



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

August 3, 2012

Mr. Matthew W. Sunseri  
President and Chief Executive Officer  
Wolf Creek Nuclear Operating Corporation  
Post Office Box 411  
Burlington, KS 66839

SUBJECT: WOLF CREEK GENERATING STATION – REVIEW OF THE 2011 STEAM  
GENERATOR TUBE INSPECTIONS DURING REFUELING OUTAGE 18  
(TAC NO. ME7755)

Dear Mr. Sunseri:

By letter dated October 19, 2011, Wolf Creek Nuclear Operating Corporation (the licensee) submitted information summarizing the results of the 2011 steam generator (SG) tube inspections performed at Wolf Creek Generating Station during Refueling Outage 18.

The U.S. Nuclear Regulatory Commission (NRC) staff has completed its review of the report and concludes that the licensee provided the information required by its technical specifications. The NRC staff's review is enclosed. No additional follow-up is required at this time.

If you have any questions, please contact me at (301) 415-3049 or via e-mail at [Terry.Beltz@nrc.gov](mailto:Terry.Beltz@nrc.gov).

Sincerely,

A handwritten signature in black ink, reading "Terry A. Beltz", is positioned above the typed name and title.

Terry A. Beltz, Senior Project Manager  
Plant Licensing Branch III-1  
Division of Operating Reactor Licensing  
Office of Nuclear Reactor Regulation

Docket No. 50-482

Enclosure:  
As stated

cc w/encl: Distribution via Listserv

OFFICE OF NUCLEAR REACTOR REGULATION  
REVIEW OF RESULTS OF 2011 STEAM GENERATOR TUBE INSPECTIONS  
PERFORMED DURING REFUELING OUTAGE 18  
WOLF CREEK GENERATING STATION  
DOCKET NO. 50-482

By letter dated October 19, 2011 (Agencywide Documents Access and Management System (ADAMS) Accession No. ML11298A261), Wolf Creek Nuclear Operating Corporation (the licensee) submitted information summarizing the results of the 2011 steam generator (SG) tube inspections performed at the Wolf Creek Generating Station (WCGS) during Refueling Outage 18.

WCGS has four Westinghouse Model F SGs. Each SG contains 5,626 thermally-treated Alloy 600 tubes. Each tube has an outside diameter of 0.688 inches and a wall thickness of 0.040 inches. The tubes are supported by stainless steel tube supports with quatrefoil-shaped holes and V-shaped chrome-plated Alloy 600 anti-vibration bars (AVB).

The licensee provided the scope, extent, methods, and results of its SG tube inspections in the documents referenced above. In addition, the licensee described corrective actions, such as tube plugging, taken in response to the inspection findings.

The licensee offered the following clarifications:

- The WCGS sampling approach meets the requirements set forth in the Electric Power Research Institute's Pressurized Water Reactor Steam Generator Examination Guidelines. Refueling Outage 18 was the third inspection of the third inspection period. Fifty percent (50%) of the tubes were inspected at Refueling Outage 17 (outage nearest the midpoint of the period) and the remaining 50% will be inspected at Refueling Outage 19 (outage nearest the end of the period).
- During secondary side visual inspections performed at the top of the tubesheet and in the upper steam drum, no degradation was observed other than the minor degradation that is being monitored at a few J-nozzle to feedring interface locations.
- A tube plugged for AVB wear can contact an adjacent tube without being severed. If a prior plugged tube continues to wear, tube-to-tube contact is generally predicted in an adjacent tube prior to the plugged tube severing.

Enclosure

The objective of the model that is used is to conservatively predict the operating time at which a tube plugged for AVB wear becomes at risk of severing, so that corrective action can be taken prior to that time. The model considers two possibilities:

- 1) Determine if a fatigue separation condition can be reached before a wearing tube (AVB wear) makes contact with its adjacent neighbor tubes.
- 2) Determine if (and when) the adjacent tube (if active) can attain a structurally limiting condition due to tube-to-tube contact before the next inspection.

In effect, if a fatigue separation condition is not achieved before tube-to-tube contact, the adjacent tube (if active) serves as a means to monitor the progression of the wear in the initially plugged and wearing tube. Monitoring the adjacent tubes confirms the analysis and allows time for proper planning to de-plug and stabilize prior to severance of the plugged tube. Thus, if the model predicts tube-to-tube contact with an active tube to occur at a particular time and physical observation by eddy current testing at that time confirms that no tube-to-tube contact wear is present, this leads to the conclusion that wear on the originally plugged tube is progressing slower than predicted and that the analysis is conservative.

If the adjacent tube(s) are plugged, they provide an effective permanent safety barrier because tube-to-tube contact wear results in an axial flaw on the tube if the adjacent tube is not severed. Axial flaws have been shown not to represent a risk for tube separation; thus, the adjacent tube itself does not represent a damage propagation mechanism. Further, the depth wear rate on both the original and adjacent tubes becomes very small due to the increasing wear area and the limited energy input to the contact wear.

Based on the NRC staff's review of the information provided by the licensee, the staff has the following observations/comments:

- No corrosion related degradation was detected during the inspection.
- Minor degradation identified during secondary side visual inspections will continue to be monitored to ensure that it does not become safety significant.

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

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Sincerely,

/RA/

Terry A. Beltz, Senior Project Manager  
Plant Licensing Branch III-1  
Division of Operating Reactor Licensing  
Office of Nuclear Reactor Regulation

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ADAMS Accession No. ML12137A280

\*memo dated March 30, 2012

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