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U.S. Nuclear Regulatory Commission
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Hope Creek Generating Station
Facility Operating License No. NPF-57
NRC Docket No. 50-354

Subject: Response to NRC Request for Additional Information, dated June 9, 2010, Related to Sections 3.1.2 and 3.3.2 of the Hope Creek Generating Station License Renewal Application

Reference: Letter from Ms. Bennett Brady (USNRC) to Mr. Thomas Joyce (PSEG Nuclear, LLC) "REQUEST FOR ADDITIONAL INFORMATION FOR THE REVIEW OF THE HOPE CREEK GENERATING STATION LICENSE RENEWAL APPLICATION (TAC NO ME1832)", dated June 9, 2010

In the referenced letter, the NRC requested additional information related to Sections 3.1.2 and 3.3.2 of the Hope Creek Generating Station License Renewal Application (LRA). Enclosed is the response to this request for additional information.

There are no new or revised regulatory commitments contained in this letter.

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

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

Executed on 7/6/10

Sincerely,

Paul J. Davison

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

Enclosures: A. Response to Request for Additional Information
B. LRA Changes associated with response to RAI 3.3.2.2.5.2

cc: S. Collins, 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

Response to Request for Additional Information related to Sections 3.1.2 and 3.3.2 of the Hope Creek Generating Station License Renewal Application

RAI 3.1.2.2.4.1
RAI 3.3.2.2.5.2

RAI 3.1.2.2.4.1

Background:

Hope Creek Generating Station (HCGS) License Renewal Application (LRA) Subsection 3.1.2.2.4, Paragraph 1

Standard Review Plan-License (SRP-LR) Subsection 3.1.2.2.4, Paragraph 1

SRP-LR Appendix A, Subsection A.1.2.3.4, Paragraph 1

LRA Subsection 3.1.2.2.4, Paragraph 1, addresses cracking due to stress corrosion cracking (SCC) or intergranular stress corrosion cracking (IGSCC) that could occur in the stainless steel or nickel alloy BWR top head enclosure vessel flange leak detection lines. The LRA states that Hope Creek Generating Station (HCGS) will use aging management program (AMP) B.2.1.1, ASME Section XI Inservice Inspection, Subsections IWB, IWC and IWD (ISI) program, and AMP B.2.1.2, Water Chemistry, to manage the aging effects of cracking due to SCC or IGSCC in the stainless steel vessel flange leak detection line exposed to treated water. It also states that the HCGS ISI program uses a VT-2 visual examination of the line prior to reactor cavity drain down, as approved by a current relief request, prior to drain down during each refueling outage.

SRP-LR Subsection 3.1.2.2.4, Paragraph 1, and GALL Report item IV.A1-10 (R-61) state that a plant-specific AMP is to be evaluated because existing programs may not be capable of mitigating or detecting crack initiation and growth due to SCC in the vessel flange leak detection line.

SRP-LRA Appendix A, Subsection A.1.2.3.4, Paragraph 1, provides generic recommendations for the "detection of aging effects" program element of a plant-specific AMP. This paragraph states that "detection of aging effects should occur before there is a loss of the structure and component intended function(s)."

Issue:

The staff does not understand how a VT-2 visual examination of the vessel flange leak detection line, as described in the LRA, would be capable of detecting cracking in the line prior to a through-wall crack having occurred. Also, the relief request described in the LRA is approved only for the current ten-year ISI inspection interval, which does not extend into the period of extended operation; and there is no assurance that the relief request would either be made by HCGS or be approved by the staff during the period of extended operation.

Request:

a) Explain how VT-2 examination will detect cracking in the vessel flange leak detection line prior to failure of the line's intended function of providing a reactor coolant pressure boundary.

b) Explain how aging of the vessel flange leak detection line will be managed during the period of extended operation without referring to implementation of a relief request which has neither been requested nor approved for the period of extended operation.

PSEG Response:

a) The reactor vessel head flange leak detection line is an ASME Class 2 piping line separated from the reactor pressure boundary by one passive membrane, a silver-plated O-ring located on the vessel flange. A second O-ring is located on the opposite side of the leak detection line tap in the vessel flange. This line is required during plant operation and will indicate failure of the inner flange seal O-ring should a failure occur. Failure of the O-ring would result in a high pressure alarm in the Main Control Room. A VT-2 visual examination on the Class 2 portion of the reactor vessel head flange leak detection line is currently performed during each refueling outage when the reactor vessel head is off and the head cavity is flooded above the vessel flange. The static head developed with the leak detection line filled with water allows for the detection of any gross indications in the line. The configuration of this system precludes testing of this line at a higher pressure with the other Class 2 components. The VT-2 examination is performed while the plant is shutdown with the line pressurized, therefore any gross indications (through-wall cracking or degradation) of the line will be revealed before the Class 2 pressure boundary intended function is required during plant operations.

b) Aging of the reactor vessel head flange leak detection line will be managed by Water Chemistry, ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD, and One-Time Inspection Aging Management Programs as indicated in the line items below, extracted from Hope Creek LRA Table 3.4.2-4 - Main Steam System. The inspection activities associated with ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD will be performed in accordance with the Hope Creek Generating Station ISI Program Plans that will be in place during the period of extended operation. The ISI Program Plans will be developed, reviewed and approved by the NRC in accordance with 10 CFR 50.55a(g)(4)(ii).

Table 3.4.2-4 Main Steam System

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs
Piping and Fittings (Head Seal Leak Detection)	Pressure Boundary	Stainless Steel	Air - Indoor (External))	None	None
Piping and Fittings (Head Seal Leak Detection)	Pressure Boundary	Stainless Steel	Treated Water (Internal) > 140 F	Cracking/Stress Corrosion Cracking	ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD
Piping and Fittings (Head Seal Leak Detection)	Pressure Boundary	Stainless Steel	Treated Water (Internal) > 140 F	Cracking/Stress Corrosion Cracking	Water Chemistry

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs
Piping and Fittings (Head Seal Leak Detection)	Pressure Boundary	Stainless Steel	Treated Water (Internal) > 140 F	Loss of Material/Pitting and Crevice Corrosion	One-Time Inspection
Piping and Fittings (Head Seal Leak Detection)	Pressure Boundary	Stainless Steel	Treated Water (Internal) > 140 F	Loss of Material/Pitting and Crevice Corrosion	Water Chemistry

RAI 3.3.2.2.5.2

Background:

HCGS LRA Subsection 3.3.2.2.5, Paragraph 2; Table 3.3.1, Item 3.3.1-12; Table 3.5.2-8, pages 3.5-176

SRP-LR Subsection 3.3.2.2.5, Paragraph 2

GALL Item VII.A4-1

HCGS LRA Subsection 3.3.2.2.5, Paragraph 2, states that HCGS will implement the Structures Monitoring Program to manage hardening and loss of strength due to elastomer degradation of the compressible joint seals (inflatable pool seals) in the reactor building exposed to treated water, and that the Structures Monitoring Program includes visual inspections of elastomer components to assure that existing environmental conditions are not causing material degradation that could result in loss of component intended function. Table 3.3.1, item 3.3.1-12 states that compressible joint seals in the reactor building have been aligned to the item based on material, environment, and aging effect.

SRP-LR Subsection 3.3.2.2.5, Paragraph 2, applies for hardening and loss of strength due to elastomer degradation in elastomer linings of the filters, valves, and ion exchangers in spent fuel pool and cleanup systems (BWR and PWR) exposed to treated water or to treated borated water. GALL item VII.A4-1 associated with this SRP-LR paragraph recommends a plant specific AMP that determines and assesses the qualified life of the linings in the environment is to be evaluated.

Issue:

Since the SRP recommends determination and assessment of a qualified life for the components associated with Subsection 3.3.2.2.5, Paragraph 2, it is not clear to the staff whether HCGS has determined a qualified life for the compressible joint seals (inflatable pool seals) that it has associated with this paragraph through the LRA Tables. It also is not clear whether visual inspection, alone, is capable of detecting hardening and loss of strength in the compressible joint seals that HCGS has associated with Subsection 3.3.2.2.5, Paragraph 2.

Request:

Provide additional information to explain how the Structures Monitoring Program adequately manages the subject aging effects. Specifically, clarify whether HCGS has determined a qualified life for the compressible joint seals aligned with LRA Table 3.3.1, Item 3.3.1-12, and Subsection 3.3.2.2.5, Paragraph 2.

PSEG Response:

HCGS has determined the component type "Compressible Joint Seals (Inflatable Pool Seals)" in the Reactor Building exposed to treated water that are aligned with LRA Table 3.3.1, Item 3.3.1-12 are not subject to aging management review. The inflatable pool seals exposed to treated water and air indoor environment are the reactor well to dryer separator pool gate seal, spent fuel pool to the reactor cavity gate seals, and spent fuel pool to cask storage pool gate seals.

The reactor well to dryer separator pool gate seal is installed along the vertical sides and bottom of the dryer separator canal opening, and can be inflated to provide a seal between the canal opening and the dryer separator canal plugs when the plugs are installed. This seal is only used during a refueling outage if it becomes necessary to drain the reactor cavity without draining the dryer separator pool. This seal is not associated with the spent fuel storage pool and does not perform an intended function for license renewal. In addition, it is not normally necessary to drain the reactor cavity without draining the dryer separator pool so the seal is not normally inflated. There are currently no plans where this will be necessary, so there is currently no anticipated need for the dryer separator pool inflatable elastomer seal. This seal is not in scope for license renewal.

The spent fuel pool to reactor cavity gate seals were periodically replaced on a 54 month frequency. The preventive maintenance activity was changed to an activity to test and inspect the seals, based on previous operating experience, replacement costs and radiation exposure. Under the revised preventive maintenance activity, the seal is replaced if the test and inspection identifies seal damage or leaks. The inspection procedure has the seals inflated to 10-15 psig and inspect for leaks, cuts, abrasion and cracking of the elastomer surface. A new preventive maintenance activity is being established to replace the spent fuel pool to reactor cavity inflatable elastomer gate seals on a specified maximum time period of 10 years, if not replaced more frequently based on testing and inspection.

The spent fuel pool to cask storage pool gates have not required a watertight seal and the associated gate seals have not been required to be inflated since the cask storage pool is normally maintained full. These seals were periodically replaced on a 54 month frequency. The preventive maintenance activity was changed to an activity to test and inspect the seals, based on previous operating experience, replacement costs and radiation exposure. Under the revised preventive maintenance activity, the seal is replaced if the test and inspection identifies seal damage or leaks. There are currently no plans to drain the cask storage pool, so there is currently no anticipated need for the associated gate seals and periodic seal replacement is not warranted. If a need to drain the cask storage pool arises in the future, elastomer gate seals installed for 10 years or longer will be replaced with new seals prior to use.

Based on the above, all the fuel pool gate seals, which are the component type "Compressible Joint Seals (Inflatable Pool Seals)" in the Reactor Building, are either short lived or do not perform an intended function for license renewal, therefore this component type is not subject to aging management review. The replacement time period associated with the "Compressible Joint Seals (Inflatable Pool Seals)" is on a specific maximum time period of 10 years as discussed above. The above discussions are consistent with the response to RAI 3.3.2.2.13-01.

These inflatable pool seals were inadvertently included in LRA Section 2.4.8 (Reactor Building) and carry through to other sections of the LRA. The LRA is revised to delete the component type

"Compressible Joint Seals (Inflatable Pool Seals)". LRA section 2.4.8 (Reactor Building), LRA Table 2.4-8 (Reactor Building), LRA Table 3.3.1 (Summary of Aging Management Evaluations for the Auxiliary Systems), LRA Subsection 3.3.2.2.5 and LRA Table 3.5.2-8 (Reactor Building) are revised as shown in Enclosure B of this letter.

Enclosure B

Hope Creek Generating Station License Renewal Application (LRA) Changes Associated With Response to RAI 3.3.2.2.5.2

The PSEG response to RAI 3.3.2.2.5.2 results in several changes to the LRA. The affected LRA Sections and Enclosure pages for the associated LRA Section markups are identified below. For clarity, portions of the original RAI are repeated in this Enclosure. Added text is shown in ***Bold Italics,*** and deletions are shown with strikethrough text.

As a result of the response to RAI 3.3.2.2.5.2 provided in Enclosure A of this letter, LRA Section 2.4.8 (Reactor Building) paragraph 6 on page 2.4-34 and ends on page 2.4-35 and LRA Table 2.4-8 (Reactor Building) on page 2.4-38, is revised as shown below. Deletions are shown with strikethrough text.

Section 2.4.8 Reactor Building

Included in the boundary of the Reactor Building are blow out panels, bolting, cable trays, compressible joints and seals, concrete elements of the building, concrete anchors and embedments, conduit, doors, equipment foundations, hatches and plugs, ~~inflatable seals~~, metal panels, miscellaneous steel, panels, racks, and other enclosures, penetration bellows, penetration seals, penetration sleeves, pipe whip restraints, roofing membrane, refueling bellows, seals and gaskets, spray shields, steel components, and tube track. Also included in the boundary of the Reactor Building is the spent fuel storage pool liner, cask loading pit liner, reactor cavity liner, steam dryer/moisture separator storage pool liner, and spent fuel storage pool skimmer surge tank liner. The components in the boundary of the building are in the scope of license renewal and subject to aging management review. Refer to the "Components Subject to Aging Management Review" table below for a complete list of components included in the boundary of the Reactor Building.

Table 2.4-8 Reactor Building
Components Subject to Aging Management Review

Component Type	Intended Function
Blowout Panel	Pressure Relief
Blowout Panel	Shelter, Protection
Bolting (Structural)	Structural Support
Cable Trays	Structural Support
~~Compressible Joints and Seals (Inflatable Pool Seals)~~	~~Water retaining boundary~~
Compressible Joints and Seals (Seismic Gaps)	Expansion / Separation

As a result of the response to RAI 3.3.2.2.5.2 provided in Enclosure A of this letter, LRA Subsections 3.3.2.2.5.1 and 3.3.2.2.5.2 on page 3.3-42, are revised as shown below. Added text is shown in ***Bold Italics,*** and deletions are shown with strikethrough text.

3.3.2.2.5 Hardening and Loss of Strength due to Elastomer Degradation

1. *Hardening and loss of strength due to elastomer degradation could occur in elastomer seals and components of heating and ventilation systems exposed to air – indoor uncontrolled (internal/external). The GALL Report recommends further evaluation of a plant-specific aging management program to ensure that these aging effects are adequately managed. Acceptance criteria are described in Branch Technical Position RLSB-1*

   Hope Creek will implement the Periodic Inspection program, B.2.2.2, to manage hardening and loss of strength due to elastomer degradation of the elastomer door seals and flexible connections exposed to indoor air or wetted air/gas for the Control Room and Control Area HVAC Systems, Filtration, Recirculation, and Ventilation System, Reactor Building Ventilation System, Remote Shutdown Panel Room HVAC System, Service Water Intake Ventilation System, and Standby Diesel Generator Area Ventilation Systems. The Periodic Inspection program is used to manage the aging effects of components that are not covered by other aging management programs, including external surfaces of non-steel components not covered by the External Surfaces Monitoring (B.2.1.25) program and internal surfaces of non-steel components not covered by the Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components (B.2.1.26) program. The Periodic Inspection program includes visual inspections and physical manipulation of elastomer components to assure that existing environmental conditions are not causing material degradation that could result in a loss of component intended functions. The Periodic Inspection program is described in Appendix B.

   ~~Hope Creek will also implement the Structures Monitoring Program, B.2.1.32, to manage hardening and loss of strength due to elastomer degradation of the compressible joint seals in the Reactor Building exposed to indoor air. The Structures Monitoring Program includes visual inspections of elastomer components to assure that existing environmental conditions are not causing material degradation that could result in a loss of component intended functions. The Structures Monitoring program is described in Appendix B.~~

2. *Hardening loss of strength due to elastomer degradation could occur in elastomer linings of the filters, valves, and ion exchangers in spent fuel pool cooling and cleanup systems (BWR and PWR) exposed to treated water or to treated borated water. The GALL Report recommends that a plant specific aging management program be evaluated to determine and assesses the qualified life of the linings in the environment to ensure that these aging effects are adequately managed. Acceptance criteria are described in Branch Technical Position RLSB-1.*

~~Hope Creek will implement the Structures Monitoring Program, B.2.1.32, to manage hardening and loss of strength due to elastomer degradation of the compressible joint seals in the Reactor Building exposed to treated water. The Structures Monitoring Program includes visual inspections of elastomer components to assure that existing environmental conditions are not causing material degradation that could result in a loss of component intended functions. The Structures Monitoring program is described in Appendix B.~~

Item Number 3.3.1-12 is not applicable to Hope Creek. Hope Creek does not have elastomer linings of filters, valves, and ion exchangers in the spent fuel pool cooling and cleanup systems.

As a result of the response to RAI 3.3.2.2.5.2 provided in Enclosure A of this letter, LRA Table 3.3.1 (Summary of Aging Management Evaluations for the Auxiliary Systems) on page 3.3-59, Item 3.3.1-11, and on page 3.3-60, Item 3.3.1-12, are revised as shown below. Deletions are shown with strikethrough text and new information is displayed in ***bolded, italicized*** text.

Table 3.3.1 Summary of Aging Management Evaluations for the Auxiliary Systems

Item Number	Component	Aging Effect/ Mechanism	Aging Management Programs	Further Evaluation Recommended	Discussion
3.3.1-11	Elastomer seals and components exposed to air – indoor uncontrolled (internal/external)	Hardening and loss of strength due to elastomer degradation	A plant specific aging management program is to be evaluated.	Yes, plant specific	The Periodic Inspection program, B.2.2.2, will be used to manage hardening and loss of strength due to elastomer degradation of the elastomer components exposed to indoor air or wetted air/gas. ~~Compressible joint seals in the Reactor Building have been aligned to this item number based on material, environment and aging effect. The Structures Monitoring Program, B.2.1.32, will be used to manage hardening and loss of strength due to elastomer degradation for these seals.~~ See subsection 3.3.2.2.5.1.

Table 3.3.1 Summary of Aging Management Evaluations for the Auxiliary Systems

Item Number	Component	Aging Effect/ Mechanism	Aging Management Programs	Further Evaluation Recommended	Discussion
3.3.1-12	Elastomer lining exposed to treated water or treated borated water	Hardening and loss of strength due to elastomer degradation	A plant-specific aging management program is to be evaluated.	Yes, plant specific	~~Compressible joint seals in the Reactor Building have been aligned to this item number based on material, environment and aging effect. The Structures Monitoring Program, B.2.1.32, will be used to manage hardening and loss of strength due to elastomer degradation for these seals.~~ ***Not Applicable*** See subsection 3.3.2.2.5.2.

As a result of the response to RAI 3.3.2.2.5.2 provided in Enclosure A of this letter, LRA Table 3.5.2-8 (Reactor Building) on page 3.5-176, is revised as shown below. Deletions are shown with strikethrough text.

Table 3.5.2-8 Reactor Building

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
~~Compressible Joints and Seals (Inflatable Pool Seals)~~	~~Water retaining boundary~~	~~Elastomer~~	~~Air - Indoor~~	~~Loss of Sealing/Deterioration of Seals, Gaskets, and Moisture Barriers (caulking, flashing, and other sealants)~~	~~Structures Monitoring Program~~	~~III.A6-12~~	~~3.5.1-44~~	~~A~~
~~Compressible Joints and Seals (Inflatable Pool Seals)~~	~~Water retaining boundary~~	~~Elastomer~~	~~Air/Gas - Dry (Internal)~~	~~Hardening and Loss of Strength/Elastomer Degradation~~	~~Structures Monitoring Program~~	~~VII.F3-7~~	~~3.3.1-11~~	~~E, 2~~
~~Compressible Joints and Seals (Inflatable Pool Seals)~~	~~Water retaining boundary~~	~~Elastomer~~	~~Treated Water~~	~~Hardening and Loss of Strength/Elastomer Degradation~~	~~Structures Monitoring Program~~	~~VII.A4-1~~	~~3.3.1-12~~	~~E, 2~~