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JUN 29 2010

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U.S. Nuclear Regulatory Commission
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Washington, DC 20555-0001

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 7, 2010, Related to Section 3.5 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 FOR SECTION 3.5 (TAC NO ME1832)", dated June 7, 2010

In the referenced letter, the NRC requested additional information related to Section 3.5 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.

A142
NRR

JUN 29 2010

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

Executed on 6/29/10

Sincerely,

Robert C. Braun
Senior Vice President Operations
PSEG Nuclear LLC

Enclosure: Response to Request for Additional Information

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

Response to Request for Additional Information related to Section 3.5 of the Hope Creek Generating Station License Renewal Application

3.5.2.1-1
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3.5.2.1-3
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3.5.2.1-5
3.5.2.1-6
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3.5.2.2.2-2

RAI 3.5.2.1-1

Background:

SRP Table 3.3-1, Item Number 3.3.1-19, credits Generic Aging Lessons Learned (GALL) Report aging management programs (AMPs) XI.M28 or XI.M34 to manage the aging effect/mechanism loss of material due to corrosion in a soil environment for steel piping. These AMPs include surveillance and preventive measures to mitigate corrosion by protecting the external surface of buried piping and tanks.

Issue:

In the license renewal application (LRA), the applicant references Item 3.3.1-19 and credits the Structures Monitoring Program to manage aging for carbon and galvanized steel penetration sleeves in a groundwater/soil environment. The staff is unclear how the HCGS Structures Monitoring AMP meets or exceeds the requirements of the GALL Report recommended programs, and how the Structures Monitoring Program will be utilized to address the structure/aging effect combinations during the period of extended operation.

Request:

Describe how the HCGS Structures Monitoring AMP meets or exceeds the requirements of the GALL Report recommended programs and how the AMP will be used to manage carbon and galvanized steel penetration sleeves in a groundwater/soil environment for loss of material/general, pitting, crevice, and microbiologically influenced corrosion during the period of extended operation. Discuss surveillance as well as preventive measure requirements.

PSEG Response:

The following Summary of Aging Management Evaluation tables for the identified license renewal structures reference LRA Table 1 Item 3.3.1-19 (NUREG-1801 Volume 2 Item VII.C1-18) and credit the Structures Monitoring Program to manage aging for carbon steel and galvanized steel penetration sleeves in a groundwater/soil environment:

- Table 3.5.2-2, Auxiliary Building Control/Diesel Generator Area
- Table 3.5.2-3, Auxiliary Building Service/Radwaste Area
- Table 3.5.2-5, Fire Water Pump House
- Table 3.5.2-8, Reactor Building
- Table 3.5.2-12, Turbine Building
- Table 3.5.2-13, Yard Structures

The LRA Table 3.3.1 Discussion column for Item 3.3.1-19 addresses how this GALL item was used, including a statement of consistency with GALL. The first paragraph of the discussion addresses where the Buried Piping Inspection program is credited, consistent with GALL. LRA subsection 3.3.2.2.8 is referenced for further evaluation of the Buried Piping Inspection program aging management activities.

As stated in the third paragraph of the Discussion column, this GALL item was also aligned to components in various structures based on material, environment and aging effect. This alignment follows from the definition of the referenced Standard Note E, which can apply when the LRA line is consistent with the NUREG-1801 item for material, environment and aging effect but a different aging management program is credited. This alignment was intended to show agreement between the LRA and GALL, with respect to the identified aging effects and mechanisms for the material and environment combination. This alignment was not intended to suggest consistency with the aging management program recommended by GALL for this item.

In this case, the recommended GALL programs are not applicable for aging management of the penetration sleeve structural components. The recommended GALL programs and associated aging management activities, including surveillance and preventive measures, are specifically applicable to buried piping and buried tanks, and include aging management activities that are effective in maintaining the pressure boundary intended function associated with buried piping and buried tank components. These programs do not include activities that will effectively manage aging effects of penetration sleeve components to assure the associated structural intended functions are maintained.

The Structures Monitoring Program is credited to manage aging effects of penetration sleeve components in the identified license renewal structures. The penetration sleeve component is a steel sleeve installed in a concrete wall that provides a wall opening for piping or conduit to be routed through and then sealed with penetration seal material. Most of the sleeve outer surface is within the concrete wall. For penetration sleeves installed in exterior walls and located below grade elevation, a small portion of the steel sleeve that protrudes past the exterior wall surface will be subject to the groundwater/soil environment.

The Structures Monitoring Program includes periodic inspection of the penetration seals and associated sleeves. Penetration seals and sleeves located below grade are inspected from the indoor side of the wall. These inspections assure penetration seal and sleeve integrity such that the component intended function is maintained. Potential degradation of the small portion of the steel sleeve that protrudes past the exterior wall surface and is subject to the groundwater/soil environment will not impact the intended function. Degradation of this area of the sleeve is unlikely to penetrate to a wall depth sufficient to impact the intended function. Most of the sleeve is protected on both the inner and outer surfaces by concrete, grout or elastomer seal material in contact with the metal surface.

As part of the Structures Monitoring Program, recurring tasks have been set up on a five-year frequency to inspect the penetration sleeves in the above-listed buildings. The inspection procedure will be revised to reflect the enhancements as noted in Hope Creek LRA Appendix A.2.1.32, Item 1.i on page A-26.

Periodic inspections of the penetration seals and associated sleeves performed under the Structures Monitoring Program will detect material degradation or indications of minor seal leakage prior to loss of the required component intended function.

RAI 3.5.2.1-2

Background:

SRP Table 3.3-1, Item Number 3.3.1-19, credits GALL Report AMPs XI.M28 or XI.M34 to manage the aging effect/mechanism loss of material due to corrosion in a soil environment for steel piping. These AMPs include surveillance and preventive measures to mitigate corrosion by protecting the external surface of buried piping and tanks.

Issue:

In LRA Table 3.5.2-9, the applicant references Item 3.3.1-19 and credits the RG 1.127, Inspection of Water-Control Structures Associated with Nuclear Power Plants, Program to manage aging for carbon and galvanized steel penetration sleeves in a groundwater/soil environment. The staff is unclear how the HCGS RG 1.127 AMP meets or exceeds the requirements of the GALL Report recommended programs, and how the RG 1.127 Program will be utilized to address the structure/aging effect combinations during the period of extended operation.

Request:

Describe how the HCGS RG 1.127 AMP meets or exceeds the requirements of the GALL Report recommended programs and how the RG 1.127 Program will be used to manage carbon and galvanized steel penetration sleeves in a groundwater/soil environment for loss of material/general, pitting, crevice, and microbiologically influenced corrosion during the period of extended operation. Discuss surveillance as well as preventive measure requirements.

PSEG Response:

The Summary of Aging Management Evaluation Table 3.5.2-9, Service Water Intake Structures, references LRA Table 1 Item 3.3.1-19 (NUREG-1801 Volume 2 Item VII.C1-18) and credits the RG 1.127, Inspection of Water-Control Structures Associated with Nuclear Power Plants program to manage aging for carbon steel and galvanized steel penetration sleeves in a groundwater/soil environment.

The LRA Table 3.3.1 Discussion column for Item 3.3.1-19 addresses how this GALL item was used, including a statement of consistency with GALL. The first paragraph of the discussion addresses where the Buried Piping Inspection program is credited, consistent with GALL. LRA subsection 3.3.2.2.8 is referenced for further evaluation of the Buried Piping Inspection program aging management activities.

As stated in the third paragraph of the Discussion column, this GALL item was also aligned to components in various structures based on material, environment and aging effect. This alignment follows from the definition of the referenced Standard Note E, which can apply when the LRA line is consistent with the NUREG-1801 item for material, environment and aging effect but a different aging management program is credited. This alignment was intended to show agreement between the LRA and GALL, with respect to the identified aging effects and mechanisms for the material and environment

combination. This alignment was not intended to suggest consistency with the aging management program recommended by GALL for this item.

In this case, the recommended GALL programs are not applicable for aging management of the penetration sleeve structural components. The recommended GALL programs and associated aging management activities, including surveillance and preventive measures, are specifically applicable to buried piping and buried tanks, and include aging management activities that are effective in maintaining the pressure boundary intended function associated with buried piping and buried tank components. These programs do not include activities that will effectively manage aging effects of penetration sleeve components to assure the associated structural intended functions are maintained.

The RG 1.127, Inspection of Water-Control Structures Associated with Nuclear Power Plants program is credited to manage aging effects of penetration sleeve components in the identified license renewal structures. The penetration sleeve component is a steel sleeve installed in a concrete wall that provides a wall opening for piping or conduit to be routed through and then sealed with penetration seal material. Most of the sleeve outer surface is within the concrete wall. For penetration sleeves installed in exterior walls and located below grade elevation, a small portion of the steel sleeve that protrudes past the exterior wall surface will be subject to the groundwater/soil environment.

The RG 1.127, Inspection of Water-Control Structures Associated with Nuclear Power Plants program is implemented for license renewal as part of the Structures Monitoring Program. The Structures Monitoring Program includes periodic inspection of the penetration seals and associated sleeves. Penetration seals and sleeves located below grade are inspected from the indoor side of the wall. These inspections assure penetration seal and sleeve integrity such that the component intended function is maintained. Potential degradation of the small portion of the steel sleeve that protrudes past the exterior wall surface and is subject to the groundwater/soil environment will not impact the intended function. Degradation of this area of the sleeve is unlikely to penetrate to a wall depth sufficient to impact the intended function. Most of the sleeve is protected on both the inner and outer surfaces by concrete, grout or elastomer seal material in contact with the metal surface.

As part of the RG 1.127, Inspection of Water-Control Structures Associated with Nuclear Power Plants Program, recurring tasks have been set up on a five-year frequency to inspect the penetration sleeves in the Service Water Intake Structure. The inspection procedure will be revised to reflect the enhancements as noted in Hope Creek LRA Appendix A.2.1.33, Item 4 on page A-28.

Periodic inspections of the penetration seals and associated sleeves performed under the Structures Monitoring Program will detect material degradation or indications of minor seal leakage prior to loss of the required component intended function.

RAI 3.5.2.1-3

Background:

SRP Table 3.5-1, Item Number 3.5.1-50, credits the GALL Report AMP XI.S6 "Structures Monitoring Program" for managing loss of material due to pitting and crevice corrosion in an air-outdoor environment for galvanized steel, aluminum and stainless steel.

Issue:

Throughout the LRA, several AMR lines which reference Table 3.5-1, Item Number 3.5.1-50 and Note E credit the applicant's Periodic Inspection Program to manage loss of material due to corrosion for aluminum and stainless steel components in an air-outdoor environment. The Periodic Inspection Program is a condition monitoring program that manages aging of piping, piping components, piping elements, ducting components, tanks, and heat exchanger components, and includes provisions for periodic visual inspections of aluminum components to detect loss of material aging effects. The LRA states that the visual inspections are conducted on a ten-year inspection frequency that has been established based on plant and industry operating experience. The staff is unclear that the HCGS Periodic Inspection AMP addresses all the components which credit it for management. Also, the staff noted for components located in an air-outdoor environment the proposed AMP does not meet guidance provided in ACI 349.3R as referenced by the GALL Report AMP XI.S6 "Structures Monitoring Program" that recommends an inspection frequency of five years for this environment.

Request:

Confirm that the components crediting this AMP are within scope of the HCGS Periodic Inspection AMP and describe how an inspection frequency of ten-years will be adequate to manage aging of the aluminum and stainless steel components for loss of material due to pitting and crevice corrosion in an air-outdoor environment during the period of extended operation.

PSEG Response:

The following Summary of Aging Management Evaluation tables reference LRA Table 1 Item 3.5.1-50 (NUREG-1801 Volume 2 Item III.B2-7) and credit the Periodic Inspection program to manage aging of miscellaneous stainless steel and aluminum components in an outdoor air environment:

- Table 3.2.2-3, Filtration, Recirculation, and Ventilation System
- Table 3.2.2-5, Hydrogen and Oxygen Analyzer System
- Table 3.3.2-7, Auxiliary Control Room and Control Area HVAC Systems
- Table 3.3.2-10, Fire Protection System
- Table 3.3.2-25, Remote Shutdown Panel Room HVAC System
- Table 3.3.2-26, Service Water Intake Ventilation System
- Table 3.3.2-28, Standby Diesel Generator Area Ventilation Systems

- Table 3.3.2-29, Standby Diesel Generators and Auxiliary Systems
- Table 3.4.2-1, Condensate Storage and Transfer System
- Table 3.5.2-6, Piping and Component Insulation Commodity Group

The LRA Table 3.5.1 Discussion column for Item 3.5.1-50 addresses how this GALL item was used, including a statement of consistency with GALL. The first paragraph of the discussion addresses where the Structures Monitoring Program is credited, consistent with GALL.

As stated in the second paragraph of the Discussion column, this GALL item was also aligned to piping and components in various systems (including piping and component insulation evaluated with the Piping and Component Insulation Commodity Group) based on material, environment and aging effect. This alignment follows from the definition of the referenced Standard Note E, which can apply when the LRA line is consistent with the NUREG-1801 item for material, environment and aging effect but a different aging management program is credited. This alignment was intended to show agreement between the LRA and GALL, with respect to the identified aging effects and mechanisms for the material and environment combination. This alignment was not intended to suggest consistency with the aging management program recommended by GALL for this item.

In this case, the recommended GALL program is the Structures Monitoring Program. This program is not applicable for aging management of the identified mechanical system piping and piping components, ducting components and insulation jacketing. The Structures Monitoring Program and associated aging management activities are specifically applicable to structural components and this program is generally not credited for mechanical system components. The guidance provided in ACI 349.3R as referenced by the GALL AMP XI.S6 "Structures Monitoring Program" applies to concrete structural components and is not applicable to the mechanical system components included in the scope of the Periodic Inspection program at Hope Creek.

The Periodic Inspection program is credited to manage aging effects of identified mechanical system piping and piping components, ducting components and insulation jacketing. The components that credit the Periodic Inspection program are included in the scope of the program as described in LRA Appendix A.2.2.2 and Appendix B.2.2.2. The component descriptions provided in LRA Appendix A and Appendix B program descriptions are summary descriptions and do not specifically identify all component types that appear in the Summary of Aging Management Evaluation tables referenced above. The component types in question are summarized in LRA Appendix A.2.2.2 and Appendix B.2.2.2 as follows:

Appendix A & B Summary Description	Included Component Types
Piping, Piping Components and Piping Elements	Piping and Fittings, Valve Body, Bolting, Thermowell, Expansion Joints, Flame Arrestor, Insulation Jacketing
Ducting Components	Louver, Bird Screen, Bolting

The Periodic Inspection program includes periodic inspection of aluminum and stainless steel components in an Air – Outdoor environment. These inspections assure component integrity such that the component intended function is maintained. The 10-year inspection frequency is based on the corrosion resistant properties of aluminum and stainless steel materials, in addition to industry and plant-specific operating experience with these materials in an Air – Outdoor environment.

As described in LRA Appendix B.2.2.2, Element 10, Operating Experience, a sample of outdoor stainless steel piping at Hope Creek was inspected for degradation due to potential exposure to outdoor environmental contaminants such as marine salt contamination from the Delaware River. Multiple inspections were performed at several locations, including locations that are in the scope of this aging management program, and no signs of degradation were observed. All inspection results were satisfactory, and in some cases the inspection results indicate the piping surfaces appear in like-new condition. The inspections were performed in 2005 and 2007. These inspection results suggest very little to no age-related degradation after more than 20 years in service, and also suggest that corrosive contamination is not significant in an Air – Outdoor environment at Hope Creek. A 10-year inspection frequency provides reasonable assurance that potential age-related degradation of the identified stainless steel component external surfaces in an Air – Outdoor environment will be detected prior to loss of component intended function. Therefore, the Periodic Inspection program is adequate to manage aging of stainless steel components for loss of material due to pitting and crevice corrosion in an Air – Outdoor environment for the period of extended operation.

The Periodic Inspection program also includes aluminum materials in an Air – Outdoor environment. The aluminum components in the scope of this program are ventilation system components, insulation jacketing components and fuel oil storage tank flame arrestor vent caps. The ventilation system components are aluminum inlet louvers and associated bird screens and attachment bolting. Aluminum inlet louvers are included in scope for completeness based on a pressure boundary function of the louver housing. Actual operating pressure associated with the ventilation system louver housing is insignificant, and credible failures would not impact ventilation system operation. The associated bird screens and attachment bolting are also not required for ventilation system operation, but are included in scope for their supporting protective function. Insulation jacketing provides a similar supporting function to protect the underlying insulation, which itself provides a supporting function for the heat trace system that protects the insulated piping. Local failures of insulation jacketing components will not impact the function of the insulated piping system.

Fuel oil storage tank flame arrestor vent caps are included in scope for completeness based on a pressure boundary function of the component housing. Actual operating pressure associated with a tank vent is insignificant, and credible pressure boundary failures would not impact the vent pipe or storage tank operation.

Aluminum is resistant to atmospheric corrosion without the use of protective coating. Plant specific operating experience does not indicate corrosion related failures of these aluminum components in the scope of this program in an Air – Outdoor environment. A

10-year inspection frequency provides reasonable assurance that potential age-related degradation of the identified aluminum component external surfaces in an Air – Outdoor environment will be detected prior to loss of component intended function. Therefore, the Periodic Inspection program is adequate to manage aging of these aluminum components for loss of material due to pitting and crevice corrosion in an Air – Outdoor environment for the period of extended operation.

RAI 3.5.2.1-4

Background:

In LRA Table 3.3.2-10, the applicant used the Aboveground Steel Tanks Program to manage loss of material due to pitting and crevice corrosion for the fire water storage tank stainless steel heaters. However, the scope of the Aboveground Steel Tanks Program, as discussed in LRA Section B.2.1.19, only includes steel tanks and does not mention other components. In addition, the program AMP states, "These inspections will be performed to detect degraded paint and coatings, and any resulting metal degradation, prior to loss of the tank intended function."

Issue:

The LRA AMP does not provide any inspection parameters or acceptance criteria for stainless steel components, nor does the LRA explain how the credited AMP meets or exceeds the requirements of the GALL Report recommended AMP, XI.S6 "Structures Monitoring Program."

Request:

a) Justify the use of an AMP intended to manage carbon steel components for a stainless steel component.
b) Provide the inspection parameters and acceptance criteria that will be used to manage the stainless steel heaters.
c) Describe how the HCGS Aboveground Steel Tanks AMP meets or exceeds the requirements of the GALL Report recommended program.

PSEG Response:

a) Electric heater components that do not have a passive intended function (i.e. pressure boundary) are considered active for license renewal and not subject to aging management review. The fire water storage tank electric heaters identified in the Summary of Aging Management Evaluation Table 3.3.2-10, Fire Protection System, are installed in encasement pipes and do not have a pressure boundary intended function. This component type should not have been included in the table. The Summary of Aging Management Evaluation Table 3.3.2-10, Fire Protection System, is revised to delete the Electric Heaters (Fire Water Storage Tank Heaters) as follows:

Table 3.3.2-10 Fire Protection System

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
~~Electric Heaters (Fire Water Storage Tank Heaters)~~	~~Pressure Boundary~~	~~Stainless Steel~~	~~Air – Outdoor (External)~~	~~Loss of Material/Pitting and Crevice Corrosion~~	~~Aboveground Steel Tanks~~	~~III.B2-7~~	~~3.5.1-50~~	~~E, 4~~
~~Electric Heaters (Fire Water Storage Tank Heaters)~~	~~Pressure Boundary~~	~~Stainless Steel~~	~~Raw Water (Internal)~~	~~Loss of Material/Pitting, Crevice, and Microbiologically Influenced Corrosion, and Fouling~~	~~Fire Water System~~	~~V.C-3~~	~~3.2.1-38~~	~~E, 5~~

The Components Subject to Aging Management Review Table 2.3.3-10, Fire Protection System, is revised to delete the Electric Heaters (Fire Water Storage Tank Heaters) as follows:

Table 2.3.3-10 Fire Protection System
Components Subject to Aging Management Review

Component Type	Intended Function
~~Electric Heaters (Fire Water Storage Tank Heaters)~~	~~Pressure Boundary~~

Since the fire water storage tank electric heaters do not have a passive license renewal intended function, they are not subject to aging management review and no aging management program is required.

b) As discussed above, the fire water storage tank electric heaters are active components that are not subject to aging management review and as such, inspection parameters and acceptance requirements do not need to be established.

c) The LRA Table 3.5.1 Discussion column for Item 3.5.1-50 addresses how this GALL item was used, including a statement of consistency with GALL. The first paragraph of the discussion addresses where the Structures Monitoring Program is credited, consistent with GALL.

As stated in the second paragraph of the Discussion column, this GALL item was also aligned to components in various systems and structures based on material, environment and aging effect. This alignment follows from the definition of the referenced Standard Note E, which can apply when the LRA line is consistent with the NUREG-1801 item for material, environment and aging effect but a different aging management program is credited. This alignment was intended to show agreement between the LRA and GALL, with respect to the identified aging effects and mechanisms for the material and environment combination. This alignment was not intended to suggest consistency with the aging management program recommended by GALL for this item.

In this case, the fire water storage tank electric heaters do not have a passive license renewal intended function and are therefore, not subject to aging management review. Consequently, the Structures Monitoring Program is not applicable.

RAI 3.5.2.1-5

Background:

SRP Table 3.5-1, Item Number 3.5.1-50, credits the GALL Report AMP XI.S6 "Structures Monitoring Program" for managing loss of material due to pitting and crevice corrosion in an air-outdoor environment for galvanized steel, aluminum and stainless steel. The GALL Report AMP recommends general visual inspections with a five year frequency.

Issue:

In LRA Table 3.3.2-10, the applicant references Item 3.5.1-50 and credits the Fire Protection Program to manage aging for aluminum bird screens in an air-outdoor environment. It is not clear to the staff that the bird screens are in the scope of the Fire Protection Program. The staff is also unclear how the HCGS Fire Protection AMP meets or exceeds the GALL Report recommended program, and how the Fire Protection Program will be utilized to address the component/aging effect combinations during the period of extended operation.

Request:

Verify that the bird screens are within the scope of the Fire Protection AMP. Also describe how the HCGS Fire Protection AMP meets or exceeds the requirements of the GALL Report recommended program and how the program will be used to manage aluminum bird screens in an air-outdoor environment for loss of material due to pitting and crevice corrosion during the period of extended operation. Include a description of the inspection frequency and the inspection techniques.

PSEG Response:

The Hope Creek fire water storage tanks have a 12-inch nominal diameter tank roof vent pipe that includes a vent cap that prevents rain water and debris from falling into the tank. The vent gap between the pipe and cap also includes a number-4 mesh aluminum screen to provide further protection from debris. The fire water storage tanks are included in the scope of license renewal under 10 CFR 54.4(a)(3) because they are relied upon to perform a function that demonstrates compliance with the Commission's regulations for Fire Protection. The vent screen is not relied upon to perform a function that demonstrates compliance with the Commission's regulations for Fire Protection. Age-related degradation of the vent screen cannot prevent air flow through the vent pipe and will not impact the intended function of the fire water storage tank. The vent screen does not have any intended functions for license renewal and is therefore not in scope. The fire water storage tank bird screen component type should not have been included in Table 3.3.2-10. The Summary of Aging Management Evaluation Table 3.3.2-10, Fire Protection System, is revised to delete the Bird Screen (Fire Water Tank Vents) as follows:

Table 3.3.2-10 Fire Protection System

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
~~Bird Screen (Fire Water Tank Vents)~~	~~Filter~~	~~Aluminum~~	~~Air – Outdoor~~	~~Loss of Material/Pitting and Crevice Corrosion~~	~~Fire Protection~~	~~III.B2-7~~	~~3.5.1-50~~	~~E, 1~~

The Components Subject to Aging Management Review Table 2.3.3-10, Fire Protection System, is revised to delete the Bird Screen (Fire Water Tank Vents) as follows:

Table 2.3.3-10 Fire Protection System
Components Subject to Aging Management Review

Component Type	Intended Function
~~Bird Screen (Fire Water Tank Vents)~~	~~Filter~~

Since the fire water tank vent bird screens are not within the scope of license renewal under 10 CFR 54.4, they are not within the scope of the Fire Protection aging management program.

The LRA Table 3.5.1 Discussion column for Item 3.5.1-50 addresses how this GALL item was used, including a statement of consistency with GALL. The first paragraph of

the discussion addresses where the Structures Monitoring Program is credited, consistent with GALL.

As stated in the second paragraph of the Discussion column, this GALL item was also aligned to components in various systems and structures based on material, environment and aging effect. This alignment follows from the definition of the referenced Standard Note E, which can apply when the LRA line is consistent with the NUREG-1801 item for material, environment and aging effect but a different aging management program is credited. This alignment was intended to show agreement between the LRA and GALL, with respect to the identified aging effects and mechanisms for the material and environment combination. This alignment was not intended to suggest consistency with the aging management program recommended by GALL for this item.

In this case, the fire water storage tank vent bird screens do not have a license renewal intended function and are therefore, not within the scope of license renewal under 10 CFR 54.4. Consequently, the Structures Monitoring Program is not applicable.

RAI 3.5.2.1-6

Background:

SRP Table 3.5-1, Item Numbers 3.5.1-37 and -45, credits the GALL Report AMP XI.S7 "RG 1.127, Inspection of Water-Control Structures Associated with Nuclear Power Plants" for managing increase in porosity and permeability, loss of strength due to leaching of calcium hydroxide, and loss of material due to abrasion and cavitation in a water-flowing environment for concrete.

Issue:

In LRA Table 3.3.2-27, AMR lines which reference Table 3.5-1, Item Number 3.5.1-37 and -45 and Note E credit the applicant's Open-Cycle Cooling Water System Program to manage this aging effect for reinforced concrete piping and fitting components in a raw water (internal) environment. The Open-Cycle Cooling Water System AMP includes mitigative, performance-monitoring, and condition monitoring activities to manage internal corrosion of piping and manages aging effects caused by bio-fouling, corrosion, erosion, protective coating failures, and silting in the Open-Cycle Cooling Water System. The staff is unclear that the HCGS Open-Cycle Cooling Water System AMP addresses the reinforced concrete piping and fitting components in a raw water (internal) environment and meets the GALL Report requirements for inaccessible concrete in a flowing-water environment. Also the staff is unclear that the proposed AMP meets guidance provided in GALL Report AMP XI.S7, "RG 1.127, Inspection of Water-Control Structures Associated with Nuclear Power Plants," that periodic inspections be performed at least once every five years for this environment.

Request:

Describe how the HCGS Open-Cycle Cooling Water System AMP meets or exceeds the

requirements of the GALL Report recommended program and how the AMP will be used to manage reinforced concrete piping and fittings in a raw water (internal) environment for increase in porosity and permeability, loss of strength due to leaching of calcium hydroxide, and loss of material due to abrasion and cavitation during the period of extended operation.

PSEG Response:

The Summary of Aging Management Evaluation Table 3.3.2-27, Service Water System, references LRA Table 1 Item 3.5.1-37 (NUREG-1801 Volume 2 Item III.A6-6) and Item 3.5.1-45 (NUREG-1801 Volume 2 Item III.A6-7), and credits the Open Cycle Cooling Water System program to manage aging of reinforced concrete piping in a raw water environment.

The LRA Table 3.5.1 Discussion column for Items 3.5.1-37 and 3.5.1-45 address how these GALL items are used, including a statement of consistency with GALL. The first paragraph of the discussion for these items address where the RG 1.127, Inspection of Water-Control Structures Associated with Nuclear Power Plants program is credited, consistent with GALL.

As stated in the second paragraph of the Discussion column for these items, these GALL items are also aligned to components in the Service Water System based on material, environment and aging effect. This alignment follows from the definition of the referenced Standard Note E, which can apply when the LRA line is consistent with the NUREG-1801 item for material, environment and aging effect but a different aging management program is credited. This alignment was intended to show agreement between the LRA and GALL, with respect to the identified aging effects and mechanisms for the material and environment combination. This alignment was not intended to suggest consistency with the aging management program recommended by GALL for this item.

In this case, the recommended GALL program is not applicable for aging management of concrete piping in the Service Water system. The recommended GALL program and associated aging management activities include in-service inspection and surveillance measures, that are specifically applicable to structural concrete components and commodities. This GALL program includes aging management activities that require inspection of water control structures that are in scope for license renewal. This GALL program is also not generally credited for mechanical system components and does not include activities that will effectively manage aging effects of the internal pressure boundary surfaces of reinforced concrete pipe in a raw water environment to assure the associated intended functions are maintained.

The Open Cycle Cooling Water program is credited to manage aging effects of internal pressure boundary surfaces of reinforced concrete pipe. The underground Service Water piping is pre-stressed concrete piping in accordance with the American Water Works Association Standard C301 and is connected with bell and spigot joints. The key elements of the piping include:

- A concrete core is spun inside a steel cylinder.

- The steel cylinder outer diameter is coated with concrete then wrapped with pre-stressing steel wire to pre-stress the concrete core and the steel cylinder.
- After the cylinder and concrete core are pre-stressed, mortar is applied on the assembly outer diameter to protect the wires.
- At one end of the pipe, a steel spigot is welded to the end of the steel cylinder. The spigot includes a groove for installation of an o-ring seal.
- On the other side of the joint, a steel bell is welded to the end of the steel cylinder. The steel bell is also coated with mortar on the bell outer diameter.

The reinforced Service Water concrete piping has a polymer coating applied to the interior of the pipe and pipe joints. The interior of each nuclear piping header is visually inspected every other refueling outage (approximately three years) for signs of coating and concrete degradation as part of the existing Open-Cycle Cooling Water Program. Discrepancies found during the piping and joint inspections are documented in and resolved through the corrective action program.

The inspections of the internal surfaces of the Service Water concrete piping is implemented through the existing Open Cycle Cooling Water System program. Therefore, the Open Cycle Cooling Water System program is the appropriate program for aging management of the internal surfaces of reinforced concrete Service Water system pipe in a raw water environment.

RAI 3.5.2.2.2-1

Background:

SRP Section 3.5.2.2.2.1.8 lists the Structures Monitoring or ASME Section XI, Subsection IWF Programs to manage the aging effect of lock-up due to wear that could occur for Lubrite® radial beam seats in the BWR drywell, RPV support shoes of PWR with nozzle supports, steam generator supports, or other sliding support bearings and sliding support surfaces. The GALL Report recommends further evaluation only for structure/aging effect combinations that are not within the ISI (IWF) or structures monitoring programs.

Issue:

LRA Section 3.5.2.2.2.1.8 states that sliding surfaces are provided for supports for radial beam seats in the drywell and the HCGS Structures Monitoring Program will be used to manage lock-up due to wear of these sliding surfaces. The staff agrees that the HCGS Structures Monitoring Program is an appropriate AMP to manage lock-up due to wear of the sliding surfaces, however, during its review of this item the staff was unable to verify that these sliding support surfaces were being inspected for loss of function due to corrosion, distortion, dirt, overload, or fatigue under either the HCGS Structures Monitoring or ASME Code Section XI, Subsection IWF AMPs and at what frequency the inspections were to be performed.

Request:

Confirm that for the Lubrite® surfaces are addressed under the HCGS Structures Monitoring AMP for loss of mechanical function due to corrosion, distortion, dirt, overload, fatigue due to vibratory and cyclic loads for Lubrite® in an air-indoor (uncontrolled) environment. Also confirm that the inspection method and the frequency of inspections is equivalent to, or exceeds, the requirements of the GALL Report recommended AMP, XI.S6 "Structures Monitoring Program."

PSEG Response:

Lubrite® material incorporated into radial beam seats is used inside the drywell at the connection between the radial box beams and the drywell shell. Lubrite® plates used at Hope Creek are bronze per ASTM B22, alloy 863, with lubricant type AE7. The radial box beams that span between the RPV pedestal or the biological shield and the drywell shell are provided with sliding connections at the drywell shell to reduce thermal axial loads, as discussed in UFSAR section 3.8.3.1.3 "Platforms and Pipe Whip Restraints".

The beam seats and box beam sliding surfaces are visually inspected for loss of mechanical function by the Structures Monitoring Program as part of the structures inside of the drywell. Visual inspection techniques are appropriate for identifying loss of mechanical function due to corrosion, distortion, dirt, overload, fatigue due to vibratory and cyclic loads for Lubrite® in an air-indoor (uncontrolled) environment. Inspection personnel examine component surfaces to identify evidence of corrosion, distortion, dirt, member misalignment or other degraded conditions which would indicate loss of mechanical function.

Visual inspection results that indicate a loss of mechanical function are entered into the corrective action process for further evaluation by the engineering staff. Components that can not be determined capable of performing the required intended function are repaired or replaced.

As part of the current Structures Monitoring Program, recurring tasks have been established to inspect the above-listed components in Primary Containment. The inspection method is consistent with the requirements of the GALL Report recommended AMP, XI.S6 "Structures Monitoring Program" as described in the implementing documents. Enhancement 9 is proposed to make the inspection frequency consistent with the requirements of the GALL Report recommended AMP, XI.S6 "Structures Monitoring Program". Implementing documents will be revised to reflect a five-year frequency, which is identified in the Hope Creek LRA Section Appendix A.2.1.32, as enhancement 9 to this program, on page A-27.

RAI 3.5.2.2.2-2

Background:

SRP-LR Sections 3.5.2.2.2.2.1 and 3.5.2.2.2.4.2 address loss of material (scaling, cracking, and spalling) due to freeze-thaw. The associated GALL Report Items (T-01 and T-15) recommend evaluation for plants located in moderate to severe weathering conditions. The GALL Report also recommends the concrete have an air content of 3 percent to 6 percent and water-to-cement ratio between 0.35 – 0.45.

Issue:

The associated LRA sections state that the weathering condition at HCGS is severe; however, a water-to-cement ratio was not specified for the concrete.

Request:

Provide the water-to-cement ratio for the concrete within the scope of license renewal. If the value is outside the limits recommended in the GALL Report, explain how aging due to freeze-thaw will be effectively managed during the period of extended operation.

PSEG Response:

The water-cement ratios for the concrete installed at Hope Creek are just outside the 0.35 - 0.45 range referenced in the Gall Report. Concrete mixture proportions, such as water-cement ratios, slumps, and entrained air content, were all controlled by the concrete mix specifications. The mix proportion parameters, such as water-cement ratio, varied by mix design. Water-cement ratios were based upon achievement of mix design strength and working limit slump. At Hope Creek structural concrete mixes, which includes fly ash, had water-cement ratios of 0.45 - 0.51, which provided the strength, workability and durability desired for different applications. ACI 201.2R-77, "Guide to Durable Concrete", Section 1.4.2, recommends water-cement ratios of 0.45 to 0.50.

Original plant construction and design minimized the vulnerability of concrete to freeze-thaw damage through the selection of concrete mixture proportions, site drainage design, and concrete construction practices. Concrete inspections have revealed the absence of freeze-thaw degradation for the in-scope Hope Creek Structures. Considering the age of the structures, this provides objective evidence that the design and construction of external reinforced concrete at Hope Creek has provided concrete with good freeze-thaw resistance.

The concrete inspections use visual inspections to identify concrete damage in accordance with the requirements of the current Structures Monitoring Program procedure. Freeze thaw damage will occur at the surface of concrete with significant moisture levels. In general, these areas are exposed at the ground surface and are accessible for inspection. As a result, the Structures Monitoring Program will identify any concrete degradation due to freeze-thaw that might occur in the future. Because freeze-thaw damage proceeds at a comparatively slow rate, the required five year

inspection frequency for the Structures Monitoring Program is adequate to address any significant concrete damage due to freeze-thaw.

As discussed above, the periodic inspections of the in-scope structures under the Structures Monitoring Program will address aging damage due to freeze-thaw prior to loss of a structure intended function.