Entergy

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Attachment 1 contains proprietary information

GNRO-2011/00012

February 23, 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. Email from A. Wang to F. Burford dated January 31, 2011, GG EPU Request for Additional Information Related to Vessel and Internals Integrity (ME4679) (Accession Number ML110310390)
2. License Amendment Request, Extended Power Uprate, dated September 8, 2010 (GNRO-2010/00056, Accession Number ML102660403)

Dear Sir or Madam:

The Nuclear Regulatory Commission (NRC) requested additional information (Reference 1) regarding certain aspects of the Grand Gulf Nuclear Station, Unit 1 (GGNS) Extended Power Uprate (EPU) License Amendment Request (LAR) (Reference 2). Attachment 1 provides responses to the additional information requested by the Vessels and Internals Integrity Branch.

GE-Hitachi Nuclear Energy Americas, LLC (GEH) consider portions of the information provided in support of the responses to the request for additional information (RAI) 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 that is referenced in the affidavit. Therefore, on behalf of GEH, Entergy requests to 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 2) as a result of the additional information provided. There are no new commitments included in this letter.

When Attachment 1 is removed, the entire letter is non-proprietary.

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 February 23, 2011.

Sincerely,

MAK/FGB/dm

Attachments:

1. Response to Request for Additional Information, Vessels and Internals Integrity Branch (Proprietary)
2. Response to Request for Additional Information, Vessels and Internals Integrity Branch (Non-Proprietary)
3. GEH Affidavit for Withholding Information from Public Disclosure

Enclosure:

1. Revised PTLR Page

cc: Mr. Elmo E. Collins, Jr.
Regional Administrator, Region IV
U. S. Nuclear Regulatory Commission
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Arlington, TX 76011-4005

U. S. Nuclear Regulatory Commission
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NRC Senior Resident Inspector
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Attachment 2

GNRO-2011/00012

Grand Gulf Nuclear Station Extended Power Uprate

Response to Request for Additional Information

Vessels and Internals Integrity Branch

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
Vessels and Internals Integrity 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 correspondence dated January 31, 2011 (Accession Number ML110310390), the U.S. Nuclear Regulatory Commission (NRC) staff has determined that the following additional information requested by the Vessels and Internals Integrity Branch is needed for the NRC staff to complete their review of the LAR. Entergy's response to each item is also provided below.

GE-Hitachi Nuclear Energy Americas, LLC (GEH) consider portions of the information provided in support of the responses to the request for additional information (RAI) 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. Therefore, on behalf of GEH, Entergy requests to withhold this Attachment 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.

RAI #1

The top guide, core shroud, and core plate were identified as potentially susceptible to IASCC at end-of-life. Provide the following details regarding inspection of these components:

Core Plate

a. Are lateral-restraint wedges installed or has an analysis of the hold down bolts been conducted for the GGNS core plate?

b. If an analysis of the hold down bolts has been conducted, provide details of the analysis.

c. If lateral-restraint wedges are installed or an analysis of hold down bolts has been conducted are inspections following BWRVIP-25 "BWR Core Plate Inspection and Flaw Evaluation Guideline" still planned?

Top Guide

a. Have BWRVIP-26-A "BWR Top Guide Inspection and Flaw Evaluation Guidelines" inspections conducted to date identified any cracking in top guide grid beams at GGNS?

b. In addition confirm GGNS is following the inspection schedules outline in BWRVIP-183 "Top Guide Grid Beam Inspection and Flaw Evaluation Guidelines" or describe the inspection program implemented to address multiple top guide grid beam failures.

Core Shroud

a. Note that BWRVIP-76 “BWR Core Shroud Inspection and Flaw Evaluation Guidelines” has been approved by the NRC as BWRVIP-76-A and should be referenced in the submittal.

b. Provide the current shroud classification and inspection schedule per BWRVIP-76-A.

Response

Core Plate

a. Lateral restraint wedges are installed. GGNS is a BWR-6 design that incorporated wedges in the initial design (see Section 3.2.2 of BWRVIP-25.) GGNS does not credit the core plate hold-down bolts for lateral load resistance.

b. Per response to item a., core plate hold-down bolts were not credited and no analysis has been conducted.

c. In accordance with BWRVIP-25 Table 3-2, no inspections are recommended for the BWR-6 design. As a result, no BWRVIP-25 inspections are planned for GGNS.

Top Guide

a. BWRVIP-26-A does not require inspection of top guide grid beams for BWR-6 plants. Inspection of the BWR-6 top guide grid beams is addressed in BWRVIP-183 (see response to item b below.) No cracking has been identified at GGNS for this location.

b. BWRVIP-183 was issued December 2007. GGNS has implemented this revised guidance in accordance with the program guidelines of BWRVIP-94.

Core Shroud

a. GGNS has implemented BWRVIP-76. Entergy is aware that the final version of BWRVIP-76 “BWR Core Shroud Inspection and Flaw Evaluation Guidelines” was approved by the NRC and was issued as BWRVIP-76-A in December 2009. For GGNS, implementation of the revision is not required until the upcoming refueling outage in the spring of 2012.

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b. The shroud is currently classified as a “Category B” shroud. The next examination of the shroud is not due until GGNS refueling outage 19 (2014).

RAI #2

The GGNS application states that “to mitigate the potential for IGSCC and IASCC, GGNS utilizes hydrogen water chemistry (HWC). Reactor vessel water chemistry conditions are also maintained consistent with the EPRI and established industry guidelines.”

a. Confirm that GGNS is following the water chemistry guidelines outlined in BWRVIP-130 “BWR Water Chemistry Guidelines.”

b. Is noble metal chemical addition used in addition to the HWC described in the GGNS application?

Response

a. GGNS maintains its water chemistry consistent with BWRVIP-190 water chemistry guidelines. BWRVIP-190 is the 2008 revision of *BWR Water Chemistry Guidelines;* the BWRVIP-130 guidance was issued in 2004. The later guidance provides an enhanced methodology for establishing the water chemistry control programs, is better aligned with the radiation protection RP2020 initiative, and updates the 2004 guidance regarding On-line NobleChem™.

b. Noble metal chemical addition was implemented at GGNS in 2010; it is used in conjunction with hydrogen water chemistry.

RAI #3

Confirm that the proposed PTLR will take effect prior to or concurrent with the proposed EPU, replacing the P-T limits currently in the GGNS Technical Specifications (TS). If the previous statement is correct the NRC staff will not review the P-T limits in the GGNS TS, as only the PTLR is applicable to the EPU.

Response

The proposed PTLR was based on the higher neutron fluence values associated with the proposed EPU. Therefore, Entergy confirms that the proposed PTLR will take effect prior to or concurrent with the proposed EPU; the P-T curves in the current Technical Specifications will not be applicable at EPU conditions.

Non-Proprietary

b. The shroud is currently classified as a “Category B” shroud. The next examination of the shroud is scheduled for GGNS refueling outage 19 (2014).

RAI #2

The GGNS application states that “to mitigate the potential for IGSCC and IASCC, GGNS utilizes hydrogen water chemistry (HWC). Reactor vessel water chemistry conditions are also maintained consistent with the EPRI and established industry guidelines.”

a. Confirm that GGNS is following the water chemistry guidelines outlined in BWRVIP-130 “BWR Water Chemistry Guidelines.”

b. Is noble metal chemical addition used in addition to the HWC described in the GGNS application?

Response

a. GGNS maintains its water chemistry consistent with BWRVIP-190 water chemistry guidelines. BWRVIP-190 is the 2008 revision of *BWR Water Chemistry Guidelines;* the BWRVIP-130 guidance was issued in 2004. The later guidance provides an enhanced methodology for establishing the water chemistry control programs, is better aligned with the radiation protection RP2020 initiative, and updates the 2004 guidance regarding On-line NobleChem^{TM}.

b. Noble metal chemical addition was implemented at GGNS in 2010; it is used in conjunction with hydrogen water chemistry.

RAI #3

Confirm that the proposed PTLR will take effect prior to or concurrent with the proposed EPU, replacing the P-T limits currently in the GGNS Technical Specifications (TS). If the previous statement is correct the NRC staff will not review the P-T limits in the GGNS TS, as only the PTLR is applicable to the EPU.

Response

The proposed PTLR was based on the higher neutron fluence values associated with the proposed EPU. Therefore, Entergy confirms that the proposed PTLR will take effect prior to or concurrent with the proposed EPU; the P-T curves in the current Technical Specifications will not be applicable at EPU conditions.

RAI#4

Do the P-T limit curves provided include a hydrostatic pressure adjustment for the column of water in a full RPV? If so, provide the pressure head used in the P-T limit curve analysis.

Response

Yes, the pressure head for GGNS is 24 psig. This is determined using the height of the vessel and the elevation of bottom of active fuel. The equation used can be found in *Development of Reactor Pressure Vessel Pressure-Temperature Curves*, NEDC-33178P-A, Section 4.3.2.2.2.

RAI#5

Address inconsistencies between the statement that "the P-T curves are beltline (A1224-1 plate) limited above 1330 psig for Curve A for 35 EFPY… " and the NRC staff determination that the P-T curves are beltline (A1224-1 plate) limited above ~1360 psig from data in Table 1 of GNRO-2010/00056.

Response

The stated limit for the beltline (A1224-1 plate) listed on page 6 (i.e., 1330 psig) of the GGNS Pressure and Temperature Limits Report (PTLR) is incorrect. The correct value as reflected in Table 1, "Tabulation of Curves – 35 EFPY", (where EFPY represents Effective Full Power Years) of the GGNS PTLR is 1360 psig. A correct version of page 6 of 30 of the propose GGNS PTLR is provided in Enclosure 1.

RAI #6

Provide the surveillance data and the analysis of the surveillance data used to determine ART from reference 6.3 (BWRVIP-135, Revision 1 "BWR Vessel and Internals Project Integrated Surveillance Program (ISP) Data Source Book and Plant Evaluations"), as required by NEDC-33178P-A.

Response

Excerpt from BWRVIP-135, Revision 1 (used by permission)

Target Vessel Materials and ISP Representative Materials for Grand Gulf

Target Vessel Materials		ISP Representative Materials
Weld	5P6214B	5P6214B
Plate	A1224-1, C2594-2	A1224-1

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BWRVIP-135, Revision 1 provides the surveillance data considered in determining the chemistry and any adjusted Chemistry Factors (CF) for the beltline materials. For GGNS, the Integrated Surveillance Program (ISP) representative weld, heat 5P6214B, is also the target vessel material. The ISP representative plate material, heat A1224-1, is also one of the target vessel materials.

Note that the Adjusted Reference Temperature (ART) table provided in the PTLR includes chemistries based on both the plant-specific information and using the BWRVIP-135 best estimates.

For the plate material, heat A1224-1 was contained in six (6) of the Supplemental Surveillance Program (SSP) capsules that have been tested and analyzed. The resultant chemistry is 0.03% Cu and 0.65% Ni. The CF from Regulatory Guide 1.99, Revision 2 (RG1.99) is 20°F; the fitted CF is 47.87°F. It is noted that the maximum scatter in the fitted data falls within the 1-sigma value of 17°F from RG1.99. BWRVIP-135 also provides best estimate chemistries that are used in the ART evaluation. Best estimate plate heat A1224-1 information is provided, defining the chemistry as 0.035% Cu and 0.65% Ni. The adjusted CF for the plate material is the greater of the RG1.99 CF or the fitted CF because the surveillance data are credible. Therefore, the CF used for the ISP evaluation for the plate material is 47.87°F.

Excerpts from BWRVIP-135, Revision 1 (used by permission)

T_{30} Shift Results for Plate Heat A1224-1

Capsule	Cu (wt%)	Ni (wt%)	Fluence (10^{17} n/cm^2, E> 1MeV	ΔT_{30}(°F)
SSP D	0.03	0.65	10.164	9.6
SSP E			17.116	38.1
SSP G			18.758	20.3
SSP I			26.581	35.1
SSP A			3.80	21.2
SSP B			4.90	-6.8

Best Estimate Chemistry from BWRVIP-135, Revision 1 (used by permission)

Heat Number	Cu (wt%)	Ni (wt%)
A1224-1	0.035	0.65

For the weld material, heat 5P6214B was included in six (6) of the SSP capsules and one (1) Perry capsule that have been tested and analyzed. The resultant chemistry is provided as

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0.027% Cu and 0.94% Ni for the Perry capsule material, and as 0.01% Cu and 0.90% Ni for the six (6) SSP capsule materials. The mean surveillance chemistry is defined as 0.02% Cu and 0.92% Ni. The resulting RG1.99 CF for the mean chemistry is 27°F, and the fitted CF is 39.75°F. The maximum scatter in the fitted data is within the 1-sigma value of 28°F from RG1.99. BWRVIP-135 also provides best estimate chemistries that are used in the ART evaluation. Best estimate weld heat 5P6214B information is provided, defining the chemistry as 0.019% Cu and 0.828% Ni. The CF from RG1.99 for the best estimate chemistry of 0.019% Cu and 0.828% Ni is 26.3°F. For the weld material, the CF is determined using the equation:

$$\text{Adjusted Surv. CF} = \left[\frac{\text{Table CF}_{\text{Vessel Chem.}}}{\text{Table CF}_{\text{Surv. Chem.}}}\right] * \text{CF}_{\text{FittedData}}$$

Therefore, the adjusted CF = (26.3°F / 27°F) * 39.75°F = 38.72°F.

As 38.72°F is greater than both 26.3°F and 27°F, and the surveillance data is credible, 38.72°F is used in the ART evaluation.

Excerpts from BWRVIP-135, Revision 1 (used by permission)

T_{30} Shift Results for Weld Heat 5P6214B

Capsule	**Cu (wt%)**	**Ni (wt%)**	**Fluence (10^{17} n/cm^2, E > 1MeV**	**ΔT_{30}(°F)**
Perry 3	0.027	0.94	3.53	-20.5
SSP D	0.01	0.90	10.317	3.1
SSP E			17.704	4.1
SSP G			19.461	34.0
SSP I			27.478	22.5
SSP A			4.09	-26.4
SSP B			5.26	15.7

Best Estimate Chemistry from BWRVIP-135, Revision 1 (used by permission)

Heat Number	**Cu (wt%)**	**Ni (wt%)**
5P6214B	0.019	0.828

RAI #7

Provide additional detail for the non-beltline analysis conducted in the following areas in order for the NRC staff to complete independent verification of the proposed P-T limits:

a. Identify limiting materials for the Reference Temperature for Nil Ductility Transition (RT_{NDT}) values used to shift the generic Bottom Head and Upper Vessel P-T curves when applying NEDC-33178P-A.

b. The NRC staff identified a limiting RT_{NDT} of 10°F for the Bottom Head Torus Plates, while GGNS assumed a RT_{NDT} of 24.6°F for Bottom Head Curve B. Support all RT_{NDT} values reported by providing details of any plant-specific analysis conducted.

c. Explain minor differences in assumed RT_{NDT} values for the Bottom Head. Specifically Curves A and C assume a limiting RT_{NDT} of 19°F, while Curve B assumes a limiting RT_{NDT} of 24.6°F.

d. Which region of the RPV is limiting for Curve C < 312 psig?

Response

In order to determine how much to shift the Pressure-Temperature (PT) curves, an evaluation is performed using Tables 4-4b and 4-5b from NEDC-33178P-A. These tables define the required Temperature minus Reference Temperature of Nil Ductility Transition ($T\text{-}RT_{NDT}$) that is used to develop the non-shifted curves. Each component listed in these tables is evaluated using the plant-specific initial RT_{NDT} for each component. The required temperature is then determined by adding the $T\text{-}RT_{NDT}$ to the plant-specific RT_{NDT}, thereby resulting in the required T for the curve. As the upper vessel curve is initially based on the non-shifted feedwater (FW) nozzle $T\text{-}RT_{NDT}$, all resulting T values are compared to the FW nozzle T. The difference between the maximum T and the FW nozzle $T\text{-}RT_{NDT}$ is used to shift the upper vessel curve. The same method is applied for the Control Rod Drive (CRD) curve. In this manner, it is assured that each curve bounds the maximum discontinuity that is represented.

For the GGNS upper vessel curve, the maximum T value from the method described above is [[ ]]. The initial required $T\text{-}RT_{NDT}$ for the [[ ]]; this is then adjusted by the GGNS-specific maximum [[ ]], resulting in [[ ]]. Comparing this to the FW nozzle values, the required $T\text{-}RT_{NDT}$ is [[ ]], which is added to the [[ ]]. It is seen that the resulting T required for the FW nozzle is [[ ]]. As [[ ]] is [[ ]] than the baseline non-shifted FW nozzle curve ([[ ]]), which is based on [[ ]], the GGNS upper vessel curve is based on an RT_{NDT} of [[ ]]. As noted above, this calculation was performed for each component shown in Table 4-4b; only the limiting case is presented here.

For the GGNS bottom head or CRD [[ ]], respectively), the maximum T value from the method described above is [[ ]]. The required $T-RT_{NDT}$ for the [[ ]]; this is adjusted by the GGNS-specific maximum [[ ]], resulting in [[ ]]. Comparing this to the CRD values, the required $T-RT_{NDT}$ is [[ ]], which is added to the [[ ]]. It is seen that the resulting T required for the bottom head is [[ ]]. As [[ ]] is [[ ]] than the baseline non-shifted CRD curve ([[ ]]), which is based on [[ ]], the GGNS bottom head (CRD) curve is based on an [[ ]]. As noted above, this calculation was performed for each component shown in Table 4-5b; only the limiting case is presented here.

Appendix H of NEDC-33178P-A contains the details of an analysis performed to determine the baseline requirement (non-shifted) for the [[ ]]. It can be seen in Section H.5 of Appendix H that the stresses developed in this finite element analysis demonstrated that the [[ ]], resulting in a baseline non-shifted required $T-RT_{NDT}$ of [[ ]]. Therefore, considering the determination of the required shift from the paragraph above for [[ ]], calculations for all components listed in Table 4-5b were compared to the CRD T, which is [[ ]] (where [[ ]] materials). Therefore, the shift for the bottom head [[ ]].

For Curve C, the upper vessel and beltline regions are bounding at pressures up to 180 psig. For pressures between 180 psig and 312.5 psig, the upper vessel is bounding.

RAI #8

Attachment 7 identifies nozzle N12 as a beltline water level instrument nozzle and notes that an evaluation was conducted using the limiting material properties for the adjoining shell ring, which appears to be appropriate as nozzle N12 is identified as austenitic. Provide details of this evaluation which demonstrates that the drill hole for the beltline water level instrument nozzle is not limiting.

Response

Appendix J of NEDC-33178P-A provides detailed results of an analysis performed for the water level instrumentation nozzle that provides the required stresses for the drill hole in the shell plate. These stresses were used to generate a specific curve applicable for the water level instrumentation nozzle to assure that this location is bounded in the PT curves. For GGNS, the

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water level instrumentation nozzle is [[
]].

RAI-#9

Provide details on any plant-specific feedwater nozzle evaluation conducted in support of the proposed P-T limits or explain why plant-specific evaluation was not required.

Response

An evaluation was performed for the feedwater nozzle as described in Section 4.3.2.1.3 of NEDC-33178P-A. This evaluation confirmed that the feedwater discontinuity bounds the other discontinuities defined in Table 4-4b of NEDC-33178P-A. The first part of the evaluation is as described in the response to RAI 7, where it is assured that the limiting component that is represented by the upper vessel nozzle curve is bounded. A second evaluation was performed using the GGNS-specific feedwater nozzle dimensions; this evaluation is shown below to demonstrate that the generic BWR/6 curve is applicable to GGNS:

Vessel radius to base metal, R_v	[[
Vessel thickness, t_v	
Vessel pressure, P_v	
Pressure stress = PR/t = [[ ]]	
Dead Weight + Thermal RFE stress	
Total Stress = [[ ]]	]]

The factor F (a/r_n) from Figure A5-1 of “PVRC Recommendations on Toughness Requirements for Ferritic Materials,” Welding Research Council Bulletin 175, August 1972 (WRC-175) is determined where:

$a = \frac{1}{4}(tn^2 + tv^2)^{\frac{1}{2}}$	[[
t_n = thickness of nozzle	
t_v = thickness of vessel	
r_n = apparent radius of nozzle = $r_i + 0.29*r_c$	
r_i = actual inner radius of nozzle	
r_c = nozzle radius (nozzle corner radius)	]]

Therefore, a/r_n = [[ ]]. The value F (a/r_n), taken from Figure A5-1 of WRC-175 for an [[ ]]. Including the safety factor of 1.5, the stress intensity factor, K_I, is $1.5\ \sigma\ (\pi a)^{1/2} * F(a/r_n)$:

Nominal K_I = 1.5 * [[ ]]

A detailed upper vessel example calculation for core not critical conditions is provided in Section 4.3.2.1.4 of NEDC-33178P-A. Section 4.3.2.1.3 of NEDC-33178P-A, presents the [[ ]] feedwater nozzle evaluation upon which the baseline non-shifted upper vessel PT curve is based. It can be seen that the nominal K_I from this evaluation is [[ ]]. Therefore, it has been shown that the nominal K_I for the GGNS-specific feedwater nozzle is bounded by the [[ ]] K_I, demonstrating applicability of the feedwater nozzle curve for GGNS.

Attachment 3

GNRO-2011/00012

Grand Gulf Nuclear Station Extended Power Uprate

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). I 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 GEH letter, GEH-GGNS-AEP-424, Larry King (GEH) to Brian Newell (Entergy), "NRC Vessel Internals and Integrity and Fire Protection RAIs," dated February 17, 2011. The proprietary information in Enclosure 1 entitled, "GEH Responses to GGNS NRC FP and VIIB RAIs (Proprietary)," 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 that 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 GEH and/or 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, that may include potential products of 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 the 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 results of an analysis performed by GEH to support the Grand Gulf Nuclear Station Extended Power Uprate (EPU) license application. This analysis is part of the GEH EPU methodology. Development of the EPU methodology and the supporting analysis techniques and information, and their application to the design, modification, and processes were achieved at a significant cost to GEH.

The development of the evaluation methodology along with the interpretation and application of the analytical results is derived from the extensive experience database that constitutes a 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 17th day of February 2011.

Edward D. Schrull, PE
Vice President, Regulatory Affairs
Services Licensing
GE-Hitachi Nuclear Energy Americas LLC
3901 Castle Hayne Rd.
Wilmington, NC 28401
edward.schrull@ge.com

Enclosure 1

Grand Gulf Nuclear Station Extended Power Uprate

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based upon a factor of 0.1111; hence the peak ID surface fluence used for this component is 2.81E+17 n/cm^2.

The P-T curves for the heatup and cooldown operating conditions at a given EFPY apply for both the 1/4T and 3/4T locations. When combining pressure and thermal stresses, it is usually necessary to evaluate stresses at the 1/4T location (inside surface flaw) and the 3/4T location (outside surface flaw). This is because the thermal gradient tensile stress of interest is in the inner wall during cooldown and the outer wall during heatup. However, as a conservative simplification, the thermal gradient stress at the 1/4T location is assumed to be tensile for both heatup and cooldown. This results in the approach of applying the maximum tensile stress at the 1/4T location. This approach is conservative because irradiation effects cause the allowable toughness, K_{Ir}, at 1/4T to be less than that at 3/4T for a given metal temperature. This approach causes no operational difficulties, since the BWR is at steam saturation conditions during normal operation, well above the heatup/cooldown temperature curve limits.

For the core not critical curve (Curve B) and the core critical curve (Curve C), the P-T curves specify a coolant heatup and cooldown temperature rate of ≤ 100°F/hr for which the curves are applicable. However, the core not critical and the core critical curves were also developed to bound transients defined on the RPV thermal cycle diagram and the nozzle thermal cycle diagrams. The P/T limits and corresponding heatup/cooldown rates of either Curve A or B may be applied while achieving or recovering from hydrostatic pressure and leak test conditions. Curve A may be used for the hydrostatic pressure and leak test if a coolant heatup and cooldown rate of ≤ 20°F/hr is maintained. Otherwise, the limits of Curve B apply when performing the hydrostatic pressure and leak test. For GGNS, plate heat A1224-1 is the limiting material for the beltline region for 35 EFPY. The initial RT_{NDT} for the A1224-1 plate materials is 0°F. The generic pressure test P-T curve is applied to the GGNS A1224-1 plate curve by shifting the P vs. (T - RT_{NDT}) values to reflect the ART value of 42.6°F (See Appendix B, GGNS Adjusted Reference Temperatures - 35 EFPY). Using the fluence discussed above, the P-T curves are beltline (A1224-1 plate) limited above 1360 psig for Curve A for 35 EFPY and are upper vessel limited above 312.5 psig for Curve B for 35 EFPY.

In order to ensure that the limiting vessel discontinuity has been considered in the development of the P-T curves, the methods in Sections 4.3.2.1 and 4.3.2.2 of Ref. 6.2 for the non-beltline and beltline regions, respectively, are applied.