



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

April 5, 2019

ANO Site Vice President
Arkansas Nuclear One
Entergy Operations, Inc.
N-TSB-58
1448 S.R. 333
Russellville, AR 72802

SUBJECT: ARKANSAS NUCLEAR ONE, UNIT 2 – REVIEW OF LICENSE RENEWAL
COMMITMENT SUBMITTAL REGARDING ENVIRONMENTALLY-ASSISTED
FATIGUE (EPID L-2018-LRO-0026)

Dear Sir or Madam:

By letter dated May 24, 2018 (Agencywide Documents Access and Management System (ADAMS) Accession No. ML18144A970), Entergy Operations, Inc. (the licensee) submitted information to fulfill a commitment for license renewal regarding the licensee's management of environmentally-assisted fatigue at Arkansas Nuclear One, Unit 2. The licensee's commitment is specified in Commitment No. 39 of Appendix A to NUREG-1828, "Safety Evaluation Report Related to the License Renewal of the Arkansas Nuclear One, Unit 2," dated June 2005 (ADAMS Accession No. ML051730233). Commitment No. 39 states that, should Arkansas Nuclear One, Unit 2, select the inspection option to manage environmentally-assisted fatigue, "... details of the scope, qualification, method, and frequency of the inspections ..." will be provided to the U.S. Nuclear Regulatory Commission (NRC) for review and approval prior to entering the period of extended operation.

The NRC staff reviewed the information in the licensee's letter and determined that the licensee has fulfilled Commitment No. 39 for license renewal. The staff assessment is enclosed.

If you have any questions, please contact me at (301) 415-4037 or Thomas.Wengert@nrc.gov.

Sincerely,

A handwritten signature in black ink that reads "Thomas J. Wengert".

Thomas J. Wengert, Senior Project Manager
Plant Licensing Branch IV
Division of Operating Reactor Licensing
Office of Nuclear Reactor Regulation

Docket No. 50-368

Enclosure:
Staff Assessment

cc: Listserv

STAFF ASSESSMENT BY THE OFFICE OF NUCLEAR REACTOR REGULATION
IMPLEMENTATION OF LICENSE RENEWAL COMMITMENT NO. 39 REGARDING
MANAGEMENT OF ENVIRONMENTALLY-ASSISTED FATIGUE
ENTERGY OPERATIONS, INC.
ARKANSAS NUCLEAR ONE, UNIT 2
DOCKET NO. 50-368

By letter dated May 24, 2018 (Agencywide Documents Access and Management System (ADAMS) Accession No. ML18144A970), Entergy Operations, Inc. (Entergy, the licensee) submitted information to the U.S. Nuclear Regulatory Commission (NRC) to fulfill a commitment for license renewal regarding the licensee's management of environmentally-assisted fatigue (EAF) at Arkansas Nuclear One, Unit 2 (ANO-2).

Background

In accordance with Title 10 of the *Code of Federal Regulations* (10 CFR) Part 54, "Requirements for Renewal of Operating Licenses for Nuclear Power Plants," the NRC issued Renewed Facility Operating License No. NPF-6 to ANO-2 on June 30, 2005. NUREG-1828, "Safety Evaluation Report Related to the License Renewal of the Arkansas Nuclear One, Unit 2," dated June 2005 (ADAMS Accession No. ML051730233), documents the NRC staff's technical review of the license renewal application. Components with a license renewal intended function are subject to an aging management review to ensure that the effects of aging will be adequately managed so that the intended function(s) will be maintained consistent with the current licensing basis for the period of extended operation as required by 10 CFR 54.21(a)(3).

Appendix A to NUREG-1828 documents commitments the licensee made to manage the effects of aging during the period of extended operation. Commitment No. 39 concerns management of EAF. Specifically, the commitment states:

Should ANO-2 select the inspection option (Option 4) to manage environmentally-assisted fatigue, details of the scope, qualification, method, and frequency of the inspections will be provide[d] to the NRC for review and approval prior to entering the period of extended operation.

Summary of the Information in the Licensee's Submittal Dated May 24, 2018

In its letter dated May 24, 2018, the licensee provides a specific implementation plan to fulfill its license renewal commitment to address the potential aging effects of EAF for several of the fatigue-sensitive locations, including the pressurizer surge line and safety injection nozzle, during the period of extended operation. The licensee identified the 5 different approaches (options) that it could use to manage the EAF effects, as described in NUREG-1828, as follows:

1. Further refinement of the fatigue analysis to lower the cumulative usage factor to below 1.0, or

Enclosure

2. Repair of the affected locations, or
3. Replacement of the affected locations, or
4. Manage the effects of fatigue by an inspection program that has been reviewed and approved by the NRC (for example, periodic non-destructive examination of the affected locations at inspection intervals to be determined by a method acceptable to the NRC). The inspections are expected to be able to detect cracking due to thermal fatigue prior to loss of function. Replacement or repair will then be implemented such that the intended function will be maintained for the period of extended operation, or
5. Monitor ASME [American Society of Mechanical Engineers] Code activities to use the environmental fatigue methodology approved by the Code committee and NRC.

In its letter, the licensee stated that it intends to use option (approach) 4 to manage the aging effects of EAF through flaw tolerance evaluation and inspections on critical locations of concern for fatigue cumulative usage factor.

In the attachment to the letter, the licensee provided a detailed fatigue flaw tolerance evaluation on the pressurizer surge line and safety injection nozzle, which the licensee identified as areas of concern. It also provided a full description of the plant-specific inspection program for the pressurizer surge line and safety injection nozzle welds, which will be part of its Augmented Inservice Inspection Program. Entergy proposed ultrasonic testing examinations and provided inspection results previously performed on the subject components. Entergy stated that the pressurizer surge line elbow welds 16-011 and 16-012, and safety injection nozzle-to-safe end welds 21-001, 22-001, 23-001, and 24-001, were volumetrically examined using manual and phased array ultrasonic testing during refueling outage 2R23 in the spring of 2014. No flaws were identified as exceeding the applicable acceptance standard.

NRC Staff Review

The NRC staff reviewed the information regarding the implementation of the subject license renewal commitment that Entergy provided. The staff finds the inspection program acceptable because:

- (a) Ultrasonic testing examination is effective in detecting fatigue flaws,
- (b) Similar examinations have been performed and have been proven to be effective, and
- (c) If unacceptable flaws are detected, replacement or repair will then be implemented such that the intended function will be maintained during the period of extended operation.

Furthermore, the NRC staff finds that the flaw tolerance evaluation the licensee used as the basis for the inspection interval is acceptable because it was based on the NRC-accepted methods in Appendix L, "Operating Plant Fatigue Assessment," of Section XI of the ASME Boiler & Pressure Vessel Code. The staff also noted that the proposed inspection program

implements the ten elements of an aging management program, as defined in NUREG-1801, Revision 2, "Generic Aging Lessons Learned (GALL) Report, Final Report," dated December 2010 (ADAMS Accession No. ML103490041).

Conclusion

Based on the above review, the NRC staff concludes that the licensee's implementation of Commitment No. 39 is acceptable because it has provided a flaw tolerance evaluation and an inspection program acceptable to the staff for the reasons described above. Therefore, the staff considers ANO-2 License Renewal Commitment No. 39 closed.

Principal Contributor: B. Fu, NRR/DMLR

Date: April 5, 2019

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 COMMITMENT SUBMITTAL REGARDING ENVIRONMENTALLY-ASSISTED
 FATIGUE (EPID L-2018-LRO-0026) DATED APRIL 5, 2019

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ADAMS Accession No.: ML19074A028

*by memorandum

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