Docket No.: 50-293

October 29, 1987

Boston Edison Company
ATTN: Mr. Ralph E. Bird
Senior Vice President - Nuclear
800 Boylston Street
Boston, Massachusetts 02199

SUBJECT: ISSUANCE OF AMENDMENT NO. 109 TO FACILITY OPERATING LICENSE NO. DPR-35 (TAC# 65523) PILGRIM NUCLEAR POWER STATION

Dear Mr. Bird:

The Commission has issued the enclosed Amendment No. 109 to Facility Operating License No. DPR-35 for the Pilgrim Nuclear Power Station. This amendment consists of changes to the Technical Specifications in response to your application dated June 1, 1987 as supplemented by letter dated September 1, 1987.

This amendment revised the Technical Specification to change the pressure range over which the high pressure coolant injection (HPCI) and reactor core isolation cooling (RCIC) systems are required to operate.

A copy of our Safety Evaluation is also enclosed. The Notice of Issuance will be included in the Commission's Bi-Weekly Federal Register Notice.

Sincerely,

/S/

Richard H. Wessman, Senior Project Manager
Project Directorate I-3
Division of Reactor Projects I/II

Enclosures:
1. Amendment No. 109 to DPR-35
2. Safety Evaluation

cc w/enclosures:
See next page

OFC	PDI-3	PDI-3	PDI-3	OGC-BETHESDA	ACTDIR/PDI-3		
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UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D. C. 20555

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See next page

Mr. Ralph G. Bird
Boston Edison Company

Pilgrim Nuclear Power Station

cc:

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AMENDMENT NO. 109 TO FACILITY OPERATING LICENSE DPR-35 -
PILGRIM NUCLEAR POWER STATION

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

BOSTON EDISON COMPANY

DOCKET NO. 50-293

PILGRIM NUCLEAR POWER STATION

AMENDMENT TO FACILITY OPERATING LICENSE

Amendment No. 109
License No. DPR-35

1. The Nuclear Regulatory Commission (the Commission) has found that:

   A. The application for amendment by Boston Edison Company (the licensee) dated June 1, 1987, as supplemented by a letter dated September 1, 1987 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 I;

   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:

(2) Technical Specifications

The Technical Specifications contained in Appendix A, as revised through Amendment No. 109, are hereby incorporated in the license. The licensee shall operate the facility in accordance with the Technical Specifications.

3. This license amendment is effective 30 days after the date of issuance.

FOR THE NUCLEAR REGULATORY COMMISSION

Acting Director
Project Directorate I-3
Division of Reactor Projects I/II

Attachment:
Changes to the Technical Specifications

Date of Issuance: October 29, 1987

ATTACHMENT TO LICENSE AMENDMENT NO. 109

FACILITY OPERATING LICENSE NO. DPR-35

DOCKET NO. 50-293

Replace the following pages of the Appendix A Technical Specifications with the enclosed pages. The revised pages are identified by amendment number and contain vertical lines indicating the areas of change. The corresponding overleaf pages are provided to maintain document completeness.

Remove Pages	Insert Pages
107	107
108	108
109	109
113	113
116	116
117	117

*3.5.B Containment Cooling Subsystem (Cont'd)

2. From and after the date that one containment cooling subsystem loop is made or found to be inoperable for any reason, continued reactor operation is permissible only during the succeeding seven days unless such subsystem loop is sooner made operable, provided that the other containment cooling subsystem loop, including its associated diesel generator, is operable.

3. If the requirements of 3.5.B cannot be met, an orderly shutdown shall be initiated and the reactor shall be in a Cold Shutdown Condition within 24 hours.

C. HPCI Subsystem

1. The HPCI Subsystem shall be operable whenever there is irradiated fuel in the reactor vessel, reactor pressure is greater than 150 psig, and reactor coolant temperature is greater than 365°F; except as specified in 3.5.C.2 and 3.5.C.3 below.

* Conditional relief granted from this LCO for the period October 31, 1980 through November 7, 1980.

4.5.B Containment Cooling Subsystem (Cont'd)

2. When one containment cooling subsystem loop becomes inoperable, the operable subsystem loop and its associated diesel generator shall be demonstrated to be operable immediately and the operable containment cooling subsystem loop daily thereafter.

C. HPCI Subsystem

1. HPCI Subsystem testing shall be performed as follows:

a.	Simulated Automatic Actuation Test	Once/operating cycle
b.	Pump Operability	Once/month and Once/cycle from the Alternate Shutdown Station
c.	Motor Operated Valve Operability	Once/month and Once/cycle from the Alternate Shutdown Station
d.	Flow Rate at 1000 psig	Once/3 months
e.	Flow Rate at 150 psig	Once/operating cycle

3.5.C HPCI Subsystem (Cont'd)

2. From and after the date that the HPCI Subsystem is made or found to be inoperable for any reason, continued reactor operation is permissible only during the succeeding seven days unless such subsystem is sooner made operable, providing that during such seven days all active components of the ADS subsystem, the RCIC system, the LPCI subsystem and both core spray subsystems are operable.

3. If the requirements of 3.5.C cannot be met, an orderly shutdown shall be initiated and the reactor pressure shall be reduced to below 150 psig within 24 hours.

3.5.D Reactor Core Isolation Cooling (RCIC) Subsystem

1. The RCIC Subsystem shall be operable whenever there is irradiated fuel in the reactor vessel, reactor pressure is greater than 150 psig, and reactor coolant temperature is greater than 365°F; except as specified in 3.5.D.2 below.

4.5.C HPCI Subsystem (Cont'd)

The HPCI pump shall deliver at least 4250 gpm for a system head corresponding to a reactor pressure of 1000 to 150 psig.

2. When it is determined that the HPCI Subsystem is inoperable the RCIC, the LPCI subsystem, both core spray subsystems, and the ADS subsystem actuation logic shall be demonstrated to be operable immediately. The RCIC system and ADS subsystem logic shall be demonstrated to be operable daily thereafter.

4.5.D Reactor Core Isolation Cooling (RCIC) Subsystem

1. RCIC Subsystem testing shall be performed as follows:

a.	Simulated Automatic Actuation Test	Once/operating cycle
b.	Pump Operability	Once/month and Once/cycle from the Alternate Shutdown Station
c.	Motor Operated Valve Operability	Once/month and Once/cycle from the Alternate Shutdown Station

3.5.D Reactor Core Isolation Cooling (RCIC) Subsystem (Cont'd)

2. From and after the date that the RCICS is made or found to be inoperable for any reason, continued reactor power operation is permissible only during the succeeding seven days provided that during such seven days the HPCIS is operable.

3. If the requirements of 3.5.D cannot be met, an orderly shutdown shall be initiated and the reactor pressure shall be reduced to or below 150 psig within 24 hours.

3.5.E Automatic Depressurization System (ADS)

1. The Automatic Depressurization Subsystem shall be operable whenever there is irradiated fuel in the reactor vessel and the reactor pressure is greater than 104 psig and prior to a startup from a Cold Condition, except as specified in 3.5.E.2 below.

4.5.D Reactor Core Isolation Cooling (RCIC) Subsystem (Cont'd)

d. Flow Rate at 1000 psig — Once/3 months

e. Flow Rate at 150 psig — Once/operating cycle

The RCIC pump shall deliver at least 400 gpm for a system head corresponding to a reactor pressure of 1000 to 150 psig.

2. When it is determined that the RCIC subsystem is inoperable, the HPCIS shall be demonstrated to be operable immediately and weekly thereafter.

4.5.E Automatic Depressurization System (ADS)

1. During each operating cycle the following tests shall be performed on the ADS:

a. A simulated automatic actuation test shall be performed prior to startup after each refueling outage.

b. With the reactor at pressure, each relief valve shall be manually opened until a corresponding change in reactor pressure or main turbine bypass valve positions indicate that steam is flowing from the valve.

c. Perform a test from the alternate shutdown panel to verify that the relief valve solenoids actuate. Test shall be performed after each refueling outage prior to startup.

BASES:

3.5.A Core Spray and LPCI Subsystem

This specification assures that adequate emergency cooling capability is available whenever irradiated fuel is in the reactor vessel.

Based on the loss of coolant analysis performed by General Electric in accordance with Section 50.46 and Appendix K of 10CFR50, the Pilgrim I Emergency Core Cooling Systems are adequate to provide sufficient cooling to the core to dissipate the energy associated with the loss of coolant accident, to limit calculated fuel clad temperature to less than 2200°F, to limit calculated local metal water reaction to less than or equal to 17%, and to limit calculated core wide metal water reaction to less than or equal to 1%.

The limiting conditions of operation in Specifications 3.5.A.1 through 3.5.A.6 specify the combinations of operable subsystems to assure the availability of the minimum cooling systems noted above. No single failure of CSCS equipment occurring during a loss-of-coolant accident under these limiting conditions of operation will result in inadequate cooling of the reactor core.

Core spray distribution has been shown, in full-scale tests of systems similar in design to that of Pilgrim, to exceed the minimum requirements by at least 25%. In addition, cooling effectiveness has been demonstrated at less than half the rated flow in simulated fuel assemblies with heater rods to duplicate the decay heat characteristics of irradiated fuel. The accident analysis takes credit for core spray flow into the core at vessel pressure below 205 psig. However, the analysis is conservative in that no credit is taken for spray cooling heat transfer in the hottest fuel bundle until the pressure at rated flow for the core spray (104 psig vessel pressure) is reached.

The LPCI subsystem is designed to provide emergency cooling to the core by flooding in the event of a loss-of-coolant accident. This system functions in combination with the core spray system to prevent excessive fuel clad temperature. The LPCI subsystem and the core spray subsystem provide adequate cooling for break areas of approximately 0.2 square feet up to and including the double-ended recirculation line break without assistance from the high pressure emergency core cooling subsystems.

The allowable repair times are established so that the average risk rate for repair would be no greater than the basic risk rate. The method and concept are described in reference (1). Using the results developed in

BASES:

3.5.C HPCI

The limiting conditions for operating the HPCI System are derived from the Station Nuclear Safety Operational Analysis (Appendix G) and a detailed functional analysis of the HPCI System (Section 6).

The HPCIS is provided to assure that the reactor core is adequately cooled to limit fuel clad temperature in the event of a small break in the nuclear system and loss-of-coolant which does not result in rapid depressurization of the reactor vessel. The HPCIS permits the reactor to be shut down while maintaining sufficient reactor vessel water level inventory until the vessel is depressurized. The HPCIS continues to operate until reactor vessel pressure is below the pressure at which LPCI operation or Core Spray System operation maintains core cooling.

The capacity of the system is selected to provide this required core cooling. The HPCI pump is designed to pump 4250 gpm at reactor pressures between 1100 and 150 psig. Two sources of water are available. Initially, demineralized water from the condensate storage tank is used instead of injecting water from the suppression pool into the reactor.

When the HPCI System begins operation, the reactor depressurizes more rapidly than would occur if HPCI was not initiated due to the condensation of steam by the cold fluid pumped into the reactor vessel by the HPCI System. As the reactor vessel pressure continues to decrease, the HPCI flow momentarily reaches equilibrium with the flow through the break. Continued depressurization causes the break flow to decrease below the HPCI flow and the liquid inventory begins to rise. This type of response is typical of the small breaks. The core never uncovers and is continuously cooled throughout the transient so that no core damage of any kind occurs for breaks that lie within the capacity range of the HPCI.

The analysis in the FSAR, Appendix G, shows that the ADS provides a single failure proof path for depressurization for postulated transients and accidents. The RCIC is required as an alternate source of makeup to the HPCI only in the case of loss of all offsite A-C power. Considering the HPCI and the ADS plus RCIC as redundant paths, reference (1) methods would give an estimated allowable repair time of 10 days based on the one month testing frequency. Considering this and the judgments of the reliability of the ADS and RCIC systems, a 7-day period is specified.

The requirement that HPCI be operable when reactor coolant temperature is greater than 365°F is included in Specification 3.5.C.1 to clarify that HPCI need not be operable during certain testing (e.g., reactor vessel hydro testing at high reactor pressure and low reactor coolant temperature). 365°F is approximately equal to the saturation steam temperature at 150 psig.

BASES:

3.5.D RCIC System

The RCIC is designed to provide makeup to the nuclear system as part of the planned operation for periods when the normal heat sink is unavailable. The nuclear safety analysis, FSAR Appendix G, shows that RCIC also serves as redundant makeup system on total loss of all offsite power in the event that HPCI is unavailable. In all other postulated accidents and transients, the ADS provides redundancy for the HPCI. Based on this and judgments on the reliability of the HPCI system, an allowable repair time of seven days is specified. Immediate and weekly demonstrations of the HPCI operability during RCIC outage is considered adequate based on judgment and practicality. More frequent testing would cause undesirable steam flow interruption and thermal cycling transients.

The requirement that RCIC be operable when reactor coolant temperature is greater than 365°F is included in Specification 3.5.D.1 to clarify that RCIC need not be operable during certain testing (e.g., reactor vessel hydro testing at high reactor pressure and low reactor coolant temperature). 365°F is approximately equal to the saturation steam temperature at 150 psig.

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

ENCLOSURE 1

SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION
RELATED TO TECHNICAL SPECIFICATIONS FOR HPCI AND RCIC OPERABILITY
BOSTON EDISON COMPANY
PILGRIM NUCLEAR POWER STATION
DOCKET NO. 50-293

1.0 INTRODUCTION

By letter dated June 1, 1987 (R. G. Bird, BECo, to U. S. Nuclear Regulatory Commission, with Attachments), the Boston Edison Company submitted revisions to the Technical Specifications (TS) for Pilgrim Station to revise the pressure range over which the high pressure coolant injection (HPCI) and reactor core isolation cooling (RCIC) systems are required to be operable. In support of the proposed change, the licensee submitted a General Electric (GE) report MDE-101-0986 "Evaluation of HPCI and RCIC Operability Requirements at Low Vessel Pressure for the Pilgrim Nuclear Power Station" dated September 1986 (Attachment 3 to the base submittal document). In response to a staff comment on the original proposal, the licensee submitted in a letter dated September 1, 1987 (BECo 87-141) further information which more precisely defines the Limiting Conditions for Operation (LCO). The second submittal was a minor change for the purpose of clarification. The staff has reviewed the individual portions of the submittal and has prepared the following evaluation.

2.0 EVALUATION

2.1 Evaluation of HPCI and RCIC Operability Requirements at Low Reactor Vessel Pressure

The present Pilgrim TS Limiting Conditions for Operation (LCOs) for the HPCI and RCIC subsystems specify operability requirements for RPV pressure greater than 104 psig. The original basis for this pressure value was the ability of the core spray to deliver full rated flow at the point the reactor pressure is reduced to 104 psig or below. The HPCI or RCIC operability down to that pressure was intended for mitigation of consequences of the small break size range of postulated loss of coolant accidents before the core spray flow becomes fully effective. The evaluation provided by GE in MDE-101-0986, concludes that the safety analyses for Pilgrim Station take no credit for operation of either the HPCI or RCIC system below 150 psig. The licensee has proposed the Bases for the Core Spray and LPCI subsystem LCO be revised to clarify the assumptions made concerning the pressure requirements of the core spray cooling system to operate under the proposed conditions.

The design bases of both the HPCI and the RCIC systems for the Pilgrim Nuclear Station include coolant injection to the reactor vessel for vessel pressure between 1100 psig and 150 psig. The safety analyses for Pilgrim take no credit for operation of either the HPCI or RCIC systems below 150 psig either directly or indirectly. Furthermore, none of the beneficial features of either HPCI or RCIC rely on operability below 150 psig. The previous Bases section of the Pilgrim technical specifications incorrectly state that safety analyses take no credit for core spray flow into the vessel above 104 psig. Revising this statement avoids incorrect inference regarding HPCI or RCIC operability requirements.

Based on our review of MDE-101-0986 and determination of the continued coverage by the plant safety systems for all break sizes under the proposed change, the staff finds the change from 104 psig to 150 psig acceptable. The documented safety analysis of GE necessitates an accompanying change in the Bases Section for the subject LCOs.

The original proposed change (BECo letter of June 1, 1987) in the HPCI/RCIC operability TS was to remove the requirement that HPCI and RCIC be operable "prior to reactor startup from a Cold Condition" and replace it with required operability when "steam is being produced". This requirement also stipulates that the RPV pressure be greater than 150 psig. In order to more precisely define the plant condition for the LCO, the licensee presented a follow-up modification (BECo letter of September 1, 1987) which replaced the words "when steam is being produced" with the words "and reactor coolant temperature is greater than 365° F". The basis for this modification includes a statement that neither the HPCI or RCIC are needed to be operable during reactor vessel hydrotesting at high reactor vessel pressure and low reactor vessel temperature. The clarification proposed by BECo in their letter of September 1, 1987 reduces the risk of ambiguity in interpreting the Technical Specifications and is, therefore, acceptable.

2.2 Technical Specification Changes

The Pilgrim Technical Specification changes resulting from the accepted proposal are as follows:

(1) Specification 3.5.C.1, 3.5.C.3, 3.5.D.1 and 3.5.D.3:

The low pressure operability requirement for the HPCI and RCIC systems was changed from 104 psig to 150 psig. This change is acceptable.

(2) Specifications 3.5.C.1 and 3.5.D.1:

These specifications are revised to clarify that HPCI/RCIC operability is required at reactor vessel pressures greater than 150 psig and reactor coolant temperature greater than 365° F. This change is acceptable.

(3) Bases Section 3.5.A:

This section is changed to reflect the updated Pilgrim Station accident analysis concerning the core spray system. This change is acceptable.

(4) Bases Sections 3.5.C and 3.5.D:

The licensee has proposed changes to these Bases sections to support the modified LCOs. The staff has reviewed the Bases changes and found them acceptable.

The page changes identified in the licensee's submittal of June 1, 1987 and supplemental submittal of September 1, 1987 contain the acceptable revisions.

3.0 SUMMARY

As a result of our review, which is described in Section 2.0 of this evaluation, we conclude that the proposed Technical Specification changes to revise the pressure range over which the HPCI and RCIC are required to be operable are acceptable.

4.0 ENVIRONMENTAL CONSIDERATIONS

This amendment involves a change in the installation or use of a facility component located within the restricted area as defined in 10 CFR Part 20. The staff had 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 published a proposed finding that the amendment involves no significant hazards consideration and there has been no public comment on such finding. 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.

5.0 CONCLUSION

We have 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, and (2) such activities will be conducted in compliance with the Commission's regulations, and the issuance of this amendment will not be inimical to the common defense and security or to the health and safety of the public.

Principal Contributor: M. McCoy, SRXB
Dated: October 29, 1987