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

February 23, 2009

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

SUBJECT: ARKANSAS NUCLEAR ONE, UNIT 1, GRAND GULF NUCLEAR STATION, RIVER BEND STATION, AND WATERFORD STEAM ELECTRIC STATION, UNIT 3 - REQUEST FOR ALTERNATIVE NO. CEP-PT-002, VISUAL EXAMINATION OF VENT, DRAIN, AND BRANCH LEAKAGE TESTS (TAC NOS. MD8819, MD8820, MD8821, AND MD8822)

Dear Mr. Ford:

By letter dated May 20, 2008 (Agencywide Documents Access and Management System (ADAMS) Accession No. ML081620369), as supplemented by letter dated January 23, 2009 ADAMS Accession No. ML090540059), Entergy Operations, Inc. (the licensee) submitted a request for relief (No. CEP-PT-002) related to the inservice inspection (ISI) program pertaining to system leakage tests for Arkansas Nuclear One, Unit 1 (ANO-1), Grand Gulf Nuclear Station (GGNS), River Bend Station (RBS), and Waterford Steam Electric Station, Unit 3 (Waterford 3). Request for Alternative No. CEP-PT-002 is applicable to the fourth 10-year ISI program interval for ANO-1 and the third 10-year ISI program intervals for GGNS, RBS, and Waterford 3.

In the request for relief, the licensee proposed to perform a system leakage test of the American Society of Mechanical Engineers Boiler and Pressure Vessel Code (ASME Code), Section XI Class 1 vent, drain, and branch connections off the reactor coolant pressure boundary (RCPB) that have double manual isolation valves that perform no other safety function other than maintaining the Class 1 pressure boundary shall be visually examined for leakage with the inboard isolation valve in the normally closed position. Branch connections off the RCPB that have double isolation valves that are also necessary to perform Class 2 safety functions shall be tested in conjunction with the Class 2 system pressure test each inspection period.

Based on its evaluation of the request for relief, the U.S. Nuclear Regulatory Commission (NRC) staff concluded in the enclosed safety evaluation that the licensee's proposed alternative provides reasonable assurance of structural integrity, and compliance with the ISI Code of record would result in hardship or unusual difficulty without a compensating increase in the level of quality and safety. Therefore, pursuant to Title 10 of the *Code of Federal Regulations*, 50.55a(a)(3)(ii), the NRC staff authorizes the program alternative proposed in CEP-PT-001 for the fourth 10-year ISI interval for ANO-1 and the third 10-year ISI intervals for GGNS, RBS, and Waterford 3.

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 related Safety Evaluation is enclosed.

Sincerely,

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

Docket Nos. 50-313, 50-416, 50-458,
and 50-382

Enclosure:
Safety Evaluation

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

INSERVICE INSPECTION PROGRAM REQUEST FOR ALTERNATIVE NO. CEP-PT-002

ARKANSAS NUCLEAR ONE, UNIT 1, GRAND GULF NUCLEAR STATION, RIVER BEND STATION, AND WATERFORD STEAM ELECTRIC STATION, UNIT 3

ENTERGY OPERATIONS, INC.

DOCKET NOS. 50-313, 50-416, 50-458, AND 50-382

1.0 INTRODUCTION

By letter dated May 20, 2008 (Agencywide Documents Access and Management System (ADAMS) Accession No. ML081620369), as supplemented by letter dated January 23, 2009 (ADAMS Accession No. ML090540059), Entergy Operations, Inc. (Entergy, the licensee), submitted a request for relief (No. CEP-PT-002) related to the inservice inspection (ISI) program pertaining to system leakage tests for Arkansas Nuclear One, Units 1 (ANO-1), Grand Gulf Nuclear Station (GGNS), River Bend Station (RBS), and Waterford Steam Electric Station, Unit 3 (Waterford 3). In the request for relief, the licensee proposed to perform a system leakage test of the American Society of Mechanical Engineers Boiler and Pressure Vessel Code (ASME Code), Section XI, Class 1 pressure retaining components in reactor coolant pressure boundary (RCPB) vent, drain, and branch connections with the inboard isolation valve closed that would isolate a small segment of Class 1 line from the system boundary for pressurization. The licensee's request for relief is based on hardship of making multiple entries into the containment for the valve alignment and thus, exposing personnel to high radiation and the risk of failure due to single-valve isolation. 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) on the basis that compliance with the ASME Code requirement would result in hardship or unusual difficulty without a compensating increase in the level of quality and safety.

Request for Alternative No. CEP-PT-002 is applicable to the fourth 10-year ISI program interval for ANO-1 and the third 10-year ISI program intervals for GGNS, RBS, and Waterford 3.

2.0 REGULATORY EVALUATION

Paragraph 10 CFR 50.55a(g) requires that 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). Pursuant 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 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 Inservice Inspection (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 interval of ANO-1, and the third 10-year intervals of GGNS, RBS, and Waterford 3, is the 2001 Edition through the 2003 Addenda of the ASME Code, Section XI.

3.0 TECHNICAL EVALUATION

System/Component(s) for which Relief is Requested

ASME Code Class 1 vent, drain, and branch connections off the reactor coolant pressure boundary (RCPB) that have double manual isolation valves that perform no other safety function other than maintaining the Class 1 pressure boundary shall be visually examined for leakage with the inboard isolation valve in the normally closed position. Branch connections off the RCPB that have double isolation valves that are also necessary to perform ASME Code Class 2 safety functions shall be tested in conjunction with the Class 2 system pressure test each inspection period.

ASME Code Requirements

The 2001 Edition through the 2003 Addenda of ASME Code, Section XI, Table IWB-2500-1, Examination Category B-P, Item Nos. B15.50 requires a system leakage test in accordance with paragraph IWB-5220. Paragraph IWB-5222(b) on "Boundaries" states "[t]he pressure retaining boundary during system leakage test conducted at or near the end of each inspection interval shall extend to all Class 1 pressure retaining components within the system boundary."

Licensee's Request for Relief

Relief is requested from paragraph IWB-5222(b) during performance of a system leakage test of RCPB ASME Code Class 1 vent, drain, and branch connections off the RCPB that have double manual isolation valves that perform no other safety function other than maintaining the Class 1 pressure boundary shall be visually examined for leakage with the inboard isolation valve in the normally closed position. Branch connections off the RCPB that have double isolation valves that are also necessary to perform ASME Code Class 2 safety functions shall be tested in conjunction with the Class 2 system pressure test each inspection period.

Basis for Relief (as stated by the licensee)

> The many of the vent and drain connections off the RCPB have double manual isolation valves. The requirement to extend the system leakage test boundary to the outboard valve on these vent and drain connections results in a hardship without a compensating increase in the level of quality and safety. Repositioning the inboard manual valves before and after the test will take considerable time and will result in an unnecessary increase in radiological dose to plant personnel. These off-normal configurations may also contribute to the risk of delaying normal plant start-up because of the critical path time and effort required to ensure configuration is restored.
>
> Based on previous pressure test dose rates, Entergy estimates that complying with the current IWB-5222(b) requirement would result in an additional accumulated dose of approximately 1 man-rem [roentgen equivalent man] at ANO-1 and Waterford 3; and approximately 0.25 man-rem at GGNS and RBS.
>
> The vent and drain connections are normally closed during plant operation. The outboard valves only see pressure if the inboard valve is open or leaks by the seat. Seat leakage, although undesirable, is not indicative of a flaw in the pressure boundary. Furthermore, these valves are generally located close to the main runs of pipe. The non-isolable portion of these vent and drain connections is pressurized and VT-2 examined during the test conducted at each refueling outage. The portion that is normally isolated is VT-2 examined during each refueling outage with the inboard isolation valve closed. In the event that leakage past the inboard valve is occurring, the VT-2 examination would be performed on the pipe while pressurized.
>
> As stated in Section III, Proposed Alternative (above), branch connections off the reactor coolant pressure boundary that have double isolation valves that are also necessary to perform Class 2 safety functions shall be tested in conjunction with the Class 2 system pressure test each inspection period. Testing these connections each inspection period in conjunction with the Class 2 system pressure tests ensures that any leakage would be identified in a timely manner and that appropriate actions, either maintenance or repair/replacement would be taken if leakage was identified from Class 1 portions of branch connections beyond the first reactor coolant pressure boundary isolation valve.
>
> Additionally, the plant technical specifications for RCPB leakage monitoring provide reasonable assurance that appropriate actions, including plant shutdown, would be taken if leakage exceeded specified limits.

Licensee's Proposed Alternative

Pursuant to 10 CFR 50.55a(a)(3)(ii), the licensee proposes an alternative to perform VT-2 visual examination of RCPB vent, drain, and branch connections for leakage with the inboard isolation valve in the normally closed position during the system leakage test conducted at or near the

end of each inspection interval required by IWB-5222(b). In its January 23, 2009, letter, the licensee proposed to utilize the following alternative requirements:

> The pressure retaining boundary shall be visually examined during the system leakage test conducted at or near the end of the interval shall extend to all Class 1 components.
>
> Vent, drain and branch connections off the reactor coolant pressure that have double manual isolation valves that perform no other safety function other than maintaining the Class 1 pressure boundary shall be visually examined for leakage with the inboard isolation valve in the normally closed position.
>
> Branch connections off the reactor coolant pressure boundary that have double isolation valves that are also necessary to perform Class 2 safety functions shall be tested in conjunction with the Class 2 system pressure test each inspection period.

4.0 STAFF EVALUATION

The ASME Code, Section XI, requires that all Class 1 components within the RCPB undergo a system leakage test at the end of each refueling outage and a system hydrostatic test at or near the end of each inspection interval. In Relief Request No. CEP-PT-002, the licensee proposed an alternative to the ASME Code requirement to perform a hydrostatic leakage test of the RCPB vent, drain, and branch connections. The proposed alternative would isolate a segment of piping between the inboard and outboard isolation valves from being pressurized during a hydrostatic leakage test. The pipe segments include two closed-valves separated by a short pipe that is connected to the reactor coolant system (RCS). The line configuration, as outlined, provides double-isolation of the RCS. Under normal plant operating conditions, the subject pipe segments would see RCS temperature and pressure only if leakage through the inboard isolation valves occurs. For the licensee to perform the ASME Code-required test, it would be necessary to manually open the inboard valves to pressurize the pipe segments. Pressurization by this method would preclude the RCS double-valve isolation and may cause safety concerns for the personnel performing the examination.

Typical line/valve configurations are in close proximity to the RCPB main runs of pipe and, thus, would require personnel entry into high-radiation areas within the containment. The licensee stated that manual actuation (opening and closing) of these valves is estimated to expose plant personnel to approximately 1 man-rem each at ANO-1 and Waterford 3, and approximately 0.25 man-rem at GGNS and RBS per test. The NRC staff agrees that this would constitute a hardship for the licensee. The licensee proposed to visually examine the isolation valves in the normally-closed position for leaks, which would indicate any evidence of past leakage during the operating cycle. Also, the RCPB vent and drain connections will be visually examined with the isolation valves in the normally-closed position during the 10-year system hydrostatic test.

The licensee has proposed an alternative to the system hydrostatic test of the extended Class 1 boundary by a system inservice test of each connecting system which is Class 2 and to perform the VT-2 visual examination 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 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 accident condition. Additionally, if the inboard 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 concluded 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 NRC staff concluded that the proposed alternative would provide an acceptable level of quality and safety. 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.

Therefore, the NRC staff believes that the licensee's proposed alternative will provide reasonable assurance of structural integrity for the RCPB vent, drain, and branch connections while maintaining personnel radiation exposure to as low as reasonably achievable. Based on this, the NRC staff has determined that compliance with the ASME Code requirements would result in hardship or unusual difficulty without a compensating increase in the level of quality and safety.

5.0 CONCLUSION

Based on the NRC staff's evaluation of the request for relief, the licensee's proposed alternative provides reasonable assurance of structural integrity, and compliance with the ASME Code requirements would result in hardship or unusual difficulty without a compensating increase in the level of quality and safety. Therefore, pursuant to 10 CFR 50.55a(a)(3)(ii), the proposed alternative in Relief Request No. CEP-PT-001 is authorized for the fourth 10-year ISI interval of ANO-1, and the third 10-year ISI intervals of GGNS, RBS, and Waterford 3. 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 23, 2009

February 23, 2009

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 related Safety Evaluation is enclosed.

Sincerely,

/RA/

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

Docket Nos. 50-313, 50-416, 50-458,
and 50-382

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Safety Evaluation

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