

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

January 19, 1999

SUBJECT: ISSUANCE OF AMENDMENT NO. 199 TO FACILITY OPERATING LICENSE  
 NO. NPF-6 - ARKANSAS NUCLEAR ONE, UNIT 2 (TAC NO. MA2223)

Dear Mr. Hutchinson:

The Commission has issued the enclosed Amendment No. 199 to Facility Operating License No. NPF-6 for the Arkansas Nuclear One, Unit 2 (ANO-2). This amendment consists of changes to the Technical Specifications (TSs) in response to your application dated June 29, 1998.

The amendment revises the Applicability of TS 3.4.2, "Reactor Coolant System - Safety Valves - Shutdown." An associated action is also revised and a footnote is removed. The amendment also revises TS 3.4.12, "Reactor Coolant System - Overpressure Protection," allowing safety injection tanks to remain unisolated if they are pressurized to less than 300 psig and making some editorial changes. In addition, affected index and Bases pages are revised.

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:

M. Christopher Nolan, 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. 199 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

January 19, 1999

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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,

A handwritten signature in cursive script, appearing to read "M. Christopher Nolan".

M. Christopher Nolan, 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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2. Safety Evaluation

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. 199  
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 June 29, 1998, 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.

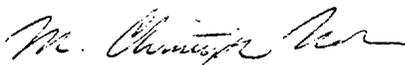
2. Accordingly, the license is amended by changes to the Technical Specifications as indicated in the attachment to this license amendment, and Paragraph 2.C.(2) of Facility Operating License No. NPF-6 is hereby amended to read as follows:

(2) Technical Specifications

The Technical Specifications contained in Appendix A, as revised through Amendment No. 199, 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 with full implementation within 60 days.

FOR THE NUCLEAR REGULATORY COMMISSION



M. Christopher Nolan, Project Manger  
Project Directorate IV-1  
Division of Reactor Projects III/IV  
Office of Nuclear Reactor Regulation

Attachment: Changes to the Technical  
Specifications

Date of Issuance: January 19, 1999

ATTACHMENT TO LICENSE AMENDMENT NO. 199

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.

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\*Overleaf pages provided to maintain document completeness. No changes contained on these pages.

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REACTOR COOLANT SYSTEM

SAFETY VALVES - SHUTDOWN

LIMITING CONDITION FOR OPERATION

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3.4.2 A minimum of one pressurizer code safety valve shall be OPERABLE with a lift setting of 2500 PSIA  $\pm$  3%\*.

APPLICABILITY: MODE 4 with Tc > 220°F.

ACTION:

With no pressurizer code safety valve OPERABLE, reduce Tc to  $\leq$  220°F within 12 hours.

SURVEILLANCE REQUIREMENTS

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4.4.2 No additional Surveillance Requirements other than those required by Specification 4.0.5.

\* The lift setting pressure shall correspond to ambient conditions of the valve at nominal operating temperature and pressure. If found outside of a  $\pm$  1% tolerance band, the setting shall be adjusted to within  $\pm$  1% of the lift setting shown.

REACTOR COOLANT SYST

LOW TEMPERATURE OVERPRESSURE PROTECTION (LTOP) SYSTEM

LIMITING CONDITION FOR OPERATION

- 3.4.12 The LTOP system shall be OPERABLE with each SIT isolated that is pressurized to  $\geq 300$  psig, and:
- a. Two LTOP relief valves with a lift setting of  $\leq 430$  psig, or
  - b. The Reactor Coolant System depressurized with an RCS vent path  $\geq 6.38$  square inches.

APPLICABILITY: MODE 4 with  $T_c \leq 220^\circ\text{F}$ , MODE 5, MODE 6 with reactor vessel head in place.

ACTION:

- a. With one LTOP relief valve inoperable in MODE 4, restore the inoperable valve to OPERABLE status within 7 days or depressurize and vent the RCS through a  $\geq 6.38$  square inch vent path within the next 8 hours.
- b. With one LTOP relief valve inoperable in MODE 5 or 6, restore the inoperable relief valve to OPERABLE status within 24 hours or depressurize and vent the RCS through a  $\geq 6.38$  square inch vent path within the next 8 hours.
- c. With both LTOP relief valves inoperable, depressurize and vent the RCS through a  $\geq 6.38$  square inch vent path within 8 hours.
- d. With a SIT not isolated and pressurized to  $\geq 300$  psig, isolate the affected SIT within 1 hour. If the affected SIT is not isolated within 1 hour, either:
  - (1) Depressurize the SIT to  $< 300$  psig within the next 12 hours, or
  - (2) Increase cold leg temperature to  $> 220^\circ\text{F}$  within the next 12 hours.
- e. The provisions of Specification 3.0.4 are not applicable.

### 3/4.4 REACTOR COOLANT SYSTEM

#### BASES

#### 3/4.4.1 REACTOR COOLANT LOOPS AND COOLANT CIRCULATION

The plant is designed to operate with both reactor coolant loops and associated reactor coolant pumps in operation, and maintain DNBR above the limits specified by Specification 3.2.4 during all normal operations and anticipated transients.

In MODE 3, a single reactor coolant loop provides sufficient heat removal capability for removing decay heat; however, single failure considerations require that two loops be OPERABLE.

In MODES 4 and 5, a single reactor coolant loop or shutdown cooling loop provides sufficient heat removal capability for removing decay heat; but single failure considerations require that at least two loops be OPERABLE. Thus, if the reactor coolant loops are not OPERABLE, this specification requires two shutdown cooling loops to be OPERABLE.

The operation of one Reactor Coolant Pump or one shutdown cooling pump provides adequate flow to ensure mixing, prevent stratification and produce gradual reactivity changes during boron concentration reductions in the Reactor Coolant System. The reactivity change rate associated with boron reductions will, therefore, be within the capability of operator recognition and control.

#### 3/4.4.2 and 3/4.4.3 SAFETY VALVES

The pressurizer code safety valves operate to prevent the RCS from being pressurized above its Safety Limit of 2750 psia. Each safety valve is designed to relieve 420,000 lbs. per hour of saturated steam at the valve setpoint. The relief capacity of a single safety valve is adequate to relieve any overpressure condition which could occur during shutdown.

Two safety valves are required in MODES 1, 2 and 3. One safety valve is required in MODE 4 with  $T_c > 220^\circ\text{F}$ . For the remainder of MODES 4, 5 and 6 with the reactor vessel head in place, overpressure protection is provided by the operating procedures and LCO 3.4.12, "Low Temperature Overpressure Protection (LTOP) System".

During operation, all pressurizer code safety valves must be OPERABLE to prevent the RCS from being pressurized above its safety limit of 2750 psia. The combined relief capacity of these valves is sufficient to limit the Reactor Coolant System pressure to within its Safety Limit of 2750 psia following a complete loss of turbine generator load while operating at RATED THERMAL POWER and assuming no reactor trip until the first Reactor Protective System trip setpoint (Pressurizer Pressure-High) is reached (i.e., no credit is taken for a direct reactor trip on the loss of turbine) and also assuming no operation of the steam dump valves.

BASES

Demonstration of the safety valves' lift setting will occur only during shutdown and will be performed in accordance with the provisions of Section XI of the ASME Boiler and Pressure Vessel Code.

3/4.4.4 PRESSURIZER

A steam bubble in the pressurizer ensures that the RCS is not a hydraulically solid system and is capable of accommodating pressure surges during operation. The steam bubble also protects the pressurizer code safety valves against water relief. The steam bubble functions to relieve RCS pressure during all design transients.

The requirement that 150 KW of pressurizer heaters and their associated controls be capable of being supplied electrical power from an emergency bus provides assurance that these heaters can be energized during a loss-of-offsite power condition to maintain natural circulation at HOT STANDBY.

3/4.4.5 STEAM GENERATORS

The Surveillance Requirements for inspection of the steam generator tubes ensure that the structural integrity of this portion of the RCS will be maintained. The program for inservice inspection of steam generator tubes is based on a modification of Regulatory Guide 1.83, Revision 1. Inservice inspection of steam generator tubing is essential in order to maintain surveillance of the conditions of the tubes in the event that there is evidence of mechanical damage or progressive degradation due to design, manufacturing errors, or inservice conditions that lead to corrosion. Inservice inspection of steam generator tubing also provides a means of characterizing the nature and cause of any tube degradation so that corrective measures can be taken.

The plant is expected to be operated in a manner such that the secondary coolant will be maintained within those chemistry limits found to result in negligible corrosion of the steam generator tubes. If the secondary coolant chemistry is not maintained within these limits, localized corrosion may likely result in stress corrosion cracking. The extent of cracking during plant operation would be limited by the limitation of steam generator tube leakage between the primary coolant system and the secondary coolant system (primary-to-secondary leakage = 150 gallons per day per steam generator). Cracks having a primary-to-secondary leakage less than this limit during operation will have an adequate margin of safety to withstand the loads imposed during normal operation and by postulated accidents. Operating plants have demonstrated that primary-to-secondary leakage of 150 gallons per day per steam generator can readily be detected by radiation monitors on the secondary system. Leakage in excess of this limit will require plant shutdown and an unscheduled inspection, during which the leaking tubes will be located and plugged or repaired.

BASES

3/4.4.12 LOW TEMPERATURE OVERPRESSURE PROTECTION SYSTEM

Low temperature overpressure protection (LTOP) of the RCS, including the reactor vessel, is provided by redundant relief valves on the pressurizer which discharge from a single discharge header. Each LTOP relief valve is a direct action, spring-loaded relief valve, with orifice area of 6.38 in<sup>2</sup> and a lift setting of  $\leq 430$  psig, and is capable of mitigating the worst-case design basis pressurization event. The LTOP design basis event is a simultaneous injection of two HPSI pumps and all three charging pumps to the water-solid RCS. The analyses assume that the safety injection tanks (SITs) are either isolated or depressurized such that they are unable challenge the LTOP relief setpoints.

Since neither the LTOP reliefs nor the RCS vent is analyzed for the pressure transient produced from SIT injection, the LCO requires each SIT that is pressurized to  $\geq 300$  psig to be isolated. The isolated SITs must have their discharge valves closed and the associated MOV power supply breaker in the open position. The individual SITs may be unisolated when pressurized to  $< 300$  psig. The associated instrumentation uncertainty is not included in the 300 psig value and therefore, the procedural value for unisolating the SITs with the LTOPs in service will be reduced.

The LTOP system, in combination with the RCS heatup and cooldown limitations of LCO 3.4.9.1 and administrative restrictions on RCP operation, provides assurance that the reactor vessel non-ductile fracture limits are not exceeded during the design basis event at low RCS temperatures. These non-ductile fracture limits are identified as LTOP pressure-temperature (P-T) limits, which were specifically developed to provide a basis for the LTOP system. These LTOP P-T limits, along with the LTOP enable temperature, were developed using guidance provided in ASME Code Section XI, Division 1, Code Case N-514 that mandates that "LTOP systems shall limit the maximum pressure in the vessel to 110% of the pressure determined to satisfy Appendix G, paragraph G-2215 of Section XI, Division 1".

The enable temperature of the LTOP isolation valves is based on any RCS cold leg temperature reaching 220°F (including a 20°F uncertainty). Although each relief valve is capable of mitigating the design basis LTOP event, both LTOP relief valves are required to be OPERABLE below the enable temperature to meet the single failure criterion of NRC Branch Technical Position RSB 5-2, unless any RCS vent path of 6.38 in<sup>2</sup> (equivalent relief valve orifice area) or larger is maintained.



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

SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION

RELATED TO AMENDMENT NO. 199 TO

FACILITY OPERATING LICENSE NO. NPF-6

ENERGY OPERATIONS, INC.

ARKANSAS NUCLEAR ONE, UNIT NO. 2

DOCKET NO. 50-368

1.0 INTRODUCTION

By letter dated June 29, 1998 (2CAN069806), Entergy Operations, Inc. (the licensee) submitted a request for changes to the Arkansas Nuclear One, Unit 2 (ANO-2), Technical Specifications (TSs). The requested changes would revise the Applicability of TS 3.4.2, "Reactor Coolant System - Safety Valves - Shutdown." An associated action would also be revised and a footnote would be removed. The amendment would also revise TS 3.4.12, "Reactor Coolant System - Overpressure Protection," allowing safety injection tanks (SITs) to remain unisolated if they are pressurized to less than 300 psig and making some editorial changes. In addition, affected index and Bases pages would be revised.

Because the amendment is being issued very close to the beginning of the refueling outage, the licensee verbally requested a change to the effective date of the amendment on December 17, 1998. The licensee requested that the effective date be within 60 days after the amendment is issued. The staff finds this change acceptable.

2.0 EVALUATION

This evaluation will be performed in three parts: (1) changes related to the applicability for the safety valves (shutdown), (2) changes related to the isolation of the SITs, and (3) human factors and administrative changes.

2.1 Changes Related to the Applicability For the Safety Valves (Shutdown)

Current TS 3.4.2 is applicable in Modes 4 and 5. However, these modes overlap, in part, with the applicability for TS 3.4.12 for the low-temperature overpressure protection (LTOP) system which is required in Mode 4 with cold leg temperature ( $T_c$ ) less than or equal to 220°F, Mode 5, and Mode 6 with reactor vessel head in place. The licensee proposed to revise the applicability for TS 3.4.2 to Mode 4 with  $T_c$  greater than 220°F.

The design basis pressurization event in the modes in which the LTOP system is required is a simultaneous injection by two high pressure safety injection pumps and all three charging pumps to a water-solid reactor coolant system (RCS). The LTOP system is designed with adequate

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capacity to protect the RCS during this event. Therefore, the pressurizer code safety valves are not required in these modes. The staff concludes that this change is acceptable.

The current Action Statement in TS 3.4.2 states:

With no pressurizer code safety valve OPERABLE, immediately suspend all operations involving positive reactivity changes and place an OPERABLE shutdown cooling loop into operation.

The licensee proposed the following revised Action Statement:

With no pressurizer code safety valve OPERABLE, reduce  $T_c$  to  $\leq 220^\circ\text{F}$  within 12 hours.

The revised action involves changing the plant status so that TS 3.4.2 is no longer applicable and the LTOP is required to be in service to protect the RCS from overpressurization. The change deletes the requirement to immediately suspend all operations involving positive reactivity changes. The licensee indicated that reducing the RCS temperature is an operation that adds positive reactivity. Therefore, the current requirement would conflict with the action to exit the mode in which the safety valves are required. In addition, the licensee indicated that control of the shutdown margin is still required by TS 3.1.1.1.

The change to the Action Statement also deletes the requirement to place an operable shutdown cooling loop into operation. The licensee indicated that a shutdown cooling loop does not have adequate relief capacity to ensure RCS overpressure protection. With no pressurizer code safety valves operable, the proposed action requires the licensee to achieve the plant conditions necessary to place the LTOP system in service, thus providing overpressure protection.

The last aspect of the change to the Action Statement is the addition of a 12-hour completion time. The current Action Statement does not include a specific completion time for placing the shutdown cooling loop into operation. The licensee indicated that the 12 hour allowance to reduce RCS temperature to bring the unit to less than or equal to  $220^\circ\text{F}$  is reasonable without challenging plant systems. The RCS contains lower energy levels (reduced pressures and temperatures) in Mode 4, which reduces the potential for large pressurizer insurges which would challenge the overpressure protection systems. The licensee also indicated that the 12-hour completion time is consistent with the improved standard TS for Combustion Engineering plants.

The staff has reviewed TS 3.4.3, "Reactor Coolant System Safety Valves - Operating," in conjunction with the proposed changes to TSs 3.4.2, "Reactor Coolant System Safety Valves - Shutdown," and 3.4.12, "Reactor Coolant System Overpressure Protection," and verified that adequate overpressure protection for the RCS would be provided for the complete range of operations. In addition, the staff has concluded that the appropriate and conservative response to a plant condition in which the RCS was operating in Mode 4 with  $T_c$  greater than  $220^\circ\text{F}$  and no pressurizer code safeties operable would be to reduce RCS  $T_c$  to less than or equal to  $220^\circ\text{F}$  such that the LTOP relief valves could provide overpressure protection for the RCS. Therefore, the staff concludes that the removal of Action Statement references to restrict the addition of

positive reactivity and requiring the initiation of shutdown cooling are acceptable. The addition of a 12-hour time limit to reduce  $T_c$  to less than or equal to 220°F is commensurate with the safety significance of the condition and consistent with similar situations already addressed in the Technical Specifications ( e.g., TS 3.4.3). Therefore, the staff concludes that the changes to the Action Statement are acceptable.

Finally, the current TS 3.4.2 includes a “#” footnote related to Mode 5. Since this TS would no longer be applicable in Mode 5, the licensee proposed to delete the footnote. The staff has reviewed this change and concludes that it is acceptable.

The licensee also revised the associated Bases to reflect these changes. The staff reviewed the changes and finds that they are acceptable.

## 2.2 Changes Related to the Isolation of the SITs

Current TS 3.4.12 requires each SIT to be isolated if its pressure is greater than or equal to RCS pressure. The licensee proposed to revise the TS to require isolation of a SIT if its pressure is greater than or equal to 300 psig. This change is intended to allow flow testing of the SIT discharge check valves with the plant shut down. The revised pressure limit is added to the limiting condition for operation (LCO) and to Actions d. and d.1 and the current “\*” footnote is removed.

The licensee indicated that the 300 psig limit was established in order to minimize the chances of an inadvertent isolation of the shutdown cooling system during the check valve test. The licensee indicated that the check valve test would typically be performed in Mode 5 and that the 300 psig limit was well below the LTOP lift set point (less than or equal to 430 psig). The 300 psig limit does not consider instrument inaccuracies. However, because the limit is 130 psi below the maximum LTOP relief valve set point, there is clearly margin available that exceeds the instrument inaccuracies. This conclusion is supported by a comparison of the minimum SIT pressure during operations (600 psig in TS 3.5.1) and the SIT pressure used in the loss-of-coolant accident analyses (550 psia in Final Safety Analysis Report Tables 6.3-9 and 6.3-17).

The staff has concluded that the proposed limit allowing the SITs to be unisolated with SIT pressure less than or equal to 300 psig is acceptable as this pressure limit is significantly below the LTOP relief valve setpoint of 430 psig and would not challenge the overpressure protection provided for the RCS in this condition. Therefore, the staff concludes that the change is acceptable.

The licensee also revised the associated Bases to reflect these changes. The staff reviewed the changes and finds that they are acceptable.

## 2.3 Human Factors and Administrative Changes

The licensee proposed to revise the title of LCO 3.4.12, make associated changes to the LCO statement, and add the LCO to the TS indexes. These changes are administrative and are acceptable. The licensee also proposed changes to Actions b., d., d.1 and d.2 to clarify completion times. The staff finds that the revised statements are equivalent or more restrictive

to the current statements and are, therefore, acceptable. Finally, current Action d.2 requires the licensee to increase cold leg temperature to greater than or equal to 220°F. However, at exactly 220°F the LCO would still be applicable. The licensee proposed to change the action to require increasing cold leg temperature to greater than 220°F, exiting the applicability for the LCO. While the staff recognizes that it is physically impossible to maintain the plant at exactly 220°F, this change corrects a deficiency in the current TS and is 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 comment.

### 4.0 ENVIRONMENTAL CONSIDERATION

The amendments change 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 change surveillance requirements. The NRC staff has determined that the amendments involve 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 amendments involve no significant hazards consideration and there has been no public comment on such finding (63 FR 56243). Accordingly, the amendments meet 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 amendments.

### 5.0 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 amendments will not be inimical to the common defense and security or to the health and safety of the public.

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