

July 2, 2007

Mr. Timothy G. Mitchell  
Vice President, Operations  
Arkansas Nuclear One  
Entergy Operations, Inc.  
1448 S. R. 333  
Russellville, AR 72802

SUBJECT: ARKANSAS NUCLEAR ONE, UNIT NO. 2 - ISSUANCE OF AMENDMENT RE:  
CONTAINMENT SPRAY NOZZLE TECHNICAL SPECIFICATIONS TEST  
REQUIREMENTS (TAC NO. MD4835)

Dear Mr. Mitchell:

The Commission has issued the enclosed Amendment No. 272 to Facility Operating License No. NPF-6 for Arkansas Nuclear One, Unit No. 2. The amendment consists of changes to the Technical Specifications in response to your application dated March 15, 2007.

The amendment revises the Surveillance Requirement (SR) 4.6.2.1.d to require verification that containment spray nozzles are unobstructed following maintenance that could result in nozzle blockage, in lieu of the current SR of performing the test every 5 years.

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/**

Alan B. Wang, Project Manager  
Plant Licensing Branch IV  
Division of Operating Reactor Licensing  
Office of Nuclear Reactor Regulation

Docket No. 50-368

Enclosures: 1. Amendment No. 272 to NPF-6  
2. Safety Evaluation

cc w/encls: See next page

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**ADAMS Accession No.: Pkg ML071550002** (Amdt./License ML071550003, TS Pgs ML071550004)

|        |             |             |             |                           |             |
|--------|-------------|-------------|-------------|---------------------------|-------------|
| OFFICE | NRR/LPL4/PM | NRR/LPL4/LA | DSS/SCVB/BC | OGC - NLO subj to comment | NRR/LPL4/BC |
| NAME   | AWang       | JBurkhardt  | RDennig     | JBonanno                  | THiltz      |
| DATE   | 6/11/07     | 6/11/07     | 5/23/07     | 6/13/07                   | 7/2/07      |

OFFICIAL RECORD COPY

Arkansas Nuclear One

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Vice President, Operations Support  
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ENTERGY OPERATIONS, INC.

DOCKET NO. 50-368

ARKANSAS NUCLEAR ONE, UNIT NO. 2

AMENDMENT TO RENEWED FACILITY OPERATING LICENSE

Amendment No. 272  
Renewed 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 March 15, 2007, 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 and paragraph 2.C.(2) of Renewed Facility Operating License No. NPF-6 as indicated in the attachment to this license amendment.
3. The license amendment is effective as of its date of issuance and shall be implemented within 60 days from the date of issuance.

FOR THE NUCLEAR REGULATORY COMMISSION

**/RA/**

Thomas G. Hiltz, Chief  
Plant Licensing Branch IV  
Division of Operating Reactor Licensing  
Office of Nuclear Reactor Regulation

Attachment: Changes to the Renewed  
Facility Operating License  
No. NPF-6 and the  
Technical Specifications

Date of Issuance: July 2, 2007

ATTACHMENT TO LICENSE AMENDMENT NO. 272

RENEWED FACILITY OPERATING LICENSE NO. NPF-6

DOCKET NO. 50-368

Replace the following pages of the Renewed Facility Operating License No. NPF-6 and 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.

Operating License

REMOVE

-3-

INSERT

-3-

Technical Specifications

REMOVE

3/4 6-11

INSERT

3/4 6-11

facility at the designated location in Pope County, Arkansas in accordance with the procedures and limitations set forth in this renewed license;

- (3) EOI, pursuant to the Act and 10 CFR Part 70, to receive, possess and use at any time at the facility site and as designated solely for the facility, special nuclear material as reactor fuel, in accordance with the limitations for storage and amounts required for reactor operation, as described in the Final Safety Analysis Report, as supplemented and amended;
- (4) EOI, pursuant to the Act and 10 CFR Parts 30, 40 and 70 to receive, possess and use at any time any byproduct, source and special nuclear material as sealed neutron sources for reactor startup, sealed sources for reactor instrumentation and radiation monitoring equipment calibration, and as fission detectors in amounts as required;
- (5) EOI, pursuant to the Act and 10 CFR Parts 30, 40 and 70, to receive, possess, and use in amounts as required any byproduct, source or special nuclear material without restriction to chemical or physical form, for sample analysis or instrument calibration or associated with radioactive apparatus or components; and
- (6) EOI, pursuant to the Act and 10 CFR Parts 30 and 70, to possess, but not separate, such byproduct and special nuclear materials as may be produced by the operation of the facility.

C. This renewed license shall be deemed to contain and is subject to conditions specified in the following Commission regulations in 10 CFR Chapter 1; Part 20, Section 30.34 of Part 30, Section 40.41 of Part 40, Sections 50.54 and 50.59 of Part 50, and Section 70.32 of Part 70; and is subject to all applicable provisions of the Act and to the rules, regulations, and orders of the Commission now or hereafter in effect; and is subject to the additional conditions specified or incorporated below:

(1) Maximum Power Level

EOI is authorized to operate the facility at steady state reactor core power levels not in excess of 3026 megawatts thermal. Prior to attaining this power level EOI shall comply with the conditions in Paragraph 2.C.(3).

(2) Technical Specifications

The Technical Specifications contained in Appendix A, as revised through Amendment No. 272 are hereby incorporated in the renewed

SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION

RELATED TO AMENDMENT NO. 272 TO

RENEWED FACILITY OPERATING LICENSE NO. NPF-6

ENTERGY OPERATIONS, INC.

ARKANSAS NUCLEAR ONE, UNIT NO. 2

DOCKET NO. 50-368

1.0 INTRODUCTION

By application dated March 15, 2007 (Agencywide Documents Access and Management System (ADAMS) Accession No. ML070780351), Entergy Operations, Inc. (the licensee), requested changes to the Technical Specifications (TSs) for Arkansas Nuclear One, Unit No. 2 (ANO-2).

The proposed changes would revise Surveillance Requirement (SR) 4.6.2.1.d to require verification that containment spray nozzles are unobstructed following maintenance that could result in nozzle blockage in lieu of the current SR of performing the test every 5 years. Specifically, the proposed change would change SR 4.6.2.1.d from "At least once per five years by performing an air or smoke flow test through each spray header and verifying each nozzle is unobstructed" to "verify each spray nozzle is unobstructed following maintenance which could result in nozzle blockage". This SR is required by TS 3/4.6.2, "Depressurization, Cooling, and pH Control Systems Containment Spray System."

2.0 REGULATORY EVALUATION

Title 10 of the *Code of Federal Regulations* (10 CFR) Part 50, Appendix A contains General Design Criteria (GDC) for nuclear power reactors. In particular, GDC 40 requires that the containment heat-removal system be designed to permit periodic testing. The containment spray system is a containment heat-removal system. The Combustion Engineering Standard Technical Specifications, NUREG-1432, Volume 1, Revision 2, dated March 2003, specifies in SR 3.6.6.A.9 a testing frequency of 10 years for the nozzle blockage test. While this is not a requirement, it had been the U.S. Nuclear Regulatory Commission's (NRC's) and industry's judgment of an acceptable frequency for this test. The current TSs require ANO-2 to test the containment spray nozzles every 5 years.



### 3.0 TECHNICAL EVALUATION

The Containment Spray System (CSS) is an Engineered Safety Feature used in response to a postulated Loss-of-Coolant Accident (LOCA). The CSS is designed to:

- Maintain reactor containment building pressure within design limits,
- Reduce the quantity of airborne iodine, and
- Establish the sump pH to retain elemental iodine.

These functions are performed by subcooled water solution sprayed into the containment atmosphere through nozzles from the spray headers located in the containment dome.

The licensee requested a change to revise TS SR 4.6.2.1.d, from requiring “at least once per five years by performing an air or smoke flow test through each spray header and verifying each spray nozzle is unobstructed” to requiring verification each CSS spray nozzle is free from obstruction following maintenance that could result in nozzle blockage (loss-of-foreign-material exclusion (FME) control).

The CSS sprays have been tested every 5 years since original plant construction and these tests have confirmed that the nozzles are free of obstructions that could have occurred following startup, operation, and maintenance of the system. The licensee stated that the containment spray nozzles are Sprayco model 1713A nozzles which have a swirl chamber design and have no moving parts in the nozzle to plug. The licensee also stated that the spray ring header is maintained dry and that the piping, ring headers, and nozzles are constructed of type 304 stainless steel. Therefore, the formation of corrosion products or loose parts that could cause nozzle plugging is unlikely.

The licensee maintains an FME program which is implemented by Procedure EN-MA-118, “Foreign Material Exclusion.” The procedure describes measures to be taken to ensure foreign material is not introduced into a system or component and describes measures to be taken if material or tool accountability is lost. This procedure applies to all station activities having the potential to introduce foreign material into systems or components which could impact plant safety. The requirements of the procedure apply when maintenance, modifications, repairs, inspections and operating activities are being conducted on open piping and equipment. The procedure establishes various levels for preventing the generation of debris when breaching a system and the removal of debris from the system if materials have entered a system. Pre-job briefs for FME are conducted prior to opening systems where foreign materials can be introduced. This procedure also requires personnel who are working on open components/systems receive FME training as part of their job qualifications. The procedure requires that when closing a system or component, an inspection be performed to ensure that all foreign material is removed. If FME is not maintained, a Condition Report is initiated requiring an assessment of the circumstances and implementation of the corrective actions to prevent reoccurrence.

Due to its location at the top of the containment, introduction of foreign material into the spray header via the open nozzles is unlikely. Foreign material introduced as a result of maintenance

is the most likely cause for obstruction; therefore, verification that no foreign material has entered the system following such maintenance is sufficient to confirm that the nozzles are free from blockage. Therefore, the potential for unidentified nozzle obstruction is very low.

The NRC staff reviewed the NRC Inspection Reports for Arkansas Nuclear One, Unit 1, and ANO-2 for the years 2000 through 2006. There were no significant findings identified in those reports that would indicate lapses in the FME program. Based on a review of these reports, the FME program appears to be effective.

The NRC staff previously approved, on a plant-specific basis, similar revisions to this requirement. The revisions require verification that each spray nozzle is unobstructed only following maintenance that could potentially result in nozzle blockage. This is based on the judgment that once the CSS nozzles are determined to be unobstructed, the only mechanisms that can cause nozzle blockage is foreign material introduced following maintenance and corrosion deposits. The first concern is addressed by the licensee's FME program. The second concern is addressed by the piping system being constructed out of corrosion-resistant materials.

NUREG-1366, "Improvements to Technical Specifications Surveillance Requirements," (May 1992) reported on an NRC staff review of industry experience which indicated that CSS' of similar design are highly reliable and are not subject to plugging after testing following construction. The NRC staff reviewed industry experience and found that, in general, once tested after construction, CSS have not been subject to blockage. There have been several exceptions. In the case of one pressurized-water reactor (PWR), a chemical added to the inner surface of a spray system pipe to eliminate corrosion detached and the loose material blocked some spray nozzles. The piping at ANO-2 is corrosion resistant; therefore, this failure mechanism is unlikely. The licensee for another PWR found debris, identified as construction debris, in the spray nozzle headers (Licensee Event Report 315/98-027). The fraction of blockage was not significant and the sprays remained functional. The debris was found by visual observation, not by an air flow test. The licensee states that the containment spray nozzles have been tested five times in addition to pre-operational tests. Pre-operational testing identified eight nozzles that had blocked flow. After removal of the blockage, air flow was verified through all containment spray nozzles. Subsequent in-place air flow tests have demonstrated unobstructed flow through each nozzle. Tests have confirmed that the system was free from construction debris and that no debris that could cause obstructions had entered the systems following startup and operation of ANO-2.

Based on the NRC staff's review and assessment of the applicable information provided by the licensee in its amendment request, the NRC staff concludes that the design of the ANO-2 CSS, the past history of these spray systems, and the licensee's FME controls provide reasonable assurance that the potential for nozzle obstruction is acceptably low. The FME controls provide reasonable protection from the introduction of foreign materials into open piping during maintenance or testing and require post-maintenance verification of system cleanliness and freedom from foreign materials. In addition, the NRC staff review of industry-wide experience has indicated that the licensee's proposed change is acceptable. Therefore, the NRC staff finds the amendment request 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. 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 published on April 24, 2007 (72 FR 20381). 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 Contributor: B. Heida

Date: July 2, 2007