November 7, 2006

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

SUBJECT: JAMES A. FITZPATRICK NUCLEAR POWER PLANT - REQUEST FOR ADDITIONAL INFORMATION REGARDING AMENDMENT APPLICATION FOR ARTS/MEOD MODIFICATIONS (TAC NO. MC9681)

Dear Mr. Kansler:

On January 26, 2006, Entergy Nuclear Operations, Inc. (Entergy), submitted an application for a proposed amendment for the James A. FitzPatrick Nuclear Power Plant which would modify Technical Specification (TS) requirements to support the implementation of Average Power Range Monitor, Rod Block Monitor, TSs/Maximum Extended Operating Domain (ARTS/MEOD) analyses.

The Nuclear Regulatory Commission staff is 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). During a telephone call on October 25, 2006, the Entergy staff indicated that a response to the RAI would be provided within 45 days.

Please contact me at (301) 415-2901 if you have any questions on this issue.

Sincerely,

/RA/

John P. Boska, Senior Project Manager
Plant Licensing Branch I-1
Division of Operating Reactor Licensing
Office of Nuclear Reactor Regulation

Docket No. 50-333

Enclosure:
RAI

cc w/encl: See next page

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RAI
cc w/encl: See next page
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FitzPatrick Nuclear Power Plant

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FitzPatrick Nuclear Power Plant

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REQUEST FOR ADDITIONAL INFORMATION

REGARDING AMENDMENT APPLICATION FOR ARTS/MEOD MODIFICATIONS

ENTERGY NUCLEAR OPERATIONS, INC.

JAMES A. FITZPATRICK NUCLEAR POWER PLANT

DOCKET NO. 50-333

On January 26, 2006, Entergy Nuclear Operations, Inc. (Entergy), submitted an application for a proposed amendment for the James A. FitzPatrick Nuclear Power Plant which would modify Technical Specification (TS) requirements to support the implementation of Average Power Range Monitor (APRM), Rod Block Monitor (RBM), TSs/Maximum Extended Operating Domain (ARTS/MEOD) analyses. The Nuclear Regulatory Commission (NRC) staff is reviewing the submittal and has the following questions:

Section 1.0 Introduction

1-1 Allowable value (AV) and analytical limit (AL) are used in a few places in attachment 5 to the application. For example, on page 1-5, the first paragraph states "In the low flow stability region, the scram AVs are based on the scram ALs given in terms of core flow using the JAF [James A. FitzPatrick] core flow to drive flow relationship...". Provide a clear definition of AV and AL as used in the above statement. What is the difference between AV and AL and how they are related?

1-2 The two tables given on page 1-5 provide the scram and rod block AVs for single-loop operation. Provide the basis for the flow-biased scram and rod block setpoints. How were the specific slopes derived or established?

1-3 Pages 1-4 and 1-5 show the two-loop operation (TLO) and single-loop operation (SLO) AVs for ranges of drive flow. Explain if the plant can operate at SLO condition at different pump speeds? If not, explain the reasons for the range of flow-biased SLO rod block and scram lines. Are these flow-biased scram lines (which differ from the TLO scram lines) intended to initiate a scram if a transient occurs while the plant is operating at SLO condition? If yes, state what analyses are supporting operation at lower pump speeds for SLO (single pump at maximum capacity).

1-4 During SLO what is the corresponding percent power and percent flow for maximum extended load line limit analysis (MELLLA) operation?

Section 3 Fuel Thermal Limits

3-1 The last paragraph on Page 1-5 discussed RBM setpoint relaxation and that the RBM is not credited in the rod withdrawal error (RWE) for the reload analysis. Did Entergy perform RWE analyses to determine that a thermal limits penalty will not be necessary?

Enclosure

3-2 In Table 3-5, page 3-14, notes b, c, and d in the table were misplaced. Please correct this.

3-3 On Page 3-1, the first paragraph has the statement "The minimum core flow at 100% of rated thermal power (RTP) used in the analysis presented in this section is 81% of RCF [rated core flow]." Why not use the exact point at 79.8% of RCF corresponding to Figure 1-1 in the analysis?

3-4 At the top of Page 3.2, it states "The other two events (IRLS [idle recirculation loop start-up] and FRFI [fast recirculation flow increase]) are by design most limiting at off-rated conditions. Even when originated from their most limiting off-rated condition, the IRLS and FRFI are less limiting than the fast pressurization events (TTNBP [turbine trip with no bypass], LRNBP [load rejection with no bypass], or FWCF [feedwater controller failure]) at rated power conditions. Thus, the IRLS and FRFI events were not considered in the determination of the off-rated limits."

(a) Provide additional information (for example, plant response) to support the above statements. Explain why those two events were not analyzed in MELLLA operation domain.

(b) In addition, the table on Page 3-3 (lower left corner) states "The LFWH [loss of feedwater heating], FLE [fuel loading error], IRLS, and FRFI events are not limiting at off-rated conditions." This statement is not consistent with the above statement. Please provide clarification.

3-5 In Table 3-2, the table and footnote showed peak transient response values which occurred at end of cycle (EOC). Confirm if this analysis was performed at other exposures such as beginning of cycle (BOC) and middle of cycle (MOC).

3-6 Section 3.2 has a table for analytical assumptions. Please document that the JAF TS minimum number of SRVs and Turbines Out of Service is consistent with the analyses assumptions.

3-7 Section 3.3.6 stated that "Only adjustment of the P < PBypass portion of the MCPR(P) [minimum critical power ratio, power dependent] curve is required because, at P $\geq$ PBypass, the K(P) applies the rated power OLMCPR [operating limit MCPR] adjustment to the MCPR(P)."

Please reference the appropriate NRC-approved amendment to the General Electric Standard Application for Reactor Fuel or other topical report that explains this off-rated calculation methodology.

This section also provided an equation for the adjustment as follows when operating in SLO:

SLO OLMCPR = OLMCPR dual-loop + SLMCPR [safety limit MCPR] SLO - SLMCPR dual-loop.

Provide additional information on this approach (e.g., how was the above equation obtained?) and references.

Section 4 Reactor Recirculation (RR) System

4-1 Section 4.0 on the RR System has the following statements:

"The effects of aging and degradation mechanisms (e.g., jet pump crudding) were not included in the evaluation."

"The results of the evaluation indicate that the capability of the [recirculation] system to support operation at 105% of RCF may be marginal during some of the fuel cycle. If so, full 105% core flow may not be available until the end of the fuel cycle when the core differential pressure decreases, which causes the jet pump flow to increase for a given [recirculation] pump flow. Rotating equipment limitations are economic in nature and do not affect plant safety."

a) Is the recirculation system operating at its nameplate rating in capacity? Explain how plant measured flow data compared to the previous reload analysis in terms of the measured core flow versus assumed AV.

b) What is the potential impact of not accounting for "jet pump crudding," in the safety analyses? Explain why the analyses results are valid if the impact of aging and degradation of the system (such as jet pump crudding) are not accounted for.

c) Discuss what impact jet pump crudding may have on SLO flow calculations.

Section 7 Instability

7-1 Figure 7-1 shows the scram AV and rod block AV lines, which do not appear to be straight linear scram lines as expected from the equations. Specifically, the scram and rod block lines within the stability exclusion appear to be curved lines. Explain why.

7-2 Designate the SLO operating state point in the power/flow map and identify the corresponding scram and rod block lines. Show the flow biased SLO scram and rod block setpoints on Figure 7-1.

7-3 Describe how you obtain core mass flow rates, Wc, for SLO. Specifically, considering the reverse flow in the inoperable loop, explain how the accuracy of the Wc values is determined.

7-4 On page 7-2, it states "For JAF Cycle 16, the core average power-to-flow ratio is estimated to be 56.8 MWt/Mlbm/hr [megawatts thermal per million pounds mass per hour] and the generic DIVOM [delta critical power ratio over initial MCPR versus the oscillation magnitude] slope is valid for Cycle 16 operation." Explain what core flow state point was used in determining the 56.8 Mwt/Mlbm/hr value? Was this value calculated based on the rated thermal power at 75% core flow? If not, state why the minimum core flow state point is not an appropriate value.

7-5 In the middle of page 7-2, a new APRM flow-biased flux scram line for ARTS/MEOD operation was determined with the additional conservatism in the evaluation. The additional conservatism was listed in numerical order 1, 2, and 3. Please explain why these assumptions

were considered as conservative and how those numbers used in the assumptions were obtained.

Section 8 Loss-of-Coolant Accident (LOCA)

8-1 Please provide additional discussion on what kind of axial power profiles were assumed in the LOCA analysis.

8-2 At the end of the fourth paragraph on page 8-1, it states "These results show that operation in the MELLLA region affects the nominal PCT [peak cladding temperature] by +3F and the Appendix K PCT by +93F." Please explain why the effects on the Appendix K PCT are much more severe than the nominal PCT.

8-3 What were your upper bound PCT results?

8-4 On Page 8-4, there are the following notes for Table 8-2: "(a) The effect on the ECCS [emergency core cooling systems]-LOCA analysis PCT of operation in the MEOD domain for GE14 is conservatively applicable to GE12 and (b) The effect on the ECCS-LOCA analysis PCT for operation at core flows greater than 100% (ICF [increased core flow]) is negligible. Thus the PCTs for the limiting large break cases at rated conditions are applicable to the ICF condition." Please provide justification for these notes.

8-5 Please provide all state points including SLO and ICF for the calculation in Table 8-2.

8-6 On page 8-2, there is a statement "The current JAF Licensing Basis PCT for GE12 fuel is 1370°F with a 170°F adder for 10 CFR 50.46 reported errors applicable to the JAF ECCS-LOCA analysis".

Was the adder limited to 10 CFR 50.46 GE12 fuel or are additional adders applicable to the GE14 fuel? In addition, a "170°F" PCT adder is a significant number. Justify why JAF did not perform LOCA reanalysis for the GE12 fuel.

8-7 Did JAF perform full spectrum ECCS-LOCA analysis? If not, please justify.

Section 11 Anticipated Transient Without Scram (ATWS)

GE topical Table 11-2 shows the Peak Vessel Bottom Pressure for ATWS analysis at 1493 psig, which provides very little margin to the ATWS overpressure protection criterion of 1500 psig. The following questions pertain to the key assumptions, conservatism and valve tolerances assumed in the ATWS analysis.

11-1 Table 11-1 shows that the analysis assumed two of the safety-relief valves (SRVs) with the lowest pressure setpoints were assumed to be out of service (OOS). This is conservative. However, explain why two SRVs OOS was assumed in the analysis? Are there specific known reasons (e.g., tolerances outside TS values) that may lead to declaring SRVs OOS frequently?

11-2 To demonstrate the SRV performance at FitzPatrick, provide the "as found" SRV tolerances data. If the SRV tolerances are outside the TS value, justify why the tolerances assumed in the safety analyses should not be increased.

11-3 The application stated: "The MEOD analysis assumed that the SRVs opened at the upper Analytical Limit of the SRV Electric Lift Subsystem [(SRVELS)], and that the two lowest set SRVs were OOS…" The following questions address crediting the SRVELS in the safety analyses.

11-3.1 Table 11-1 specifies the initial conditions assumed in the ATWS analyses and shows that the SRVELS was credited. However, the Updated Final Safety Analysis Report (UFSAR) 4.4.5 (4th paragraph, last sentence) states that "SRVELS is not credited in any accident analysis." Since the SRV electric lift system is not a TS specified safety-grade system, justify why it is acceptable to take credit for it. Most importantly, state why credit for the SRVELS is necessary at FitzPatrick?

11-3.2 Table 11-1 shows SRVELS opening analytical limits at the UFSAR setpoint values of +1.5%. Justify the basis for not using TS +3% tolerance value.

11-4 Document the reasons why main steam isolation valve (MSIV) and pressure regulator failed open (PRFO) are the most limiting ATWS transients.

11-5 Table 11-2 shows a peak vessel bottom pressure for ATWS analysis of 1493 psig at 31.4 seconds. Since the ATWS peak pressure margin is low, state what conservatisms were assumed in the plant-specific inputs and ATWS analysis methods that will provide some confidence that the small margin is acceptable.

11-6 Confirm standby liquid control system (SLCS) success by providing the following event sequence information, preferably in tabular format:

a) Time of SLCS initiation
b) Reactor pressure vessel (RPV) bottom head pressure at time of SLCS initiation
c) RPV bottom head pressure at time of SLCS injection (SLCS initiation plus 30 sec SLCS liquid transport time - from Table 11-1)
d) SLC pump discharge relief valve setpoint
e) Delta psig SLCS pump margin available at time of SLCS initiation
f) Time hot shutdown is achieved.

<u>Instrumentation Questions</u>

1. Attachment 5 of the January 26, 2006, submittal is the General Electric Technical Report NEDC-33087P, Revision 1, dated September 2005. This report, on pages 1-4 and 1-5, lists the AV for the Flow-Biased APRM neutron flux high trip setting as:

Two Loop Operation:
0.38 * Wd + 61.0% for 0% < Wd $\leq$ 24.7%
1.15 * Wd + 42.0% for 24.7% < Wd $\leq$47.0%
0.63 * Wd + 73.7% for 47.0% < Wd $\leq$68.7%
With a maximum of 117.0% power for Wd > 68.7%

Single Loop Operation:
0.38 * Wd + 57.9% for 0% < Wd ≤ 32.7%
1.15 * Wd + 32.8% for 32.7% < Wd ≤ 50.1%
0.58 * Wd + 61.3% for 50.1% < Wd ≤95.9%
With a maximum of 117.0% power for Wd > 95.9%

By letter dated December 22, 2005, Entergy submitted Revisions 19 and 20 (cycle 17 update) to the Core Operating Limits Report which also listed the same equation. However, these equations are listed as trip settings. Based on this, the NRC staff is unable to determine whether these values have been calculated as AVs or trip settings. As a result, it is not clear as to the setpoint methodology used or how the instrument uncertainties have been addressed. Therefore, in order for the staff to determine the adequacy of the setpoint determination, please provide the setpoint methodology and calculation performed to determine the trip setpoint and limiting safety system setting. Also provide the information on how the operability of these instruments are determined during the surveillance tests required by the TSs.

2. On the bottom of page 5 of Attachment 1 to the December 22, 2005, application, it states that the physical changes to the plant to accommodate the expanded operating region include Flow Control Trip Reference cards. GE Report NEDC- 33087 references GE licensing topical report NEDC -32339P-A, Supplement 2, Revision 1. The staff's acceptance of NEDC - 32339P - A is based on certain design and installation criteria. Please provide the information to show that FitzPatrick meets those criteria. If these criteria are not met then justify the acceptability of these cards to establish the expanded operating region.