Boston Edison

Pilgrim Nuclear Power Station
Rocky Hill Road
Plymouth, Massachusetts 02360

August 10, 1994
BECo Ltr. 94-086

E. T. Boulette, PhD
Senior Vice President — Nuclear

U.S. Nuclear Regulatory Commission
Document Control Desk
Washington, DC 20555

SUBJECT: **REQUEST FOR ENFORCEMENT DISCRETION**

Boston Edison Company requests the Nuclear Regulatory Commission (NRC) to exercise enforcement discretion in granting a one time out-of-service (OOS) extension of the Reactor Core Isolation Cooling (RCIC) system Technical Specification 3.5.D.2 from 7 days to 14 days. The extension would provide Boston Edison Company with needed additional time to implement corrective actions to restore the RCIC system to Operable status. The RCIC system became inoperable on August 3, 1994 when the RCIC turbine tripped during the performance of Surveillance Procedure No. 8.5.5.1, "RCIC Pump Operability Flow Rate and Valve Test at Approximately 1000 psig."

This request for a 14 day out-of-service (OOS) reflects the Standard Technical Specification allowed RCIC OOS time, and is consistent with our June 9, 1994 proposed Technical Specification change submittal that would increase Pilgrim's RCIC OOS time from 7 to 14 days. We could not forsee the RCIC problem which requires us to request enforcement discretion and that our proposed change be treated as an emergency Technical Specification amendment.

In addition, this request to provide additional OOS time aids in restoring RCIC to operable status. RCIC testing requires reactor produced steam at above 150 psig which would not be available if Pilgrim were to shut down to satisfy the 7 day requirement of Technical Specification 3.5.D.2. Operating the plant for extended periods at less than 150 psig is operationally undesirable.

Compensatory measures are not planned because the High Pressure Coolant Injection (HPCI) system is operable, satisfying the compensatory measure required by Technical Specification 3.5.D.2. HPCI will not be taken out of service while RCIC is out of service. The HPCI system performance is monitored through the Maintenance Rule program. The 2 year rolling average (monitored quarterly: latest 3/31/94) indicates a total availability of 98.5% as of March 1994. This compares favorably to the 97.5% total availability performance criterion. In addition there have been no HPCI demand failures for the past 2 years compared to a Maintenance Rule criterion that would allow a total of 2 demand failures.

This request has been reviewed by Pilgrim's Operations Review Committee (ORC) and recommended for approval. This request poses no threat to the health and safety of the public or the environment, and does not involve a significant safety hazard. The basis for this conclusion is discussed in this letter's Attachment #1. The circumstances making this request necessary and planned corrective actions are provided in Attachment #2.

9408160180 940810
PDR ADOCK 05000293
P PDR

A001
1/1

If you have any questions or require additional information regarding this request, please do not hesitate to contact me.

E. T. Boulette

PMK/nas/ts/enforce

Attachments

cc: Mr. R. Eaton, Project Manager
Division of Reactor Projects - I/II
Office of Nuclear Reactor Regulation
Mail Stop: 14D1
U. S. Nuclear Regulatory Commission
1 White Flint North
11555 Rockville Pike
Rockville, MD 20852

Mr. Thomas Martin
U. S. Nuclear Regulatory Commission
Region I
475 Allendale Road
King of Prussia, PA 19406

Senior NRC Resident Inspector
Pilgrim Nuclear Power Station

Mr. Robert M. Hallisey, Director
Radiation Control Program
Massachusetts Department of Public Health
305 South Street
Jamaica Plain, MA 02130

ATTACHMENT #1:
SAFETY ANALYSIS SUPPORTING A REQUEST FOR DISCRETIONARY ENFORCEMENT OF REACTOR CORE ISOLATION COOLING (RCIC) TECHNICAL SPECIFICATION 3.5.D.2

The following evaluation is provided in support of Boston Edison Company's request for discretionary enforcement concerning the RCIC out-of-service (OOS) time.

The RCIC system serves as a standby source of cooling water to provide limited decay heat removal whenever the main feedwater is isolated from the reactor vessel. Although RCIC does provide some supplemental assistance to HPCI during a postulated LOCA, this is not a design basis requirement for the system. The RCIC flow is considerably smaller than the HPCI flow and is therefore not an important contributor to LOCA mitigation. The Pilgrim LOCA analyses were performed without taking credit for RCIC.

Currently, PNPS may continue to operate for seven (7) days after the RCIC system is made or found inoperable. The seven day LCO is based on HPCI operability. To support Boston Edison Company's (BECo) June 6, 1994 Technical Specification request allowing operation with the RCIC system out-of-service for fourteen days, the accidents and abnormal operational transients associated with operation with the RCIC system out-of-service were reviewed. In addition, the RCIC system design basis and the safety criteria were also reviewed.

The RCIC system is a steam driven coolant injection system designed to deliver 400 gpm of coolant from the condensate storage tank or suppression pool at vessel pressures above 150 psig. The RCIC system provides a backup to the HPCI system but has a capacity less than 10% of HPCI. Examples of such scenarios where RCIC may be used are (1) loss-of-feedwater and (2) steam line break outside containment. To a lesser extent, RCIC would contribute to coolant inventory make-up for more major coolant inventory loss scenarios, e.g. recirculation line rupture (LOCA) at pressure, whether HPCI was available or not.

The primary justification for extending the OOS for RCIC is that its small coolant capacity makes it a minor contributor to accident mitigation. When available, HPCI flow capacity can maintain core coolant coverage or prevent fuel damage. When HPCI is not available, core uncovery could occur for a loss-of-feedwater event. However, this is only for a short period until automatic vessel blowdown on low-low reactor water level allows low pressure coolant injection and spray to restore the water level. Fuel heat-up resulting from this is negligible.

Safety criteria used to determine the acceptability of extending continued operation with the RCIC system out-of-service (OOS) is consistent with Pilgrim's licensing basis. For example, events with the expected frequency of occurrence greater than once-per-reactor lifetime are required to meet the transient MCPR thermal limit: more than 99.9% of the fuel rods are expected to avoid boiling transition. Very low probability events, such as a LOCA, are required to satisfy the criteria of 10CFR50.46: the primary criterion being that the Peak Cladding Temperatures (PCT) be maintained less than 2200^{o}F.

Analyses performed by Pilgrim's NSSS vendor, General Electric, in support of the June 9, 1994 BECo proposed Technical Specification change demonstrated 10CFR50.46 limits (i.e. a PCT less than 2200^{o}F) were met. The core damage frequency analysis for Pilgrim is unchanged by operating Pilgrim in accordance with this request. The 14 day OOS for RCIC conforms to the OOS time for this system found in BWR Standard Technical Specifications. Hence, increasing the allowed OOS time from 7 to 14 days does not result in a challenge to fuel cladding integrity or BWR Standard Technical Specifications, and operating Pilgrim in accordance with this discretionary enforcement request will not pose a threat to the public health and safety.

ATTACHMENT #2:
EVENTS AND PLANNED
ACTIONS SUPPORTING DISCRETIONARY
ENFORCEMENT OF TECHNICAL SPECIFICATION 3.5.D.2

On Wednesday, August 3, 1994 during the operability surveillance RCIC tripped on high steam flow at startup. Subsequent investigation revealed that the cause for the trip was that the governor control valve failed to respond to the control system demand because of valve binding. Preliminary investigation into why the control valve was binding identified that the alignment pins were not properly aligned. The valve was rebuilt and properly aligned and post work testing (PWT) followed.

At approximately 0400 on Friday, August 5, 1994 RCIC was run for post work testing. During the surveillance, it was noted the oil level on the coupling end bearing decreased while the level rose in the governor end bearing. This occurred approximately 15 minutes into the run. Shortly after, fluctuations in speed were identified, and a small amount of oil was noted on the RCIC skid. The turbine was manually tripped at that time and an investigation into the change in oil level began.

Based on discussions with the vendor (Dresser Rand) and troubleshooting observations, the cause for the change in bearing oil levels was due to air becoming entrained in the oil. The air forms a bubble in the drain line from the governor end bearing, retarding oil drainage. This failure to drain properly increases the bearing oil level. Since oil is not draining from this bearing, the only source of oil to the sump and the oil pump is from the coupling end, lowering the oil level. Dresser Rand stated that the most likely cause is the pumping action of the trip disk which aerates the oil; however, other sources such as pump suction piping leaks could have been the cause.

Several steps have been taken to identify the source of air. These include: sealing all the joints on the oil pump suction tubing, followed by its replacement with piping to eliminate potential sources of air in-leakage at the pump suction; verifying the oil level to ensure the oil is not being agitated and aerated by pumping action of the trip disk; replacement of the oil with oil of the type used prior to Refueling Outage (RFO)#9 to identify if the new oil was foaming. We have also replaced the oil pump; installed a new oil pump relief valve and installed a vent line on the governor end bearing return drain line to the oil sump. After each of the changes RCIC was operated, and in each case the same symptoms occurred approximately 15 minutes into the run with the exception of the initial run following installation of the vent line with some non-Q parts. Because our surveillance runs are usually less than 15 minutes, this was the most significant contributing factor affecting our ability to have previously identified or anticipated this condition. Also a contributing factor was the failure of the vendor or other affected sites to supply information regarding this problem to the rest of the industry. We will be preparing a nuclear network message to notify the rest of the industry of the oil foaming problem caused by entrained air.

To continue troubleshooting, the RCIC system must be capable of operating so that we can test corrections made. If the plant were to shut down, RCIC would not be able to be operated, preventing dynamic testing which is required for the verification of the actions taken. Operating the reactor at below 150 psig (RCIC is not required to be operable) is undesirable. The best condition from an operating and troubleshooting viewpoint is to remain at power.

We are installing a vent line on the pump end bearing return drain line to the oil sump. We will also be implementing a modification to increase the size of the bearing oil return lines from the RCIC turbine bearings to the oil sump. Based on discussion with the RCIC turbine manufacturer, Terry Turbine (Dresser Rand) Corporation, increasing the venting and/or draining capability of the oil system has proven successful at other plants (Monticello, Salem, and Duane Arnold) that have experienced similar bearing oil foaming due to entrained air. Additionally, the RCIC turbine bearings will be inspected in-situ to ensure no degradation exist that would contribute to entrained air in the lubricating oil. The increased size in the oil return lines discussed above, inspection, post work testing and operability testing, can be completed within the additional 7 day OOS time requested.

ATTACHMENT #3:
SUMMARY OF ENFORCEMENT DISCRETION
DISCUSSION

1. **The Technical Specification or other license conditions that will be violated.**

Technical Specification 3.5.D.2 will be violated if reactor operation continues above 150 psig at the expiration of the 7 day allowed OOS time for RCIC.

2. **The circumstances surrounding the situation, including the need for prompt action.**

The RCIC turbine tripped August 3, 1994 due to high steam flow during a surveillance test. The problem was remedied, but during post work testing it was noted the oil level on the coupling end bearing decreased while the level rose in the governor end bearing. This occurred approximately 15 minutes into the run. Shortly thereafter, fluctuations in speed were identified, and a small amount of oil was noted on the RCIC skid. The turbine was manually tripped at that time and an investigation into the change in oil level began.

Based on discussions with the vendor (Dresser Rand) and troubleshooting observations, the cause for the change in bearing oil levels was due to air becoming entrained in the oil. The air forms a bubble in the drain line from the governor end bearing, retarding oil drainage. This failure to drain properly increases the bearing oil level. Since oil is not draining from this bearing, the only source of oil to the sump and the oil pump is from the coupling end, lowering the oil level. Dresser Rand stated that the most likely cause is the pumping action of the trip disk which aerates the oil; however, other sources such as pump suction piping leaks could have been the cause.

Several steps have been taken to identify the source of air. These include: sealing all the joints on the oil pump suction tubing, followed by its replacement with piping to eliminate potential sources of air in-leakage at the pump suction; verifying the oil level to ensure the oil is not being agitated and aerated by pumping action of the trip disk; replacement of the oil with oil of the type used prior to Refueling Outage (RFO)#9 to identify if the new oil was foaming. We have also replaced the oil pump; installed a new oil pump relief valve and installed a vent line on the governor end bearing return drain line to the oil sump. After each of the changes RCIC was operated, and in each case the same symptoms occurred approximately 15 minutes into the run with the exception of the initial run following installation of the vent line with some non-Q parts. Because our surveillance runs are usually less than 15 minutes, this was the most significant contributing factor affecting our ability to have previously identified or anticipated this condition. Also a contributing factor was the failure of the vendor or other affected sites to supply information regarding this problem to the rest of the industry. We will be preparing a nuclear network message to notify the rest of the industry of the oil foaming problem caused by entrained air.

To continue troubleshooting, the RCIC system must be capable of operating so that we can test corrections made. If the plant were to shut down, RCIC would not be able to be operated, preventing dynamic testing which is required for the verification of the actions taken. Operating the reactor at or below 150 psig (RCIC is not required to be operable) is undesirable. The best condition from an operating and troubleshooting viewpoint is to remain at power.

3. **The safety basis for the request that enforcement discretion be exercised, including an evaluation of the safety significance and potential consequences of the proposed course of action.**

The RCIC system serves as a standby source of cooling water to provide limited decay heat removal whenever the main feedwater is isolated from the reactor vessel. Although RCIC does provide some supplemental assistance to HPCI during a postulated LOCA, this is not a design basis requirement for the system. The RCIC flow is considerably smaller than the HPCI flow and is therefore not an important contributor to LOCA mitigation. The Pilgrim LOCA analyses were performed without taking credit for RCIC.

The primary justification for extending the OOS for RCIC is that its small coolant capacity makes it a minor contributor to accident mitigation. When available, HPCI flow capacity can maintain core coolant coverage or prevent fuel damage. When HPCI is not available, core uncovery could occur for a loss-of-feedwater event. However, this is only for a short period until automatic vessel blowdown on low-low reactor water level allows low pressure coolant injection and spray to restore the water level. Fuel heat-up resulting from this is negligible.

As stated in the response to #4, HPCI is and will continue to be available during the period of enforcement discretion. If HPCI becomes unavailable we will exit enforcement discretion and take the action prescribed by Technical Specifications.

4. **Any proposed compensatory measure(s).**

Compensatory measures are not planned because the High Pressure Coolant Injection (HPCI) system is operable, satisfying the compensatory measure required by Technical Specification 3.5.D.2. HPCI will not be taken out of service while RCIC is out of service. Also see Item #9.

5. **The justification for the duration of the noncompliance.**

We will strive to minimize use of the enforcement discretion for Technical Specification 3.5.D.2. However, the additional 7 days allows us to have sufficient reactor produced steam to test the efficacy of repairs and modifications made to the RCIC system.

Also, the total OOS time of 14 days comports with Boiling Water Reactor Standard Technical Specifications.

6. **The basis for the licensee's conclusion that the noncompliance will not be of potential detriment to the public health and safety and that a significant safety hazard is not involved.**

As discussed in attachment #1 of this letter, a variety of limiting-case scenarios were analyzed to demonstrate the effects of increasing the OOS time for the RCIC system. The conclusion of the analyses is that this proposed change does not violate Pilgrim's licensing basis or 10CFR50.46 requirements. Therefore, since the licensing basis and code required PCT continues to be met, and because the proposed change comports with the requirements of BWR Standard Technical Specifications, operating Pilgrim in accordance with the requested enforcement discretion will not be of potential detriment to the public health and safety and a significant safety hazard is not involved.

7. **The basis for the licensee's conclusion that the noncompliance will not involve adverse consequences to the environment.**

Applying this requested enforcement discretion makes Pilgrim's OOS consistent with BWRs governed by Standard Technical Specifications. As described in #6, analyses indicates that extending the allowed total OOS to 14 days does not violate Pilgrim's licensing basis or 10CFR50.46 requirements. Hence, the probability and consequences of an event adverse to the environment remain essentially unchanged by operating Pilgrim in accordance with the requested enforcement discretion.

8. **A statement that the request has been approved by the facility organization that normally reviews safety issues (Plant Onsite Review Committee, or its equivalent).**

Boston Edison Company's request for discretionary enforcement regarding Reactor Core Isolation Cooling (RCIC) Technical Specification 3.5.D.2 was reviewed and approved by the Operations Review Committee (ORC) on August 9, 1994, at Meeting #94-53 and on August 10, 1994, at Meeting #94-55.

9. **Any other information the NRC staff deems necessary before making a decision to exercise enforcement discretion.**

The HPCI system performance is monitored through the Maintenance Rule program. The 2 year rolling average (monitored quarterly: latest 3/31/94) indicates a total availability of 98.5% as of March 1994. This compares favorably to the 97.5% total availability performance criterion. In addition there have been no HPCI demand failures for the past 2 years compared to a Maintenance Rule criterion that would allow a total of 2 demand failures.

If plant circumstances change, such as loss of equipment redundant to RCIC or vital to the operation of equipment redundant to RCIC, we will exit the enforcement discretion and bring Pilgrim into the condition prescribed by Technical Specifications.