**Tennessee Valley Authority**, 1101 Market Street, Chattanooga, Tennessee 37402

CNL-17-137

October 30, 2017

10 CFR 50.55(e)

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

Bellefonte Nuclear Plant, Unit 2
Construction Permit CPPR - 123
NRC Docket No. 50-439

Subject: **Bellefonte Nuclear Plant Unit 2 - Containment Vertical Tendon (V281) Failure - Third Interim Report**

Reference(s)
1. U.S. Nuclear Regulatory Commission Operations Center Event Notification No. 52476, dated January 6, 2017
2. Letter from TVA to NRC, CNL-17-004, "Bellefonte Nuclear Plant Unit 2 - Containment Vertical Tendon (V281) Failure - First Interim Report," dated January 6, 2017 (ML17006A212)
3. Letter from TVA to NRC, CNL-17-076, "Bellefonte Nuclear Plant Unit 2 - Containment Vertical Tendon (V281) Failure - Second Interim Report," dated June 7, 2017 (ML17158B336)

The purpose of this letter is to provide the NRC with the third interim report on the subject defect initially reported to the NRC Operations Center on January 6, 2017, and referenced in Bellefonte Condition Report 1239343. TVA submitted the initial interim report on this matter via Reference 2.

In Reference 3, TVA provided a second interim report and made a commitment to submit an update to the interim report prior to October 31, 2017. Enclosure 1 of this letter contains the third interim report. Enclosure 2 provides the list of commitments made in this submittal. TVA will submit the next report by February 28, 2018. Please address any questions regarding this response to Edward Schrull at (423) 751-3850.

Respectfully,

J. W. Shea
Vice President, Nuclear Regulatory Affairs and Support Services

Enclosures

cc: See Page 2

Enclosures
1. 10 CFR 50.55(e) Third Interim Report Bellefonte Nuclear Plant Containment Vertical Tendon Coupling Failure
2. List of Commitments

cc (Enclosures):

NRC Regional Administrator - Region II
Deputy Regional Administrator for Construction
NRR Project Manager - Watts Bar Nuclear Plant

**10 CFR 50.55(e) THIRD INTERIM REPORT**
**BELLEFONTE NUCLEAR PLANT**
**CONTAINMENT VERTICAL TENDON COUPLING FAILURE**

## Description of Deficiency

The additional inspection of the failed Bellefonte Nuclear Plant (BLN) Unit 2 Reactor Building Containment Vertical Tendon V281 coupling indicated a potential for an unknown common mode failure mechanism for BLN Containment vertical tendon rock anchor couplings. On December 6, 2016, the Unit 2 Reactor Building Containment Vertical Tendon V281 rock anchor/ tendon anchor coupling was found failed during a routine weekly inspection. The anchor coupling appears to have sheared in the threaded portion allowing the anchor head for the vertical tendon and the anchor head for the rock anchor tendon to separate.

The failed tendon coupling was inspected on October 19, 2016, and showed no signs of component specific damage or improper installation creating the potential for an unknown common mode failure.

## Safety Significance

The cause for the failure of the V281 rock anchor/tendon anchor coupling has been determined to be Environmentally Influenced Corrosion Cracking. An extent of condition including grease testing of 18 additional tendons, has determined that no detectable hydrogen sulfide was found and that "…there would come a time, where the remaining tendons would have an insufficient amount of water present to support corrosion and its associated hydrogen induction." Based on this conclusion, additional tendon failures of this type are not anticipated.

## Cause of Deficiency

The cause of the failure of the V281 rock anchor/tendon anchor coupling is Environmentally Influenced Corrosion Cracking. Chemical analysis of the coupling grease and metallurgical analysis of the failed coupling was performed.

## Interim Progress

Upon discovery, access to the BLN Unit 2 tendon gallery was restricted. The area of the V281 tendon failure has been cleaned. Grease samples have been obtained and sent to TVA Central Labs for analysis. The coupling from the rock anchor and tendon anchor locations has been removed and was sent to TVA Central Labs for metallurgical analysis. The subsequent Central Labs report was sent to Sargent and Lundy for further evaluation.

Grease samples have also been taken from adjacent tendons (V272 through V290) to evaluate if conditions are similar to the samples from tendon V281.

A third party consultant performed a vendor review that indicated that the failure was similar to the Unit 1 tendon V9 failure that occurred in 2009 (CR 200119). The analyses performed for the current coupling failure have determined that the failure mechanism is the same for both failures.

After review of third party reports, TVA determined that additional analysis of the Unit 2 V281 tendon failure is necessary. The additional analysis will account for differences between the Unit 2 V281 and Unit 1 V9 failures, including variations in reactor building tendon location and building parameters. Additionally, a third party review of tensioning and detensioning plans for Unit 2 will be required to account for unit-specific variances. These actions have been captured in CR 1239343. Prior reports were performed for the Unit 1 V9 failure and are specific to Unit 1.

Further actions will be added to CR 1239343 upon completion of the additional analysis. CR 225287, which was initiated to investigate applicability of the Unit 1 V9 tendon failure to the Unit 2 reactor building, will be closed to the actions being taken in CR 1239343.

**Future Updates**

TVA will provide an update to this report by February 28, 2018 following reviews of the additional analysis and corrective action documents CR 200119 and CR 1239343.

**ENCLOSURE 2**

**LIST OF COMMITMENTS**

1. TVA will submit an update to this interim report prior to February 28, 2018.