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

January 21, 2010

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

SUBJECT: ARKANSAS NUCLEAR ONE, UNIT 2 – REQUEST FOR ALTERNATIVE VRR-ANO2-2009-1 FOR THE FOURTH 10-YEAR INSERVICE TESTING INTERVAL (TAC NO. ME2407)

Dear Sir or Madam:

By letter dated October 16, 2009, and electronic mail dated January 8, 2010, Entergy Operations, Inc. (Entergy, the licensee), proposed an alternative to the inservice testing (IST) requirements of the American Society of Mechanical Engineers (ASME) "Code for Operation and Maintenance of Nuclear Power Plants" (OM Code), pertaining to the frequency of the leak rate test for two service water boundary isolation valves at Arkansas Nuclear One, Unit 2 (ANO-2). The licensee's proposed alternative, pursuant to Title 10 of the *Code of Federal Regulations* (10 CFR) 50.55a(a)(3)(ii), is for the fourth 10-year IST interval. The fourth interval begins on March 26, 2010.

The Code of record governing the fourth 10-year IST interval for valves at ANO-2 is the ASME OM Code, 2004 Edition. The 2004 Edition of the OM Code, Subsection ISTC-3630(a), requires that Category A valves, with a leakage requirement not based on an owner's Appendix J program of 10 CFR Part 50, shall be tested to verify their seat leakages are within acceptable limits and that the tests shall be conducted at least once every 2 years. Entergy has proposed to perform the test on a test frequency of at least once every 3 years for two service water boundary isolation valves, 2CV-1541-1 and 2CV-1560-2. This request impacts only these two valves and would allow ANO-2 to test one valve per refueling outage instead of both valves in the same outage.

The U.S. Nuclear Regulatory Commission (NRC) staff has completed its review and concluded that the licensee's proposed alternative would provide reasonable assurance of valve operability. The NRC staff has concluded that compliance with the specified requirements of 2004 Edition of the OM Code Subsection ISTC-3630(a) 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 NRC staff authorizes the use of request for alternative VRR-ANO2-2009-1, for service water boundary isolation valves, 2CV-1541-1 and 2CV-1560-2, for the fourth 10-year IST interval, that begins on March 26, 2010, and ends on March 25, 2020.

All other ASME OM Code requirements for which relief has not been specifically requested remain applicable, including third-party review by the Authorized Nuclear Inspection Inspector.

The NRC staff's safety evaluation is enclosed. If you have any questions, Please contact Kaly Kalyanam at (301) 415 1480 or via email at kaly.kalyanam@nrc.gov.

Sincerely,

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

REQUEST FOR ALTERNATIVE VRR-ANO2-2009-1 FOR

THE FOURTH 10-YEAR INSERVICE TESTING INTERVAL

ARKANSAS NUCLEAR ONE, UNIT 2

ENTERGY OPERATIONS, INC.

DOCKET NO. 50-368

1.0 INTRODUCTION

By letter dated October 16, 2009 (Agencywide Documents Access and Management System (ADAMS) Accession No. ML092890479), and electronic mail dated January 8, 2010 (ADAMS Accession No. ML100080519), Entergy Operations, Inc. (Entergy, the licensee), submitted relief request VRR-ANO2-2009-1 for the fourth 10-year inservice testing (IST) program interval at Arkansas Nuclear One, Unit 2 (ANO-2). The licensee requested relief from certain IST requirements of the American Society of Mechanical Engineers (ASME) "Code for Operation and Maintenance of Nuclear Power Plants" (OM Code).

The Code of record governing the fourth 10-year IST interval for valves at ANO-2, is the ASME OM Code, 2004 Edition. The 2004 Edition of the OM Code, Subsection ISTC-3630(a) requires that Category A valves, with a leakage requirement not based on an owner's Appendix J program of Title 10 of the *Code of Federal Regulations* (10 CFR) Part 50, shall be tested to verify their seat leakages are within acceptable limits and that the tests shall be conducted at least once every 2 years. The fourth 10-year interval begins on March 26, 2010, and ends on March 25, 2020.

2.0 REGULATORY EVALUATION

The regulations in 10 CFR 50.55a, "Codes and standards," requires that IST of certain ASME Code Class 1, 2, and 3 pumps and valves be performed at 120-month (10-year) IST program intervals in accordance with the specified ASME Code and applicable addenda incorporated by reference in the regulations, except where alternatives have been authorized or relief has been requested by the licensee and granted by the U.S. Nuclear Regulatory Commission (NRC) pursuant to paragraphs (a)(3)(i), (a)(3)(ii), or (f)(6)(i) of 10 CFR 50.55a. In accordance with 10 CFR 50.55a(f)(4)(ii), licensees are required to comply with the requirements of the latest

edition and addenda of the ASME Code incorporated by reference in the regulations 12 months prior to the start of each 120-month IST program interval. In accordance with 10 CFR 50.55a(f)(4)(iv), IST of pumps and valves may meet the requirements set forth in subsequent editions and addenda that are incorporated by reference in 10 CFR 50.55a(b), subject to NRC approval. Portions of editions or addenda may be used provided that all related requirements of the respective editions and addenda are met. In proposing alternatives or requesting relief, the licensee must demonstrate that: (1) the proposed alternatives provide an acceptable level of quality and safety; (2) compliance would result in hardship or unusual difficulty without a compensating increase in the level of quality and safety; or (3) conformance with Code requirements is impractical for the facility. The regulations in 10 CFR 50.55a authorize the NRC to approve alternatives and to grant relief from ASME Code requirements upon making necessary findings. NRC guidance contained in Generic Letter (GL) 89-04, "Guidance on Developing Acceptable Inservice Testing Programs," dated April 3, 1989, provides alternatives to ASME Code requirements which are acceptable. Further guidance is given in GL 89-04, Supplement 1, dated April 4, 1995, and NUREG-1482, Revision 1, "Guidelines for Inservice Testing at Nuclear Power Plants," January 2005.

3.0 TECHNICAL EVALUATION

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

ASME Code Class 3, OM Code Category A, service water (SW) boundary isolation valves 2CV-1541-1 and 2CV-1560-2.

3.2 Code Requirements (as stated by the licensee):

The code of record governing the fourth 10-year Inservice Testing (IST) interval for valves at Arkansas Nuclear One, Unit 2 (ANO-2), is the ASME OM Code, 2004 Edition. The 2004 Edition of the OM Code [Subsection] ISTC-3630(a) requires that Category A valves, with a leakage requirement not based on an Owner's 10 CFR 50, Appendix J program, shall be tested to verify their seat leakages are within acceptable limits and that the tests shall be conducted at least once every 2 years.

3.3 Licensee's Basis for Requesting Relief (as stated by the licensee):

These valves can only be tested when the unit is shutdown in Modes 5 or 6 and with the associated SW loop out of service, one at a time. Normally these valves are tested during refueling outages. The entire loop of SW is required to be removed from service and drained empty to perform this test. In doing this, all the loads on that particular SW loop are declared inoperable which may include the associated emergency control room chiller, the associated emergency diesel generator, the backup SW train for cooling the spent fuel pool, and the standby shutdown cooling train. Declaring the emergency control room chillers inoperable requires ANO-1 [Arkansas Nuclear One, Unit 1] to enter into Technical Specification action statements since this equipment is used for cooling both ANO control rooms.

Most importantly, the removal of a SW loop from operation reduces the defense in depth for loss of decay heat removal events by removing its cooling water source and its emergency diesel generator as a backup power source. The emergency diesel generator also supplies a backup power supply to the standby shutdown cooling train. Removal of the SW loop from operation also removes the backup cooling water train from the spent fuel pool during outage conditions when the spent fuel pool heat load is the highest. This unnecessarily increases the risk and vulnerability of ANO-2 during a refueling outage.

These actions and vulnerabilities are repeated when the other valve is tested during the same outage.

It is estimated to take approximately 125 man-hours to perform the test. This is approximately $4400 per valve for the test. Each test takes approximately two (2) days to perform. To remove one loop of SW from service, the estimated dose consequence is less than 10 mrem [millirem].

NUREG-1482, Revision 1, "Guidelines for Inservice Testing at Nuclear Power Plants" was reviewed for a definition of "hardship". Hardship is interpreted to mean a high degree of difficulty or an adverse impact on plant operation. The above hardships can be significantly reduced using the modified test frequency without decreasing the level of quality or safety.

3.4 Licensee's Proposed Alternative Testing and Basis (as stated by the licensee):

Entergy proposes an alternate test frequency for performing leak rate tests for valves 2CV-1541-1 and 2CV-1560-2. Specifically, Entergy proposes to test one valve each refueling outage. This would alter the frequency to once every three (3) years.

Entergy believes the current requirement for leak rate testing the identified valves every two years (i.e., testing both valves every refueling outage) results in a hardship without a compensating increase in the level of quality or safety. Entergy also believes that the proposed alternative of performing the leak rate test once every three years (i.e., testing one valve each refueling outage) provides reasonable assurance that the valves described herein are periodically leak tested and maintained leak tight.

This request for relief is from the frequency of the leak rate test only. The full stroke test of these valves will continue to occur every three months. The acceptance criteria of the full stroke and the leak rate tests nor the required corrective actions if the acceptance criterion is violated are not being changed. The test methods for the full stroke test and the leak rate test are not being changed due to this request.

The ECP [Emergency Cooling Pond] is shared between ANO-1 and ANO-2. The design basis for the ECP is that it be capable of dissipating the heat from an accident on one unit, permit the concurrent safe shutdown and cool down of the remaining unit, and maintain both in a safe shutdown condition. The capacity of the ECP is to be sufficient to provide cooling both for the period of time needed to evaluate the situation and for the period of time needed to take corrective action.

The inventory analysis for the ECP assumes a total loss of 30 gallons per minute (gpm) from the boundary valves of both units combined. Currently, the analysis assumes the allowable leakage to be evenly distributed among the valves, or 2.5 gpm per valve. Even distribution of the allowed leakage is not a design requirement for operability of the individual valves, provided total leakage is being monitored and margin is being maintained from the allowable.

While it is acceptable for individual valve leakage limits to be greater than those calculated from even distribution of the total, the valve limits need to be below the total ECP allowable leakage to avoid masking and shadowing concerns. Total leakage from the valves on each system is monitored to ensure the limit assumed in the ECP inventory analysis is not exceeded. Thus, the limit for operability for an individual valve also needs to be below the limit for the system. In addition, it is desirable to establish a maintenance limit (Acceptable Normal Range) to initiate corrective maintenance at a leakage threshold above what would normally be expected for the valve and below the operability threshold.

The allowable leakage below which corrective maintenance is not required is established to be less than 1.5 gpm. This is the "Acceptable Normal Range". The SW boundary isolation valves have been replaced in previous cycles with metal seats (or metal/graphite laminated layers) to reduce the potential for gross leakage from failure modes of soft seats (i.e., rubber lined butterfly valves) tearing away from the valve body. The performance history (recent history summarized in the table below) has been reviewed and the valves should be readily capable of performing with less than 1.5 gpm leakage.

	2CV-1541-1		2CV-1560-2	
Test Date	**Normal Rate (gpm)**	**Acceptable Rate (gpm)**	**Normal Rate (gpm)**	**Acceptable Rate (gpm)**
10/10/2003	0.25	1.5	0	1.5
04/07/2005	0	1.5	0	1.5
10/20/2006	0	1.5	0	1.5
04/04/2008	0	1.5	1.25	1.5
09/08/2009	0	1.5	N/A	1.5

This threshold initiates corrective maintenance at leakage levels below the currently established 2.5 gpm limit. Corrective maintenance will typically be performed during the outage that leakage exceeding 1.5 gpm is detected. However, the corrective maintenance may be scheduled during the following outage to better align with train maintenance and other preventative maintenance schedules provided the Limiting Range of Operability is not exceeded and the as-left total system leakage can be maintained below the Acceptable Normal Range (< 10 gpm / system).

The valve operability threshold is greater than or equal to 9.0 gpm, or 30% of the assumed ECP inventory loss to SW boundary valves. This threshold, being only 30% of the total assumed inventory loss for the ECP, provides conservatism to the total allowed leakage for establishing a functional failure criterion for the ECP boundary isolation valves.

One of the two valves will be leak tested each refueling outage on a rotating basis in accordance with current plant procedures. If problems are found with the sample valve that results in leakage in excess of the limiting value for operability described in the test procedure, both valves will be tested during the same outage to verify operability.

As is evident from the information above, these valves have a history of having very little leakage, always within the acceptance criteria. There are no plans in the foreseeable future that would require these valves to be changed or replaced.

Based on the determination that compliance with the OM Code [Subsection ISTC-3630(a)] requirements results in a hardship without a compensating increase in the level of quality or safety, this proposed alternative should be granted pursuant to 10 CFR 50.55a(a)(3)(ii).

3.5 Duration of Proposed Alternative (as stated by the licensee)

This relief will be effective for ANO-2's Fourth Inservice Testing [10-year interval]. The fourth interval starts on March 26, 2010.

3.6 NRC Staff Evaluation

The valves identified in this alternative are normally closed motor-operated 18-inch Tricentric stainless steel butterfly stop valves. They have an active open safety function to direct the SW return flow to the ECP, an active closed safety function to isolate a ruptured SW header to ensure the long-term cooling capability, and also serve as SW boundary isolation valves. The total allowed leakage limit for each valve is based on the inventory analysis for the ECP assuming a total loss of 30 gpm from the boundary valves of both units combined. Administrative leakage limits have been calculated for each of the subject valves. These calculations and administrative limits were not reviewed as part of this safety evaluation.

Seat leakage testing of these valves requires the entire service water loop to be drained and removed from service. In doing this, all the loads on that particular service water loop are declared inoperable including the associated emergency control room chiller, the associated emergency diesel generator, the backup SW train for cooling the spent fuel pool, and the standby shutdown cooling train. Declaring these systems inoperable would increase the risk and vulnerability of ANO-2 during a refueling outage. Declaring the emergency control room chillers inoperable requires ANO-1 to enter into Technical Specification Action statements because this equipment is used for cooling both ANO control rooms. Furthermore, it is estimated that it will take approximately 125 man-hours and 2 days per valve to perform the Code-required test, the cost associated with the test is approximately $4,400 per valve, and there is a dose consequence of less than 10 mrem. Therefore, the NRC staff concludes that performance of the seat leakage tests for the affected valves would be a hardship to the licensee.

Subsection ISTC-3630(a) of 2004 Edition of the OM Code requires that the valves identified in the relief request be leakage tested at least once every 2 years. Because of the hardship of testing the affected valves, the licensee is requesting that, in lieu of testing both valves, the test will be performed on a rotating basis with one valve being tested each refueling outage. The licensee's proposal will result in the testing of each valve every 3 years. In the event that a valve selected for testing during a refueling outage is not capable of meeting the leakage limit, the other valve will be leakage tested during the same refueling outage. A review of historical leak test results over a period of 7 years (2003 through 2009) for each of these valves indicated that measured leakages are in most cases non-existent or less than the administrative limits. In addition, the licensee states that the relief request seeks relief from the frequency of the leak rate test only. The full stroke test of these valves will continue every 3 months as required by the OM Code Subsection ISTC.

The NRC staff concludes that the licensee's proposal of testing the affected valves on a rotating basis combined with good history of previous test results provides reasonable assurance of valve operability, and support that an extension of the time period from 2 to 3 years between tests is reasonable and is, therefore, acceptable. Since these valves are of the same size/type and experience identical service conditions, the licensee's proposal to test one of the two valves on a rotating basis is also consistent with the philosophy of the sample test as described in NUREG-1482, Revision 1, Section 4.1 for check valves and, therefore, is acceptable.

Therefore, pursuant to 10 CFR 50.55a(a)(3)(ii), the NRC staff authorizes the use of request for alternative VRR-ANO2-2009-1, for service water boundary isolation valves, 2CV-1541-1 and 2CV-1560-2, for the fourth 10-year IST interval, that begins on March 26, 2010, and ends on March 25, 2020.

4.0 CONCLUSION

Based on the above, the NRC staff concludes that the licensee's proposed alternative to the Code testing requirements of valves 2CV-1541-1 and 2CV-1560-2 is acceptable and provides reasonable assurance of valve operability. In addition, the NRC staff has concluded that compliance with the current 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 NRC staff authorizes the use of request for alternative VRR-ANO2-2009-1 for ANO-2's fourth 10-year IST interval.

All other ASME OM Code requirements for which relief has not been specifically requested remain applicable.

Principal Contributor: N. Kalyanam

Date: January 21, 2010

All other ASME OM Code requirements for which relief has not been specifically requested remain applicable, including third-party review by the Authorized Nuclear Inspection Inspector.

The NRC staff's safety evaluation is enclosed. If you have any questions, Please contact Kaly Kalyanam at (301) 415 1480 or via email at kaly.kalyanam@nrc.gov.

Sincerely,

/RA/

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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