Entergy Operations, Inc.
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Attachment 1 contains PROPRIETARY information.

GNRO-2012/00079

August 7, 2012

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

SUBJECT: Summary Report of Replacement Steam Dryer Data – Responses to Requests for Additional Information

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

REFERENCES:

1. NRC letter to Entergy Operations, Inc., *Grand Gulf Nuclear Station, Unit 1 – Issuance of Amendment Re: Extended Power Uprate (TAC No. ME4679)*, July 18, 2012 (ADAMS Accession No. ML121210020)
2. Entergy Operations, Inc. letter to the NRC (GNRO-2012/00075), Summary Report of Replacement Steam Dryer Data, July 5, 2012 (ADAMS Accession No. ML12118A145)
3. NRC e-mail to Entergy Operations, Inc., June 11, 2012
4. NRC e-mail to Entergy Operations, Inc., July 11, 2012

Dear Sir or Madam:

In Reference 1, the NRC issued to Entergy Operations, Inc. (Entergy) Operating License (OL) Amendment 191 for an extended power uprate (EPU) for Grand Gulf Nuclear Station, Unit 1 (GGNS). Included in Amendment 191 is new OL Condition 2.C.(46), which specifies requirements applicable to replacement steam dryer testing during power ascension. Two of the requirements of new OL Condition 2.C.(46)(a) are as follows:

2. GGNS shall monitor the main steam line (MSL) strain gages and on-dryer instrumentation at a minimum of three power levels up to 3898 MWt. Based on a comparison of projected and measured strains and accelerations, GGNS will assess whether the dryer acoustic and structural models have adequately captured the response significant to peak stress projections. If the measured strains and accelerations are not within the CLTP acceptance limits, the new measured data will

When Attachment 1 is removed from this letter, the entire letter is NON-PROPRIETARY.

be used to re-perform the full structural re-analysis for the purposes of generating modified EPU acceptance limits.

3. GGNS shall provide a summary of the data and evaluation of predicted and measured pressures, strains, and accelerations. This data will include the GGNS-specific bias and uncertainty data and transfer function, revised peak stress table and any revised acceptance limits. The predicted pressures shall include those using both PBLE methods (that is, Method 1 using on-dryer data, and Method 2 using MSL data). It shall be provided to the NRC Project Manager upon completion of the evaluation. GGNS shall not increase power above 3898 MWt until the NRC PM notifies GGNS the NRC accepts the evaluation or NRC questions regarding the evaluation have been addressed. If no questions are identified within 240 hours after the NRC receives the evaluation, power ascension may continue.

In accordance with OL Condition 2.C.(46)(a)2, above, Entergy completed monitoring the MSL and on-dryer instrumentation at 3898 MWt. Using this data, Entergy assessed the dryer acoustic and structural models and determined:

1. These models have adequately captured the response significant to peak stress projections; and

2. The measured strains and accelerations are within the Current Licensed Thermal Power (CLTP) acceptance limits.

Pursuant to OL Condition 2.C.(46)(a)3 and in support of the conclusions stated above, Entergy transmitted to the NRC a summary report of the data and evaluation of predicted and measured pressures, strains, and accelerations via Reference 2. In addition to this report, Entergy also provided in Reference 2 responses to requests for additional information (RAIs) pertaining to the replacement steam dryer analysis, which had been requested by the NRC via Reference 3.

As a result of their review of Reference 2, the NRC staff transmitted to Entergy follow-up RAIs via Reference 4. The responses to these RAIs are provided in Attachment 1.

Information contained in Attachment 1 was provided to Entergy by General Electric – Hitachi Nuclear Energy Company (GEH). GEH considers certain information contained in Attachment 1 to be proprietary and, therefore, exempt from public disclosure pursuant to 10 CFR 2.390. An affidavit for withholding this information, executed by GEH, is provided in Attachment 2 and references the GEH transmittal to Entergy. Therefore, on behalf of GEH, Entergy requests the attachment be withheld from public disclosure in accordance with 10 CFR 2.390(b)(1). A non-proprietary version of Attachment 1 is provided in Attachment 3.

If you have any questions or require additional information, please contact Guy Davant at (601) 368-5756.

This letter contains regulatory commitments, which are identified in Attachment 4.

I declare under penalty of perjury that the foregoing is true and correct; executed on August 7, 2012.

Sincerely,

MAK/ghd

Attachments:
1. Responses to NRC Requests for Additional Information (Proprietary Version)
2. GEH Affidavit Supporting Proprietary Information provided in Attachment 1
3. Responses to NRC Requests for Additional Information (Non-Proprietary Version)
4. List of Regulatory Commitments

cc: Mr. Elmo E. Collins, Jr.
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U. S. Nuclear Regulatory Commission
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U. S. Nuclear Regulatory Commission
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NRC Senior Resident Inspector
Grand Gulf Nuclear Station
Port Gibson, MS 39150

ATTACHMENT 1

GRAND GULF NUCLEAR STATION

GNRO-2012/00079

RESPONSES TO NRC REQUESTS FOR ADDITIONAL INFORMATION

(PROPRIETARY VERSION)

The header of each page in this enclosure carries the notation "GEH Proprietary Information - Class III (Confidential)." GEH proprietary information is identified by a dotted underline inside double square brackets. [[This sentence is an example.{3}]] Figures and tables containing GEH proprietary information are identified with double square brackets before and after the object. In each case, the superscript notation{3} refers to Paragraph (3) of the affidavit provided in Attachment 3, which provides the basis for the proprietary determination. Specific information that is not so marked is not GEH proprietary.

ATTACHMENT 2

GRAND GULF NUCLEAR STATION

GNRO-2012/00079

GEH AFFIDAVIT SUPPORTING PROPRIETARY INFORMATION CONTAINED IN ATTACHMENT 1

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-067, "Grand Gulf Steam Dryer: Transmittal of Steam Dryer Responses to Requests for Additional Information RAIs-1 and 2," dated July 19, 2012. The GEH proprietary information in Enclosure 1, which is entitled "GEH Responses to GGNS Steam Dryer Requests for Additional Information 1 and 2, GEH Proprietary Information - Class III (Confidential)" is identified by a dotted underline inside double square brackets. [[This sentence is an example.{3}]] Figures and tables containing GEH proprietary information are identified with double square brackets before and after the object. 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 19th day of July 2012.

Edward D. Schrull, PE
Vice President, Regulatory Affairs
Services Licensing
GE-Hitachi Nuclear Energy Americas LLC
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ATTACHMENT 3

GRAND GULF NUCLEAR STATION

GNRO-2012/00079

RESPONSES TO NRC REQUESTS FOR ADDITIONAL INFORMATION

(NON-PROPRIETARY VERSION)

RESPONSES TO NRC REQUESTS FOR ADDITIONAL INFORMATION

Follow-Up EMCB-GGNS1-SD-RSD-RAI-1

The staff reviewed Appendix J to *Grand Gulf Nuclear Station Replacement Steam Dryer Power Ascension Monitoring Current Licensed Thermal Power Test Report*, NEDC-33765P, DRF Section 0000-0149-4694-R0, Revision 0 (Attachment to Entergy Letter GNRO-2012/00075, dated July 5, 2012, from M.A. Krupa to USNRC Document Control Desk).

The stress results in Table 1 (Appendix J, NEDC 33765P, R0, July 2012, Response to NRC RAI-1) show that the [[ ]] contribution dominates the maximum stress at [[ ]] (highest stress location). Therefore, this location will experience many more cycles [[ ]] of high stress than the expected [[ ]], or less than [[ ]] over the life of the dryer (as stated in response to audit action item #12, Attachment to GNRO-2011/00088). It appears the GGNS is a so called "high frequency" plant. The licensee is requested to provide strain histograms based on rain-flow cycle counting for Grand Gulf based on data collected at 100% CLTP, and during power ascension at power plateaus corresponding to 105% CLTP, 110% CLTP, and at EPU.

Response

As requested by the NRC staff, Entergy will provide strain histograms based on rain-flow cycle counting for GGNS using data collected at 100% CLTP, and during power ascension at power plateaus corresponding to 105% CLTP, 110% CLTP, and at EPU. These will be provided in the associated steam dryer data reports for the 105% CLTP, 110% CLTP, and EPU power plateaus. The 100% CLTP histogram will be included in the 105% CLTP report.

Regarding the NRC's classification of GGNS as a "high frequency" plant, provided below is additional information pertaining to the stress analysis.

The high and low frequency stress results caused by flow induced vibration (FIV) for the nine time-shift load cases are scanned for the maximum stress. [[ ]] are considered in the analysis to "flush out" sensitive regions of the dryer that can be affected by potential [[ ]]. Therefore, it is by design that node locations such as [[ ]] are included in the dryer stress assessment. The dryer structural model is dense with high frequency (HF) mode shapes; therefore, it is expected there will be regions affected primarily by SRV response. The stress evaluation [[ ]] to provide a bounding projection at EPU. These projections are conservative for second shear mode-driven resonances.

From the rain-flow cycle counting assessment of Quad Cities Unit 2 (QC2) strain data (response to audit action item #12, Attachment to GNRO-2011/00088), the dryer FIV response did not result in high amplitude FIV cycles that were equivalent [[ ]]. Peak response cycles important to fatigue ([[ ]] the strain percent of maximum test range) were on the

order of [[ ]]
years of operation.

In the analysis, GEH does not credit the lower cycles with a fatigue assessment but evaluates the peak stress projection, in this case [[ ]], against the code endurance limit allowable.

In addition, if the fatigue curve is extrapolated from 10^{11} cycles out to 10^{12} cycles, the fatigue limit would become 13.5 ksi rather than 13.6 ksi. The limiting stress projection at EPU conditions is [[ ]] as shown in Table 6 of NEDC-33765P, which is approximately [[ ]] lower than the extrapolated fatigue limit of 13.5 ksi at 10^{12} cycles.

Follow-Up EMCB-GGNS1-RSD-RAI-2

The staff reviewed Appendix K to *Grand Gulf Nuclear Station Replacement Steam Dryer Power Ascension Monitoring Current Licensed Thermal Power Test Report*, NEDC-33765P, DRF Section 0000-0149-4694-R0, Revision 0 (Attachment to Entergy Letter GNRO-2012/00075, dated July 5, 2012, from M.A. Krupa to USNRC Document Control Desk).

[[

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Response

The approach used to calculate the alternating stress intensity as described in the response to NRC RAI-2 (Appendix K of NEDC-33765P, Rev. 0) follows the guidelines provided in ASME Code NG-3216.2, “Varying Principal Stress Direction.” The guideline provided in ASME Code NG-3222.4 references NG-3216.2 for calculating the alternating principal stress. NG-3222.4 requires determining expected cyclic load combinations then uses a Minor’s Rule method for determining the expected life under these cyclic load cases using an expected number of cycles for each case. The available FIV analysis results do not include standard cyclic load combinations, so this method cannot be used with the finite element analysis (FEA) result data available.

[[

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The guidance in the ASME alternating stress rules does not address the complexity of performing FIV analyses for nine time-shift cases and applying frequency-dependent bias and uncertainty to the results. [[

]] Therefore, the suggested approach is not feasible within the current time constraints and licensing commitments.

[[

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[[

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Figure 100. Comparison of Accelerometer A2 Measured Response with Time Interval Bias and Uncertainty Adjustment

(Blue = adjusted model response for 9 cases, Red = measured response)

Table 17. Max. Predicted Vs. Max Measured Response at CLTP over 120 second time interval

[[			
			]]

Follow-Up EMCB-GGNS1-RSD-RAI-3

The licensee is requested to provide vibration data along with acceptance limits for the main steam line (MSL), and the MSL safety relief valves (SRVs) for Grand Gulf based on data collected at 100% CLTP, and during power ascension at power plateaus corresponding to 105% CLTP, 110% CLTP, and at EPU.

Response

Below is a tabulation of results from the SRV vibration testing performed as part of the GGNS EPU Power Ascension Test (PAT) at ~ 100% CLTP (3898 MWt).

The resultant measured acceleration represents the combined peak accelerations reported by the tri-axial accelerometer at the particular node. This peak was gathered from the time-history data after band-pass filtering (2 - 250Hz) and DC-offset removal.

Node 1008 of MSL-A has reported data that contained intermittent high-amplitude spikes. These type spikes were not seen in the corresponding data for the other valves at the same valve location (top) nor were they seen in the data of at any of the nodes. For these reasons, the data at this location was deemed unusable and the other limits related to MSL-A were adjusted to account for this.

COMP./PIPING DESCRIPTION / SEGMENT	MONITOR LOC./DIR.	RESULTANT ACCEL. MEASURED (g)	RESULTANT ACCEL. LIMIT (g)	POINT NUM.	RESULTANT ACCEL. MARGIN (%)	NOTES
B21-F041A	X	0.00	0.00	1	0	Non-Op Sensor
Top of Valve	Y					Non-Op Sensor
MSL-A, Node 1008	Z					Non-Op Sensor
B21-F041A	X	1.18	2.27	2	48.18	
Actuator	Y					
MSL-A, Node 1010	Z					
B21-F051A	X	0.68	2.27	3	70.25	
Actuator	Y					
MSL-A, Node 2010	Z					
B21-F047A	X	0.49	2.27	4	78.56	
Actuator	Y					
MSL-A, Node 4010	Z					
B21-F051B	X	0.71	4.03	5	82.46	
Top of Valve	Y					
MSL-B, Node 1008	Z					
B21-F051F	X	0.71	2.73	6	73.99	
Actuator	Y					
MSL-B, Node 3010	Z					
B21-F041F	X	0.94	4.03	7	76.68	
Top of Valve	Y					
MSL-B, Node 4008	Z					
B21-F041K	X	0.89	4.03	8	77.83	
Top of Valve	Y					
MSL-B, Node 6008	Z					
B21-F041C	X	0.72	4.03	9	82.14	
Top of Valve	Y					
MSL-C, Node 1008	Z					
B21-F051C	X	0.88	2.73	10a	67.69	
Actuator	Y					
MSL-C, Node 3010	Z					
B21-F047G	X	0.94	4.03	10b	76.76	
Top of Valve	Y					
MSL-C, Node 4008	Z					
B21-F047L	X	1.01	4.03	10c	74.81	
Top of Valve	Y					
MSL-C, Node 6008	Z					
B21-F047D	X	0.81	4.03	10d	79.85	
Top of Valve	Y					
MSL-D, Node 1008	Z					

COMP./PIPING DESCRIPTION / SEGMENT	MONITOR LOC./DIR.	RESULTANT ACCEL. MEASURED (g)	RESULTANT ACCEL. LIMIT (g)	POINT NUM.	RESULTANT ACCEL. MARGIN (%)	NOTES
B21-F047D	X	1.90	2.73	10e	30.43	
Actuator	Y					
MSL-D, Node 1010	Z					
B21-F041D	X	0.70	2.73	10f	74.38	
Actuator	Y					
MSL-D, Node 2010	Z					
B21-F051D	X	0.69	2.73	10g	74.89	
Actuator	Y					
MSL-D, Node 4010	Z					

The vibration data for the 105% CLTP (~ 4102 MWt), 110% CLTP (~ 4306 MWt), and EPU (~ 4408 MWt) power plateaus will be provided ten business days after reaching each associated power plateau.

ATTACHMENT 4

GRAND GULF NUCLEAR STATION

GNRO-2012/00079

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. Entergy will provide strain histograms based on rain-flow cycle counting for GGNS using data collected at 100% CLTP, and during power ascension at power plateaus corresponding to 105% CLTP, 110% CLTP, and at EPU. These will be provided in the associated steam dryer data reports for the 105% CLTP, 110% CLTP, and EPU power plateaus. The 100% CLTP histogram will be included in the 105% CLTP report.	✓		10/31/2012
2. The vibration data for the 105% CLTP, 110% CLTP, and EPU power plateaus will be provided ten business days after reaching each associated power plateau.	✓		Ten business days after reaching each associated power plateau.