



Boston Edison

Pilgrim Nuclear Power Station
Rocky Hill Road
Plymouth, Massachusetts 02360

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

November 7, 1996
BECo Ltr. #96-094

U.S. Nuclear Regulatory Commission
Attn: Document Control Desk
Washington, D.C. 20555

Docket No. 50-293
License No. DPR-35

Subject: Power-Flow Stability Technical Specifications Related to Pilgrim's
Installation of BWROG Enhanced Option 1A

BACKGROUND

Boiling water reactor (BWR) cores are susceptible to coupled neutronic/thermal-hydraulic reactor instabilities in certain portions of the core power/flow operating domain. General Design Criterion (GDC) 12 requires that established fuel thermal limits not be violated as a result of such instabilities. Compliance with GDC 12 can be achieved by preventing the instabilities. The Boiling Water Reactor Owners' Group (BWROG) developed stability long-term solution Enhanced Option 1A to provide a methodology for prevention of reactor instabilities. Pilgrim participated in the BWROG Enhanced Option 1A effort and plans to begin implementing it during Refueling Outage (RFO) #11.

The Enhanced Option 1A Stability Solution uses hardware modifications to the flow-biased APRM rod-block and neutron flux scram logic cards to enforce the restriction of plant operation in regions susceptible to core thermal-hydraulic instability. The scram function is set down at low reactor flows to exclude entry into an "exclusion region" that includes the high core power, low core flow operating region now restricted by plant procedures. The rod block function is set down to create the "restricted region," a buffer zone between the "exclusion region" and an outer zone known as the "monitored region." An additional LPRM feed monitor provides a warning of decreasing margin to stable core operation.

Enhanced Option 1A also includes "defense-in-depth" features to provide diverse protection, removing reliance on a single system or methodology. These features include the monitored region and the Period Based Detection System.

9611190105 961107
PDR ADOCK 05000293
P PDR

AD001/1

CONCLUSION CONCERNING PROPOSED STANDARD TECHNICAL SPECIFICATIONS

We have reviewed the BWROG proposed standard technical specifications (STS) for Enhanced Option 1A vis-à-vis Pilgrim's Technical Specifications and have concluded our current technical specifications and administrative controls address this modification with minimal changes being required. We have attached a comparison matrix to this letter and have discussed the basis for our conclusion below.

BASES for CONCLUSION

- **STS PROPOSED 3.2.5 Fraction of Core Boiling Boundary (FCBB)**

The purpose of the LCO is to establish limits on the boiling boundary to ensure that the core will remain stable during normal reactor operations in the restricted region of the power-flow map defined in the Core Operating Limits Report (COLR). PNPS design permits normal plant evolutions without requiring intentional entry into the restricted region of the power flow map; therefore, Pilgrim's planned modification does not include implementation of the Fraction of Core Boiling Boundary (FCBB). In addition, Pilgrim is already proscribed from exceeding the limiting values for power/flow relationship as specified in the COLR (i.e., operating in the restricted region) by Technical Specification 3.11.D. This specification, along with supporting Off-Normal Condition procedures, requires exiting this region by returning to the allowed operating domain as defined in the cycle-specific Power/Flow Operating Map (COLR Figure 3.4 -1).

COLR Figure 3.4-1 and the Off-Normal Condition procedures will be revised in accordance with NEDO 32339, Supplement 5, as appropriate.

- **STS PROPOSED SR 3.2.5.1 - FCBB**

STS (SR) 3.2.5.1 requires verifying $FCBB \leq 1.0$ once/24 hours and once within 15 minutes following an unexpected transient.

Since Pilgrim is not implementing FCBB and because we prohibit operation in the restricted region, SR 3.2.5.1 has no application at Pilgrim.

Pilgrim's Technical Specification 4.11.D requires "daily" (24 hours) determination of compliance with power/flow relationships specified in the COLR ensuring that Pilgrim is not inadvertently operating in the restricted region; if operation is in the restricted region, corrective actions (i.e., exiting the region or shutting down) are imposed. In addition, Pilgrim's Off-Normal Condition procedures for loss of feedwater heating and recirculation system problems require assessing operating conditions by plotting power vs. flow on the power/flow map and taking action as appropriate.

- **STS PROPOSED 3.3.1.1 Surveillance Requirements**

The proposed changes to the surveillance requirements for the "APRM Flow Biased Simulated Thermal Power – High" (Function 2.b of Table 3.3.1.1) would :

1. Replace SR 3.3.1.1.3, for adjusting the channel to conform to a calibrated flow signal every 7 days, with SR 3.3.1.18 requiring adjusting the flow control trip reference card to conform to reactor flow once within 7 days after reaching equilibrium conditions following a refueling outage; and
2. Exempt the digital components of the flow control trip reference cards from the 184 day CHANNEL CALIBRATION requirements.

Current Pilgrim Technical Specification Table 4.1.2 (calibration frequencies) surveillance requirements for the APRM flow bias scram function specifies a calibration of the flow bias signal every 3 months. Note 1 to Table 4.1.2 clarifies this as, "Adjust the flow bias trip reference, as necessary, to conform to a calibrated flow signal." Since Pilgrim's implementation of Enhanced Option 1A will modify the existing APRM flow biased circuit cards with digital flow control trip reference cards, the surveillance requirements will be revised for the new circuitry as part of Pilgrim's adoption of STS in 1998.

- **STS PROPOSED 3.3.1.3 Period Based Detection System (PBDS)**

The purpose of the LCO for PBDS is to provide the operator with indication (alarms) that conditions consistent with a significant degradation in the stability performance of the reactor core has occurred while operating in the restricted or monitored region. Pilgrim will operate in the monitored region during normal and transient conditions; however, Pilgrim will only enter the restricted region as a result of unexpected transients. PBDS is defined as a "defense-in-depth" feature in NEDO 32339, and as a "defense-in-depth" feature, we believe PBDS is not within the purview of Technical Specifications as established by the criteria set down in 10 CFR 50.36.

Pilgrim will incorporate the implementation of PBDS into the FSAR and plant procedures in accordance with the requirements of Enhanced Option 1A.

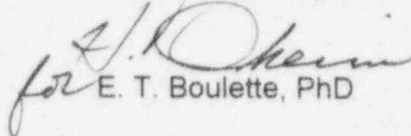
- **STS PROPOSED 3.4.1 Recirculating Loops Operating**

This LCO requires two recirculating loops with matched flows to be operating while in Modes 1 and 2 (Run and Startup) and provides the requirements for single loop operation. If the requirements are not met, 24 hours are allowed to restore applicability. Pilgrim's License Condition E prohibits power operation with single recirculation loop operation greater than 24 hours. Recirculation system balance and other requirements for two loop operation are contained in Pilgrim Technical Specifications 3/4.6.E and F. Because single loop operation is limited to only 24 hrs, the proposed requirements do not apply.

SUMMARY

Pilgrim will be installing equipment to address power-flow instabilities. We have reviewed the proposed STS against Pilgrim's Technical Specifications and conclude Pilgrim's Technical Specifications require changes only to the surveillances for the APRM Flow Biased Scram function and the COLR to address the issues for instability. To further enhance safe operation, the guidance/requirements of NEDO-32339 will be incorporated into the FSAR and procedures, as appropriate.

Should you require further information on Pilgrim's implementation of Enhanced Option 1A, please contact P. M. Kahler at (508) 830-7939.


for E. T. Boulette, PhD

Enclosure: Technical Specification Comparison Matrix

PMK/dmc/option1a

cc: Mr. Alan B. Wang, Project Manager
Project Directorate I-1
Office of Nuclear Reactor Regulation
Mail Stop: 14B2
U. S. Nuclear Regulatory Commission
1 White Flint North
11555 Rockville Pike
Rockville, MD 20852

Regional Administrator, Region I
U.S. Nuclear Regulatory Commission
475 Allendale Road
King of Prussia, PA 19406

Senior Resident Inspector
Pilgrim Nuclear Power Station