Entergy

Entergy Operations, Inc.
P. O. Box 756
Port Gibson, MS 39150

Michael Perito
Vice President, Operations
Grand Gulf Nuclear Station
Tel. (601) 437-6409

GNRO-2012/00064

June 22, 2012

U.S. Nuclear Regulatory Commission
Attn: Document Control Desk
Washington, DC 20555

SUBJECT: Response to Request for Additional Information (RAI) Set 17 dated May 24, 2012
Grand Gulf Nuclear Station, Unit 1
Docket No. 50-416
License No. NPF-29

REFERENCE:

1. NRC Letter, "Requests for Additional Information for the Review of the Grand Gulf Nuclear Station, License Renewal Application," dated May 24, 2012 (GNRI-2012/00124) (ML 12125A373)

2. Grand Gulf Nuclear Station, Unit 1 Letter (GNRO-2012/00042), "Response to Request for Additional Information (RAI) dated April 17, 2012" , dated May 15, 2012

Dear Sir or Madam:

Entergy Operations, Inc is providing, in Attachment 1, the response to Reference 1 Request for Additional Information (RAI). Attachment 2 includes a revised response to RAI B.1.21-5 provided in a GGNS letter dated May 15, 2012 (Reference 2). Attachment 3 is an updated listing of regulatory commitments for license renewal that includes revised commitment 12 required in response to RAIs in this letter.

This letter contains no new commitments. If you have any questions or require additional information, please contact Christina L. Perino at 601-437-6299.

I declare under penalty of perjury that the foregoing is true and correct. Executed on the 22nd day of June, 2012.

Sincerely,

MP/jas

Attachment(s): (see next page)

Attachment(s): 1. Response to Request for Additional Information (RAI)
2. Revised Response to RAI B.1.21-5
3. List of Regulatory Commitments

cc: with Attachment(s)

Mr. John P. Boska, Project Manager
Plant Licensing Branch I-1
Division of Operating Reactor Licensing
Office of Nuclear Reactor Regulation
U.S. Nuclear Regulatory Commission
Mail Stop O-8-C2
Washington, DC 20555

cc: without Attachment(s)

Mr. Elmo E. Collins, Jr.
Regional Administrator, Region IV
U.S. Nuclear Regulatory Commission
1600 East Lamar Boulevard
Arlington, TX 76011-4511

U.S. Nuclear Regulatory Commission
ATTN: Mr. A. Wang, NRR/DORL
Mail Stop OWFN/8 G14
11555 Rockville Pike
Rockville, MD 20852-2378

U.S. Nuclear Regulatory Commission
ATTN: Mr. Nathaniel Ferrer NRR/DLR
Mail Stop OWFN/ 11 F1
11555 Rockville Pike
Rockville, MD 20852-2378

NRC Senior Resident Inspector
Grand Gulf Nuclear Station
Port Gibson, MS 39150

Attachment 1 to

GNRO-2012/00064

Response to Request for Additional Information (RAI)

The format for the RAI responses below is as follows. The Request for Additional Information (RAI) is listed in its entirety as received from the Nuclear Regulatory Commission (NRC) with a background, issue and request subparts. This is followed by the Grand Gulf Nuclear Station (GGNS) RAI response to the individual question.

RAI 3.1.1.62-1

Background LRA Table 3.1.1, item 3.1.1-62, addresses high-strength, low-alloy steel, or stainless steel closure bolting; stainless steel control rod drive head penetration flange bolting exposed to air with reactor coolant leakage being managed for cracking due to stress corrosion cracking. The LRA states that this item is not applicable because SRP-LR item 3.1.1-62 is only applicable to pressurized water reactors (PWRs).

LRA Tables 3.1.2-3 and 3.1.2-4 include carbon and low alloy steel bolting exposed to air with reactor coolant leakage which is being managed for loss of material and loss of preload.

Issue Although the SRP-LR states that item 3.1.1-62 is only applicable to PWRs, the cracking due to stress corrosion cracking (SCC) aging effect applies to all high-strength bolting. The LRA includes carbon and low alloy steel bolting exposed to air with reactor coolant leakage in LRA Tables 3.1.2-3 and 3.1.2-4 of the reactor coolant system. The staff noted that the applicant is managing these items for loss of material and loss of preload, but not cracking due to SCC.

Request State the basis for why cracking due to SCC is not applicable to in-scope carbon and low alloy steel closure bolting exposed to air with reactor coolant leakage (external) in the reactor coolant system, or provide an aging management program (AMP) to manage this aging effect.

RAI 3.1.1.62-1 RESPONSE

NUREG-1801 includes no listing for high-strength steel bolting in the BWR reactor coolant system tables, so the relevant line in the ESF Table V.E, External Surfaces of Components and Miscellaneous Bolting was used for comparison. Thus, high-strength, low-alloy steel closure bolting is evaluated with the reactor vessel and is listed in LRA Table 3.1.2-1. As shown in LRA Table 3.1.2-1, cracking of high-strength, low-alloy steel bolting is managed by the Bolting Integrity Program.

RAI 3.2.1.63-1

Background The GALL Report recommends in several items (such as VII.H2.AP-55 and VII.E5.AP-273) that stainless steel components exposed to condensation or raw water be managed for loss of material. LRA Table 3.2.2-6 states that the stainless steel moisture separator exposed internally and externally to indoor air has no aging effects and no AMP is proposed. There are no other environments listed for the moisture separator.

Issue It is unclear why the moisture separator has no aging effects since moisture separators are usually exposed to air containing significant amounts of water, and parts may be exposed to water where the moisture accumulates.

Request Explain why the stainless steel moisture separator is not susceptible to any aging effects and does not require aging management.

RAI 3.2.1.63-1 RESPONSE

LRA Table 3.2.2-6 lists the aging management review results for the standby gas treatment system (SGTS). Under normal operating conditions, the SGTS is in standby and the internal environment for the system is air – indoor, which does not contain significant moisture. In an air – indoor environment, stainless steel does not experience aging effects requiring management.

RAI 3.3.1.72-1

Background SRP-LR Table 3.3-1, item 72, addresses gray cast iron and copper alloy with greater than 15-percent zinc or 8-percent aluminum piping, piping components, and piping elements exposed to treated water, raw water, closed-cycle cooling water, or soil and recommends GALL Report AMP XI.M33, "Selective Leaching," to manage loss of material due to selective leaching.

LRA Table 3.3.2-12 contains aging management review (AMR) results for copper alloy with greater than 15-percent zinc or 8-percent aluminum strainers exposed internally and externally to raw water and treated water. The AMR items are being managed for loss of material due to selective leaching on the internal surfaces using the Selective Leaching Program. However, the AMR items are not being managed for loss of material due to selective leaching on the external surfaces.

Issue It is not clear why external surfaces of the strainers are not being managed for loss of material due to selective leaching.

Request Explain why the external surfaces of the strainers do not need to be managed for loss of material due to selective leaching.

RAI 3.3.1.72-1 RESPONSE

LRA Table 3.3.2-12 is revised to include the external surfaces of the strainers exposed to raw water and treated water. The Selective Leaching Program manages loss of material due to selective leaching. Additions are shown with underline

Table 3.3.2-12: Fire Protection – Water System

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Item	Table 1 Item	Notes
Strainer	Filtration	Copper alloy > 15% Zn or > 8% Al	Raw water (ext)	Loss of material	Selective Leaching	VII.G.A-47	3.3.1-72	A
Strainer	Filtration	Copper alloy > 15% Zn or > 8% Al	Treated water (ext)	Loss of material	Selective Leaching	VII.C2.AP-32	3.3.1-72	C

RAI 3.3.1.72-2

Background LRA Table 3.3.2-14 contains AMR results for copper alloy with greater than 15-percent zinc or 8-percent aluminum and gray cast iron valve bodies and gray cast iron pump casing externally exposed to condensation that will be managed for loss of material using the Selective Leaching program. Additionally, LRA Table 3.3.2-19-6 contains an AMR item for gray cast iron valve body internally exposed to condensation that will be managed for loss of material using the Selective Leaching program. All items refer to SRP-LR Table 3.3.1, item 72, which addresses gray cast iron and copper alloy with greater than 15-percent zinc or 8-percent aluminum piping, piping components, and piping elements exposed to treated water, raw water, closed-cycle cooling water, or soil, and recommends GALL Report AMP XI.M33, "Selective Leaching," to manage loss of material due to selective leaching.

Issue LRA Tables 3.3.2-11, 3.3.2-16, 3.3.2-19-16, 3.3.2-19-19, 3.3.2-19-21, 3.3.2-19-26, 3.3.2-19-27, and 3.3.2-19-28 contain AMR results for copper alloy with greater than 15-percent zinc or 8-percent aluminum and/or gray cast iron valve bodies and piping internally or externally exposed to condensation; however, loss of material due to selective leaching is not identified as an aging effect.

LRA Table 3.0.1, Service Environments for Mechanical Aging Management Reviews," defines condensation as "air and condensation on surfaces of indoor systems with temperatures below dew point; condensation is considered untreated water due to potential for surface contamination."

There is insufficient information for the staff to determine why selective leaching is an aging mechanism of concern for some copper alloy with greater than 15-percent zinc or 8-percent aluminum and gray cast components exposed to condensation, but not for other similar components with the same material and environment.

Request Explain why the copper alloy with greater than 15-percent zinc or 8-percent aluminum and gray cast components exposed to condensation in the LRA tables identified in the issue statement do not need to be managed for loss of material due to selective leaching.

RAI 3.3.1.72-2 RESPONSE

Components identified in LRA Tables 3.3.2-11, 3.3.2-16, 3.3.2-19-21, 3.3.2-19-27, and 3.3.2-19-28 as copper alloy with greater than 15-percent zinc or 8-percent aluminum/ gray cast iron are conservatively identified as subject to condensation (internal) as part of compressed air systems. Since these systems are equipped with dryers to maintain an acceptably low dew point, the components are not subject to significant moisture that would allow selective leaching to occur. Therefore, the susceptible materials are not subject to selective leaching.

Components identified in LRA Tables 3.3.2-19-16, 3.3.2-19-19 and 3.3.2-19-26 are conservatively identified with condensation (external), but are subject to only infrequent intermittent wetting (e.g., limited time periods with condensation). Intermittent wetting is due to limited periods of operation occurring only during testing. This is in contrast to chilled water system components in LRA Table 3.3.2-14 (Plant Chill Water) which are subject to continuous operation and wetting. Therefore, loss of material due to selective leaching is not an aging effect requiring management for components in LRA Tables 3.3.2-19-16, 3.3.2-19-19 and 3.3.2-19-26.

Components identified in LRA Table 3.3.2-19-6 are conservatively identified as subject to condensation (internal) as part of the combustible gas control system (CGCS) which controls the concentration of hydrogen which may be released in the drywell and containment following a postulated loss of coolant accident (LOCA). Since the system normally operates only during quarterly testing, significant moisture will not be present and loss of material due to selective leaching is not an aging effect requiring management. While loss of material due to selective leaching is not an issue in this system, the Selective Leaching Program was inadvertently applied to gray cast iron valves subject to internal condensation in the table.

LRA Table 3.3.2-19-6 is revised to delete the use of the Selective Leaching Program for gray cast iron valves subject to limited intermittent internal condensation.

Table 3.3.2-19-6: Combustible Gas Control System [10 CFR 54.4(a)(2)]

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Item	Table 1 Item	Notes
~~Valve body~~	~~Pressure boundary~~	~~Gray cast iron~~	~~Condensation (int)~~	~~Loss of material~~	~~Selective Leaching~~	~~VII.C1.A-51~~	~~3.3.1-72~~	~~C~~

RAI 3.3.1.92-1

Background The SRP-LR, item 3.3.1-92, states that aluminum piping, piping components, and piping elements exposed to condensation (internal) is subject to loss of material due to general and crevice corrosion. The item recommends the use of GALL Report AMP XI.M38, "Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components," to manage the loss of material due to general and crevice corrosion aging effect.

LRA Table 3.3.1, item 3.3.1-92, states that aluminum piping, piping components, and piping elements exposed to condensation (internal) is subject to loss of material due to general and crevice corrosion, and will be managed by the Internal Surfaces in Miscellaneous Piping and Ducting Components Program. However, there are no LRA Table 2 AMR items which reference LRA Table 3.3.1, item 3.3.1-92.

Issue If aluminum piping, piping components, and piping elements exposed to condensation (internal) are subject to loss of material due to general and crevice corrosion as stated in LRA Table 3.3.1, item 3.3.1-92, then it should be reflected through a Table 2 item in the LRA. The lack of LRA Table 2 AMR items indicates that LRA Table 3.3.1, item 3.3.1-92, is not applicable at GGNS, contradicting the information provided in LRA Table 3.3.1, or that LRA Table 2 AMR items have been omitted from the LRA.

Request Provide an amendment to the LRA to identify appropriate LRA Table 2 AMR items which reference item LRA Table 3.3.1, item 3.3.1-92, or update item 3.3.1-92 to state that it is not applicable along with technical justification.

RAI 3.3.1.92-1 RESPONSE

LRA Tables 3.3.2-15 and 3.3.2-16 each include one aluminum component type internally exposed to condensation. Loss of material for these components is managed by the Compressed Air Monitoring Program. LRA Table 3.3.1, Item 3.3.1-92, is revised to identify the Compressed Air Monitoring Program. LRA Tables 3.3.2-15 and 3.3.2-16 are revised to identify the corresponding link to Table 3.3.1 Item 3.3.1-92.

Changes to the following tables are shown with strikethrough for deletions and underline for additions.

Table 3.3.1: Auxiliary Systems					
Item Number	**Component**	**Aging Effect/ Mechanism**	**Aging Management Programs**	**Further Evaluation Recommended**	**Discussion**
3.3.1-92	Aluminum piping, piping components, and piping elements exposed to condensation (internal)	Loss of material due to pitting and crevice corrosion	Chapter XI.M38, "Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components	No	~~Consistent with NUREG-1801.~~ Loss of material for aluminum components exposed to condensation is managed by the ~~Internal Surfaces in Miscellaneous Piping and Ducting Components~~ Compressed Air Monitoring Program.

Table 3.3.2-15: Standby Diesel Generator System								
Component Type	**Intended Function**	**Material**	**Environment**	**Aging Effect Requiring Management**	**Aging Management Program**	**NUREG -1801 Item**	**Table 1 Item**	**Notes**
Filter housing	Pressure boundary	Aluminum	Condensation (int)	Loss of material	Compressed Air Monitoring	VII.F1.A P-142	3.3.1-92	~~G~~ E

Table 3.3.2-16: HPCS Diesel Generator System								
Component Type	**Intended Function**	**Material**	**Environment**	**Aging Effect Requiring Management**	**Aging Management Program**	**NUREG -1801 Item**	**Table 1 Item**	**Notes**
Air start motor housing	Pressure boundary	Aluminum	Condensation (int)	Loss of material	Compressed Air Monitoring	VII.F1.A P-142	3.3.1-92	~~G~~ E

RAI 3.3.2.10-1

Background The "detection of aging effects" program element of GALL Report AMP XI.M36, "External Surfaces Monitoring of Mechanical Components," states that visual external inspections of metallic surfaces are performed at a frequency not to exceed one refueling cycle.

LRA Table 3.3.2-10 includes line items stating that carbon steel and stainless steel piping exposed to waste water (external) are subject to a loss of material that will be managed by the Periodic Surveillance and Preventive Maintenance Program. The "detection of aging effects" program element of LRA Section B.1.35 states that visual inspections occur at least once every five years.

Issue The inspection interval for external metallic surfaces exposed to waste water in LRA Table 3.3.2-10 is longer than that recommended by GALL Report AMP XI.M36; therefore, the loss of material aging effect may not be adequately managed.

Request Review the components with external surfaces exposed to a waste water environment that are being managed by the Periodic Surveillance and Preventive Maintenance Program and provide a technical justification for the program's inspection interval and its adequacy to appropriately manage the aging effects.

RAI 3.3.2.10-1 RESPONSE

Components listed in LRA Table 3.3.2-10 (Floor and Equipment Drains System) for which aging effects are managed by the Periodic Surveillance and Preventive Maintenance (PSPM) Program include the external surfaces of piping that drains water to the sump and is exposed to a waste water environment. This piping was conservatively included in scope and is totally enclosed inside sumps such that its failure would have no impact on any license renewal intended functions. These piping components are not readily visible during plant operations and refueling outages.

NUREG-1801 XI.M36, 'External Surfaces Monitoring of Mechanical Components' states "Surfaces that are not readily visible during plant operations and refueling outages are inspected when they are made accessible and at such intervals that would ensure the components' intended functions are maintained" and "The intervals of inspections may be adjusted, as necessary, based on plant-specific inspection results and industry operating experience."

The inspection intervals established for the Periodic Surveillance and Preventive Maintenance Program described in LRA B.1.35 are based on GGNS and industry operating experience to ensure the components' intended functions are maintained. The inspection intervals are adjusted as necessary based upon operating experience. This is consistent with the discussion in NUREG-1801 XI.M36.

Operating experience review identified no failures of this piping and shows that this existing program has been effective in managing the effects of aging, since the inspections provide detection of degradation prior to loss of intended function.

RAI 3.3.2.16-1

Background The SRP-LR, item 3.3.1-83, states that cracking due to stress corrosion cracking could occur in stainless steel diesel engine exhaust piping, piping components, and piping elements exposed to diesel exhaust. In addition, the item recommends the use of GALL Report AMP XI.M38, "Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components," to manage cracking due to stress corrosion cracking of stainless steel diesel engine exhaust piping, piping components and piping elements.

LRA Table 3.3.2-16, for the high-pressure core spray (HPCS) diesel generator system includes three separate AMR items for stainless steel expansion joints, stainless steel flexible connections, and stainless steel turbochargers exposed to diesel exhaust (internal) that are being managed for loss of material. For the corresponding material and environment, the GALL Report recommends managing for both loss of material and cracking due to stress corrosion.

Issue The stainless steel expansion joint, flexible connection, and turbochargers exposed to diesel exhaust in LRA Table 3.3.2-16 are not being managed for stress corrosion cracking as recommended by the SRP-LR, item 3.3.1-83.

Request Provide the bases for not managing the stainless steel expansion joint, flexible connection, and turbochargers exposed to diesel exhaust in Table 3.3.2-16 for stress corrosion cracking or provide an appropriate AMP that will manage this aging effect for this material and environment combination.

RAI 3.3.2.16-1 RESPONSE

The stainless steel expansion joint listed in LRA Table 3.3.2-16 is mounted in a horizontal position, which could promote "pooling" of condensation from diesel engine exhaust after system shutdown. This situation could result in cracking due to stress corrosion cracking. LRA Table 3.3.2-16 is revised to add this potential aging effect.

The stainless steel flexible connections listed in LRA Table 3.3.2-16 are mounted in a vertical orientation, and therefore are not subject to "pooling" of condensation. Thus, cracking due to stress corrosion is not an aging effect requiring management for these flexible connections.

Based on review of new more detailed vendor information, LRA Table 3.3.2-16 is revised to delete stainless steel subcomponents and add carbon steel subcomponents for the HPCS diesel generator turbocharger. The carbon steel subcomponents are not subject to stress corrosion cracking.

LRA Table 3.3.2-16 HPCS Diesel Generator System is revised as follows. Additions are shown with underline.

Table 3.3.2-16 HPCS Diesel Generator System								
Component Type	**Intended Function**	**Material**	**Environment**	**Aging Effect Requiring Management**	**Aging Management Program**	**NUREG-1801 Item**	**Table 1 Item**	**Notes**
Expansion joint	Pressure boundary	Stainless steel	Exhaust gas (int)	Cracking	Internal Surfaces in Miscellaneous Piping and Ducting Components	VII.H2.AP-128	3.3.1-83	A
Turbocharger	Pressure boundary	Carbon steel	Air - indoor (ext)	Loss of material	External Surfaces Monitoring	VII.I.A-77	3.3.1-78	C
Turbocharger	Pressure boundary	Carbon steel	Exhaust gas (int)	Loss of material	Internal Surfaces in Miscellaneous Piping and Ducting Components	VII.H2.AP-104	3.3.1-88	C
Turbocharger	Pressure boundary	Carbon steel	Exhaust gas (int)	Cracking - fatigue	TLAA – metal fatigue	--	--	H
Turbocharger	Pressure boundary	Stainless steel	Air - indoor (ext)	None	None	VII.J.AP-123	3.3.1-120	A
Turbocharger	Pressure boundary	Stainless steel	Exhaust gas (int)	Loss of material	Internal Surfaces in Miscellaneous Piping and Ducting Components	VII.H2.AP-128	3.3.1-83	C
Turbocharger	Pressure boundary	Stainless steel	Exhaust gas (int)	Cracking - fatigue	TLAA – metal fatigue	--	--	H

RAI 3.3.2.19-1

Background LRA Table 3.3.2-19-19 contains an AMR result for gray cast iron ejector internally exposed to raw water that will be managed for loss of material using the Service Water Integrity program. The AMR item refers to SRP-LR Table 3.3.1, Item 38, which addresses copper alloy and steel heat exchanger components exposed to raw water and recommends GALL Report AMP XI.M20, "Open-Cycle Cooling Water System" to manage loss of material due to general, pitting, crevice, galvanic, and microbiologically influenced corrosion, and fouling.

Issue Table IX.C of the GALL Report, Revision 2, defines steel as including gray cast iron, but cautions that gray cast iron is susceptible to selective leaching. However, in Table 3.3.2-19-19, loss of material due to selective leaching is not listed as an aging effect requiring management for the gray cast iron ejector.

Request Justify why the gray cast iron ejector exposed to raw water does not need to be managed for loss of material due to selective leaching.

RAI 3.3.2.19-1 RESPONSE

Gray cast iron exposed to raw water is susceptible to loss of material due to selective leaching and should be managed by the Selective Leaching program. LRA table 3.3.2-19-19 should have included the Selective Leaching Program for the gray cast iron ejector exposed to raw water. LRA Table 3.3.2-19-19 is revised to include gray cast iron ejector exposed to raw water managed by the Selective Leaching Program.

Changes to the following table are shown with strikethrough for deletions and underline for additions.

Table 3.3.2-19-19: Plant Service Water System [10 CFR 54.4(a)(2)]

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Item	Table 1 Item	Notes
Ejector	Pressure boundary	Gray cast iron	Condensation (ext)	Loss of material	External Surfaces Monitoring	VII.I.A-81	3.3.1-78	A
Ejector	Pressure boundary	Gray cast iron	Raw water (int)	Loss of material	Service Water Integrity	VII.C1.AP-183	3.3.1-38	C
Ejector	Pressure boundary	Gray cast iron	Raw water (int)	Loss of material	Selective Leaching	VII.C1.A-51	3.3.1-72	A

RAI 3.3.2.19-2

Background GALL Report AMP XI.M29, "Aboveground Metallic Tanks," states that for storage tanks supported on earthen or concrete foundations, corrosion may occur at inaccessible locations, such as the tank bottom. The AMP also states in the "detection of aging effects" program element that potential corrosion of tank bottoms is determined by taking ultrasonic testing (UT) for thickness measurements of the tank bottoms whenever the tank is drained and at least once within 5 years of entering the period of extended operation.

LRA Tables 3.3.2-19-20 and 3.3.2-19-24 state that carbon steel tanks exposed to waste water (internal) and treated water (internal) are managed for loss of material by the Internal Surfaces in Miscellaneous Piping and Ducting Components Program. However, the Internal Surfaces in Miscellaneous Piping and Ducting Components Program does not state that an UT for thickness of tank bottoms is included in the program for tanks that are supported by earthen or concrete foundations.

LRA Table 3.3.2-12 states that carbon steel tanks exposed to condensation (internal) and raw water (internal) are managed for loss of material by the Fire Water System Program. The Fire Water System Program description does not state that an UT for thickness of tank bottoms is included in the program for tanks that are supported by earthen or concrete foundations.

Issue It is not clear if the tanks are on earthen or concrete foundations. If the tanks are on earthen or concrete foundations, it is not clear that tanks will be adequately tested to ensure that significant degradation is not occurring and that the component intended function is maintained during the period of extended operation.

Request Indentify each tank and state how each is mounted or supported. In addition, for any tank that is supported on earthen or concrete foundations, indentify the aging management program and inspection technique that will be used to manage the appropriate aging effect.

RAI 3.3.2.19-2 RESPONSE

LRA Table 3.3.2-19-20, Floor and Equipment Drain System

Tanks identified in LRA table 3.3.2-19-20 are the auxiliary floor drain transfer tanks in the auxiliary building, the condensate clean waste tank in the turbine building, and the condensate demineralizer regeneration solution collector tank in the turbine building. These indoor tanks are supported on concrete pads. Thus, the tank exterior will not be exposed to wetted conditions. Since the external tank bottoms encounter a dry concrete environment, there is no aging effect requiring management for the external surface of the bottom of the tanks.

The Internal Surfaces in Miscellaneous Piping and Ducting Components program described in LRA B.1.26 will perform internal inspections during periodic system and component surveillances or during the performance of maintenance activities when the surfaces are made accessible for visual inspection. The program includes visual inspections to ensure that existing environmental conditions are not causing material degradation that could result in a loss of component intended functions. Aging effects on the tanks' external surfaces are managed by the External Surfaces Monitoring Program.

During review of LRA Table 3.3.2-19-20, it was determined that the external environment of concrete was not specified. LRA Table 3.3.2-19-20 is revised to include the environment of concrete (external) for the tank bottoms.

LRA Table 3.3.2-19-24, Domestic Water System

The tank identified in LRA Table 3.3.2-19-24 is the control building domestic water heater tank inside the control building. The indoor tank is supported on a pedestal. The External Surfaces Monitoring Program, described in LRA B.1.18, will manage the aging effect of loss of material for the external surface of the tank, including the bottom of the tank, through visual inspection of external surfaces for evidence of loss of material.

The Internal Surfaces in Miscellaneous Piping and Ducting Components program described in LRA B.1.26 will perform internal inspections, during periodic system and component surveillances or during the performance of maintenance activities when the surfaces are made accessible for visual inspection. The program includes visual inspections to ensure that existing environmental conditions are not causing material degradation that could result in a loss of component intended functions.

LRA Table 3.3.2-12, Fire Protection – Water System

Tanks listed in LRA Table 3.3.2-12 are the two fire water storage tanks. These tanks are located in the yard and are supported by a concrete foundation around the circumference of the tank. Beneath the tank is a soil environment inside the concrete foundation ring. Since the tanks are located outdoors, there is a potential of wetted conditions beneath the tanks. LRA Table 3.3.2-12 identifies that the Aboveground Metallic Tanks Program will manage the aging effect of loss of material for the external surface of the bottoms of these two carbon steel tanks.

As stated in LRA Appendix B.1.2, the Aboveground Metallic Tanks Program manages loss of material for the outer surfaces, including bottom surfaces, of above-ground metallic tanks constructed on concrete or soil, using periodic visual inspections and measurements of the thickness of the tank bottoms.

During the review of LRA Table 3.3.2-12, it was determined that the external environment of soil was not included. LRA Table 3.3.2-12 is revised to include the environment of soil (external) for the bottom of the tanks, with the aging effect requiring management "loss of material" managed by the Aboveground Metallic Tanks Program. Additions are shown with underline.

Table 3.3.2-19-20: Floor and Equipment Drain System [10 CFR 54.4(a)(2)]								
Component Type	**Intended Function**	**Material**	**Environment**	**Aging Effect Requiring Management**	**Aging Management Program**	**NUREG-1801 Item**	**Table 1 Item**	**Notes**
Tank	Pressure boundary	Carbon steel	Air – indoor (ext)	Loss of material	External Surfaces Monitoring	VII.I.A-77	3.3.1-78	A
Tank	Pressure boundary	Carbon steel	Concrete (ext)	None	None	VII.J.AP-282	3.3.1-112	C
Tank	Pressure boundary	Carbon steel	Waste water (int)	Loss of material	Internal Surfaces in Miscellaneous Piping and Ducting Components	VII.E5.AP-281	3.3.1-91	C

Table 3.3.2-12: Fire Protection – Water System								
Component Type	**Intended Function**	**Material**	**Environment**	**Aging Effect Requiring Management**	**Aging Management Program**	**NUREG-1801 Item**	**Table 1 Item**	**Notes**
Tank	Pressure boundary	Carbon steel	Air – indoor (ext)	Loss of material	External Surfaces Monitoring	VII.I.A-77	3.3.1-78	A
Tank	Pressure boundary	Carbon steel	Air – outdoor (ext)	Loss of material	Aboveground Metallic Tanks	VII.H1.A-95	3.3.1-67	C
Tank	Pressure boundary	Carbon steel	Concrete (ext)	Loss of material	Aboveground Metallic Tanks	VIII.E.SP-115	3.4.1-30	C
Tank	Pressure boundary	Carbon steel	Soil(ext)	Loss of material	Aboveground Metallic Tanks	VIII.E.SP-115	3.4.1-30	C
Tank	Pressure boundary	Carbon steel	Condensation (int)	Loss of material	Fire Water System	VII.F1.A-08	3.3.1-90	E
Tank	Pressure boundary	Carbon steel	Fuel oil (int)	Loss of material	Diesel Fuel Monitoring	VII.G.AP-234	3.3.1-68	C, 303

RAI 3.5.1.78-1

Background SRP-LR Table 3.5-1, item 78, recommends that steel fuel pool liners be managed for cracking due to stress corrosion cracking and loss of material due to pitting and crevice corrosion with GALL Report AMP XI.M2, "Water Chemistry," and monitoring of the spent fuel pool water level and leakage from the leak chase channels.

LRA Table 3.5.1, item 3.5.1-78, states that steel fuel pool liners will be managed for loss of material due to pitting and crevice corrosion with the Water Chemistry Control – BWR program and monitoring of the spent fuel pool water level and leakage from the leak test channels. Item 3.5.1-78 also states that cracking due to stress corrosion cracking is not an aging effect requiring management because there are no in-scope stainless steel components exposed to treated water > 60°C (140°F). UFSAR Section 9.1.3.2 states that the spent fuel pool water temperature is normally maintained below 140°F.

Issue The staff has identified the following issues for AMR items associated with LRA item 3.5.1-78:

a. LRA Table 3.5.2-3 states that the spent fuel pool liner and gate will be managed for cracking with the Water Chemistry Control – BWR program and monitoring of the spent fuel pool water level, referencing item 3.5.1-78. However, LRA item 3.5.1-78 states that loss of material is the applicable aging effect.

b. LRA Table 3.5.2-3 also states that spent fuel pool storage racks will be managed for loss of material with the Water Chemistry Control – BWR program and monitoring of the spent fuel pool water level, referencing item 3.5.1-78. The staff does not consider the monitoring of the pool water level to be an appropriate aging management activity to verify the effectiveness of water chemistry controls for the storage racks.

c. The AMR items in LRA Table 3.5.2-3 that are associated with LRA item 3.5.1-78 cite plant-specific note 504, which states that the One-Time Inspection Program will verify the effectiveness of the water chemistry controls. The use of the One-Time Inspection is not included in the discussion for LRA Table 3.5.1, item 3.5.1-78.

d. For the AMR items in LRA Table 3.5.2-3 that are associated with LRA item 3.5.1-78, monitoring of the leak chase channels is not cited as an aging management activity, although this activity is recommended in SRP-LR Table 3.5-1, item 78, and is included in the discussion for LRA Table 3.5.1, item 3.5.1-78.

Request

a. Resolve the discrepancy between the AMR item for the spent fuel pool liner and gate or LRA Table 3.5.1, item 3.5.1-78, regarding whether cracking will be age managed. Also, revise the AMR item for the spent fuel pool liner and gate to include loss of material as an aging effect requiring management, or provide the technical justification for why loss of material does not need to be age managed.

b. Revise the AMR item for the spent fuel storage racks to remove monitoring of the pool water level as an aging management activity, or provide the technical justification for why such monitoring is appropriate to verify the effectiveness of water chemistry controls to mitigate loss of material for the storage racks.

c. Resolve the discrepancy between the AMR items in LRA Table 3.5.2-3 and the discussion for LRA Table 3.5.1, item 3.5.1-78, regarding whether the One-Time

Inspection Program will be used to verify the effectiveness of water chemistry controls for all associated AMR items.

d. Revise the AMR items associated with LRA Table 3.5.1, item 3.5.1-78, to include monitoring of the leak chase channels as an aging management activity, as appropriate.

RAI 3.5.1.78-1 RESPONSE

a. As indicated in LRA Table 3.5.1, item 3.5.1-78 for the spent fuel pool liner and gate, loss of material is an aging effect requiring management, but cracking is not an aging effect requiring management. Consistent with line item 3.5.1-78, LRA Table 3.5.2-3 has been revised to delete "cracking" and add "loss of material" for the spent fuel pool liner plate and gate exposed to fluid environment as shown below. Additionally, discussion in LRA Table 3.5.1, item 3.5.1-78, has been revised to clarify applicability of aging effect "Loss of material" for the component "Spent fuel pool liner plate and gate."

b. Revised Table 3.5.2-3 line item "Spent fuel storage racks" in "Exposed to fluid environment" by deleting "and monitoring of spent fuel pool water level" from the Aging Management Program column.

c. The use of the One-Time Inspection Program is not included in the discussion for LRA Table 3.5.1, item 3.5.1-78 since that discussion was intended to address the SRP information for that specific line item. However, as indicated in LRA Section B.1.33, the One-Time Inspection Program will verify the effectiveness of the Water Chemistry Control - BWR Program by confirming that unacceptable loss of material is not occurring. This is further indicated by plant-specific note 504 in LRA Table 3.5.2-3. Accordingly, there is no discrepancy regarding whether the One-Time Inspection Program will be used to verity the effectiveness of water chemistry controls for the associated AMR items.

d. Revised LRA Table 3.5.2-3 line item "Spent fuel pool liner plate and gate" in "Exposed to fluid environment" by adding "monitoring leakage from the leak chase channels" to the Aging Management Program column. No other AMR item is associated with LRA Table 3.5.1, Item 3.5.1-78.

Additions are shown with underline and deletions with strikethrough.

Table 3.5.1: Structures and Component Supports					
Item Number	**Component**	**Aging Effect/ Mechanism**	**Aging Management Program**	**Further Evaluation Recommended**	**Discussion**
3.5.1-78	Steel components: fuel pool liner	Cracking due to stress corrosion cracking; Loss of material due to pitting and crevice corrosion	Water Chemistry, and Monitoring of the spent fuel pool water level in accordance with technical specifications and leakage from the leak chase channels.	No, unless leakages have been detected through the SFP liner that cannot be accounted for from the leak chase channels	At GGNS, the Water Chemistry Control - BWR Program manages ~~aging effects~~ loss of material on the spent fuel pool liner. Monitoring spent fuel pool water level in accordance with technical specifications and monitoring leakage from the leak test channels will also continue during the period of extended operation. Cracking due to stress corrosion is not an aging effect requiring management for treated water < 140°F. There are no stainless steel spent fuel components with intended functions exposed to treated water > 60°C (> 140°F).

Additions are shown with underline and deletions with strikethrough.

Table 3.5.2-3: Turbine Building, Process Facilities and Yard Structures								
Structure and/or Component or Commodity	**Intended Function**	**Material**	**Environment**	**Aging Effect Requiring Management**	**Aging Management Program**	**NUREG-1801 Item**	**Table 1 Item**	**Notes**
Spent fuel pool liner plate and gate	EN, SSR	Stainless steel	Exposed to fluid environment	~~Cracking~~ Loss of material	Water Chemistry Control – BWR, ~~and~~ monitoring of spent fuel pool water level and monitoring leakage from the leak chase channels	III.A5.T-14	3.5.1-78	A, 504
Spent fuel storage racks	EN, SSR	Stainless steel	Exposed to fluid environment	Loss of material	Water Chemistry Control – BWR ~~and monitoring of spent fuel pool water level~~	III.A5.T-14	3.5.1-78	A, 504

RAI 3.5.2.4-1

Background The SPR-LR states that stainless steel components exposed to outdoor air can be susceptible to cracking and loss of material depending on the outdoor environmental conditions. SRP-LR Sections 3.4.2.2.2 and 3.4.2.2.3 state that cracking and loss of material is applicable for plants with outdoor environments high in chlorides, such as those near a saltwater coastline, near a highway treated with salt, with chlorides in the soil, or that have a cooling tower treated with chlorine.

In LRA Table 3.5.2-4, the applicant stated that for stainless steel base plates, component and piping supports, anchor bolts, ASME Class 1, 2, 3 and MC support bolting, and structural bolting exposed to air-outdoor, there are no aging effects and no AMP is proposed. The AMR items cite generic note I. The AMR items also cite a plant-specific note which states that sulfur dioxide vapors or other similar substances do not chemically pollute the ambient outdoor environment at GGNS and the external environment does not contain saltwater or high chloride content; therefore aging management is not required for aluminum and stainless steel components exposed to the external environment. However, LRA Sections 3.4.2.2.2 and 3.4.2.2.3 state that the applicant has a cooling tower treated with hypochlorite and that cracking and loss of material of stainless steel components directly exposed to outdoor air are identified as aging effects requiring management and are managed by the External Surfaces Monitoring Program.

Issue It is unclear to the staff why these stainless steel components exposed to outdoor air are not being managed for cracking and loss of material given that the applicant's outdoor air environment contains cooling tower vapor which contains chlorides.

Request Explain why cracking and loss of material are not applicable aging effects for stainless steel base plates, component and piping supports, anchor bolts, ASME Class 1, 2, 3 and MC support bolting, and structural bolting exposed to outdoor air. If these stainless steel components are not susceptible to cracking and loss of material, resolve the inconsistency with LRA Sections 3.4.2.2.2 and 3.4.2.2.3.

RAI 3.5.2.4-1 RESPONSE

The stainless steel structural components/commodities in an air-outdoor environment are susceptible to "cracking" and "loss of material." The line items for stainless steel base plates, component and piping supports, anchor bolts, ASME Class 1, 2, 3 and MC support bolting, and structural bolting exposed to air-outdoor shown in LRA Table 3.5.2-4 are revised as follows. Additions are shown with underline and deletions with strikethrough.

Table 3.5.2-4: Bulk Commodities								
Structure and/or Component or Commodity	**Intended Function**	**Material**	**Environment**	**Aging Effect Requiring Management**	**Aging Management Program**	**NUREG-1801 Item**	**Table 1 Item**	**Notes**
Base plates	SNS, SRE,, SSR	Stainless steel	Air – outdoor	~~None~~ Cracking Loss of material	~~None~~ Structures monitoring			~~I, 503~~ G
Components and piping supports	SNS, SRE,, SSR	Stainless steel	Air – outdoor	~~None~~ Cracking Loss of material	~~None~~ Structures monitoring			~~I, 503~~ G
Anchor bolts	SNS, SRE,, SSR	Stainless steel (bolted connections)	Air – outdoor	~~None~~ Cracking Loss of material	~~None~~ Structures monitoring			~~I, 503~~ G
ASME Class 1,2,3 and MC Supports bolting	SNS, SRE,, SSR	Stainless steel (bolted connections)	Air – outdoor	~~None~~ Cracking Loss of material	~~None~~ ISI-IWF			~~I, 503~~ G
Structural bolting	SNS, SRE,, SSR	Stainless steel (bolted connections)	Air – outdoor	~~None~~ Cracking Loss of material	~~None~~ Structures monitoring			~~I, 503~~ G

Attachment 2 to

GNRO-2012/00064

Revised Response to RAI B.1.21-5

RAI B.1.21-5 Revised Response

In the response to RAI B.1.21-5 provided in letter GNRO-2012/00042 dated May 15, 2012 it was stated that "If the option to replace the sprinklers is chosen, all sprinkler heads that have been in service for 50 years will be replaced." It has been determined that this change will result in a change to an enhancement in Appendix A.1.21 and B.1.21. The changes to these sections are provided below with additions underlined and deletions with strikethrough.

A.1.21 Fire Water System Program

The Fire Water System Program will be enhanced as follows.

- Sprinkler heads will be tested or replaced. If testing is chosen a ~~A~~ representative sample of sprinkler heads will be tested before the end of the 50-year sprinkler head service life and at 10-year intervals thereafter during the extended period of operation. NFPA-25 defines a representative sample of sprinklers to consist of a minimum of not less than 4 sprinklers or 1 percent of the number of sprinklers per individual sprinkler sample, whichever is greater. If replacement of the sprinklers is chosen, all sprinklers that have been in service for 50 years will be replaced.

B.1.21 FIRE WATER SYSTEM

Enhancements

The following enhancements will be implemented prior to the period of extended operation.

Elements Affected	Enhancements
4. Detection of Aging Effects 6. Acceptance Criteria	The Fire Water System Program will be enhanced to include a visual inspection of a representative number of locations on the interior surface of below grade fire protection piping at a frequency of at least once every ten years during the period of extended operation. A representative number is 20% of the population (defined as locations having the same material, environment, and aging effect combination) with a maximum of 25 locations. Acceptance criteria will be no unacceptable degradation.
4. Detection of Aging Effects	The Fire Water System Program will be enhanced to include testing or replacement of sprinkler heads. If testing is chosen a representative sample of sprinkler heads will be tested before the end of the 50-year sprinkler head service life and at 10-year intervals thereafter during the extended period of operation. NFPA-25 defines a representative sample of sprinklers to consist of a minimum of not less than 4 sprinklers or 1 percent of the number of sprinklers per individual sprinkler sample, whichever is greater. If replacement of the sprinkler heads is chosen, all sprinklers that have been in service for 50 years will be replaced.

Attachment 3 to

GNRO-2012/00064

List of Regulatory Commitments

List of Regulatory Commitments

The following table identifies those actions committed to by Entergy in this document. Additions are shown with underline and deletions with strikethrough.

#	COMMITMENT	IMPLEMENTATION SCHEDULE	SOURCE	RELATED LRA SECTION / AUDIT ITEM
1	Implement the 115 kilovolt (KV) Inaccessible Transmission Cable Program for Grand Gulf Nuclear Station (GGNS) as described in License Renewal Application (LRA) Section B.1.1	Prior to November 1, 2024	GNRO-2011/00093	B.1.1
2	Implement the Aboveground Metallic Tanks Program for GGNS as described in LRA Section B.1.2	Prior to November 1, 2024	GNRO-2011/00093	B.1.2
3	Enhance the Bolting Integrity Program for GGNS to clarify the prohibition on use of lubricants containing MoS_2 for bolting, and to specify that proper gasket compression will be visually verified following assembly. Enhance the Bolting Integrity Program to include consideration of the guidance applicable for pressure boundary bolting in Regulatory Guide (NUREG) 1339, Electric Power Research Institute (EPRI) NP-5769, and EPRI TR-104213. Enhance the Bolting Integrity Program to include volumetric examination per American Society of Mechanical Engineers (ASME) Code Section IX, Table IWB-2500-1, Examination Category B-G-1, for high-strength closure bolting regardless of code classification.	Prior to November 1, 2024	GNRO-2011/00093	B.1.3
4	Enhance the Boraflex Monitoring Program for GGNS to perform periodic surveillances of the boraflex neutron absorbing material on at least a five year frequency using Boron-10 Areal Density Gage for Evaluating Racks (BADGER) testing. RACKLIFE analysis will continue to be performed each cycle. This analysis will include a comparison of the RACKLIFE predicted silica to the plant measured silica. This comparison will determine if adjustments to the RACKLIFE loss coefficient are merited. The analysis will include projections to the next planned RACKLIFE analysis date to ensure current Region I storage locations will not need to be reclassified as Region II storage locations in the analysis interval.	Prior to November 1, 2024	GNRO-2011/00093	B.1.4
5	Implement the Buried Piping and Tanks Inspection Program for GGNS as described in LRA Section B.1.5.	Prior to November 1, 2024	GNRO-2011/00093	B.1.5

#	COMMITMENT	IMPLEMENTATION SCHEDULE	SOURCE	RELATED LRA SECTION / AUDIT ITEM
6	Enhance the Boiling Water Reactor (BWR) Vessel Internals Program for GGNS as follows. (a) Evaluate the susceptibility to neutron or thermal embrittlement for reactor vessel internal components composed of CASS, X-750 alloy, precipitation-hardened (PH) martensitic stainless steel(e.g., 15-5 and 17-4 PH steel), and martensitic stainless steel (e.g., 403, 410 and 431 steel). (b) Inspect portions of the susceptible components determined to be limiting from the standpoint of thermal aging susceptibility, neutron fluence, and cracking susceptibility (i.e., applied stress, operating temperature, and environmental conditions). The inspections will use an inspection technique capable of detecting the critical flaw size with adequate margin. The critical flaw size will be determined based on the service loading condition and service-degraded material properties. The initial inspection will be performed either prior to or within 5 years after entering the period of extended operation. If cracking is detected after the initial inspection, the frequency of re-inspection will be justified based on fracture toughness properties appropriate for the condition of the component. The sample size will be 100% of the accessible component population, excluding components that may be in compression during normal operations.	Prior to November 1, 2024	GNRO-2011/00093	B.1.11

#	COMMITMENT	IMPLEMENTATION SCHEDULE	SOURCE	RELATED LRA SECTION / AUDIT ITEM
7	Enhance the Compressed Air Monitoring Program for GGNS to apply a consideration of the guidance of ASME OM-S/G-1998, Part 17; ANSI/ISA-S7.0.01-1996; EPRI NP-7079; and EPRI TR-108147 to the limits specified for air system contaminants. Enhance the Compressed Air Monitoring Program to include periodic and opportunistic inspections of accessible internal surfaces of piping, compressors, dryers, aftercoolers, and filters to apply consideration of the guidance of ASME OM-S/G-1998, Part 17 for inspection frequency and inspection methods of these components in the following compressed air systems. • Automatic Depressurization System (ADS) air • Division 1 Diesel Generator Starting Air (D1DGSA) • Division 2 Diesel Generator Starting Air (D2DGSA) • Division 3 Diesel Generator Starting Air (D3DGSA), also known as the HPCS Diesel Generator • Instrument Air (IA)	Prior to November 1, 2024	GNRO-2011/00093	B.1.12/RAI B.1.12-1
8	Enhance the Diesel Fuel Monitoring Program to include a ten-year periodic cleaning and internal inspection of the fire water pump diesel fuel oil tanks, the diesel fuel oil day tanks for Divisions I, II, III, and the diesel fuel oil drip tanks for Divisions I, II. These cleanings and internal inspections will be performed at least once during the 10-year period prior to the period of extended operation and at succeeding 10-year intervals. If visual inspection is not possible, a volumetric inspection will be performed. Enhance the Diesel Fuel Monitoring Program to include a volumetric examination of affected areas of the diesel fuel tanks if evidence of degradation is observed during visual inspection. The scope of this enhancement includes the diesel fuel oil day tanks (Divisions I, II, III), the diesel fuel oil storage tanks (Divisions I, II, III), the diesel fuel oil drip tanks (Divisions I, II), and the diesel fire pump fuel oil storage tanks, and is applicable to the inspections performed during the 10-year period prior to the period of extended operation and at succeeding 10-year intervals.	Prior to November 1, 2024	GNRO-2011/00093	B.1.16

#	COMMITMENT	IMPLEMENTATION SCHEDULE	SOURCE	RELATED LRA SECTION / AUDIT ITEM
9	Enhance the External Surfaces Monitoring Program to include instructions for monitoring of the aging effects for flexible polymeric components through manual or physical manipulation of the material, including a sample size for manipulation of at least 10 percent of available surface area. Enhance the External Surfaces Monitoring Program as follows. 1. Underground components within the scope of this program will be clearly identified in program documents. 2. Instructions will be provided for inspecting all underground components within the scope of this program during each 10-year period, beginning 10 years prior to entering the period of extended operation.	Prior to November 1, 2024	GNRO-2011/00093	B.1.18

#	COMMITMENT	IMPLEMENTATION SCHEDULE	SOURCE	RELATED LRA SECTION / AUDIT ITEM
10	Enhance the Fatigue Monitoring Program to monitor and track all critical thermal and pressure transients for all components that have been identified to have a fatigue Time Limited Aging Analysis (TLAA). Enhance the Fatigue Monitoring Program to perform a review of the GGNS high energy line break analyses and the corresponding tracking of associated cumulative usage factors to ensure the GGNS program adequately manages fatigue usage for these locations. Fatigue usage calculations that consider the effects of the reactor water environment will be developed for a set of sample reactor coolant system components. This sample set will include the locations identified in NUREG/CR-6260 and additional plant-specific component locations in the reactor coolant pressure boundary if they are found to be more limiting than those considered in NUREG/CR-6260. F_{en} factors will be determined using the formulae sets listed in Section 4.3.3. If necessary following this analysis, revised cycle limits will be incorporated into the Fatigue Monitoring Program documentation. Enhance the Fatigue Monitoring Program to provide updates of the fatigue usage calculations on an as-needed basis if an allowable cycle limit is approached, or in a case where a transient definition has been changed, unanticipated new thermal events are discovered, or the geometry of components have been modified. The program revision will include providing for the consideration of the recirculation pump fatigue analysis exemption validity if cycles that were input into the exemption evaluation exceed their limits.	Two years prior to November 1, 2024	GNRO-2011/00093 GNRO-2012/00063	B.1.19/ RAI B.1.19-1, RAI 4.3-11

#	COMMITMENT	IMPLEMENTATION SCHEDULE	SOURCE	RELATED LRA SECTION / AUDIT ITEM
11	Enhance the Fire Protection Program to require visual inspections of the Halon/CO2 fire suppression system at least once every fuel cycle to examine for signs of corrosion. Enhance the Fire Protection Program to require visual inspections of fire damper framing at least once every fuel cycle to check for signs of degradation. Enhance the Fire Protection Program to require visual inspection of concrete curbs, manways, hatches, manhole covers, hatch covers, and roof slabs at least once every fuel cycle to confirm that aging effects are not occurring. Enhance the Fire Protection Program to require an external visual inspection of the CO2 tank at least once every fuel cycle to examine for signs of corrosion.	Prior to November 1, 2024	GNRO-2011/00093 GNRO-2012/00042	B.1.20/ RAI B.1.20-2

#	COMMITMENT	IMPLEMENTATION SCHEDULE	SOURCE	RELATED LRA SECTION / AUDIT ITEM
12	Enhance the Fire Water Program to include inspection of hose reels for degradation. Acceptance criteria will be enhanced to verify no unacceptable degradation. Enhance the Fire Water Program to include one of the following options. (1) Wall thickness evaluations of fire protection piping using non-intrusive techniques (e.g., volumetric testing) to identify evidence of loss of material will be performed prior to the period of extended operation and at periodic intervals thereafter. Results of the initial evaluations will be used to determine the appropriate inspection interval to ensure aging effects are identified prior to loss of intended function. OR (2) A visual inspection of the internal surface of fire protection piping will be performed upon each entry to the system for routine or corrective maintenance. These inspections will be capable of evaluating (a) wall thickness to ensure against catastrophic failure and (b) the inner diameter of the piping as it applies to the design flow of the fire protection system. Maintenance history shall be used to demonstrate that such inspections have been performed on a representative number of locations prior to the period of extended operation. A representative number is 20% of the population (defined as locations having the same material, environment, and aging effect combination) with a maximum of 25 locations. Additional inspections will performed as needed to obtain this representative sample prior to the period of extended operation.	Prior to November 1, 2024	GNRO-2011/00093	B.1.21/RAI B.1.51-5

#	COMMITMENT	IMPLEMENTATION SCHEDULE	SOURCE	RELATED LRA SECTION / AUDIT ITEM
12 (cont.)	Enhance the Fire Water Program to include a visual inspection of a representative number of locations on the interior surface of below grade fire protection piping in at least one location at a frequency of at least once every 10 years during the period of extended operation. A representative number is 20% of the population (defined as locations having the same material, environment, and aging effect combination) with a maximum of 25 locations. Acceptance criteria will be revised to verify no unacceptable degradation. Enhance the Fire Water Program to test or replace sprinkler heads. If testing is chosen a representative sample of sprinkler heads will be tested before the end of the 50-year sprinkler head service life and at 10-year intervals thereafter during the period of extended operation. Acceptance criteria will be no unacceptable degradation. NFPA-25 defines a representative sample of sprinklers to consist of a minimum of not less than 4 sprinklers or 1 percent of the number of sprinklers per individual sprinkler sample, whichever is greater. If replacement of the sprinkler heads is chosen, all sprinklers that have been in service for 50 years will be replaced. Enhance the Fire Water Program to include visual inspection of spray and sprinkler system internals for evidence of degradation. Acceptance criteria will be enhanced to verify no unacceptable degradation.		GNRO-2012-00064	
13	Enhance the Flow-Accelerated Corrosion Program to revise program documentation to specify that downstream components are monitored closely to mitigate any increased wear when susceptible upstream components are replaced with resistant materials, such as high Cr material.	Prior to November 1, 2024	GNRO-2011/00093	B.1.22
14	Enhance the Inservice Inspection - IWF Program to address inspections of accessible sliding surfaces.	Prior to November 1, 2024	GNRO-2011/00093	B.1.24/ RAI B.1.24-1

#	COMMITMENT	IMPLEMENTATION SCHEDULE	SOURCE	RELATED LRA SECTION / AUDIT ITEM
14 (cont.)	Enhance the Inservice Inspection - IWF Program to; clarify that parameters monitored or inspected will include corrosion; deformation; misalignment of supports; missing, detached, or loosened support items; improper clearances of guides and stops; and improper hot or cold settings of spring supports and constant load supports. Accessible areas of sliding surfaces will be monitored for debris, dirt, or indications of excessive loss of material due to wear that could prevent or restrict sliding as intended in the design basis of the support. Elastomeric vibration isolation elements will be monitored for cracking, loss of material, and hardening. Structural bolts will be monitored for corrosion and loss of integrity of bolted connections due to self-loosening and material conditions that can affect structural integrity.High-strength structural bolting (actual measured yield strength greater than or equal to 150 ksi or 1,034 MPa in sizes greater than 1 inch nominal diameter) susceptible to stress corrosion cracking (SCC) will be monitored for SCC. Enhance the Inservice Inspection - IWF Program to clarify that detection of aging will include: a) Monitoring structural bolting (American Society for Testing Materials (ASTM) A-325, ASTM F1852, and ASTM A490 bolts) and anchor bolts will be monitored for loss of material, loose or missing nuts, loss of pre-load and cracking of concrete around the anchor bolts. b) Volumetric examination comparable to that of ASME Code Section XI, Table IWB-2500-1, Examination Category B-G-1 should be performed for high strength structural bolting to detect cracking in addition to the VT-3 examination. This volumetric examination may be waived with adequate plant-specific justification.			

#	COMMITMENT	IMPLEMENTATION SCHEDULE	SOURCE	RELATED LRA SECTION / AUDIT ITEM
14 (cont.)	c) Identification of component supports that contain high strength bolting (actual measured yield greater than or equal to 150 ksi) in sizes greater than 1 inch nominal diameter. The extent of examination for support types that contain high-strength bolting will be as specified in ASME Code Section XI, Table IWF-2500-1. GGNS will examine high-strength structural bolting on the frequency specified in ASME Code Section XI, Table IWF-2500-1. Enhance the Inservice Inspection - IWF Program acceptance criteria to include the following as unacceptable conditions. a) Loss of material due to corrosion or wear, which reduces the load bearing capacity of the component support; b) Debris, dirt, or excessive wear that could prevent or restrict sliding of the sliding surfaces as intended in the design basis of the support; and c) Cracked or sheared bolts, including high strength bolts, and anchors.		GNRO-2012/00055 GNRO-2011/00093	
15	Enhance the Inspection of Overhead Heavy Load and Light Load Handling Systems Program to include monitoring of rails in the rail system for the aging effect "wear", and structural connections/bolting for loose or missing bolts, nuts, pins or rivets. Additionally, the program will be clarified to include visual inspection of structural components and structural bolts for loss of material due to various mechanisms and structural bolting for loss of preload due to self-loosening. Enhance the Inspection of Overhead Heavy Load and Light Load Handling Systems Program acceptance criteria to state that any significant loss of material for structural components and structural bolts, and significant wear of rails in the rail system, is evaluated according to ASME B30.2 or other applicable industry standard in the ASME B30 series.	Prior to November 1, 2024	GNRO-2011/00093	B.1.25
16	Implement the Internal Surfaces in Miscellaneous Piping and Ducting Components Program as described in LRA Section B.1.26.	Prior to November 1, 2024	GNRO-2011/00093	B.1.26

#	COMMITMENT	IMPLEMENTATION SCHEDULE	SOURCE	RELATED LRA SECTION / AUDIT ITEM
17	Enhance the Masonry Wall Program to clarify that parameters monitored or inspected will include monitoring gaps between the supports and masonry walls that could potentially affect wall qualification. Enhance the Masonry Wall Program to clarify that detection of aging effects require masonry walls to be inspected every 5 years.	Prior to November 1, 2024	GNRO-2011/00093	B.1.27/ B.1.27-1
18	Implement the Non-EQ Cable Connections Program as described in LRA Section B.1.28	Prior to November 1, 2024	GNRO-2011/00093	B.1.28
19	Enhance the Non environmentally Qualified (Non-EQ) Inaccessible Power Cables (400V to 35kV) Program to include low-voltage (400V to 2kV) power cables. Enhance the Non-EQ Inaccessible Power Cables (400V to 35kV) Program to include condition-based inspections of manholes not automatically dewatered by a sump pump being performed following periods of heavy rain or potentially high water table conditions, as indicated by river level. Enhance the Non-EQ Inaccessible Power Cables (400V to 35kV) Program to clarify that the inspections will include direct observation that cables are not wetted or submerged, that cables/splices and cable support structures are intact, and that dewatering/drainage systems (i.e., sump pumps) and associated alarms if applicable operate properly.	Prior to November 1, 2024	GNRO-2011/00093	B.1.29
20	Implement the Non-EQ Instrumentation Circuits Test Review Program as described in LRA Section B.1.30.	Prior to November 1, 2024	GNRO-2011/00093	B.1.30
21	Implement the Non-EQ Insulated Cables and Connections Program as described in LRA Section B.1.31.	Prior to November 1, 2024	GNRO-2011/00093	B.1.31
22	Enhance the Oil Analysis Program to provide a formalized analysis technique for particulate counting. Enhance the Oil Analysis Program to include piping and components within the main generator system (N41) with an internal environment of lube oil.	Prior to November 1, 2024	GNRO-2011/00093	B.1.32

#	COMMITMENT	IMPLEMENTATION SCHEDULE	SOURCE	RELATED LRA SECTION / AUDIT ITEM
23	Implement the One-Time Inspection Program as described in LRA Section B.1.33.	Within the 10 years prior to November 1, 2024	GNRO-2011/00093	B.1.33
24	Implement the One-Time Inspection – Small Bore Piping Program as described in LRA Section B.1.34.	Within the 6 years prior to November 1, 2024	GNRO-2011/00093	B.1.34
25	Enhance the Periodic Surveillance and Preventive Maintenance Program to include all activities described in the table provided in LRA Section B.1.35 program description.	Prior to November 1, 2024	GNRO-2011/00093	B.1.35
26	Enhance the Protective Coating Program to include parameters monitored or inspected by the program per the guidance provided in ASTM D5163-08. Enhance the Protective Coating Monitoring and Maintenance Program to provide for inspection of coatings near sumps or screens associated with the Emergency Core Cooling System. Enhance the Protective Coating Program to include acceptance criteria per ASTM D 5163-08.	Prior to November 1, 2024	GNRO-2011/00093	B.1.36
27	Enhance the Reactor Vessel Surveillance Program to ensure that the additional requirements specified in the final NRC safety evaluation for BWRVIP-86 Revision 1 are addressed before the period of extended operation.	Prior to November 1, 2024	GNRO-2011/00093	B.1.38
28	Enhance the Regulatory Guide (RG) 1.127, Inspection of Water-Control Structures Associated With Nuclear Power Plant Program to clarify that detection of aging effects will monitor accessible structures on a frequency not to exceed 5 years consistent with the frequency for implementing the requirements of RG 1.127. Enhance the RG 1.127, Inspection of Water-Control Structures Associated With Nuclear Power Plant Program to perform periodic sampling, testing, and analysis of ground water chemistry for pH, chlorides, and sulfates on a frequency of at least every 5 years. Enhance the RG 1.127, Inspection of Water-Control Structures Associated With Nuclear Power Plant Program acceptance criteria to include quantitative acceptance criteria for evaluation and acceptance based on the guidance provided in ACI 349.3R.	Prior to November 1, 2024	GNRO-2011/00093	B.1.39
29	Implement the Selective Leaching Program as described in LRA Section B.1.40.	Prior to November 1, 2024	GNRO-2011/00093	B.1.40
30	Enhance the Structures Monitoring Program to clarify that the scope includes the following: a) In-scope structures and structural components. • Containment Building (GGN 2)	Prior to November 1, 2024	GNRO-2011/00093	B.1.42/ RAI B.1.42-3, B.1.42-5

#	COMMITMENT	IMPLEMENTATION SCHEDULE	SOURCE	RELATED LRA SECTION / AUDIT ITEM
30 (cont.)	• Control House – Switchyard • Culvert No. 1 and drainage channel • Manholes and Ductbanks • Radioactive Waste Building Pipe Tunnel b) In-scope structural components • Anchor bolts • Anchorage / embedments • Base plates • Basin debris screen and grating • Battery racks • Beams, columns, floor slabs and interior walls • Cable tray and cable tray supports • Component and piping supports • Conduit and conduit supports • Containment sump liner and penetrations • Containment sump structures • Control room ceiling support system • Cooling tower drift eliminators • Cooling tower fill • CST/RWST retaining basin (wall) • Diesel fuel tank access tunnel slab • Drainage channel • Drywell floor slab (concrete) • Drywell wall (concrete) • Ductbanks • Electrical and instrument panels and enclosures • Equipment pads/foundations • Exterior walls • Fan stack grating • Fire proofing • Flood curbs • Flood retention materials (spare parts) • Flood, pressure and specialty doors • Floor slab • Foundations • HVAC duct supports • Instrument line supports • Instrument racks, frames and tubing trays • Interior walls • Main steam pipe tunnel • Manholes • Manways, hatches, manhole covers, and hatch covers • Metal siding • Missile shields • Monorails • Penetration sealant (flood, radiation)			

#	COMMITMENT	IMPLEMENTATION SCHEDULE	SOURCE	RELATED LRA SECTION / AUDIT ITEM
30 (cont.)	• Penetration sleeves (mechanical/ electrical not penetrating primary containment boundary) • Pipe whip restraints • Pressure relief panels • Reactor pedestal • Reactor shield wall (steel portion) • Roof decking • Roof hatches • Roof membrane • Roof slabs • RPV pedestal sump liner and penetrations • Seals and gaskets (doors, manways and hatches) • Seismic isolation joint • Stairway, handrail, platform, grating, decking, and ladders • Structural bolting • Structural steel, beams columns, and plates • Sumps and Sump liners • Support members: welds; bolted connections; support anchorages to building structure • Support pedestals • Transmission towers (see Note 1) • Upper containment pool floor and walls • Vents and louvers Note 1: The inspections of these structures may be performed by the transmission personnel. However, the results of the inspections will be provided to the GGNS Structures Monitoring Program owner for review. c) Clarify the term "significant degradation" to include "that could lead to loss of structural integrity". d) Include guidance to perform periodic sampling, testing, and analysis of ground water chemistry for pH, chlorides, and sulfates on a frequency of at least every 5 years. Enhance the Structures Monitoring Program to clarify that parameters monitored or inspected include: a) inspection for missing nuts for structural connections. b) monitoring sliding/bearing surfaces such as Lubrite plates for loss of material due to wear or corrosion, debris, or dirt. The program will be enhanced to include monitoring elastomeric vibration isolators and structural sealants for cracking, loss of material, and hardening.			

#	COMMITMENT	IMPLEMENTATION SCHEDULE	SOURCE	RELATED LRA SECTION / AUDIT ITEM
30 (cont.)	c) Include periodically inspecting the leak chase system associated with the upper containment pool and spent fuel pool to ensure the tell-tales are free of significant blockage. The inspection will also inspect concrete surfaces for degradation where leakage has been observed, in accordance with this Program.		GNRO-2012-00054	
	Enhance the Structures Monitoring Program to clarify that detection of aging effects will: a) include augmented inspections of vibration isolators by feel or touch to detect hardening if the vibration isolation function is suspect. b) Require inspections every 5 years for structures and structural components within the scope of license renewal unless technical justification is provided to extend the inspection to a period not to exceed 10 years.		GNRO-2011/00093	
	c) Require direct visual examinations when access is sufficient for the eye to be within 24-inches of the surface to be examined and at an angle of not less than 30° to the surface. Mirrors may be used to improve the angle of vision and accessibility in constricted areas.		GNRO-2012-00054	
	d) Specify that remote visual examination may be substituted for direct examination. For all remote visual examinations, optical aids such as telescopes, borescopes, fiber optics, cameras, or other suitable instruments may be used provided such systems have a resolution capability at least equivalent to that attainable by direct visual examination.		GNRO-2012-00054	
	Enhance the Structures Monitoring Program acceptance criteria by prescribing acceptance criteria based on information provided in industry codes, standards, and guidelines including NEI 96-03, ACI 201.1R-92, ANSI/ASCE 11-99 and ACI 349.3R-96. Industry and plant-specific operating experience will also be considered in the development of the acceptance criteria.		GNRO-2011/00093	

#	COMMITMENT	IMPLEMENTATION SCHEDULE	SOURCE	RELATED LRA SECTION / AUDIT ITEM
31	Enhance the Water Chemistry Control – Closed Treated Water Program to provide a corrosion inhibitor for the engine jacket water on the engine-driven fire water pump diesel in accordance with industry guidelines and vendor recommendations. Enhance the Water Chemistry Control – Closed Treated Water Program to provide periodic flushing of the engine jacket water and cleaning of heat exchanger tubes for the engine-driven fire water pump diesel in accordance with industry guidelines and vendor recommendations. Enhance the Water Chemistry Control – Closed Treated Water Program to provide testing of the engine jacket water for the engine-driven fire water pump diesels at least annually. Enhance the Water Chemistry Control – Closed Treated Water Program to revise the water chemistry procedure for closed treated water systems to align the water chemistry control parameter limits with those of EPRI 1007820.	Prior to November 1, 2024	GNRO-2011/00093 GNRO-2012/00049	B.1.44/ RAI B.1.44-1, B.1.44-2

#	COMMITMENT	IMPLEMENTATION SCHEDULE	SOURCE	RELATED LRA SECTION / AUDIT ITEM
31 (cont.)	Enhance the Water Chemistry Control – Closed Treated Water Program to conduct inspections whenever a boundary is opened for the following systems. • Drywell chilled water (DCW – system P72) • Plant chilled water (PCW – system P71) • Diesel generator cooling water subsystem for Division I and II standby diesel generators • Diesel engine jacket water for engine-driven fire water pump • Diesel generator cooling water subsystem for Division III (HPCS) diesel generator • Turbine building cooling water (TBCW– system P43) • Component cooling water (CCW – system P42) These inspections will be conducted in accordance with applicable ASME Code requirements, industry standards, and other plant-specific inspection and personnel qualification procedures that are capable of detecting corrosion or cracking.			

#	COMMITMENT	IMPLEMENTATION SCHEDULE	SOURCE	RELATED LRA SECTION / AUDIT ITEM
31 (cont.)	Enhance the Water Chemistry Control – Closed Treated Water Program to inspect a representative sample of piping and components at a frequency of once every ten years for the following systems. • Drywell chilled water (DCW – P72) • Plant chilled water (PCW – P71) • Diesel generator cooling water subsystem for Division I and II standby diesel generators • Diesel engine jacket water for engine-driven fire water pump • Diesel generator cooling water subsystem for Division III (HPCS) diesel generator • Turbine building cooling water (TBCW – P43) • Component cooling water (CCW – P42) Components inspected will be those with the highest likelihood of corrosion or cracking. A representative sample is 20% of the population (defined as components having the same material, environment, and aging effect combination) with a maximum of 25 components. The inspection methods will be in accordance with applicable ASME Code requirements, industry standards, or other plant specific inspection and personnel qualification procedures that ensure the capability of detecting corrosion or cracking.			
32	Enhance the BWR CRD Return Line Nozzle Program to include inspection of the CRD return line nozzle inconel end cap to carbon steel safe end dissimilar metal weld once prior to the period of extended operation and every 10 years thereafter.	Prior to November 1, 2024	GNRO-2012/00029	B.1.6 / RAI B.1.6-1
33	Enhance the BWR Penetrations Program to include that site procedures which implement the guidelines of BWRVIP-47-A will be clarified to indicate that the guidelines of BWRVIP-47-A apply without exceptions.	Prior to November 1, 2024	GNRO-2012/00029	B.1.8 / RAI B.1.8-1