

Mr. C. Randy Hutchinson  
 Vice President, Operations ANO  
 Entergy Operations, Inc.  
 1448 S. R. 333  
 Russellville, AR 72801

March 12, 1998

SUBJECT: ISSUANCE OF AMENDMENT NO.188 TO FACILITY OPERATING LICENSE  
 NO. NPF-6 - ARKANSAS NUCLEAR ONE, UNIT NO. 2 (TAC NO. M99275)

Dear Mr. Hutchinson:

The Commission has issued the enclosed Amendment No.188 to Facility Operating License No. NPF-6 for the Arkansas Nuclear One, Unit No. 2 (ANO-2). This amendment consists of changes to the Technical Specifications (TSs) in response to your application dated July 21, 1997, as supplemented by the letter dated February 18, 1998.

The amendment consists of several changes to the ANO-2 TSs involving Emergency Feedwater Surveillance Testing. The changes include an extension of the emergency feedwater (EFW) pump surveillance testing frequency, a reduction in the minimum steam generator pressure required to perform the surveillance testing on the turbine-drive EFW pump, and a modification to the EFW pump testing requirements.

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

Sincerely,

ORIGINAL SIGNED BY:  
 William Reckley, Project Manager  
 Project Directorate IV-1  
 Division of Reactor Projects III/IV  
 Office of Nuclear Reactor Regulation

Docket No. 50-368

Enclosures: 1. Amendment No. 188 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

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Sincerely,

A handwritten signature in black ink that reads "William Reckley".

William Reckley, Project Manager  
Project Directorate IV-1  
Division of Reactor Projects III/IV  
Office of Nuclear Reactor Regulation

Docket No. 50-368

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cc w/encls: See next page

Mr. C. Randy Hutchinson  
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Arkansas Nuclear One, Unit 2

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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. 188  
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 July 21, 1997, 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. 188, 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.

FOR THE NUCLEAR REGULATORY COMMISSION



William Reckley, Project Manager  
Project Directorate IV-1  
Division of Reactor Projects III/IV  
Office of Nuclear Reactor Regulation

Attachment: Changes to the Technical  
Specifications

Date of Issuance: March 12, 1998

ATTACHMENT TO LICENSE AMENDMENT NO. 188

FACILITY OPERATING LICENSE NO. NPF-6

DOCKET NO. 50-368

Revise the following pages of the Appendix "A" Technical Specifications with the attached pages. The revised pages are identified by Amendment number and contain vertical lines indicating the area of change. The corresponding overleaf pages are also provided to maintain document completeness.

REMOVE PAGES

3/4 7-5  
3/4 7-6  
B 3/4 7-1  
B 3/4 7-2

INSERT PAGES

3/4 7-5  
3/4 7-6  
B 3/4 7-1  
B 3/4 7-2

PLANT SYSTEMS

EMERGENCY FEEDWATER SYSTEM

LIMITING CONDITION FOR OPERATION

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3.7.1.2 Two emergency feedwater pumps and associated flow paths shall be OPERABLE with:

- a. One motor driven pump capable of being powered from an OPERABLE emergency bus, and
- b. One turbine driven pump capable of being powered from an OPERABLE steam supply system.

APPLICABILITY: MODES 1, 2, and 3

ACTION:

With one emergency feedwater pump inoperable, restore the inoperable pump to OPERABLE status within 72 hours or be in HOT SHUTDOWN within the next 12 hours.

SURVEILLANCE REQUIREMENTS

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4.7.1.2 Each emergency feedwater pump shall be demonstrated OPERABLE:

- a. At least once per 31 days by:
  1. Verifying that each valve (manual, power operated or automatic) in the flow path that is not locked, sealed, or otherwise secured in position, is in its correct position.
- b. In accordance with Specification 4.0.5 by:
  1. Verifying the developed head of each EFW pump at the flow test point is greater than or equal to the required developed head. This surveillance requirement is not required to be performed for the turbine driven EFW pump until 24 hours after exceeding 700 psia in the steam generators.

PLANT SYSTEMS

SURVEILLANCE REQUIREMENTS (Continued)

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- c. At least once per 18 months by:
  - 1. Verifying that each automatic valve in the flow path actuates to its correct position on MSIS or EFAS test signals.
  - 2. Verifying that the motor driven pump starts automatically upon receipt of an EFAS test signal.
  - 3. Verifying that the turbine driven pump steam supply MOV opens automatically upon receipt of an EFAS test signal.
- d. By verifying proper alignment of the required EFW flow paths by verifying flow from the condensate storage tank to each steam generator. This SR is required to be verified prior to entering MODE 2 whenever plant has been in MODES 4, 5, 6, or defueled for > 30 days.

### 3/4.7 PLANT SYST

#### BASES

#### 3/4.7.1 TURBINE CYCLE

##### 3/4.7.1.1 SAFETY CYCLES

The OPERABILITY of the main steam line code safety valves ensures that the secondary system pressure will be limited to within 110% of its design pressure of 1100 psia during the most severe anticipated system operational transient. The maximum relieving capacity is associated with a turbine trip from 100% RATED THERMAL POWER coincident with an assumed loss of condenser heat sink (i.e., no steam bypass to the condenser).

The specified valve lift settings and relieving capacities are in accordance with the requirements of Section III of the ASME Boiler and Pressure Code, 1971 Edition. The "as-found" requirements are conservative with respect to Section XI of the ASME Boiler and Pressure Vessel Code, 1986 Edition, and Addenda through 1987. The total relieving capacity for all MSSVs is 14,804,000 lb/hr. The ANO-2 full power (100%) steam flow plus 2% for conservatism is 12,950,000 lb/hr. Therefore, the total relieving capacity of the MSSVs is 114.32% of the 102% power steam flow through each main steam header. A minimum of 2 OPERABLE safety valves per steam generator ensures that sufficient relieving capacity is available for removing decay heat.

STARTUP and/or POWER OPERATION is allowable with safety valves inoperable within the limitations of the ACTION requirements on the basis of the reduction in secondary system steam flow and THERMAL POWER required by the reduced reactor trip settings of the Power Level-High channels. The reactor trip setpoint reductions are derived on the following bases:

$$SP = \frac{(X) - (Y)}{X} \times (114.32\%)$$

where:

- SP = reduced reactor trip setpoint in percent of RATED THERMAL POWER
- 114.32% = Total maximum safety valve relieving capacity of 102% power steam flow
- X = Total relieving capacity of all safety valves per steam line in lbs/hour
- Y = Total Maximum relieving capacity of the inoperable safety valve(s) in lbs/hour. In each case, the valves with the greatest relieving capacity were assumed inoperable.

## PLANT SYSTEMS

### BASES

#### 3/4.7.1.2 EMERGENCY FEEDWATER SYSTEM

The OPERABILITY of the emergency feedwater (EFW) system ensures that the Reactor Coolant System can be cooled down to Shutdown Cooling (SDC) entry conditions from normal operating conditions in the event of a total loss of off-site power.

The EFW system is designed to supply sufficient water to the steam generator(s) to remove decay heat with steam generator pressure at the setpoint of the MSSVs. Subsequently, the EFW system supplies sufficient water to cool the unit to SDC entry conditions, and steam is released through the ADVs.

SR 4.7.1.2.b.1 verifies that each EFW pump's developed head at the flow test point is greater than or equal to this required developed head. This test ensures that EFW pump performance has not degraded during the cycle. Flow and differential head are normal tests of pump performance required by Section XI of the ASME Code. Because it is undesirable to introduce cold EFW into the steam generators while they are operating, this testing is performed on recirculation flow. This test confirms one point that is indicative of pump overall performance. Such inservice tests confirm component OPERABILITY, trend performance, and detect incipient failures by indicating abnormal performance. Performance of inservice testing, discussed in the ASME Code, Section XI, satisfies this requirement. The SR for the turbine driven EFW pump is allowed to be deferred for up to 24 hours after exceeding 700 psia in the steam generators. This allowance will ensure the test is completed within a reasonable period of time after establishing sufficient steam pressure to perform the test.

SR 4.7.1.2.c ensures that EFW can be delivered to the appropriate steam generator, in the event of any accident or transient that generates an EFAS signal. This is assured by demonstrating that each automatic valve in the flow path actuates to its correct position on an actual or simulated actuation signal. The 18 month frequency is based on the need to perform the SRs under the conditions that apply during a unit outage and the potential for an unplanned transient if the SRs were performed with the reactor at power.

SR 4.7.1.2.d ensures that the EFW System is properly aligned by verifying the flow path from the condensate storage tank (CST) to each steam generator prior to entering MODE 2 operation, after more than 30 days below MODE 3. OPERABILITY of the EFW flow paths must be verified before sufficient core heat is generated that would require the operation of the EFW System during a subsequent shutdown. The Frequency is reasonable, based on engineering judgment, and other administrative controls to ensure that flow paths remain OPERABLE. To further ensure EFW System alignment, the OPERABILITY of the flow paths is verified following extended outages to determine that no misalignment of valves has occurred. This SR ensures that the flow path from the CST to the steam generators is properly aligned.

#### 3/4.7.1.3 CONDENSATE STORAGE TANK

The OPERABILITY of the condensate storage tank with the minimum water volume ensures that sufficient water is available to maintain the RCS at HOT STANDBY conditions for one hour with steam discharge to atmosphere with concurrent with total loss of off-site power. The contained water volume limit includes an allowance for water not usable because of tank discharge line location or other physical characteristics.



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

SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION

RELATED TO AMENDMENT NO.188 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 July 21, 1997, Entergy Operations, Inc. (the licensee) submitted a request for changes to the Arkansas Nuclear One, Unit No. 2 (ANO-2) Technical Specifications (TS). The requested changes would revise the emergency feedwater (EFW) surveillance testing requirements in TS 4.7.1.2 for ANO-2. The proposed changes include a reduction in the minimum steam generator (SG) pressure required to perform the surveillance testing on the turbine-driven EFW pump, an extension of the EFW pump surveillance testing frequency, and modifications to the EFW pump testing requirements. The proposed changes are generally consistent with the applicable surveillance requirements in NUREG-1432, Draft Revision 2 (ISTS), "Standard Technical Specifications for Combustion Engineering Plants."

The letter dated February 18, 1998, clarified and added information provided in the TS Bases Sections associated with the EFW system and required surveillances. This submittal did not change the initial proposed no significant hazards consideration determination.

2.0 BACKGROUND

The EFW system consists of one electric-driven pump and one turbine-driven pump on two independent trains that are each capable of feeding either of the two SGs. The system has several functions, which include providing a safety grade backup source of feedwater to the SGs when needed to meet the cooling requirements for accidents analyzed in the Safety Analysis Report; providing feedwater to the SGs as necessary to assure that decay heat and residual heat can be removed at a rate such that the fuel design limits and the design conditions of the reactor coolant pressure boundary are not exceeded; and removing decay heat until the plant has been cooled and depressurized to permit the use of the shutdown cooling system.

By letter dated October 2, 1992, Entergy Operations received NRC approval for Amendment 136 to the ANO-2 TSs to reduce the minimum SG pressure requirements from greater than 865 psig to greater than 800 psia for the turbine-driven EFW pump surveillance test. This change was requested as a result of SG tubes being plugged, which required a lower reactor coolant system (RCS) hot leg temperature. The reduction in RCS hot leg temperature resulted in a significant reduction of the steam pressure in the SGs.

### 3.0 EVALUATION

ANO-2 has continued to inspect and plug SG tubes when they meet the plugging criteria, which has caused a further decrease in SG steam pressure since the original RCS hot leg temperature reduction. The licensee has proposed to decrease the minimum SG pressure required in TS 4.7.1.2.a.1 from greater than 800 psia to greater than 700 psia to allow for adequate steam pressure for testing the turbine-driven EFW pump. The licensee found that the expected performance curve for the turbine-driven EFW pump has an inlet steam pressure of 300 psia at the trip and throttle valve, which is sufficient to develop the full turbine horsepower for the required flowrate and discharge pressure. Based on a SG supply pressure of greater than 700 psia, minus the maximum head loss of 100 psi from the SGs to the trip and throttle valve, the steam pressure would exceed 600 psia at the inlet to the turbine-driven EFW pump. Therefore, a 300 psia margin would exist between the TS minimum allowed SG pressure and the pressure required for the turbine to develop its required horsepower. The licensee concluded that the proposed reduction in the minimum allowed SG pressure would not affect the turbine-driven EFW pump's capability to deliver the required flowrate and discharge pressure during operation. In addition, the licensee stated that this change in steam pressure should be adequate to account for SG tube plugging that may occur until the SGs are replaced in the fall of 2000. The staff agrees with the licensee's conclusion, and finds it acceptable to decrease the minimum required SG pressure to greater than 700 psia for the surveillance test.

The licensee has proposed, in TS 4.7.1.2.b.1, to revise the flow testing requirements for the EFW pumps from specific flows at defined test conditions on a monthly test interval to that testing required by TS 4.0.5 and the inservice testing (IST) program. Verifying each EFW pump's flow characteristics in accordance with the IST program ensures that pump performance has not degraded during the cycle and is an acceptable alternative to the current TS requirements. The proposed change will also revise the testing interval from monthly to the interval defined by the IST program (currently the IST defines a quarterly test interval). A comprehensive examination of surveillance requirements in TS was performed by the NRC staff and was documented in NUREG-1366, "Improvements to Technical Specification Surveillance Requirements," dated December 1992. Based on the results of the evaluations documented in NUREG-1366, the NRC issued Generic Letter 93-05, "Line-Item Technical Specifications Improvements to Reduce Surveillance Requirements for Testing During Power Operation," dated September 27, 1993. The change proposed by the licensee regarding an increase in the EFW pump surveillance interval from monthly to quarterly is consistent with the recommendations in NUREG-1366. In addition to the studies referenced in NUREG-1366, the licensee provided data specific to ANO-2. The staff finds the operating history of the pumps at ANO-2 to be compatible with the recommended interval in NUREG-1366. Therefore, the staff finds the proposed change to the EFW surveillance requirements to be acceptable.

The proposed TS 4.7.1.2.b.1 also eliminates the need for an exception from TS 4.0.4 (currently in TS 4.7.1.2.a.1) pertaining to performing surveillances prior to entering an operating mode in which the subject system is required to be operable. The exception to TS 4.0.4 was previously required to allow the surveillance of the turbine-driven EFW pump to be deferred until steam generator pressure was above the test pressure. The proposed revision to TS 4.7.1.2.b.1 defines a maximum period of 24 hours within which the surveillance of the turbine-driven EFW pump is required to be performed once the defined test conditions are reached. Based on the

expected heat removal requirements present during the 24-hour period in which the testing of the turbine-driven EFW pump can be deferred, the availability of alternate heat removal systems (including the motor-driven EFW pump) during this period, and engineering judgement, the staff finds it acceptable to perform the surveillance of the turbine-driven EFW pump within 24 hours of establishing plant conditions that can support the test. Therefore, the staff agrees that the exception from TS 4.0.4 contained in TS 4.7.1.2.A.1 can be deleted.

In the proposed revision of TS 4.7.1.2.c, the licensee has removed the words "during shutdown" for the 18 month surveillance requirements for the EFW system since the words are not defined within the ANO-2 TSs. Although the references to "during shutdown" are removed from the surveillance requirement, the proposed Bases Section associated with the revised TS describe that the 18 month frequency is based on the need to perform the surveillances under the conditions that apply during a unit outage and also states that performance of the tests when the reactor is at power could lead to an unplanned transient. The staff finds that the proposed TS change and enhanced Bases Section clarify the description of the testing conditions and are therefore acceptable.

In proposed TS 4.7.1.2.d, the licensee has revised the current 18 month surveillance requirement for verifying the turbine-driven EFW train flow path (currently TS 4.7.1.2.b.4) to include verification of the electric-driven EFW train flow path. This change corrects a deficiency in the current TS in that the routine verification of the electric-driven EFW train flow is not included in the current TS 4.7.1.2 as a required surveillance activity. The proposed surveillance requirements would also revise the frequency of flow path verification from at least once per 18 months (during shutdown) to whenever the plant has been below mode 3 for greater than 30 days and prior to entering mode 2. This change would continue to require the verification of the EFW flow paths (now for both EFW trains) following refueling outages and would add the requirement to verify the EFW flow paths following any outage that involves extended operation in those modes most likely to affect the EFW flow path configuration. The proposed flow path verifications further ensure that the EFW system is properly aligned following extended outages. The staff finds the proposed changes to be acceptable.

The licensee has proposed new revisions to bases for TS 3/4.7.1.2 and has added information to the revised surveillance requirements. The staff agrees with the proposed changes to the bases for the EFW TS. Also, the licensee has proposed administrative changes to renumber the TSs in accordance with the changes described above. The staff finds these changes to be acceptable.

The staff reviewed the licensee's proposed changes that would revise the EFW surveillance testing requirements in TS 4.7.1.2 for ANO-2. Based on its review, the staff concludes that the licensee's proposed change to reduce the minimum SG pressure required to perform the surveillance testing on the turbine-driven EFW pump is adequate to demonstrate the pump's performance, and it is acceptable. Also, the staff concludes that the proposed changes to extend the EFW pump surveillance testing frequency and modify the EFW pump testing requirements are acceptable.

#### 4.0 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.

## 5.0 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 62 FR 43367. 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: V. Ordaz  
W. Reckley

Date: March 12, 1998