Template = NRR-058

April 4, 2000

Mr. Craig G. Anderson
Vice President, Operations ANO
Entergy Operations, Inc.
1448 S. R. 333
Russellville, AR 72801

SUBJECT: ARKANSAS NUCLEAR ONE, UNIT NO. 2 - ISSUANCE OF AMENDMENT RE: REMOVAL OF REACTOR VESSEL SPECIMEN TABLE FROM TECHNICAL SPECIFICATIONS AND CHANGE TO REACTOR VESSEL SPECIMEN TABLE (TAC NO. MA8104)

Dear Mr. Anderson:

The Commission has issued the enclosed Amendment No. 213 to Facility Operating License No. NPF-6 for Arkansas Nuclear One, Unit No. 2. This amendment consists of changes to the Technical Specifications (TSs) in response to your application dated January 27, 2000.

The amendment relocates the schedule for the withdrawal of reactor vessel material surveillance specimens, from the TSs to the Safety Analysis Report, pursuant to the guidance provided in Generic Letter 91-01, "Removal of the Schedule for the Withdrawal of Reactor Vessel Material Specimens From Technical Specifications." Changes to the related Bases are also made. In addition, the proposed change to the surveillance specimen removal schedule is approved.

A copy of our related Safety Evaluation is also enclosed. The Notice of Issuance will be included in the Commission's next biweekly *Federal Register* notice.

Sincerely,

/RA/

Thomas W. Alexion, Project Manager, Section 1
Project Directorate IV & Decommissioning
Division of Licensing Project Management
Office of Nuclear Reactor Regulation

Docket No. 50-368

Enclosures:
1. Amendment No. 213 to NPF-6
2. Safety Evaluation

cc w/encls: See next page

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UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D.C. 20555-0001

April 4, 2000

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Vice President, Operations ANO
Entergy Operations, Inc.
1448 S. R. 333
Russellville, AR 72801

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Thomas W. Alexion

Thomas W. Alexion, Project Manager, Section 1
Project Directorate IV & Decommissioning
Division of Licensing Project Management
Office of Nuclear Reactor Regulation

Docket No. 50-368

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2. Safety Evaluation

cc w/encls: See next page

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& Chief Operating Officer
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UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D.C. 20555-0001

ENTERGY OPERATIONS, INC.

DOCKET NO. 50-368

ARKANSAS NUCLEAR ONE, UNIT NO. 2

AMENDMENT TO FACILITY OPERATING LICENSE

Amendment No. 213
License No. NPF-6

1. The Nuclear Regulatory Commission (the Commission) has found that:

   A. The application for amendment by Entergy Operations, Inc. (the licensee), dated January 27, 2000, complies with the standards and requirements of the Atomic Energy Act of 1954, as amended (the Act), and the Commission's rules and regulations set forth in 10 CFR Chapter I;

   B. The facility will operate in conformity with the application, the provisions of the Act, and the rules and regulations of the Commission;

   C. There is reasonable assurance (i) that the activities authorized by this amendment can be conducted without endangering the health and safety of the public, and (ii) that such activities will be conducted in compliance with the Commission's regulations;

   D. The issuance of this license amendment will not be inimical to the common defense and security or to the health and safety of the public; and

   E. The issuance of this amendment is in accordance with 10 CFR Part 51 of the Commission's regulations and all applicable requirements have been satisfied.

2. Accordingly, the license is amended by changes to the Technical Specifications as indicated in the attachment to this license amendment, and paragraph 2.C.(2) of Facility Operating License No. NPF-6 is hereby amended to read as follows:

   2. Technical Specifications

      The Technical Specifications contained in Appendix A, as revised through Amendment No. 213 , are hereby incorporated in the license. The licensee shall operate the facility in accordance with the Technical Specifications.

3. The license amendment is effective as of its date of issuance and shall be implemented within 30 days from the date of issuance.

FOR THE NUCLEAR REGULATORY COMMISSION

Robert A Gramm

Robert A. Gramm, Chief, Section 1
Project Directorate IV & Decommissioning
Division of Licensing Project Management
Office of Nuclear Reactor Regulation

Attachment: Changes to the Technical Specifications

Date of Issuance: April 4, 2000

ATTACHMENT TO LICENSE AMENDMENT NO. 213

FACILITY OPERATING LICENSE NO. NPF-6

DOCKET NO. 50-368

Replace the following pages of the Appendix A Technical Specifications with the attached revised pages. The revised pages are identified by amendment number and contain marginal lines indicating the areas of change.

Remove	Insert
3/4 4-22a	3/4 4-22a
3/4 4-24	3/4 4-24
B 3/4 4-10	B 3/4 4-10

SURVEILLANCE REQUIREMENTS

4.4.9.1.1 The Reactor Coolant System temperature and pressure shall be determined to be within the limits at least once per 30 minutes during system heatup, cooldown, and inservice leak and hydrostatic testing operations.

4.4.9.1.2 The reactor vessel material irradiation surveillance specimens shall be removed and examined, to determine changes in material properties, at the intervals shown in SAR Table 5.2-12. The results of these examinations shall be used to update Figures 3.4-2A, 3.4-2B and 3.4-2C.

Table Deleted
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BASES

The Lowest Service Temperature is the minimum allowable temperature at pressures above 20% of the pre-operational system hydrostatic test pressure (624 psia). This temperature is defined as equal to the most limiting RTNDT for the balance of the Reactor Coolant System component (conservatively estimated as 50°F) plus 100°F, per Article NB 2332 of Section III of the ASME Boiler and Pressure Vessel Code. Temperature instrument uncertainty is conservatively estimated as 20°F.

The horizontal line between the minimum boltup temperature and the Lowest Service Temperature is defined by the ASME Boiler and Pressure Vessel Code as 20% of the pre-operational hydrostatic test pressure.

The minimum boltup temperature is the minimum allowable temperature at pressures below 20% of the pre-operational system hydrostatic test pressure. The minimum is defined as the initial RT_{NDT} for the material of the higher stressed region of the reactor vessel plus any effects for irradiation per Article G-2222 of Section III of the ASME Boiler and Pressure Vessel Code. The initial reference temperature of the reactor vessel and closure head flanges was determined using the certified material test reports and Branch Technical Position MTEB 5-2. The maximum initial RT_{NDT} associated with the stressed region of the vessel flange is 30°F. The minimum boltup temperature including temperature instrument uncertainty is 30°F + 20°F = 50°F. However, for additional conservatism, a minimum boltup temperature of 70°F is utilized.

The number of reactor vessel irradiation surveillance specimens and the frequencies for removing and testing these specimens are provided in SAR Table 5.2-12 to assure compliance with the requirements of Appendix H to 10 CFR Part 50.

The limitations imposed on the pressurizer heatup and cooldown rates are provided to assure that the pressurizer is operated within the design criteria assumed for the fatigue analysis performed in accordance with the ASME Code requirements.

UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D.C. 20555-0001

SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION

RELATED TO AMENDMENT NO. 213 TO

FACILITY OPERATING LICENSE NO. NPF-6

ENTERGY OPERATIONS, INC.

ARKANSAS NUCLEAR ONE, UNIT NO. 2

DOCKET NO. 50-368

1.0 INTRODUCTION

By letter dated January 27, 2000, Entergy Operations, Inc. (the licensee), submitted a request for changes to the Arkansas Nuclear One, Unit No. 2 (ANO-2), Technical Specifications (TSs). The requested changes would revise TS 4.4.9.1.2 regarding surveillance capsule removal and testing intervals by replacing the reference to TS Table 4.4-5 with a reference to Safety Analysis Report (SAR) Table 5.2-12, and it would delete TS Table 4.4-5 which lists the surveillance capsule removal and testing time intervals. The request is based on the provisions of Generic Letter (GL) 91-01 "Removal of the Schedule for the Withdrawal of Reactor Vessel Material Specimens From Technical Specifications," issued January 4, 1991. The capsule removal schedule currently is part of the TSs, however, removal is consistent with the TS improvement program.

The submittal also requests staff review and approval of a revised capsule removal schedule as provided by NRC Administrative letter 97-04, "NRC Staff Approval for Changes to 10 CFR Part 50, Appendix H, Reactor Vessel Surveillance Specimen Withdrawal Schedules." The licensee requests to remove the next surveillance capsule during the scheduled fall 2000 refueling outage at about 15.5 effective full power years (EFPY) of operation. This capsule removal satisfies the requirements of American Society for Testing and Materials (ASTM) E185-82 "Standard Practice for Conducting Surveillance Tests for Light-Water Cooled Nuclear Power Reactor Vessels," which was adopted by reference in Appendix H to 10 CFR Part 50.

2.0 EVALUATION

2.1 Removal of Table 4.4.5 from the TS

ANO-2 TS 4.4.9.1.2 requires the reactor vessel material irradiation surveillance specimens be removed and examined at the intervals specified in TS Table 4.4-5. Under the proposed change, Table 4.4-5 will be removed from the TS and referenced in the ANO-2 SAR.

GL 91-01 provides guidance for the preparation of a license amendment request to remove the schedule for the withdrawal of reactor vessel material surveillance specimens from the TSs. According to GL 91-01, the removal from the TS of the schedule for the withdrawal of reactor vessel material surveillance specimens will not result in any loss of regulatory control because changes to this schedule are controlled by the requirements of Appendix H to 10 CFR Part 50, "Reactor Vessel Material Surveillance Program Requirements." The main provisions of the GL are as follows.

- To ensure that the surveillance specimens are withdrawn at the proper time, the surveillance requirements in the TS on pressure and temperature limits must indicate that the specimens shall be removed and examined to determine changes in their material properties, as required by Appendix H.

- Licensees should include an updated Bases section for this TS with this proposal if changes to the Bases section are necessary to remove references to the table being removed from the TS.

- The licensee should commit to maintain the NRC-approved version of the specimen withdrawal schedule in the SAR.

The licensee's actions meet all the criteria of the GL. It stated that it will modify the related TS surveillance requirement 4.4.9.1.2 (described above) and associated bases to reflect the SAR location for the capsule removal schedule; and that it already included the schedule for capsule withdrawal in the Unit 2 SAR, Table 5.2-12.

2.2 Changing the Surveillance Specimen Removal Schedule

2.2.1 Appendix H Compliance

The licensee intends to remove a specimen capsule during the scheduled fall 2000 ANO-2 refueling outage (2R14) at approximately 15.5 EFPY rather than the currently scheduled 19 EFPY. The current removal schedule at 19 EFPY will occur during ANO-2 cycle 17, scheduled for fall 2003. This schedule conforms to ASTM E185-82, "Standard Practice for Conducting Surveillance Tests for Light-Water Cooled Nuclear Power Reactor Vessels," as referenced by 10 CFR 50, Appendix H.

Appendix H states that the design of the surveillance program and the withdrawal schedule must meet the requirements of the edition of ASTM E185 that is current on the issue date of the American Society of Mechanical Engineers Code to which the reactor vessel was purchased. Later editions of ASTM E185 may be used, but including only those editions through 1982.

The licensee stated that its withdrawal schedule conforms to ASTM E185-82. The schedule in TS Table 4.4-5 originally showed the first capsule being withdrawn at 5 EFPY. But, to support work that the industry was doing on monitoring fluence, the licensee revised the schedule to pull the capsule at the end of cycle 2, or 1.69 EFPY.

The licensee wants to change the removal scheduled for 19 EFPY to 15.5 EFPY for a number of reasons. Among these are:

- The fluence determination used to develop the current 21 EFPY pressure-temperature limits was based on a linear extrapolation from the one data point at the end of cycle 2 out to 21 EFPY. Inherent in that analysis was the continued use of "high leakage" cores. However, in cycle 7 the core was changed to a "low leakage" design, in part, to reduce the vessel fluence. This reduction in the vessel fluence was not accounted for in determining the 21 EFPY fluence values.

- Cycle 17, which corresponds to the current removal schedule at 19 EFPY, is one cycle after the power uprate and two cycles after the replacement of the steam generators. The cycle 16 and possibly the cycle 17 power uprated cores will be of a higher leakage core design than the current core designs.

- Since cycle 2, the inlet temperature has been decreased several times. With the new steam generator replacement, the inlet temperature will be increased to near the temperature in cycle 1. In addition, the poison in the fuel was changed from boron carbide to gadolinium and will later be changed to erbium. The fuel enrichment has also increased through reload fuel cycles.

On the basis of these considerations, the licensee thinks it prudent to change the withdrawal schedule of the next surveillance capsule. It will revise the schedule contained in the ANO-2 SAR to withdraw a capsule during the steam generator replacement outage (at the end of cycle 14, approximately 15.5 EFPY). This would allow enough time to have the capsule analyzed and to adjust the pressure/temperature, low temperature overpressure protection, and pressurized thermal shock analyses before exceeding the basis for the fluence values listed in the current TS.

The staff notes that Table 1 of ASTM E185-82 calls for withdrawing the second capsule at 15 EFPY or at the time when the accumulated fluence of the capsule corresponds to the approximate end-of-life fluence at the reactor vessel inner wall location, whichever comes first. Withdrawing the capsule at 15.5 EFPY corresponds to the table and is therefore acceptable and preferable. Other considerations favor the new withdrawal schedule. The licensee withdrew the first specimen earlier than the table calls for (at 1.69 versus 5 EFPY). An earlier withdrawal date of the second capsule is desirable because it would reduce the interval of gathering of data. Withdrawal of the third capsule at the end-of-life is, according to the table, acceptable. Moreover, the licensee has three extra standby capsules; these are not required by the table. Their presence ensures the possibility of adjusting the schedule should the earlier withdrawn specimens not give the desired results. For all these considerations, the staff finds that the licensee's change is acceptable.

2.2.2 Vessel Fluence

The current pressure temperature limits were developed for 21 EFPY of operation. The fluence was extrapolated from the results of the analysis of the capsule removed at the end of cycle 2, after 1.69 EFPY of operation. However, the early cycles were refueled with the out-in loading scheme, which has high neutron leakage. In cycle 7 the core loading pattern was changed to low leakage. Therefore, the fluence to 19 EFPY, which is the current removal schedule, is overestimated. In addition, the inlet water temperature decreased several times since cycle 2. This also contributes toward an actual lower fluence value.

The current surveillance capsule removal schedule will occur during cycle 17 (scheduled for fall 2003). However, the licensee plans to implement a power uprate during cycle 16 outage and will replace the steam generators prior to cycle 15. In addition the licensee informed the staff of their intent to revise the surveillance capsule withdrawal schedule to the 14th refueling outage in compliance with the requirements of GL 92-01, Revision 1, "Reactor Vessel Structural Integrity," dated March 6, 1992. The 14th refueling outage is scheduled for the fall of 2000.

The impending plant modifications of the steam generator and the power uprate will contribute to increase the fast neutron flux to the pressure vessel by amounts which have not been estimated by the licensee. For example, the inlet water temperature will rise to the value of the initial cycles, increasing the flux to the vessel. In addition, the neutron absorbers in the new fuel design will change from boron carbide to gadolinium (and later to erbium), altering the amount and the spectrum of the neutron leakage.

The current surveillance capsule removal schedule for ANO-2 calls to remove the next capsule at 19 EFPY, which is in 2003. However, the licensee scheduled a power uprate and steam generator changes before the scheduled capsule removal. The proposed change in the surveillance capsule removal and testing intervals is acceptable because: (1) the time to the next evaluation is shorter than what is required by the current TSs, (2) quantification of the fluence at this point in the plant's life will provide a better baseline with which to assess the effects of the pending plant modifications on the vessel fluence, and (3) it will provide a more precise fluence evaluation for future plant operation. The staff finds that the proposed change of the removal schedule before the plant modifications is prudent and conservative. Therefore, the staff agrees with the proposed changes to the TSs which implement the proposed surveillance capsule removal schedule.

2.3 Summary

The staff finds that the licensee's proposed removal of TS Table 4.4.5 meets the criteria of GL 91-01, and is therefore acceptable. The licensee may, accordingly, make its proposed change (i.e., remove Table 4.4-5 from the TS and reference it in the ANO-2 SAR).

The staff also finds that the licensee's proposed change to the withdrawal schedule of a specimen capsule from 19 EFPY to 15.5 EFPY is in accordance with ASTM E185-82, and is prudent and conservative. Therefore, it is also acceptable.

3.0 STATE CONSULTATION

In accordance with the Commission's regulations, the Arkansas State official was notified of the proposed issuance of the amendment. The State official had no comments.

4.0 ENVIRONMENTAL CONSIDERATION

The amendment changes a requirement with respect to installation or use of a facility component located within the restricted area as defined in 10 CFR Part 20 and changes surveillance requirements. The NRC staff has determined that the amendment involves no significant increase in the amounts, and no significant change in the types, of any effluents that may be released offsite, and that there is no significant increase in individual or cumulative

occupational radiation exposure. The Commission has previously issued a proposed finding that the amendment involves no significant hazards consideration, and there has been no public comment on such finding (65 FR 9007, 02/23/00). Accordingly, the amendment meets the eligibility criteria for categorical exclusion set forth in 10 CFR 51.22(c)(9). Pursuant to 10 CFR 51.22(b), no environmental impact statement or environmental assessment need be prepared in connection with the issuance of the amendment.

6.0 CONCLUSION

The Commission has concluded, based on the considerations discussed above, that (1) there is reasonable assurance that the health and safety of the public will not be endangered by operation in the proposed manner, (2) such activities will be conducted in compliance with the Commission's regulations, and (3) the issuance of the amendment will not be inimical to the common defense and security or to the health and safety of the public.

Principal Contributors: M. Banic
L. Lois

Date: April 4, 2000