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March 8, 2013
L-13-101

10 CFR 50.55a

ATTN: Document Control Desk
U.S. Nuclear Regulatory Commission
Washington, DC 20555-0001

SUBJECT:
Davis-Besse Nuclear Power Station
Docket No. 50-346, License No. NPF-3
10 CFR 50.55a Request RR-E1, Proposed Alternative Regarding Post-Repair Pressure Testing Requirements (TAC No. MF0537)

By letter dated January 18, 2013 (Accession No. ML13018A349), FirstEnergy Nuclear Operating Company (FENOC) requested an exemption from post-repair testing requirements of the containment vessel opening. By letter dated February 28, 2013 (Accession No. ML13058A253), the Nuclear Regulatory Commission (NRC) indicated that supplemental information was needed for acceptance of the requested licensing action. As discussed with NRC staff during a teleconference on February 22, 2013, this submittal replaces the January 18, 2013 submittal in its entirety.

Pursuant to 10 CFR 50.55a(a)(3)(i), FENOC requests NRC approval of a proposed alternative from the requirements in 10 CFR 50.55a(g)(4)(ii) with regard to the post-repair pressure testing requirements of IWE-5000 (2008 addenda) as conditioned by 50.55a(b)(2)(ix)(J). FENOC requests approval of the proposed alternative on the basis that the request provides an acceptable level of quality and safety. The details of the 10 CFR 50.55a request are enclosed.

The proposed alternative is applicable to the Davis-Besse Nuclear Power Station, Unit No. 1, fourth 10-year inservice inspection interval, which began on September 21, 2012. FENOC requests approval of the proposed alternative by January 18, 2014, in order to support the scheduled refueling outage in the spring of 2014.

There are no regulatory commitments contained in this submittal. If there are any questions or additional information is required, please contact Mr. Thomas A. Lentz, Manager – Fleet Licensing, at (330) 315-6810.

Sincerely,

Raymond A. Lieb

Enclosure:
10 CFR 50.55a Request Number RR-E1

cc: NRC Region III Administrator
NRC Resident Inspector
NRC Project Manager
Utility Radiological Safety Board

Proposed Alternative
in Accordance with 10 CFR 50.55a(a)(3)(i)

--Alternative Provides Acceptable Level of Quality and Safety--

1. American Society of Mechanical Engineers (ASME) Code Component Affected

Class Type:	Seismic Class I, Class MC
Component:	Steel containment vessel
Description:	Freestanding cylindrical steel pressure vessel with hemispherical dome and ellipsoidal bottom

2. Applicable Code Edition and Addenda

ASME Boiler and Pressure Vessel (B&PV) Code, Section XI, 2007 Edition through 2008 Addenda

3. Applicable Code Requirement

ASME B&PV Code, Section XI, 2007 Edition through 2008 Addenda, Paragraph IWE-5223.4, which states:

> *IWE-5223.4 Examination. During the pneumatic leakage test, the leak tightness of brazed joints and welds affected by the repair/replacement activity shall be verified by performing one of the following:*
> *(a) a bubble test—direct pressure technique in accordance with Section V, Article 10, Appendix I, or any other Section V, Article 10 leak test that can be performed in conjunction with the pneumatic leakage test.*
> *(b) a Type A, B, or C Test, as applicable, in accordance with 10CFR50, Appendix J.*

IWE-5223.4 is conditioned by 10 CFR 50.55a Paragraph (b)(2)(ix)(J), which states:

> *In general, a repair/replacement activity such as replacing a large containment penetration, cutting a large construction opening in the containment pressure boundary to replace steam generators, reactor vessel heads, pressurizers, or other major equipment; or other similar modification is considered a major containment modification. When applying IWE–5000 to Class MC pressure-retaining components, any major containment modification or repair/replacement, must be followed by a Type A test to provide assurance of both containment structural integrity and leaktight integrity prior to returning to service, in accordance with 10 CFR part 50, Appendix J, Option A or Option B on which the applicant's or licensee's Containment Leak-Rate Testing Program is based. When applying IWE-5000, if a Type A, B, or C Test is performed, the test pressure and acceptance standard for the test must be in accordance with 10 CFR part 50, Appendix J.*

4. Reason for Request

The Davis-Besse Nuclear Power Station Unit No. 1 (DBNPS) containment vessel is a cylindrical steel pressure vessel with hemispherical dome and ellipsoidal bottom. It is completely enclosed by a reinforced concrete shield building having a cylindrical shape with a shallow dome roof. The cylindrical shell and bottom head thickness, exclusive of reinforced areas, is 1 ½ inch with a dome thickness of 13/16 inch. An annular space is provided between the wall of the containment vessel and the shield building, and clearance is also provided between the containment vessel and the dome of the shield building. The original Construction Code for the containment vessel was the ASME B&PV Code, Section III, Class B, 1968 Edition through Summer 1969 Addenda.

FENOC plans to replace the DBNPS steam generators in the spring of 2014. These replacement activities require the opening of the containment vessel to provide access for the removal of the original steam generators as well as the installation of the replacement steam generators. Following replacement of these major components, the containment vessel will be restored to its original design requirements.

Once the containment vessel has been restored, a leakage test in accordance with IWE-5223.4, as modified by 10 CFR 50.55a, Paragraph (b)(2)(ix)(J), would be required. However, due to the nature of the repair, which restores the containment vessel to ASME requirements, an effective post-repair test of containment structural and leaktight integrity can be performed by an alternative leakage test, which pressurizes the entire containment vessel, in accordance with IWE-5223.4(a).

5. Proposed Alternative and Basis for Use

Proposed Alternative

The proposed alternative is in lieu of the required Type A integrated leak rate test following restoration of the containment vessel pressure boundary.

Structural integrity and the leaktight integrity of the repair will be ensured by the proposed localized leakage bubble test. The containment vessel opening repair weld will be bubble tested after pressurizing the entire containment to between $0.96P_a$ and $1.10P_a$, where P_a is the design basis loss-of-coolant accident containment peak pressure (P_a), which is 38.0 pounds per square inch gauge (psig). The bubble test of the repair weld will be performed after a hold time of at least 15 minutes. The test acceptance criteria will be zero detectable leakage, which will be determined by the absence of bubble formation, as observed from the annular space, using a leak detection medium in accordance with test procedures. Any leakage identified will be corrected, and the test will be re-performed.

The nondestructive examination (NDE) personnel performing the bubble test will be certified as VT-2 examiners in accordance with the requirements of ANSI/ASNT CP-189, "ASNT Standard for Qualification and Certification of Nondestructive Testing Personnel." The leakage test shall be performed prior to entry into Mode 4 following restoration of the containment vessel pressure boundary.

Basis for Use

The repair/replacement NDE activities, specifically the pre-service examination and post-repair/replacement testing requirements, associated with temporary removal and reinstallation of the DBNPS containment vessel opening, will be performed in accordance with the requirements of ASME Section XI, 2007 Edition through 2008 Addenda. ASME Section XI, Paragraph IWA-4411, "Welding, Brazing, Fabrication, and Installation," states that welding and installation activities shall be performed in accordance with the Owner's Requirements and, except as modified by IWA-4411 (a) through (i), in accordance with the original Construction Code of the item.

Fabrication and installation activities (that is, cutting and welding) will be performed in accordance with the original Construction Code Class B of ASME Section III, or reconciled to a later edition of the ASME Code in accordance with the requirements of IWA-4000, "Repair/Replacement Activities." The restoration of the construction opening and associated weld will return the structural integrity of the containment vessel to its original design requirements.

Prior to performing the repair weld, the surfaces to be welded will be prepared in accordance with the approved ASME Repair/Replacement Plan. The weld will be performed by qualified personnel in accordance with ASME Section IX, "Qualification Standard for Welding and Brazing Procedures, Welders, Brazers, and Welding and Brazing Operators," requirements. Post weld examinations will be performed on the containment vessel repair, which will include a 100 percent radiography in accordance with the Construction Code. In addition, a general visual examination will be performed during, or upon completion of, the pressure test.

The reapplication of containment vessel coatings will be performed following completion of radiography and prior to the performance of the localized leakage bubble test. Therefore, the containment vessel opening will have been restored to its original design requirements and will have been examined to ensure weld integrity.

The bubble test will ensure zero leakage at the repair area, in lieu of a Type A test that measures and permits a specified amount of total containment leakage; in other words, this zero leakage acceptance criterion is more stringent than that of a Type A test. Zero leakage acceptance criteria for the bubble test will ensure that the containment vessel leakage rate was not altered by the steam generator replacement activity, and it will also verify leaktight integrity. Additionally, the pressurization of the entire containment vessel to the accident pressure will confirm the structural integrity of the containment vessel after the repair is complete.

DBNPS has successfully completed two Appendix J Type A tests following containment vessel restoration associated with two separate reactor vessel closure head replacements. Per the DBNPS Containment Leakage Rate Testing Program, the tests performed in the 2003 refueling outage and the 2011 mid-cycle outage indicated that the Containment System is performing well within leakage limits as greater than 50% margin remained of the 0.375% weight per day leakage limit in both cases. Greater than 80% margin remained following the restoration of the containment vessel during the 2011 mid-cycle outage.

In summary, the combination of a 100 percent weld radiography (meeting the construction code radiography acceptance criteria) and the localized leakage bubble test of the repair weld (while at design pressure with a zero leakage acceptance criteria) as well as recent history of acceptable Type A tests will ensure the structural and leaktight integrity of the containment vessel.

Therefore, in accordance with the requirements of 10 CFR 50.55a(a)(3)(i), the localized leakage bubble test provides an acceptable level of quality and safety in lieu of the required Type A test.

6. Duration of Proposed Alternative

The duration of the proposed alternative would be through completion and approval of all testing associated with restoration of the containment vessel opening created to support the DBNPS steam generator replacement during the 2014 outage. The proposed alternative shall be utilized during the fourth 10-year inservice inspection interval, which commenced on September 21, 2012.

7. Precedents

1. Entergy letter to NRC dated July 27, 2011, "Request for Alternative to ASME IWE-5221 Regarding Post Repair Testing of Waterford 3's Steel Containment Vessel Opening" (Accession No. ML112150195).

2. NRC letter to Entergy dated January 4, 2012, "Waterford Steam Electric Station, Unit 3 - Request for Alternative to ASME IWE-5221 Regarding Post-Repair Testing of Steel Containment Vessel Opening (TAC No. ME6795) (Accession No. ML113330137).

3. TVA letter to NRC dated November 17, 2005, "Watts Bar Nuclear Plant (WBN), Unit 1 - One Time Request for Relief from American Society of Mechanical Engineers (ASME), Section XI Code Requirements - Tests Following Repair, Modification, or Replacement (IWE-5221)" (Accession No. ML053260493).

4. NRC letter to TVA dated August 30, 2006, "Watts Bar Nuclear Plant, Unit 1 - One Time Request for Relief from American Society of Mechanical Engineers Section XI Code Requirements - Tests Following Repair, Modification, or Replacement (IWE-5221) (TAC No. MC8920)" (Accession No. ML061590111).