



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

October 28, 2008

Vice President, Operations
Entergy Operations, Inc.
Waterford Steam Electric Station, Unit 3
17265 River Road
Killona, LA 70057-3093

SUBJECT: WATERFORD STEAM ELECTRIC STATION, UNIT 3 - SUMMARY OF
TELEPHONE CONFERENCE CALLS REGARDING THE 2008 STEAM
GENERATOR TUBE INSPECTIONS (TAC NO. MD8379)

Dear Sir or Madam:

On May 5, 8, 9, 12, and 16, 2008, the U.S. Nuclear Regulatory Commission staff participated in telephone conference calls with representatives of Entergy Operations, Inc. (the licensee) regarding its 2008 steam generator (SG) tube inspections at Waterford Steam Electric Station, Unit 3. The majority of the discussions and documentation focused on the degraded SG batwings. One call was, however, dedicated to the general inspection of SG results. The NRC staff did not identify any issues that would warrant immediate follow-up action.

The information provided by the licensee in support of the discussions on SG tube inspections is available in the Agencywide Documents Access and Management System Accession No. ML081440106.

If you have any questions, please contact me at (301) 415-1480 or send an e-mail to Kaly.Kalyanam@nrc.gov.

Sincerely,

A handwritten signature in black ink, appearing to read "Kaly Kalyanam", with a horizontal line under the last name.

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

Docket No. 50-382

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SUMMARY OF CONFERENCE CALLS
REGARDING THE 2008
STEAM GENERATOR TUBE INSPECTION AT
WATERFORD STEAM ELECTRIC STATION, UNIT 3
DOCKET NO. 50-382

On May 5, 8, 9, 12, and 16, 2008, representatives of the U.S. Nuclear Regulatory Commission (NRC) and Entergy Operations, Inc. (the licensee), participated in telephone conference calls regarding its 2008 steam generator (SG) tube inspection activities at Waterford Steam Electric Station, Unit 3 (Waterford 3). In support of these calls, the licensee provided several documents, which are publicly available (Agency Documents and Access Management System (ADAMS), Accession No. ML081440106). The majority of the discussions and documentation focused on the degraded SG batwings. One call was, however, dedicated to the general inspection results. A summary of these discussions is provided below.

Waterford 3 has two Model 3410 SGs (SG 31 and SG 32) designed and fabricated by Combustion Engineering. The mill-annealed Alloy 600 SG tubes have an outside diameter of 0.750 inches and a nominal wall thickness of 0.048 inches. Each SG contains 9,350 tubes. The tubes are explosively expanded for the full depth of the tubesheet at each end and are supported by a number of carbon steel lattice grid (i.e., eggcrate) tube supports, diagonal bars (also referred to as batwings), and vertical straps. The tubes in rows 1 through 18 are U-bends and the tubes in rows 19 through 147 are square bends. There are no alternate repair criteria (i.e., other than the 40 percent through-wall repair criteria) approved for the plant.

During the spring 2005 outage, the licensee discovered two batwing supports in SG 32 which had separated at the support bar in the stay cavity region in the center of the SG. The batwings serve as a spacer to prevent tube-to-tube contact during normal operation. These two batwings caused minor tube wear which did not compromise tube integrity. These findings were described in Information Notice 2005-29, "Steam Generator Tube and Support Configuration" (ADAMS Accession No. ML052280011).

The NRC staff interaction with Waterford 3 during the 2006 steam generator inspections is summarized in a letter dated April 24, 2007 (ADAMS Accession No. ML071090059). The licensee performed a mid-cycle SG inspection, at Waterford 3, in 2007. The NRC staff interaction with the licensee during the mid-cycle inspection is documented in a letter dated November 23, 2007 (ADAMS Accession No. ML073190171).

All findings during the 2008 refueling outage No. 15 (RFO-15) SG inspections were bounded by the licensee's assessment. The scope of secondary side inspections included detailed

region. As a result of these inspections, degradation was observed on several plugged tubes; however, the extent of degradation observed was bounded by previous analyses. The licensee also performed primary side inspections during this outage which included unplugging several tubes. The extent of degradation (number of tubes affected and the severity) was bounded by the licensee's analysis. There was no significant change in the configuration of the batwings since the mid-cycle outage. However, there were some additional batwings affected in SG 31 (the least affected steam generator) although those batwings still remained generally aligned (i.e., not bent and twisted as found in SG 32). One loose batwing piece in SG 32 was found to have migrated into the tube bundle (this was one of the loose batwing pieces identified during the mid-cycle outage – the other three loose pieces appeared to have remained in the same general position). This piece is adjacent to tubes that already had been plugged (and some had been stabilized).

The licensee took several actions during the outage to provide additional confidence that tube integrity would be maintained including: (a) reinforcing the batwing-to-wrap-around weld associated with one batwing (this one-sided weld was in steam generator 31 and was identified during the 2006, RFO-14 inspections), (b) preventively plugging and stabilizing all tubes in the blow-down lane from the center of the steam generator to the first tie rod, and (c) hydraulically expanding several tubes to hold the one batwing that slipped into the bundle (due to a degraded wrap around bar weld) in SG 32 in place. In a letter dated May 20, 2008 (ADAMS Accession No. ML081440106), the licensee documented the conditions observed in the Waterford 3 SGs during the RFO 15 inspections. This letter also provided many of the graphics shared with the NRC staff in support of the conference calls.

The licensee committed to actions similar to those committed to following their previous refueling outage (e.g., enhanced leakage monitoring) with the exception that the licensee is not planning to perform a mid-cycle outage.

In support of the May 9, 2008 conference call, in which the general inspection results were discussed, the licensee provided responses to the discussion points sent to the licensee in a letter dated April 8, 2008 (ADAMS Accession No. ML080860716). Additional information discussed during the call and not included in the document provided by the licensee is summarized below:

- One freespan axially oriented indication was detected near the 90-degree bend on the hot-leg side of the SG. The indication is approximately 4.5 inches long and has a maximum depth of approximately 52-percent throughwall. The licensee is considering *in-situ* pressure testing this indication. (Subsequent to the conference call, the licensee determined that the indication did not meet the screening criteria for performing an *in-situ* pressure test).
- The uncertainty associated with depth sizing freespan indications is approximately 11 percent. This is based on approximately 20 pulled tubes from Combustion Engineering SGs.

- The 42-percent throughwall indication of wear was located at the center vertical strap.
- There is no significant difference in the growth rate and sizes of the wear indications at the batwing supports in the tubes in columns associated with the stay cavity region and those tubes in columns not associated with the stay cavity region. In addition, there is no significant difference in the depth of new wear indications in these two populations of tubes (i.e. inside and outside the stay cavity region).
- The size distribution and number of indications detected are comparable to what was predicted/projected in the operational assessment.
- It appears that there will likely be more tubes repaired in SG 31 than in SG 32.
- At the time of the call, the tube inspections were approximately 99.8 percent complete, with the special interest inspections being 90-percent complete. SG 32 was being sludge lanced at the time of the call.

The NRC staff did not identify any issues that warranted immediate follow-up.

October 28, 2008

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Sincerely,
/RA/

N. Kalyanam, Project Manager
Plant Licensing Branch IV
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