March 31, 2004

Mr. William R. Kanda, Vice President - Nuclear
First Energy Nuclear Operating Company
10 Center Road
P.O. Box 97
Perry, OH 44081

SUBJECT: REQUEST FOR ADDITIONAL INFORMATION (RAI) FOR THE REVIEW OF LICENSE AMENDMENT REQUEST TO INCREASE THE MAIN STEAM LINE TURBINE BUILDING HIGH TEMPERATURE TRIP SETPOINT ALLOWABLE VALUE AT PERRY NUCLEAR POWER PLANT (TAC. NO. MC0342)

Dear Mr. Kanda:

By letter dated August 14, 2003, First Energy Nuclear Operating Company (FENOC), requested approval of a license amendment for the Perry Nuclear Power Plant (PNPP) to increase the main steam line turbine building high temperature trip setpoint allowable value contained in the Technical Specification (TS) Table 3.3.6.1-1, item 1.f, "Allowable Value of Main Steam Line Turbine Building Temperature–High," function from 138.9°F to 149.6°F.

During the review, the NRC staff has identified that additional information is needed in order to complete the review. Specific questions are presented in the attached request for additional information (RAI).

The enclosed questions have already been discussed with your staff. In order to accommodate PNPP's need for this change before the summer, please respond to this RAI by May 26, 2004. If you have any questions concerning our review, or additional time is needed to respond to the RAI, please contact me at (301) 415-3154.

Sincerely,

/RA/

Stephen P. Sands, Project Manager, Section 2
Project Directorate III
Division of Licensing Project Management
Office of Nuclear Reactor Regulation

Docket No.: 50-440

Enclosures: Request for Additional Information

cc w/encl: See next page

March 31, 2004

Mr. William R. Kanda, Vice President - Nuclear
First Energy Nuclear Operating Company
10 Center Road
P.O. Box 97
Perry, OH 44081

SUBJECT: REQUEST FOR ADDITIONAL INFORMATION (RAI) FOR THE REVIEW OF LICENSE AMENDMENT REQUEST TO INCREASE THE MAIN STEAM LINE TURBINE BUILDING HIGH TEMPERATURE TRIP SETPOINT ALLOWABLE VALUE AT PERRY NUCLEAR POWER PLANT (TAC. NO. MC0342)

Dear Mr. Kanda:

By letter dated August 14, 2003, First Energy Nuclear Operating Company (FENOC), requested approval of a license amendment for the Perry Nuclear Power Plant (PNPP) to increase the main steam line turbine building high temperature trip setpoint allowable value contained in the Technical Specification (TS) Table 3.3.6.1-1, item 1.f, "Allowable Value of Main Steam Line Turbine Building Temperature–High," function from 138.9°F to 149.6°F.

During the review, the NRC staff has identified that additional information is needed in order to complete the review. Specific questions are presented in the attached request for additional information (RAI).

The enclosed questions have already been discussed with your staff. In order to accommodate PNPP's need for this change before the summer, please respond to this RAI by May 26, 2004. If you have any questions concerning our review, or additional time is needed to respond to the RAI, please contact me at (301) 415-3154.

Sincerely,
/RA/
Stephen P. Sands, Project Manager, Section 2
Project Directorate III
Division of Licensing Project Management
Office of Nuclear Reactor Regulation

Docket No.: 50-440

Enclosures: Request for Additional Information

cc w/encl: See next page

DISTRIBUTION:

PUBLIC	PDIII-2 R/F	AMendiola	SSands
PCoates	OGC	ACRS	SReynolds, RIII

ADAMS Accession Number: ML040860570

OFFICE	PM:LPD3-2	LA:LPD3-2	SC:LPD3-2
NAME	SSands	PCoates	DPickett for AMendiola
DATE	03/30/04	03/30/04	03/31/04

OFFICIAL RECORD COPY

cc:

Mary E. O'Reilly
FirstEnergy Corporation
76 South Main St.
Akron, OH 44308

Resident Inspector's Office
U.S. Nuclear Regulatory Commission
P.O. Box 331
Perry, OH 44081-0331

Regional Administrator, Region III
U.S. Nuclear Regulatory Commission
801 Warrenville Road
Lisle, IL 60532-4531

Sue Hiatt
OCRE Interim Representative
8275 Munson
Mentor, OH 44060

Mr. Vernon K. Higaki
Manager - Regulatory Affairs
FirstEnergy Nuclear Operating Company
Perry Nuclear Power Plant
P.O. Box 97, A210
10 Center Road
Perry, OH 44081

Timothy Rausch, Plant Manager
FirstEnergy Nuclear Operating Company
Perry Nuclear Power Plant
P.O. Box 97, SB306
Perry, OH 44081

Mayor, Village of North Perry
North Perry Village Hall
4778 Lockwood Road
North Perry Village, OH 44081

Donna Owens, Director
Ohio Department of Commerce
Division of Industrial Compliance
Bureau of Operations & Maintenance
6606 Tussing Road
P. O. Box 4009
Reynoldsburg, OH 43068-9009

Carol O'Claire, Chief, Radiological Branch
Ohio Emergency Management Agency
2855 West Dublin Granville Road
Columbus, OH 43235-7150

Mayor, Village of Perry
P.O. Box 100
Perry, OH 44081-0100

Dennis Clum
Radiological Assistance Section Supervisor
Bureau of Radiation Protection
Ohio Department of Health
P.O. Box 118
Columbus, OH 43266-0118

Zack A. Clayton
DERR
Ohio Environmental Protection Agency
ATTN: Mr. Zack A. Clayton
P.O. Box 1049
Columbus, OH 43266-0149

Chairman
Perry Township Board of Trustees
3750 Center Road, Box 65
Perry, OH 44081

Daniel Z. Fisher
Transportation Department
Public Utilities Commission
180 East Broad Street
Columbus, OH 43215-3793

Joseph J. Hagan
Senior Vice President
Engineering and Servicees
First Energy Nuclear Operating Company
76 South Main Street
Akron, Ohio 44308

REQUEST FOR ADDITIONAL INFORMATION

PERRY NUCLEAR POWER PLANT (PNPP)

LICENSE AMENDMENT REQUEST TO INCREASE MAIN STEAM LINE TURBINE BUILDING

HIGH TEMPERATURE TRIP SETPOINT ALLOWABLE VALUE CONTAINED IN THE

TECHNICAL SPECIFICATIONS

The Nuclear Regulatory Commission (NRC) staff has reviewed the August 14, 2004, FENOC submittal regarding changes to the Perry Nuclear Power Plant Technical Specification change. In order to complete the review of the proposed license amendment request (LAR), the staff needs the following information concerning the GOTHIC analysis used to support the change. The staff has focused on case W-3-33 (worst case for temperature response for proposed leak rate).

(1) It is stated that the GOTHIC subdivided volume model is used for cases where buoyancy-induced flow is expected to be the primary means of mass transport or, for this case, when the steam line break is small and there exists the possibility of a localized temperature response (CN 2.4.6.14 Rev 0, page 3 of 51). In the GOTHIC qualification manual two studies are presented which appear to be related to this LAR. One is standard problem 13 which shows thermal stratification for a 3x3 subdivided model, however, the results are not qualified and there is only a single control volume (1,000 ft^3). The other is an HDR study which supports the need for consistent vertical modeling, as used in the LAR model, however, the HDR is not on a scale similar to the turbine building. (a) Is there any data or comparisons to other computer programs (for example those used to evaluate building HVAC and contaminate transport) which can be used to assess or confirm the LAR model? (b) Have there been any "loss of ventilation" events at Perry which could be used to benchmark the model?

(2) A "steady-state" run, for a period of one hour, is performed before the transient starts. During this run the "steady-state" circulation flows are established based on the initial conditions and the modeling (flow paths, heat sinks and sources). During this time period the temperatures in the model decrease, with, for example, the fluid and heat sinks in control volume (CV) 1 reaching about 84.4 °F (starting at 110 °F). While this could be characterized as a conservative aspect of the model, it would take longer to heat up the cooled down fluid and structures, it would appear that the results may be influenced by the nodalization. (a) Are the conditions at the end of the "steady-state" run the expected conditions at the time of the leak? (Note, for other cases, summer and average, the results are different.) (b) Have nodalization studies, changes in the number of subdivided volumes per control volume and number of control volumes, been performed to support the LAR model? (c) The heat sources and boundary conditions (fixed heat fluxes) should be re-evaluated to provide a better "steady-state," or additional justification for the current model is needed.

ENCLOSURE

(3) The intent of the environmental boundary condition, BC 1P, is to maintain the pressure in the lower elevations in the turbine building at near atmospheric pressure, with the area of flow path (FP) 21 set large enough to allow the air to be driven to the outside atmosphere. It would therefore be expected that the various CVs in the model would remain at, or near, about 14.7 psia. However, during the “steady-state” portion of the transient, the pressure rises to about 15.3 psia. Following the start of the leak the pressure increases to about 15.92 psia, in 14 minutes, and settles down to about 15.8 psia. This could be characterized as non-conservative, it would not take as long to heat up the fluid and structures at the higher pressure. (a) Are the conditions at the end of the “steady-state” run the expected conditions at the time of the leak? (Note, for other cases, summer and average, the results are different.) (b) FP 21 should be re-evaluated (area, hydraulic diameter) to provide a means to maintain the pressure near atmospheric or the current model needs additional justification.

(4) Based on guidance in the GOTHIC User Guide (for a sharp-edged orifice in a wall that is much larger than the orifice - as discussed in Section 21.6.3 “Doorways”), a forward and reverse non-recoverable loss coefficient of 2.78 is used in all FPs. It is not clear that FPs with areas on the order of 100 to 900 ft^2 would be covered by this guidance. The effective CV areas are on the order of 1,000 to 8,000 ft^2, before subdividing into smaller interfaces. Consider FP 5 with an area of 915 ft^2, connecting CV 7s12 to CV 6s11. The subdivided volume interface area is about 1,200 ft^2 (39 ft by 30.5 ft), with a total side area of 8,050 ft^2 (115 ft by 70 ft). The total FP area between CV 7 and CV 6 is over 4,300 ft^2. (a) Provide justification for the value used for the loss coefficient, including reference to appropriate data. (b) Have any studies been performed to assess the importance of this assumption? (c) Is the geometry and forced circulation closer to the case where the value should be 1.0?

(5) It appears that only CV 7 includes modeling of X-direction and Y-direction cell face variations, in addition to the Z-direction (elevation). (a) Why is this appropriate, should the other CVs include these variations? (b) What does GOTHIC assume if the information is not provided, is the (default) “def” value used throughout?

(6) In developing the flow path modeling, it is assumed that the volume-to volume flow velocities are relatively small and a constant flow path inertia length (30 ft) is used for all volume-to-volume connections (FP 23 used 70 ft) and the flow path friction length is set to a small constant value (1.0 ft). It is further stated that the friction length is only important for thermally or buoyancy driven flows and the LAR case is driven by the forced ventilation system (CN 2.4.6.14 Rev 0, page 7 of 51), that is this length is unimportant. It also appears that the hydraulic diameters are assumed to be constant for large or small areas, and that for FPs 15 to 20 they represent some type of flow restriction. (a) Have any studies been performed to assess the importance of these assumptions? (b) Have the results been assessed to verify these assumptions? (c) Explain the apparent inconsistency between the statements on pages 3 (See (1) above) and 7 of CN 2.4.6.14 Rev 0. (d) Provide the rationale for the selection of the hydraulic diameters and assess their importance.

(7) Scoping studies (attempting to address the above issues) performed by the staff, using GOTHIC 7.0, indicate that there is a large uncertainty in the time to reach the proposed high temperature trip setpoint, ranging from about 8 minutes to 48 minutes to reach 155 °F. The initial and boundary conditions address seasonal changes and are

reasonable. How should uncertainties in developing the model (nodalization, flow path characterization and heat sources/sinks) be considered in establishing the setpoint?

(8) The submittal states that with a leak of 280 gpm, the Main Steam system will isolate in about 17.5 minutes to limit the impact of the leak. The submittal does not discuss leaks of <280 gpm but >25 gpm. The staff is concerned that a lesser but still substantial leak could go undetected for an extended period of time with unanalyzed consequences. The licensee needs to provide an analysis that addresses the impact of leaks between 25 and 280 gpm.

(9) On page 3 of 7 of the technical analysis, item 3 states that: "The leak will be detected before the leakage could increase a level beyond the capability of the makeup system." What is the approximate leak rate outside containment during normal operation? How much leakage can be compensated by the excess capacity of the feedwater system? How much CRD flow will also compensate for the leak? The present allowable leakage rate of 25 gpm is made up by the above systems. Please confirm that the proposed 280 gpm leakage rate can be made-up by those systems.

(10) On page 5 of 7–Leakage Shall not Exceed Makeup Capability "GE establishes the Loss of Coolant Accident limit as an equivalent 2-inch diameter schedule 80 pipe break based on the normal capability, which is approximately an equivalent mass Main Steam System leakage value of 383 gpm." Please clarify whether 383 gpm is at the upstream or downstream of the break.