August 5, 1987

Docket No.: 50-293

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

Dear Mr. Bird:

The Commission has issued the enclosed Amendment No. 102 to Facility Operating License No. DRP-35 for the Pilgrim Nuclear Power Station. This amendment consists of changes to the Technical Specifications in response to your application dated May 29, 1987 as supplemented by a letter dated July 15, 1987 containing minor explanatory details.

This amendment revises the Technical Specifications to reflect modifications to the Standby Liquid Control System in response to the Anticipated Transient Without Scram Rule, 10CFR50.62(c)(4). The revisions are to Technical Specification 4.4.A and 4.4.C for surveillance requirements; Section 3.4.C for sodium pentaborate solution chemical characteristics; deletion of Figure 3.4.2; changes to the bases; a change to Table 6.9.1, changes to Figure 3.4.1 and several minor administrative changes.

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. 102 to DPR-35
2. Safety Evaluation

cc w/enclosures:
See next page

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

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Richard H. Wessman,
Senior Project Manager
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2. Safety Evaluation

cc w/enclosures:
See next page

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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. 102
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 May 29, 1987 as supplemented by a letter dated July 15, 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. 102, are hereby incorporated in the license. The licensee shall operate the facility in accordance with the Technical Specifications.

3. This license amendment is effective immediately.

FOR THE NUCLEAR REGULATORY COMMISSION

Victor Nerses

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

Attachment:
Changes to the Technical
Specifications

Date of Issuance: August 5, 1987

ATTACHMENT TO LICENSE AMENDMENT NO. 102

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
95	95
96	96
97	97
--	97a*
98	98
99	99**
100	100
101	101
102	102**
225	225

*Denotes new page
** Page intentionally deleted

3.4 STANDBY LIQUID CONTROL SYSTEM

Applicability:

Applies to the operating status of the Standby Liquid Control System.

Objective:

To assure the availability of a system with the capability to shutdown the reactor and maintain the shutdown condition without the use of control rods.

Specification:

A. Normal System Availability

1. During periods when fuel is in the reactor and prior to startup from a cold condition, the Standby Liquid Control System shall be operable, except as specified in 3.4.B below. This system need not be operable when the reactor is in the Cold Shutdown Condition, all operable control rods are fully inserted and Specification 3.3.A is met.

4.4 STANDBY LIQUID CONTROL SYSTEM

Applicability:

Applies to the surveillance requirements of the Standby Liquid Control System.

Objective:

To verify the operability of the Standby Liquid Control System.

Specification:

A. Normal System Availability

The operability of the Standby Liquid Control System shall be verified by the performance of the following tests:

1. At least once per month each pump loop shall be functionally tested by recirculating demineralized water to the test tank.

2. At least once during each operating cycle:

   a. Check that the system relief valves trip full open at pressures less than 1800 psig, and reseat on a falling pressure greater than 1275 psig.

   b. Manually initiate the system, except explosive valves. Pump boron solution through the recirculation path and back to the Standby Liquid Control Solution Tank. Check that each pump flow rate meets or exceeds 39 GPM against a system head of 1275 psig.

3.4 STANDBY LIQUID CONTROL SYSTEM

4.4 STANDBY LIQUID CONTROL SYSTEM

c. Manually initiate one of the Standby Liquid Control System loops and pump demineralized water into the reactor vessel.

This test checks explosion of the charge associated with the tested loop, proper operation of the valves, and pump operability. The replacement charges to be installed will be selected from the same manufactured batch as the tested charge.

d. Both systems, including both explosive valves, shall be tested in the course of two operating cycles.

B. Operation with Inoperable Components:

1. From and after the date that a redundant component is made or found to be inoperable, Specification 3.4.A.1 shall be considered fulfilled and continued operation permitted provided that the component is returned to an operable condition within seven days.

B. Surveillance with Inoperable Components:

1. When a component is found to be inoperable, its redundant component shall be demonstrated to be operable immediately and daily thereafter until the inoperable component is repaired.

LIMITING CONDITIONS FOR OPERATION	SURVEILLANCE REQUIREMENTS
3.4 STANDBY LIQUID CONTROL SYSTEM	4.4 STANDBY LIQUID CONTROL SYSTEM
C. Sodium Pentaborate Solution	C. Sodium Pentaborate Solution
At all times when the Standby Liquid Control System is required to be operable the following conditions shall be met:	The following tests shall be performed to verify the availability of the Liquid Control Solution:
1. The net volume - concentration of the Liquid Control Solution in the liquid control tank shall be maintained as required in Figure 3.4-1.	1. Volume: Check at least once per day.
2. The temperature of the liquid control solution shall be maintained above 48°F. If the solution temperature falls to or below 48°F, the system will be flow tested to verify aflow path.	2. Temperature: Check at least once per day.
3. The enrichment of the liquid control solution shall be maintained at a B^{10} isotope enrichment exceeding 54.5 atom percent.	3. Concentration: Check at least once per month. Also check concentration anytime water or boron is added to the solution, or the solution temperature is at or below 48°F.
D. There are two operational considerations associated with the Standby Liquid Control sodium pentaborate solution requirements. The first consideration involves sodium pentaborate concentration/volume requirements. The second consideration involves B^{10} isotopic enrichment. The related Limiting Conditions for Operation are delineated below:	4. Enrichment: Check B^{10} enrichment level by test anytime boron is added to the solution and during each refueling outage. Enrichment analyses shall be received within 30 days of test performance. If not received within 30 days, see Table 6.9.1 for reporting requirements.

3.4 STANDBY CONDITIC FOR OPERATION	SURVEILLANC EQUIREMENTS
3.4 STANDBY LIQUID CONTROL SYSTEM	4.4 STANDBY LIQUID CONTROL SYSTEM

D.1 If specification 3.4.A, B, or C.1 or C.2 cannot be met, the reactor shall be placed in a Cold Shutdown Condition with all operable control rods fully inserted within 24 hours.

D.2 If the enrichment requirements of specification 3.4.C.3 are not met, a check shall be made to ensure that sodium pentaborate solution meets the original design criteria by comparing the enrichment, concentration and volume to established criteria. If the sodium pentaborate solution does not meet the original design criteria, the reactor shall be placed in a Cold Shutdown Condition with all operable control rods fully inserted within 24 hours.

D.3 If the sodium pentaborate solution meets the original design criteria, but the enrichment requirements of specification 3.4.C.3 are not met, bring the B^{10} isotopic enrichment to greater than 54.5 atom percent within seven days from the time of receipt of the enrichment report. If after this time period the enrichment requirements of specification 3.4.C.3 are still not met, submit a report to the NRC within seven days and advise them of plans to bring the solution up to a demonstratable 54.5 atom percent B^{10} isotopic enrichment.

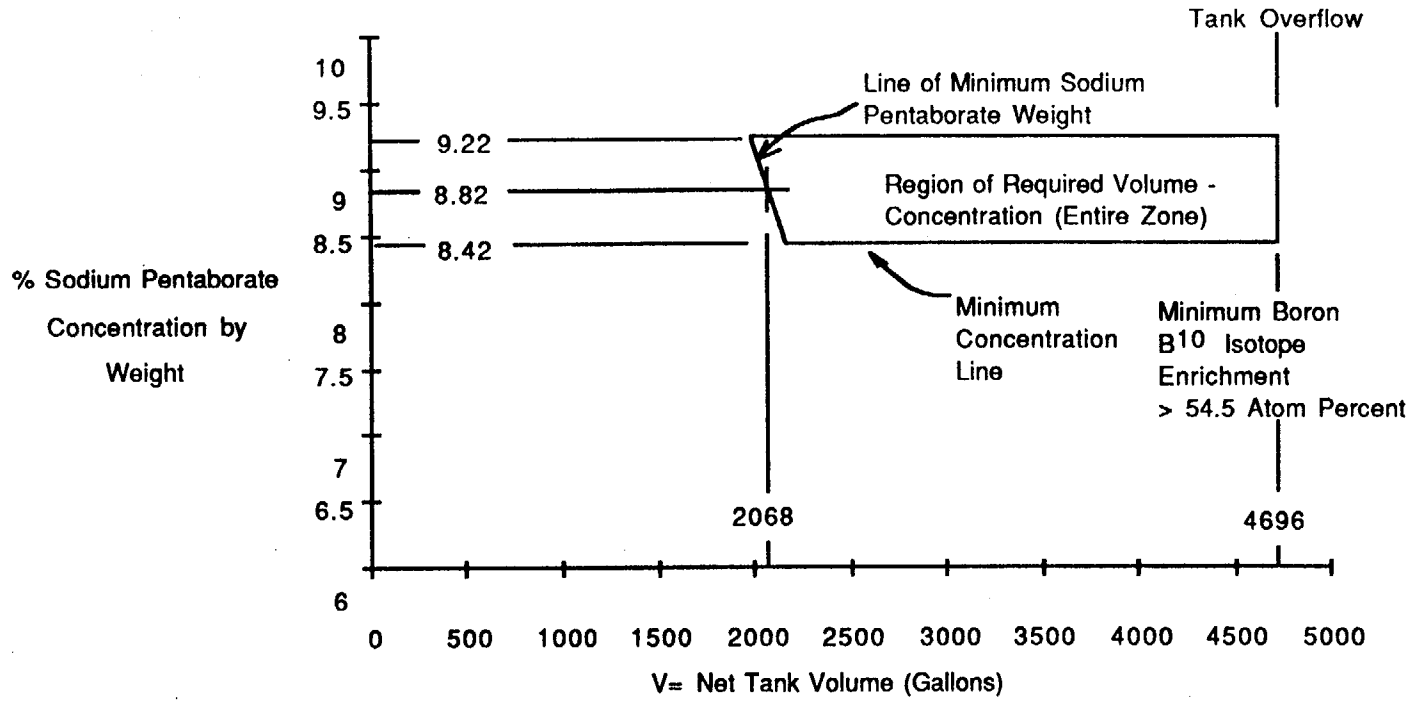

Figure 3.4 - 1
Sodium Pentaborate Solution
Volume and Concentration Requirements

Page 99
(intentionally deleted)

BASES:

3.4 & 4.4 STANDBY LIQUID CONTROL SYSTEM

A. The requirements for SLC capability to shut down the reactor are identified via the station Nuclear Safety Operational Analysis (Appendix G to the FSAR, Special Event 45). If no more than one operable control rod is withdrawn, the basic shutdown reactivity requirement for the core is satisfied and the Standby Liquid Control system is not required. Thus, the basic reactivity requirement for the core is the primary determinant of when the standby liquid control system is required. The design objective of the standby liquid control system is to provide the capability of bringing the reactor from full power to a cold, xenon-free shutdown condition assuming that none of the withdrawn control rods can be inserted. To meet this objective, the Standby Liquid Control system is designed to inject a quantity of boron that produces a concentration equivalent to 700 ppm of natural boron in the reactor core. The 700 ppm equivalent concentration in the reactor core is required to bring the reactor from full power to a three percent Δ k subcritical condition, considering the hot to cold reactivity difference, xenon poisoning etc. The system will inject this boron solution in less than 125 minutes. The maximum time requirement for inserting the boron solution was selected to override the rate of reactivity insertion caused by cooldown of the reactor following the xenon poison peak.

The Standby Liquid Control system is also required to meet 10CFR50.62 (Requirements for Reduction of Risk from Anticipated Transients Without Scram (ATWS) Events for Light-Water-Cooled Nuclear Power Plants). The Standby Liquid Control system must have the equivalent control capacity (injection rate) of 86 gpm at 13 percent by wt. natural sodium pentaborate for a 251" diameter reactor pressure vessel in order to satisfy 10CFR50.62 requirements. This corresponds to an equivalent control capacity (injection rate) of 66 gpm at 13 percent by wt. natural sodium pentaborate solution for the PNPS reactor pressure vessel diameter of 218". This equivalency requirement is fulfilled by a combination of concentration, B^{10} enrichment and flow rate of sodium pentaborate solution. A minimum 8.42% concentration and 54.5% enrichment of B^{10} isotope at a 39 GPM pump flow rate satisfies the ATWS Rule (10CFR 50.62)equivalency requirement.

Because the concentration/volume curve has been revised to reflect the increased B^{10} isotopic enrichment, an additional requirement has been added to evaluate the solution's capability to meet the original design shutdown criteria whenever the B^{10} enrichment requirement is not met.

Experience with pump operability indicates that the monthly test, in combination with the tests during each operating cycle, is sufficient to maintain pump performance. The only practical time to fully test the liquid control system is during a refueling outage. Various components of the system are individually tested periodically, thus making more frequent testing of the entire system unnecessary.

BASES:

3.4 & 4.4 STANDBY LIQUID CONTROL SYSTEM (Cont'd)

The minimum limitation on the relief valve setting is intended to prevent the loss of sodium pentaborate solution via the lifting of a relief valve at too low a pressure. The upper limit on the relief valve settings provides system protection from overpressure.

B. Only one of the two standby liquid control pumping loops is needed for operating the system. One inoperable pumping circuit does not immediately threaten the shutdown capability, and reactor operation can continue while the circuit is being repaired. Assurance that the remaining system will perform its intended function and that the long term average availability of the system is not reduced is obtained for a one out of two system by an allowable equipment out of service time of one third of the normal surveillance frequency. This method determines an equipment out of service time of ten days. Additional conservatism is introduced by reducing the allowable out of service time to seven days, and by increased testing of the operable redundant component.

C. The quantity of B^{10} stored in the Standby Liquid Control System Storage Tank is sufficient to bring the concentration of B^{10} in the reactor to the point where the reactor will be shutdown and to provide a minimum 25 percent margin beyond the amount needed to shutdown the reactor to allow for possible imperfect mixing of the chemical solution in the reactor water.

Level indication and alarm indicate whether the solution volume has changed, which might indicate a possible solution concentration change. Test intervals for level monitoring have been established in consideration of these factors. Temperature and liquid level alarms for the system are annunciated in the control room.

The solution shall be kept at least 10°F above the maximum saturation temperature to guard against boron precipitation. Minimum solution temperature is 48°F. This is 10°F above the saturation temperature for the maximum allowed sodium pentaborate concentration of 9.22 Wt. Percent.

Each parameter (concentration, pump flow rate, and enrichment) is tested at an interval consistent with the potential for that parameter to vary and also to assure proper equipment performance. Enrichment testing is required when material is received and when chemical addition occurs since change cannot occur by any process other than the addition of new chemicals to the Standby Liquid Control solution tank.

Page 102
(intentionally deleted)

TABLE 6.9.1

	Area	Reference	Submittal Date
a.	Secondary Containment Leak Rate Testing (1)	4.7.C.c	Upon completion of each test (2)
b.	(Deleted)		
c.	(Deleted)		
d.	Gross Gaseous Release 0.05 Ci/sec for 48 Hours	4.8.B.	Ten days after the release occurs
e.	Standby Liquid Control solution enrichment out of specification	3.4.C.3	Fourteen days after receipt of a non-complying enrichment report or lack of receipt of such a report within the required thirty days, if enrichment compliance cannot be achieved within seven days.

NOTES:

1. Each integrated leak rate test of the secondary containment shall be the subject of a summary technical report. This report shall include data on the wind speed, wind direction, outside and inside temperatures during the test, concurrent reactor building pressure, and emergency ventilation flow rate. The report shall also include analyses and interpretations of those data which demonstrate compliance with the specified leak rate limits.

2. The report shall be submitted within 90 days after completion of each test. Test periods shall be based on the commercial service data as the starting point.

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

SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION RELATING TO STANDBY LIQUID CONTROL SYSTEM BOSTON EDISON COMPANY PILGRIM NUCLEAR POWER STATION DOCKET NO. 50-293

1.0 INTRODUCTION

By letters dated May 29 and July 15, 1987, R. G. Bird, Boston Edison Company (BECo), to U.S. Nuclear Regulatory Commission, BECo proposed to change the Technical Specifications (TS) for Pilgrim. The changes address the use of boron, enriched in the isotope B-10, in the sodium pentaborate solution used in the Standby Liquid Control System (SLCS) in order to meet the requirements of the Anticipated Transient Without Scram (ATWS) Rule, 10CFR50.62 paragraph (c)(4). The proposed changes are to TS Sections 3.4.A, 3.4.C, 3.4.D, 4.4.A, 4.4.C, Figures 3.4-1 and 2, Bases 3.4, 4.4 and Table 6.9.1 all associated with SLCS. The changes include administrative adjustments to page numbers and section numbers caused by the technical changes. In addition, in the revision of Table 6.9.1 the requirement for a 5 year Inservice Inspection (ISI) report was deleted since the report has already been submitted.

2.0 EVALUATION

The proposed TS changes for Pilgrim are intended to meet the requirements of the ATWS Rule, 10CFR50.62(c)(4). The ATWS Rule requires that the SLCS be equivalent in control capacity to a system with an 86 gpm injection rate, using 13 weight percent unenriched sodium pentaborate solution. Of the several proposed approaches presented in the General Electric report, Reference 1, and approved in the NRC evaluation, Reference 2, BECo has chosen to use enriched (in B-10) boron. Using the calculation methods of Reference 1 results in a minimum concentration of 8.42 weight percent sodium pentaborate when using an enrichment of 54.5 atom percent B-10, an injection of 39 gpm and a water mass of

507,850 pounds (?27 inch vessel). The new limits are reflected in the revised T/S section 3.4.C.3 and Figure 3.4.1.

The temperature/concentration requirements of existing Figure 3.4.2 are no longer required because the curve extends down only to 9.4% sodium pentaborate concentration and is based upon naturally enriched sodium pentaborate. The proposed revised concentration limits, in proposed TS Figure 3.4-1 allow a maximum concentration of 9.22% enriched sodium pentaborate. At 9.22% enriched sodium pentaborate concentration, the temperature required to preclude sodium pentaborate precipitation (with a 10°F margin) is 48°F. The controlled building temperatures provide assurance that it will be difficult for the SLCS solution to approach this limit, and system alarms provide operator notification of such a potential event. Because of the 10°F margin to potential sodium pentaborate precipitation at monitored concentration levels, the 48°F temperature limit provides equivalent protection to that considered in the original safety evaluation. The 48°F temperature limit, which is included in the proposed TS, preempts the previous temperature - concentration curve provided in Figure 3.4.2. Accordingly, the staff finds the proposed TS Section 3.4.C.2 and deletion of Figure 3.4.2 to be acceptable.

Having selected the enriched boron option of compliance with the ATWS Rule, BECo, following an approved approach, has elected to have the sodium pentaborate formulated at the chemical vendor's facility. The boron enrichment test will therefore be done prior to the acceptance for use on the site. The boron enrichment test also will be done anytime boron is added to the solution and each refueling outage. If the enrichment level is less than 53.5 atom percent, a period of seven days is allowed to bring the boron enrichment into compliance. If at the end of the seven day period, compliance can not be assured, the licensee is required to submit a report, within seven days, to the NRC advising the NRC of the licensee's plan to comply with the ATWS Rule. These are all acceptable procedures. They have been agreed upon as elements of an appropriate approach for compliance with the ATWS Rule in discussions between the staff and industry (BWR Owners Group ATWS Committee, Ref. 3). The proposed changes in T/S Sections 4.4.C.4 and 3.4.D. to

implement these procedures are acceptable.

The bases to Technical Specification 3.4 and 4.4 were revised to reflect the proposed changes. The revised bases are acceptable since they adequately explain the bases for the proposed requirements in the Technical Specifications.

The administrative changes, including the deletion of the requirement for the 5 year ISI report which has already been submitted, meet the eligibility criteria for categorical exclusion set forth in 10CFR51.22(c)(10). Pursuant to 10CFR51.22(b) no additional environmental impact statement or environmental assessment need be prepared for those items.

3.0 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 readiation 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.

4.0 CONCLUSIONS

BECo has requested TS changes for Pilgrim which would provide for the use of enriched boron in the SLCS to meet the requirements of 10CFR50.62(c)(4) and administrative changes. The approach selected by BECo and the associated TS are acceptable. The staff 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, 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 contributors: G. Thomas, O. Gormley

Date: AUG 5 1987

REFERENCES

1. "Anticipated Transients Without Scram: Response to NRC ATWS Rule, 10CFR50.62", NEDE-31096-P, December 1985.

2. "Safety Evaluation of Topical Report (NEDE-31096-P) 'Anticipated Transients Without Scram: Response to ATWS Rule, 10CFR50.62'", letter from G. Lainas (NRC) October 21 1986.

3. Minutes to BWR Owner's Group informal meeting on April 1, 1987 with NRC to discuss ATWS Technical Specification Bases, Bethesda, MD, April 3, 1987.

AMENDMENT NO. 102 TO FACILITY OPERATING LICENSE DPR-35-
PILGRIM NUCLEAR POWER STATION

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Docket No. 50-293
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