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SEP 30 2010

10 CFR 50
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LR-N10-0360

U.S. Nuclear Regulatory Commission
ATTN: Document Control Desk
Washington, DC 20555-0001

Hope Creek Generating Station
Facility Operating License No. NPF-57
NRC Docket No. 50-354

Subject: Supplement to the Hope Creek Generating Station License Renewal Application to Revise the Maximum Cable Testing and Cable Vault Inspection Frequencies and Clarify Related Information in the Inaccessible Medium Voltage Cables Not Subject to 10 CFR 50.49 Environmental Qualification Requirements (E3) Program

References:

1. PSEG Letter LR-N10-0291 to USNRC, "Supplement to PSEG response to RAIs B.2.1.18, B.2.1.37-01 and B.2.1.37-02 associated with the Hope Creek Generating Station License Renewal Application," dated August 9, 2010

2. PSEG Letter LR-N10-0325 to USNRC, "Supplement to the Hope Creek Generating Station License Renewal Application to include Low Voltage Power Cables in the scope of the Inaccessible Medium Voltage Cables Not Subject to 10 CFR 50.49 Environmental Qualification Requirements (E3) Program," dated September 7, 2010

3. PSEG Letter LR-N10-0190 to USNRC, "Response to NRC Request for Additional Information, dated May 14, 2010, Related to the Aging Management Program Audit Associated with the Hope Creek Generating Station License Renewal Application," dated June 14, 2010

In Reference 1, PSEG Nuclear LLC (PSEG) provided supplemental responses to NRC RAIs B.2.1.37-01 and B.2.1.37-02 that were associated with the Inaccessible Medium

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Voltage Cables Not Subject to 10 CFR 50.49 Environmental Qualification Requirements (E3) Program to clarify certain information contained in the original response. Reference 2 revised the scope of the E3 Program to include low voltage power cables. After review of that submittal and further internal discussions among NRC staff, follow-up discussions were held during which NRC staff requested that PSEG Nuclear consider additional changes to the E3 program.

As a result of these discussions, PSEG Nuclear is now supplementing its License Renewal Application (LRA) to revise the maximum cable testing and cable vault inspection frequencies in its Inaccessible Medium Voltage Cables Not Subject to 10 CFR 50.49 Environmental Qualification Requirements Program. The LRA changes associated with this supplement are provided in Enclosure A of this letter. Commitment number 37 of the License Renewal Commitment List is modified as shown on page 8 of Enclosure A. There are no other new or revised regulatory commitments contained in this letter.

In addition, to clearly identify which power cables are now being included in the scope of the Inaccessible Medium Voltage Cables Not Subject to 10 CFR 50.49 Environmental Qualification Requirements Program, the response to NRC RAI B.2.1.37-03 submitted in the reference 3 letter is updated and provided in Enclosure B.

Also, as a result of discussions with NRC staff, PSEG Nuclear is providing, in Enclosure C, information supporting the basis for current licensing period inspection frequency differences for certain power cable vaults and manholes.

If you have any questions, please contact Mr. Ali Fakhar, PSEG Manager - License Renewal, at 856-339-1646.

I declare under penalty of perjury that the foregoing is true and correct.

Executed on 9/30/10

Sincerely,

Paul J. Davison

Paul J. Davison
Vice President, Operations Support
PSEG Nuclear LLC

Enclosures:
A. Changes to the Cable Testing and Cable Vault Inspection Frequencies Associated with the Inaccessible Medium Voltage Cables Not Subject to 10 CFR 50.49 Environmental Qualification Requirements (E3) Program for the Hope Creek Generating Station License Renewal Application

B. Updated Response to NRC RAI B.2.1.37-03

C. Clarification of Information provided in PSEG Nuclear Letter LR-N10-0291 Related to Difference in Cable Vault and Manhole Inspection Frequencies for Current Licensing Period Activities

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cc: Regional Administrator – USNRC Region I
B. Brady, Project Manager, License Renewal – USNRC
R. Ennis, Project Manager – USNRC
NRC Senior Resident Inspector – Hope Creek
P. Mulligan, Manager IV, NJBNE
L. Marabella, Corporate Commitment Tracking Coordinator
T. Devik, Hope Creek Commitment Tracking Coordinator

Enclosure A

Changes to the Cable Testing and Cable Vault Inspection Frequencies Associated with the Inaccessible Medium Voltage Cables Not Subject to 10 CFR 50.49 Environmental Qualification Requirements (E3) Program for the Hope Creek Generating Station License Renewal Application

Introduction

This Enclosure contains an update to the information provided in the Hope Creek Generating Station License Renewal Application (LRA) and subsequent correspondence related to the Hope Creek Inaccessible Medium Voltage Cables Not Subject to 10 CFR 50.49 Environmental Qualification Requirements (E3) aging management program. This update is being provided as a result of discussions with NRC Staff.

The low voltage power cables (480V) were added to the scope of the E3 program in PSEG letter LR-N10-0325. The low voltage power cables are routed in the same cable vaults as the medium voltage power cables and therefore, there are no additional cable vaults added to the scope of the E3 Program. The testing frequency for both the medium voltage and low voltage power cables is being established as no greater than 6 years, as further described below. The cable vault inspection frequency is being established as no greater than 1 year, as further described below.

Included in this update are changes to LRA Appendix A and Appendix B. The changes and the affected sections and pages of the LRA are described and shown below.

Change Summary:

The Inaccessible Medium Voltage Cables Not Subject to 10 CFR 50.49 Environmental Qualification Requirements aging management program (Hope Creek LRA Appendix B, Section B.2.1.37) cable testing maximum frequency has been changed from 10 years to 6 years. The cable vault inspection maximum frequency has been changed from 2 years to 1 year.

For clarity, the entire revised LRA Appendix A, Section A.2.1.37 (page A-30), LRA Appendix B, Section B.2.1.37 (pages B-167 through B-170), and Appendix A, Section A.5, License Renewal Commitment List Item No. 37 (page A-68) are provided with inserted text highlighted by ***bold italics*** and deleted text highlighted by ~~strike-through~~ font as shown below. The original LRA text and updates made previously through PSEG Nuclear correspondence LR-N10-0190, LR-N10-0291 and LR-N10-0325 are shown in normal font.

Hope Creek Appendix A

A.2.1.37 Inaccessible Medium Voltage Cables Not Subject to 10 CFR 50.49 Environmental Qualification Requirements

The Inaccessible Medium Voltage Cables Not Subject to 10 CFR 50.49 Environmental Qualification Requirements aging management program is a new program that will be used to manage the aging effects and mechanisms of non-EQ, in scope inaccessible power cables (480 volts, 4,160 volts and 13,800 volts). These cables may at times be exposed to significant moisture simultaneously with significant voltage. Significant moisture is defined as periodic exposures that last more than a few days (e.g., cable in standing water). Periodic exposures that last less than a few days (e.g., normal rain and drain) are not significant. Significant voltage exposure is defined as being subject to system voltage for more than twenty-five percent of the time. Note that no inaccessible power cable exposed to significant moisture was excluded from the program due to the "significant voltage" criterion. The Hope Creek cables in the scope of this aging management program will be tested using a proven test for detecting deterioration of the insulation system due to wetting, that is state-of-the-art at the time the test is performed. ***The cable test frequency will be established based on test results and industry operating experience. The maximum time between tests will be no longer than 6 years.*** ~~The cables will be tested at least once every 10 years, and~~ t***T***he first tests will be completed prior to the period of the extended operation.

Prior to the period of extended operation, ~~M~~***m***anholes and cable vaults associated with the cables included in this aging management program will be inspected for water collection (with water removal as necessary). ~~Prior to the period of extended operation, the frequency of inspections for accumulated water will be established based on inspection results to keep the cables infrequently submerged.~~ The objective of the inspections, as a preventive action, is to ~~keep the cables infrequently submerged, thereby minimizing their~~ ***minimize*** exposure ***of the power cables*** to significant moisture. ***The frequency of inspections for accumulated water will be established based on inspection results***. This approach to determining inspection frequency recognizes that a recurring inspection, set at the optimum frequency, would result in the cables being submerged only as a result of event driven, rain and drain, type occurrences. Station procedures will direct the assessment of the cable condition as a result of rain or other event driven occurrences. As a limit on the amount of time between inspections, the maximum time between inspections will be no more than ~~2~~ ***1*** year~~s~~.

The Inaccessible Medium Voltage Cables Not Subject to 10 CFR 50.49 Environmental Qualification Requirements aging management program will be enhanced as follows:

1. Add low voltage power cables (480 volts or greater) to the scope of the program.

2. ***Change cable testing maximum frequency from 10 years to 6 years. Change cable vault and manhole inspection maximum frequency from 2 years to 1 year.***

This new program, including the enhancement, will be implemented prior to the period of extended operation. In addition, initial cable tests will be implemented prior to the period of extended operation and sufficient manhole and cable vault inspections will be performed prior to the period of extended operation so that proper inspection frequencies are established to ~~keep cables infrequently submerged~~ ***minimize the exposure of power cables to significant moisture*** during the period of extended operation.

Hope Creek Appendix B

B.2.1.37 Inaccessible Medium Voltage Cables Not Subject to 10 CFR 50.49 Environmental Qualification Requirements

Program Description

The Inaccessible Medium Voltage Cables Not Subject to 10 CFR 50.49 Environmental Qualification Requirements program is a new program that manages inaccessible power cables (480 volts, 4,160 volts and 13,800 volts) that are exposed to significant moisture simultaneously with significant voltage.

Significant moisture is defined as periodic exposure to moisture that last more than a few days (e.g., cable in standing water). Periodic exposure to moisture that last less than a few days (i.e., normal rain and drain) is not significant. Significant voltage exposure is defined as being subjected to system voltage for more than twenty-five percent of the time. Note that no inaccessible power cable exposed to significant moisture was excluded from the program due to the "significant voltage" criterion.

Development of this program will consider the technical information and guidance provided in NUREG/CR-5643, IEEE Standard P1205, SAND 96-0344, and EPRI TR-109619. In scope, non-EQ, inaccessible power cables subject to significant moisture and voltage will be tested as part of this aging management program. These power cables will be tested using a proven test for detecting deterioration of the insulation system due to wetting, such as power factor, partial discharge, or polarization index, as described in EPRI TR-103834-P1-2, or other testing that is state-of-the-art at the time the test is performed. ***The cable test frequency will be established based on test results and industry operating experience. The maximum time between tests will be no longer than 6 years.*** ~~Cable testing will be performed at least once every ten years.~~ The first tests will be completed prior to the period of the extended operation.

Prior to the period of extended operation, ~~M~~*m*anholes and cable vaults associated with the cables included in this aging management program will be

inspected for water collection (with water removal as necessary). In scope, non-EQ, inaccessible power cables subject to significant moisture and voltage will be evaluated, so that draining or other corrective actions can be taken. ~~Prior to the period of extended operation, the frequency of manhole and cable vault inspections for accumulated water will be established based on inspection results. To keep the cables infrequently submerged. This adjustment in inspection frequency recognizes that t~~***T***he objective of the inspections, as a preventive action, is to ~~keep the cables infrequently submerged, thereby minimizing their~~ ***minimize the*** exposure ***of power cables*** to significant moisture. ***The frequency of inspections for accumulated water will be established based on inspection results***. This ~~adjustment in inspection frequency also~~ ***approach to determining the inspection frequency*** recognizes that a recurring inspection, set at the optimum frequency, would result in the cables being submerged only as a result of event driven, rain and drain, type occurrences. Station procedures will direct the assessment of the cable condition as a result of rain or other event driven occurrences. The maximum time between inspections will be no more than ~~two~~ ***one*** years. Sufficient manhole and cable vault inspections will be performed prior to the period of extended operation so that proper inspection frequencies are established to ~~keep cables infrequently submerged~~ ***minimize the exposure of power cables to significant moisture*** during the period of extended operation.

NUREG-1801 Consistency

The Inaccessible Medium Voltage Cables Not Subject to 10 CFR 50.49 Environmental Qualification Requirements aging management program is a new aging management program that is consistent with NUREG-1801 aging management program XI.E3, "Inaccessible Medium Voltage Cables Not Subject to 10 CFR 50.49 Environmental Qualification Requirements."

Exceptions to NUREG-1801

None.

Enhancements

Prior to the period of extended operation, the following enhancement will be implemented in the program elements:

1. Add low voltage power cables (480 volts or greater) to the scope of the program. Program Elements Affected: Scope of Program (Element 1)

2. ***Change cable testing maximum frequency from 10 years to 6 years. Change cable vault and manhole inspection maximum frequency from 2 years to 1 year.***

Operating Experience

The Inaccessible Medium Voltage Cables Not Subject to 10 CFR 50.49 Environmental Qualification Requirements program is a new preventive and condition monitoring program that manages inaccessible power cable exposed to significant moisture simultaneously with significant voltage. Demonstration that the effects of aging are effectively managed is achieved through objective evidence which shows that the localized damage and breakdown of insulation leading to electrical failure due to moisture intrusion and water trees are being adequately managed. The following examples of operating experience at Hope Creek provide objective evidence that the Inaccessible Medium Voltage Cables Not Subject to 10 CFR 50.49 Environmental Qualification Requirements program will be effective in assuring that intended functions will be maintained consistent with the current licensing basis for the period of extended operation:

1. In response to NRC Generic Letter 2007-01, Inaccessible or Underground Power Cable Failures that Disable Accident Mitigation Systems or Cause Plant Transients, Hope Creek reported no history of failures of inaccessible or underground medium or low (480V or greater) voltage power cables. A cable condition-monitoring program has not yet been implemented for medium or low voltage power cable. However, a representative sample of medium voltage cables have been routinely monitored since initial plant operations as part of existing maintenance procedures for periodically megger testing rotating electrical equipment. These tests include the power cables from the electrical switchgear to the equipment motor windings. Polarization Index (PI) testing for rotating equipment is performed with the power feeder cable connected. This example provides objective evidence that in-scope 4 kV cable insulation is in satisfactory condition, and detection methods exist such that if any aging effects of interest for this new program do occur, they would be detected prior to loss of intended function.

2. In August 2007 the cable vaults for class 1E motor feeds and controls for service water were observed to be potentially flooded in the vicinity of the Manhole 102 yard area. The vaults were observed at the time to be under standing water from recent heavy rain. Each vault contains four power cables, one medium voltage 5 kV cable (Okonite with EPR insulation and Hypalon jacket) and three other 480-volt cables. The power cable in question is designed for direct burial. A corrective action process notification was initiated to address the impact on the cable vaults. The Hope Creek yard area in the vicinity of the cable vaults was re-graded to minimize rainwater (and brackish service water yard dumps) from pooling on top of the vaults, creating a swale from the vault area to the storm drain south of the vault. Corrective actions included a technical evaluation. Two cable vaults have been inspected. The cables were found submerged in water. The water was pumped out of the cable vault. The cable vault structure was found to be in good material condition. The remaining cable vaults are scheduled for inspection. This example provides objective

evidence that corrective actions are taken to in response to industry operating experience and to minimize the water intrusion into the cable vaults.

3. A self-assessment was conducted in February 2008 evaluating critical medium voltage underground cable in response to industry generic operating experience. The assessment addressed testing practices, spare cable contingencies and potential vulnerabilities. The report concluded that existing underground medium voltage cable insulation (EPR) is considered to be the best material for this application. Best industry practices were evaluated for cable monitoring and testing, and follow-up actions were created to develop the test program and institute preventive maintenance activities for this shielded cable. This example provides objective evidence that industry operating experience will be used to improve the program such that if any aging effects of interest do occur, they would be detected prior to loss of intended function.

4. Hope Creek has no history of failures of inaccessible or underground low voltage (480V) power cables. In addition, individual inaccessible low voltage power cables have been routinely monitored (every 6 refueling outages) since initial plant operations as part of existing maintenance procedures for periodically inspecting, cleaning, and testing the 480V Service Water Intake Structure Motor Control Centers (SWIS MCC). Megger testing for the SWIS MCC bus bars is performed with the incoming power feeder cable connected. The incoming power feeder cable is from the 480V substation located in the Reactor Building. The results of the megger tests show that the incoming feeder cables are in good condition. This example provides objective evidence that in-scope 480V cable insulation is in satisfactory condition, and detection methods exist and the test frequency are adequate such that if any aging effects of interest for this new program do occur, they would be detected prior to loss of intended function.

Problems identified would not cause significant impact to the safe operation of the plant, and adequate corrective actions were taken to prevent recurrence. There is sufficient confidence that the implementation of the Inaccessible Medium Voltage Cables Not Subject to 10 CFR 50.49 Environmental Qualification Requirements program will effectively identify degradation prior to failure. Appropriate guidance for re-evaluation, repair, or replacement is provided for locations where degradation is found. Assessments of the Inaccessible Medium Voltage Cables Not Subject to 10 CFR 50.49 Environmental Qualification Requirements program are performed to identify the areas that need improvement to maintain the quality performance of the program.

Conclusion

The new Inaccessible Medium Voltage Cables Not Subject to 10 CFR 50.49 Environmental Qualification Requirements aging management program will provide reasonable assurance that the ***in-scope*** inaccessible power cables ~~exposed to significant moisture~~ will be adequately managed so that the intended functions of these cables will be maintained consistent with the current licensing basis during the period of extended operation.

A.5 – LICENSE RENEWAL COMMITMENT LIST

Hope Creek LRA Appendix A, Section A.5, License Renewal Commitment List Item No. 37 is revised as shown below as a result of this supplement. Any other actions described in this submittal represent intended or planned actions. They are described for the NRC's information and are not regulatory commitments.

NO.	PROGRAM OR TOPIC	COMMITMENT	UFSAR SUPPLEMENT LOCATION (LRA APP. A)	ENHANCEMENT OR IMPLEMENTATION SCHEDULE	SOURCE
37	Inaccessible Medium Voltage Cables Not Subject to 10 CFR 50.49 Environmental Qualification Requirements	Inaccessible Medium Voltage Cables Not Subject to 10 CFR 50.49 Environmental Qualification Requirements is a new program that will be used to manage the aging effects and mechanisms of non-EQ, in scope inaccessible power cables (480V, 4,160V, 13,800V). ***The cable test frequency will be established based on test results and industry operating experience. The maximum time between tests will be no longer than 6 years.*** Manholes and cable vaults associated with the cables included in this aging management program will be inspected for water collection (with water removal as necessary) with the objective of ~~keeping the cables infrequently submerged, thereby~~ minimizing ~~their~~ ***the*** exposure ***of power cables*** to significant moisture. Prior to the period of extended operation, the frequency of inspections for accumulated water will be established based on inspection results to ~~keep the cables infrequently submerged~~ ***minimize the exposure of power cables to significant moisture***. The maximum time between inspections will be no longer than ~~two~~ ***one*** years. The Inaccessible Medium Voltage Cables Not Subject to 10 CFR 50.49 Environmental Qualification Requirements aging management program will be enhanced as follows: 1. Add low voltage power cables (480 volts or greater) to the scope of the program. ***2. Change cable testing maximum frequency from 10 years to 6 years. Change cable vault and manhole inspection maximum frequency from 2 years to 1 year.***	A.2.1.37	Enhanced program and initial cable tests to be implemented prior to the period of extended operation. ~~Sufficient manhole/cable vault inspections to be performed prior to the period of extended operation so that proper inspection frequencies are established to keep cables infrequently submerged during the period of extended operation.~~ ***Test and inspection schedule identified in commitment.***	Section B.2.1.37 Hope Creek Letter LR-N10-0190 RAI B.2.1.37-01 Hope Creek Letter LR-N10-0190 RAI B.2.1.37-02 Hope Creek Letter LR-N10-0325 LRA Supplement ***Hope Creek Letter LR-N10-0360 LRA Supplement***

Enclosure B

Updated Response to NRC RAI B.2.1.37-03

This Enclosure provides an update to the information submitted in PSEG Letter LR-N10-0190, Enclosure A, pages 33 and 34, to reflect the inclusion of low voltage power cables within the scope of the Inaccessible Medium Voltage Cables Not Subject to 10 CFR 50.49 Environmental Qualification Requirements program. New information presented in this updated response to RAI B.2.1.37-03 is shown in ***bold italic*** font. Deleted information is shown with ~~strike-through~~ font.

RAI B.2.1.37-03

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 scope of the program.

Request:

Identify inaccessible medium voltage cables within the scope of AMP B.2.1.37 including cable ID number, insulation and jacket material.

PSEG Revision to RAI B.2.1.37-03 Response:

The following table identifies the inaccessible ~~medium voltage~~ ***power*** cables within the scope of the Inaccessible Medium Voltage Cables Not Subject to 10 CFR 50.49 Environmental Qualification Requirements program (AMP B.2.1.37), including cable ID number, insulation and jacket material.

Location	Manufacturer	Voltage Class	Number of Conductors ; Size of Wires	Insulation	Shielding	Cable IDs
HC Switchyard (SBO)	Okonite	15kV	Two 1/C per phase; 2000 KCMIL	EPR with Hypalon Overall Jacket	Tinned Copper Tape	NA1A0101A
						NA1A0101N
						NA1A0101P
						NA1A0101Q
						NA1A0101R
						NA1A0101S
						NA1A0104A
						NA1A0104N
						NA1A0104P
						NA1A0104Q
						NA1A0104R
						NA1A0104S
HC Service Water	Okonite	5kV	3/C; 4/0 AWG	EPR with Hypalon Overall Jacket	Tinned Copper Tape	AC1C0205A
						BC1C0206A
						CC1C0207A
						DC1C0208A
HC Service Water	***Okonite***	***600V***	***2 – 500MCM Triplex***	***EPR with Hypalon Overall Jacket***	***Unshielded***	***AF1B0157A***
						AF1B0157B
						BF1B0161A
						BF1B0161B
						CF1B0165A
						CF1B0165B
						DF1B0169A
						DF1B0169B

Enclosure C

Clarification of Information provided in PSEG Nuclear Letter LR-N10-0291 (Supplemental Responses to NRC RAI B.2.1.37-01 and RAI B.2.1.37-02) Related to Difference in Cable Vault and Manhole Inspection Frequencies for Current Licensing Period Activities

After discussions with NRC Staff, there is a need to clarify the basis for a difference in the current licensing period inspection frequency for the service water pump power cables as compared to the Station Blackout (SBO) recovery power cables, as previously described in PSEG Letter LR-N10-0291. The difference in water accumulation inspection frequency between the service water cable vaults and the SBO recovery cable manholes is commensurate with the difference in the safety significance of the inaccessible power cable system and the ability to align the plant equipment to allow performance of cable vault and manhole inspections or repairs.

The service water cable vaults and power cables are safety related. The current licensing basis actions are to resolve the Part 50 non-cited violation (NCV) that has been issued by the NRC. The service water cables are not always energized (not all service water pumps are required to run during normal operations). To support the current corrective action program plan, the service water cable vaults are currently inspected for water accumulation weekly.

In contrast, the SBO recovery cable manholes and power cables are non-safety related. The current licensing basis corrective actions are to resolve deficiencies in the switchyard cable vault drainage system (sump pump repair). Because the SBO recovery cables are normally energized (normal offsite power supply with an associated 72 hour LCO action statement), corrective actions must be scheduled during times when the offsite power supply is de-energized (typically scheduled during refueling outages which occur every 18 months). The switchyard cable vault sump pump is scheduled to be repaired Oct 2010. The water accumulation will be assessed again after the drainage system is operating as designed. The current plan is to inspect the SBO recovery cable manholes after the drainage system is repaired. If the SBO recovery power cables continue to be found submerged, then additional actions will be considered, such as more frequent manual pumping, or installing automatic sump pumps, as appropriate. The final resolution will be implemented prior to the period of extended operation. To support the current corrective action program plan, the SBO recovery cable manholes are currently inspected for water accumulation every 18 months.

In summary, the difference in water accumulation inspection frequency between the service water cable vaults and the SBO recovery cable manholes is due to their difference in safety significance and the ability to align the plant equipment to allow performance of cable vault and manhole inspections or repairs.