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1CAN101802

October 10, 2018

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

SUBJECT: 45th-Year Reactor Building Inspection Report
Arkansas Nuclear One, Unit 1
Docket No. 50-313
License No. DPR-51

Dear Sir or Madam:

Entergy Operations, Inc. (Entergy) conducted the Arkansas Nuclear One, Unit 1 (ANO-1) 45th-Year Tendon Surveillance and Concrete Inspection in association with the spring 2018 refueling outage (1R27). Pursuant to the requirements of IWL-3300 of the American Society of Mechanical Engineers (ASME) Section XI, 2007 Edition with 2008 Addenda, as modified by 10 CFR 50.55a and ANO-1 Technical Specification (TS) 5.6.6, an engineering report was prepared to document the evaluation of the examinations that did not meet the acceptance standards of the ANO-1 Containment Inspection Program. In accordance with ANO-1 TS 5.6.6, the results of this engineering evaluation are to be submitted to the NRC within 30 days of the completion of the evaluation which was completed on October 2, 2018.

The scope of this report is limited to examinations of concrete containments covered by the rules of ASME Section XI, Subsection IWL. Examination of the containment metallic liner and Class MC components is accomplished under the rules of ASME Section XI, Subsection IWE. As such, these examinations are not in the scope of this report.

While no indications were found that challenge current structural integrity or leak tightness of the containment, four indications were found that required evaluation under IWL-3300. A summary of the results is provided in the attachment to this letter.

Based on the results of the engineering evaluation of the 45th-Year Tendon Surveillance and Concrete Inspection, Entergy has concluded that the ANO-1 Reactor Building is capable of performing its design function and is expected to remain capable of performing its design function until completion of the 50th-Year Tendon Surveillance and Concrete Inspection. Additionally, the observed indications do not suggest the presence of degradation in inaccessible areas.

No new regulatory commitments are included in this letter.

If there are any questions or if additional information is needed, please contact me.

Sincerely,

ORIGINAL SIGNED BY STEPHENIE L. PYLE

SLP/dbb

Attachment: Summary of Engineering Evaluation associated with the ANO-1 45th-Year
Reactor Building Tendon Surveillance and Concrete Inspection

cc: Mr. Kriss Kennedy
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U. S. Nuclear Regulatory Commission
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Attachment to

1CAN101802

**Summary of Engineering Evaluation associated with the ANO-1 45th-Year
Reactor Building Tendon Surveillance and Concrete Inspection**

Summary of Engineering Evaluation associated with the ANO-1 45th-Year Reactor Building Tendon Surveillance and Concrete Inspection

Entergy Operations, Inc. (Entergy) conducted the Arkansas Nuclear One, Unit 1 (ANO-1) 45th-Year Tendon Surveillance and Concrete Inspection in association with the spring 2018 refueling outage (1R27). While no indications were found that challenge current structural integrity or leak tightness of the Reactor Building, there were three indications that required evaluation under IWL-3300 (reported below).

Pursuant to the requirements of IWL-3300 of the American Society of Mechanical Engineers (ASME) Section XI, 2007 Edition with 2008 Addenda, as modified by 10 CFR 50.55a and ANO-1 Technical Specification (TS) 5.6.6, an engineering report was prepared to document the evaluation of the examinations that did not meet the acceptance standards of the ANO-1 Containment Inspection Program. The engineering report was completed on October 2, 2018. In accordance with ANO-1 TS 5.6.6, the results of this evaluation are to be submitted to the NRC within 30 days of the completion of the evaluation.

1. Drops of Water Detected on the Shop End of Tendon 21H55

IWL-3221.3(e) states that there must be no evidence of free water at the tendon anchorage.

The inspection of the field end of the tendon revealed a small amount of free water (< 1 oz.) on the end of the tendon and anchorage area. A water sample could not be obtained for testing due to the small amount observed. As a part of the surveillance inspection process, the corrosion protection medium was removed from the anchorage area and a sample was retained for testing. The results of the grease testing showed that water soluble chlorides, nitrates, and sulfides, as well as the water content and neutralization values were all within the acceptable limits for the protection medium. The corrosion and crack inspection recorded no cracking with Level 1 corrosion (bright metal with no visible corrosion) and Level 2 corrosion (reddish brown color with no pitting).

The amount of moisture observed at the tendon is considered insignificant as defined in ANO procedure SEP-CISI-ANO-001 (Containment Tendon Inspections).

CAUSE OF CONDITION [IWL-3310(a)]:

It is possible that the tendon can gasket was leaking, although there is no reporting of a grease leak at this location. The most probable cause of the small accumulation of water is that it formed through condensation on the inside of the tendon can.

APPLICABILITY OF CONDITION TO THE OTHER UNIT [IWL-3310(b)]:

ANO, Unit 2 (ANO-2), being of the same design and in the same environment as the ANO-1 Reactor Building, is susceptible to condensation forming in the tendon cans. Based on the results of the tendon surveillances to date, there is no known evidence that indicates that the presence of a small amount of moisture caused by condensation has an adverse effect on the tendon pre-stress system. The current required periodic tendon surveillances are considered sufficient to detect any adverse conditions or trends should they develop.

ACCEPTABILITY OF CONTAINMENT [IWL-3310(c)]

Based on the above evaluation, it is concluded that the presence of the free water had no negative effect on tendon 21H55, and the tendon has its full capacity to maintain the required post tensioned force. As a result, the Reactor Building is acceptable without further evaluation or repair/replacement activities.

REQUIREMENTS FOR REPAIR REPLACEMENT [IWL-3310(d)]

Based on the above discussion, the Reactor Building is acceptable without further evaluation or repair/replacement activities.

ADDITIONAL EXAMINATION REQUIREMENTS [IWL-3310(e)]

No additional examinations are warranted for this condition.

2. Grease Samples on the Field Ends of Tendons V008 and V032 Exhibited Neutralization Numbers below Detectable Limits (< 0.500)

IWL-3221.4 and Table ILW-2525-1 requires that the Reserve alkalinity (Base number) must be at least 50% of the installed value, or no less than zero if the as-installed value was 5 or less. For ANO-1 the latter acceptance value applies.

The original protection medium grease for the tendons at ANO-1 was Visconorust 2090-P, and the acceptance value for the surveillance was that it shall be no less than 0. Because the actual neutralization numbers were below detectable limits (< 0.500), the results for the required test are inconclusive. To ensure that the grease had not significantly deteriorated, an acid test was performed in accordance with American Society for Testing and Materials (ASTM) D 974-04, "Standard Test Method for Acid and Base Number by Color-indicator Titration," on an additional grease sample from each of these tendons. The results of the test revealed acid numbers of 3.53 for tendon V008 and 3.81 for tendon V032. While there is no known industry standard that states any acceptance criteria for an acid test, particularly related to IWL inspections, the ASTM standard test method lists a range of possible acid and base numbers from 0 to 250.

The reported acid numbers are considered practically neutral. The function of the grease coating on the tendons is to protect the tendon components from corrosion. The inspection revealed no evidence of active corrosion or that constituents of the grease had caused any degradation of the post-tensioning system.

CAUSE OF CONDITION [IWL-3310(a)]:

The Visconorust 2090P grease that was originally used on these tendons contained a low base number (< 5) at installation. As the service life of the grease has increased, additional degradation products have formed in the grease which has decreased the base number of the grease.

APPLICABILITY OF CONDITION TO THE OTHER UNIT [IWL-3310(b)]

The tendon corrosion protection medium specified for ANO-2 is Visconorust 2090P-4. This later version of 2090P grease contains more desirable properties, such as a base number of 35 or more. The condition of having neutralization numbers that are below detectable limits is not generally applicable to ANO-2.

ACCEPTABILITY OF CONTAINMENT [IWL-3310(c)]

The anchorage inspection report recorded Level 1 corrosion on tendon V008, and Level 1 and 2 corrosion on tendon V032. These corrosion levels correspond to bright metal with no visible corrosion for Level 1, and reddish brown color with no pitting for Level 2. The results of the grease sampling was acceptable, with the exception of the neutralization numbers below detectable limits. The visual inspection of tendons did not show any evidence of active corrosion, or that there has been any degradation of the post-tensioning system. Therefore, this condition is considered acceptable.

REQUIREMENTS FOR REPAIR REPLACEMENT [IWL-3310(d)]

A new tendon cap and gasket were installed on the tendon ends, and the cans were refilled with 2090P-4 grease. No repair or replacement actions are required.

ADDITIONAL EXAMINATION REQUIREMENTS [IWL-3310(e)]

No additional examinations are warranted for this condition.

3. Tendon 2D213 Accepted more than 10% of the Net Tendon Duct Volume Grease when being Refilled

The requirement for acceptability is outlined in IWL-3221.4 which states that the absolute difference between the amount removed and the amount replaced shall not exceed 10% of the tendon net duct volume. After inspection, tendon 2D213 was refilled with grease, and the absolute difference recorded was 38.8%.

CAUSE OF CONDITION [IWL-3310(a)]:

The cause of the low grease level in the tendon is known, as the tendon can was previously identified as leaking.

APPLICABILITY OF CONDITION TO THE OTHER UNIT [IWL-3310(b)]

The ANO-2 Containment Building was constructed with an enhanced tendon can design that has an improved sealing ability. ANO-2 does not have the tendon can grease leak issues similar to ANO-1.

ACCEPTABILITY OF CONTAINMENT [IWL-3310(c)]

The visual inspection of the tendon identified Level 1 and 2 corrosion, which corresponds to bright metal with no visible corrosion for Level 1 and a reddish-brown color with no pitting for Level 2. There was no water identified or reported in the tendon caps of this tendon, and the grease samples that were analyzed were acceptable. The condition is acceptable because the cause of the condition is known and all inspection and testing results were acceptable.

REQUIREMENTS FOR REPAIR REPLACEMENT [IWL-3310(d)]

The tendon can and gasket was replaced with the tendon duct and cans being refilled with grease. No repair or replacement activity is required.

ADDITIONAL EXAMINATION REQUIREMENTS [IWL-3310(e)]

No additional examinations or actions are warranted for this condition.

Based on the results of the engineering evaluation of the 45th-Year Tendon Surveillance and Concrete Inspection, Entergy has concluded that the ANO-1 Reactor Building is capable of performing its design function and is expected to remain capable of performing its design function until completion of the 50th-Year Tendon Surveillance and Concrete Inspection. Additionally, the observed indications do not suggest the presence of degradation in inaccessible areas.