



Entergy Nuclear Operations, Inc.  
Pilgrim Nuclear Power Station  
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John A. Dent, Jr.  
Site Vice President

March 20, 2014

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 in Support of Proposed License Amendment: Revision to Technical Specification (TS) 2.1, Safety Limits To Resolve Pressure Regulator Fail-Open (PRFO) Transient Reported by General Electric Nuclear Energy In Accordance with 10 CFR 21.21(d)

- REFERENCES:
1. Entergy Letter No. 2.13.009, "Proposed License Amendment: Revision to Technical Specification (TS) 2.1, Safety Limits To Resolve Pressure Regulator Fail-Open (PRFO) Transient Reported by General Electric Nuclear Entergy in Accordance with 10 CFR 21.21(d), dated April 5, 2013
  2. GE Energy-Nuclear, "10 CFR 21 Reportable Condition Notification: Potential to Exceed Low Pressure Technical Specification Safety Limit", MFN 05-021, March 29, 2005
  3. NRC Letter, Request for Additional Information Regarding Safety Limits to Resolve Pressure Regulator Fail-Open Transient License Amendment Request (TAC NO. MF1382), dated February 18, 2014

LETTER NUMBER: 2.14.025

Dear Sir or Madam:

By Reference 1, Entergy Nuclear Operations, Inc. (Entergy) submitted an application for proposed license amendment to the Pilgrim Operating License Technical Specifications (TS). The proposed amendment reduces the reactor dome pressure from 785 psig to 685 psig in TS 2.1.1 and 2.1.2 Safety Limits, and associated Bases, and adds GEXL Correlation for GE 14 and GNF2 Type Fuel and GNF2 Generic Compliance with GESTAR II References to resolve the Pressure Regulator Failure-Open (PRFO) transient reported by GE Nuclear Energy in Reference 2.

By Reference 3, NRC requested Additional Information (RAI) to complete its review and approval of proposed License Amendment.

The Enclosure to this letter provides the Entergy response to the NRC RAI. These responses were discussed with the NRC NRR Project Manager and NRC NRR reviewer on February 20, 2014.

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NRR

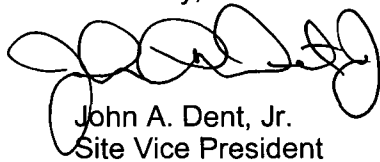
The enclosed responses do not invalidate the no-significant hazards consideration determination described in the application for the proposed License Amendment (Reference 1).

This letter contains no new regulatory commitments.

If you have any questions regarding the subject matter, please contact Joseph R. Lynch at (508) 830-8403.

I declare under penalty of perjury that the foregoing is true and correct. Executed on 20th of March, 2014.

Sincerely,



John A. Dent, Jr.  
Site Vice President

Enclosure: Entergy Response to NRC Request for Additional Information (1 page)

CC:

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ENCLOSURE

TO ENTERGY LETTER NO. 2.14.025

Entergy Response to NRC Request for Additional Information  
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## ENTERGY RESPONSE TO NRC REQUEST FOR ADDITIONAL INFORMATION (RAI)

Reference: NRC Letter, Pilgrim Nuclear Power Station Request for Additional Information Regarding Safety Limits to Resolve Pressure Regulator Fail-Open Transient License Amendment Request (TAC NO. MF1382), dated February 18, 2014

### **NRC RAI 1:**

Please justify that the data used for development and verification of the GEXL critical power correlation are still valid for the proposed lower pressure range to 685 psig.

### **ENTERGY RESPONSE:**

The data used for development and verification of the GEXL critical power correlation is based on the following GE documents:

1. NEDC-32851P-A, GEXL14 Correlation for GE14 Fuel, Rev.4, September 2007 (Reference Table 2, Page 6).
2. NEDC-33292P, GEXL17 Correlation for GNF2 Fuel, Rev. 3, June 2009 (Reference Table 3-1, Page 3-4).

These GE documents state that Stern Laboratory test data extended the pressure range from 700 to 1400 psia. This data was used to create the GEXL Correlations. Therefore valid test data forms the basis of the extended range of applicability for GEXL Correlation from 700 to 1400 psia. These GE documents are referenced in the Grand Gulf Nuclear Station Unit 1 License Amendment No. 191 (Pages 324-325).

### **NRC RAI 2:**

Provide a detailed description of the analytic analysis for the pressure regulator fail open Anticipated Operational Occurrence transient to support the proposed LAR, including a sequence of events in relation to the set point for turbine control valves, safety relief valves, and main steam isolation valves to justify that the event causes the Critical Power Ratio to increase.

### **ENTERGY RESPONSE:**

Analysis of pressure regulator fail-open (PRFO) transient is described in Pilgrim Nuclear Power Station Updated FSAR, Appendix R, Section R.2.4.1. The sequence of events during the PRFO transient is as follows:

Both pressure regulators fail open, calling for Turbine Control Valves to open wider. This causes rapid depressurization. When Reactor pressure reaches 810 psig, the Low Pressure Isolation Set point, main steam isolation valves (MSIVs) begin to close. When MSIVs are approximately 10% closed (90% open), a position driven Reactor Scram occurs, which terminates the event. Our amendment request to lower the Low Pressure Technical Specification limit to 700 psia offers a greater range for pressure to reduce further while MSIVs are closing. MSIVs close in the next 3 to 5 seconds, which terminates pressure reduction.

The pressure reduction causes creation of large voids in the core, which introduce negative reactivity and lower power. At lower pressure, the latent heat of vaporization is larger than that at higher pressure. Therefore the Critical Heat Flux is greater at lower pressure. Both of these factors cause Minimum Critical Power Ratio (Critical Power / Actual Power) to rise during depressurization. Therefore the PRFO transient has no adverse safety consequence and Minimum Critical Power Ratio (MCPR) actually rises during the event.