NRR-DMPSPEm Resource

From: Kim, James
Sent: Thursday, September 6, 2018 9:55 AM
To: Duke, Paul R.; Thomas, Brian J.
Cc: Marabella, Lee A.
Subject: Salem 1 and 2 - Final RAI RE: Inverter AOT Extension
Attachments: Salem Inverter AOT - Final RAI.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 has determined that the additional information is required for the staff to complete its review. On August 24, 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 5, 2018, the NRC staff and the licensee held a conference call to clarify the request. A publicly available version of this final RAI (attached) will be placed in the NRC's ADAMS. Subsequently, the licensee agreed to respond to this request by October 12, 2018.

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REQUEST FOR ADDITIONAL INFORMATION

SALEM GENERATING STATION, UNITS 1 AND 2

LICENSE AMENDMENT REQUEST TO REVISE TECHNICAL SPECIFICATIONS ACTION 3.8.2.1.b REGARDING VITAL INSTRUMENT BUS INVERTERS

DOCKET NOS. 50-272 and 50-311

By letter dated May 16, 2018 (Agencywide Documents Access management System (ADAMS) Accession No. ML18136A866), 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 changes to changes to 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 Electrical Engineering Operating Branch (EEOB) staff has determined that the following additional information is needed to complete the review of the Salem license amendment request (LAR).

Regulatory Requirements

The following Nuclear Regulatory Commission (NRC) regulatory documents are applicable to the staff's review of the licensee's amendment request:

The general design criteria that were followed in the design of this plant are the Atomic Industrial Forum (AIF) version, as published in a letter to the Atomic Energy Commission from E. A. Wiggin, Atomic Industrial Forum, dated October 2, 1967. The criteria were developed as performance criteria which define or describe safety objectives and procedures, and they provide a guide to the type of plant design information which is included in this report.

In addition to the AIF General Design Criteria, the Salem was designed to comply with PSEG's understanding of the intent of the AEC's proposed General Design Criteria, as published for comment by the AEC in July 1967. The application of the AEC's proposed General Design Criteria to the Salem station is discussed in Section 3.1.2 of the updated safety evaluation report.

Salem General Design Criterion 24, "Emergency Power for Protection Systems," requires that in the event of loss of all offsite power, sufficient alternate power sources of power shall be provided to permit the required functioning of the protection systems.

Salem General Design Criterion 39, "Emergency Power for Engineered Safety Features," requires that Alternate power systems shall be provided and designed with adequate independency, redundancy, capacity, and testability to permit the functioning required of the engineered safety features. As a minimum, the onsite power system and the offsite power system shall each, independently, provide this capacity assuming a failure of a single active component in each power system.

Title 10 of the *Code of Federal Regulations* (10 CFR) Part 50.36, “Technical Specifications,” requires, in part, that the operating license of a nuclear production facility include TS. 10 CFR 50.36 (c)(2) requires that the TS include limiting conditions for operation (LCOs) which are the lowest functional capability or performance levels of equipment required for safe operation of the facility. When an LCO of a nuclear reactor is not met, the licensee shall shut down the reactor or follow any remedial action permitted by the technical specifications until the condition can be met.

To issue or amend a license with a particular remedial action, the Commission must be able to find, among other things, that there is reasonable assurance that the activities authorized by the operating license (e.g., continued operation for a set amount of time when an LCO is not met) can be conducted without endangering the health and safety of the public.

The staff also considered the following guidance documents to evaluate the LAR:

The NRC staff’s guidance in BTP 8-8 for reviewing LARs for AOT extensions for electrical power sources states that “the licensee must provide justification for the duration of the requested AOT (actual hours plus margin) based on plant-specific past operating experience.”

In addition, Regulatory Guide 1.93 Revision 1 on Availability of Electric Power Sources, indicates that another subsequent single failure as a possibility that would necessitate severe restriction on the time allowed.

EEOB RAI-1

LAR Section 2.3, “Reason for the Proposed Change,” states:

> Salem performs preventative maintenance on the VIB inverters during refueling outages. There are no current plans to perform routine preventive maintenance on a scheduled basis at power. Should the need for such maintenance be identified as a result of component performance, the necessary preventive maintenance would be planned and scheduled in accordance with PSEG procedures for on-line work management.
>
> Experience both at Salem and at other nuclear power plants has shown that the current AOTs for restoration of an inoperable VIB inverter are insufficient in certain instances to support on-line troubleshooting, corrective maintenance, and post-maintenance testing while the unit is at power. Specifically, Salem has entered TS 3.8.2.1 LCO due to an inoperable inverter 5 times since 2009. The actual times in the LCO were 9 hours 28 minutes in 2009, 16 hours 39 minutes in 2014, 23 hours 33 minutes in 2016, 16 hours 47 minutes in 2017 and 32 hours 50 minutes in 2018 (for the D inverter): however in these instances, the cause of the failures was readily evident. This allowed the troubleshooting process to be minimized thereby allowing for a quick repair and subsequent testing.

The LAR requests changes to 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. Based on the above operating experience that needed a maximum of 33 hours, the licensee has not justified the duration of the AOT extension requested for either preventive or corrective maintenance for the inverters at Salem. Therefore, the licensee is requested to provide technical justification for the duration of the requested AOT

(actual hours plus margin based on plant-specific past operating experience and vendor recommendations).

EEOB RAI-2

LAR Section 2.1, "System Design and Operation**,"** states

> The safety related 115V A.C. instrument and control power system is divided into four independent power supply channels (A, B, C, and D) for each unit, designed to provide reliable uninterrupted source of power for reactor control instrumentation, reactor protection instrumentation and safety-related equipment. Each channel supplies its associated safety related electrical load group. Vital instrument bus loads are assigned to load groups such that a loss of any one vital instrument bus will not will prevent the operation of the required safety systems during a postulated design basis event.

The NRC staff's guidance in BTP 8-8 for reviewing LARs for AOT extensions for electrical power sources recommends the provision of a supplemental power source capable of performing the function of the inoperable equipment during the extended AOT. The NRC staff notes that the licensee did not discuss the provision of a supplemental power source during the extended AOT. To allow the NRC staff to evaluate the technical adequacy of the extended AOT for inoperable inverters, provide the following information:

In case another inverter would fail in a redundant channel during the proposed extended AOT for restoring inoperable inverters in one channel to operable status, provide a discussion that describes:

a. The plant configuration, response, and effects on the plant safety-related systems required to mitigate a design basis event (DBE) and their safety functions after the second inverter fails.
b. The use of a supplemental 115 V AC power source such as a spare inverter or a UPS, the compensatory measures, equipment alignment, and the procedures in place to address the potential consequences to the plant in the event of a DBE or an anticipated operational occurrence if there would be a potential loss of safety functions or reduction in defense in depth of affected safety systems. If there is not a need to use a supplemental 115 V AC power source, please provide a justification.