Entergy

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Attachment 1 contains proprietary information.

GNRO-2011/00105

November 25, 2011

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

SUBJECT: Request for Additional Information Regarding
Extended Power Uprate

Grand Gulf Nuclear Station, Unit 1
Docket No. 50-416
License No. NPF-29

REFERENCES:

1. Entergy Operations, Inc. letter to the NRC (GNRO-2010/00056), *License Amendment Request - Extended Power Uprate*, September 8, 2010 (ADAMS Accession No. ML102660403)
2. NRC Steam Dryer Audit (September 19 - 20, 2011), NRC Audit Report, October 19, 2011 (ADAMS Accession No. ML112790370)
3. Entergy Operations, Inc. letter to the NRC (GNRO-2011/00088), *Request for Additional Information Regarding Extended Power Uprate*, October 10, 2011 (ADAMS Accession No. ML112840174)
4. Entergy Operations, Inc. letter to the NRC (GNRO-2011/00101), *Request for Additional Information Regarding Extended Power Uprate*, November 14, 2011 (ADAMS Accession No. ML113190403)

Dear Sir or Madam:

In Reference 1, Entergy submitted a license amendment request (LAR) to the Nuclear Regulatory Commission (NRC), which proposes an extended power uprate for Grand Gulf Nuclear Station, Unit 1 (GGNS). As part of the uprate, Entergy is replacing the current steam dryer, as discussed in the LAR.

The Nuclear Regulatory Commission (NRC) conducted an audit of the steam dryer design activities on September 19 and 20, 2011. In their report of this audit (Reference 2), they requested additional information regarding the steam dryer. Responses to those Requests for Additional Information (RAIs) were provided in Reference 3. The NRC has requested additional

information based on those responses. Reference 4 provided responses to RAI items 1, 3, 4, 7, and 8 requested by the Mechanical and Civil Engineering Branch. Responses to items 5, 6, and 9 are provided in the attachment to this letter. Response to remaining RAI 2 will be provided by November 29, 2011.

GE-Hitachi Nuclear Energy Americas, LLC (GEH) considers portions of the information provided in support of the responses to the RAIs in Attachment 1 to be proprietary and, therefore, exempt from public disclosure pursuant to 10 CFR 2.390. An affidavit for withholding information, executed by GEH, is provided in Attachment 3. The proprietary information was provided to Entergy in a GEH transmittal letter that is referenced in the affidavit. Therefore, on behalf of GEH, Entergy requests the NRC withhold Attachment 1 from public disclosure in accordance with 10 CFR 2.390(b)(1). A non-proprietary version of the RAI responses is provided in Attachment 2.

No change is needed to the no significant hazards consideration included in the initial LAR (Reference 1) as a result of the additional information provided. This letter contains new commitments, which are identified in Attachment 4.

If you have any questions or require additional information, please contact Jerry Burford at 601-368-5755.

I declare under penalty of perjury that the foregoing is true and correct. Executed on November 25, 2011.

Sincerely,

MAK/FGB

Attachments:
1. Response to Request for Additional Information, Mechanical and Civil Engineering Branch, Steam Dryer (Proprietary Version)
2. Response to Request for Additional Information, Mechanical and Civil Engineering Branch, Steam Dryer (Non-Proprietary Version)
3. GEH Affidavit for Withholding Information from Public Disclosure
4. List of Regulatory Commitments

cc: Mr. Elmo E. Collins, Jr.
Regional Administrator, Region IV
U. S. Nuclear Regulatory Commission
612 East Lamar Blvd., Suite 400
Arlington, TX 76011-4125

U. S. Nuclear Regulatory Commission
ATTN: Mr. A. B. Wang, NRR/DORL (w/2)
ATTN: ADDRESSEE ONLY
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Mail Stop OWFN/8 B1
11555 Rockville Pike
Rockville, MD 20852-2378

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

State Health Officer
Mississippi Department of Health
P. O. Box 1700
Jackson, MS 39215-1700

Attachment 2

GNRO-2011/00105

Grand Gulf Nuclear Station Extended Power Uprate

Response to Request for Additional Information

Mechanical and Civil Engineering Branch, Steam Dryer

(Non-Proprietary)

This is a non-proprietary version of Attachment 1 from which the proprietary information has been removed. The proprietary portions that have been removed are indicated by double square brackets as shown here: [[ ]].

Non-Proprietary

Response to Request for Additional Information
Mechanical and Civil Engineering Branch

By letter dated September 8, 2010, Entergy Operations, Inc. (Entergy) submitted a license amendment request (LAR) for an Extended Power Uprate (EPU) for Grand Gulf Nuclear Station, Unit 1 (GGNS). By letters dated March 30, 2011 and July 6, 2011 (U.S. Nuclear Regulatory Commission (NRC) ADAMS Accession No. ML110900275 and ML111880138, respectively), Entergy submitted responses to requests for additional information (RAI) from the Mechanical and Civil Engineering Branch related to the steam dryer. Subsequently, on September 19-20, 2011 the NRC staff conducted an audit of the replacement steam dryer calculations, in which several open items were identified. Entergy provided responses to those items in a letter to the staff dated October 10, 2011. The NRC has requested further additional clarification; responses to RAIs 1, 3, 4, 7, and 8 were provided in a letter dates November 14, 2011. Responses to RAIs 5, 6 and 9 are provided below.

RAI 5

In response to audit action item 11, the applicant provided a summary of all adjustments made to their GGNS replacement dryer stress calculations, and a table updating the maximum stresses and stress ratios. The licensee also stated that based on the reanalysis, the [[

]] The licensee is requested to revise this table based on the licensee's responses to the follow-up questions for audit action items 1, 3, 5, and 7 noted above.

RESPONSE

As discussed during the audit, a reanalysis of the GGNS steam dryer was performed in May, 2011. This is the reanalysis that resulted in the improved Minimum Alternating Stress Ratio (MASR) of [[ ]] that is described in this current RAI. The revised stress table reflecting that result was presented in Table 3 in the response to audit action item 11 in the October 10, 2011 letter. The results of a new reanalysis considering the impact of the audit findings was also included in the response to audit action item 11 as Table 2. The revised stress table in that response showed a new limiting [[

]]

component. This result is an improvement on the margin compared to [[ ]] from the original GGNS dryer analysis submission.

Non-Proprietary

The responses to the recent follow-up NRC questions (RAIs 1 through 4) on audit action items 1, 3, 5 and 7 do not result in any additional changes to the stress table. Similarly, the design change to [[

]] do not result in any additional changes to the stress table.

However, in preparing the response to RAI 6, the stresses in four components were reevaluated: [[

]]

[[

]] In this table, note that positive values indicate an increase in the MASR from the response to audit action item 11 Table 2 values. Note also that the [[

]]

Non-Proprietary

[[

{3}]]

Non-Proprietary

RAI 6

In Section 3.3.2.4 of the GEH report NEDC-33601P, the applicant discusses [[

.]]

(Section 3.3.2.4.5, see Node 26 data in Table 3-22).

(a) The licensee is requested to explain whether [[
]] and also explain how does one determine whether to perform sub-modeling at a given high stress location.

(b) The licensee is requested to explain why the [[
]]

(c) It appears that the strength of materials approach determines the [[
]] The licensee is requested to explain whether this stress is compared with the [[
]]

Response

[[

]]

(a) [[

Non-Proprietary

]]

(b) [[

]]

(c) [[

Non-Proprietary

Non-Proprietary

]]

Non-Proprietary

RAI 9

(a) The licensee is requested to identify the ASME Code requirements that are followed for the design and fabrication of the partial penetration welds in the GGNS replacement steam dryer.
(b) The licensee is requested to describe how the fatigue assessment of the partial penetration weld is performed.
(c) If the size of the partial penetration weld is smaller than that required by the ASME code, the licensee is requested to describe how the undersize effect of the partial penetration weld is accounted for in the fatigue assessment of the GGNS dryer.

Response

(a) The steam dryer, including the dryer units, is a non-safety related item and is classified as an Internal Structure as defined in the ASME BPV Code Section III, Subsection NG, Paragraph NG-1122. The steam dryer is not an ASME Code component, but the structural evaluation methodology uses the Code as a design guide with the exception [[ ]] as discussed in Subsections 3.3.4.3 and 3.3.4.4 of NEDC-33601 (Reference 2).

The Grand Gulf Replacement Steam Dryer (RSD) uses partial joint penetration groove welds as allowed by the ASME Section III Subsection NG, Paragraphs NG-3352.4 (Type IV joints) and NG-3352.6 Type (VI Joints) (Reference 1). It is noted that NG-3351(a) states, in part, "Joints whose design functions are neither to restrain nor support the core do not fall into any category." Subparagraph NG-3350 is typically applied to welded joints in structures whose function is to either restrain or support the core structures. For reactor internal components that do not fall into the core support structure category, such as the steam dryer, some flexibility is allowed to accommodate additional design and manufacturing considerations.

The RSD is manufactured and examined with Subsection NG-4000 and NG-5000 guidance. The dryer is also manufactured from materials inspected per NG-2500. To ensure high quality welds, the replacement dryer employs weld processes that are fully qualified, including thorough metallurgical evaluation with the requirements of ASME Code Section IX. [[

]], robust weld process qualifications are conducted to prevent weld defects from occurring during fabrication. Metallurgical evaluations demonstrating an acceptable weld root are required prior to weld procedure approval as described in NEDC-33601 Appendix E paragraph 4.2 (Reference 2).

Non-Proprietary

(b) For partial penetration welds, peak stress intensities are obtained from the shell finite element model time history analysis. Because the shell finite element model of the full steam dryer is not capable of predicting the full stress concentrations in partial penetration welds, weld fatigue factors and, if necessary, weld size reduction factors for partial penetration welds are applied to the calculated peak stress intensities to determine the fatigue stress. Partial penetration welds are treated similarly to fillet welds; the weld factors for fillet welds are described in Section 3.3.2.2.3 in NEDC-33601 (Reference 2).

A weld size reduction factor may be needed as stated above. When using the traditional Strength of Materials formulas, the effective weld size is taken into account in the weld section properties. [[

]]

As described in the NEDC-33601 (Reference 2), the requirement for acceptance of a steam dryer component is that its maximum stress intensity has to be less than the fatigue limit. The Minimum Alternating Stress Ratio (MASR) is calculated and reported for each of the steam dryer components. The MASR is defined as the Fatigue Stress Limit divided by the Maximum Service Stress. A minimum alternating stress ratio less than 1.0 indicates the stress in the steam dryer component has exceeded its fatigue limit. For the GGNS RSD, a MASR of 2.0 is specified as the acceptance criterion.

(c) All partial penetration welds in the RSD have been evaluated. Only one weld was not analyzed in accordance with (b) above. This is a small anti-rotation weld on the adjusting ring to splice bar that is needed during installation of the splice bar. Following installation of the splice bar this weld does not perform any function. Any analyzed partial penetration welds that do not meet the fatigue stress criterion are redesigned as full-depth groove welds.

As part of the final dryer fabrication, it was determined that the partial penetration welds in three areas in the dryer bank assembly did not meet the fatigue acceptance criterion. These three areas are: 1) top cap to top cap (with divider plate) joints, 2) the top cap to bank end plate joints, and 3) bank end plate to trough joints. These welds are being redesigned as full-depth groove welds. Because the weld extends through the full section thickness, the joint is

Non-Proprietary

consistent with the global shell finite element model and no further stress adjustment is needed to account for the size of the weld.

References:

1. ASME Boiler & Pressure Vessel Code, Section III, Subsection NG, 2004 Edition.

2. NEDC-33601P Rev. 0 “Grand Gulf Replacement Steam Dryer Fatigue Stress Analysis Using PBLE Methodology”, September 2010. This document is Attachment 11 to the GGNS Extended Power Uprate License Amendment Request, submitted on September 8, 2010.

Attachment 3

GNRO-2011/00105

Grand Gulf Nuclear Station Extended Power Uprate

Response to Request for Additional Information

Mechanical and Civil Engineering Branch, Steam Dryer

GEH Affidavit for Withholding Information from Public Disclosure

GE-Hitachi Nuclear Energy Americas LLC

AFFIDAVIT

I, **Edward D. Schrull, PE** state as follows:

(1) I am the Vice President, Regulatory Affairs, Services Licensing, GE-Hitachi Nuclear Energy Americas LLC ("GEH"), and have been delegated the function of reviewing the information described in paragraph (2) which is sought to be withheld, and have been authorized to apply for its withholding.

(2) The information sought to be withheld is contained in Enclosure 1 of GEH letter, 173280-JB-050, "Grand Gulf Steam Dryer: Transmittal of Steam Dryer Requests for Additional Information 5, 6 and 9," dated November 25, 2011. The GEH proprietary information in Enclosure 1, which is entitled "GEH Responses to Requests for Additional Information 5, 6 and 9, Mechanical and Civil Engineering Branch - Steam Dryer, GEH Proprietary Information - Class III (Confidential)" is identified by a dotted underline inside double square brackets. [[This sentence is an example.{3}]] In each case, the superscript notation {3} refers to Paragraph (3) of this affidavit, which provides the basis for the proprietary determination.

(3) In making this application for withholding of proprietary information of which it is the owner or licensee, GEH relies upon the exemption from disclosure set forth in the Freedom of Information Act ("FOIA"), 5 USC Sec. 552(b)(4), and the Trade Secrets Act, 18 USC Sec. 1905, and NRC regulations 10 CFR 9.17(a)(4), and 2.390(a)(4) for trade secrets (Exemption 4). The material for which exemption from disclosure is here sought also qualifies under the narrower definition of trade secret, within the meanings assigned to those terms for purposes of FOIA Exemption 4 in, respectively, Critical Mass Energy Project v. Nuclear Regulatory Commission, 975 F2d 871 (DC Cir. 1992), and Public Citizen Health Research Group v. FDA, 704 F2d 1280 (DC Cir. 1983).

(4) The information sought to be withheld is considered to be proprietary for the reasons set forth in paragraphs (4)a. and (4)b. Some examples of categories of information that fit into the definition of proprietary information are:

a. Information that discloses a process, method, or apparatus, including supporting data and analyses, where prevention of its use by GEH's competitors without license from GEH constitutes a competitive economic advantage over other companies;

b. Information that, if used by a competitor, would reduce their expenditure of resources or improve their competitive position in the design, manufacture, shipment, installation, assurance of quality, or licensing of a similar product;

c. Information that reveals aspects of past, present, or future GEH customer-funded development plans and programs, resulting in potential products to GEH;

d. Information that discloses trade secret and/or potentially patentable subject matter for which it may be desirable to obtain patent protection.

(5) To address 10 CFR 2.390(b)(4), the information sought to be withheld is being submitted to NRC in confidence. The information is of a sort customarily held in confidence by GEH, and is in fact so held. The information sought to be withheld has, to the best of my knowledge and belief, consistently been held in confidence by GEH, not been disclosed publicly, and not been made available in public sources. All disclosures to third parties, including any required transmittals to the NRC, have been made, or must be made, pursuant to regulatory provisions or proprietary and/or confidentiality agreements that provide for maintaining the information in confidence. The initial designation of this information as proprietary information, and the subsequent steps taken to prevent its unauthorized disclosure, are as set forth in the following paragraphs (6) and (7).

(6) Initial approval of proprietary treatment of a document is made by the manager of the originating component, who is the person most likely to be acquainted with the value and sensitivity of the information in relation to industry knowledge, or who is the person most likely to be subject to the terms under which it was licensed to GEH. Access to such documents within GEH is limited to a "need to know" basis.

(7) The procedure for approval of external release of such a document typically requires review by the staff manager, project manager, principal scientist, or other equivalent authority for technical content, competitive effect, and determination of the accuracy of the proprietary designation. Disclosures outside GEH are limited to regulatory bodies, customers, and potential customers, and their agents, suppliers, and licensees, and others with a legitimate need for the information, and then only in accordance with appropriate regulatory provisions or proprietary and/or confidentiality agreements.

(8) The information identified in paragraph (2), above, is classified as proprietary because it contains detailed GEH design information of the methodology used in the design and analysis of the steam dryers for the GEH Boiling Water Reactor (BWR). Development of these methods, techniques, and information and their application for the design, modification, and analyses methodologies and processes was achieved at a significant cost to GEH.

The development of the evaluation processes along with the interpretation and application of the analytical results is derived from the extensive experience databases that constitute major GEH asset.

(9) Public disclosure of the information sought to be withheld is likely to cause substantial harm to GEH's competitive position and foreclose or reduce the availability of profit-making opportunities. The information is part of GEH's comprehensive BWR safety and technology base, and its commercial value extends beyond the original development cost. The value of the technology base goes beyond the extensive physical database and analytical methodology and includes development of the expertise to determine and apply the appropriate evaluation process. In addition, the technology base includes the value derived from providing analyses done with NRC-approved methods.

The research, development, engineering, analytical and NRC review costs comprise a substantial investment of time and money by GEH. The precise value of the expertise to devise an evaluation process and apply the correct analytical methodology is difficult to quantify, but it clearly is substantial. GEH's competitive advantage will be lost if its competitors are able to use the results of the GEH experience to normalize or verify their own process or if they are able to claim an equivalent understanding by demonstrating that they can arrive at the same or similar conclusions.

The value of this information to GEH would be lost if the information were disclosed to the public. Making such information available to competitors without their having been required to undertake a similar expenditure of resources would unfairly provide competitors with a windfall, and deprive GEH of the opportunity to exercise its competitive advantage to seek an adequate return on its large investment in developing and obtaining these very valuable analytical tools.

I declare under penalty of perjury that the foregoing affidavit and the matters stated therein are true and correct to the best of my knowledge, information, and belief.

Executed on this 25th day of November 2011.

Edward D. Schrull, PE
Vice President, Regulatory Affairs
Services Licensing
GE-Hitachi Nuclear Energy Americas LLC
3901 Castle Hayne Rd.
Wilmington, NC 28401
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Attachment 4

GNRO-2011/00105

Grand Gulf Nuclear Station Extended Power Uprate

List of Regulatory Commitments

List of Regulatory Commitments

The following table identifies those actions committed to by Entergy in this document. Any other statements in this submittal are provided for information purposes and are not considered to be regulatory commitments.

COMMITMENT	TYPE (Check one)		SCHEDULED COMPLETION DATE (If Required)
	ONE-TIME ACTION	CONTINUING COMPLIANCE	
1. Response to remaining RAI 2 will be provided.	✓		11/29/11
2. The final machined pad for each tie bar will be confirmed to be of sufficient thickness to ensure the stresses in the pad remain within the final stress results.	✓		12/31/11