



Entergy Nuclear Operations, Inc.  
Pilgrim Nuclear Power Station  
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Kevin H. Bronson  
Site Vice President

September 7, 2010

U.S. Nuclear Regulatory Commission  
Attn: Document Control Desk  
Washington, DC 20555-0001

SUBJECT: Entergy Nuclear Operations, Inc.  
Pilgrim Nuclear Power Station  
Docket No. 50-293  
License No. DPR-35

Entergy Response to NRC Request for Additional Information (RAI)  
Related to Relocation of Pressure-Temperatures (P-T) Curves to the  
Pressure and Temperature Limits Report (PTLR) (TAC No. ME3253)

REFERENCES: 1. Entergy Letter No. 2.10.005, Proposed License Amendment to  
Technical Specifications: Revised P-T Limit Curves and  
Relocation of Pressure-Temperature (P-T) Curves to the Pressure  
and Temperature Limits Report (PTLR), dated January 24, 2010

LETTER NUMBER: 2.10.041

Dear Sir or Madam:

This letter docketed Entergy's response to the NRC Request for Additional Information (RAI) forwarded to Pilgrim Licensing Staff by letter dated July 21, 2010. The RAI included six requests.

Attachment A provides Entergy's response to the NRC RAI.

Entergy's response to the NRC RAI supports the proposed License amendment for relocation of Pressure-Temperature (P-T) Curves into the Pressure-Temperature Limits Report and the No Significant Hazards Consideration determination submitted by Reference 1.

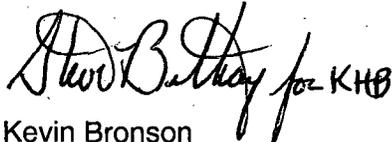
There are no commitments made in this submittal.

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If you have any questions, please call Mr. Joseph Lynch, Pilgrim Licensing Manager at 508-830-8403.

I declare under penalty of perjury that the foregoing is true and correct. Executed on the 7<sup>th</sup> day of September, 2010

Sincerely,



Kevin Bronson  
Site Vice President

Attachment A: Entergy Response to NRC Request for Additional Information (4 pages)

CC: Mr. Richard Guzman, Project Manager  
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**ATTACHMENT A**

**TO ENTERGY LETTER NO. 2.10.041**

**ENTERGY RESPONSE TO NRC REQUEST FOR ADDITIONAL INFORMATION**

**RELATED TO RELOCATION OF PRESSURE-TEMPERATURE LIMITS CURVES**

**JULY 21, 2010 (TAC NO. ME3253)**

**NRC REQUEST FOR ADDITIONAL INFORMATION (RAI) -1**

Some reactor pressure vessel (RPV) materials information in Table 7.8 of the Pressure and Temperature Limits Report (PTLR) in your submittal dated January 24, 2010, differs from those in the recent Pilgrim License Renewal Application. Please provide the following:

1. The calculation of the chemistry factor for the lower shell longitudinal weld #1, #2, and #3, using the relevant integrated surveillance program (ISP) data,
2. The chemistry factor calculations for any other Table 7.8 RPV materials based on the ISP data, and
3. A revised PTLR providing "supplemental data and calculations of the chemistry factor in the PTLR if the surveillance data are used in the ART [adjusted reference temperature] calculation" to meet the seventh technical criterion in Generic Letter 96-03, "Relocation of Pressure Temperature Limit Curves and Low Temperature Overpressure Protection System Limits."

**Entergy Response:**

The requested calculations and development of chemistry factors is included in Reference 9.3 of the PTLR. To summarize these results:

1. Lower shell longitudinal welds #1, #2, and #3 were made from weld heat No. 27204. The ISP surveillance data reported in Appendix B-12 of BWRVIP-135 was considered in the evaluation of that vessel weld. As a result, the best fit CF of 300.2 °F (and a reduced margin,  $\sigma_{\Delta}$ ) was used for determining the ART value for weld heat No. 27204 based on the use of "credible" surveillance data.
2. The representative plate material from the ISP is not the same heat number as the limiting plate in the Pilgrim vessel, the Chemistry Factor from the RG1.99 tables was used to determine ART values for PNPS plates. Similarly, the representative weld material is not the same heat number as the PNPS limiting weld number, so the RG1.99 CF value from the tables was used in the determination of the ART values for PNPS welds.
3. The discussion of the seventh technical criterion for use of credible surveillance data is given in BWRVIP-135 and reproduced in Appendix A of the SI LTR, SIR-05-044 A.

## **NRC RAI-2**

Page 6 of the PTLR stated, "These [finite element] analyses were performed to determine through-wall thermal and pressure stress distributions for the Pilgrim feedwater nozzles due to a step-change thermal transient. . . , and for the recirculation inlet nozzles (N2) due to a shutdown transient at 100°F/hr.... "

1. Please confirm whether the finite element models are plant specific. If generic finite element models were used, explain how you adjust the generic results for the Pilgrim application.
2. Confirm that Table 7.5 (Figure 6.2) is the only table in the PTLR which provides results from the finite element analysis. Confirm whether this finite element model is for the feedwater nozzle or for the recirculation inlet nozzle.

### **Entergy Response:**

Separate nozzle specific and plant specific finite element models were developed for the recirculation inlet and feedwater nozzles. This is addressed in the PTLR on page 7. PTLR Table 7.5 for the Upper Vessel Region is based on the feedwater nozzle results. This is noted on the line labeled "Component" at the top of PTLR Table 7.5. Note that Table 7.2 also includes results from the analysis of the feedwater nozzle. Other Tables were developed including consideration of the recirculation N2 and instrument N16 nozzles, as noted on pages 6-7 of the PTLR. The finite element results for the N2 nozzle are implicitly included in these Tables, and the N2 results are bounded by the results presented. N2 results are presented in Reference 9.12 of the PTLR.

## **NRC RAI-3**

Table 7.4 of the PTLR listed the calculated  $K_{Ic}$  (plane-strain fracture toughness),  $K_{Im}$  (allowable membrane stress intensity factor), and P (pressure) values at different fluid temperatures using a KIT (thermal stress intensity factor) value of  $6.86 \text{ ksi}(\text{inch})^{0.5}$  for the beltline/core not critical Curve B (Figure 6.2). The Nuclear Regulatory Commission (NRC) staff has verified the calculated values in Table 7.4, but found that the proposed P-T limits do not include temperature and pressure instrument uncertainties. Explain how you handle the temperature and pressure instrument uncertainties in the P-T limit application in accordance with the SIR-05044-A report, "Pressure-Temperature limits Report Methodology for Boiling Water Reactors," which requires consideration of these uncertainties in the P-T limits.

### **Entergy Response:**

The instrument uncertainty for pressure is considered to be due to hydrostatic head. The value used is 18.3 psig for the full vessel (507.5 inches water height at room temperature), as shown in Reference 9.4. The temperature uncertainty is assumed to be zero.

## **NRC RAI-4**

Table 7.5 of the PTLR listed the calculated  $K_{Ic}$ ,  $K_{Im}$ , and P values at different fluid temperatures using a KIT value of  $117.41 \text{ ksi}(\text{inch})^{1/2}$  for the upper vessel region/core not critical Curve B (Figure 6.2). Provide a sample calculation for the  $K_{Im}$  value at a low fluid temperature where the KIT value exceeds the  $K_{Ic}$  value. Explain how your methodology is consistent with the SIR-05-044-A report methodology for the upper vessel region.

**Energy Response:**

The detailed evaluation is included in Reference 9.4 of the PTLR, Section 2.1.3, page 12/30. From PNPS-03Q-302, Rev. 2, dated 11/30/09, the PT curves at low temperatures are calculated by scaling the thermal stress intensity factor by the ratio of (saturation temperature minus 90) / (546-90). The 117.41 ksi-in<sup>0.5</sup> is calculated for the Turbine Roll transient which is considered to be a shock from 546-90. The rationale is that the vessel can only experience a shock from the saturation temperature to 90 degrees; therefore at temperatures lower than 546, the full shock cannot be experienced and it is not necessary to penalize the curve by using the full 117.42 ksi-in<sup>0.5</sup>.

**NRC RAI-5**

Provide an evaluation for the small-diameter, drill-hole type instrument nozzle (e.g., water level nozzle) if it exists in the RPV beltline region. The stress concentration factor associated with the drill-hole type nozzle in the beltline may make it more limiting than the limiting beltline material that is identified in the proposed P-T limits.

**Energy Response:**

The evaluation of the instrument nozzle is included in Reference 9.3 of the PTLR, and is summarized on page 5, paragraphs 4 and 5, of the PTLR. There, it states that the fluence at the instrument nozzle at 34 EFPY is 3.52 x 10<sup>15</sup>. It is bounded by the N2 nozzle. To the extent applicable, its effects are included in the evaluation.

The requested information is included in the PTLR from References 9.3, 9.4, and 9.12. These References were not submitted with the proposed License Amendment submittal to Relocate Pressure-Temperature Limits to the PTLR. They are calculations, PNPS-03Q-302, PNPS-22Q-301, and PNPS-22Q-302. These calculations could be provided to the NRC as proprietary documents, if required. The proprietary nature of these documents is due primarily to their use of EPRI Integrated Surveillance Program (ISP) data, which is proprietary to EPRI.

PTLR Reference	SIA Document	Pilgrim Document
9.3*	PNPS-22Q-301 Rev. 1	M-1282 Rev. 1
9.4*	PNPS-03Q-302 Rev. 2	M-1284 Rev. 1
9.12*	PNPS-22Q-302 Rev. 0	M-1285 Rev. 0

\*Structural Integrity Associates' Proprietary documents

**NRC RAI-6**

As indicated in NRC letter dated November 2, 2009 (Agencywide Documents Access and Management System (ADAMS) Accession No. ML092151016), to the Technical Specification (TS) Task Force Traveler (TSTF) regarding a staff position taken on TSTF-419, Revision 0, there is a generic concern related to the inclusion of revision numbers and dates in the PTLR References Section of the TSs. Specifically, the Topical Report revision numbers or approval dates from the TS in accordance with the subject TSTF Traveler does not provide a direct link to specific TS numerical values relocated to the PTLR, since there is no reference to a specific methodology. The NRC staff has determined that the relaxation of specificity regarding Topical Report documentation following the framework delineated in TSTF travelers 393, 408, and 419 is not currently acceptable. Therefore, the staff does not currently support the position reflected in TSTF Traveler 419, Rev. 0.

In light of the November 2, 2009, letter, and in light of the fact that the license is requesting to implement TSTF-419 during continued generic discussions regarding TSTF-419, the NRC staff requests the licensee to provide a revised TS page(S) for PNPS providing PTLR References Section, citing NRC approved methodology that includes revision numbers and dates.

**Entergy Response:**

Entergy proposed Relocation of Pressure-Temperature Limits to the Pressure and Temperature Limits Report (PTLR) in accordance with TSTF-419, Rev 0 and NRC Generic Letter 96-03, follows NRC approved precedents, cited below:

- James A. FitzPatrick, Amendment No. 292, (TAC No. MD8556) dated October 3, 2008.
- Wolf Creek, Amendment No. 180 (TAC No. MD9217), dated January 27, 2009.
- Comanche Peak, Amendment No. 132 (TAC No. MC9500) dated February 22, 2007
- Calloway, Amendment No. 177 (TAC No. MD3053), dated December 5, 2006

Entergy staff understands that a reference to the NRC approved plant-specific PTLR with its Revision numbers should be included in the applicable Technical Specification. The PTLR makes reference to the NRC approved methodology that was used to derive P-T limits.

- The proposed TS Section 5.5.9 included in the proposed License Amendment submittal makes reference to the NRC approved methodology.
- Upon receipt of NRC approved License Amendment and PTLR, Entergy plans to revise TS BASES page B3/4.6-1 in accordance with the TS Bases Control Program; making reference to the NRC approved PTLR.
- Future revisions to the PTLR will be developed in compliance with 10 CFR 50.59, and will be submitted to the NRC as a controlled document, similar to the Core Operating Limits Report.

Therefore, reference to the PTLR in use would be included in the TS, with the NRC approved methodology. This approach addresses NRC's concern expressed in RAI-6 with respect to PTLR.