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

April 7, 2011

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: TECHNICAL SPECIFICATION CHANGE TO EXTEND THE TYPE A TEST FREQUENCY TO 15 YEARS (TAC NO. ME4090)

Dear Sir or Madam:

The Commission has issued the enclosed Amendment No. 292 to Renewed Facility Operating License No. NPF-6 for Arkansas Nuclear One, Unit No. 2 (ANO-2). The amendment consists of changes to the Technical Specifications (TSs) in response to your application dated June 17, 2010, as supplemented by letters dated January 17, 20, and 31 and March 7, 2011.

The amendment allows for the extension to the 10-year frequency of the ANO-2 Type A (Integrated Leak Rate Test) that is required by TS 6.5.16, "Containment Leakage Rate Testing Program," to 15 years on a permanent basis.

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,

N. Kaly Kalyanam, Project Manager
Plant Licensing Branch IV
Division of Operating Reactor Licensing
Office of Nuclear Reactor Regulation

Docket No. 50-368

Enclosures:
1. Amendment No. 292 to NPF-6
2. Safety Evaluation

cc w/encls: Distribution via Listserv

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

ENTERGY OPERATIONS, INC.

DOCKET NO. 50-368

ARKANSAS NUCLEAR ONE, UNIT NO. 2

AMENDMENT TO RENEWED FACILITY OPERATING LICENSE

Amendment No. 292
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 June 17, 2010, as supplemented by letters dated January 17, 20, and 31 and March 7, 2011, 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 as indicated in the attachment to this license amendment, and Paragraph 2.C.(2) of Renewed Facility Operating License No. NPF-6 is hereby amended to read as follows:

(2) Technical Specifications

The Technical Specifications contained in Appendix A, as revised through Amendment No. 292, are hereby incorporated in the renewed license. The licensee shall operate the facility in accordance with the Technical Specifications

3. The license amendment is effective as of its date of issuance and shall be implemented within 30 days from the date of issuance.

FOR THE NUCLEAR REGULATORY COMMISSION

Michael T. Markley, 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
Technical Specifications

Date of Issuance: April 7, 2011

ATTACHMENT TO LICENSE AMENDMENT NO. 292

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	INSERT
-3-	-3-

Technical Specifications

REMOVE	INSERT
6-18	6-18

(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. 292 are hereby incorporated in the renewed license. The licensee shall operate the facility in accordance with the Technical Specifications.

Exemptive 2nd paragraph of 2.C.2 deleted per Amendment 20, 3/3/81.

(3) Additional Conditions

The matters specified in the following conditions shall be completed to the satisfaction of the Commission within the stated time periods following issuance of the renewed license or within the operational restrictions indicated. The removal of these conditions shall be made by an amendment to the renewed license supported by a favorable evaluation by the Commission.

2.C.(3)(a) Deleted per Amendment 24, 6/19/81.

6.5.16 Containment Leakage Rate Testing Program

A program shall be established to implement the leakage rate testing of the containment as required by 10 CFR 50.54(o) and 10 CFR 50, Appendix J, Option B, as modified by approved exemptions. This program shall be in accordance with the guidelines contained in NEI 94-01, Revision 2-A, "Industry Guideline for Implementing Performance-Based Option of 10 CFR Part 50, Appendix J," dated October 2008. The next Type A test performed after the November 30, 2000 Type A test shall be performed no later than November 30, 2015.

In addition, the containment purge supply and exhaust isolation valves shall be leakage rate tested prior to entering MODE 4 from MODE 5 if not performed within the previous 92 days.

The peak calculated containment internal pressure for the design basis loss of coolant accident, P_a, is 58 psig.

The maximum allowable containment leakage rate, L_a, shall be 0.1% of containment air weight per day at P_a.

Leakage rate acceptance criteria are:

a. Containment leakage rate acceptance criteria is $\leq 1.0\ L_a$. During the first unit startup following each test performed in accordance with this program, the leakage rate acceptance criteria are $< 0.60\ L_a$ for the Type B and Type C tests and $\leq 0.75\ L_a$ for Type A tests.

b. Air lock acceptance criteria are:

   1. Overall air lock leakage rate is $\leq 0.05\ L_a$ when tested at $\geq P_a$.

   2. Leakage rate for each door is $\leq 0.01\ L_a$ when pressurized to ≥ 10 psig.

The provisions of Specification 4.0.2 do not apply to the test frequencies specified in the Containment Leakage Rate Testing Program.

The provisions of Specification 4.0.3 are applicable to the Containment Leakage Rate Testing Program.

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

SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION

RELATED TO AMENDMENT NO. 292 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 June 17, 2010 (Agencywide Documents Access and Management System (ADAMS) Accession No. ML101680380), as supplemented by letters dated January 17, 20, and 31 and March 7, 2011 (ADAMS Accession Nos. ML110180087, ML110210971, ML110320611, and ML110660225, respectively), Entergy Operations, Inc. (the licensee), requested changes to the Technical Specifications (TSs) for Arkansas Nuclear One, Unit No. 2 (ANO-2). The supplemental letters dated January 17, 20, and 31 and March 7, 2011, provided additional information that clarified the application, did not expand the scope of the application as originally noticed, and did not change the U.S. Nuclear Regulatory Commission (NRC) staff's original proposed no significant hazards consideration determination as published in the *Federal Register* on July 27, 2010 (75 FR 44024).

The proposed change in the license amendment request (LAR) would revise a certain portion of ANO-2's TS 6.5.16, "Containment Leakage Rate Testing Program," to change the implementation document for complying with the provisions of Option B to Appendix J in Title 10 of the *Code of Federal Regulations* (10 CFR), Part 50, from NRC Regulatory Guide (RG) 1.163, "Performance-Based Containment Leak-Test Program," dated September 1995 (ADAMS Accession No. ML003740058), to the Nuclear Energy Institute's (NEI's) topical report (TR) NEI 94-01, Revision 2-A, "Industry Guideline for Implementing Performance-Based Option of 10 CFR Part 50, Appendix J," dated October 2008 (ADAMS Accession No. ML100620847) (referred to as NEI 94-01 in this safety evaluation (SE)) and to extend the current primary containment Type A test interval from 11.3 years to 15 years, based on acceptable performance. These proposed changes would allow the next Type A test for ANO-2 to be performed within 15 years from the last test (i.e., no later than November 30, 2015), as opposed to the current, one-time 11.3-year interval date of February 29, 2012, and would allow successive Type A tests to be performed at 15-year intervals provided that acceptable performance history is maintained.

2.0 REGULATORY EVALUATION

The regulations in 10 CFR 50.54(o) requires that the primary reactor containments for water cooled power reactors shall be subject to the requirements set forth in Appendix J to 10 CFR Part 50, "Primary Reactor Containment Leakage Testing for Water-Cooled Power Reactors." Appendix J includes two options, Option A, "Prescriptive Requirements," and Option B, "Performance-Based Requirements," either of which can be chosen for meeting the requirements of the Appendix J. The testing requirements in Appendix J ensure that (a) leakage through these containments or systems and components penetrating these containments does not exceed allowable leakage rates specified in the TSs; and (b) integrity of the containment structure is maintained during its service life. Option B of Appendix J specifies the performance-based requirements and criteria for preoperational and subsequent leakage-rate testing. ANO-2 has voluntarily adopted and has been implementing Option B for meeting the requirements of Appendix J and TS 6.5.16 requires that leakage rate testing be performed as required by 10 CFR Part 50, Appendix J, Option B, as modified by approved exemptions, and in accordance with the guidelines contained in NRC RG 1.163 dated September 1995. This regulatory guide endorses, with certain exceptions, NEI's TR NEI 94-01, Revision 0, "Industry Guideline for Implementing Performance-Based Option of 10 CFR Part 50, Appendix J," dated July 26, 1995.

"Type A" tests measure the containment system overall integrated leakage rate; "Type B" pneumatic tests detect and measure local leakage rates across pressure-retaining leakage-limiting boundaries such as penetrations; and "Type C" pneumatic tests measure containment isolation valve leakage rates. After the preoperational pressure tests, testing is required periodically based on the historical performance of the overall containment system (for Type A tests), and based on the safety significance and historical performance of each boundary and isolation valve (for Type B and C tests) to ensure integrity of the overall containment system as a barrier to fission product release. The leakage rate test results must not exceed the allowable leakage rate (La) with margin, as specified in the TSs. Option B also requires that a general visual inspection of the accessible interior and exterior surfaces of the containment system for structural deterioration, which may affect the containment leak-tight integrity, must be conducted prior to each Type A test and at a periodic interval between tests based on the performance of the containment system.

Section V.B.3 of 10 CFR 50 Appendix J, Option B, requires that the regulatory guide or other implementation document used by a licensee to develop a performance-based leakage-testing program must be included, by general reference, in the plant TSs. Further, Section V.B.3 says the submittal for TS revisions must contain justification, including supporting analyses, if the licensee chooses to deviate from methods approved by the Commission and endorsed in a regulatory guide.

The regulations in 10 CFR Part 50, Appendix J, Option B, require that a Type A test be conducted at a periodic interval based on historical performance of the overall containment system. The ANO-2 TS 6.5.16 requires that leakage rate testing be performed as required by 10 CFR Part 50, Appendix J, Option B, as modified by approved exemptions, and in accordance with the guidelines contained in RG 1.163. This RG endorses, with certain exemptions, NEI's TR NEI 94-01, Revision 0, dated July 26, 1995.

NRC RG 1.174, "An Approach for Using Probabilistic Risk Assessment in Risk-Informed Decisions on Plant-Specific Changes to the Licensing Basis," dated July 1998 (ADAMS Accession No. ML003740133), provides guidance on the use of probabilistic risk assessment (PRA) findings and risk insights in support of licensee requests for changes to a plant's licensing basis.

NRC RG 1.200, Revision 1, "An Approach for Determining the Technical Adequacy of Probabilistic Risk Assessment Results for Risk-Informed Activities," dated January 2007 (ADAMS Accession No. ML070240001), describes an acceptable approach for determining whether the quality of the PRA, in total or the parts that are used to support an application, is sufficient to provide confidence in the results, such that the PRA can be used in regulatory decisionmaking.

A similar TS change was approved for the Nine Mile Point Nuclear Station, Unit No. 2, on March 30, 2010[1].

3.0 TECHNICAL EVALUATION

3.1 Proposed Changes

Current TS 6.5.16, "Containment Leak Rate Testing Program," states, in part, that

> A program shall be established to implement the leakage rate testing of the containment as required by 10 CFR 50.54(o) and 10 CFR 50, Appendix J, Option B, as modified by approved exemptions. This program shall be in accordance with the guidelines contained in Regulatory Guide 1.163, "Performance-Based Containment Leak-Test Program," dated September 1995, except that the next Type A test performed after the November 30, 2000 Type A test shall be performed no later than February 29, 2012.

In its letter dated January 20, 2011, the licensee proposed to revise the corresponding portion (as above) of TS 6.5.16, "Containment Leakage Rate Testing Program," to state

> A program shall be established to implement the leakage rate testing of the containment as required by 10 CFR 50.54(o) and 10 CFR 50, Appendix J, Option B, as modified by approved exemptions. This program shall be in accordance with the guidelines contained in NEI 94-01, Revision 2-A, "Industry Guideline for Implementing Performance-Based Option of 10 CFR Part 50, Appendix J," dated October 2008. The next Type A test performed after the November 30, 2000 Type A test shall be performed no later than November 30, 2015.

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[1] Guzman, R. V., U.S. Nuclear Regulatory Commission, letter to Samuel L. Belcher, Nine Mile Point Nuclear Station, LLC, "Nine Mile Point Nuclear Station, Unit No. 2 – Issuance of Amendment Re: Extension of Primary Containment Integrated Leakage Rate Testing Interval (TAC No. ME1650)," dated March 30, 2010 (ADAMS Accession No. ML100730032).

The performance of fewer integrated leak rate tests (ILRTs) will result in significant savings in radiation exposure to personnel, cost, and critical path time during future refueling outages. In addition, the proposed change supports tying an ILRT to the potential breach in containment for a reactor head replacement at ANO-2, should the current head replacement projected schedule continue as planned.

3.2 Deterministic Considerations: Structural and Leak-Tight Integrity of the Containment

3.2.1 Topical Report NEI 94-01, Revision 2-A

NEI 94-01, Revision 2-A, is the NRC-accepted version of Revision 2 of the TR. The NRC's final safety evaluation report (SER) dated June 25, 2008[2] (referred to as the NEI 94-01 SER in this SE), documents the NRC's evaluation and acceptance of NEI 94-01, Revision 2, subject to the specific limitations and conditions listed in Section 4.1 of the SER. NEI 94-01 describes an approach for implementing the optional performance-based requirements of Option B to Appendix J to 10 CFR Part 50. It incorporates the regulatory positions stated in RG 1.163 (September 1995), and includes provisions for extending Type A test (ILRT) intervals to up to 15 years. NEI 94-01 delineates a performance-based approach for determining Type A, Type B, and Type C containment leakage rate surveillance testing frequencies.

This method uses industry performance data, plant-specific performance data, and risk insights in determining the appropriate testing frequency. The guideline discusses the performance factors that licensees must consider in determining test intervals. While it does not provide the details on how to perform the tests, it references the American National Standards Institute/American Nuclear Society (ANSI/ANS) 56.8-2002, "Containment System Leakage Testing Requirements," for detailed guidance for performing the tests.

In the NEI 94-01 SER, the NRC staff concluded that NEI 94-01 describes an acceptable approach for implementing the optional performance-based requirements of Option B of Appendix J to 10 CFR Part 50, and is acceptable for referencing by licensees proposing to amend their TSs regarding containment leakage rate testing, subject to the specific limitations and conditions listed in Section 4.1. Section 3.1 of the NEI 94-01 SER provides the NRC staff position on the adequacy of NEI 94-01 in addressing the performance-based Type A, Type B, and Type C test frequencies. It also addresses the adequacy of pre-test inspections, procedures to be used after major modifications to the containment structure, deferral of tests beyond the 15-year interval, and the relation of containment in-service inspection (CISI) requirements mandated by 10 CFR 50.55a to the containment leak rate testing requirement.

NEI 94-01 also requires that a plant-specific risk impact assessment be performed using the approach and methodology described in the Electric Power Research Institute's (EPRI's) TR-1009325, Revision 2-A, "Risk Impact Assessment of Extended Integrated Leak Rate Testing Intervals," August 2007, subject to conditions in Section 4.2 of the NEI 94-01 SER, for a

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[2] Maxin, M. J., U.S. Nuclear Regulatory Commission, letter to John C. Butler, Nuclear Energy Institute, "Final Safety Final Safety Evaluation for Nuclear Energy Institute (NEI) Topical Report (TR) 94-01, Revision 2, 'Industry Guideline for Implementing Performance-Based Option of 10 CFR Part 50, Appendix J' And Electric Power Research Institute (EPRI) Report No. 1009325, Revision 2, August 2007, 'Risk Impact Assessment of Extended Integrated Leak Rate Testing Intervals' (TAC No. MC9663)," dated June 25, 2008 (ADAMS Accession No. ML081140104).

proposed extension of the ILRT interval to 15 years. For the plant-specific confirmatory risk assessment, please refer to Section 3.4 of this SE.

3.2.2 Adoption of NEI 94-01, Revision 2-A

In the NEI 94-01 SER, the NRC staff concluded that the guidance in NEI 94-01, Revision 2-A, is acceptable for referencing by licensees proposing to amend their TSs regarding containment leakage rate testing, subject to the six limitations and conditions noted as in Section 4.1 of the NEI 94-01 SER. The NRC staff evaluated whether the licensee adequately addressed and satisfied these conditions in the LAR and supplemental information submittals, as discussed below.

NEI 94-01 SER, Condition 1 states:

> For calculating the Type A leakage rate, the licensee should use the definition in the NEI TR 94-01, Revision 2, in lieu of that in ANSI/ANS-56.8-2002. (Refer to SE Section 3.1.1.1).

In its letter dated June 17, 2010, the licensee stated, in part, that

> Following the NRC approval of this license amendment request, ANO-2 will use the definition in Section 5.0 of NEI 94-01, Revision 2-A, for calculating the Type A leakage rate when future ANO-2 Type A tests are performed...

Furthermore, in its letter dated January 20, 2011, ANO-2 commits to the use of the definition in Section 5.0 of NEI 94-01, Revision 2-A, on a continuing compliance basis.

Since the licensee has committed to comply with the definition in NEI 94-01 for calculating the Type A test leakage rate, the NRC staff concludes that the licensee has adequately addressed Condition 1.

NEI 94-01 SER, Condition 2 states:

> The licensee submits a schedule of containment inspections to be performed prior to and between Type A tests. (Refer to SE Section 3.1.1.3).

NEI 94-01, Section 9.2.3.2, "Supplemental Inspection Requirements," states that in order to provide continuing supplemental means of identifying potential containment degradation, a general visual examination of accessible interior and exterior surfaces of the containment for structural deterioration that may affect the containment leak-tight integrity must be conducted prior to each Type A test and during at least three other outages before the next Type A test if the interval of the Type A test is extended to 15 years. NEI 94-01, Section 9.2.3.2 recommends performing the inspections in conjunction, or coordinated, with the American Society of Mechanical Engineers Boiler and Pressure Vessel Code (ASME Code), Section XI, Subsection IWE/IWL required examinations. Section 3.1.1.3 of the NEI 94-01 SER states in part that, to avoid duplication or deletion of examinations, licensees using NEI 94-01 have to develop a schedule of containment inspections that satisfy both Section 9.2.3.2 of NEI 94-01 and ASME Code, Section XI, Subsection IWE and IWL requirements. The licensee stated that

it typically conducts this general visual inspection in accordance with the ANO-2 Containment Inservice Inspection Plan, which implements the requirements of the ASME Code, Section XI, Subsections IWE and IWL, as required by 10 CFR 50.55a(g)(4).

In its letter dated March 7, 2011, the licensee stated that the frequency of examinations per Subsection IWE (three examinations over a 10-year interval) assures that at least three (typically four) general visual examinations of metallic components will be conducted between the Type A tests and one scheduled immediately before the next Type A test, if the Type A test interval is extended to 15 years. The licensee concluded that, for the containment metallic liner, this satisfies the general visual requirements of Section 9.2.3.2 of NEI 94-01 and Condition 2 in the NEI 94-01 SER.

Further, the licensee stated that visual examinations of accessible concrete containment surfaces performed in accordance with Subsection IWL at a frequency of 5 years (± 1 year), will be scheduled. This results in at least three IWL examinations being performed during a 15-year Type A test interval. The licensee stated that, in addition to the IWL examinations, ANO-2 performs a visual inspection of the accessible interior and exterior concrete surfaces of the ANO-2 Containment Building Structure prior to any Type A test. This examination is performed, in accordance with approved plant procedures, in sufficient detail to identify any evidence of deterioration which may affect the reactor building's structural integrity or leak tightness. The areas that are inspected include the external surface of the building, the tendon access area, the basement of the building and the wall inside the main steam safety enclosure. The licensee concluded that, together, these examinations assure that at least four general visual examinations of concrete containment surfaces will be conducted before the next Type A test if the Type A test interval is extended to 15 years. Therefore the requirements of Section 9.2.3.2 of NEI 94-01 and Condition 2 in Section 4.1 of the NEI 94-01 SER are met. Additionally, the licensee provided a typical approximate schedule, shown in Table 1 below, for general visual examinations of containment surfaces, representative of a typical 15-year period between Type A tests. It is noted that ANO-2 is on an 18-month refueling cycle.

TABLE 1: Schedule of IWE/IWL General Visual Examinations

Calendar Year (Refueling outage)	Type A Test (ILRT)	General Visual Examination of Accessible Surface	
		Exterior	Interior (Liner)
2000 (2R14)	X	X	X
2003 (2R16)			X
2005 (2R17)		X	
2006 (2R18)			X
2009 (2R20)			X
2010		X	
2012 (2R22)			X
2014 (2R23)		X	
2015 (2R24)	X	X	X

On the basis that the licensee's schedule of general visual examinations described above results in at least three examinations between Type A tests and one examination immediately prior to the Type A test for both containment concrete and metallic liner surfaces, the NRC staff concludes that the licensee's inspection schedule plan, detailed in the LAR and the supplemental information meets the general visual examination requirements in NEI 94-01, Revision 2-A, and 10 CFR Part 50, Appendix J, Option B, and therefore, satisfies Condition 2 in the NEI 94-01 SER for NEI 94-01, Revision 2-A.

NEI 94-01 SER, Condition 3 states:

> The licensee addresses the areas of the containment structure potentially subjected to degradation. (Refer to SE Section 3.1.3).

In its letter dated March 7, 2011, the licensee stated that general visual examinations of accessible interior and exterior surfaces of the containment system for structural problems are typically conducted in accordance with the ANO-2 Containment Inservice Inspection (ISI) Plan, which implements the requirements of ASME Code, Section XI, Subsections IWE and IWL, as required by 10 CFR 50.55a(g). The ANO-2 containment system does employ moisture barriers but does not employ bellows on penetrations through the containment pressure retaining boundaries. The licensee stated that there are no primary containment surface areas that require augmented examination in accordance with ASME Section XI, IWE-1240. The licensee stated that the ANO-2 IWE/IWL program contains requirements to evaluate the acceptability of the inaccessible areas if such conditions were identified, in accordance with 10 CFR 50.55a(b)(2)(ix)(A) and 10 CFR 50.55a(b)(2)(viii)(E).

In its letter dated January 17, 2011, the licensee provided a detailed discussion of the ANO-2 operating experience and evaluation results of the moisture barrier examinations since 1999 and concluded that although several areas at the junction of the metal liner and interior concrete floor were found to have rust with some localized pitting/degradation, no structurally significant liner plate pitting or degradation was noted from the inspection of the liner behind the moisture barriers.

Regarding the inaccessible areas of containment, the licensee stated in its letter dated March 7, 2011, that the only areas that the ANO-2 IWE/IWL program identifies as inaccessible are the basemat liner plate (covered by a layer of concrete), those sections of the liner plate under duct work (less than 20 percent of the liner surface area) and under the moisture barrier. In addition, the only inaccessible concrete areas are the buried sections of the containment wall which is less than 5 percent of the total area. The licensee stated that the examinations that have been performed to date have not identified any conditions in the accessible areas that could indicate the presence of or result in degradation in these inaccessible areas. The licensee stated that, to date, there have been no instances under either the IWE or the IWL examinations where conditions at ANO-2 were identified in accessible areas that could indicate the presence of or result in degradation in these inaccessible areas. Thus, to date, ANO-2 has not had the need to implement any new technologies to inspect the inaccessible areas.

The licensee added that Entergy actively participates in various nuclear utility owners groups, ASME Code committees, and with NEI to maintain cognizance of ongoing developments within the nuclear industry. Industry operating experience is also continuously reviewed to determine

its applicability to ANO-2. Adjustments to inspection plans and availability of new, commercially available technologies for the examination of the inaccessible areas of the containment would be explored and considered as part of these activities.

Section 3.1.3 of the NEI 94-01 SER, states, in part, that licensees referencing NEI 94-01, Revision 2-A, in support of a request to amend their TSs, should also explore/consider such inaccessible degradation-susceptible areas in plant-specific inspections, using viable, commercially available non-destructive examination (NDE) methods (such as boroscopes, guided wave techniques, etc.; see NRC report ORNL/NRC/LTR-02/02, "Inspection of Inaccessible Regions of Nuclear Power Plant Containment Metallic Pressure Boundaries," June 2002 (ADAMS Accession No. ML061230425)), for recommendations to support plant-specific evaluations. The NRC staff's intent of this statement in the SER is that licensees should explore and consider NDE techniques, such as those discussed in the referenced report or other methods for inspections of inaccessible degradation-susceptible areas of the containment pressure boundary, to support plant-specific evaluations of inaccessible areas, as these advanced technologies become commercially available and viable for implementation in practice in the future, while recognizing that these techniques may not be commercially viable at the present time. The NRC staff notes that, in addition to the inaccessible areas identified in the previous paragraphs, the side of the containment liner backing to the concrete is another degradation-susceptible inaccessible area where these advanced technologies could be applied when they become viable.

The information provided by the licensee identified areas in the ANO-2 containment that are inaccessible and indicated that the ANO-2 operating experience, to date, has not identified any conditions that would indicate the presence or result in degradation of these inaccessible areas. Nevertheless, the licensee acknowledged that, as an active participant of tracking ongoing technology developments and industry operating experience, adjustments to inspection plans and the availability of new, commercially available technologies for examination of the inaccessible areas of the containment would be explored and considered as part of these activities. Based on the above, the NRC staff concludes that the licensee has adequately addressed the intent of Condition 3 in its LAR.

NEI 94-01 SER, Condition 4 states:

> The licensee addresses any tests and inspections performed following major modifications to the containment structure, as applicable. (Refer to SE Section 3.1.4).

The licensee stated in its letters dated June 17, 2010, and January 17, 2011, that ANO-2 replaced its steam generators in the fall 2000 and a post-repair Type A test and a structural integrity test that were required by the increased containment design pressure from power uprate, were performed following that modification. The licensee also stated that any unplanned modifications to the containment prior to the next Type A test would be subject to the special testing requirements of Section IV.A, "Containment modification," of Appendix J to 10 CFR Part 50. The licensee also stated that when ANO-2 replaces the reactor vessel closure head, the containment structure may need to be modified but the design change process established will address any testing requirements for this and any future containment structure modifications.

The licensee stated that the design change procedures include evaluations pertaining to impacts of the modification to the ASME Code, Section XI, containment ISI program, the Appendix J to 10 CFR Part 50, primary containment leakage rate testing program, and the ASME Code, Section XI, repair/replacement program. Also, the licensee stated that the ANO-2 ASME Code, Section XI repair/replacement program is the program that provides the requirements for performing repair/replacement activities, including pressure testing, to Class MC components and Class CC concrete containments as required by 10 CFR 50.55a. The licensee also indicated that the design change process is used to facilitate/implement the requirements of the repair/replacement program. The licensee summarized that the design change process at Entergy, comprised of the Impact Screening, Process Applicability Determination, and 10 CFR 50.59 Evaluation as required by established company procedures, ensures that the requirements of Condition 4 of Section 4.1 and Section 3.1.4 of the NEI 94-01 SER for NEI 94-01, Revision 2-A, with regard to major and minor containment repairs and modifications, are met. The licensee added that based on the outcome of this evaluation, an NRC staff review of any proposed modifications is obtained prior to the installation of the modification, as required.

The NRC staff's intent of placing Condition 4, with reference to Section 9.2.4 of NEI 94-01, is to ensure that following major containment modifications, such as those described in Section 3.1.4 of the NEI 94-01 SER, the post-repair pressure testing performed must demonstrate both structural and leak-tight integrity of the repaired containment. Based on the above, and the post-repair pressure testing (i.e., Type A test) performed previously in 2000 following the major containment modification for steam generator replacement, the NRC staff concludes that the licensee has committed to the staff's position with regard to post-repair pressure testing following major and minor containment repairs and modifications, as explained in Section 3.1.4 of the NEI 94-01 SER. Therefore, the staff concludes that the licensee has adequately addressed Condition 4 in its LAR.

NEI 94-01 SER, Condition 5 states:

> The normal Type A test interval should be less than 15 years. If a licensee has to utilize the provision of Section 9.1 of NEI TR 94-01, Revision 2, related to extending the ILRT interval beyond 15 years, the licensee must demonstrate to the NRC staff that it is an unforeseen emergent condition. (Refer to SE Section 3.1.1.2).

The licensee stated in Section 4 of the LAR that it acknowledges and accepts the NRC staff position in Condition 5, as communicated to the nuclear industry in NRC Regulatory Issue Summary (RIS) 2008-27, "Staff Position on Extension of the Containment Type A Test Interval Beyond 15 Years Under Option B of Appendix J to 10 CFR Part 50," dated December 8, 2008 (ADAMS Accession No. ML080020394).

The licensee has acknowledged and accepted the NRC staff position, with regard to extending the Type A test intervals beyond the approved upper-bound limit of 15 years, in Condition 5 and clarified in RIS 2008-27. Based on the above, the NRC staff concludes that the licensee has confirmed its understanding that any extension of the Type A test interval beyond the upper-bound performance-based limit of 15 years should be infrequent and should be requested only

for compelling reasons, and that the NRC staff will implement the position in RIS 2008-27 in reviewing such LARs. Therefore, the NRC staff concludes that the licensee has adequately addressed Condition 5 in its LAR.

NEI 94-01 SER, Condition 6 states:

> For plants licensed under 10 CFR Part 52, applications requesting a permanent extension of the ILRT surveillance interval to 15 years should be deferred until after the construction and testing of containments for that design have been completed and applicants have confirmed the applicability of NEI TR 94-01, Revision 2, and EPRI Report No. 1009325, Revision 2, including the use of past containment ILRT data.

In its letter dated June 17, 2010, the licensee stated this condition is not applicable to ANO-2 since ANO-2 is not licensed to 10 CFR Part 52. The NRC staff concludes that ANO-2 is currently an operating reactor licensed to 10 CFR Part 50 and, therefore, Condition 6 does not apply.

Based on the above, the NRC staff concludes that the licensee has adequately addressed and satisfied the six conditions in Section 4.1 of the NEI 94-01 SER for NEI 94-01. Therefore, the staff concludes that the licensee's adoption of NEI 94-01, Revision 2-A, as the implementation document in its TS 6.5.16, "Containment Leakage Rate Testing Program," is acceptable.

3.2.3 Extension of Current Type A Test Interval from 10 to 15 Years

3.2.3.1 Description of the ANO-2 Primary Containment System

The ANO-2 primary containment is a reinforced pre-stressed concrete structure post-tensioned by tendons in the cylinder and the dome. The containment structure consists of a flat circular base slab, a right circular cylinder, and a sphere-torus dome. The dome is pre-stressed by three systems of dome tendons spaced at 120 degrees apart. The circular cylinder wall is pre-stressed by a system of horizontal and vertical tendons. The horizontal tendons are anchored at three buttresses equally spaced around the outside of the containment and the vertical tendons are anchored to the base slab at the bottom and the ring girder at the top.

The containment's interior is lined with steel plates welded together to form a leak-tight barrier. Since the base slab liner plate is covered with concrete, leak chase channels are provided at the seam welds, to allow for leak testing during normal operation. Access for personnel and equipment is provided by steel penetrations that are attached to the liner plate and anchored into the concrete structure. The primary containment wall contains penetrations for different purposes, such as fuel transfer, piping, and electrical. A large diameter equipment hatch provides for transfer of material and equipment. Additionally, two personnel access locks provide access to personnel that are entering or leaving the containment. The hatch and lock doors are supplied with two compression seals with provisions for leak testing. Also, one transfer tube is provided for fuel movement between the refueling canal and the spent fuel pool.

The leak-tight integrity of the penetrations and isolation valves are verified through Type B and Type C local leak-rate tests (LLRTs) and the overall leak-tight integrity and structural integrity of

10 CFR Part 50. These tests are performed at the peak calculated design-basis accident (DBA) pressure, Pa, which is 58 pounds per square inch gauge (psig) for ANO-2. The leakage rate testing requirements of 10 CFR Part 50, Appendix J, Option B (Type A, Type B, and Type C Tests) and the CISI requirements mandated by 10 CFR 50.55a, together, ensure the continued leak-tight and structural integrity of the containment during its service life.

In its letter dated June 17, 2010, the licensee proposed to extend the current performance-based Type A test interval from 11.3 years (previously approved one-time extension) to 15 years by adopting NEI 94-01, as the implementation document in the TS. This change would allow ANO-2 to conduct the next Type A test by November 30, 2015, in lieu of the current due date of February 29, 2012. The licensee further justified the proposed change by demonstrating adequate performance of the ANO-2 containment based on historical plant-specific containment leakage testing program results and CISI results and supported by a plant-specific risk assessment, consistent with the guidance in NEI 94-01. The review and evaluation, from the point of deterministic considerations, with regard to containment structural and leak-tight integrity if the current ILRT interval is extended from 10 (11.3 years) years to 15 years follows.

3.2.3.2 ANO-2 Type A Test Performance History

The licensee stated that the ANO-2 ILRT testing history of the containment structure leakage is acceptable, with margin, and no failed ILRTs. The TS acceptance criterion for maximum allowable containment leakage rate, La, is 0.1 percent of containment air weight at the peak calculated containment internal pressure for design basis loss-of-coolant accident, Pa. The last ILRT was performed in November 2000 after the installation of the replacement steam generators. The licensee stated that the value of Pa for ANO-2 in TS 6.5.16 was 54 psig prior to November 2000 and is 58 psig following steam generator replacement in November 2000. The licensee noted that the November 2000 ILRT was performed concurrently with the uprate structural integrity test (SIT) at the SIT test pressure of 68 psig, based on a one-time exemption (65 FR 62375; October 18, 2000). In its letter dated January 17, 2011, the licensee provided a tabulation of as-found results of all the previous Type A tests conducted at ANO-2, as shown in Table 2 below.

TABLE 2: ANO-2 Type A Test Results

	Calculated Leakage Rate	
Completion Date	**Mass Point Calculation**	**95 % Upper Confidence Level**
May 31, 1981	0.028% / day	0.033% / day (Note 1)
May 1, 1985	0.022% / day	0.023% / day (Note 1)
April 22, 1988	0.028% / day	0.032% / day (Note 1)
April 9, 1991	0.0197% / day	0.0229% / day (Note 1)
March 17, 1994	0.0517% / day	0.0553% / day (Note 1)
November 30, 2000	0.049% / day	0.056% / day (Note 2)

Note 1: Percent of containment air weight per day at P_a (54 psig).
Note 2: Percent of containment air weight per day at Structural Integrity Test pressure (68 psig [based on a one-time exemption (65 FR 62375; October 18, 2000)]).

ILRT Acceptance Criteria is [0.1 %/day for as-found condition and] 0.075 %/day [for as-left condition] (ANO-2 Technical Specification 6.5.16).

The results in Table 2 show that all the previous Type A tests at ANO-2, including the two most recent tests performed in 2000 and 1994, were successful with containment performance leakage rates less than the maximum allowable containment leakage rate (La at Pa) of 0.1 percent containment air weight per day, at a pressure of 54 psig and the most recent with a SIT pressure of 68 psig.

The NRC staff concludes that, consistent with the guidance in NEI 94-01, this performance history for Type A tests supports extending the current ILRT interval to 15 years.

3.2.4 ANO-2 Type B and Type C Tests

In its letters dated June 17, 2010, and January 17, 2011, the licensee described its Type B and Type C testing program. The licensee stated that the ANO-2 Appendix J, Type B and Type C testing program requires testing of electrical penetrations, airlocks, hatches, flanges, and valves within the scope of the program as required by Option B of Appendix J to 10 CFR Part 50 and TS 6.5.16. The Type B and Type C testing program consists of LLRT of penetrations with a resilient seal, expansion bellows, double-gasketed manways, hatches and flanges, and containment isolation valves that serve as a barrier to the release of the post-accident containment atmosphere. The licensee stated that ANO-2 does not employ bellows on penetrations through containment pressure retaining boundaries.

The licensee stated that the combined Type B and Type C leakage acceptance criterion (0.6 La) is 103,894 standard cubic centimeters per minute (sccm). In its letter dated January 17, 2011, the licensee stated that the as-found combined leakage from the Type B and Type C tests are evaluated by the summation of the limiting pathway leak rate measurement of each penetration. The pathway is determined as the smaller of the inboard and outboard leak rate measurement. This summation determines the as-found Type B and Type C leak rates on a minimum path basis. There has been no outage since the last Type A test that was conducted in November 2000, in which the combined as-found minimum path leak rate from the Type B and Type C tests exceeded the acceptance criteria.

In its letter dated January 17, 2011, the licensee provided the maximum and minimum pathway leak rate summary totals for the last two refueling outages that occurred during the spring 2008 (2R19) and fall 2009 (2R20), as shown in Table 3 below. The values are well below the acceptance criteria of 103,894 sccm.

TABLE 3: As-Found Minimum and As-Left Maximum Pathway Leakages

Refueling Outage	Leakages	Value, in sccm
2R19	As-Found Minimum Pathway Leakage	7,847
	As-Left Maximum Pathway Leakage	17,466
2R20	As-Found Minimum Pathway Leakage	9,372
	As-Left Maximum Pathway Leakage	18,162

The licensee stated that industry experience has shown that the Type B and Type C tests can identify the vast majority (over 95 percent) of all potential primary containment leakage paths.

The licensee stated that this LAR adopts the guidance in NEI 94-01, Revision 2-A, in place of NEI 94-01, Revision 0, but otherwise does not affect the scope, performance, or scheduling of Type B or Type C tests, and that Type B and Type C testing will continue to provide a high degree of assurance that the primary containment integrity is maintained.

In its letter dated January 17, 2011, the licensee provided two tables (Tables 2.1-1 and 2.1-2) that relate to Type B and Type C testing. Table 2.1-1 identified all containment pressure boundary components at ANO-2 that are subject to the Type B and Type C testing, under the containment leakage rate testing program, with the current test frequency and the approximate dates (or refueling outage) of the last test and the next scheduled test. Based on its review, the NRC staff concluded that a significant number of these components are being tested at performance-based intervals of 54 months and 108 months, and the testing is being implemented during refueling outages in a staggered manner. Table 2.1-2 summarized ANO-2's performance results by penetration for Type B and Type C testing that would support the maximum and minimum pathway leakage values, as provided in its submittals. The licensee also provided, in Table 2.1-3, a summary of the containment penetration components at ANO-2 that did not demonstrate acceptable administrative performance limits during refueling outages 2R19 (spring 2008) and 2R20 (fall 2009). The licensee summarized the cause and corrective actions taken for each test failure. In addition, the licensee stated that the performance-based test interval was reduced for two components from 60 months to 18 months.

Based on the above, the NRC staff concludes that the licensee has appropriately addressed the corrective actions and has adjusted test schedules consistent with its Appendix J, Option B program, for cases of as-found test failures. Based on the information discussed above, the staff concludes that there is reasonable assurance that the licensee is effectively implementing its Type B and Type C Testing program under Option B, in a rational and systematic manner that is consistent with the implementation document in the TS, and will continue to do so, in accordance with NEI 94-01, if the current ILRT interval is extended to 15 years. Therefore, the NRC staff concludes that the integrity of the containment pressure boundary penetrations (including access hatches and airlocks) and isolation valves are effectively monitored through Type B and Type C testing, as required by Appendix J to 10 CFR Part 50, and the implementation document referenced in the ANO-2 TS.

3.2.5 Containment In-Service Inspection Program

In its letter dated June 17, 2010, the licensee stated that the ISI of the ANO-2 containment is conducted in accordance with the ANO-2 Containment Inservice Inspection Plan, which implements the requirements of the ASME Code, Section XI, Subsections IWE and IWL. The IWE/IWL inspections and supplemental inspections, in accordance with other approved plant procedures, are used to satisfy the general visual examination requirements of Appendix J, Option B and to monitor and manage the age-related degradations of the primary containment to ensure that containment structural and leak-tight integrity is maintained through its service life. The licensee stated that there are no primary containment surface areas that require augmented examination in accordance with ASME Code, Section XI, IWE-1240. The licensee stated that any abnormal degradation of the primary containment structure, identified during the conduct of the IWE/IWL ISI program examinations or other inspections, are entered into the corrective action program for evaluation, to determine the cause of the degradation and to

initiate corrective action. The licensee stated that identification and evaluation of inaccessible areas are addressed in accordance with the requirements of 10 CFR 50.55a(b)(2)(ix)(A) and (E), and that there were no instances of such conditions identified to date at ANO-2 that required such an evaluation. The licensee added that the examination of the pressure-retaining bolted connections and the evaluation of containment bolting flaws or degradation are performed in accordance with the requirements of 10 CFR 50.55a(b)(ix)(G) and 10 CFR 50.55a(b)(ix)(H).

In its letter dated January 17, 2011, the licensee provided a detailed discussion of the ANO-2 operating experience and evaluation results of the moisture barrier examinations since 1999. Although several areas of the moisture barrier were found damaged at different points in time or material below the gap sealant were found missing, these degradations were repaired and re-inspected. The licensee stated that although several areas at the junction of the metal liner and interior concrete floor were found to have rust with some localized pitting/degradation, no structurally significant liner plate pitting or degradation was noted from the inspection of the liner behind the moisture barriers. The liner was cleaned and coating reapplied in these areas. The most recent IWE inspection of the moisture barrier in the fall of 2010 did not identify any evidence of defects in the moisture barrier. The licensee concluded that no unacceptable indications have been identified to date by the IWE inspections.

In its letter dated January 17, 2011, in response to an NRC staff request for additional information (RAI) dated November 18, 2010 (ADAMS Accession No. ML103220236), the licensee stated that the 30th year containment inspection for ANO-2 was conducted during June 2010. During the inspection, no recordable indications were observed during the general exterior inspection of the concrete containment structure for ANO-2. Based on the data collected during the 2010 30th year containment IWL inspection, the licensee stated that no new abnormal degradation of the post tensioning system has occurred at the ANO-2 containment structure. The 35th year inspection is currently scheduled to be performed in March 2014 and the 40th year inspection is scheduled for the fall of 2018.

Based on the above, the NRC staff concludes that the ANO-2 CISI is conducted in accordance with the ANO-2 Containment Inservice Inspection Plan which implements the requirements of the ASME Code, Section XI, Subsections IWE and IWL and the licensee is adequately implementing its CISI program to monitor and manage the age-related degradation of the ANO-2 containment structure. The results of the inspections, to date, indicate that the structural and leak-tight integrity of the containment has been effectively monitored and managed and will continue to be managed, if the current ILRT interval is extended from 10 years to 15 years, in accordance with NEI 94-01.

3.2.6 Summary

Based on the evaluation above, the NRC staff concludes that the licensee has effectively implemented an adequate containment leakage rate testing (ILRT and LLRT) program, CISIs and supplemental inspections to periodically examine, monitor, and manage age-related and environmental degradation of the ANO-2 primary containment. The results of the past ILRTs, LLRTs, and the CISI programs demonstrate acceptable performance of the ANO-2 primary containment and demonstrate that the structural and leak-tight integrity of the primary containment structure is adequately managed. The structural and leak-tight integrity of the

ANO-2 primary containment will continue to be periodically monitored and managed by the LLRT and CISI programs, if the current ILRT interval is extended from 11.3 years to 15 years. Therefore, the NRC staff concludes that there is reasonable assurance that the containment structural and leak-tight integrity will continue to be maintained, without undue risk to public health and safety, if the current ILRT interval at ANO-2 is extended to 15 years. Therefore, the NRC staff concludes that extending the current ILRT interval at ANO-2 from 11.3 years to 15 years, in accordance with NEI 94-01, Revision 2-A, is acceptable. The next Type A test may therefore be conducted no later than November 30, 2015, in lieu of the current due date of February 29, 2012.

3.3 Deterministic Considerations: Containment Leak-Tight Integrity Considerations

3.3.1 Containment Leak-Tight Integrity Considerations

The containment leak rate testing program requires the licensee to perform ILRT which measures the overall leakage rate of the primary reactor containment and LLRTs that are primarily intended to detect leakage paths and measure leakage rates for primary reactor containment penetrations and containment isolation valve leakage.

In Section 3.2.1 of this SE, the NRC staff concluded that the use of NEI 94-01 is acceptable for referencing by licensees proposing to amend their TSs to permanently extend the ILRT surveillance interval to 15 years.

3.3.2 Containment Pressure Boundary Evaluation

In response to its RAI dated November 18, 2010, in which the NRC staff requested that the licensee identify any bellows used on penetrations through containment pressure retaining boundaries, and if present, to provide information on their location, inspection, testing, and operating experience with regard to detection of leakage, the licensee, in its letter dated January 17, 2011, stated that ANO-2 does not employ bellows on penetrations through containment pressure retaining boundaries. Since degradation of bellows is a source for potential leakage, the absence of bellows provides additional confidence to the staff of that containment integrity would be maintained during design accident conditions.

The NRC staff noted that the statement in Section 4.0, "Technical Analysis," of the licensee's letter dated June 17, 2010 (see below), would require NRC approval before implementation and requested that the licensee clarify or revise the statement, since it is neither consistent with the intent of the LAR nor does it reflect that any changes to the containment Type A testing program that are not in accordance with the guidance provided with NEI-94-01.

> The proposed change replaces the reference to RG 1.163 with a reference to NEI 94-01; however, the proposed TS change is worded to indicate that the Appendix J Testing Program must be in accordance with NRC-reviewed and accepted guidelines (i.e., NEI 94-01), with the specific version of those guidelines specified in the Appendix J Testing Program Plan. These proposed TS changes are consistent with the regulatory requirement to include the implementation document used to develop the performance-based leakage testing program, by general reference, in the plant TS, and assures that only NRC-reviewed and

accepted guidance is used to develop the program. In addition, these changes will allow the use of later NRC-accepted versions of NEI 94-01 without the unnecessary burden of processing a license amendment.

In its letter dated January 17, 2011, the licensee stated that it agreed that the paragraph in question is neither consistent with the rest of the LAR nor its intent to implement a containment leakage rate testing program in accordance with the guidelines contained in NEI 94-01. The licensee's letter stated that the paragraph should be deleted and no further NRC consideration be given to it and the deletion of this paragraph does not alter the remaining portions of the LAR.

In its letter dated June 17, 2010, the licensee stated that previous ILRT testing confirmed that the ANO-2 containment structure leakage is acceptable, with considerable margin, with respect to the TS acceptance criterion of 0.1 percent of containment air weight percent per day (wt %/day) at the design basis loss of coolant accident pressure (La). Since the last two ANO-2 Type A as-found results were less than 1.0 La, a test frequency of at least once per 15 years would be in accordance with NEI 94-01, Revision 2-A. The licensee also stated that containment penetration (Type B and Type C) testing is being performed in accordance with Option B of Appendix J to 10 CFR Part 50, and that the current total penetration leakage on a minimum pathway basis is less than 10 percent of the leakage allowed for containment integrity ($\leq 1.0\ L_a$), and so did not exceed the TS acceptance criterion for Type B and Type C tests ($0.6\ L_a$).

Additionally, the NRC staff reviewed the results from the most recent Type A tests performed in May 1981, May 1985, April 1988, April 1991, March 1994, and November 2000. All the tests show that the results of Type A leakage are well below the TS acceptance criterion 0.075 wt %/day. The steam generators at ANO-2 were replaced during the November 2000 outage, which required a hole to be cut in the primary containment structure. While the test result in 2000 is higher than previous test results, it is still below the TS acceptance criterion of 0.075 wt%/day.

The NRC staff concludes, based on the ILRT test results in 2000 and the combined Type B and Type C test leakage values for refueling outages of spring 2008 (2R19) and fall 2009 (2R20) provided by the licensee, that the containment leak rates at ANO-2 did not exceed the TS acceptance criteria for Type B and Type C tests ($0.6\ L_a$).

3.3.3 Summary

The proposed TS change does not involve any other changes to licensing commitments or acceptance criteria. Therefore, changing the reference from NRC RG 1.163 to NEI 94-01, Revision 2-A, is consistent with the NRC SE of the NEI guidance in NEI 94-01, Revision 2-A.

Based on the foregoing evaluations, the NRC staff concludes that the ANO-2 containment has a good recent leakage rate history. Additionally, the NRC staff concludes that there are no significant increases in risk or reductions in safety resulting from the requested test extension. Therefore, the staff concludes that the requested TS change, increasing the Type A test interval frequency permanently to 15 years, is acceptable.

3.4 Risk Analysis

3.4.1 Background

Section 9.2.3.1, "General Requirements for ILRT Interval Extensions beyond Ten Years," of NEI 94-01 states that plant-specific confirmatory analyses of the risk associated with ILRT interval extensions are required when extending the interval beyond 10 years. Section 9.2.3.4, "Plant-Specific Confirmatory Analyses," of NEI 94-01 states that the assessment should be performed using the approach and methodology described in NEI 94-01. (It should be noted that the accepted version of EPRI TR-1009325, Revision 2-A, is also identified as TR-1018243). The analysis is to be performed by the licensee and retained in the plant documentation and records as part of the basis for extending the ILRT interval.

3.4.2 Plant-Specific Risk Evaluation

The licensee performed a risk impact assessment of extending the Type A test interval from 10 to 15 years and the risk assessment was provided in its letters dated June 17, 2010, and January 17, 2011. In performing the risk assessment, the licensee considered the guidelines of NEI 94-01, the methodology used in EPRI TR-1018243, "Risk Impact Assessment of Extended Integrated Leak Rate Testing Intervals," October 2008, and NRC RG 1.174.

The basis for the current 10-year test interval is provided in Section 11.0, "Bases for Performance and Risk-Based Testing Frequencies for Type A, Type B, and Type C Tests," of NEI 94-01, Revision 0, and was established in 1995 during the development of the performance-based Option B to Appendix J. Section 11.0 of NEI 94-01 states that NUREG-1493, "Performance-Based Containment Leak-Test Program," September 1995, provided the technical basis to revise leakage rate testing requirements contained in Option B to Appendix J of 10 CFR Part 50. The basis consisted of qualitative and quantitative assessments of the risk impact (in terms of increased public dose) associated with a range of extended leakage rate test intervals. To supplement this basis, the industry undertook a similar study; the results of that study are documented in EPRI TR-104285, "Risk Impact Assessment of Revised Containment Leak Rate Testing Intervals," dated August 1994.

The EPRI TR-104285 study used an analytical approach similar to that presented in NUREG-1493 for evaluating the incremental risk associated with increasing the interval for Type A tests. The Appendix J, Option A, requirements that were in effect for ANO-2 early in the plant's life required a Type A test frequency of three tests in 10 years. The EPRI study estimated that relaxing the test frequency from three tests in 10 years to one test in 10 years would increase the average time that a leak, that was detectable only by a Type A test, goes undetected from 18 to 60 months. Since Type A tests only detect about 3 percent of leaks (the rest are identified during LLRTs, based on industry leakage rate data gathered from 1987 to 1993), this results in a 10 percent increase in the overall probability of pre-existing containment leakage. The risk contribution of pre-existing leakage for the pressurized-water reactor and boiling-water reactor representative plants in the EPRI study confirmed the NUREG-1493 conclusion that a reduction in the frequency of Type A tests from three tests in 10 years to one test in 10 years leads to an "imperceptible" increase in risk that is on the order of 0.2 percent or a fraction of one person roentgen equivalent man (rem) per year in increased public dose.

The licensee quantified the risk from sequences that have the potential to result in large releases if a pre-existing leak was present. Since the Option B rulemaking was completed in 1995, the NRC staff has issued RG 1.174 on the use of probabilistic risk assessment in evaluating risk-informed changes to a plant's licensing basis. The licensee has proposed using RG 1.174 guidance and the EPRI-TR-1018243 report to assess the acceptability of extending the Type A test interval beyond that established during the Option B rulemaking.

RG 1.174 states that a PRA used in risk-informed regulation should be performed in a manner that is consistent with accepted practices. In NRC Regulatory Issue Summary (RIS) 2007-06, "Regulatory Guide 1.200 Implementation," dated March 22, 2007 (ADAMS Accession No. ML070650428), the NRC clarified that for all risk-informed applications received after December 2007, the NRC staff will use Revision 1 of RG 1.200, "An Approach for Determining the Technical Adequacy of Probabilistic Risk Assessment Results for Risk-Informed Activities," dated January 2007 (ADAMS Accession No. ML070240001), to determine whether the technical adequacy of the PRA used to support a submittal is consistent with accepted practices. Revision 2 of RG 1.200 will be used for all risk-informed applications received after March 2010. In NEI 94-01 SER and EPRI TR-1009325, Revision 2, the NRC staff states that Capability Category I of the ASME PRA Standard shall be applied as the standard for assessing PRA quality for ILRT extension applications, since approximate values of core damage frequency (CDF) and large early release frequency (LERF) and their contribution among release categories are sufficient to support the evaluation of changes to ILRT frequencies.

3.4.3 Technical Adequacy of the PRA

In its letter dated June 17, 2010, the license addressed the technical adequacy of the PRA that forms the basis for the subject risk assessment. The ANO-2 PRA internal events model has recently been updated to meet ASME PRA Standard RA-Sb-2005 Capability Category II and RG 1.200, Revision 1. An industry peer review team reviewed the ANO-2 PRA model in July 2008. Additionally, in its letter dated January 17, 2011, the licensee provided a summary of the findings that were relevant to the ILRT analysis from the peer review, and an assessment of the impact of these findings on the risk assessment for the ILRT extension. The NRC staff evaluated the differences between RG 1.200, Revision 1 and Revision 2 requirements and determined that the differences do not impact the results of this application. In addition, the licensee performed a bounding analysis for the external events contributors and the results did not significantly increase the risk associated with this license amendment. Given that the licensee has evaluated its PRA against RG 1.200, Revision 1, and the ASME PRA Standard, evaluated all of the findings developed during the reviews of its PRA for applicability to the ILRT extension, and determined that any unresolved issues would not impact the conclusions of the ILRT risk assessment, the NRC staff concludes that the current ANO-2 PRA model is of sufficient technical quality to support the evaluation of changes to ILRT frequencies.

3.4.4 Estimated Risk Increase

RG 1.174 provides risk-acceptance guidelines for assessing the increases in CDF and LERF for risk-informed LARs. Since the Type A test does not impact CDF, the relevant criterion is the change in LERF. The licensee has estimated the total increase in LERF for combined internal and external events as 6.76E-09 for the proposed amendment based on the cumulative change from the original frequency of three tests in a 10-year interval, the current test interval of

10 years, and the proposed testing interval of 15 years. Additionally, the licensee estimated the change in the conditional containment failure probability for the proposed amendment and judged it to be insignificant and reflecting sufficient defense-in-depth.

The licensee's comparisons of risk are based on a change in test frequency from three tests in 10 years (the test frequency under Appendix J, Option A) to one test in 15 years. This bounds the impact of extending the test frequency from one test in 10 years to one test in 15 years. Based on the licensee's analysis associated with extending the Type A test frequency, the NRC staff concludes:

- Given the change from the three in 10-year test frequency to a one in 15-year test frequency, the increase in the total integrated plant risk is estimated to be 3.49E-4 person-rem per year. This increase is comparable to that estimated in NUREG-1493, where it was concluded that a reduction in the frequency of tests from three in 10 years to one in 20 years leads to an "imperceptible" increase in risk. Therefore, the increase in the total integrated plant risk for the proposed change is considered small and supportive of the proposed change.

- The increase in LERF resulting from a change in the Type A test frequency from the current three in 10 years to one in 15 years is estimated to be about 7.6×10^{-9} per year, based on the plant-specific internal events PRA, and about 1.7×10^{-8} per year, when external events are included.

- Guidance in RG 1.174 defines very small changes in LERF as below 10^{-7}/yr, increasing the ILRT interval from three in 10 years to a one in 15 years is, therefore, considered to be "very small" and non-risk significant and the results support this determination. The NRC staff concludes that increasing the Type A interval to 15 years results in only a small change in LERF and is consistent with the acceptance guidelines of RG 1.174.

- RG 1.174 also discusses the need to show that the proposed change is consistent with the defense-in-depth philosophy. Consistency with the defense-in-depth philosophy is maintained if a reasonable balance is preserved between prevention of core damage, prevention of containment failure, and consequence mitigation. The licensee estimates the change in the conditional containment failure probability to be 8.18E-3 for the cumulative change of going from a test frequency of three in 10 years to one in 15 years. The NRC staff concludes that the defense-in-depth philosophy is maintained based on the small magnitude of the change in the conditional containment failure probability for the proposed amendment.

Based on the above, the NRC staff concludes that the increase in projected risk due to the proposed change is within the acceptance guidelines, while maintaining the defense-in-depth philosophy of RG 1.174, and is, therefore, acceptable.

3.4.5 Summary

Based on the above, the NRC staff concludes that the proposed LAR for a permanent, 5-year extension of the Type A containment integrated leak rate test interval for the ANO-2, is acceptable, from a risk perspective. Additionally, the NRC staff concludes that the next Type A test for ANO-2 should be performed within 15 years from the last test (i.e., no later than November 30, 2015).

4.0 REGULATORY COMMITMENT

In its letter dated June 17, 2010, the licensee made one regulatory commitment with a one-time action and a scheduled completion date as "Upon NRC approval of this License Amendment Request (LAR)," as follows:

> ANO will use the definition in Section 5.0 of NEI 94-01, Revision 2-A, for calculating the Type A leakage rate.

The NRC staff considers the above to be a regulatory commitment and acceptable

5.0 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.

6.0 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 and changes surveillance requirements. 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 in the *Federal Register* on July 27, 2010 (75 FR 44024). The amendment also relates to changes in recordkeeping, reporting, or administrative procedures or requirements. Accordingly, the amendment meets the eligibility criteria for categorical exclusion set forth in 10 CFR 51.22(c)(9) and 10 CFR 51.22(c)(10). 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.

7.0 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 Contributors: R. Torres
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Date: April 7, 2011

April 7, 2011

Vice President, Operations
Arkansas Nuclear One
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SUBJECT: ARKANSAS NUCLEAR ONE, UNIT NO. 2 - ISSUANCE OF AMENDMENT RE: TECHNICAL SPECIFICATION CHANGE TO EXTEND THE TYPE A TEST FREQUENCY TO 15 YEARS (TAC NO. ME4090)

Dear Sir or Madam:

The Commission has issued the enclosed Amendment No. 292 to Renewed Facility Operating License No. NPF-6 for Arkansas Nuclear One, Unit No. 2 (ANO-2). The amendment consists of changes to the Technical Specifications (TSs) in response to your application dated June 17, 2010, as supplemented by letters dated January 17, 20, and 31 and March 7, 2011.

The amendment allows for the extension to the 10-year frequency of the ANO-2 Type A (Integrated Leak Rate Test) that is required by TS 6.5.16, "Containment Leakage Rate Testing Program," to 15 years on a permanent basis.

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/

N. Kaly Kalyanam, Project Manager
Plant Licensing Branch IV
Division of Operating Reactor Licensing
Office of Nuclear Reactor Regulation

Docket No. 50-368

Enclosures:
1. Amendment No. 292 to NPF-6
2. Safety Evaluation

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