January 17, 2006

Mr. Karl W. Singer
Chief Nuclear Officer and
Executive Vice President
Tennessee Valley Authority
6A Lookout Place
1101 Market Street
Chattanooga, TN 37402-2801

SUBJECT: WATTS BAR NUCLEAR PLANT, UNIT 1 — SUMMARY OF THE STAFF'S REVIEW OF THE STEAM GENERATOR TUBE INSPECTION 15-DAY AND 90-DAY REPORTS FOR THE 2005 OUTAGE (TAC NO. MC7485)

Dear Mr. Singer:

In a letter dated March 23, 2005 (ADAMS Accession No. ML0508700458), Tennessee Valley Authority (TVA, the licensee) submitted the 15-day steam generator (SG) plugging and sleeving report in accordance with Technical Specification (TS) 5.9.9. In another letter dated March 23, 2005 (ML050870457), TVA submitted the F* (F-star) alternate repair criteria report in accordance with TS 5.9.9. By letter dated June 28, 2005 (ML051820267), TVA submitted the 90-day SG voltage-based alternate repair criteria report. By letter dated November 2, 2005 (ML053110148), TVA provided additional information concerning these reports. In addition to these reports, the U.S. Nuclear Regulatory Commission (NRC) staff summarized additional information concerning the 2005 SG tube inspection (i.e., end-of-cycle 6) in a letter dated June 20, 2005 (ML051510040).

As discussed in the enclosed evaluation, the NRC staff has completed its review of the above documents and concludes that the licensee provided the information required by their TSs. In addition, the staff did not identify any technical issues that warrant followup action at this time. If you have any questions please contact me at (301) 415-1364.

Sincerely,

/RA/

Douglas V. Pickett, Senior Project Manager
Plant Licensing Branch II-2
Division of Operating Reactor Licensing
Office of Nuclear Reactor Regulation

Docket No. 50-390

Enclosure: As stated

cc: see next page

January 17, 2006

Mr. Karl W. Singer
Chief Nuclear Officer and
Executive Vice President
Tennessee Valley Authority
6A Lookout Place
1101 Market Street
Chattanooga, TN 37402-2801

SUBJECT: WATTS BAR NUCLEAR PLANT, UNIT 1 — SUMMARY OF THE STAFF'S REVIEW OF THE STEAM GENERATOR TUBE INSPECTION 15-DAY AND 90-DAY REPORTS FOR THE 2005 OUTAGE (TAC NO. MC7485)

Dear Mr. Singer:

In a letter dated March 23, 2005 (ADAMS Accession No. ML0508700458), Tennessee Valley Authority (TVA, the licensee) submitted the 15-day steam generator (SG) plugging and sleeving report in accordance with Technical Specification (TS) 5.9.9. In another letter dated March 23, 2005 (ML050870457), TVA submitted the F* (F-star) alternate repair criteria report in accordance with TS 5.9.9. By letter dated June 28, 2005 (ML051820267), TVA submitted the 90-day SG voltage-based alternate repair criteria report. By letter dated November 2, 2005 (ML053110148), TVA provided additional information concerning these reports. In addition to these reports, the U.S. Nuclear Regulatory Commission (NRC) staff summarized additional information concerning the 2005 SG tube inspection (i.e., end-of-cycle 6) in a letter dated June 20, 2005 (ML051510040).

As discussed in the enclosed evaluation, the NRC staff has completed its review of the above documents and concludes that the licensee provided the information required by their TSs. In addition, the staff did not identify any technical issues that warrant followup action at this time. If you have any questions please contact me at (301) 415-1364.

Sincerely,
/RA/
Douglas V. Pickett, Senior Project Manager
Plant Licensing Branch II-2
Division of Operating Reactor Licensing
Office of Nuclear Reactor Regulation

Docket No. 50-390

Enclosure: As stated

cc: see next page

DISTRIBUTION:

PUBLIC	PLB II-2 r/f	MMarshall	RidsAcrsAcnwMailCenter
MMurphy	RidsOgcRp	AHiser	RSola (Hard Copy)
MVaaler	RidsNrrPMDPickett	MLesser	RidsRgn2MailCenter (SCahill)
RidsNrrLACSola	RidsNrrDorlPlbii2	KKarwoski	

ADAMS Accession No.: ML060110110 NRC-106

OFFICE	PLBII-2	PLBII-2/LA	PLBII-2/PM	DCI/CSGB/BC	PLBII-2/BC
NAME	MVaaler	RSola	DPickett	AHiser	MMarshall
DATE	1/13/06	1/13/06	1/13/06	by memo dated 11 / 29 / 05	1/17/06

OFFICIAL RECORD COPY

cc:

Mr. Ashok S. Bhatnagar, Senior Vice President
Nuclear Operations
Tennessee Valley Authority
6A Lookout Place
1101 Market Street
Chattanooga, TN 37402-2801

Mr. Larry S. Bryant, Vice President
Nuclear Engineering and Technical Services
Tennessee Valley Authority
6A Lookout Place
1101 Market Street
Chattanooga, TN 37402-2801

Mr. Robert J. Beecken, Vice President
Nuclear Support
Tennessee Valley Authority
6A Lookout Place
1101 Market Street
Chattanooga, TN 37402-2801

Mr. Michael D. Skaggs
Site Vice President
Watts Bar Nuclear Plant
Tennessee Valley Authority
P.O. Box 2000
Spring City, TN 37381

General Counsel
Tennessee Valley Authority
ET 11A
400 West Summit Hill Drive
Knoxville, TN 37902

Mr. John C. Fornicola, Manager
Nuclear Assurance and Licensing
Tennessee Valley Authority
6A Lookout Place
1101 Market Street
Chattanooga, TN 37402-2801

Mr. Glenn W. Morris, Manager
Corporate Nuclear Licensing
and Industry Affairs
Tennessee Valley Authority
4X Blue Ridge
1101 Market Street
Chattanooga, TN 37402-2801

Mr. Paul L. Pace, Manager
Licensing and Industry Affairs
Watts Bar Nuclear Plant
Tennessee Valley Authority
P.O. Box 2000
Spring City, TN 37381

Mr. Jay Laughlin, Plant Manager
Watts Bar Nuclear Plant
Tennessee Valley Authority
P.O. Box 2000
Spring City, TN 37381

Senior Resident Inspector
Watts Bar Nuclear Plant
U.S. Nuclear Regulatory Commission
1260 Nuclear Plant Road
Spring City, TN 37381

County Executive
375 Church Street
Suite 215
Dayton, TN 37321

County Mayor
P. O. Box 156
Decatur, TN 37322

Mr. Lawrence E. Nanney, Director
Division of Radiological Health
Dept. of Environment & Conservation
Third Floor, L and C Annex
401 Church Street
Nashville, TN 37243-1532

Ms. Ann P. Harris
341 Swing Loop Road
Rockwood, Tennessee 37854

EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION

TENNESSEE VALLEY AUTHORITY

STEAM GENERATOR TUBE INSPECTION REPORTS

FOR THE 2005 OUTAGE

WATTS BAR NUCLEAR PLANT, UNIT 1

DOCKET NO. 50-390

By letter dated March 23, 2005 (ADAMS Accession No. ML050870458), Tennessee Valley Authority (TVA, the licensee) submitted the 15-day steam generator (SG) plugging and sleeving report in accordance with Technical Specification (TS) 5.9.9. In another letter dated March 23, 2005 (ML050870457), TVA submitted the F* (F-star) alternate repair criteria report in accordance with TS 5.9.9. By letter dated June 28, 2005 (ML051820267), TVA submitted the 90-day SG voltage-based alternate repair criteria report. By letter dated November 2, 2005 (ML053110148), TVA provided additional information concerning these reports. In addition to these reports, the U.S. Nuclear Regulatory Commission (NRC) staff summarized additional information concerning the 2005 SG tube inspection (i.e., end-of-cycle 6) in a letter dated June 20, 2005 (ML051510040).

Watts Bar Unit 1 has four Westinghouse Model D3 SGs. Each SG contains 4674 mill annealed Alloy 600 tubes. Each tube has a nominal outside diameter of 0.75 inch and a nominal wall thickness of 0.043-inch. The tubes were hardroll expanded for the full length of the tubesheet. The tubes are supported by a number of carbon steel support plates that have drilled holes through which the tubes pass. Below the tube supports is a flow distribution baffle.

The licensee implements alternate tube repair criteria for degradation within the tubesheet region (F-star) and for outside diameter stress corrosion cracking at the tube support plate elevations.

Tubes were repaired using Alloy 800 sleeves in both the end-of-cycle 5 (2003) and end-of-cycle 6 (2005) outages.

The licensee provided the scope, extent, methods, and results of their SG tube inspections for implementation of these alternate tube repair criteria in the documents referenced above. The licensee also described corrective actions (e.g., tube plugging) taken in response to the inspection findings.

As a result of the review of the reports, the NRC staff has the following comment/observation:

> One tube was identified with a 6.32 volt indication. The indication was located in a portion of the tube that passes through one of the tube support plates. The tube was removed from service. This indication was slightly greater than the structural limit

of 5.65 volts. Although the licensee did not assess the structural integrity of this single indication, they did perform an analysis of the probability of burst for the entire tube bundle which indicated that the tube bundle had adequate integrity. In addition, the licensee indicated that this indication would have adequate integrity with respect to main steam line break differential pressures with 95 percent probability using the 95/95 lower tolerance limit on material properties. The staff notes that maintaining tube structural integrity is important since an inherent assumption of the accident induced leakage model is that no tubes burst (rather they simply leak at a leak rate determined based on a correlation between leak rate and bobbin voltage).

The licensee underpredicted the maximum voltage observed during the end-of-cycle 6 inspections. Since the performance criteria were met during the end-of-cycle 6 inspection and predicted to be met for the end-of-cycle 7 inspections, no additional actions were taken during the end-of-cycle 6 inspections. The staff notes that although the performance criteria were met for the end-of-cycle 6, the underprediction in the maximum voltage can be used as an early predictor of a non-conservative methodology. If the methodology is non-conservative, the projections for end-of-cycle 7 may be nonconservative. Given the margin to the acceptance limits (1×10^{-2} for probability of burst and 3 gallons per minute for accident induced leakage), the conservatism in the analysis methodologies (e.g., flaws are in the free span, the tube supports will deflect during a steam line break), and the planned replacement of the SGs at the end-of-cycle 7, the NRC staff has determined that no additional follow-up is required at this time.

Based on a review of the information provided (i.e., regarding implementation of the alternate tube repair criteria), the NRC staff concludes that the licensee provided the information required by their TSs. In addition, the staff concludes that there are no technical issues that warrant followup action 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.

Principal Contributor: Ken Karwoski

Date: January 17, 2006