

BOSTON EDISON

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Boston Edison Company's Response to the
NRC Safety Evaluation of the Pilgrim
Nuclear Power Station (PNPS) Response to the
Station Blackout (SBO) Rule (TAC No. 68585)


This letter responds to the NRC Safety Evaluation Report (SER) dated February 13, 1991, requesting a schedule for implementing Station Blackout (SBO) equipment and procedure modifications in accordance with 10CFR50.63(c)(4). The SER also requested a schedule for modifications, if any, resulting from the recommendations included in the SER.

We submitted an initial response to the NRC SER on March 26, 1991, (BECO letter #91-042) describing SBO-related modifications scheduled for Refueling Outage (RFO) #8. Our response also included a commitment to provide by June 1, 1991, an implementation plan and schedule for the remaining modifications and a schedule for resolving the SER recommendations. Enclosure 1 provides our implementation plan and schedule for the SBO equipment and associated procedure modifications and a schedule for resolving the SER recommendations. Enclosure 2 provides additional information justifying Pilgrim as a four (4) hour SBO duration plant.

The equipment and associated procedure modifications are based upon the previously-described commitments to fully comply with the Station Blackout Rule by designating Pilgrim's SBO Diesel Generator as the Alternate AC source as defined in 10CFR50.2. The scope of the SBO equipment modifications includes the installation of protective relays required to connect the SBO Diesel Generator to the 23KV circuit entering PNPS to allow load testing of the Alternate AC source during station operation. This modification is scheduled for completion during RFO #8 as described in our March 26, 1991 submittal. In addition, certain modifications to enable the operators to energize the shutdown buses from the SBO-Diesel Generator within 10 minutes of a SBO event are scheduled for RFO #9.

BECo letter 90-106, dated August 31, 1991, provided a basis for Pilgrim to be a 4 hour SBO duration plant. The 4 hour SBO duration was selected based upon NUMARC 87-00 and Regulatory Guide 1.155 that placed Pilgrim in the offsite design characteristic P2 group. A minimum SBO duration of 4 hours was derived from the Extremely Severe Weather (ESW) classification for offsite power design characteristic group, Alternate AC configuration, and Emergency Diesel Generator target reliability (R.G. 1.155 methodology). One consideration for the offsite design characteristic P2 group selection for Pilgrim was based on the results achieved from switchyard improvements implemented to reduce offsite power failures due to salt spray contamination in the PNPS switchyard. These improvements as well as other 345 KV system changes were implemented at the time we installed the Station Blackout Diesel Generator as part of our Safety Enhancement Program to enhance the overall reliability of the Station offsite power supply. The NRC, in its review of BECo submittals, assigned Pilgrim to the P3 group stating the information provided on salt spray contamination was not sufficient to support BECo's assumption on the reduction of salt spray-related offsite power failures. We have further evaluated the historical perspective of salt spray-related power failures at Pilgrim since these improvements and concluded Pilgrim should remain in the P2 site characteristic group with a SBO duration of 4 hours. Enclosure 2 provides information in support of this conclusion.

We request NRC's concurrence on the 4 hour SBO duration based upon the additional information provided in Enclosure 2. NRC's concurrence is requested by August 1, 1991, so that we can plan to resolve the SER recommendations by December 1991, based upon the 4 hour SBO duration and the 10CFR50.2 requirements for Alternate AC source. The resolutions will be maintained as a part of the SBO documentation. Schedules for completing any modifications resulting from these actions will be submitted in accordance with our Long Term Program.


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Enclosures

WGL/clc/5804

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ENCLOSURE 1

10CFR50.63(c)(4) IMPLEMENTATION SCHEDULE

A. IMPLEMENTATION SCHEDULE COMMITMENT

- | <u>1. EQUIPMENT MODIFICATIONS (SER Item 2.5)</u> | <u>SCHEDULE</u> |
|---|-----------------|
| (a) Shutdown Bus Energization Modification
(Installation of Protective Relays to allow load testing of the SBO-Diesel Generator during normal PNPS operation) | RFO #8 |
| (b) SBO-Diesel Generator 10 minute Energization Modification (enables the operator to control the D.G. and energize the shutdown buses from the SBO-DG within 10 minutes of an SBO) | RFO #9 |

2. PROCEDURE MODIFICATIONS (SER Item 2.4)

Plant procedures have been revised to meet the requirements of the SBO Rule. Further revisions will be made to formally interface with offsite AC restoration procedures and to accommodate the modifications outlined in item 1) above. The affected procedures are identified below.

Existing Procedures

- | | | |
|---|--|----------|
| (a) 5.3.31 | Station Blackout | Complete |
| (b) 2.2.146 | Station Blackout Diesel Generator for Control of Electrical Malfunctions | Complete |
| (c) Emergency Operating Procedures (EOPs 1-9) | Emergency Operating Procedures for Control of Reactor Pressure Vessel (RPV), Primary Containment, Secondary Containment and Radioactive Releases | Complete |
| (d) 8.9.16 | Manual Start and Load of Blackout Diesel
(Develop a procedure to manually start and load the SBO Diesel on a periodic basis) | Complete |

New Procedures or Revisions

Development of new or revisions to existing procedures may be identified as the 10 minute energization modification is reviewed through the design review process. These new or revisions to procedures will be completed by RFO#9, concurrent with the modification.

3. TRAINING OF OPERATORS (SER Item 2.4)

- (a) The operators have been trained on the existing SBO related procedures including the manual start-up and loading of the SBO-DG. Complete
- (b) Upon completion of the 10 minute energization modification during RFO #9, operators will be trained on the energization of shutdown buses from the SBO-DG and associated procedures. RFO #9
This training will be completed during RFO #9.

4. EDG RELIABILITY PROGRAM (SER Item 2.7)

We are currently formalizing the existing collection and analysis of EDG performance data by utilizing the applicable elements of the reliability program of NUMARC 87-00, Appendix D. A target reliability of 0.975 for Pilgrim's Class 1E Diesel Generator has been selected as discussed in NUMARC 87-00, Section 3.2.6. The EDG reliability program is planned for implementation beginning January 1, 1992. Jan. 1992

5. QUALITY ASSURANCE PROGRAM FOR SBO EQUIPMENT (SER Item 2.6)

- a) BECo has designated the SBO Diesel Generator as the SBO equipment. This SBO-DG was procured, installed, and tested as nonclass 1E equipment. The QA guidance of R.G. 1.155 will be evaluated for QA/QC controls to the SBO equipment by December 1991. Dec. 1991
- b) The interface components and modifications to the safety-related system will be accomplished in accordance with the QA program for safety-related systems. Ongoing

6. AAC SOURCE INSPECTION, TESTING, MAINTENANCE AND RELIABILITY
(SER Item 2.2.2)

- (a) The SBO-DG is inspected, tested, and maintained in accordance with the manufacturer's recommendations to demonstrate operability and reliability. Ongoing

(b) A target reliability of 0.95 will be established and a reliability program implemented post RFO #9 after completion of the 10 minute energization modification.

RFO #9

B. SER RECOMMENDATIONS

1. CROSSTIE CIRCUITS TESTING (4kV AND 480 V) (SER Item 2.2.2)

The AAC system will be demonstrated to energize the shutdown buses within 10 minutes of a SBO. This demonstration includes the testing of 4kv and 480V crosstie connections.

RFO #9

2. CONDENSATE REQUIREMENT, EFFECTS OF VENTILATION AND TECHNICAL SPECIFICATION REQUIREMENTS FOR TORUS TEMPERATURE AND RPV CONDITIONS FOR SBO DURATION (SER Item 2.3.1, 2.3.4 and 2.3.6)

The SER recommendations will be evaluated for the SBO duration within the requirements for alternate AC source (10CFR50.2). This evaluation is currently targeted for completion in December 1991, based on NRC's concurrence by August 1, 1991 on the 4 hour SBO duration (Enclosure 2).

Dec. 1991

3. QA PROGRAM (SER Item 2.6)

This is addressed in Item A.5 above.

4. EDG RELIABILITY PROGRAM (SER Item 2.7)

This is addressed in Item A.4 above.

ENCLOSURE 2

PILGRIM STATION BLACKOUT DURATION (SER Item 2.1)

A. HISTORICAL PERSPECTIVE AT PILGRIM

Pilgrim experienced approximately 9 salt spray contamination related power failures between 1972 and 1987. Effective means of reducing the salt spray related outages were investigated at the time the Safety Enhancement Program was implemented. A third diesel generator was installed to address the Station Blackout concerns. To improve the reliability of the switchyard, the below discussed improvements were implemented.

B. IMPROVEMENTS

The improvements implemented during the summer of 1987 included increasing the size of bushings and coating (all but two) switchyard bushings with Dow Corning Sylgard High Voltage Insulator Coating. Station electrical maintenance personnel monitor the switchyard for indications of bushing contamination with the intent of washing down the bushings if necessary. An improved procedure for washing is also in practice. Electrical Maintenance records indicate no washdowns since July 1987 other than for personnel training program requirements.

C. EXPERIENCE SINCE IMPROVEMENTS

Pilgrim has not experienced salt spray contamination related power failures since implementation of the improvements to the switchyard. The two specific types of insulators used in the switchyard have been tested to determine the effectiveness of Sylgard. Attachment A, "Evaluation of RTV Coatings for Post Insulators-Interim Report - EPRI Research Project RP 2472-3" summarizes the results of this test. The conclusion is the application of Sylgard to the PNPS-specific insulators increases the average flashover voltage significantly for various amounts of contamination.

BECo performed a statistical analysis in response to the need to demonstrate a correlation between the switchyard improvements made in the Summer of 1987 and the subsequent reduced likelihood of offsite power failures due to salt buildup. The distribution over time of the nine losses of offsite power events since Pilgrim's initial startup through the 1987 switchyard improvements were evaluated and shown to be consistent with a Poisson process with a frequency of 0.6 events per year. If the 1987 switchyard improvements were ineffective, the expected number of losses of offsite power events due to salt buildup from the Fall of 1987 to late Spring of 1991 would be at least two ($0.6 \text{ events/yr.} \times 4 \text{ yrs.} = 2.4 \text{ events}$). The actual number of events in the four years following the 1987 improvements is zero.

The probability of no losses of off-site power events due to salt buildup in the past four years, if the switchyard improvements were ineffective, is only 0.09. Therefore, it can be concluded with a confidence of greater than 90% there is a statistical correlation between the 1987 switchyard improvements and a subsequent reduced likelihood of losses of offsite power events due to salt buildup. We expect the 90% confidence number will increase as more years of experience are gained and factored into our reliability data base.

This reduction in salt spray contamination-related failures has improved the reliability of the switchyard and the site characteristics and reduced significantly the severe weather group contribution for loss of offsite power failures.

D. CONCLUSIONS

Based upon the experience gained from the above-discussed improvements, BECo has concluded the site design characteristic group is P2 for determining the Station Blackout duration.

ATTACHMENT A: "Evaluation of RTV Coatings for Post Insulators", Interim Report, EPRI Research Project RP 2472-3, January 1988.