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

May 21, 2009

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

SUBJECT: ARKANSAS NUCLEAR ONE, UNIT NO. 2 - APPROVAL OF REQUEST FOR RELIEF NO. ANO 2-PT-001 ON END-OF-INTERVAL SYSTEM LEAKAGE TEST FOR THE EXTENDED REACTOR COOLANT PRESSURE BOUNDARY PIPING (TAC NO. MD9537)

Dear Sir or Madam:

By letter dated July 31, 2008, Entergy Operations, Inc. (the licensee) submitted Relief Request No. ANO2-PT-001 for Arkansas Nuclear One, Unit 2 (ANO-2). The licensee proposed an alternative to the requirements of American Society of Mechanical Engineers Boiler and Pressure Vessel Code (ASME Code), Section XI, "Rules for Inservice Inspection of Nuclear Power Plant Components," 2001 Edition with 2003 Addenda, IWB-5222(b), which requires an end-of-interval system leakage test to include all ASME Code Class 1 components within the system boundary. Relief Request No. ANO2-PT-001 is applicable to the third 10-year inservice inspection (ISI) interval.

The licensee has proposed an alternative to pressurize up to the inboard isolation valve, which would exclude a segment of the Class 1 boundary from attaining the required test pressure. The alternative is to perform the system leakage test of the piping segments between the inboard and the outboard isolation valves to the requirement of the interconnecting Class 2 system leakage test to be conducted during the same inspection interval.

The U.S. Nuclear Regulatory Commission (NRC) staff has completed its review of the subject request for relief. Based on the enclosed safety evaluation (SE), the NRC staff has determined that the licensee's proposed alternative provides reasonable assurance of structural integrity and the licensee's compliance with the requirement would result in hardship or unusual difficulty without a compensating increase in the level of quality and safety. Therefore, pursuant to paragraph 50.55a(a)(3)(ii) of Title 10 of the *Code of Federal Regulations*, the NRC staff authorizes the use of Relief Request No. ANO2-PT-001 for the third 10-year ISI interval at ANO-2.

All other requirements of the ASME Code, Section XI for which relief has not been specifically requested remain applicable, including a third-party review by the Authorized Nuclear Inservice Inspector.

If you have any questions regarding the SE, please contact Kaly Kalyanam at (301) 415-1480.

Sincerely,

CFlyon for

Michael T. Markley, Chief
Plant Licensing Branch IV
Division of Operating Reactor Licensing
Office of Nuclear Reactor Regulation

Docket No. 50-368

Enclosure:
Safety Evaluation

cc w/encl: Distribution via Listserv

UNITED STATES
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SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION

THIRD 10-YEAR INTERVAL INSERVICE INSPECTION PROGRAM

REQUEST FOR ALTERNATIVE ANO2-PT-001

ARKANSAS NUCLEAR ONE, UNIT 2

ENTERGY OPERATIONS, INC.

DOCKET NO. 50-368

1.0 INTRODUCTION

By letter dated July 31, 2008, Entergy Operations, Inc. (the licensee) submitted relief request ANO2-PT-001 for Arkansas Nuclear One, Unit 2 (ANO-2) proposing an alternative to the requirements of American Society of Mechanical Engineers Boiler and Pressure Vessel Code (ASME Code), Section XI, "Rules for Inservice Inspection of Nuclear Power Plant Components," 2001 Edition with 2003 Addenda, IWB-5222(b), which requires a system leakage test to include all ASME Code Class 1 components within the system boundary. The licensee has proposed an alternative to pressurize up to the inboard isolation valve, which would exclude a segment of the Class 1 boundary from attaining the required test pressure. The alternative is to perform the system leakage test of the piping segments between the inboard and the outboard isolation valves to the requirement of the interconnecting Class 2 system leakage test to be conducted during the same inspection interval.

The licensee's request for relief is based on hardship of performing off-normal activities in order to pressurize the portion of piping between the inboard and outboard isolation valves to Code Class 1 system leakage test pressure corresponding to 100 percent rated reactor power. The U.S. Nuclear Regulatory Commission (NRC) staff has evaluated the licensee's request for relief pursuant to Title 10 of the *Code of Federal Regulations* (10 CFR) 50.55a(a)(3)(ii) and determined that compliance with the Code requirements would result in hardship or unusual difficulty without a compensating increase in the level of quality and safety.

2.0 REGULATORY REQUIREMENTS

Paragraph 10 CFR 50.55a(g) requires that inservice inspection (ISI) of ASME Code Class 1, 2, and 3 components be performed in accordance with Section XI of the ASME Code and applicable addenda, except where specific written relief has been granted by the Commission pursuant to 10 CFR 50.55a(g)(6)(i). According to 10 CFR 50.55a(a)(3), alternatives to the requirements of paragraph 50.55a(g) may be used, when authorized by the NRC, if an applicant demonstrates that the proposed alternative would provide an acceptable level of quality and safety or if the specified requirement would result in hardship or unusual difficulty without a compensating increase in the level of quality and safety.

Pursuant to 10 CFR 50.55a(g)(4), ASME Code Class 1, 2, and 3 components (including supports) shall meet the requirements, except the design and access provisions and the preservice examination requirements, set forth in the ASME Code, Section XI, "Rules for ISI of Nuclear Power Plant Components," to the extent practical within the limitations of design, geometry, and materials of construction of the components. The regulations require that ISI of components and system pressure tests conducted during the first 10-year interval and subsequent intervals comply with the requirements in the latest edition and addenda of Section XI of the ASME Code incorporated by reference in 10 CFR 50.55a(b) 12 months prior to the start of the 120-month interval, subject to the limitations and modifications listed therein.

The ISI Code of record for the third 10-year ISI interval for ANO-2 is the 2001 Edition through the 2003 Addenda of the ASME Code, Section XI.

3.0 TECHNICAL EVALUATION

3.1 System/Component(s) for Which Relief is Requested

Reactor Coolant Pressure Boundary (RCPB)

1. High Pressure Safety Injection (HPSI) Header No. 1 piping between check valves 2SI-27A and 2SI-28A

2. HPSI Header No. 2 piping between check valves 2SI-27B and 2SI-28B

3. Safety Injection Loop "A" piping between check valves 2SI-13A, 2SI-14A, 2SI-15A and 2SI-16A

4. Safety Injection Loop "B" piping between check valves 2SI-13B, 2SI-14B, 2SI-15B and 2SI-16B

5. Safety Injection Loop "C" piping between check valves 2SI-13C, 2SI-14C, 2SI-15C and 2SI-16C

6. Safety Injection Loop "D" piping between check valves 2SI-13D, 2SI-14D, 2SI-15D and 2SI-16D

7. Safety Injection piping between valves 2CV-5084-1, 2CV-5086-2 and 2SI-19

8. Low Temperature Overpressure Protection (LTOP) vent piping between valves 2CV-4730-1 and 2CV-4731-2

9. LTOP vent piping between valves 2CV-4740-2, 2CV-4741-1 and 2CV-4698-1

10. Pressurizer Auxiliary Spray piping between valves 2CVC-28A and 2CV-4824-2

3.2 ASME Code Requirements

The 2001 Edition with the 2003 Addendum to ASME Code, Section XI, Paragraph IWB-5222(b) in Examination Category B-P, for Item B15.50 requires that the pressure retaining boundary during the system leakage test conducted at or near the end of each inspection interval extend to all Class 1 pressure retaining components within the piping system.

3.3 Licensee's Request for Relief

Relief is requested from performing the system leakage test in accordance with the requirements of the 2001 Edition of the ASME Code, Section XI with 2003 Addenda, Paragraph IWB-5222(b) for the portion of Class 1 piping between the inboard and the outboard isolation valves including the valves identified above in Section 3.1 of this safety evaluation.

3.4 Licensee's Basis for Requesting Relief (as stated)

Performing leakage test of the Class 1 boundary beyond the inboard isolation valves at or near the end of each inspection interval requires conditions that place the plant in abnormal configurations or requires off-normal activities in order to pressurize the subject piping. These challenges include abnormal line-ups, installing jumpers around valve operation interlocks, installing and removing piping jumpers around valves, removing valve internals, and installing plugs. Associated with each challenge come additional burdens prior to plant restart, such as:

- High radiation exposure
- Erecting and removing scaffolding
- Multiple disassembly and reassembly of valves and control circuitry
- Welding

These off-normal configurations and challenges have a potential to adversely impact normal plant start-up because of the critical path time and effort required to ensure system configuration is restored and tested.

The piping subject to this request is outboard of the first isolation valve and is designed to RCPB conditions. However, its operations during normal conditions is not subject to RCPB operating conditions but to Class 2 system conditions of high pressure safety injection (HPSI), shutdown cooling, safety injection, low temperature overpressure protection (LTOP) relief isolation or auxiliary spray. While the subject piping is extremely difficult to test with the Class 1 leakage test, it is easily aligned to the Class 2 system and can be tested at Class 2 test conditions each inspection period. Although Class 2 pressure is lower than Class 1, it is representative of conditions for which the subject piping is exposed during both normal and accident conditions. Additionally, if the inboard valve leaked (thereby pressurizing the subject piping) and a through-wall flaw did exist that could only be detected at the higher pressure; the flaw would be discovered

during the Class 1 leakage test, which is performed during each refueling outage with the inboard valve closed.

3.5 Licensee's Proposed Alternative

In lieu of performing the system leakage test at or near the end of inspection interval of the Class 1 piping between the inboard and the outboard isolation valves including the isolation valves in the RCPB identified in Section 3.1 of this safety evaluation, the licensee proposed to perform a system leakage test complying with the Class 2 pressure requirements scheduled to be conducted during each inspection period of the same inspection interval.

4.0 STAFF EVALUATION

The ASME Code, Section XI of record requires that all Class 1 components within the RCPB undergo a system leakage test at or near the end of each inspection interval. In Relief Request No. ANO2-PT-001, the licensee proposed an alternative to test the Class 1 piping between the inboard and the outboard isolation valves including the isolation valves in the RCPB identified in Sections 3.1 of this safety evaluation. The licensee proposed to perform a pressure test complying with the Class 2 requirements to be conducted during the same inspection interval.

The inboard and the outboard isolation valves in the HPSI system and pressurizer auxiliary spray system for which the licensee has requested the relief, are check valves which prevent flow from the reactor coolant system (RCS) to the connecting system. The portion of piping between the check valves including the valves are Class 1. The nominal operating pressure for the components is that of its connecting system unless the inboard check valve leaks. In order to perform the Code-required system leakage test for these components in the extended Class 1 pressure boundary, an alternative method of pressurizing it to the RCS operating pressure corresponding to 100 percent power would be required. The NRC staff believes that the provision for pressurization for the system leakage test would require considerable man-hour effort resulting in high radiological exposure to personnel. Furthermore, pressurization by this method would preclude the RCS double-valve isolation and may cause safety concerns for the personnel performing the examination.

The licensee has proposed an alternative to perform the system leakage test of the piping segments between the inboard and the outboard isolation valves to the requirement of the interconnecting Class 2 system leakage test to be conducted during the same inspection interval. This alternative, however, would expose the extended Class 1 boundary to a lower test pressure that corresponds to the operating pressure of each connecting system in lieu of the Code-required RCS pressure corresponding to 100 percent power. The staff believes that the lower pressure system leakage test of the components in the extended Class 1 boundary will also detect any leakage in the pressure boundary at a lower leak rate than that of the Code-required test pressure. Nevertheless, the components in the extended Class 1 boundary are exposed to a lower pressure than the RCS pressure during normal operation or during accident condition. Additionally, if the inboard check valve would leak (thereby pressurizing the subject components) with a through-wall flaw existing in the subject component that could only be detected at the higher pressure than that of the normal operating pressure, the flaw would be detected during a routine system leakage test of the RCS conducted prior to startup of the unit following each refueling outage. A mitigating factor in accepting the test pressure of system

operating pressure in lieu of the Code-required test pressure is based on the fact that there is no known degradation mechanism, such as intergranular stress-corrosion cracking, primary water stress-corrosion cracking, or thermal fatigue, that is likely to affect the welds in the subject segments.

The staff believes that the licensee's proposed alternative provides reasonable assurance of structural integrity for the components in the extended Class 1 boundary while maintaining personnel radiation exposure to as low as reasonably achievable. The staff has further determined that compliance with the Code requirement would result in hardship or unusual difficulty without a compensating increase in the level of quality and safety.

5.0 CONCLUSION

Based on the staff's evaluation of Relief Request No. ANO2-PT-001, compliance with the requirements of the 2001 Edition with the 2003 Addenda, Paragraph IWB-5222(b) of the ASME Code, Section XI for the segment of Class 1 piping between the inboard and the outboard isolation valves including the valves would result in hardship or unusual difficulty without a compensating increase in the level of quality and safety. The licensee's proposed alternative in the request for relief provides reasonable assurance of structural integrity. Therefore, pursuant to 10 CFR 50.55a(a)(3)(ii), the proposed alternative in Relief Request No. ANO2-PT-001 is authorized for the third 10-year ISI interval of ANO-2. All other requirements of the ASME Code, Section XI for which relief has not been specifically requested remain applicable, including a third-party review by the Authorized Nuclear Inservice Inspector.

Principal Contributor: P. Patnaik

Date: May 21, 2009

If you have any questions regarding the SE, please contact Kaly Kalyanam at (301) 415-1480.

Sincerely,

/RA by CF Lyon for/

Michael T. Markley, Chief
Plant Licensing Branch IV
Division of Operating Reactor Licensing
Office of Nuclear Reactor Regulation

Docket No. 50-368

Enclosure:
Safety Evaluation

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