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

September 7, 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 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:
As stated

cc w/encl: Listserv

GRAND GULF NUCLEAR STATION
LICENSE RENEWAL APPLICATION
REQUESTS FOR ADDITIONAL INFORMATION SET 33

RAI 4.1-2a

Background. In the response to request for additional information (RAI) 4.1-2 dated July 3, 2012, Entergy Operations, Inc. (the applicant) stated that the spent fuel cask crane, new fuel handling crane, and polar crane are designed for a minimum of 100,000 cycles in accordance with CMAA-70, and that the allowable cycles based on CMAA-70 allowable stress ranges are not time-limited and are well above the estimated number of cycles for the aforementioned cranes during 60 years of plant operation. Based on this information the applicant concluded that there are no time-limited aging analyses (TLAAs) associated with these cranes.

Issue. The staff concurs that the CMAA-70 allowable stress ranges for the analysis of these cranes is not a time-dependent variable defined by the life of the plant. However, the staff also noted that the monitoring of load cycle lifts against the upper bound CMAA-70 design limit for these load cycle lifts may be a time-dependent assessment defined by the current operating term. Therefore, the staff does not have sufficient information to conclude that the current licensing basis (CLB) does not include any assessments for these cranes that would need to be identified as TLAAs for the license renewal application (LRA) because the analyses may include a time-dependency.

Request.

a. Provide an explanation and the basis why the analyses of loading cycle lifts for the spent fuel cask crane, new fuel handling crane, and polar crane do not need to be identified as TLAAs for the LRA when compared to the six criteria for defining TLAAs in 10 CFR 54.3(a). In the response, specifically clarify and justify why the assessment of load cycle lifts against the design limits set for these lifts per the CMAA-70 criteria would not be time-dependent defined by the life of the plant or why the number of load lift cycles would not need to be monitored during the period of extended operation. Include in the response a clear explanation on how the analyses compare to each of the six criteria for defining TLAAs in 10 CFR 54.3(a) and provide the basis on why the analyses are either in conformance or out of conformance with each of the six criteria for defining TLAAs.
b. If it is determined that the analyses of loading cycle lifts for the spent fuel cask crane, new fuel handling crane, and polar crane do need to be identified as TLAAs, amend the LRA to include an assessment of these TLAAs and provide the basis for accepting each of the TLAAs in compliance with one of three TLAA acceptance requirements in 10 CFR 21(c)(1)(i), (ii), or (iii). In addition, provide the applicable changes to both the aging management review (AMR) results in LRA Section 3 and Updated Final Safety Analysis Report (UFSAR) Supplement in LRA Appendix A.

RAI 4.1-2b

Background. In the response to RAI 4.1-2 dated July 3, 2012, the applicant stated that the containment hatchway crane load bearing parts were analyzed by Grand Gulf Nuclear Station, Unit 1 (GGNS) for all applicable loads per the requirements of the American Institute of Steel

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Construction (AISC) Steel Construction Manual (hence AISC standard), 7th Edition and that the evaluation of the crane per the AISC standard criteria did not include any time-dependent evaluation defined by the life of the plant. Therefore, the applicant concluded that there are no TLAAs for the containment hatchway crane because the evaluations of crane were not based on time-dependent criteria defined by the life of the plant.

Issue. Based on its review of this AISC standard, the staff noted that the crane rails were required to be designed in accordance with requirements for crane rail designs in Section 1 of the AISC standard and that the load bearing parts of the cranes were required to be evaluated in accordance with the specification requirements in Section 5 of the AISC standard. This includes a potential evaluation of the crane load bearing parts for possible fatigue loading conditions per Chapter 5, Section 1.7 of the AISC standard and Section 1.7 of Appendix B of the AISC standard. Specifically, the staff noted that Table B1 "Number of Loading Cycles," in Appendix B of the AISC standard would establish a loading condition for each of the crane load bearing parts based on the following load cycle ranges for the cranes: (a) 20,000–100,000 loading cycles establish cranes for loading condition 1; (b) 100,000–500,000 loading cycles establish cranes for loading condition 2; (c) 500,000–2,000,000 loading cycles establish cranes for loading condition 3; and (d) over 2,000,000 loading cycles establish cranes for loading condition 4. The staff noted that the Tables B2 and B3 in Appendix B of the AISC specification then use the loading condition category for each of the load bearing parts to establish maximum allowable stresses for these components.

In addition, UFSAR Section 9D.3.1 states that the evaluation of load bearing parts for the containment hatchway crane was used to perform structural modifications of the crane and to "derate" the crane. The staff is not clear if modifications were made to the design of this crane or what "derating" the crane involved. Thus, the staff does not have sufficient information to conclude that evaluation of the containment hatchway crane does not include any time-dependent analyses that conformed to the definition of a TLAA in 10 CFR 54.3(a).

Request.

a. Provide a full explanation on how the load bearing parts for the containment hatchway crane were assessed for potential loads, or else provide a complete explanation why the crane loads would not have been required to be assessed for fatigue if fatigue analyses were not performed for the containment hatchway crane load bearing parts as part of the GGNS CLB.

b. If the CLB does include applicable fatigue analysis or analyses for the containment hatchway crane load bearing parts, provide your basis why the analysis or analyses would not need to be identified as a TLAA or TLAAs for the LRA based on a comparison to the six criteria for TLAAs in 10 CFR 54.3(a). If the CLB does include such evaluations, provide a clear explanation on why the evaluations are either in conformance or out of conformance with each of the six criteria for defining TLAAs in 10 CFR 54.3(a). Amend the LRA appropriately if it is determined that the CLB does include such a fatigue analysis or analyses and the analysis or analyses are determined to conform to the definition of a TLAA.

c. Identify all modifications of the containment hatchway crane that were made per the AISC standard evaluation of the crane and specifically what is meant by the term

"derating" of the crane. In addition, identify all specific AISC standard subpart evaluations that were used to either modify the structure of the crane or to "derate" this crane and the specific AISC criteria or other NRC requirements that the crane was "derated" from and explain the basis for such "derating" objectives. Explain and justify why the specific AISC standard subpart evaluations that were used either to modify the containment hatchway crane or used to "derate" the containment hatchway crane would not need to be identified as TLAAs when compared to the six criteria for defining TLAAs in 10 CFR 54.3(a).

RAI 4.1-4a

Background. In the response to RAI 4.1-4 dated July 3, 2012, the applicant stated that the plant-specific fracture mechanics evaluation does not need to be identified as a TLAA because the analysis does not include a time dependency and therefore is not a time-dependent analysis defined by the life of the plant. The applicant further stated that the intent of the plant-specific fracture mechanics evaluation was to justify the inspection intervals in the generic evaluation (GE).

The applicant stated that the specific evaluation concluded that the results presented therein were valid for use in establishing future feed water nozzle inspection intervals based on the alternate requirements specified in the GE, and therefore that the plant-specific evaluation did not qualify the feedwater nozzles for a fixed term and is not a TLAA.

Issue. The staff does not agree with the applicant that the plant-specific flaw tolerance analysis does not need to be identified as a TLAA for the GGNS LRA. As has been confirmed by the applicant, the applicant is using the plant-specific flaw tolerance as the safety basis for establishing the inspection frequency of its alternative inservice inspections for the FW nozzles, which involve recommended alternative ultrasonic test examination techniques.

Thus, the staffs position is that the applicant should have identified the plant-specific flaw tolerance analysis as a TLAA because it meets all six of the criteria in 10 CFR 54.3(a). This includes conformance with TLAA identification Criterion 3 in that the evaluation is based on time-dependent assumptions defined by the life of the plant.

Request.

a. Provide the basis why the plant-specific cycle-dependent flaw tolerance analysis does not need to be identified as a TLAA in accordance with10 CFR 54.21(c)(1).
b. If the response to request (a) concludes that the plant-specific analysis needs to be identified as a TLAA, provide the necessary information and LRA revision to support the TLAA disposition in accordance with 10 CFR 54.21(c)(1)(i), (ii), or (iii). Assess and justify if the inservice inspection interval for the alternative FW nozzle examinations under the Boiling Water Reactor (BWR) Feedwater (FW) Nozzle Program will need to be adjusted for inspections on FW nozzle during the period of extended operation, based on the justification that is used to disposition the TLAA in accordance with 10 CFR 54.21(c)(1)(i), (ii), or (iii),

RAI 4.7.1-1a

Background. By letter dated June 5, 2012, the staff issued RAI 4.7.1-1 requesting that the results of the projected analyses be provided to demonstrate that the intended functions of the main steam line (MSL) flow restrictors are maintained in accordance with the current licensing basis during the period of extended operation. The response, dated July 3, 2012, stated that the erosion rate of 0.004 inches per year stated in the UFSAR Section 5.4.4.4 was highly conservative, and that information from a "later evaluation" shows that the expected erosion of the flow restrictors would be less than the 0.160 inches derived from the 0.004 inches per year for 40 years of operation. The response also provided several attributes to explain the reduction in the erosion-corrosion rate from the 0.004 inches per year given in the UFSAR, including: (a) materials with minimal chromium content are resistant to erosion-corrosion damage, (b) the relative erosion-corrosion rate for steel begins to decrease above 300° F, and (c) the Grade CF8 stainless steel material will not experience pitting or stress corrosion cracking due to chloride ions.

EPRI 1011231, "Recommendations for Controlling Cavitation, Flashing, Liquid Droplet Impingement, and Solid Particle Erosion," states that while materials such as stainless steel are immune to flow-accelerated corrosion, erosive mechanisms will eventually damage virtually any material.

Issue. Although the flow restrictors are constructed from stainless steel, the chrome content in stainless steel does not prevent loss of material due to erosion in all situations. In addition, the response to RAI 4.7.1-1 did not provide the results of the projected analyses or the bases for the conclusion in the "later evaluation" that the erosion-corrosion projected through the period of extended operation will be less than the total originally projected for 40 years. The applicant stated that the evaluation is proprietary; however, this does not preclude the information from being provided to the NRC.

Request. Provide the evaluation discussed in the response to RAI 4.7.1-1 that shows the expected erosion of the flow restrictors would be less than 0.160 inches for 60 years of operation.

RAI 4.7.1-2

Background. The components addressed in LRA Table 3.1.2-3, "Reactor Coolant Pressure Boundary," include cast austenitic stainless steel (CASS) flow elements, which appear to be the MSL flow restrictors. The table indicates that these components are being managed for cracking through LRA Table 3.4.1, item 11, and for loss of material through LRA Table 3.1.1, item 79 using the Water Chemistry – BWR program, with verification of the program's effectiveness through the One-Time Inspection program.

UFSAR Section 5.4.4.3 states that ASTM A351 (Type 304) CASS material was selected for the MSL flow restrictors based on its excellent resistance to erosion-corrosion in a high velocity steam environment. In addition, LRA Section 4.7.1 describes the evaluation of a plant-specific TLAA for erosion of the MSL flow restrictors.

Issue. 10 CFR 54.21(a) states, in part, that license renewal applications must identify and list components within scope that are subject to an AMR and must describe and justify the methods used to demonstrate that the effects of aging will be adequately managed.

The staff reviewed the applicant's AMR results in LRA Table 3.1.2-3 "Reactor Coolant Pressure Boundary," and noted that it did not include an AMR item for the TLAA associated with erosion of the MSL flow restrictors. It is not clear to the staff why these components evaluated by the TLAA and discussed in LRA Section 4.7.1 are not included as AMR items in the applicable table.

Request. Provide an AMR item for the MSL flow elements in LRA Table 3.1.2-3 that credits the TLAA for evaluating loss of material in the components by an erosion-corrosion mechanism, or provide the bases for why the MSL flow elements are not included.

September 7, 2012

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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

Enclosure:
As stated

cc w/encl: Listserv

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Letter to M. Perito from N. Ferrer dated September 7, 2012

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