June 10, 2010

Mr. Thomas Joyce
President and Chief Nuclear Officer
PSEG Nuclear LLC
P.O. Box 236
Hancocks Bridge, NJ 08038

SUBJECT: REQUEST FOR ADDITIONAL INFORMATION FOR THE REVIEW OF THE SALEM NUCLEAR GENERATING STATION, UNIT 1 AND UNIT 2, LICENSE RENEWAL APPLICATION IDENTIFIED DURING THE AUDIT (TAC NOS. ME1836 AND ME1834)

Dear Mr. Joyce:

By letter dated August 18, 2009, as supplemented by letter dated January 23, 2009, Public Service Enterprise Group Nuclear, LLC, submitted an application pursuant to Title 10 of the *Code of Federal Regulations* Part 54 (10 CFR Part 54) for renewal of Operating Licenses Nos. DPR-70 AND DPR-75 for the Salem Nuclear Generating Station, Unit 1 and Unit 2. The staff of the U.S. Nuclear Regulatory Commission (NRC or the staff) completed its aging management program consistency audit on February 19, 2010 and has identified, in the enclosure, areas where additional information is needed to complete the review. Further requests for additional information may be issued in the future.

Items in the enclosure were discussed with John Hufnagel and other members of your staff, and a mutually agreeable date for the response is within 30 days from the date of this letter. If you have any questions, please contact me by telephone at 301-415-2981 or by e-mail at bennett.brady@nrc.gov.

Sincerely,

/RA/

Bennett Brady, Project Manager
Projects Branch 1
Division of License Renewal
Office of Nuclear Reactor Regulation

Docket Nos. 50-272 and 50-311

Enclosure:
As stated

cc w/encl: See next page

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ADAMS Accession No.: **ML101440081**

OFFICE	PM:DLR:RPB1	LA:DLR	BC:DLR:RPB1	PM:DLR:RPB1
NAME	B. Brady	Y. Edmonds	B. Pham	B. Brady
DATE	06/03/10	05/27/10	06/03/10	06/10/10

OFFICIAL RECORD COPY

Letter to T. Joyce from B. Brady dated June 10, 2010

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Salem Nuclear Generating Station
Units 1 and 2

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Mr. Earl R. Gage
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Salem, NJ 08079

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RAI B.2.1.9-01

Background:

Generic Aging Lessons Learned (GALL) aging management program (AMP) XI.M18, "Bolting Integrity," Program Element 1, "scope of program," states that the program covers bolting within the scope of license renewal, including 1) safety-related bolting, 2) bolting for nuclear steam supply system component supports, 3) bolting for other pressure retaining components, including nonsafety-related bolting, and 4) structural bolting (actual measured yield strength ≥150 ksi); and Program Element 2, "preventive actions," states that selection of bolting material and use of lubricants and sealants is in accordance with the guidelines of EPRI NP-5769 and the additional recommendations in NUREG-1339, and that bolting replacement activities include proper torquing and application of appropriate preload based on EPRI documents.

Both the license renewal application (LRA) and the program basis document for Salem Nuclear Generating System (SNGS) AMP B.2.1.9 indicate that aging effects for component support bolting and structural bolting are managed by AMPs different from the Bolting Integrity Program, such as the Structures Monitoring Program, the Inspection of Overhead Heavy Load and Light Load (Related to Refueling) Handling Systems Program, the ASME Section XI, Subsection IWF, Program, the External Surfaces Monitoring Program, or the Buried Piping Inspection Program.

Issue:

It is not clear to the staff why the use of AMPs different from the Bolting Integrity Program for managing the aging effects of bolts in the scope of license renewal was not identified as an exception to Element 1 of the Bolting Integrity Program. Also, it is not clear how the other, credited AMPs, which are primarily inspection programs, would implement all of the elements of the Bolting Integrity Program, especially Element 2, which includes recommendations related to procurement, replacement activities, and requirements for and implementation of proper torquing, that normally are not included within the scope of an inspection program.

Requests:

a) Explain why the use of other programs to manage the aging effects of component support and structural bolting was not identified as an exception to GALL AMP XI.M18, Element 1.

b) Explain how you ensure that other AMPs credited for aging management of component support and structural bolting include all recommendations for aging management of bolting in GALL AMP XI.M18. Include sufficient information for the staff to determine whether and how the preventive actions in GALL AMP XI.M18, Element 2, are included in the other credited AMPs.

ENCLOSURE

RAI B.2.1.18-01

Background:

The applicant discussed the Fuel Oil Chemistry Program enhanced procedures for SNGS as part of the license renewal application. During the staff review of the enhanced sampling procedures for the main fuel oil storage tank, the diesel fire pump fuel oil storage tanks, and the diesel fuel oil storage tanks, it was noted that the procedures state that if a significant amount of water (greater than two ounces per gallon of fuel) is present, then a Notification per the Corrective Action Plan should be submitted.

Issue:

It is not clear how the person performing the testing will be able to complete the analysis with the current level of detail provided in the procedure. For example, with the main fuel oil storage tank, it was unclear how the tester would be able to discern two ounces of water in a 10 gallon sample. With the diesel fire pump fuel oil storage tank sample, it was unclear what level of water was determined not acceptable, given that only a one liter sample was specified to be drawn.

Request:

Please clarify how there is reasonable assurance that the analyses requested to be performed in the enhanced procedures will be performed correctly.

RAI B.2.1.15-01

Background:

GALL AMP XI.M26, Element 4, "detection of aging effects" states:

> The periodic visual inspection and function test is performed at least once every six months to examine the signs of degradation of the halon/CO_2 fire suppression system. Material conditions that may affect the performance of the system, such as corrosion, mechanical damage, or damage to dampers, are observed during these tests.

SNGS LRA Appendix B2.1.15 takes an exception to GALL AMP XI.M26, and states:

> NUREG-1801 recommends visual inspection and functional testing of the Halon and Carbon Dioxide fire suppression systems at least once every six months. The Halon and Carbon Dioxide fire suppression systems currently undergo functional testing every refueling cycle (18-months).

Issue:

It is not clear if the exception only applies to functional testing.

Request:

Clarify that the exception only applies to functional testing, and that the SNGS Fire Protection Program performs visual inspection at least once every six months to examine the signs of degradation of the halon/CO_2 fire suppression system. If the visual inspection is not performed once every six months, please justify why this is not an exception to the GALL AMP XI.M26.

RAI B.2.1.15-02

Background:

GALL AMP XI.M26, Element 4, "detection of aging effects," states:

> Visual inspections of the halon/CO_2 fire suppression system detect any sign of added degradation, such as corrosion, mechanical damage, or damage to dampers. The periodic function test and inspection performed at least once every six months detects degradation of the halon/CO_2 fire suppression system before the loss of the component intended function.

GALL AMP XI.M26, Element 6, "acceptance criteria," states:

> Also, any signs of corrosion and mechanical damage of the halon/CO_2 fire suppression system are not acceptable.

Program Basis Document, SH-PBD-AMP-XI.M26, under Section 3.4.f, states:

> The Fire Protection Program directs halon fire suppression system surveillance that verifies storage tank weight at least every six months. The Halon fire suppression system, including associated ventilation dampers, is verified to actuate in response to a simulated test signal, every refueling cycle. During the inspections, adverse conditions are required to be reported for corrective action evaluation. Procedures S1(2).FP-SV.FS-0066 (Q) and S1(2).FP-ST.FS-0048 (Q) are referenced.
>
> The program directs low-pressure Carbon Dioxide fire suppression system surveillance that verifies the carbon dioxide storage tank level and pressure on a weekly basis. System operability is verified at least once per refueling outage by verifying the system valves and associated ventilation dampers actuate manually and automatically in response to a simulated actuation signal. Any adverse conditions are required to be reported in the corrective action program. Procedures S1(2).FP-SV.FS-0019 (Q) and S1(2).FP-ST.FS-0048 (Q) (should be 0021) are referenced.

Issue:

Procedure S1(2).FP-ST.FS-0048 (Q) addresses functional test of the Relay Room Halon 1301 System and ensures that dampers and devices actuate properly. However, there is no visual inspection activity to check for degradation such as corrosion or mechanical damage. Acceptance criteria as identified in the procedure do not address corrosion.

Procedure S1(2).FP-SV.FS-0019 (Q) verifies that the valves in the flow path of the 10 ton CO_2 system are in their correct position. However, there is no visual inspection activity to check for degradation such as corrosion or mechanical damage. Acceptance criteria as identified in the procedure do not address corrosion.

Procedure S1(2).FP-ST.FS-0021 (Q) verifies the operation of the diesel area total flooding CO_2 system. However, there is no visual inspection activity to check for degradation such as corrosion or mechanical damage. Acceptance criteria as identified in the procedure do not address corrosion.

Request:

Clarify how this is considered consistent with the GALL AMP XI.M26. If it is not consistent, justify why this is not an exception or an enhancement.

RAI B.2.1.25-01

Background:

GALL AMP XI.M37, "Flux Thimble Tube Inspection," Program Element 5, "monitoring and trending," states that flux thimble tube wall thickness measurements will be trended and wear rates calculated, with examination frequency based on plant-specific wear projections, and that re-baselining of the examination frequency should be justified using plant-specific wear-rate data unless prior plant-specific NRC acceptance for the re-baselining was received.

Issue:

SNGS replaced its original flux thimble tubes with an improved design in 1990 and has not routinely performed flux thimble tube eddy current testing (ECT) to measure flux thimble tube wall thickness since 1993. SNGS states that it will reinstitute flux thimble tube testing in accordance with the recommendations in NRC Bulletin 88-09 during the period of extended operation. Because of the lack of on-going testing, it is not clear to the staff how SNGS will baseline the existing wall thickness of flux thimble tubes.

Requests:

a) Explain how the baseline condition of the flux thimble tube walls will be established when ECT is reinstituted during the period of extended operation.

b) Explain how plant-specific flux thimble tube wear rates will be determined and projected to ensure that acceptance criteria for flux thimble tube wall thickness continue to be met during the operating interval between subsequent flux thimble tube inspections.

RAI B.2.1.38-01

Background:

GALL AMP XI.E3, states that the program applies to inaccessible medium voltage cables that are exposed to significant moisture simultaneously with significant voltage. Significant moisture is defined as periodic exposures to moisture that last for more than a few days.
GALL AMP XI.E3 also states that periodic actions are taken to prevent cables from being exposed to significant moisture. GALL AMP XI.E3 further states that inspection for water collection should be performed based on actual plant experience with water accumulation in the manhole with an inspection frequency of at least every two years.

Issue:

The applicant identified operating experience and the staff confirmed through walkdowns and operating experience review, cases of inaccessible medium voltage cable exposure to significant moisture (cable submergence in manholes/vaults) and cable support structural degradation inconsistent with GALL AMP XI.E3 (i.e., periodic actions are taken to prevent cables from being exposed to significant moisture). A review of operating experience does not provide information on in-scope inaccessible medium voltage station blackout (SBO) recovery cable testing results or manhole/vault inspections. SBO cables in-scope of license renewal including direct buried portions may also be exposed to significant moisture.

Requests:

a) Describe how SNGS LRA AMP B.2.1.38 meets GALL AMP XI.E3 for in-scope inaccessible medium voltage SBO recovery cables considering that operating history shows that the in-scope inaccessible medium voltage SBO recovery cables are exposed to significant moisture (i.e. exposure lasting more than a few days).

b) In addition, (i) describe how plant operating experience was incorporated into AMP B.2.1.38 to minimize exposure of in-scope inaccessible medium voltage SBO recovery cables to significant moisture during the period of extended operation, (ii) discuss any corrective actions taken that address submerged cable conditions identified through manhole/vault inspections, (iii) discuss cable testing/frequency and applicability that demonstrates that in-scope inaccessible medium voltage SBO recovery cable will continue to perform their intended function during the period of extended operation.

RAI B.2.1.38-02

Background:

GALL AMP XI.E3, states that the program applies to inaccessible (e.g., in conduit, direct buried) medium-voltage cables within the scope of license renewal that are exposed to significant moisture simultaneously with significant voltage.

Issue:

Program Basis Document SH-PBD-AMP-XI.E3, “Inaccessible Medium Voltage Cables Not Subject to 10 CFR 50.49 Environmental Qualification Requirements,” scope of program does not identify cables that are within the scope of the program.

Request:

Identify inaccessible medium voltage cables within the scope of AMP B.2.1.38 including cable ID number, insulation and jacket material.

RAI B.2.1.38-03

Background:

GALL AMP XI.E3, “Inaccessible Medium Voltage Cables Not Subject to 10 CFR 50.49 Environmental Qualification Requirements” Program Element 1, “scope of program,” provides definitions for significant moisture and significant voltage. Standard Review Plan for License Renewal (SRP LR) Table 3.6-2, Final Safety Analysis Report (FSAR) Supplement for Aging Management of Electrical and Instrumentation and Control System also includes definitions for significant moisture and significant voltage.

Issue:

LRA FSAR Supplement Section A.2.1.38 does not include definitions of significant moisture or significant voltage consistent with SRP LR Table 3.6-2 or GALL AMP XI.E3, “Inaccessible Medium Voltage Cables Not Subject to 10 CFR 50.49 Environmental Qualification Requirements.” The lack of these definitions in combination with the applicant’s stated objective of using inspections to ensure that cables are infrequently submerged may not provide consistency with GALL AMP XI.E3.

Request:

Explain why LRA FSAR supplement A.2.1.38 for LRA AMP B.2.1.38 does not include the definitions of significant voltage and significant moisture consistent with GALL AMP XI.E3 and SRP LR Table 3.6-2.

RAI B.2.1.40-01

Background:

NUREG 1801, Vol. 1, Rev. 1, GALL Report states that operating experience involving the aging management program, including past corrective actions resulting in program enhancements or additional programs, should provide objective evidence to support a determination that the effects of aging will be adequately managed so that the structure and components’ intended functions will be maintained during the period of extended operation.

Issue:

The applicant LRA and basis document provide operating experience examples that conclude that the effects of aging and aging mechanisms are being adequately managed. The applicant stated that these examples provide objective evidence that the aging management program, acceptance criterion, and the corrective action process will be effective in resolving problems prior to loss of function. However, it is not clear based on the applicant's discussion that the included examples are representative of operating experience in that the search methodology and criteria, (e.g., XI.E6 connection type, time frame, connection stressors – application, loading, locations) and aging management program components within the scope of license renewal and electrical GALL AMPs are not discussed.

Request:

Provide a discussion on the evaluation methods and search criteria used to select the examples provided in LRA B.2.1.40. The discussion should demonstrate that the examples provided are representative of the operating experience for the applicable GALL AMP. See LRA Sections B.2.1.36, 37, 38, 39, 40 and B.3.1.2 and the associated program basis documents.

RAI B2.2.2-01

Background:

Plant-specific B.2.2.2 Periodic Inspection in the "detection of aging effects" program element does not describe when, where, and how program data are collected. However, Section A1.2.3 of NUREG-1800, Appendix A states that the program element should describe when, where, and how program data are collected (i.e., all aspects of activities to collect data as part of the program).

Issue:

LRA Section B.2.2.2 Periodic Inspection in the "detection of aging effects" program element description states that the parameters monitored and inspected include direct visual inspection of component surfaces and ultrasonic wall thickness measurements. It is not clear to the staff what parameter would be monitored during direct visual inspections to identify effect of aging on aluminum components, e.g., pitting and crevice corrosion (LRA Table 3.3.2-7).

Request:

State what parameters would be monitored to identify the effect of aging on aluminum components, e.g., pitting and crevice corrosion (LRA Table 3.3.2-7).

RAI B2.2.2-02

Background:

Plant-specific B.2.2.2 Periodic Inspection "detection of aging effects" program element does not describe when, where, and how program data are collected. However, Section A1.2.3 of NUREG-1800, Appendix A states that the program element should describe when, where, and how program data are collected (i.e., all aspects of activities to collect data as part of the program).

Issue:

LRA Section B.2.2.2 Periodic Inspection in "detection of aging effects" program element description states that visual inspections of elastomer components will detect the presence and extent of hardening and loss of strength; and visual inspection may include physical manipulation to assist in detecting hardening and degradation of elastomer components. Given that visual inspection would not always include physical manipulations, the staff is not clear on: (a) the process in determining a need for physical manipulation to assist visual inspections of elastomer components; (b) the characteristics assessed by physical manipulations; and (c) how collected information is quantified or otherwise used to assess component longevity.

Request:

Clarify the process in determining a need for physical manipulation to assist visual inspections of elastomer components. Clarify characteristics assessed by physical manipulations and how collected information will be quantified or otherwise used to assess component longevity.

RAI B2.2.2-03

Background:

Section A1.2.3 of NUREG-1800, Appendix A states that the acceptance criteria of the program and its basis should be described.

Issue:

In element 6 of the LRA AMP it states that acceptance criteria for loss of material are based on the original equipment design wall thickness and any corrosion allowance requirements. It is not clear to the staff what the acceptance criteria for determining effects of aging on aluminum components are.

Request:

Clarify what the acceptance criteria for determining effects of aging on aluminum components are.

RAI B.2.1.3-01

Background:

GALL AMP XI.M3, “Reactor Head Closure Studs,” Program Element 4, “detection of aging effects,” states that “Examination Category B-G-1 for pressure-retaining bolting greater than two inches diameter in reactor vessels specifies … surface and volumetric examination of studs when removed.”

Issue:

Based on its review of the SNGS Reactor Head Closure Studs Program, the staff has determined that only volumetric examinations are provided for studs when removed from the reactor flange.

The staff also noted that in SNGS LRA Section B.2.1.3, the “program description” states that the Reactor Head Closure Studs AMP is an existing program that provides for ASME Section XI inspections of reactor head closure studs, nuts and washers for cracking, loss of material, loss of fracture toughness and coolant leakage from reactor vessel closure stud bolting in an air environment. However, loss of fracture toughness is not an aging effect that is typically associated with reactor head closure studs.

Requests:

a) Explain why this is not identified as an exception to the GALL Report’s recommendations or identify it as an exception to the GALL Report.

b) Justify why volumetric examination (only) of reactor head closure studs when removed provides adequate detection of the aging effects for which the Reactor Head Closure Studs Program is credited.

c) Clarify why loss of fracture toughness is listed as an aging effect managed by the Reactor Head Closure Studs Program, and explain what mechanism causes this aging effect in these components.