June 27, 2005

Mr. Michael R. Kansler
President
Entergy Nuclear Operations, Inc.
440 Hamilton Avenue
White Plains, NY 10601

SUBJECT: REQUEST FOR ADDITIONAL INFORMATION REGARDING TECHNICAL SPECIFICATION CHANGES FOR SINGLE RECIRCULATION LOOP OPERATION, PILGRIM NUCLEAR POWER STATION (TAC NO. MC4333)

Dear Mr. Kansler:

By letter dated September 2, 2004, Entergy Nuclear Operations, Inc. submitted an amendment request to revise the license and Technical Specifications for the Pilgrim Nuclear Power Station to allow operation with a single recirculation loop in service.

The Nuclear Regulatory Commission staff has been reviewing the submittal and has determined that additional information is needed to complete its review. The specific questions are found in the enclosed request for additional information (RAI). A response to these RAIs is requested to be provided within 45 days.

Sincerely,

/RA/

James J. Shea, Project Manager, Section 2
Project Directorate I
Division of Licensing Project Management
Office of Nuclear Reactor Regulation

Docket No. 50-293

Enclosure: As stated

cc w/encl: See next page

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REQUEST FOR ADDITIONAL INFORMATION

REGARDING TECHNICAL SPECIFICATION CHANGES

FOR SINGLE RECIRCULATION LOOP OPERATION

ENTERGY NUCLEAR OPERATIONS, INC.

PILGRIM NUCLEAR POWER STATION

DOCKET NO. 50-293

By letter dated September 2, 2004, Entergy Nuclear Operations, Inc. (Entergy) submitted an amendment request to revise the license and Technical Specifications for the Pilgrim Nuclear Power Station (PNPS) to allow operation with a single recirculation loop in service. The Nuclear Regulatory Commission (NRC) staff has the following questions regarding the information provided:

1. Stability:

   A. We understand that PNPS implemented Stability Option 1D during the refueling outage completed in May 2005. Please discuss and justify the effectiveness of Option 1D for operation with single recirculation loop operation (SLO).

   B. The staff understands that PNPS is experiencing recirculation system flow perturbation (bi-stable flow) potentially due to the recirculation system configuration.

      Provide an evaluation of how PNPS' susceptibility to flow perturbation is accounted for in Option 1D (e.g., flow mapping uncertainties) for SLO. Please submit supporting documentation or the vortexing evaluation that demonstrates the magnitude of the flow oscillations that have been experienced at PNPS.

   C. The instability requirements section of the Enclosure to the September 2, 2004, amendment request provides a discussion on the impact of SLO on the instability response of boiling-water reactors (BWRs). The submittal states that as the core flow increases beyond 40% of rated during SLO, substantial reverse flow is established in the inactive loop. The increase in the system noise increases the total core flow noise, which tends to increase the observed neutron flux noise. However, the discussion did not factor in the PNPS-specific vortexing and the additional system noise this may induce for SLO.

      1. Provide an evaluation of the impact of the PNPS vortexing on the noise and accuracy of the neutron monitoring instrumentations (e.g., low-power range monitors, average power range monitors (APRMs) and traversing in-core probes (TIPs) for SLO, where there is backflow through 10 of the jet pumps. Explain if instrumentation adjustment or filtering of system noise during SLO would be performed. State how it would be ensured

that any noise filtering or system adjustment would not result in a delayed flow-biased APRM scram in the event of instability?

2. Evaluate the reference stability solution documents and state if the conclusions of the referenced documents would still hold for PNPS, in terms of SLO with a feedwater heater out of service (FWHOOS) or final feedwater temperature reduction (FFWTR), and the potential for increased core flow noise due to vortexing.

D. The application states SLO can be combined with FWHOOS or FFWTR. Pump trip from SLO conditions with FWHOOS or FFWTR would affect the plant's instability response. Although the SLO is restricted to a lower rod line and power level, the higher initial subcooling and the faster rate of reaching natural recirculation could lead to a higher susceptibility to instability. It is not clear if the scram setpoints calculations accounted for the transient initiating from a condition with higher subcooling for both two loop operation (TLO) and SLO. Provide an evaluation/discussion on how the PNPS stability option setpoint calculation method accounts for the impact of SLO with FWHOOS or TLO with FWHOOS/FFWTR on the stability performance. Reference the applicable sections of the NRC-approved licensing topical report (LTR) that addresses this.

2. <u>Safety Limit for Minimum Critical Power and Bi-stable Condition:</u>

A. Considering the bi-stable flow condition and the potential increase in the measured flow inaccuracies, explain if the recirculation flow uncertainties should be increased for PNPS. Please submit the uncertainty information supporting your calculations.

B. Section 3.1.2 of the September 2, 2004, submittal presents progression error analysis to demonstrate the uncertainty analysis procedure used to establish the core flow uncertainty for SLO and concludes that the General Electric Thermal Analysis Basis value remains bounding. State if the uncertainty analysis provided in Equation 3.3 (Page 3-3 of GE-NE-0000-0027-5301, Revision 1) was previously evaluated by the NRC. If so, provide the applicable reference. If not, expand on the core flow uncertainty analysis provided so that the acceptability of the approach can evaluated.

C. Section 3.2, “TIP Reading Uncertainty” cites generic BWR tests performed to establish the TIP noise uncertainty for SLO operation. Several BWRs, including PNPS, experience additional flow fluctuation attributed to the characteristic of the plant-specific recirculation system configuration. Do these tests include plants experiencing additional noise due to the recirculation flow fluctuations? If not, justify why the TIP random noise should not increase for both SLO and TLO to account for non-typical random neutron, electronic and boiling noise.

3. Bi-stable Flow and Vibration:

Explain if the susceptibility to bi-stable flow would increase the pump vibration concerns and if this was taken into account in developing the power/flow ratio at which SLO would be allowed.

4. Design Bases Analyses:

A. For the pump seizure event, the amendment request proposes scaling the SLO operating limit minimum critical power ratio performed for Cycle 14 for the current cycle (Cycle 16). Please state whether PNPS is already loaded with GE14 fuel. If so, why was the pump seizure event not analyzed with the introduction of GE14 fuel? If the reference pump seizure event is based on a different core loaded fuel design, in terms of licensing basis, justify why the pump seizure event based on a different fuel type should be used for the GE14 fuel introduction using a scaling approach.

B. The application states that the rod withdrawal error (RWE) evaluations are independent of the source of core flow (i.e., one recirculation loop or two) and consequently, these evaluations are valid for both TLO and SLO. Operation at low-flow conditions rely on different control rod patterns than operation at rated conditions, making rod worth different. Explain why RWE initiated from rated conditions with dual recirculation loops bounds operation with a single recirculation loop. If there is an NRC-approved licensing technical review that addresses this issue and is applicable to PNPS, please reference it.

C. The amendment request states that for SLO, the flow-biased APRM scram trip and rod block setpoints must be adjusted to account for the change in the relationship between drive flow and core flow due to reverse flow in the inactive loop jet pumps and lower core resistance. Evaluate the impact, if any, that the susceptibility to flow oscillation would have on the drive flow to core flow adjustments and the associated correction made to the flow-biased APRM scram and rod block.

5. Emergency Core Cooling System - Loss-of-Coolant Accident (LOCA) Analysis

A. The proposed planar linear heat generation rate (PLHGR)/maximum average planar linear heat generation rate (MAPLHGR) multiplier is based on the LOCA analysis performed at rated conditions ("SAFER/GESTR-LOCA Loss of Coolant Accident Analysis for Pilgrim Nuclear Power Station," NEDC-31852-P, Rev. 2, January 2003). Is the referenced analysis based on GE14 fuel introduction?

B. Reference the NRC-approved licensing document or amendment to GESTAR II that accepted developing PLHGR/MAPLHGR multipliers that would result in a peak cladding temperature (PCT) that is the same as the two-loop PCT, instead of performing a separate SLO LOCA analysis that establishes an SLO MAPLHGR.

C. The submittal states that using the 0.8 PLHGR/MAPLHGR multipliers with the Appendix K assumptions yields PCT values that are well below the Title 10 of the *Code of Federal Regulations* (10 CFR) Section 50.46 PCT limit of 2200 EF. Please state what these PCT values are for all calculated statepoints in the licensed maximum extended load line limit analysis domain. Include all applicable increases to the PCT that were performed based on 10 CFR 50.44 reports (< 50 degrees).

Pilgrim Nuclear Power Station

cc:

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