May 24, 2007

Mr. Kevin T. Walsh
Vice President of Operations
Entergy Operations, Inc.
17265 River Road
Killona, LA 70057-0751

SUBJECT: WATERFORD STEAM ELECTRIC STATION, UNIT 3 - SUMMARY OF NUCLEAR REGULATORY COMMISSION'S REVIEW OF STEAM GENERATOR TUBE INSPECTIONS FOR ITS SPRING 2005 OUTAGE (TAC NO. MD2111)

Dear Mr. Walsh:

By letters dated May 24, 2005, May 17 and December 27, 2006, and April 23, 2007, Entergy Operations, Inc.(the licensee), submitted information pertaining to the steam generator tube inspections at the Waterford Steam Electric Station, Unit 3, for its spring 2005 outage, in accordance with the plant's Technical Specifications (TSs). Additional information regarding the licensee's inspections is included in a letter dated March 31, 2006.

The Nuclear Regulatory Commission staff has completed its review of these reports and concludes that the licensee provided the information required by their TSs and that no additional follow-up is required at this time. The staff's review of the report is enclosed.

If you have any questions, please call me at (301) 415 1480.

Sincerely,

/RA/

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

Docket No. 50-382

Enclosure: Summary of NRC's Review

cc: See next page

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ADAMS Accession No.: ML071430208 *via input memo dated 05/22/07

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REVIEW OF THE 2005 STEAM GENERATOR TUBE INSPECTION REPORTS

ENTERGY OPERATIONS, INC.

WATERFORD STEAM ELECTRIC STATION, UNIT 3

DOCKET NO. 50-382

By letters dated May 24, 2005 (Agencywide Documents Access and Management System (ADAMS) Accession No. ML051460385), May 17, 2006 (ADAMS Accession No. ML061390029), December 27, 2006 (ADAMS Accession No. ML063620418), and April 23, 2007 (ADAMS Accession No. ML071150071), Entergy Operations, Inc.(the licensee), submitted information pertaining to the steam generator (SG) tube inspections at the Waterford Steam Electric Station, Unit 3 (Waterford 3) for its spring 2005 outage in accordance with the plant's Technical Specifications. Additional information regarding the licensee's inspections is included in a letter dated March 31, 2006 (ADAMS Accession ML060880134).

Waterford 3 has two Model 3410 SGs 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.

The licensee provided the scope, extent, methods, and results of their SG tube inspections in the documents referenced above. In addition, the licensee described corrective actions (i.e., tube plugging) taken in response to the inspection findings.

As a result of the review of these reports, the Nuclear Regulatory Commission (NRC) staff has the following notes/observations:

- During a Foreign Object Search and Retrieval (FOSAR) Inspection in SG 31, a mechanical feedwater heater (FWH) plug in the blowdown lane was identified and removed. The FWH plug was not detected during eddy current examinations. The discovery of the plug was entered into the licensee's Corrective Action Program. The source of the plug was determined to be from the 1C FWH. The plug became loose because it was not fully expanded into the tube during installation (which occurred in 1997). Several additional plugs were found to be missing from the 1C FWH.

  During the subsequent refueling outage (i.e., refueling outage 14 in 2006), the licensee did not find any additional FWH plugs in the SG. The licensee stated that the probability of this type of plug challenging SG tube integrity is minimal given its weight of 1.25 ounces.

  Additional modifications and inspections of the 1C FWH are planned for refueling outage 15 in April 2008.

- A number of new wear scars were identified during the 2005 (refueling outage 13) inspections. One suspected cause of this increase in the number of wear indications is that there was more tube bundle movement due to the removal of corrosion products and thinning of the support structures as a result of the chemical cleanings performed during refueling outages 10 (2000) and 12 (2003).

- Degradation of the feedwater thermal liner was observed during the outage. No loose parts were identified during the FOSAR that were attributed to the thermal liner.

- The noise associated with the eddy current data obtained during the 2005 outage was compared to the noise associated with the data used to qualify the inspection technique. The noise in the U-bend, at tube supports, and the expansion transition were assessed. This assessment was performed using the average and maximum peak-to-peak voltage amplitude of the noise. For axial primary water stress-corrosion cracking at the expansion transition, the average and maximum levels of noise in the field data exceeded the corresponding quantities associated with the data used to qualify the technique. NRC Regulatory Issue Summary 2000-22, "Issues Stemming from NRC Staff Review of Recent Difficulties Experienced in Maintaining Steam Generator Tube Integrity," highlights the importance of limiting the effects of noise on data quality (e.g., through the use of high-frequency coils) and the importance of site-specific qualification of generically qualified techniques. High levels of noise can result in flaws not being detected.

- During the outage, two batwing supports in SG 32 were identified as being separated at the support bar in the stay-cavity region. 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. There was no evidence of batwing degradation in SG 31. Waterford performed extensive tube plugging and stabilization in an effort to protect active tubes from being damaged as a result of the broken batwings. This issue was the topic of a meeting on November 3, 2005, and the subject of NRC Information Notice 2005-29, "Steam Generator Tube and Support Configuration." The staff is continuing monitoring the licensee's actions in response to these findings.

Based on a review of the information provided, the staff concludes that the licensee provided the information required by their technical specifications. In addition, the staff concludes that there are no technical issues that warrant follow-up action at this time since the inspections appear to be consistent with the objective of detecting potential tube degradation and the inspection results (with the exception of the broken batwings discussed above) appear to be consistent with industry operating experience at similarly designed and operated units.