

VIRGINIA ELECTRIC AND POWER COMPANY  
RICHMOND, VIRGINIA 23261

February 28, 2000

United States Nuclear Regulatory Commission  
Attention: Document Control Desk  
Washington, DC 20555-0001

Serial No.: 00-011  
NLOS/MM  
Docket Nos.: 50-338  
50-339  
License Nos.: NPF-4  
NPF-7

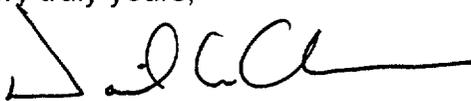
Gentlemen:

**VIRGINIA ELECTRIC AND POWER COMPANY**  
**NORTH ANNA POWER STATION UNITS 1 AND 2**  
**ANNUAL STEAM GENERATOR INSERVICE INSPECTION SUMMARY REPORT**

Pursuant to Technical Specification 6.9.1.5.b for North Anna Power Station Units 1 and 2, Virginia Electric and Power Company is submitting the results of the steam generator tube inservice inspections performed during 1999. The steam generator tube inspections conducted on Unit 2 during the fall 1999 refueling outage are included in the attachment. There were no inspections performed on Unit 1 steam generators in 1999.

This letter does not establish any new commitments. Should you have any questions or require additional information, please contact us.

Very truly yours,



David A. Christian  
Vice President - Nuclear Operations

Attachment

cc: U. S. Nuclear Regulatory Commission  
Region II  
Atlanta Federal Center  
61 Forsyth Street, SW, Suite 23 T85  
Atlanta, GA 30303-3415

Mr. M. J. Morgan  
NRC Senior Resident Inspector  
North Anna Power Station

A047

**Virginia Power  
North Anna Unit 2 1999  
Annual Steam Generator Report**

Station	Unit	Outage Date	Generator Examined			Date of Report
North Anna	2	September, 1999		B		12/28/99

Scope of Inspection					
SG	Inspection Program	Planned	Inspected	Inspection Method	Extent
B	Hot Leg	1796	1796	Bobbin	TEC - TEH
B	Row 1 U-Bend RPC	20	20	3-Coil RPC	7H - 7C
B	TTSH RPC	719	719	3-Coil RPC	TSH +/- 3"

Indications of Imperfections Detected							
SG	NDE Method	Row	Column	Indication Code	Location	Active Yes/No	Measured Wall Penetration
B	N/A	N/A	N/A	N/A	NONE	No	N/A

Tube Plugging		
SG	Reason/Mechanism	Tubes Plugged
B	NONE	0
<b>Total Tubes Plugged</b>		<b>0</b>

Repair Attributions				
SG	Row	Column	Reason/Mechanism	Repair Method
B	N/A	N/A	NONE	N/A

Plugging/Repair Record					
SG	Tubes Plugged	Tubes Repaired (Not Plugged)	Percent Plugged	Percent Repaired (Not Plugged)	Percent Plugged or Repaired
A	0	N/A	0	N/A	0
B	0	N/A	0	N/A	0
C	0	N/A	0	N/A	0

## TUBE INTEGRITY ASSESSMENT

The past operating interval between inspections of the "B" steam generator was 31.4 EFPM. The projected next operating interval for the "B" steam generator is approximately 47.8 EFPM. No conditions were identified during the current completed inspection efforts that would impact the structural and leakage performance of the Unit 2 steam generators through the next planned operating interval, thereby satisfying the operational assessment. In accordance with our Program Plan logic for general and focused tubing inspections on one steam generator per refueling cycle, the findings of this inspection are consistent with maintaining this planned frequency of inspection.

The only degradation that is expected over the long term is minor wear at anti-vibration bar (AVB) locations. AVB wear is reported during bobbin testing. Typically, indications begin to be reported at approximately 10% through wall and, in general, are slow growing. Industry experience, to date, on similar design steam generators have reported no appreciable AVB wear. Typical growth of 2% to 5% per cycle through-wall wear has been experienced at Surry. The performance of the North Anna generators is expected to be at least equal that of Surry since the close gap AVB tolerance techniques were used during manufacturing.

The following evaluation was performed to evaluate a potential existing 10% through wall AVB wear condition relative to tube integrity requirements at the end of the next planned operating interval (3 Cycles - 47.8 EFPM) for the "B" steam generator. The wear projection is based on 5%/Cycle growth rate and a total NDE uncertainty of 14.6%.

$$\% \text{ TW (2003)} = 10\% \text{ TW (1999)} + [(5\% \text{ Growth/cycle}) \times 3 \text{ Cycles}] + 14.6\%$$

$$\% \text{ TW (2003)} = 39.6\%$$

No structural integrity concern is identified for the planned operating interval of North Anna Unit 2 "B" steam generators.

Although there are no findings indicative of a concern, sensitivity to primary to secondary leakage events will continue with conservatively based monitoring procedures. Similar chemistry controls are expected to be maintained throughout the next cycle. Any chemistry excursion or significant change to a treatment program will be evaluated on a case-by-case basis to determine its impact on the planned inspection cycle and scope. Due to small amounts of sludge being removed and continued low corrosion product transport, sludge lancing or other enhanced cleaning methods will continue to be planned on an every other outage basis unless the laboratory analysis of scale samples and subsequent review of results would indicate otherwise.

Based on the results of this eddy current inspection, past inspections, and current chemistry operating practices, "B" steam generator will be expected to safely operate for at least three cycles before the next planned tube inspection. If other steam generator tube issues are subsequently identified on either of the other North Anna steam generators during ensuing inspections or if other relevant industry findings are identified during the inspection of similar model steam generators, the planned inspection intervals will be reviewed in accordance with our Program Plan requirements. Results

to date also indicate that the currently planned tube inspection interval for "A" and "C" steam generators can remain as presently planned. The "C" steam generator is currently scheduled for inspection during the spring of 2001 and "A" for the fall of 2002. These inspections will complete 100% bobbin re-inspection of all tubes since baseline.

Results of secondary side inspections continue to demonstrate reliable operation. Continuing diligence in chemistry and FME control will support long term performance. Evaluation and monitoring will continue as planned in accordance with our Program Plan. Continuing awareness of any related industry issues will be considered when planning future inspections.

### **Summary and Conclusion**

Overall condition assessments have been delineated in the North Anna Steam Generator Monitoring and Inspection Program Plan. Consistent with the NEI 97-06 requirements, a pre-outage assessment was performed to identify any relevant or potential degradation mechanisms to be considered for the North Anna Unit 2 steam generators and to identify the appropriate eddy current inspection scope and probe capabilities.

Performance criteria are established in this document in three areas:

- Tubing Structural Integrity
- Operational Leakage
- Projected Accident Leakage

The inspection performed on the "B" steam generator was consistent with the Program Plan and the results formed the basis of the condition monitoring and operational assessment performed for this outage.

Condition monitoring and operational assessment of the steam generator tube bundles are performed to verify that the condition of the tubes, as reflected in the inspection results, is in consistent with plant licensing basis. Defects detected are evaluated to confirm that the Reg. Guide 1.121 margins against leakage and burst were not exceeded at the end of this operating cycle using the bounding assessment method. The results of the condition monitoring evaluation are used as a basis for an operational assessment, which demonstrates prospectively that the anticipated performance of the steam generators will likewise not exceed the Reg. Guide 1.121 margins against leakage and tube burst during the ensuing operating period.

No tube degradation was identified during the inspection program. Hence, acceptable tube integrity at the end of the current operating cycle is demonstrated and condition monitoring and operational assessment requirements on burst pressure and accident condition leak rates are satisfied. This condition monitoring and operational assessment for tube integrity follows the requirements of the EPRI GC-107621. "Steam Generator Integrity Assessment Guidelines," draft dated December 1998.

to date also indicate that the currently planned tube inspection interval for "A" and "C" steam generators can remain as presently planned. The "C" steam generator is currently scheduled for inspection during the spring of 2001 and "A" for the fall of 2002. These inspections will complete 100% bobbin re-inspection of all tubes since baseline.

Results of secondary side inspections continue to demonstrate reliable operation. Continuing diligence in chemistry and FME control will support long term performance. Evaluation and monitoring will continue as planned in accordance with our Program Plan. Continuing awareness of any related industry issues will be considered when planning future inspections.

### **Summary and Conclusion**

Overall condition assessments have been delineated in the North Anna Steam Generator Monitoring and Inspection Program Plan. Consistent with the NEI 97-06 requirements, a pre-outage assessment was performed to identify any relevant or potential degradation mechanisms to be considered for the North Anna Unit 2 steam generators and to identify the appropriate eddy current inspection scope and probe capabilities.

Performance criteria are established in this document in three areas:

- Tubing Structural Integrity
- Operational Leakage
- Projected Accident Leakage

The inspection performed on the "B" steam generator was consistent with the Program Plan and the results formed the basis of the condition monitoring and operational assessment performed for this outage.

Condition monitoring and operational assessment of the steam generator tube bundles are performed to verify that the condition of the tubes, as reflected in the inspection results, is in consistent with plant licensing basis. Defects detected are evaluated to confirm that the Reg. Guide 1.121 margins against leakage and burst were not exceeded at the end of this operating cycle using the bounding assessment method. The results of the condition monitoring evaluation are used as a basis for an operational assessment, which demonstrates prospectively that the anticipated performance of the steam generators will likewise not exceed the Reg. Guide 1.121 margins against leakage and tube burst during the ensuing operating period.

No tube degradation was identified during the inspection program. Hence, acceptable tube integrity at the end of the current operating cycle is demonstrated and condition monitoring and operational assessment requirements on burst pressure and accident condition leak rates are satisfied. This condition monitoring and operational assessment for tube integrity follows the requirements of the EPRI GC-107621(draft), "Steam Generator Integrity Assessment Guidelines," dated December 1998.

The condition of the North Anna Unit 2 steam generators, as indicated by the results of the condition monitoring evaluation, satisfy the requirements of Reg. Guide 1.121 with respect to structural and leakage integrity margin. The completed operating interval, i.e., time between the last steam generator "B " inspection, was approximately 31.4 EFPM. The planned operating interval before the next inspection of Steam Generator "B" is 47.8 EFPM. With no tube degradation being reported following the replacement EOC3 operation, no known condition exists that would exceed structural and leakage margin requirements before the end of next planned operating interval for steam generator "B." Thus, the operational assessment requirements are satisfied for the "B" steam generator

**Corrective Actions Planned**

None

**Evaluation (If SG condition does not meet previous cycle operational assessment)**

Not Applicable

The condition of the North Anna Unit 2 steam generators, as indicated by the results of the condition monitoring evaluation, satisfy the requirements of Reg. Guide 1.121 with respect to structural and leakage integrity margin. The completed operating interval, i.e., time between the last steam generator "B " inspection, was approximately 31.4 EFPM. The planned operating interval before the next inspection of Steam Generator "B" is 47.8 EFPM. With no tube degradation being reported following the replacement EOC3 operation, no known condition exists that would exceed structural and leakage margin requirements before the end of next planned operating interval for steam generator "B." Thus, the operational assessment requirements are satisfied for the "B" steam generator

### **Corrective Actions Planned**

None

### **Evaluation (If SG condition does not meet previous cycle operational assessment)**

Not Applicable