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

June 27, 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, 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 by e-mail at 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 24

RAI 3.3.2.15-1

Background: License renewal application (LRA) Tables 3.3.2-15, "Standby Diesel Generator System," and 3.3.2-16, "HPCS Diesel Generator System," contain aging management review (AMR) items which specify the Service Water Integrity program to manage loss of material due to wear for copper alloy with greater than 15 percent zinc heat exchanger tubes externally exposed to treated water. The AMR items cite generic note H indicating that this aging effect is not in the Generic Aging Lessons Learned (GALL) Report for this component, material, and environment combination.

LRA Section B.2.1.14 states that the applicant's Service Water Integrity Program is consistent with GALL Report aging management program (AMP) XI.M20, "Open-Cycle Cooling Water System." GALL Report AMP XI.M20 manages aging effects on components exposed to raw water systems using a combination of (a) surveillance and control techniques, (b) inspections, and (c) heat transfer capability testing of heat exchangers. The GALL Report AMP XI.M20 "detection of aging effects" program element states that visual or nondestructive examinations may be performed to identify degradation and that nondestructive testing, such as ultrasonic testing and eddy current testing, are effective methods to measure surface conditions or the extent of wall loss associated with service water system piping and components.

Issue: The GALL Report identifies loss of material due to various types of corrosion as an aging effect requiring management for copper alloy heat exchanger components; but does not identify loss of material due to wear as an aging effect requirement management. The nature of the loss of material due to wear aging mechanism for these items is not clear to the staff.

The applicant proposes to manage the external surface of heat exchange tubes exposed to treated water using a program that is intended to manage aging for components exposed to raw water. While it is possible to detect loss of material on the external portion of heat exchanger tubes by performing certain nondestructive examinations of the internal surfaces, the LRA did not describe the nondestructive examination method that will be used to manage the aging effects for these items.

Request: For the items in Tables 3.3.2-15 and 3.3.2-16 that are being managed for loss of material due to wear, describe the nature of the aging mechanism and discuss the associated plant-specific or industry operating experience associated with the identification of the additional aging mechanism for these items. Also, provide a description of the nondestructive examination method to be used by the Service Water Integrity Program and justification that the method being used will adequately manage loss of material from the treated water side of the associated heat exchanger tubes.

RAI 3.5.1.87-1

Background: The GALL Report recommends that structural bolting in any environment should be managed for loss of preload due to self-loosening (e.g., GALL Report items III.B1.1.TP-229 and III.A1.TP-261). Standard Review Plan for License Renewal (SRP-LR) Table 3.5-1, items 87

and 88, recommends the ASME Section XI, Subsection IWF and Structures Monitoring Program, respectively, to manage this aging effect.

Issue: LRA Table 3.5.1, items 87 and 88, state that this aging effect is not applicable and does not require management. No further discussion is provided.

Request: Explain why loss of preload is not an aging effect for structural bolting within the scope of license renewal, or provide an acceptable AMP to manage loss of preload during the period of extended operation. The response should address both the ASME Section XI, Subsection IWF and the Structures Monitoring Programs.

RAI 3.5.2.1-1

Background: LRA Table 3.5.2-1 addresses elastomer containment building electrical seals and sealant that will be managed for the aging effects of cracking and change in material properties by the Containment Leak Rate Program and references SRP-LR Table 3.5.1, item 26. The GALL Report recommends using GALL Report AMP XI.S1, "ASME Section XI, Subsection IWE," to ensure that these aging effects are adequately managed.

Issue: In the LRA, the applicant references SRP-LR Table 3.5.1, item 26, and credits the Containment Leak Rate Program to manage the aging effect of cracking and change in material properties of elastomer containment building electrical seals and sealant in an air – indoor uncontrolled environment. Since the Containment Leak Rate Program is a performance monitoring program that monitors parameters related to leakage rates and does not by itself provide information that would indicate aging degradation has initiated, the staff is unable to determine how the Containment Leak Rate Program will evaluate change in material properties, or if visual examinations are performed of the elastomer containment building electrical penetration seals and sealants to manage aging in the form of cracking or change in material properties.

Request: Describe how the Containment Leakage Rate Program meets the recommendations in GALL Report item II.B4.CP-40 with respect to managing the aging effect of cracking and change in material properties of elastomer containment building electrical seals and sealant in an air – indoor uncontrolled environment.

RAI 3.5.2.4-4

Background: LRA Table 3.5.2-4 addresses carbon steel fire hose reels that will be managed for loss of material by the Fire Water System Program and references SRP-LR Table 3.5.1, item 3.5.1-92. The GALL Report recommends using GALL Report AMP XI.S6, "Structures Monitoring Program," to ensure that these aging effects are adequately managed.

Issue: The staff notes that the applicant's Fire Water System Program has been enhanced to include periodic inspection of fire hose reels; however, GALL Report AMP XI.M27, "Fire Water System," focuses on the inspection of internal system corrosion conditions. The staff is unclear how the applicant's Fire Water System Program will be utilized to address the structure/aging effect combination, during the period of extended operation.

Request: Describe how the Fire Water System Program meets the recommendations provided in GALL Report AMP XI.S6, with respect to frequency of inspections, qualifications of inspection personnel, and acceptance criteria.

RAI 3.5.2.4-5

Background: LRA Table 3.5.2-4 states that rubber water stops exposed to an air – indoor uncontrolled environment have no aging effects requiring management and no proposed AMP. GALL Report Section IX.F, "Selected Definitions & Use of Terms for Describing and Standardizing Aging Mechanisms," identifies elastomer (i.e., rubber) degradation mechanisms as cracking, crazing, fatigue breakdown, abrasion, chemical attacks, and weathering. The GALL Report states that for rubber materials, hardening and loss of strength of elastomers can be induced by elevated temperature (over about 95°F (35°C)), and additional aging factors such as exposure to ozone, oxidation, and radiation. The staff notes that GALL Report item AP-102 states that elastomers exposed to an air-indoor uncontrolled environment are subject to hardening and loss of strength due to degradation, and can be managed by GALL Report AMP XI.M36, "External Surfaces Monitoring of Mechanical Components." The staff also notes that SRP-LR Table 3.5-1, item 72, identifies loss of sealing due to deterioration of seals, gaskets, and moisture barriers (caulking, flashing, and other sealants) as an aging effect/mechanism that will be managed by the Structures Monitoring Program.

Issue: The staff lacks sufficient information to determine whether these rubber water stops are exposed to sufficient levels of ozone, oxidation, and radiation to cause aging effects requiring management.

Request: Provide a technical basis as to why there are no aging effects requiring management or AMP for these rubber water stops or propose an AMP to manage the aging effects.

RAI 3.5.2.2.1.3-1

Background: SRP-LR Section 3.5.2.2.1.3 addresses loss of material due to general, pitting and crevice corrosion for steel elements of accessible and inaccessible areas of containments. The SRP-LR recommends further evaluation if the four following GALL Report conditions cannot be satisfied:

1. Concrete meeting the specifications of ACI 318 or 349 and the guidance of ACI 201.2R was used for the containment concrete in contact with the embedded containment shell or liner.
2. The concrete is monitored to ensure that it is free of penetrating cracks that provide a path for water seepage to the surface of the containment shell or liner.
3. The moisture barrier, at the junction where the shell or liner becomes embedded, is subject to aging management activities in accordance with ASME Section XI, Subsection IWE requirements.
4. Water ponding on the containment concrete floor is not common and when detected is cleaned up in a timely manner.

Issue: The staff agrees that conditions 2 and 4 were addressed adequately by the applicant; however, the LRA did not specify that condition 1 was met, or for condition 3, if a moisture

barrier was present at the junction where the liner becomes embedded in the concrete and, if present, is it subject to aging management activities in accordance with ASME Section XI, Subsection IWE requirements.

Request:

a. Confirm that the containment concrete in contact with the embedded steel liner meets the guidance contained in ACI 201.2R as specified in the GALL Report.
b. State whether a moisture barrier is or is not present at the junction where the liner becomes embedded in the concrete and, if present, that it is subject to aging management activities in accordance with ASME Section XI, Subsection IWE requirements.

RAI 4.6.2-1

Background: LRA Section 4.6.2 states that calculations were identified for the bellows on the containment penetration guard pipes and the fuel transfer tube that analyzed a large number of cycles of flexure due to normal operation and earthquakes. The LRA also states that the number of analyzed cycles is significantly higher than the total number of cycles projected for the period of extended operation. The LRA further states that the applicant will use the Fatigue Monitoring Program to manage the aging effects due to fatigue in accordance with 10 CFR 54.21(1)(c)(iii).

Issue: The LRA does not provide additional information regarding the calculations performed for the fatigue analysis, such as the number of analyzed cycles or the included transients. The staff needs further information to confirm that an evaluation for the fatigue analysis is valid for the period of extended operation

Request: Identify the number of cycles of the bellows for the guard pipes and fuel transfer tube were designed for and explain how that number was developed. Also identify which transients were included in the original evaluation and which transients will be monitored under the Fatigue Monitoring Program.

RAI B1.14-1

Background: LRA Section B.1.14, states that the Containment Inservice Inspection – IWL Program is consistent with GALL Report AMP XI.S2, "ASME Section XI, Subsection IWL." The GALL Report AMP XI.S2 "parameters monitored or inspected" program element recommends that the containment concrete surfaces be examined for evidence of damage or degradation, such as those defined in ACI 201.1R and ACI 349.3R.

Issue: Grand Gulf Nuclear Station (GGNS) License Renewal Project, Aging Management Program Evaluation Report for Civil/Structural for Containment Inservice Inspection (CII) – IWL, only identifies ACI 349.3R criteria for the concrete containment surface examination, and does not refer to ACI 201.1R, "Guide for Conducting a Visual Inspection of Concrete in Service," for conducting containment concrete surface visual examination.

Request: Describe the methods that will be used for conducting containment concrete visual surface examination. In addition, describe if these methods are consistent with the guidance provided in ACI 201.1R.

RAI B1.14-2

Background: LRA Section B.1.14, states that the Containment Inservice Inspection – IWL Program is consistent with GALL Report AMP XI.S2. The GALL Report AMP XI.S2 "acceptance criteria" program element recommends that quantitative acceptance criteria based on the "Evaluation Criteria" provided in Chapter 5 of ACI 349.3R-02, may be used to augment the qualitative assessment of the Responsible Engineer.

Issue: The applicant's Containment Inservice Inspection (CISI) Program Plan provides examination process of IWL Program in Appendix B – "CII Examination Process Flowchart" and Appendix C – "GGNS Recording and Screening Criteria" in the applicant's procedure of CEP-CII-004, Rev. 302 "General and Detailed Visual Examinations of Concrete Containments." It is not clear if the quantitative acceptance criterion for containment concrete surface visual examination is included in the applicant's program.

Request: Describe the acceptance criteria used for the containment concrete surface visual examination and describe if the acceptance criteria are consistent with the quantitative acceptance criteria recommended in Chapter 5 of the ACI 349.3R-02.

RAI B1.14-3

Background: LRA Section B.1.14, states that the Containment Inservice Inspection – IWL Program is consistent with the GALL Report AMP XI.S2. The GALL Report AMP XI.S2 "scope of program" program element recommends that scope of the AMP should be in accordance with ASME Section XI, Subsection IWL-1000. According to IWL-1100, steel embedded plates that are backed by concrete are within the scope of the containment concrete inservice inspection program. In addition, the GALL Report AMP XI.S2 "operating experience" program element states that the implementation of Subsection IWL, in accordance with 10 CFR 50.55a, is a necessary element of aging management for concrete containments through the period of extended operation.

Issue: During the walkdown of GGNS containment structure on January 31, 2012, the staff noted embedded steel plates in the concrete containment's exterior surface. These embedded steel plates had signs of corrosion and the concrete surface adjacent to these embedded plates had rust stains.

Request: Please describe how the aging of the embedded steel plates located on the exterior surface of the concrete containment will be managed.

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Sincerely,

/RA/

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

Docket No. 50-416

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