UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D.C. 20555-0001

June 20, 2012

Mr. Michael Perito
Vice President, Site
Entergy Operations, Inc.
P.O. Box 756
Port Gibson, MS 39150

SUBJECT: REQUESTS FOR ADDITIONAL INFORMATION FOR THE REVIEW OF THE GRAND GULF NUCLEAR STATION LICENSE RENEWAL APPLICATION (TAC NO. ME7493)

Dear Mr. Perito:

By letter dated October 28, 2011, Entergy Operations, Inc., submitted an application pursuant to Title 10 of the *Code of Federal Regulations*, Part 54, to renew the operating license for Grand Gulf Nuclear Station, Unit 1 (GGNS) for review by the U.S. Nuclear Regulatory Commission (NRC or the staff). The staff is reviewing the information contained in the license renewal application and has identified, in the enclosure, areas where additional information is needed to complete the review.

These requests for additional information were discussed with Jeff Seiter, and a mutually agreeable date for the response is within 30 days from the date of this letter. If you have any questions, please contact me at 301-415-1045 or e-mail nathaniel.ferrer@nrc.gov.

Sincerely,

Nathaniel Ferrer, Project Manager
Projects Branch 1
Division of License Renewal
Office of Nuclear Reactor Regulation

Docket No. 50-416

Enclosure:
Requests for Additional
Information

cc w/encl: Listserv

GRAND GULF NUCLEAR STATION
LICENSE RENEWAL APPLICATION
REQUESTS FOR ADDITIONAL INFORMATION SET 21

RAI 3.1.2.1-1

Background. SRP-LR Section A.1.2.1, item 7, states that applicable aging effects to be considered for license renewal include those that could result from normal plant operation, including plant/system operating transients and plant shutdown.

License renewal application (LRA) Tables 3.1.2-1 and 3.1.2-3, state that carbon steel and low alloy steel components including nozzles, nozzle safe ends and extensions, nozzle flanges, reactor vessel upper head, piping, flow elements, thermal sleeves, and valve bodies exposed externally to indoor air do not require any aging effect to be managed. The related aging management review (AMR) items cite generic note G, indicating this environment is not in the generic aging lessons learned (GALL) Report for the aging effects of this component and material combination. Also, the associated plant-specific note, 102, states that high component surface temperature precludes moisture accumulation that could result in corrosion.

Issue. In its review, the staff found that identical material and environment combinations were found in the GALL Report, in systems other than the reactor coolant system. The staff noted that the basis for not managing any aging effects is that the temperature of the components under consideration is above the dew point. The GALL Report states that the aging effect of loss of material due to exposure of steel surfaces to indoor air, which can result in condensation but only rarely, should be considered. The staff also noted that during refueling outages, these components will be at ambient temperatures for prolonged periods of time, which may or may not be above the dew point.

Request. Provide the technical basis to justify why there are no aging effects requiring management for the subject components given that, during normal plant events such as refueling outages, these components will be at or near ambient temperatures.

RAI 3.2.2-1

Background. LRA Section 4.3.2 discusses the time-limited aging analysis (TLAAs) associated with assumed thermal cycle count for allowable secondary stress range reduction factor in non-Class 1 piping and non-piping components. The LRA states that these TLAAs are dispositioned in accordance with 10 CFR 54.21 (c)(1)(i), that the existing analyses remain valid for the period of extended operation.

Issue. The staff reviewed the applicant's AMR results in the associated LRA Tables within LRA Sections 3.2, 3.3 and 3.4, and noted that the results did not include all applicable AMR line items for the TLAAs associated with metal fatigue of non-Class 1 piping and non-piping components. For low-pressure core spray system, high-pressure core spray system, standby-liquid control system, suppression pool makeup system and standby-gas treatment system, Updated Final Safety Analysis Report (UFSAR) Table 3.2-1 indicates these systems are non-Class 1 and the staff noted that there may be components that have been analyzed for cumulative fatigue damage. It is not clear to the staff why those components that may have

been analyzed for cumulative fatigue damage, as discussed in LRA Section 4.3.2, are not included as AMR items in applicable tables in LRA Sections 3.2, 3.3 and 3.4.

Request. Revise the applicable LRA Tables in Sections 3.2, 3.3, and 3.4 to include all AMR items that address cumulative fatigue damage for non-Class 1 piping and non-piping components, or justify why AMR items are not needed for cumulative fatigue damage in LRA Sections 3.2, 3.3, and 3.4 that are associated with non-Class 1 piping and non-piping components.

DRAI 3.3.1.82-1

Background. LRA Table 3.3.1, items 82 and 96, associated with elastomer seals and components, was not used. The justification for not using the item is, "[w]ear of elastomer components is considered an event driven condition rather than an aging effect. If the elastomer component is properly designed, installed and maintained, contact with other surfaces leading to wear will not occur."

GALL Report Section IX.F defines wear "as the removal of surface layers due to relative motion between two surfaces or under the influence of hard, abrasive particles. Wear occurs in parts that experience intermittent relative motion, frequent manipulation, or in clamped joints where relative motion is not intended, but may occur due to a loss of the clamping force."

Issue. The conclusion that properly designed, installed, and maintained components will not experience wear is not consistent with the GALL Report definition of wear. Within the definition of the term "wear" in GALL Report Section IX.F, there are three factors to consider that could cause age-related wear due to the design of the joint, including (a) relative motion between two surfaces under the influence of hard abrasive particles, (b) frequent manipulation, or (c) in clamped joints where relative motion is not intended but may occur due to a loss of the clamping force.

It is unclear to the staff whether there are any components within the scope of license renewal that are designed in such a way that they could be impacted by the three age-related factors considered in the definition of wear.

Request.

a. State whether any elastomeric components within the scope of license renewal, which are designed with relative motion, are exposed to an internal or external environment that includes hard abrasive particles.

b. State whether there are any elastomeric components within the scope of license renewal that are susceptible to wear that over time, due to their frequent manipulation, could challenge the CLB function(s) of the component.

c. State whether there are any elastomeric components within the scope of license renewal designed with clamped joints where relative motion is not intended; however, the components are susceptible to wear over time due to a loss of the clamping force and could challenge the CLB function(s) of the component due to wear.

d. If an aging effect requiring management (AERM) is applicable based on the configurations or aging mechanisms described in requests (a) through (c), discuss how the AERM will be managed.

DRAI 3.3.1.76-1

Background. LRA Table 3.3.1, item 76, associated with elastomeric duct flexible connection exposed internally to interior indoor air states that hardening and loss of strength due to elastomer degradation should be managed with the External Surfaces Monitoring program.

LRA Table 3.3.2-17, Control Room Ventilation System, lists an item for elastomeric duct flexible connections exposed internally to indoor air which cites LRA Table 3.3.1, item 76, generic note I and plant-specific note 306. This item states that there are no AERM and proposed AMP. Plant-specific note 306 states, "Changes of material properties and cracking in elastomers are results of exposure to ultra-violet light or elevated temperatures (> 95°F). The interior surfaces of these components are not exposed to ultra-violet light and are part of the control room HVAC system that is not exposed to elevated temperatures."

GALL Report Section IX.C states, "[h]ardening and loss of strength of elastomers can be induced by elevated temperature (over about 95°F or 35°C), and additional aging factors (e.g., exposure to ozone, oxidation, and radiation)."

Issue. The staff could not confirm that there are no aging effects for this material and environment combination for this component, material and environmental combination because 95°F is a general guideline and does not necessarily apply to all elastomeric material types.

Request. State the specific material type for these elastomeric duct flexible connections and state the basis why there are no AERM and no proposed AMP. If the specific elastomeric material type does age despite being in an environment below 95°F, state how the effects of aging will be managed.

DRAI 3.3.2.19-3

Background. LRA Table 3.3.2-19-8 states that for Teflon flexible connections exposed internally to treated water (internal), there is no aging effect and no AMP is proposed.

Issue. While Teflon is resistant to temperatures higher than that encountered in spent fuel cooling systems, there are studies which demonstrate that certain grades of Teflon degrade when exposed to radiation.

Request. State the specific Teflon material type for these flexible connections and state the basis for why there are no AERM and, therefore, no proposed AMP. If the specific Teflon material type does age, state how the effects of aging will be managed.

RAI 3.5.1.33-1

Background. LRA Table 3.5-1, item 33, states that seals and gaskets will be managed for loss of sealing due to wear, damage, erosion, tear, surface cracks, or other defects by the Structures Monitoring program in lieu of the Containment Leak Rate program.

The item specifically states, "[a]dditionally the items referencing this item are associated with inside containment. GGNS items referring to seals and gaskets are associated with components outside containment and are managed by the Structures Monitoring Program for cracking and change in material properties." Aging management review items that cite LRA Table 3.5.1, item 33, are included in LRA Table 3.5.2-4, seals and gaskets (doors, manways and hatches).

ASME Code Section XI, NE-1130 states, "[t]he containment system includes, all piping, pumps, and valves attached to the containment vessel, or to penetrations assemblies out to and including any valves required to isolate the system and provide a pressure boundary for the containment function."

UFSAR Table 6.2-49 footnote 1 states, "[p]enetration is sealed by a blind flange or door with double o-ring seals, double expandable seals, double gasket seals or a weld. These seals are leakage rate tested by pressurizing between the seals or gaskets. Because the guard pipe inspection ports inboard seal is a weld, Type B testing is not required." Footnote 1 applies to penetrations associated with the equipment hatch, personnel locks, fuel transfer tube, and guard pipe inspection ports. LRA Table 3.5.2-1 states that the rubber seals for the airlock doors and equipment hatch are managed for cracking and change in material properties by the Containment Leak Rate program.

RAI 3.5.1.33-1

Issue. The staff recognizes that LRA Table 3.5.1, item 33, states that the seals and gaskets are "outside containment;" however, the seals and gaskets can be outside containment and still be associated with the containment penetration boundary. It is clear that seals associated with the airlock and equipment hatch are being managed by the Containment Leak Rate Program. However, it is not clear that the seals or gaskets associated with the fuel transfer tube, and guard pipe inspection ports are being managed by the Containment Leak Rate Program or whether they are considered long lived passive items. It is also not clear whether some of the seals and gaskets (doors, manways and hatches), which are included in LRA Table 3.5.2-4 and cite LRA Table 3.5.1, item 33, are associated with the containment penetration boundary and should be managed by the Containment Leak Rate Program instead of the Structures Monitoring Program.

Request. State how the seals or gaskets associated with the fuel transfer tube, and guard pipe inspection ports are being managed, or state if they are not considered to be long lived passive items.

State whether any of the seals and gaskets (doors, manways and hatches), which are included in LRA Table 3.5.2-4 and cite 3.5.1-33, are associated with the containment penetration function. If they are, state the basis for using the Structures Monitoring Program in lieu of the

Containment Leak Rate Program, or revise the LRA to reflect that the Containment Leak Rate Program will be used to manage their aging.

RAI 3.5.1.33-2

Background. LRA Section B.1.42, Structures Monitoring Program, Enhancement 4, states that the program will be enhanced to include physical manipulation of vibration isolaters, if the vibration isolation function is suspect. LRA Table 3.5.2-4 contains AMR items for roof membranes, and seals and gaskets (doors, manways, and hatches) being managed for cracking and change in material properties. The AMR items reference LRA Table 3.5-1, item 33, which states that the Structures Monitoring Program will manage the aging effects. The staff noted that neither the Structures Monitoring Program nor the implementing procedures contain a requirement to augment the visual examinations of roof membranes, and seals and gaskets (doors, manways, and hatches) with physical manipulation.

The "detection of aging effects" program element of GALL Report AMPs XI.M36 and XI.M38 recommend that 10 percent of available surface area of flexible polymeric components be manipulated; however neither the program nor the implementing procedures contain a requirement to conduct this sample size inspection.

Issue. The staff believes that physical manipulation of flexible elastomeric and polymeric materials is necessary, as recommended by GALL Report AMPs XI.M36 and XI.M38, to determine if hardening, loss of strength, or cracking is occurring. In addition, a lower bound of manipulation in relation to the available surface area should be provided to ensure that an adequate representative sample of the material is inspected.

Request. Enhance the Structures Monitoring Program to include physical manipulation of 10 percent of the available surface area of flexible roof membranes, and seals and gaskets (doors, manways, and hatches), or state the basis for why there is a reasonable assurance that the components will meet their CLB intended function(s) absent physical manipulation.

RAI 3.5.2.4-2

Background. UFSAR Chapter 9, page 9A-28, 9A.5.2.3n, states, "[t]he blowout shaft, Fire Zone 1A124, consists of the remaining horizontal separation distance, which contains concrete joint sealant (Rodofoam II)."

LRA Table 3.5.2-4 includes the following items:

- Flood retention materials (spare parts), wood, sand, sealant
- Penetration sealant (flood radiation)
- Seismic isolation joint

Issue. It is not clear to the staff whether this concrete joint sealant fulfills an intended license renewal function or if it is periodically replaced. In addition, the above AMR items from LRA Table 3.5.2-4 do not appear to include the concrete joint sealant.

Request. State whether the concrete joint sealant (Rodofoam II) has an intended license renewal function. If it does have an intended license renewal function, state whether it is a long lived passive component. If both of these responses are positive, state what AMR item includes this item.

RAI 3.5.2.4-3

Background. The GALL Report states that aluminum components exposed to outdoor air can be susceptible to loss of material due to pitting and crevice corrosion depending on the outdoor environmental conditions. SRP-LR Section 3.4.2.2.3 states that 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 where the water is treated with chlorine.

In LRA Table 3.5.2-4, the applicant stated that for aluminum vents and louvers 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 Section 3.4.2.2.2 states that the applicant has a cooling tower treated with hypochlorite.

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

Request. Explain why loss of material is not an applicable aging effect for aluminum vents and louvers exposed to outdoor air. If these aluminum components are not susceptible to loss of material, resolve the inconsistency with LRA Section 3.4.2.2.2.

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June 20, 2012

Mr. Michael Perito
Vice President, Site
Entergy Operations, Inc.
P.O. Box 756
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Sincerely,

/RA/

Nathaniel Ferrer, Project Manager
Projects Branch1
Division of License Renewal
Office of Nuclear Reactor Regulation

Docket No. 50- 416

Enclosure:
Requests for Additional
Information

cc w/encl: Listserv

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Letter to Michael Perito from Nathaniel Ferrer dated June 20, 2012

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