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

April 18, 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 7

RAI B.1.34-1

Background. LRA Section B.1.34 states that the One-Time Inspection – Small-Bore Piping Program is consistent with GALL Report AMP XI.M35 and includes a statistically significant sampling approach. GALL Report AMP XI.M35 states under the "detection of aging effects" program element that the inspection sample size should be at least 3 percent of the weld population or a maximum of 10 welds of each weld type if the unit (a) has never experienced a failure of its American Society of Mechanical Engineers (ASME) Code Class 1 small-bore piping, and (b) has more than 30 years of operating history at the time when the application is submitted. Otherwise, the inspection sample size should be at least 10 percent of the weld population or a maximum of 25 welds of each weld type. The NRC issued the operating license for Grand Gulf Nuclear Station, Unit 1 (GGNS), on November 1, 1984, and the applicant submitted the LRA on October 28, 2011; therefore, GGNS had less than 27 years of operating history at the time when the application was submitted.

Issue. Based on the operating history of GGNS, the sample size for the one-time inspection should be at least 10 percent of the weld population or a maximum of 25 welds of each weld type to be consistent with GALL Report AMP XI.M35. However, LRA Section B.1.34 does not provide the total population of welds of each weld type or the total number of these welds that will be included in the volumetric inspections.

Request. Characterize the inspection sample size by completing the table below:

	Total Number of Welds at GGNS	Total Number of Welds to Be Inspected under the One-Time Inspection – Small-Bore Piping Program	Percentage of Total Welds To Be Inspected
ASME Code Class 1 Small-Bore Piping Full Penetration or Butt Welds			
ASME Code Class 1 Small-Bore Piping Partial Penetration or Socket Welds			

Provide technical justification if the sample size is less than the sample size described in the GALL Report (i.e., 10 percent of the weld population or a maximum of 25 welds of each weld type).

ENCLOSURE

RAI B.1.34-2

Background. GALL Report AMP XI.M35 states under the "detection of aging effects" program element that the One-Time Inspection Small-Bore Piping Program does not apply to plants that have experienced cracking in ASME Code Class 1 small-bore piping due to stress corrosion, cyclical (including
thermal, mechanical, and vibration fatigue) loading, or thermal stratification and thermal turbulence. LRA Section B.1.34 states that GGNS has not experienced this type of cracking.

Issue. During its onsite audit, the staff could not determine how or to what extent the applicant reviewed operating experience information in order to demonstrate that GGNS has not experienced cracking in its ASME Code Class 1 small-bore piping.

Request. With respect to the identification of cracking in ASME Code Class 1 small-bore piping, describe how operating experience was considered. In this description:

a. Identify the specific sources of information reviewed (e.g., databases and document types).

b. For each information source, describe the process or methodology used to find potential instances of cracking in ASME Code Class 1 small-bore piping. Include specific keywords or search terms, if used.

c. Provide a list of all those items found to potentially involve cracking. Identify the specific source of each item (e.g., condition report numbers and licensee event reports).

d. For each item, provide the date of occurrence, a brief summary of the circumstances, and a disposition as to whether it concerns cracking of ASME Code Class 1 small-bore piping.

If cracking of ASME Code Class 1 small-bore piping is identified, provide a plant-specific program that includes periodic inspections, or explain and justify why the One-Time Inspection Small-Bore Piping Program will adequately manage cracking.

RAI B.1.34-3

Background. GALL Report AMP XI.M35 states under the "detection of aging effects" program element that the inspections should be based on susceptibility, inspectability, dose considerations, operating experience, and the limiting locations of the total population of ASME Code Class 1 small-bore piping. The GALL Report program also states that opportunistic destructive examinations of socket welds may be performed and a sampling basis should be used if more than one weld is removed from service. LRA Section B.1.34 states that the One-Time Inspection – Small-Bore Piping Program is consistent with GALL Report AMP XI.M35 and that sample selection is based on susceptibility to stress corrosion, cyclic loading (including thermal, mechanical, and vibration fatigue), or thermal stratification and thermal turbulence.

Issue. During the onsite audit, the staff reviewed the applicant's engineering report on AMPs for ASME Code Class 1 components, and found that the One-Time Inspection – Small-Bore Piping

Program does not include a methodology for selecting sample locations. The staff also found that the One-Time Inspection – Small-Bore Piping Program credits opportunistic destructive examinations; however, the program does not discuss a sampling basis for these examinations when more than one socket weld is removed from service.

Request.

a. Describe the methodology for selecting the inspection sample locations. Discuss how this methodology accounts for susceptibility to cracking, inspectability, dose considerations, operating experience, and the limiting locations of the total population of ASME Code Class 1 small-bore piping.

b. Describe the sampling basis that will be used to determine which welds will be destructively examined when more than one weld is removed from service.

RAI B.1.34-4

Background. LRA Section B.1.34 states that the applicant's One-Time Inspection – Small-Bore Piping Program is consistent with GALL Report AMP XI.M35 and provides a one-time volumetric inspection of a sample of ASME Code Class 1 small-bore piping locations susceptible to cracking. GALL Report AMP XI.M35 states under the "operating experience" program element that volumetric inspection techniques should have a demonstrated capability and proven industry record to detect cracking in piping weld and base metal material. During its onsite audit, the staff reviewed the applicant's engineering report on AMPs for ASME Code Class 1 components and found that the One-Time Inspection – Small-Bore Piping Program includes volumetric examinations of full penetration welds using "demonstrated techniques."

Issue. There was insufficient information available during the audit for the staff to determine what constitutes a "demonstrated technique" for volumetric examinations of full penetration welds or whether such techniques are capable of detecting cracking.

Request. Describe how the volumetric techniques that will be used to examine full penetration welds are capable of detecting cracking.

RAI B.1.34-5

Background. LRA Section A.1.34 provides a summary description of the One-Time Inspection – Small-Bore Piping Program for the Updated Final Safety Analysis Report (UFSAR) supplement. This summary states that the program includes a statistically significant sampling approach and provides a one-time volumetric inspection of a sample of ASME Code Class 1 piping locations susceptible to cracking.

Issue. The UFSAR supplement does not provide sufficient information for the administrative and regulatory control of the program because it does not describe certain characteristics of the program important for managing the effects of aging. The inspection sample size is important because it is used to establish whether cracking is occurring in ASME Code Class 1 small-bore piping. However, the UFSAR supplement does not specifically state the sample size. Also, during its onsite audit, the staff reviewed the applicant's engineering report on AMPs for ASME Code Class 1 components and found that the One-Time Inspection – Small-Bore Piping Program includes opportunistic destructive tests as a method for detecting aging effects, and

each destructive examination will be credited as equivalent to two volumetric examinations. The examination techniques are important because they are used to find the effects of aging. However, the UFSAR supplement does not state that the program detects aging through destructive examinations.

Request. Revise the summary description in LRA Section A.1.34 to specify (a) the inspection sample size, and (b) that the program relies on destructive examinations, in addition to volumetric examinations, to detect aging effects. Alternatively, justify how the program will have adequate administrative and regulatory control.

RAI B.1.37-1

Background. The "corrective actions" program element of the GALL Report AMP XI.M3, "Reactor Head Closure Bolting," states that the maximum yield strength of replacement bolting materials should be limited as recommended in NUREG-1339 (< 150 ksi). During the audit, the staff noted that the applicant's Reactor Head Closure Studs Program documentation does not clearly indicate if the "corrective actions" program element is consistent with the GALL Report, with respect to using replacement bolting materials that have measured yield strength less than 150 ksi.

Issue. Clarify if the Reactor Head Closure Studs Program "corrective actions" program element is consistent with GALL AMP XI.M3 in terms of the yield strength criterion recommended for replacement bolting materials.

Request.

a. Clarify if the "corrective actions" program element is consistent with the GALL Report in terms of using replacement bolting materials that have a measured yield strength less than 150 ksi. If the "corrective actions" program element is not consistent with the GALL Report, identify this as a program exception and provide justification why the Reactor Head Closure Studs Program with the cited exception is adequate in managing the aging effects of the replacement bolting.

b. Revise the LRA as necessary, consistent with the response.

RAI B.1.37-2

Background. The "operating experience program" element of LRA Section B.1.37 states that surface examination of reactor pressure vessel studs, nuts, and washers from 2001 through 2010 identified no relevant indications. The LRA also states that continuing examination of the studs, washers, and nuts and evaluation of the results provide evidence that the program remains effective in managing and detecting cracking and loss of material in the bolting. In contrast, the applicant's Appendix A of its Inservice Inspection (ISI) Program dated June 26, 2000, indicates that the planned examinations used on the nuts and washers were visual examinations, consistent with ASME Code Section XI, Table IWB-2500-1.

In addition, LRA Section B.1.37 does not address the inspection results for the reactor head closure bolting components, which were obtained using the other examination methods (e.g., visual and volumetric) specified in ASME Code Section XI.

Issue. It is not clear what examinations the applicant performs on the Reactor Head Closure Studs Program in order to ensure the effectiveness of the program. In addition, the staff needs a summary review of the inspection results of the closure bolting components that were obtained using the other examination methods specified in the ASME Code Section XI, but not discussed in the LRA in order to ensure the adequacy of the program.

Request.

a. Clarify which methods of examination are used to inspect the studs, nuts, washers and flange threads, respectively, in the applicant's program. If the examination method is not consistent with those specified in ASME Code Section XI, as referenced in the GALL Report, justify how the examination method is acceptable to detect and manage the aging effects.

b. Summarize the inspection results for the following ASME Code inspection items, for the period (2001-2010) discussed in the LRA to confirm the effectiveness of the program: (1) volumetric examination of the closure studs and reactor vessel flange threads, and (2) visual examination of the nuts and washers.

RAI B.1.37-3

Background. During the onsite audit of the applicant's operating experience, the staff noted that in 1986, the applicant discovered that two of the closure studs were undersized. The condition report that the staff reviewed did not provide further information.

Issue. It is unclear if the undersized studs, if left in service, would be subjected to higher service stresses. If they were subject to higher service stresses, they would have higher susceptibility to the following aging effects: stress corrosion cracking (SCC) and loss of material due to wear or galling. It is also unclear how the undersized studs were dispositioned, such that their intended function is maintained, and their aging effects are managed adequately during the period of extended operation.

Request.

a. Clarify if the undersized studs are in service and will continue to be in service during the period of extended operation. If the studs are in service, provide the following information on the two undersized studs:
    - Locations of the studs in the reactor vessel head flange
    - Inservice inspection results for the studs
    - Information to justify the adequacy of the undersized studs for continued use, including engineering evaluations such as stress and fatigue analyses
    - Justification of the adequacy of the program to manage the aging effects of the undersized studs.

b. If the undersized studs were replaced, provide additional information to confirm whether the replacement studs are consistent with the GALL Report in terms of yield strength criterion (< 150 ksi) and use of acceptable surface coatings.

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Nathaniel Ferrer, Project Manager
Projects Branch 1
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Docket No. 50- 416

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