

March 26, 2007

Mr. Michael Kansler
President
Entergy Nuclear Operations, Inc.
440 Hamilton Avenue
White Plains, NY 10601

SUBJECT: PILGRIM NUCLEAR POWER STATION - ISSUANCE OF AMENDMENT
RE: EXTENSION OF PRESSURE-TEMPERATURE LIMITS SPECIFIED IN
TECHNICAL SPECIFICATIONS (TAC NO. MD4093)

Dear Mr. Kansler:

The Commission has issued the enclosed Amendment No. 227 to Facility Operating License No. DPR-35 for the Pilgrim Nuclear Power Station. The amendment consists of changes to the Technical Specifications (TSs) in response to your application dated January 15, 2007.

The proposed changes modify the TSs to extend the use of the current pressure-temperature limits as specified in TS Figures 3.6.1, 3.6.2, and 3.6.3 through the end of operating cycle 18.

A copy of the related Safety Evaluation is also enclosed. Notice of Issuance will be included in the Commission's biweekly *Federal Register* Notice.

Sincerely,

/RA/

James Kim, Project Manager
Plant Licensing Branch I-1
Division of Operating Reactor Licensing
Office of Nuclear Reactor Regulation

Docket No. 50-293

Enclosures:

1. Amendment No. 227 to License No. DPR-35
2. Safety Evaluation

cc w/encls: See next page

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ENTERGY NUCLEAR GENERATION COMPANY
ENTERGY NUCLEAR OPERATIONS, INC.
DOCKET NO. 50-293
PILGRIM NUCLEAR POWER STATION
AMENDMENT TO FACILITY OPERATING LICENSE

Amendment No. 227
License No. DPR-35

1. The Nuclear Regulatory Commission (the Commission) has found that:
 - A. The application for amendment filed by Entergy Nuclear Operations, Inc. (the licensee) dated January 15, 2007, complies with the standards and requirements of the Atomic Energy Act of 1954, as amended (the Act), and the Commission's rules and regulations set forth in 10 CFR Chapter 1;
 - B. The facility will operate in conformity with the application, the provisions of the Act, and the rules and regulations of the Commission;
 - C. There is reasonable assurance: (i) that the activities authorized by this amendment can be conducted without endangering the health and safety of the public, and (ii) that such activities will be conducted in compliance with the Commission's regulations;
 - D. The issuance of this amendment will not be inimical to the common defense and security or to the health and safety of the public; and
 - E. The issuance of this amendment is in accordance with 10 CFR Part 51 of the Commission's regulations and all applicable requirements have been satisfied.

2. Accordingly, the license is amended by changes to the Technical Specifications as indicated in the attachment to this license amendment, and paragraph 3.B of Facility Operating License No. DPR-35 is hereby amended to read as follows:

B. Technical Specifications

The Technical Specifications contained in Appendix A, as revised through Amendment No. 227, are hereby incorporated into the license. The licensee shall operate the facility in accordance with the Technical Specifications.

3. This license amendment is effective as of the date of issuance and shall be implemented within 60 days.

FOR THE NUCLEAR REGULATORY COMMISSION

/RA/

Douglas V. Pickett, Chief (Acting)
Plant Licensing Branch I-1
Division of Operating Reactor Licensing
Office of Nuclear Reactor Regulation

Attachment: Changes to the License
and Technical Specifications

Date of Issuance: March 26, 2007

ATTACHMENT TO LICENSE AMENDMENT NO. 227

FACILITY OPERATING LICENSE NO. DPR-35

DOCKET NO. 50-293

Replace the following page of the Facility Operating License with the attached revised page. The revised page is identified by amendment number and contains a marginal line indicating the area of change.

Remove
3

Insert
3

Replace the following pages of the Appendix A Technical Specifications with the attached revised pages. The revised pages are identified by amendment number and contain marginal lines indicating the areas of change.

Remove
3/4.6-9
3/4.6-10
3/4.6-11
3/4.6-12
3/4.6-13
3/4.6-14
3/4.6-15
3/4.6-16

Insert
-
-
-
-
-
3/4.6-9
3/4.6-10
3/4.6-11

SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION
RELATED TO AMENDMENT NO. 227 TO FACILITY OPERATING LICENSE NO. DPR-35
ENERGY NUCLEAR GENERATION COMPANY
ENERGY NUCLEAR OPERATIONS, INC.
PILGRIM NUCLEAR POWER STATION
DOCKET NO. 50-293

1.0 INTRODUCTION

By letter dated January 15, 2007 (ADAMS Accession No. ML070230293), Entergy Nuclear Operations, Inc. (the licensee) submitted a request for changes to the Pilgrim Nuclear Power Station (Pilgrim) Technical Specifications (TSs). Specifically, the proposed changes would extend the use of the current pressure-temperature (PT) limits as specified in TS Figures 3.6.1, 3.6.2, and 3.6.3 through the end of operating cycle 18. The licensee has chosen the RAMA code to calculate the vessel fluence. The extension time is needed by Entergy to design, submit, and execute an action plan to improve the reactor vessel dosimetry. The dosimetry is needed to benchmark the RAMA code in order to satisfy a RAMA limitation.

The licensee is requesting a two fuel cycles extension of the current PT limits in order to submit and execute a plan to improve plant dosimetry and use the RAMA calculated fluence values to the end of the extended license. The NRC staff finds the request reasonable based on the estimated margin for 48 effective full-power years (EFPYs) of operation. The 48 EFPY peak vessel fluence value is lower than the value used for the current PT curves calculated for 32 EFPYs. In addition, the license amendment request includes two commitments, i.e., (1) to “[s]ubmit to the NRC an action plan to improve benchmarking data to support approval of new P-T curves for Pilgrim using R.G. 1.190 guidance” by September 15, 2007, and (2) “[s]ubmit updated P-T curves for Pilgrim to the NRC for approval” by June 8, 2010.

2.0 REGULATORY EVALUATION

Fast neutron irradiation ($E > 1.0$ MeV) modifies the material properties of the reactor vessel. The level of irradiation determines material properties, therefore, it is subject to the requirements of General Design Criteria (GDC) 30, “Quality of Reactor Coolant Pressure Boundary,” GDC 31, “Fracture Prevention of Reactor Coolant Pressure Boundary,” and GDC 14, “Reactor Coolant Pressure Boundary.” GDC 30 requires that the vessel “...shall be designed, fabricated, erected and tested to the highest quality standards possible.” GDC 31, requires that the vessel be designed with sufficient margin to assure that when the vessel is stressed under operating, maintenance testing and postulated accident conditions the boundary behaves in a non brittle manner. Finally, GDC 14, requires that the pressure vessel be

designed, fabricated, erected and tested so as to have an extremely low probability of abnormal leakage, of rapidly propagating failure, and gross rupture.

The NRC staff issued RG 1.190 that describes acceptable calculational methods for the determination of the vessel fluence that satisfies the requirements of the above GDCs, therefore, the review is subject to the guidance in RG 1.190.

3.0 TECHNICAL EVALUATION

3.1 Staff Evaluation

The licensee has chosen the RAMA code to calculate the vessel fluence. However, the RAMA code has a limitation requiring that plants (other than boiling-water reactors 4s) have a minimum of one plant-specific surveillance capsule successfully analyzed using the RAMA code. Pilgrim could not satisfy this requirement. In addition, the proposed calculated fluence value to the end of the extended license is smaller than the existing value to the end of the current license. The smaller calculated fluence value is possible at the end of extended license because the original values were overly conservative and the plant-specific benchmark value will be more realistic due to use of RAMA code.

The licensee is requesting extension of the current PT limit curves for two fuel cycles to enable collection of data to establish acceptable plant dosimetry to satisfy the RAMA limitation. The request is based on the fact that the current limit curves are based on a fluence value calculated for 48 EFPYs of operation and there exists sufficient margin to assure safe operation. Pilgrim will be at the end of cycle 16 in the spring of 2007. The requested extension of applicability is to the end of cycle 18 when the estimated operation will be 26.3 EFPYs. Therefore, the margin is $48/26.3 = 1.83$. Based on bounding fluence value uncertainties to $\pm 10\%$, the NRC staff finds that there is sufficient margin to assure safe operation for cycles 17 and 18.

Another fact supporting the conservatism of the current fluence value is that the source term for the calculation of cycles 4, 5, 6, and 7 was based on a composite model derived from cycle 4, which had an unusually high number of fuel assemblies in the periphery, thus, overestimating the contribution of the source. The projections of fluence based on this model would be conservatively high and the conservatism would be compounded when extrapolated out to end-of-life.

Another fluence conservatism was identified in the justification of previously approved Pilgrim licensing amendment (LA) 197 where the staff observed that the General Electric (GE) report MDE-277-1285 provided conservative projections that were 25% higher than predicted peak vessel fluence values.

In summary, the NRC staff finds that the requested extension of the applicability of the current PT limit curves for two more cycles is acceptable because there is sufficient margin to assure safe operation for cycles 17 and 18.

3.2 Technical Specification Changes

The only change required to indicate the change of the period of applicability is the number of the cycle number on the title of Figures 3.6.1, 3.6.2, and 3.6.3 from 16 to 18. The PT limit curves remain the same. In addition, the licensee proposes to eliminate five blank TS pages which is an editorial change.

3.3 Licensee Commitments

The licensee made the following commitments: (1) "Submit to the NRC an action plan to improve benchmarking data to support approval of new P-T curves for Pilgrim using R.G 1.190 guidance" by September 15, 2007, and (2) "Submit updated P-T curves for Pilgrim to the NRC for approval" by June 8, 2010.

4.0 FINAL NO SIGNIFICANT HAZARDS CONSIDERATION DETERMINATION

The Commission's regulations in 10 CFR 50.92 state that the Commission may make a final determination that a license amendment involves no significant hazards consideration if operation of facility, in accordance with the amendment, would not (1) involve a significant increase in the probability or consequences of an accident previously evaluated; (2) create the possibility of a new or different kind of accident from any accident previously evaluated; or (3) involve a significant reduction in a margin of safety. Because this amendment is being issued before the expiration of 60 days, pursuant to 10 CFR 2.309(b), the NRC staff has made a final no significant hazards consideration determination.

1. Does the proposed change involve a significant increase in the probability or consequences of an accident previously evaluated?

Response: No.

The current pressure-temperature curves were generated in accordance with the fracture toughness requirements of 10 CFR Part 50, Appendix G, and American Society of Mechanical Engineers (ASME) Boiler and Pressure Vessel (B&PV) Code, Section XI, Appendix G and NRC Regulatory Guide 1.99, Revision 2, "Radiation Embrittlement of Reactor Vessel Materials." The current pressure-temperature curves were established in compliance with the methodology used to calculate and predict effects of radiation on embrittlement of reactor vessel beltline materials. The use of the proposed pressure-temperature curves through operating cycle 18 is acceptable because sufficient margin exists between the actual Effective Full Power Years (EFPYs) and the Effective Full Power Years used to establish the 48 EFPY curve. This proposed license amendment does not modify the reactor coolant pressure boundary, (i.e., there are no changes in operating pressure, materials, or seismic loading) and there are no physical changes to the plant being introduced. In addition, the proposed change does not adversely affect the integrity of the reactor coolant pressure boundary such that its function in the control of radiological consequences is affected.

Therefore, the proposed change does not involve a significant increase in the probability or consequences of an accident previously evaluated.

2. Does the [proposed] change create the possibility of a new or different kind of accident from any accident previously evaluated?

Response: No.

The proposed license amendment does not create the possibility of new or different kind of accident from any accident previously evaluated. The pressure-temperature curves were generated in accordance with the fracture toughness requirements of 10 CFR Part 50, Appendix G, and ASME B&PV Code, Section XI, Appendix G. Compliance with the proposed pressure-temperature curves will ensure the avoidance of conditions in which brittle fracture of primary coolant pressure boundary materials is possible because such compliance with the current pressure-temperature curves provides sufficient protection against a non-ductile-type fracture of the reactor pressure vessel. No new modes of operation are introduced by the proposed change. The proposed change will not create any failure mode not bounded by previously evaluated accidents. Further, the proposed change does not affect any activities or equipment and is not assumed in any safety analysis to initiate any accident sequence. Therefore, the proposed change does not create the possibility of a new or different kind of accident from any previously evaluated.

3. Does the proposed change involve a significant reduction in a margin of safety?

Response: No.

The current curves are based on established NRC and ASME methodologies in force when LA 197 was approved. The proposed license amendment requests the use of the proposed curves for two additional operating cycles. This is acceptable because sufficient margin exists between actual EFPYs and the EFPYs used in the development of the existing curves to yield a conservatism factor slightly in excess of 1.8.

Operation within the current limits ensures that the reactor vessel materials will continue to behave in a non-brittle manner, thereby preserving the original safety design bases. No plant safety limits, set points, or design parameters are adversely affected by the proposed changes. Therefore, the proposed change does not involve a significant reduction in a margin of safety.

5.0 STATE CONSULTATION

In accordance with the Commission's regulations, the Massachusetts State official was notified of the proposed issuance of the amendment. The State official had no comments.

6.0 ENVIRONMENTAL CONSIDERATION

The amendment changes a requirement with respect to installation or use of a facility component located within the restricted area as defined in 10 CFR Part 20. The NRC staff has determined that the amendment involves no significant increase in the amounts, and no significant change in the types, of any effluents that may be released offsite, and that there is no significant increase in individual or cumulative occupational radiation exposure. The Commission has made a final finding that the amendment involves no significant hazards consideration. Accordingly, the amendment meets the eligibility criteria for categorical exclusion set forth in 10 CFR 51.22(c)(9). Pursuant to 10 CFR 51.22(b), no environmental impact statement or environmental assessment need be prepared in connection with the issuance of the amendment.

7.0 CONCLUSION

Based on the above, the NRC staff finds that the requested extension of the applicability of the current PT limit curves for two more cycles is acceptable.

The Commission has concluded, based on the considerations discussed above, that: (1) there is reasonable assurance that the health and safety of the public will not be endangered by operation in the proposed manner, (2) such activities will be conducted in compliance with the Commission's regulations, and (3) the issuance of the amendment will not be inimical to the common defense and security or to the health and safety of the public.

Principal Contributor: Lambros Lois

Date: March 26, 2007

Pilgrim Nuclear Power Station

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