

NRR-DMPSPeM Resource

From: Kim, James
Sent: Friday, September 21, 2018 4:05 PM
To: Duke, Paul R.; Thomas, Brian J.
Cc: Marabella, Lee A.
Subject: Salem 1 and 2 - Final RAI from PRA Branch RE: Inverter AOT Extension
Attachments: Salem AOT-Revised Final RAI from PRA Branch.docx

By letter dated May 16, 2018, (Agencywide Documents Access and Management System (ADAMS) Accession No. ML18136A866), as supplemented by letter dated June 14, 2018 (ML18169A218), PSEG Nuclear LLC (PSEG, the licensee), requested an amendment to Renewed Facility Operating License No. DPR-70 and DPR-75 for Salem Generating Station (Salem) Units 1 and 2. This license amendment request proposes to change Technical Specification (TS) 3.8.2.1, "A. C. Distribution - Operating." The proposed change would increase the Vital Instrument Bus (VI B) Inverters allowed outage time (AOT) from 24 hours for the A, B and C inverters to 7 days and from 72 hours for the D inverter to 7 days.

The NRC staff from Instrumentation and Controls Branch has determined that the additional information is required for the staff to complete its review. On September 6, 2018, the NRC staff sent PSEG the draft Request for Additional Information (RAI). This RAI relates to the licensee's request to increase the Vital Instrument Bus (VIB) Inverters allowed outage time (AOT).

On September 18, 2018, the NRC staff and the licensee held a conference call to clarify the request. During the conference, it was agreed that a revised RAI will be provided. On September 20, 2018, the NRC staff sent PSEG the revised RAI. Subsequently, the licensee agreed to respond to this request within 30 days of this email. A publicly available version of this final RAI (attached) will be placed in the NRC's ADAMS.

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**REVISED REQUEST FOR ADDITIONAL INFORMATION BY THE PROBABILISTIC RISK
ASSESSMENT LICENSING BRANCH, DIVISION OF RISK ASSESSMENT
LICENSE AMENDMENT REQUEST FOR EXTENSION OF VITAL
INSTRUMENT BUS INVERTER ALLOWED OUTAGE TIMES
PSEG NUCLEAR LLC
SALEM NUCLEAR GENERATING STATION UNITS 1 AND 2
DOCKET NOS. 50-272 AND 50-311 (EPID: L-2018-LLA-0140)**

By letter dated May 16, 2018, as supplemented by letter dated June 14, 2018 (Agencywide Documents Access and Management System (ADAMS) Accession Numbers ML18136A866 and ML18169A218, respectively), Public Service Enterprise Group Nuclear, LCC (PSEG, the licensee), submitted a license amendment request (LAR) regarding the Salem Nuclear Generating Station Units 1 and 2. The proposed amendment would change technical specification (TS) 3.8.2.1, "A.C. [alternating current] Distribution - Operating," that would increase the vital instrument bus inverter allowed outage time (AOT) from 24 hours to 7 days for the A, B and C inverters and from 72 hours to 7 days for the D inverter. The licensee states that the proposed change will allow increased flexibility in the scheduling and performance of corrective maintenance, allow better control and allocation of resources, and reduce the potential for unplanned plant shutdowns.

The Probabilistic Risk Assessment (PRA) Licensing Branch (APLA) of the Division of Risk Assessment staff has reviewed the LAR and determined that additional information, related to PRA considerations described in the LAR, is required for the APLA staff to complete the review. A request for additional information (RAI) memorandum was provided to the Division of Operating Reactor Licensing on August 23, 2018. Subsequently, a clarification call was held with the licensee and NRC staff on September 18, 2018, and clarifications to the RAI questions were determined to be appropriate. The revised RAI questions are provided below.

Regulatory Basis

Title 10 of the *Code of Federal Regulations* (10 CFR) Part 50.65, "Requirements for monitoring the effectiveness of maintenance at nuclear power plants," requires that preventive maintenance activities must be sufficient to provide reasonable assurance that Structures Systems and Components are capable of fulfilling their intended functions. As it relates to the proposed inverter AOT extension, 10 CFR 50.65(a)(4) requires the assessment and management of the increase in risk that may result from proposed maintenance activities.

10 CFR 50.63, "Loss of all alternating current power," requires that nuclear power plants must be able to withstand a loss of all A.C. power for an established period of time and recover from a station blackout.

Enclosure

The following are applicable regulatory guidelines and policy documents for evaluating the risk impact of the proposed change:

- Regulatory Guide (RG) 1.174, Revision 2 (May 2011), "An Approach for Using Probabilistic Risk Assessment in Risk-Informed Decisions on Plant-Specific Changes to the Licensing Basis," describes an acceptable risk-informed approach for assessing changes to licensing bases.
- RG 1.177, Revision 1 (May 2011), "An Approach for Plant-Specific, Risk-Informed Decision-making: Technical Specifications," describes an acceptable risk-informed approach for assessing proposed permanent TS changes in AOTs. In addition, this RG provides risk acceptance guidelines for evaluating the results of such assessments.
- RG 1.200, Revision 2 (March 2009), "An Approach for Determining the Technical Adequacy of Probabilistic Risk Assessment Results for Risk-Informed Activities," describes an acceptable approach for determining whether the quality of the PRA models, in total or the parts that are used to support an application, is sufficient to provide confidence in the results, such that the PRA models can be used in regulatory decision making for light-water reactors.
- Regulatory Issue Summary 2007-06 (March 2007), "Regulatory Guide 1.200 Implementation," describes how the Nuclear Regulatory Commission (NRC) will implement its technical adequacy review of plant-specific PRAs used to support risk-informed licensing actions after the issuance of RG 1.200.

Request For Additional Information

APLA RAI-1

In order to ensure efficiency in its reviews and prevent duplicate reviews of a licensee's PRA technical acceptability, the NRC staff may utilize PRA information from the licensee's previous risk-informed submittals. In the course of its review for this LAR, the staff utilized information from the licensee's application for Salem containment fan cooler unit AOT extension dated March 6, 2017 (ADAMS Accession Number ML17065A241), as supplemented by letters dated May 4, 2017 (ADAMS Accession Number ML17125A051) and September 14, 2017 (ADAMS Accession Number ML17257A439). The method used by the licensee for estimating core damage frequency (Δ CDF) for fire and seismic events in the supplemental letter dated May 4, 2017, differs from the method used in the current LAR dated May 16, 2018 (ADAMS Accession Number ML18136A866). The NRC staff performed a confirmatory calculation based on the method used in the May 4, 2017 letter. The resulting value for Δ CDF for fires corresponded to Region II RG 1.74 acceptance criteria. As a result, the licensee's conclusion in Section 3.2.3.2 of the current LAR that since the change in CDF is negligible, the large early release frequency (LERF) impact will also be negligible would not be valid per the confirmatory calculation, as a change in CDF corresponding to Region II of RG 1.74 is not considered negligible.

Alternate Fire Event Calculations for Salem Inverter D

Calculation of $\Delta CDF_{\text{surrogate}}$:

$$\Delta CDF_{\text{surrogate}} = F_{\text{IE-F}} \times U_{\text{A}_{\text{INV}}} \times P_{\text{BU}} \times (T_{\text{AOT}}/T_{\text{CYC}}) = \underline{2.51\text{E-}06 / \text{reactor-year}}$$

where:

$$F_{\text{IE-F}} = \text{fire initiating event frequency} = 4.62\text{E-}01$$

$$U_{\text{A}_{\text{INV}}} = \text{Unavailability of inverter D} = 1.0$$

$$P_{\text{BU}} = \text{Probability of backup power failure} = 2.83\text{E-}04$$

$$T_{\text{AOT}} = \text{AOT duration} = 7 \text{ days}$$

$$T_{\text{CYC}} = \text{cycle duration} = 365 \text{ days}$$

$$T_{\text{AOT}}/T_{\text{CYC}} = \text{Fractional Unavailability}$$

Per the NRC alternate calculations above, the values determined for $\Delta CDF_{\text{surrogate}}$ correspond to Region II RG 1.74 acceptance criteria. This is a less conservative result than that reported in Section 3.2.3.2 of the licensee's LAR dated May 16, 2018.

RAI-1:

Please provide a discussion explaining the use of the two different calculation methods and the rationale for the acceptability of the fire PRA approach used in the LAR dated May 16, 2018, as opposed to the method used in the letter dated May 4, 2017, and the basis for the determination that this approach is sufficiently conservative to support the proposed inverter AOT extension. In addition, provide an evaluation of the ΔLERF from fire events.

APLA RAI-2

The entry for item (I) in Table A-7 of Attachment 2 to the LAR dated May 16, 2018, notes that the Salem PRA Model of Record (MOR) (SA115A) was only completed for Salem Unit 1 and it relies on Unit 2 equipment for certain support functions.

RAI-2:

Please provide justification that the cross-unit support functions, as well as the asymmetries, in the Salem PRA MOR (SA115A) are adequately accounted for such that application to Salem Unit 2 is appropriate.