



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

February 26, 2013

Vice President, Operations  
Arkansas Nuclear One  
Entergy Operations, Inc.  
1448 S.R. 333  
Russellville, AR 72802

SUBJECT: ARKANSAS NUCLEAR ONE, UNIT 1 – CONFERENCE CALL SUMMARY  
REGARDING THE UPCOMING 2013 STEAM GENERATOR TUBE  
INSPECTIONS (TAC NO. ME8279)

Dear Sir or Madam:

On January 25, 2013, the U.S. Nuclear Regulatory Commission (NRC) staff participated in a conference call with representatives of Entergy Operations, Inc. (the licensee), regarding its upcoming steam generator tube inspection activities at Arkansas Nuclear One Unit 1. A summary of the conference call is enclosed.

If you have any questions, please contact me at (301) 415-1480 or by e-mail at [kaly.kalyanam@nrc.gov](mailto:kaly.kalyanam@nrc.gov).

Sincerely,

A handwritten signature in cursive script, reading "N. Kaly Kalyanam", followed by "for" in a smaller, less distinct script.

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

Docket No. 50-313

Enclosure:  
As stated

cc w/encl: Distribution via Listserv

SUMMARY OF JANUARY 25, 2013, CONFERENCE CALL REGARDING

THE UPCOMING 2013 STEAM GENERATOR TUBE INSPECTIONS

ENTERGY OPERATIONS, INC.

ARKANSAS NUCLEAR ONE, UNIT 1

DOCKET NO. 50-313

On January 25, 2013, the U.S. Nuclear Regulatory Commission (NRC) staff participated in a conference call with representatives of Entergy Operations, Inc. (the licensee), regarding its upcoming steam generator (SG) tube inspection activities at Arkansas Nuclear One, Unit 1 (ANO1). Information provided by the licensee in support of the January 25, 2013, conference call is located in the Agencywide Documents Access and Management System (ADAMS) at Accession No. ML13029A703.

The replacement SGs for ANO1 are Enhanced Once-Through Steam Generators (EOTSG) manufactured by AREVA. The EOTSG is a straight shell and tube type heat exchanger installed in a vertical position. The Alloy 690 thermally treated tubing has a nominal diameter of 0.625 inches and a nominal wall thickness of 0.037 inches. The tubes were expanded hydraulically for the full depth of the tubesheet. There are 15 tube support plates that are constructed of Type 410 stainless steel. These supports have a trefoil-shaped hole design.

Information discussed during the conference call that was not included in the licensee-provided document is summarized below:

The licensee stated that tube support plate (TSP) wear growth rate is low and continues to support three cycles of operation between inspections; however, it decided to inspect to validate the flaw growth rate for the tube-to-tube wear (TTW) and to determine the extent of tie rod bowing. Analyses have confirmed that the TSPs are getting hung up on the inner shroud during cool down, which is causing the tie rods to bow and to come into contact with the tubes.

The worst-case tie rod bowing in SG A is less than 1.6 inches and is located between the lower tubesheet and the first TSP. During the last outage, the maximum bowing was approximately 1.3 inches in SG A and approximately 0.5 to 0.6 inches in SG B. Based on the latest thermal cycling fatigue analysis, the tie rod bowing in SG A is expected to increase for the first ten thermal cycles, and then the bowing should level out at approximately 1.85 inches. SG A is currently in the sixth thermal cycle.

Investigations of the cause of the tube-to-tube contact that resulted in wear are on-going. Several possible causes are being investigated and these investigations include both laboratory and field testing. The licensee indicated that they will be performing frequency testing on the SG tubes during the upcoming outage, to determine how much tension or compression remains in the tubes when the plant is shutdown. The tubes are preloaded during SG fabrication and the preload varies across the tubesheet to account for tubesheet flexure during operation. This type

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of testing has been performed in naval applications. This TTW has been detected in approximately 50 tubes in SG A and approximately 70 tubes in SG B. Most of the wear after the first cycle was 7-10 percent through wall (TW) and then either stopped growing or increased by 5-6 percent TW over the next cycle. The maximum depth of the wear after four cycles of operation is 26 percent TW and has been constant for the last three cycles. The TTW appears to be self-arresting. The TTW is located near the middle of the tube length. A couple of the tubes with TTW also had TSP wear, but there was no discernable trend regarding TTW and TSP wear.

The inspections of the tubes around the tie rods will be expanded until no proximity indications are detected.

The licensee may also investigate the flatness of the tubesheet during the outage if the equipment is available in time.

The licensee indicated that it would support another conference call with the NRC during the upcoming spring 2013 outage.

February 26, 2013

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Sincerely,

/RA by Alan Wang for/

N. Kaly Kalyanam, Project Manager  
Plant Licensing Branch IV  
Division of Operating Reactor Licensing  
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DATE	2/20/13	2/15/13	2/7/13	2/26/13	2/26/13

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