May 21, 2001

MEMORANDUM TO: File

FROM: Thomas W. Alexion, Project Manager, Section 1 ***/RA/***
Project Directorate IV & Decommissioning
Division of Licensing Project Management

SUBJECT: ARKANSAS NUCLEAR ONE, UNIT 2 RE: PROPOSED LICENSE AMENDMENT ON EXTENDED POWER UPRATE (TAC NO. MB0789)

The U. S. Nuclear Regulatory Commission (NRC) staff has had discussions with Entergy Operations, Inc., the licensee, on its December 19, 2000, "Application for License Amendment to Increase Authorized Power Level." The requested power level increase is 7.5%.

In order to facilitate these discussions, the NRC provided the licensee with a preliminary request for additional information (RAI) on reactor systems. This RAI does not represent final NRC positions and it may get revised as a result of discussions with the licensee. The purpose of this memorandum is to place the attachment in the Public Document Room.

Docket No. 50-368

Attachment: As stated

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NAME	TAlexion	DJohnson
DATE	05/14/01	5/14/01

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Request for Additional Information on
Reactor Systems
Extended Power Uprate License Amendment Application
Arkansas Nuclear One, Unit 2 (ANO-2)

General

Several instances in the Power Uprate Licensing Report (PULR) refer to a "107.5% power uprate". Please change this phrase to either a "7.5 percent power uprate" or an "uprated power of 3026 megawatts thermal."

PULR Section 4.1.1 - Reactor Coolant System

The PULR states on page 4-2 that the original design T_{hot} was 612 °F and that the Cycle 16 T_{hot} would be 609 °F. Streaming effects from low leakage cores can cause a stratified temperature profile in the hot legs with the peak temperature being higher than the average temperature. Have you observed hot leg streaming effects in ANO-2? What is the impact of the peak hot leg temperature exceeding the design temperature due to present or future hot leg streaming effects?

Standard Review Plan (SRP) Section 5.2.2 - Overpressure Protection

Page 4-3 of the PULR states that the effect of power uprate and the replacement steam generators on the low temperature overpressure protection (LTOP) analysis was discussed in correspondence dated December 21, 1999 (2CAN129907). The referenced correspondence does not discuss the effect of the power uprate. Please confirm that an LTOP analysis was performed that accounts for the power uprate and provide the steam generator tube plugging limits for which the analysis is valid.

Page 5-28 of the PULR discusses the report on overpressure protection. Please provide the assumptions and results (including the steam generator tube plugging limits for which these analyses are valid) for the bounding pressure excursion transients that were used to evaluate the adequacy of the sizing for the primary and secondary safety valves at the uprated power level.

SRP Section 5.4.7 - Residual Heat Removal System

Section 4.1.4, page 4-7 of the PULR states that an evaluation of the shutdown cooling system was performed that is comparable to that described in Safety Analysis Report (SAR) Section 9.3.6.6. Please provide your evaluation that demonstrates the adequacy of the shutdown cooling system at the uprated power level.

PULR Section 4.1.2 - Chemical and Volume Control System (CVCS)

Page 4-5 of the PULR states that the design requirement for the CVCS system to provide for letdown or makeup for a 75 °F/hr heatup or cooldown was met except for a momentary deficit. This indicates that there must be a revised design requirement that was met without exception. Please state the true design requirements and verify that they are met without exception.

SRP Chapter 15 - Accident Analysis

Page 7-105 of the PULR states that the power measurement uncertainty was reduced. Justify the reduction in power uncertainty from 3 percent to 2 percent.

Table 8.3-1 of the PULR states that the peak rod axial average burnup is 67,300 megawatt days per metric ton uranium (MWD/MTU). This value is greater than the NRC-approved burnup limit for your fuel and is outside that range of approval and validity of your fuel rod evaluation codes. Please provide a list of all safety analyses that are affected by this assumption and provide information to show that the analyses are conservative when they are done within the valid limits of fuel burnups.

Your report does not list the fuel bundle designs that will be present in the core after the power uprate. Provide a list and description of the fuel bundle designs that will be used in your core. If more than one fuel bundle design is used, how are mixed core effects evaluated?

Page 7-105 of the PULR states that the charging pump flow was changed from 44 gallons-per-minute (gpm) to 46 gpm for the Chapter 15 safety analyses. What is the impact of raising the CVCS flow rate from 44 gpm to 46 gpm? What safety analyses are affected by this change? Why is there no technical specification change if this new value is required to meet the safety analysis?

Verify that your analyses use approved methodologies and that your analyses and inputs meet all restrictions in the approved methodologies. For example, a fuel burnup of 67,300 MWD/MTU would not meet the restrictions of your approved fuel rod modeling methodology.

The tube plugging limits in your transient, accident, and loss-of-coolant accident (LOCA) analyses are set at 10 percent (i.e., pages 7-14 and 7-18 of the PULR). What is the maximum percentage of plugged tubes allowed in any single steam generator? Was the effect of this allowed asymmetry (if any) evaluated for all transient, accident, and LOCA analyses.

Please provide the initial steam generator mass and the basis for that value for all Chapter 15 transient and accident analyses.

PULR Section 7.3.11.2 - Feedwater Line Break Accident

Provide the location of the feedwater line inlet in your steam generator.

Justify that the low level trip occurs with at least 40,000 pounds mass (lbm) of liquid remaining in the faulted steam generator (page 7-135 of the PULR). The justification should be based on the accuracy of the instrumentation under the conditions and the physics of two phase flow. What is the impact of not being able to take credit for this trip?

10 CFR 50.62 - Anticipated Transients Without Scram (ATWS)

Please submit an analysis of an ATWS at the uprated power level to show that peak pressures and the percentage of cycle with an unfavorable moderator temperature coefficient are

consistent with those considered by the staff in deliberations leading to promulgation of the ATWS rule.

SRP Section 15.6.5 - LOCA

Please provide your analysis of the switch over from refueling water storage tank injection to sump recirculation to show that the core remains at an adequately cool temperature during any flow reduction or interruption that may occur during switch over. The analysis assumptions should be consistent with your emergency operating procedures.

Page 7-6 of the PULR states that the long-term cooling model is different than the one referenced in the ANO-2 SAR. Please provide your long term cooling analysis as required by the Safety Evaluation approving topical report CENPD-254-P-A when it is first applied to a plant application referencing the report.

Please provide the results of your pump trip analysis for a small-break LOCA as required by Item II.K.3.5 of NUREG-0737, "Clarification of TMI Action Plan Requirements," to determine the maximum time allowed to trip the reactor coolant pumps?

10 CFR 50.63 - Station Blackout

Please submit the ANO-2 coping analysis for a station blackout at the uprated power level to show that the plant is able to cope with a station blackout for the ANO-2 specific duration.

SRP Section 4.2 - Fuel System Design, PULR Chapter 8 - Nuclear Fuel

Table 8.3-1 of the PULR lists the peak rod axial average burnup as 67,300 MWD/MTU both for current conditions and for uprated conditions. Please explain this, considering that the maximum approved 1 pin burnup is 60 megawatt days per kilogram uranium per references 8.3-8 and 8.3-9.

Section 8.1.1.1 of the PULR gives a brief description of the rod bow penalties. Please expand on this description. In particular, please discuss why the value given for burnups up to 33 gigawatt days per metric ton uranium (GWD/MTU) is valid and provide a more detailed justification of no penalty for burnups beyond 33 GWD/MTU.