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

February 25, 2009

Mr. B. S. Ford
Senior Manager
Nuclear Safety & Licensing
Entergy Operations, Inc.
1340 Echelon Parkway
Jackson, MS 39213-8298

SUBJECT: ARKANSAS NUCLEAR ONE, UNIT 1 - REQUEST FOR ALTERNATIVE ANO1-PT-002, RELIEF FROM SYSTEM HYDROSTATIC TEST REQUIREMENTS FOR THE EXTENDED REACTOR COOLANT PRESSURE BOUNDARY PIPING (TAC NO. MD8823)

Dear Mr. Ford:

By letter dated May 20, 2008, supplemented by letter dated January 23, 2009, Entergy Operations, Inc. (Entergy, the licensee), submitted a request for alternative ANO1-PT-002 for Arkansas Nuclear One, Unit 1 (ANO-1), proposing an alternative to the requirements of the American Society of Mechanical Engineers Boiler and Pressure Vessel Code (ASME Code), Section XI, "Rules for Inservice Inspection [ISI] of Nuclear Power Plant Components," 2001 Edition, 2003 Addenda, IWB-5222(b), which requires a system hydrostatic test to include all ASME Code Class 1 components within the system boundary.

Specifically, ASME Code, Section XI, IWB-5222(b) states, "The pressure retaining boundary during the system leakage test conducted at or near the end of each inspection intervals shall extend to all Class 1 pressure boundary retaining components within the system." Entergy requests to visually examine the extended reactor pressure boundary between the first and second check valves in the reactor coolant system, for the components in the decay heat removal Loops A and B, and for the pressurizer auxiliary spray piping, during the Class 2 system leakage test to be conducted in the current inspection period.

Based on the U.S. Nuclear Regulatory Commission (NRC) staff's review of the information provided by the licensee in its letters dated May 20, 2008, and January 23, 2009, authorizing the proposed alternative is justified on the basis that the proposed alternative provides reasonable assurance that the proposed alternative would provide an acceptable level of quality and safety and that compliance with the specified requirements would result in hardship or unusual difficulty without a compensating increase in the level of quality and safety. Therefore, the NRC staff authorizes the proposed alternative pursuant to paragraph 50.55a(a)(3)(ii) of Title 10 of the *Code of Federal Regulations* for the fourth 10-year ISI interval at ANO-1.

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.

The NRC staff's safety evaluation is enclosed.

Sincerely,

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

Docket No. 50-313

Enclosure:
Safety Evaluation

cc w/encl.: Distribution via ListServ

UNITED STATES
NUCLEAR REGULATORY COMMISSION
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SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION

FOURTH 10-YEAR INSERVICE INSPECTION INTERVAL

REQUEST FOR ALTERNATIVE ANO1-PT-002 TO THE

AMERICAN SOCIETY OF MECHANICAL ENGINEERS CODE, SECTION XI, IWB-5222(b)

ENTERGY OPERATIONS, INC.

ARKANSAS NUCLEAR ONE, UNIT 1

DOCKET NO. 50-313

1.0 INTRODUCTION

By letter dated May 20, 2008 (Agencywide Documents Access and Management System (ADAMS) Accession No. ML081620369), supplemented by letter dated January 23, 2009 (ADAMS Accession No. ML090540059)), Entergy Operations, Inc. (Entergy, the licensee), submitted a request, under Title 10 of the *Code of Federal Regulations* (10 CFR), Section 50.55(a)(3)(i), for alternative ANO1-PT-002 for Arkansas Nuclear One, Unit 1 (ANO-1), 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, 2003 Addenda, IWB-5222(b), which requires a system hydrostatic test to include all ASME Code Class 1 components within the system boundary.

ASME Code, Section XI, IWB-5222(b) states, "The pressure retaining boundary during the system leakage test conducted at or near the end of each inspection intervals shall extend to all Class 1 pressure boundary retaining components within the system." Entergy requests to visually examine the extended reactor pressure boundary between the first and second check valves in the reactor coolant system, for the components in the decay heat removal Loops A and B, and for the pressurizer auxiliary spray piping, during the Class 2 system leakage test to be conducted in the current inspection period.

2.0 REGULATORY REQUIREMENTS

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. According to 10 CFR 50.55a(a)(3), alternatives to the requirements of paragraph 50.55a(g) may be used, when authorized by the U.S. Nuclear Regulatory Commission (NRC), if an applicant demonstrates that the proposed alternatives would provide an acceptable level of quality and safety, or if compliance with 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 fourth 10-year ISI inspection interval for ANO-2 is the 2001 Edition with 2003 Addenda of the ASME Code, Section XI.

3.0 TECHNICAL EVALUATION

3.1 Components for Which Relief is Requested

Reactor Coolant Pressure Boundary (RCPB):

- Decay Heat Removal System Loop "A," between check valves DH-14A, CF-1A, DH-13A, and DH-18
- Decay Heat Removal System Loop "B," between check valves DH-14B, CF-1B, DH-13B, and DH-17
- Pressurizer Auxiliary Spray Piping between check valves DH-12 and DH-16

3.2 ASME Code Requirements

The 2001 Edition with 2003 Addenda, 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 the 2003 Addenda, paragraph IWB-5222(b) for the portion of Class 1 piping between the inboard and the outboard check valves including the check valves identified above in Sections 3.1 of this safety evaluation.

3.4 Basis for Proposed Alternative (as proposed by the licensee)

Performing the 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 are additional burdens prior to plant restart, such as:

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

These off-normal configurations and challenges may also contribute to the risk of delaying normal plant start-up because of the critical path time and effort required to ensure system configuration is restored.

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 are typically not subject to RCPB operating conditions but to Class 2 system conditions of decay heat removal, auxiliary spray, or high-pressure injection. While the subject piping is extremely difficult to test with the Class 1 leakage test, it is easily tested with the Class 2 system at Class 2 test conditions because of the check valve boundaries. Although Class 2 system pressure is lower than that of 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 NRC Staff Evaluation

The ASME Code, Section XI requires that all Class 1 components within the reactor coolant system (RCS) boundary undergo a system hydrostatic test at or near the end of each inspection interval. In Relief Request No. ANO1-PT-002, the licensee proposed an alternative to test the Class 1 piping between the inboard and the outboard check valves in the RCPB identified in Section 3.1 of this safety evaluation. The licensee proposed to perform a pressure test complying to the Class 2 requirements to be conducted during the same inspection interval.

The inboard and the outboard check valves in the decay heat removal Loops A and B, and the pressurizer auxiliary spray system for which the licensee has requested the relief, are check valves which prevent back flow from the 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 (IWB-5221) system hydrostatic 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 concludes that the provision for pressurization for the system hydrostatic 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 the system hydrostatic test of the extended Class 1 boundary by a system leakage test of each connecting system. The alternative would require performing a pressure test complying with Class 2 requirements 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 NRC staff concludes that the lower pressure system leakage test of the components in the extended Class 1 boundary will also detect leakage in the pressure boundary with 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 an 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 routine system leakage test of the RCS conducted prior to startup of the unit following each refueling outage. The NRC staff concludes that the licensee's proposed alternative provides reasonable assurance that the proposed alternative would provide an acceptable level of quality and safety for the components in the extended Class 1 boundary while maintaining personnel radiation exposure to as low as reasonably achievable. The NRC staff has further concluded that compliance to the Code requirement would result in hardship or unusual difficulty without a compensating increase in the level of quality and safety.

4.0 CONCLUSION

Based on the NRC staff's evaluation of Relief Request No. ANO1-PT-002, compliance with the requirements of the ASME Code, Section XI, 2001 Edition with 2003 Addenda, paragraph IWB-5222(b) for the portion of Class 1 piping between the inboard and the outboard check valves in the RCPB identified in Section 3.1 of this safety evaluation 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 an adequate level of quality and safety. Therefore, pursuant to 10 CFR 50.55a(a)(3)(ii), the proposed alternative in Relief Request No. ANO1-PT-002 is authorized for the fourth 10-year ISI interval of ANO-1.

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: N. Kalyanam

Date: February 25, 2009

The NRC staff's safety evaluation is enclosed.

Sincerely,

/RA/

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

Docket No. 50-313

Enclosure:
Safety Evaluation

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