

June 7, 2001

MEMORANDUM TO: File

FROM: Thomas W. Alexion, Project Manager, Section 1 /RA/
Project Directorate IV
Division of Licensing Project Management
Office of Nuclear Reactor Regulation

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 materials and chemical engineering issues. 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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Request for Additional Information on
Materials and Chemical Engineering Issues
Extended Power Uprate License Amendment Application
Arkansas Nuclear One, Unit 2 (ANO-2)

1. Reactor Vessel Structural Integrity

Part 50 to Title 10, *Code of Federal Regulations*, requires that NRC-licensed utilities perform the following structural integrity analyses for the pressurized water reactor (PWR)-designed reactor vessels:

- Pressurized Thermal Shock (PTS) Analyses as required by 10 CFR 50.61,
- Pressure/Temperature (P/T) Limit and Low Temperature Overpressurization (LTOP) Analyses required by 10 CFR Part 50, Appendix G, and
- Upper Shelf Energy Analyses (USE) required by 10 CFR Part 50, Appendix G.

In Section 8.4 of the ANO-2 Power Uprate Licensing Report (PULR), you indicate:

- that a reactor pressure vessel (RPV) surveillance capsule was removed during ANO-2 Refueling Outage (RO) 2R14, and that a revised fast neutron fluence will be calculated for this capsule,
- that the revised fluence calculation will be used as the basis for revising the P/T Limit, LTOP and PTS Analyses for ANO-2,
- that, as a result to a change of the limited ANO-2 RPV beltline material, the current curves in the Technical Specifications (TSs) are applicable through approximately 17 effective full power years (EFPYs), and not 21 EFPYs as is currently specified in TS Figures 3.4-2A, 3.4-2B, and 3.4-2C, and
- that the current TS curves are conservatively estimated to be applicable through the beginning of Cycle 16 (the next operating cycle), and that at the beginning of Cycle 15 the fuel burnup for ANO-2 was approximately 15.7 EFPYs.

It needs to be emphasized that a revised USE analysis will also be needed for a 7.5% increase in rated power. It also needs to be emphasized that this surveillance capsule was not irradiated under the power-uprated conditions; the revised fluence calculations based on this capsule, therefore, may not conservatively bound the neutron fluences used for P/T, LTOP, PTS, and USE analyses in the current ANO-2 licensing basis. The licensee is therefore requested to either:

- a. provide technical analyses to demonstrate the P/T, LTOP, PTS, and USE analyses in the current ANO-2 licensing basis will remain valid (are bounded) for the neutron fluences that are estimated to result from the 7.5% increase in rated power, or

- b. if the fluences used for the current P/T, LTOP, PTS, and USE analyses will not be bounded by those that will result from the 7.5% increase in rated power, provide revised P/T, LTOP, PTS, and USE analyses that are based on the neutron fluences that are estimated to result from the 7.5% increase in rated power. [NOTE: If ANO-2 reactor will reach 17 EFPYs prior to the end of Cycle 16, the current approved PT curves (i.e., TS Figures 3.4-2A, 3.4-2B, and 3.4-2C) in the ANO-2 TSs will not be valid for a portion of the next operating cycle, and revised PT limit curves should therefore be submitted six months prior to the anticipated time when 17 EFPYs will be exceeded to allow the staff ample time to approve the curves.]

2. Effect on Steam Generator Tube Integrity

The licensee installed replacement steam generators in the fall of 2000. In License Amendment 223, dated October 4, 2000, NRC approved the changes to ANO-2 TSs in regard to steam generator surveillance requirements and sleeving repair criteria as a part of steam generator replacement. However, there is no discussion of the impact of the power uprate on the steam generator tube integrity in the December 19, 2000, submittal. The staff has determined that the following issues need to be addressed for the replacement steam generators under power uprate conditions:

- a. Discuss the potential impact of changes in flow rate on tube wear degradation from anti-vibration bars.
- b. Discuss the potential impact of the power uprate on other modes of tube degradation (other than wear) in the replacement steam generator tubing.
- c. Discuss the potential impact of the power uprate on the 40-percent plugging limit in the ANO-2 TSs.

3. ANO-2 PULR Section 2.3.1, "Fuel Pool System"

The fuel pool system, described in Section 2.3.1, has a dual function of removing heat from the spent fuel pool and removing impurities from its water. The licensee has demonstrated that the heat removal function will not be significantly affected by the power uprate, but the cleaning function was not addressed in the submittal. Please describe how the purification of the spent fuel pool water will be affected by the power uprate. Your response should address the potential effect of power uprate on the amount of impurities in the pool's water and on the performance of the ion exchange resin.

4. ANO-2 PULR Section 7.3.10, "LOCA [Loss-of-Coolant Accident] Dose Analysis"

The LOCA dose analysis, described in Section 7.3.10, contains updated particulate iodine spray removal coefficients. Please describe how these revised coefficients were determined. Provide the methods and the input parameters used in the calculations.