018). Upon completion of Table S-2, "Plant Modifications" and incorporation of the FPRA modeling refinements and NUREG-2180, and prior to extending the frequency for the ILRT for each Unit, ensure that the risk metrics remain below the ILRT acceptance criteria for delta LERF, population dose rate (PDR), conditional containment failure probability (CCFP) and total LERF (i.e., only applicable if delta LERF is in the small range per RG 1.174). Also, propose a mechanism within the license condition consistent with RG 1.174, Revision 3 that if the updated risk associated with changes identified in the self-approval processes exceeds the acceptance guidelines, TVA will submit additional information for NRC review and approval consistent with the EPRI Report 1009325, Revision 2-A and RG 1.174, Revision 3 guidance prior to extending the frequency for the ILRT.

APLA RAI 02-02

The licensee in response to APLA RAI 02, in its letter dated March 27, 2018, provided Tables 1, 2, and 3 to demonstrate the inclusion of NUREG-2180 for three fire compartments, 16-K, 16-M, and 16-O across the three units identified to be impacted by the approved NRC methodology. In review of the results provided across the three fire compartments, for all three Units there existed asymmetric percentage changes between CDF and LERF. In all cases the LERF change is at least twice that of the CDF change, except for one case that is roughly half. There is also asymmetry across the units, where the changes occur in 16-K and 16-O for Unit 1, but occurs only in 16-M for Unit 2. Fire compartment 16-O shows this asymmetry in Unit 3 as well. Provide justification to address the potential anomalies within the fire compartments across the three units. The justification should include discussion of any spatial differences within the fire areas and three units.