

June 19, 1998

Mr. Leon J. Olivier  
Vice President - Nuclear/Station Director  
Boston Edison Company  
Pilgrim Nuclear Power Station  
RFD #1 Rocky Hill Road  
Plymouth, MA 02360

SUBJECT: ISSUANCE OF AMENDMENT NO. 175 TO FACILITY OPERATING LICENSE  
NO. DPR-35, PILGRIM NUCLEAR POWER STATION (TAC NO. MA1307)

Dear Mr. Olivier:

The Commission has issued the enclosed Amendment No. 175 to Facility Operating License No. DPR-35 for the Pilgrim Nuclear Power Station. This amendment is in response to your application dated March 25, 1998, as supplemented on April 8, and May 5, 1998. The April 8, 1998, letter requested the staff to review this amendment under exigent circumstances.

The amendment will modify the Pilgrim Nuclear Power Station Technical Specification Section 3.6.A.1 with respect to the monitoring requirements for the vessel flange and adjacent shell differential temperature during heatup and cooldown and would remove the 145 ° Fahrenheit differential temperature limit. The staff attempted to process this amendment on an exigent basis in accordance with 10 CFR 50.91(a)(6)(i)(A). However, due to technical issues which arose during the review of the amendment, additional time was required beyond the normal 30-day public notice period. Therefore, this amendment is not being issued on an exigent basis.

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,

ORIGINAL SIGNED BY

Alan B. Wang, Project Manager  
Project Directorate I-3  
Division of Reactor Projects - I/II  
Office of Nuclear Reactor Regulation

Docket No. 50-293

Enclosures: 1. Amendment No. 175 to License No. DPR-35  
2. Safety Evaluation

cc w/encls: See next page

\*See previous concurrence

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 RFD #1 Rocky Hill Road  
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DATED: June 19, 1998

AMENDMENT NO. 175 TO FACILITY OPERATING LICENSE NO. DPR-35-PILGRIM NUCLEAR  
POWER STATION

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UNITED STATES  
NUCLEAR REGULATORY COMMISSION  
WASHINGTON, D.C. 20555-0001

BOSTON EDISON COMPANY

DOCKET NO. 50-293

PILGRIM NUCLEAR POWER STATION

AMENDMENT TO FACILITY OPERATING LICENSE

Amendment No. 175  
License No. DPR-35

1. The Nuclear Regulatory Commission (the Commission or the NRC) has found that:
  - A. The application for amendment filed by the Boston Edison Company (the licensee) dated March 25, 1998, as supplemented on April 8, and May 5, 1998, complies with the standards and requirements of the Atomic Energy Act of 1954, as amended (the Act), and the Commission's rules and regulations;
  - 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:

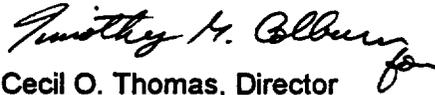
B. Technical Specifications

The Technical Specifications contained in Appendix A, as revised through Amendment No. 175, are hereby incorporated in the license. The licensee shall operate the facility in accordance with the Technical Specifications.

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3. This license amendment is effective as of its date of issuance and shall be implemented within 30 days.

FOR THE NUCLEAR REGULATORY COMMISSION



Cecil O. Thomas, Director  
Project Directorate I-3  
Division of Reactor Projects - I/II  
Office of Nuclear Reactor Regulation

Attachment: Changes to the Technical  
Specifications

Date of Issuance: June 19, 1998

**ATTACHMENT TO LICENSE AMENDMENT NO. 175**

**FACILITY OPERATING LICENSE NO. DPR-35**

**DOCKET NO. 50-293**

Replace the following pages of the Appendix A Technical Specifications with the attached pages. The revised pages are identified by Amendment number and contain vertical lines indicating the area of change.

**Remove**

**3/4.6-1**

**B3/4.6-1**

**Insert**

**3/4.6-1**

**B3/4.6-1**

## LIMITING CONDITION FOR OPERATION

### 3.6 PRIMARY SYSTEM BOUNDARY

#### Applicability:

Applies to the operating status of the reactor coolant system.

#### Objective:

To assure the integrity and safe operation of the reactor coolant system.

#### Specification:

#### A. Thermal and Pressurization Limitations

1. The average rate of reactor coolant temperature change during normal heatup or cooldown shall not exceed 100°F/hr when averaged over a one-hour period except when the vessel temperatures are above 450°F.
  
2. The reactor vessel shall not be pressurized for hydrostatic and/or leakage tests, and subcritical or critical core operation shall not be conducted unless the reactor vessel temperatures are above those defined by the appropriate curves on Figures 3.6-1, 3.6-2, and 3.6-3. (Linear interpolation between curves is permitted). At stated pressure, the reactor vessel bottom head may be maintained at temperatures below those temperatures corresponding to the adjacent reactor vessel shell as shown in Figures 3.6-1 and 3.6-2.

## SURVEILLANCE REQUIREMENT

### 4.6 PRIMARY SYSTEM BOUNDARY

#### Applicability:

Applies to the periodic examination and testing requirements for the reactor cooling system.

#### Objective:

To determine the condition of the reactor coolant system and the operation of the safety devices related to it.

#### Specification:

#### A. Thermal and Pressurization Limitations

1. During heatups and cooldowns, with the reactor vessel temperature less than or equal to 450°F, verify the RCS heatup and cooldown rates are within limits every 15 minutes.
  
2. Reactor vessel shell temperatures, including reactor vessel bottom head, and reactor coolant pressure shall be permanently logged at least every 15 minutes whenever the shell temperature is below 220°F and the reactor vessel is not vented.

**BASIS:**

**3/4.6 PRIMARY SYSTEM BOUNDARY**

**A. Thermal and Pressurization Limitations**

The allowable rate of heatup and cooldown for the reactor vessel contained fluid is 100°F per hour averaged over a period of one hour. This rate has been chosen based on past experience with operating power plants. The associated time periods for heatup and cooldown cycles when the 100°F per hour rate is limiting provides for efficient, but safe, plant operation.

Specific analyses were made based on a heating and cooling rate of 100°F/hour applied continuously over a temperature range of 100°F to 546°F. Calculated stresses were within ASME Boiler and Pressure Vessel Code Section III stress intensity and fatigue limits even at the flange area where maximum stress occurs.

The manufacturer performed detailed stress analysis as shown in Amendment 17 of the FSAR. This analysis includes more severe thermal conditions than those which would be encountered during normal heating and cooling operations.

The coolant in the bottom of the vessel is at a lower temperature than that in the upper regions of the vessel when there is no recirculation flow. This colder water is forced up when recirculation pumps are started. This will not result in stresses which exceed ASME Boiler and Pressure Vessel Code, Section III limits when the temperature differential is not greater than 145°F.

The reactor coolant system is a primary barrier against the release of fission products to the environs. In order to provide assurance that this barrier is maintained at a high degree of integrity, restrictions have been placed on the operating conditions to which it can be subjected.

Appendix G to 10CFR50 defines the temperature-pressurization restrictions for hydrostatic and leak tests, pressurization, and critical operation. These limits have been calculated for Pilgrim and are contained in Figures 3.6-1, 3.6-2, and 3.6-3.



UNITED STATES  
NUCLEAR REGULATORY COMMISSION  
WASHINGTON, D.C. 20555-0001

SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION  
RELATED TO AMENDMENT NO. 175 TO FACILITY OPERATING LICENSE NO. DPR-35

BOSTON EDISON COMPANY

PILGRIM NUCLEAR POWER STATION

DOCKET NO. 50-293

1.0 INTRODUCTION

By letter dated March 25, 1998, Boston Edison Company (BECo or the licensee), proposed to amend Facility Operating License No. DPR-35 in accordance with 10 CFR 50.90. By letter dated April 8, 1998, BECo requested that this amendment be reviewed under exigent circumstances. The staff attempted to process this amendment on an exigent basis in accordance with 10 CFR 50.91(a)(6)(i)(A). However, due to technical issues which arose during the review of the amendment, additional time was required beyond the normal 30-day public notice period. Therefore, this amendment is not being issued on an exigent basis. The proposed change modifies the Pilgrim Nuclear Power Station (PNPS) Technical Specification (TS) 3.6.A.1 and 4.6.A.1 as it pertains to Primary System Boundary, Thermal and Pressurizer Limitations, Surveillance Requirements, and Basis. Specifically, the licensee proposed to eliminate a 145°F temperature difference limit between the reactor vessel flange and adjacent vessel shell and eliminate its associated surveillance requirement contained in the TS. By letter dated April 27, 1998, the staff transmitted a request for additional information to the licensee. The licensee responded to the request for additional information in a letter dated May 5, 1998. The May 5, 1998, letter provided clarifying information that did not change the intent of the initial proposed no significant hazards consideration determination.

2.0 DISCUSSION

The PNPS reactor vessel has thermocouples installed on the lower flange and the adjacent vessel wall as depicted in Attachment D of the licensee's March 25, 1998, letter. PNPS TS 4.6.A.1 requires the monitoring and recording of the thermocouple differential temperature (DT) between the reactor vessel lower flange and the adjacent shell during heatup and cooldown. TS 3.6.A.1 further requires the thermocouple DT not to exceed 145°F as measured at the thermocouple locations. According to the licensee, the thermocouple DT is monitored to ensure that the licensing basis design criteria are not exceeded during normal startup and shutdown procedures. The licensee indicated that the accuracy of the reactor vessel lower flange thermocouple had recently deteriorated and was no longer reliable. The licensee performed analyses to demonstrate that there is a correlation between the calculated thermocouple DT and the measured fluid heatup and cooldown rates recorded in the past, hence, making the thermocouple DT monitoring redundant.

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### 3.0 EVALUATION

The licensee identified two areas of compliance with the PNPS licensing basis associated with monitoring the thermocouple DT. These are compliance with the ASME Code Section III design stress limits and compliance with 10 CFR 50 Appendix G fracture toughness requirements. Compliance with the ASME Code Section III design criteria is documented in Combustion Engineering (CE) Report CENC-1139, "Analytical Report for Pilgrim Reactor Vessel," 1971. Section III contains a requirement that the range of primary plus secondary stress intensity not exceed a  $3S_m$  limit (80 ksi). The maximum range of primary plus secondary stress intensity reported in CENC-1139 is 38 ksi for the 100°F/hr heatup transient. This evaluation considered loads from all sources: pressure, bolt load, and the heatup transient. The licensee also indicated that the maximum calculated thermocouple DT of 83°F occurs during the cooldown transient and the calculated stress intensity range for the cooldown transient is lower. The maximum heatup/cooldown rate, controlled by plant TS, is limited to 100°F/hr when averaged over a 1-hour period. Therefore, the licensee concluded that ample margin exists in meeting the ASME Code Section III design criteria for primary plus secondary stress intensity as long as the heatup/cooldown rates are maintained within the 100°F/hr TS limit.

The licensee also examined the temperature measurements recorded over several outages. The licensee compared the measured thermocouple DT during initial startup testing for a cooldown rate that approached 100°F/hr with the DT predicted by the analysis in CENC-1139. The measured thermocouple DT of 90°F was in reasonable agreement with the calculated value of 83°F cited above. On the basis of this comparison, the licensee further concluded that measurement of the heatup and cooldown rate is sufficient to ensure that the ASME Code Section III limits for primary plus secondary stress intensity have not been exceeded.

The licensee was unable to determine the original basis for the TS thermocouple DT limit of 145°F. The licensee performed an evaluation, using the analytical technique contained in CENC-1139, to determine the maximum DT that could be allowed at the location of the thermocouples and still meet the ASME Code Section III criteria for primary plus secondary stress intensity range. The licensee's calculated thermocouple DT corresponding to this stress intensity range was 149°F for the heatup and 166°F for the cooldown. Since stresses during the cooldown corresponding to a thermocouple DT of 166°F are still within the acceptable code limits, the licensee concluded that the TS requirement to limit the flange-to-shell DT to less than 145°F is unnecessary.

The staff agrees with the licensee's assessment that the thermocouple DT monitoring is redundant. The licensee's requirement to monitor and maintain the heatup/cooldown rates within the 100°F/hr TS limit provides an adequate basis to monitor compliance with the ASME Code Section III design limit for primary plus secondary stress intensity in the reactor vessel shell.

A second concern is the fracture toughness limits specified in 10 CFR 50 Appendix G. The licensee reviewed the basis for the TS regarding reactor vessel pressure-temperature (P-T) limits and concluded that the Section III stress intensity requirement is more limiting than the Appendix G fracture toughness requirement for the flange-to-shell stresses. The licensee did not request any revision to current P-T limits, therefore, the calculation sheet provided by the licensee regarding the P-T curve for the closure flange region is considered to be for informational only. In future P-T submittals, the licensee should discuss this information for the closure flange along with the P-T limits for the most limiting beltline material.

The staff finds the safety limits provided by the 145°F thermocouple DT limit and associated monitoring requirement in Technical Specification 3.6.A.1 and 4.6.A.1 are redundant to the TS controlled heatup/cooldown rates and therefore, are unnecessary. The 145°F thermocouple DT limit and associated monitoring requirement in Technical Specification 3.6.A.1 and 4.6.A.1 are also bounded by the TS heatup/cooldown rates and therefore, this limit does not need to be in the TS. Based on the above, the staff concludes that this proposed TS change is acceptable.

#### 4.0 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.

#### 5.0 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 and changes surveillance requirements. 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 previously issued a proposed finding that the amendment involves no significant hazards consideration, and there has been no public comment on such finding (63 FR 23304). 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.

#### 6.0 CONCLUSION

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 Contributors: J. Fair  
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Date: June 19, 1998