June 30, 2004

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

SUBJECT: SUPPLEMENTAL REQUEST FOR ADDITIONAL INFORMATION REGARDING STRETCH POWER UPRATE, INDIAN POINT NUCLEAR GENERATING UNIT NO. 2 (TAC NO. MC1865)

Dear Mr. Kansler:

By a letter dated January 29, 2004, as supplemented on April 12 and June 16, 2004, Entergy Nuclear Operations, Inc. (Entergy) submitted an application to increase the licensed thermal power level at Indian Point Nuclear Generating Unit No. 2 (IP2).

The Nuclear Regulatory Commission (NRC) staff is reviewing the information provided in these submittals and has determined that additional information is needed to complete its review. The June 16 Entergy letter responded to a prior request for additional information (RAI) dated May 14, 2004. Subsequently, the NRC staff finds that information is needed to answer several additional questions not included in the May 14 RAI. The specific questions are found in the enclosed supplemental RAI. During a telephone call on June 18, 2004, the Entergy staff indicated that a response to the RAI would be provided within 30 days.

If you should have any questions, please do not hesitate to call me.

Sincerely,

/RA/

Patrick D. Milano, Sr. Project Manager, Section 1
Project Directorate 1
Division of Licensing Project Management
Office of Nuclear Reactor Regulation

Docket No. 50-247

Enclosure: As stated

cc w/encl: See next page

Mr. Michael R. Kansler, President
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440 Hamilton Avenue
White Plains, NY 10601

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Dear Mr. Kansler:

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SUPPLEMENTAL REQUEST FOR ADDITIONAL INFORMATION

REGARDING STRETCH POWER UPRATE (SPU)

ENTERGY NUCLEAR OPERATIONS, INC.

INDIAN POINT NUCLEAR GENERATING UNIT NO. 2 (IP2)

DOCKET NO. 50-247

In a letter dated January 29, 2004, as supplemented on April 12 and June 16, 2004, Entergy Nuclear Operations, Inc. (the licensee) submitted its application to increase the licensed thermal power level by 3.26% at IP2. The Nuclear Regulatory Commission (NRC) staff has the following questions regarding the information provided:

Fuel Design Features and Components

1. In Section 7.1 of Attachment III (Application Report) to the January 29 letter, the licensee states the fuel assembly structural integrity is not affected and the core coolable geometry is maintained for the 15x15 Vantage+ fuel assembly design and the 15x15 upgraded fuel assembly for IP2 under SPU conditions.

   Provide the technical basis that shows the upgraded fuel assembly's structural integrity and the core coolable geometry are maintained under the SPU conditions.

2. Regarding the fuel core design description of analyses and evaluations in Section 7.3.3, it states that conceptual models were developed that followed the uprate transition to an equilibrium cycle and that the SPU evaluation assumed a core thermal power level of 3216 MWt during the three transition cycles.

   State whether the core is being treated as a mixed core during the transition cycles. Also, explain how fuel damage was analyzed in a seismic event for the mixed core as it transitions to a homogeneous 15x15 upgraded fuel loading and describe the worst case scenario analyzed. In addition, provide the technical justification that shows structural integrity at the SPU condition for the mixed core is maintained in a loss-of-coolant accident (LOCA) coincident with a seismic event at IP2.

3. In Section 7.1 of the Application Report, the licensee states the level of fuel rod fretting, oxidation and hydriding of thimbles and grids, fuel rod growth gap, and guide thimble wear was acceptable.

   Provide a reference to the document which provides the analytical results, and list the numerical values for these parameters along with their acceptable limit for the SPU conditions. Also, explain how the analysis performed for IP2 SPU conditions met the applicable regulatory criteria and indicate whether the methodology used has been previously approved by the staff.

Enclosure

4. In Section 7.1 of the Application Report, the licensee states that analyses verified the fuel assembly holddown spring's capability to maintain contact between the fuel assembly and the lower core plate at normal operating conditions for the SPU.

   Describe the analyses performed to justify this statement. Additionally, provide the numerical values that show the design criteria are met.

5. In the Fuel Criterion Evaluation Process (FCEP) Notification of the 15x15 Upgrade Designs submitted by Westinghouse Electric Company to the NRC on February 6, 2004, Westinghouse states that evaluations of the 15x15 upgraded fuel assembly design for seismic and LOCA loading at IP2 have been performed in accordance with the "Reference Core Report 17x17 Optimized Fuel Assembly" methodology.

   Provide the technical justification showing that the 17x17 design/method referenced is applicable to the 15x15 fuel design.

6. In Section 7.4 of the Application Report, the licensee states rod internal pressure and clad fatigue criteria were met for the SPU condition. The licensee also states a vessel average temperature of 549 °F resulted in violation of the clad fatigue criterion.

   Provide the technical justification explaining how maintaining a vessel temperature of 562 ± 3 °F will meet the rod internal pressure and clad fatigue criteria for the SPU operation. Also, provide the analytical basis that shows the clad fatigue criterion is met under SPU core conditions with a vessel average temperature of 562 ± 3 °F.

<u>LOCA Transients</u>

1. Provide a statement indicating that, prior to operating at the uprated power level, emergency operating procedures will be in place and operator training will be completed to ensure that the actions for switchover to hot leg injection will occur consistent with the stated times.

2. In Attachment III to the April 12 letter, the licensee stated that new well-mounted dual-element resistance temperature detectors (RTDs) will be inserted into two of the three thermowells and that the third thermowell will be capped for future use.

   Provide a justification for the insertion of only two of the three thermowells. Explain if there will be any configuration changes to the current design and if there are any effects on the temperature measurement for the SPU condition.

3. The LOCA submittals did not address slot breaks at the top and side of the pipe.

   Justify why these breaks are not considered for the IP2 LBLOCA response.

4. Provide the LBLOCA analysis results (tables and graphs, as appropriate) to the time that stable and sustained quench is established.

5. Tables 6.2-3 and 6.2.5 in the Application Report provide LBLOCA and SBLOCA analyses results for the IP2 SPU.

   Provide all results (peak clad temperature, maximum local oxidation, and total hydrogen generation) for both LBLOCA and SBLOCA. For maximum local oxidation include consideration of both pre-existing and post-LOCA oxidation, and cladding outside and post-rupture inside oxidation. Also include the results for fuel resident from previous cycles.

<u>Nuclear Steam Supply System (NSSS) Fluid Systems</u>

1. In Section 4.1.7 of the Application Report, the licensee discusses the spent fuel pool (SFP) cooling system. However, the information is only described in general terms and conditions.

   Describe the specific methods and controls that will be used to perform the cycle specific calculations required to determine that the SFP cooling system can remove the additional heat load and maintain operating conditions within current design. Are these calculations done in accordance with approved methods?

<u>Mechanical Equipment Design Transients</u>

1. Table 3.1-1 of the Application Report compares the design parameters used in the existing design transient development and for the stretch power uprate. The licensee indicated that the current design transients remain bracketing and applicable for the SPU. In addition, these IP2 specific design transients have been used in the NSSS component stress analyses and evaluations presented in Section 5 of this report. The licensee further stated that even though the existing design transients bracket the SPU Program, all of the design transients were redeveloped based on the SPU Program design parameters shown in Table 3.1-1 and re-transmitted to the analysts for use in the IP2 SPU Program.

   In light of Table 3.1-1, the cold leg temperature range (between 514.3 to 538.2 °F) appears to be more severe than the current design basis cold leg temperature range. Provide a comparison of the design basis transients used in the current design basis transients and the stretch power uprate conditions for NSSS components stress and fatigue analysis. Clarify how the current design basis transients are applicable for the SPU conditions.

<u>Piping and Supports</u>

1. In Section 9.9.3 of the Application Report, the justifications provided on page 9.9-3 for not evaluating the piping and support systems where the increase in temperature, pressure and flow rate are less than 5 percent of the current rated design basis condition are qualitative and nonspecific. For instance, the licensee stated that these increases are some what offset by conservatism in analytical methods used. The licensee also indicated that conservatism may include the enveloping of multiple thermal operating conditions.

Provide the technical basis for not evaluating these piping and support systems. The technical justifications should be based on specific quantitative assessment or intuitively conservative deduction. Also, discuss how the flow effects on the transient loads, which may increase non-proportional to the ratio of flow rate change, are considered (see page 9.9.2).

Generic Issues and Programs

1. On page 10-22, the licensee indicated that the effect of the SPU on the current pressure locking and thermal binding (PLTB) evaluation of safety-related motor-operated valves (MOVs) and air-operated valves (AOVs) was reviewed. It was determined that the SPU does not introduce any increased challenge for thermal binding and/or pressure locking and does not effect the results and conclusions of the current evaluation.

   Provide a summary of the evaluation of SPU effects on PLTB in response to Generic Letter (GL) 95-07 for power-operated valves (POVs) including MOVs and AOVs, with respect to the changes of the parameters such as maximum open and close differential pressure, maximum open and close line pressure, flow rate, fluid, fluid temperature, and ambient temperature, that might affect the valve performance.

2. On page 10-23, the licensee indicated that an isolated water condition is assumed to exist between 2 MOVs in the return line from loop no. 2 hot leg to the suction of the residual heat removal (RHR) pumps inside containment. The curve for containment temperature as a function of time following a LBLOCA is an input used in the analysis of this piping segment. Due to the relatively small differences between the containment temperature profile used in this analysis and the containment temperature profile for a LBLOCA under SPU conditions, and a greater than 30-percent margin between the calculated maximum pressure and the maximum allowable pressure under Updated Final Safety Analysis Report (UFSAR) criteria, the stresses in this line under SPU conditions continue to remain within UFSAR allowable.

   Discuss quantitatively how much the pressure will increase due to the increased temperature for the stretch power uprate since the increase in pipe stress is not linearly proportional to the increase in temperature in the isolated piping segment.

3. In item 49 of the April 12 letter, the licensee indicated that piping systems (i.e., main steam, extract steam, feedwater heater drain and vents, moisture separator and reheater drains, boiler feedwater, and condensate systems) affected by flow increase associated with stretch power uprate, were visually observed to determine if any existing vibration concerns exist. As a follow-up to this visual inspection, walkdowns will be conducted during the increase to SPU power. The acceptance criteria are based on displacement or velocity screening criteria.

   Provide a summary of the evaluation for flow effects on the main steam line vibration, which will be increased for the SPU condition. Discuss the plan and schedule of the vibration monitoring program with regard to the power ascension, monitoring methods (installing accelerometers, using hand-held devices), strategic locations of monitoring, and acceptance criteria. Confirm whether the vibration monitoring will be performed for the affected system piping and components in accordance with the American Society of Mechanical Engineers Operations and Maintenance (OM) Code.

4. Provide a summary evaluation of the effect of the stretch power uprate on the design basis analysis for high energy line breaks, intermediate energy line breaks, jet impingement and pipe whip restraints.

5. Section 10.2, “Generic Letter 89-10 Motor-Operated Valve Program,” states that the flowrate for the feedwater pump discharge isolation valves will increase due to SPU conditions at IP2.

   Discuss the evaluation of the increased flowrate on the performance of these MOVs.

6. Section 10.2 states that the changes in system flows, pressures, and temperatures in the NSSSs resulting from the SPU have been documented, and that there are no changes that affect the conclusions of the MOV Program for the NSSS MOVs.

   Discuss the changes in system flows, pressure, and temperatures, and the evaluation of the impact on the performance of those MOVs.

7. Section 10.2 states that the effect of MOV operating parameter changes on related GL 89-10 parameters (e.g., valve dynamic thrust values) has been evaluated and determined to be acceptable.

   Discuss the MOV operating parameter changes, the related GL 89-10 parameters, and the evaluation that found those changes to be acceptable.

8. Section 10.2 states that the environmental data review determined that the changes in maximum ambient temperatures at MOV locations are acceptable.

   Discuss the maximum ambient temperature changes, and the evaluation that determined the impact on MOV performance to be acceptable (including consideration of Limitorque Technical Update 93-03, as applicable).

9. Section 10.2 states the analysis of a steamline break inside containment under SPU conditions takes credit for operation of the feedwater control valve isolation MOVs, and that these MOVs will be added to the GL 89-10 program.

   Provide the analysis that verifies the capability of the feedwater control valve isolation MOVs to perform their credited function under design-basis conditions (including procurement and maintenance history, actuator sizing and setup calculations, and static and dynamic diagnostic test results).

10. Section 10.7, “In-Service Inspection/In-Service Testing Programs,” states that the effect of changes on these programs from the SPU will be evaluated as part of the engineering change process.

    Discuss, with examples, the evaluation of the impact of the SPU conditions on the performance of safety-related pumps, POVs (including air-operated valves), check valves, and safety or relief valves. Discuss any resulting adjustments to the in-service testing program.

11. Section 10.8.4, “SPU Equipment Qualification Evaluation,” states that accident temperatures outside containment in the steam and feedline penetration area have been reanalyzed and result in higher temperatures, and that all equipment outside containment required for accident response have been justified as qualified.

    Discuss the evaluation of any safety-related pumps and valves located in the steam and feedline penetration area, and the impact on their performance from higher temperature due to SPU conditions.

12. Section 10.10, “Generic Letter 95-07,” states that the effect of the SPU on the current pressure locking and thermal binding evaluation was reviewed, and that the SPU does not introduce any increased challenge for thermal binding and/or pressure locking and does not effect the results and conclusions of the current evaluation.

    Discuss, with examples, the evaluation of the effect of the SPU on the potential for thermal binding and pressure locking of safety-related POVs, including consideration of increased ambient temperatures in applicable locations.

13. Section 10.15.4, “Startup Testing,” states that power escalation will be controlled by a specific procedure that includes controls for power escalation, hold points, and data collection requirements. Section 10.15.4 also states that a vibration monitoring activity will be initiated to monitor plant response at various power levels.

    Discuss the plans for power escalation including specific hold points and duration, inspections, and plant walkdowns. Also, discuss the vibration monitoring activity including data collection methods and locations, baseline vibration measurements, and planned data evaluation.

14. Discuss the evaluation of potential flow vibration effects resulting from SPU conditions for reactor pressure vessel internals, and steam and feedwater systems and their associated components, including impact on structural capability and performance during normal operations, anticipated transients (initiation and response), and design-basis conditions; and preparation for responding to the potential occurrence of loose parts as a result of the power uprate.