VIRGINIA ELECTRIC AND POWER COMPANY
RICHMOND, VIRGINIA 23261
February 26, 2003

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

Serial No.: 03-072
NLOS/MM
Docket Nos.: 50-280/281
License Nos.: DPR-32/37

Gentlemen:

VIRGINIA ELECTRIC AND POWER COMPANY (DOMINION)
SURRY POWER STATION UNITS 1 AND 2
ANNUAL STEAM GENERATOR INSERVICE INSPECTION SUMMARY REPORT

Pursuant to Technical Specification 4.19.F.b for Surry Power Station Units 1 and 2, Virginia Electric and Power Company (Dominion) is submitting the results of the steam generator tube inservice inspections performed during 2002. The steam generator tube inspections conducted on Unit 2 during the Spring 2002 refueling outage are included in the Attachment. There were no steam generator tube inspections conducted on Unit 1 during 2002.

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

Very truly yours,

C. L. Funderburk
Director – Nuclear Licensing & Operations Support

Attachment

cc: U. S. Nuclear Regulatory Commission
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Sam Nunn Atlanta Federal Center
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Mr. R. A. Musser
NRC Senior Resident Inspector
Surry Power Station

A047

Dominion Generation
Surry Unit 2
2002 Annual Steam Generator Report

Dominion Generation
Surry Unit 2
Annual Steam Generator Report

Station	Unit	Outage Date	Generator Examined			Date of Report
Surry	2	March, 2002	A			

SG Design Information						
SG Model	**TSP Type.**	**TSP Mat'l**	**# TSP**	**Baffle Mat'l**	**AVB Mat'l**	**# AVB**
51F	Quatrefoil	Type 405 SS	7	Type 405 SS	ChromePlated IN-600	2
# Tubes	**Tube Dia.**	**Tube Mat'l**	**Tube Pitch**	**Tube Tks**	**Expansion**	**Heat X-fer Area**
3342	0.875"	Alloy 600TT	1.281"	0.050"	Full Hydraulic	51,500 sq. ft.

Scope of Inspection					
SG	**Inspection Program**	**Planned**	**Inspected**	**Inspection Method**	**Extent**
A	Bobbin	3327	3327	Bobbin	TSH-TSC
A	Row 1 U-Bend RC	92	92	+Point RC	7H – 7C
A	TTS Hot leg RC	667	667	+ Point RC	TSH +/- 3"
A	TTS Cold Leg RC	200	200	+Point RC	TSC +/- 1"
A	Special Interest RC	14	14	+Point RC	Various

Indications of Imperfections Detected							
SG	**NDE Method**	**Row**	**Column**	**Indication Code**	**Location**	**Active Yes/No**	**Measured Wall Penetration**
A	Bobbin	26	9	12%	AV4	No	12%
A	Bobbin	31	13	10%	AV4	No	10%
A	Bobbin	11	24	23%	AV2 + 1.64	No	23%
A	Bobbin	40	49	12%	AV1	No	12%
A	Bobbin	40	49	12%	AV3	No	12%
A	Bobbin	25	57	17%	AV2	No	17%
A	Bobbin	36	62	24%	AV2	No	24%
A	Bobbin	36	62	12%	AV3	No	12%
A	Bobbin	36	62	24%	AV4	No	24%
A	Bobbin	40	65	20%	AV2	No	20%
A	Bobbin	29	70	12%	AV2	No	12%
A	Bobbin	38	72	24%	AV4	No	24%
A	Bobbin	38	74	21%	AV4	No	21%
A	Bobbin	26	86	23%	AV3	No	23%
A	+ PT RC	17	16	23%	TSH	No	23%
A	+PT RC	18	16	18%	TSH	No	18%

Tube Plugging		
SG	**Reason/Mechanism**	**Tubes Plugged**
A	AVB Wear	1
Total Tubes Plugged		1

Repair Attributions				
SG	**Row**	**Column**	**Reason/Mechanism**	**Repair Method**
A	11	24	AVB Wear	Plug

Plugging/Repair Record					
SG	Tubes Plugged	Tubes Repaired (Not Plugged)	Percent Plugged	Percent Repaired (Not Plugged)	Percent Plugged or Repaired
A	16	0	0.48	0	0 48
B	7	0	0.21	0	0.21
C	17	0	0 51	0	0.51

TUBE INTEGRITY ASSESSMENT

1.0 Summary

Overall condition assessments are set forth in the Surry Steam Generator Monitoring and Inspection Program Plan, SPS-SGMIPP-001, Rev. 3 (Program Plan). The assessments provided in the Program Plan are consistent with the requirements of the Nuclear Energy Institute guideline NEI 97-06. A Pre-Outage Assessment was performed to identify any potentially relevant conditions that may be applicable to Surry Unit 2. The eddy current inspection scope, probes to be used during the inspection, and detection and sizing information for the anticipated mechanisms were also determined during the assessment.

Performance Criteria are established in three areas:

- Structural Integrity – Margin of 3.0 against burst under normal steady state power operation and a margin of 1.4 against burst under the most limiting design basis accident.

- Operational Leakage – RCS operational primary-to-secondary leakage through one steam generator shall not exceed 150 gpd.

- Accident Induced Leakage – Leakage shall not exceed 1 gpm per steam generator during Main Steam Line Break (MSLB).

The inspection performed on "A" steam generator was consistent with the Program Plan. The results from the current inspection and previous inspections were considered in the condition monitoring and operational assessment. The operating time on this generator since the last inspection was 31.4 EFPM. The cumulative operating time on the Surry Unit 2 replacement steam generators is approximately 16.5 EFPY.

A condition monitoring evaluation of the steam generator tube bundles was performed to verify that the condition of the tubes based upon the inspection results complies with the plant licensing basis. The evaluation was based upon a bounding structural limit calculation. The results of the condition monitoring evaluation are used as a basis for the operational assessment. The operational assessment demonstrates prospectively that the anticipated performance of the steam generators will not exceed the performance criteria margins against leakage and tube burst during the next operating period. This report documents the condition monitoring and operational assessment based upon the inspection results from the Surry Unit 2 "A" steam generator inspection that was performed in March 2002. The assessments that were performed conform to the March 2000 EPRI Steam Generator Integrity Assessment Guidelines, Revision 1 (TR-107621-R1) and the requirements of NEI 97-06.

The condition of the Surry Unit 2 steam generators as indicated by the results of this inspection continues to satisfy the safety margin requirements with respect to structural and leakage integrity. Evaluations of the indications identified on "A" steam generator confirm

that acceptable tube integrity will be maintained through the end of the current operating cycle (Replacement EOC 13).

The results of the inspection performed on "A" steam generator were consistent with prior operational assessments and did not require expansion of the inspection to other steam generators. The only operative degradation mechanism identified during the inspection of "A" steam generator was tube wear at the AVB contact points. The AVB wear rates were consistent with past Unit 2 results. Projection of AVB wear indications for the next planned operating interval for "A" steam generator (i.e. ~ 50 EFPM) indicates that no conditions that exceed the structural and leakage margin requirements will occur before the end of that next planned operating interval. Thus, the operational assessment requirements are satisfied.

2.0 Surry Unit 2 – Summary of Evaluated Degradation Mechanisms, Inspection Methods, and Plan

Table 1 provides a summary of the Surry Unit 2 tube plugging attributes following the REOC – 13 inspection of "A" steam generator. A total of forty (40) tubes have been plugged in Surry Unit 2. Mechanical tube wear at AVB contact points (16 tubes) and pitting (12 tubes) are the main degradation modes. Both modes of degradation are classified as "inactive" as defined by the EPRI Rev. 5 Examination Guidelines for all steam generators. No corrosion related cracking degradation has been identified in Surry Unit 2.

There are currently sixteen (16) tubes that have been plugged in "A" steam generator. Eleven (11) tubes were plugged as a result of cold leg pitting. One (1) tube was plugged due to tube wear at AVB contact points (Reference Table 1). Nine (9) tubes with wear at AVB contact points were left in service following the 1999 inspection.

The inspection that was planned and implemented for "A" steam generator is outlined below:

- 100% full length bobbin inspection of 3327 tubes which equates to a 33% sample of the total tube population in all three (3) steam generators,

- Focused rotating probe (Plus Point) inspection at the hot leg top-of-tubesheet of 667 tubes which is a 20% sample of the "A" steam generator. At least 60% of the tubes in the Critical Area were inspected.

- Focused rotating probe (Plus Point) inspection of a 200 tube sample of cold leg top-of-tubesheet transitions concentrated in low flow area and "sludge pile" periphery.

- 100 % single coil Plus Point rotating probe inspection of Row 1 U-bend inspection (92 open tubes) which equates to a 33% sample of Row 1 U-bends in all three steam generators, and

- Rotating probe confirmation, as necessary, of bobbin indications per Surry Site Specific Analysis Guidelines.

Table 1

SURRY POWER STATION UNIT #2
PLUGGING ATTRIBUTES

DATE	Preservice			Dec-81			Jun-83			Apr-85			Jun-86			Oct-86			Oct-88			Mar-91			Mar-93		
EFPY	0.0			1.1			2.4			3.6			4.5			4.7			5.9			7.2			8.7		
S/G	A	B	C	A	B	C	A	B	C	A	B	C	A	B	C	A	B	C	A	B	C	A	B	C	A	B	C
AVB																										2	
Freespan																											
Tube Pulls																											
Foreign Object													1														
Pitting																											
Anomalies																											
Other	1		1																								
Sub-Total	1	0	1	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	2	0
TOTAL	2			0			0			0			1			0			0			0			2		

DATE	Feb-95			Apr-96			Oct-97			Apr-99			Oct-00			Apr-02			Total per S/G		
EFPY	10.2			11.2			12.5			13.9			15.2			16.6					
S/G	A	B	C	A	B	C	A	B	C	A	B	C	A	B	C	A	B	C	A	B	C
AVB						3		3							7	1			1	5	10
Freespan																			0	0	0
Tube Pulls																			0	0	0
Foreign Object																			1	0	0
Pitting	4									7		1							11	0	1
Anomalies						3													0	0	3
Other	1					2		2		1									3	2	3
Sub-Total	5	0	0	0	0	8	0	5	0	8	0	1	0	0	7	1	0	0	16	7	17
TOTAL	5			8			5			9			7			1			40		

Total tubes plugged by category

- **16 AVB**
- **0 Freespan**
- **0 Tube Pulls**
- **1 Foreign Objects**
- **12 Pitting**
- **3 Anomalies**
- **8 Other**

3.0 Condition Monitoring Assessment – Tube Integrity Evaluation

The condition monitoring assessment is an evaluation of the past operating cycle (REOC 13) with respect to the structural and leakage integrity margin as determined by the current inspection results. The condition of the Surry Unit 2 steam generators, as indicated by the results of the current inspection of "A" steam generator and past inspections indicate that the structural and leakage integrity margins were met over the last operating period.

3.1 Primary Side Inspection

No conditions that would indicate the presence of corrosion degradation were noted during the eddy current inspection of "A" steam generator. The inspection results are consistent with prior findings and no new conditions were identified.

3.1.1 Bobbin Program

AVB Wear Indications

Fourteen (14) anti-vibration bar (AVB) intersections, in eleven (11) tubes, were identified in "A" steam generator with tube wear. The maximum wear depth found was 24%. Tube integrity for the last operating interval was clearly not challenged by any of the wear indications observed. The maximum indication depths reported are below the tube repair limit and well below the structural limit. The average growth rate per cycle since the last inspection for AVB wear locations was 0.8 % with the maximum growth for any single indication being 5.0%. The maximum growth rate occurred on tube R11 C24 which was plugged. The growth rate for AVB wear that was observed during this inspection is consistent with the values that have been observed in prior inspections.

All of the wear indications exhibited minimal growth since 1999, except for the indication seen on R11 C24. This wear indication is not at a typical location since it was located between AV2 and AV3. The Surry Unit 1 and 2 steam generators contain 2 sets of V-shaped bars that are designed to extend into the bundle to the centerline of Row 8 or Row 11 tubes. The wear seen in this tube is related to the V-shaped portion of the AVB. Re-analysis of the 1999 bobbin data for R11 C24 indicated that a 13% wear indication existed at this location. Two other wear indications of this type have been previously identified in the Surry Unit 1 generators (R11 C38 - Unit 1 "C" and R10 C44 - Unit 1 "A"). The wear indication in Unit 1 at the V-shaped portion of the AVB bar in R11 C38 was the first indication of this nature that was detected in the Surry generators. This indication was examined with a rotating coil (RC) probe and confirmed to be a volumetric, wear-type indication. These kinds of indications can be easily identified based upon the bobbin signature therefore, the subsequent indications were not further investigated with an RC probe. Based on the information gained from the three (3) indications identified to date, this type of wear appears to occur later in operating time and exhibit growth rates toward the higher end of the bounding range as compared to AVB wear typically observed at Surry.

Table 2 provides a summary of the AVB wear indications reported during this inspection with growth rates determined from prior inspection data.

Table 2 - Summary of AVB Reported Indications Identified in "A" Steam Generator (ETSS #96004.1 Rev. 7 Utilized For Sizing)

Row	Column	Inspection Date	Volts	% TWD	Location	Wear Rate (%TW/Cycle)
26	9	03/2002	0.27	12%	AV4	0
		04/1999	0.30	14%	AV4	
31	13	03/2002	0.19	10%	AV4	0
		04/1999	0.23	12%	AV4	
11	24	03/2002	0.81	23%	AV2 + 1.64"	5.0
		04/1999	0.27	13% (Note 1)	AV2 + 1.64"	
40	49	03/2002	0.25 0.26	12% 12%	AV1 AV3	0 0
		04/1999	0.30 0.27	13% 12%	AV1 AV3	
25	57	03/2002	0.49	17%	AV2	0.5
		04/1999	0.41	16%	AV2	
		02/1995	0 65	16%	AV2	
36	62	03/2002	0 88 0.25 0.83	24% 12% 24%	AV2 AV3 AV4	1.5 1.5 2.5
		04/1999	0.66 0 57	21% 9% (Note 1) 19%	AV2 AV3 AV4	
		02/1995	0.41	12%	AV2	
40	65	03/2002	0.68	20%	AV2	0
		04/1999	0.80	23%	AV2	
		02/1995	0.86	18%	AV2	
29	70	03/2002	0.26	12%	AV2	0
		04/1999	0.27	13%	AV2	
38	72	03/2002	0.95	24%	AV4	0
		04/1999	0.98	26%	AV4	
		02/1995	0.86	17%	AV4	
38	74	03/2002	0.72	21%	AV4	0.5
		04/1999		20% (Note 1)	AV4	
		02/1995		12% (Note 2)	AV4	
26	86	03/2002	0.84	23%	AV3	0
		04/1999	0.88	24%	AV3	
		02/1995	1.01	19%	AV3	

Note 1: %TWD based on re-analysis of the 1999 eddy current data
Note 2: %TWD based on re-analysis of the 1995 eddy current data

Dent (DNT) Signals

DNT signals continue to be monitored for potential degradation. Four hundred and twelve (412) dent signals were reported with about 80% of the total being between 2 and 4 volts. Except for a limited number of dents at the upper supports in Unit 1 "C" and Unit 2 "C" steam generators, nearly all of the dents in the Surry generators were induced during manufacture. The dents are low-level indications that result from handling of the tubes prior to and during installation into the generators. All of the dent indications had been previously identified and base-lined; therefore, only two of the dents were examined with rotating Plus Point inspection. R1 C14 contained a 42.8 volt DNT call at 7H + 3.95" and R10 C53 contained a 20.8 volt DNT call at TSH + 1.05". Both of these dents were examined with a rotating Plus Point probe and no degradation was noted.

Recent inspection results from the Unit 1 and 2 "C" steam generators have shown an apparent pattern of small voltage dents in the peripheral tubes at the 6th and 7th tube support plates. These dents are believed to have resulted from the quatrefoil contact points interacting with the outside of the tubes. Evaluation of the data for Unit 2 "A" steam generator showed 43 tubes with dent calls at 7th hot leg support and 67 tubes with dent calls at 7th cold leg support. All calls were traced back to history and were not exhibiting "growth" as noted in the "C" steam generators. The dent calls being reported at the 7th support plate are predominantly located at Rows 10 through 30 and Columns 80 through 94 in "C" steam generators of both units. A clear correlation between denting and location does not exist for "A" steam generator. The potential progression of low-level denting at the upper supports in the Unit 1 and 2 steam generators will continue to be monitored during the course of routine inspections.

Other Signals

All other signals reported as a result of the bobbin program resulted from low voltage signals associated with manufacturing buff marks (MBMs) or other manufacturing anomalies. The signals associated with these categories do not represent in-service degradation. Nevertheless, these signals are being monitored over time for any change from the initial condition.

3.1.2 Focused Rotating Coil Programs

Cold Leg Top-of-Tubesheet

To address the potential that pitting may exist directly in the transition at the top of the tube-sheet in the cold leg of "A" steam generator, a 200 tube sample was examined with the rotating Plus Point probe. Steam generator "A" was selected for this inspection because the greatest number of PIT indications (11) had been observed in this generator during prior inspections. No evidence of pitting or other corrosion degradation was detected as a result of the Plus Point inspection program.

Hot Leg Top-of-Tubesheet

Plus Point inspection of the top of the tube-sheet on the hot leg was performed on 668 tubes. The original program identified 667 tubes for inspection however one (1) additional tube, R10 C53, was identified with a 20.8 volt DNT at this location during the full length bobbin program. This DNT indication was added to the inspection program.

During the Plus Point inspection program a small volumetric-type indication located at the expansion transition was identified at location R17 C16. The indication showed no crack-like characteristics and was sized at a depth of 23% using a qualified Plus Point sizing technique. Eight (8) tubes surrounding R17 C16 were subsequently inspected to determine the presence of any foreign object. As a result of that inspection, a volumetric indication was also found on an adjacent tube (R18 C16). No other indications were noted. The indication in R18 C16 was very similar to the indication found in R17 C16 and was determined to have a depth of 18%. Additional inspections were conducted to "box-in" the indication in R18 C16. No additional indications were noted. Based on the results of the additional rotating coil inspection, the indications seen in R17 C16 and R18 C16 were most likely caused by a foreign object. No foreign object was observed by the eddy current inspection at these locations. Locations R17 C16 and R18 C16, and the adjacent columns, were inspected during the secondary side in-bundle visual inspection of "A" steam generator. No foreign objects were found in these areas, although assorted small foreign objects were noted in other areas of the steam generator. These foreign objects were removed during subsequent retrieval activities. Due to the shallow depths of these indications and the fact that no foreign objects could be located in the area, both tubes were left in service.

Row 1 U-bends

All of the Row 1 U-bends (92 open tubes) were inspected with a 0.680 diameter single coil mid-range Plus Point probe. No indications were noted. Signal-to-noise measurements were taken for a 20 tube sample during this inspection and the results compared with the EPRI qualification data used in developing ETSS #96511 at both 300 kHz and 400 kHz. The average values obtained were within acceptable limits for noise; therefore, no tubes required testing with a high frequency Plus Point probe.

During the entire examination process, the Dominion NDE Level III performed random data checks as well as a final verification of the planned versus completed inspection program. No issues were identified.

3.2 Operational Leakage

Routine primary-to-secondary leak monitoring is conducted in accordance with station procedure 0-HSP-LKRATE-001. During the past operating cycle, no measurable primary-to-secondary leakage was observed during plant operation. Operations procedure 0-OSP-RC-002, "Steam Generator Primary-to-Secondary Leakage Monitoring", provides the appropriate actions to avoid a through-wall steam generator tube defect from propagating to a tube rupture by initiating appropriate increased monitoring and plant actions at levels less than 150 GPD.

3.3 Projected Accident Leakage

Based on the fact that no through-wall indications or indications approaching the structural limit have been reported in the Surry Unit 2 steam generators, no primary-to-secondary leakage would be expected under accident induced loads.

4.0 Operational Assessment: Tube Integrity and Leakage

The following sections summarize the growth rate evaluation and the NDE sizing uncertainty evaluations performed to support the Operational Assessment for the only degradation mechanism observed, i.e., AVB wear.

The past operating interval between inspections of the "A" steam generator was 31.4 EFPM. The projected operating interval until the next inspection of S/G "A" is approximately 50 EFPM.

The results of the REOC-13 eddy current inspection were consistent with prior inspection results. The data gathered to date indicates that the AVB wear in the Surry Unit 2 steam generators is "inactive" as defined by the EPRI Rev. 5 Examination Guideline. A total of 11 tubes (14 AVB locations) that exhibited mechanical wear were identified in "A" steam generator by this inspection. No other operative damage mechanisms have been observed, so no other growth projections were considered.

4.1 AVB Wear Depth Projections

This evaluation addressed all AVB wear conditions relative to the tube integrity requirements at the end of the next operating interval (3 Cycles – 50.7 EFPM) for "A" steam generator. The AVB indications identified during the REOC – 13 inspection were included in the recently completed statistical analysis of the AVB data for both Surry Unit 1 and 2. An updated summary for Surry Unit 2 is provided in Table 3. Based on the limited number of wear sites in "A" and "B" S/G's, the AVB growth rate used for the operational assessment projection was based on the statistical mean of the combined wear rate for all three Unit 2 steam generators. The AVB wear rate used in the operational assessment was 5.32%/Cycle based on a 95/50 confidence limit.

The technique uncertainty used for the operational assessment was obtained from ETSS #96004.1 (Rev 7). The analyst uncertainty for wear measurements was obtained from the "Capabilities of Eddy Current Data Analysts to Detect and Characterize Defects in SG Tubes" D. H. Harris, 15th Steam Generator NDE Workshop, Long Beach, CA, July 1996. The total NDE uncertainty was 9.08% and the adjusted % through-wall (TW) depth was based on the equation $y = 0.97x + 3.49$. Table 4 lists the projected %TW at REOC 16 (fall, 2006) for all AVB wear sites left in service for the "A" steam generator. All indications are projected to be below the structural limit of 60% TW.

4.2 Operational Leakage

There are no findings of concern relative to primary-to-secondary leakage. Primary-to-secondary leakage events will continue to be monitored based upon conservative monitoring procedures. Industry recommended primary-to-secondary leakage values as referenced in the NEI 97-06 S/G Program Guideline Document have been implemented at Surry.

4.3 Projected Accident Leakage

The inspection findings indicate that no leakage should occur during the next operating cycle for "A" steam generator.

4.4 Conclusion

Based on the results of the current and past eddy current inspections, "A" steam generator meets the performance criteria to operate for at least three cycles before the next planned tubing inspection. If other issues are identified on other Surry steam generators in future inspections, or other relevant industry findings are noted during the inspection of similar model steam generators, a review of planned inspection intervals will be conducted. The results of the REOC-13 inspection of "A" steam generator confirm that the current Operational Assessment for Surry Unit 2 "C" steam generator is valid. No change to the inspection schedule for "C" steam generator (Spring of 2005) is necessary. For "B" steam generator, no conditions were identified which would compromise the conservative structural performance criteria; therefore, no change to the inspection schedule for "B" steam generator (Fall of 2003) is required.

Chemistry controls that are similar to those currently in place at Surry are expected to be in place throughout the next cycle. Chemistry excursions or significant changes to treatment programs will be evaluated on a case-by-case basis relative to the impact on planned inspection cycles and scopes. Due the low amounts of sludge being removed from the generators and the continued low corrosion product transport, sludge lancing or other enhanced methods will continue to be planned on an every other outage basis. Laboratory analysis of scale samples and subsequent review of results will be continued and evaluated with respect to the frequency of sludge lancing. Supplemental inspections and enhanced cleaning decisions will be based upon an evaluation of scale conditioning processes and associated removal techniques.

Table 3 – Surry Unit 2 AVB Statistical Summary

a) Steam Generator 'A" (Updated 3/31/02)

Number of Tubes with AVB Wear Indications	11
Number of AVB Wear Indications	14
Average Wear Rate	1.35% TWD / Cycle
Number of Data Points	30
Standard Deviation	1.31% TWD / Cycle
90/50 Wear Rate = Mean + 1.28 x Standard Deviation	3.03%TWD / Cycle
95/50 Wear Rate = Mean + 1.65 x Standard Deviation	3.47% TWD / Cycle
Number of Tubes Plugged	1

b) Steam Generator "B"

Number of Tubes with AVB Wear Indications	6
Number of AVB Wear Indications	11
Average Wear Rate	4.187%TWD / Cycle
Number of Data Points	11
Standard Deviation	1.560% TWD / Cycle
90/50 Wear Rate = Mean + 1.28 x Standard Deviation	6.18% TWD / Cycle
95/50 Wear Rate = Mean + 1.65 x Standard Deviation	6.76% TWD / Cycle
Number of Tubes Plugged	5

c) Steam Generator "C"

Number of Tubes with AVB Wear Indications	43
Number of AVB Wear Indications	73
Average Wear Rate	2.751%TWD / Cycle
Number of Data Points	111
Standard Deviation	1.551% TWD / Cycle
90/50 Wear Rate = Mean + 1.28 x Standard Deviation	4.74% TWD / Cycle
95/50 Wear Rate = Mean + 1.65 x Standard Deviation	5.31% TWD / Cycle
Number of Tubes Plugged	10

d) Steam Generators "A", "B", and "C" Combined (Updated with the "A" Steam Generator Results - 3/31/02)

Number of Tubes with AVB Wear Indications	60
Number of AVB Wear Indications	98
Average Wear Rate	2.58%TWD / Cycle
Number of Data Points	152
Standard Deviation	1.66% TWD / Cycle
90/50 Wear Rate = Mean + 1.28 x Standard Deviation	4.70% TWD / Cycle
95/50 Wear Rate = Mean + 1.65 x Standard Deviation	5.32% TWD / Cycle
Number of Tubes Plugged	15

Table 4
Surry Unit 2 – Steam Generator "A"
Fall 2006 Projected AVB %TWD Bases on Spring 2002 Indications

- Number of Tubes With AVB Indications: 11 Tubes
- Number of AVB Wear Sites: 14 Intersections
- Number of New Indications Not Existing in 1999: None
- Average Wear Rate (%TWD / Cycle) for REOC 13: 0.8 % / Cycle
- 95%/50% Wear Rate Based on Historical Surry 2 S/G Wear Rates: 5.32 % / Cycle
  (Mean + 1.65 x Std. Dev.)
- Sizing Technique: ETSS # 96004.1 Rev. 7
- Adjusted NDE Parameter: y = 0.97x +3.49
- Technique Uncertainty @ 90/50CL: 5.74%
  (Based on Standard Error of Regression @90/50 CL)
- Analyst Uncertainty @ 90/50 CL : 7.04%
  (Value obtained from D H. Harris paper presented at the 1996 15th Steam Generator NDE Workshop titled "Capabilities of Eddy Current Analysts to Detect and Characterize Defects in Steam Generator Tubes)
- Total NDE Uncertainty @ 90/50CL: 9.08%
  (Square root of the sum of the squares of the individual uncertainties)
- Fall 2006 Projection % TWD: Adjusted 2002 % TWD + Total NDE Uncertainty [9.08%TWD] + Growth [5.32 % x 3 cycles]

Row	Column	Location	Spring 2002 (REOC 13) % TWD	Adjusted Spring 2002 %TWD	Fall 2006 (REOC 16) Projected %TWD
26	9	AV4	12%	15%	40%
31	13	AV4	10%	13%	38%
11	24	AV2 + 1.64"	23%	26%	51%
40	49	AV1 AV3	12% 12%	15% 15%	40% 40%
25	57	AV2	17%	20%	45%
36	62	AV2 AV3 AV4	24% 12% 24%	27% 15% 27%	52% 40% 52%
40	65	AV2	20%	23%	48%
29	70	AV2	12%	15%	40%
38	72	AV4	24%	27%	52%
38	74	AV4	21%	24%	49%
26	86	AV3	23%	26%	51%

Corrective Actions Planned
None

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

ATTACHMENTS:

Attachment 1 – Three Letter Codes
Attachment 2 – Series 51F Steam Generator - Sketches

ATTACHMENT 1

Three Letter Codes

General Codes

ANF - ANOMALY NOT FOUND -Indicates that a previously reported anomaly cannot be found within .50" of the location where the anomaly was previously called

ANR - ANOMALY NOT REPORTABLE - Indicates that a previously reported anomaly does not meet the present reporting criteria.

BDA - BAD DATA (retest) – Indicates that the data for the specified tube is not acceptable for analysis due to poor signal quality. The tube will be re-tested to the required extent

INF - INDICATION NOT FOUND - Indicates that a previously reported INDICATION has not been found in the data being analyzed or that a tube/signal is being re-tested for positive identification (PID) and no signal is present in the retest data

INR - INDICATION NOT REPORTABLE - Indication called in previous inspections that are still detectable but fall below current reporting criteria

NDD - NO DETECTABLE DISCONTINUITY – The recorded data has no signal responses meeting the criteria established in the Site Specific Analysis Guidelines for degradation, damage precursors or anomalies.

NT - NO TEST (re-test) – Indicates that the tube ROW, COLUMN was encoded on the tape; however, no inspection data was recorded for analysis

OBS - OBSTRUCTED – Blockage of a tube that prevents passage of a defined minimum size probe through the tube

PID - POSITIVE IDENTIFICATION - Verification of a signal at the same reported ROW/COL and at the same reported tube location.

PLG - PLUG – Indicates that the tube at the specified location has been plugged

PVN - PERMEABILITY VARIATION – Condition where the test coil impedance changes due to a change in the tubing material's inherent tendency to conduct magnetic flux lines.

PLP – POSSIBLE LOOSE PART – Indicates the possible presence of a loose part in the generator.

RST - RESTRICTED - Blockage of a tube that prevents passage of a probe beyond a specified location within the tube.

TIU - TUBE I.D. UNCERTAIN (re-test) - Indicates that the ROW and/or COL identifier for a given tube is in doubt

BOBBIN CODES

BLG - BULGE - An area along the tube where the diameter of the tube has been abruptly deformed in an outward direction as compared to the nominal tube diameter.

CUD - COPPER DEPOSIT - The presence of copper deposits on the outside of the tube.

DNT - DENT – An area along the tube where the diameter of the tube has been abruptly reduced compared to the nominal tube diameter.

LGV - LOCAL GEOMETRIC VARIATION - A local reduction in tube diameter usually associated with a localized change in conductivity of the tube. LGV signals are caused by dings introduced during manufacturing/installation process and do not represent a discernible wall loss. The signals must be verified by history review to be called with bobbin (See rotating probe DNG code).

MBM - MANUFACTURING BURNISH MARK – A tubing condition where localized tubing imperfections were removed by buffing and are detectable due to the effects of cold working and minor localized wall thinning. The signal must be verified by history review to be called with bobbin

MMB - MULTIPLE MANUFACTURING BUFF MARK - Multiple MBM signals in close proximity over a length of tube. The signals must be verified by history review to be called with bobbin.

NQI – NON-QUANTIFIABLE INDICATION – A bobbin signal requiring rotating coil examination for disposition

NQN – NON-QUANTIFIABLE NONDEGRADED – A bobbin signal which was formally classified as NQI but has been determined to be anomalous or of a type which does not represent degradation.

PDS - POSTIVE DRIFT SIGNAL –Long (several inches to several feet) drift signals evident on absolute channels caused by variations in tube concentricity associated with the pilgring process The signals may be located at random elevations and are generally only in one leg of the tube.

ROTATING PROBE CODES

DNG - DING – A localized inward displacement of the tube caused by a mechanical impact on the OD surface.

MAA - MULTIPLE AXIAL ANOMALY - Multiple axially oriented signals located at the top of the tube sheet that the rotating coil data shows to result from an anomalous condition in the tube.

MCA - MULTIPLE CIRCUMFERENTIALLY ORIENTED ANOMALY - Multiple circumferentially oriented signals located at the top of the tube sheet that the rotating coil data shows to result from an anomalous condition in the tube.

MAI - MULTIPLE AXIAL INDICATION - Multiple axially oriented signals that the rotating coil data shows to result from flaws in the tube.

MBM - MANUFACTURING BURNISH MARK – A tubing condition where localized tubing imperfections were removed by buffing and are detectable due to the effects of cold working and minor localized wall thinning.

MCI - MULTIPLE CIRCUMFERENTIALLY ORIENTED INDICATION - Multiple circumferentially oriented signals reported from rotating probe data that the rotating coil data shows to result from flaws in the tube

MMB - MULTIPLE MANUFACTURING BUFF MARK - Multiple MBM signals in close proximity over a length of tube.

NDF - NO DEGRADATION FOUND - For special interest exams. No visible signal found at the location of interest

NQN – NON-QUANTIFIABLE NONDEGRADED – A bobbin NQI signal which is determined to be anomalous or not to represent degradation

PIT - PIT – Localized attack on tubing resulting from non-uniform corrosion rates caused by the formation of local corrosion cells At NAPS, the condition refers to small volumetric indications with approximately the same axial and circumferential extent.

SAA - SINGLE AXIAL ANOMALY – A single axially oriented signal located at the top of the tube sheet that the rotating coil data shows to result from an anomalous condition in the tube.

SCA - SINGLE CIRCUMFERENTIALLY ORIENTED ANOMALY – A single circumferentially oriented signal located at the top of the tube sheet that the rotating coil data shows to result from an anomalous condition in the tube.

SAI - SINGLE AXIAL INDICATION – A single axially oriented signal that the rotating coil data shows to result from a flaw in the tube.

SCI - SINGLE CIRCUMFERENTIALLY ORIENTED INDICATION – A single circumferentially oriented signal that the rotating coil data shows to result from a flaw in the tube.

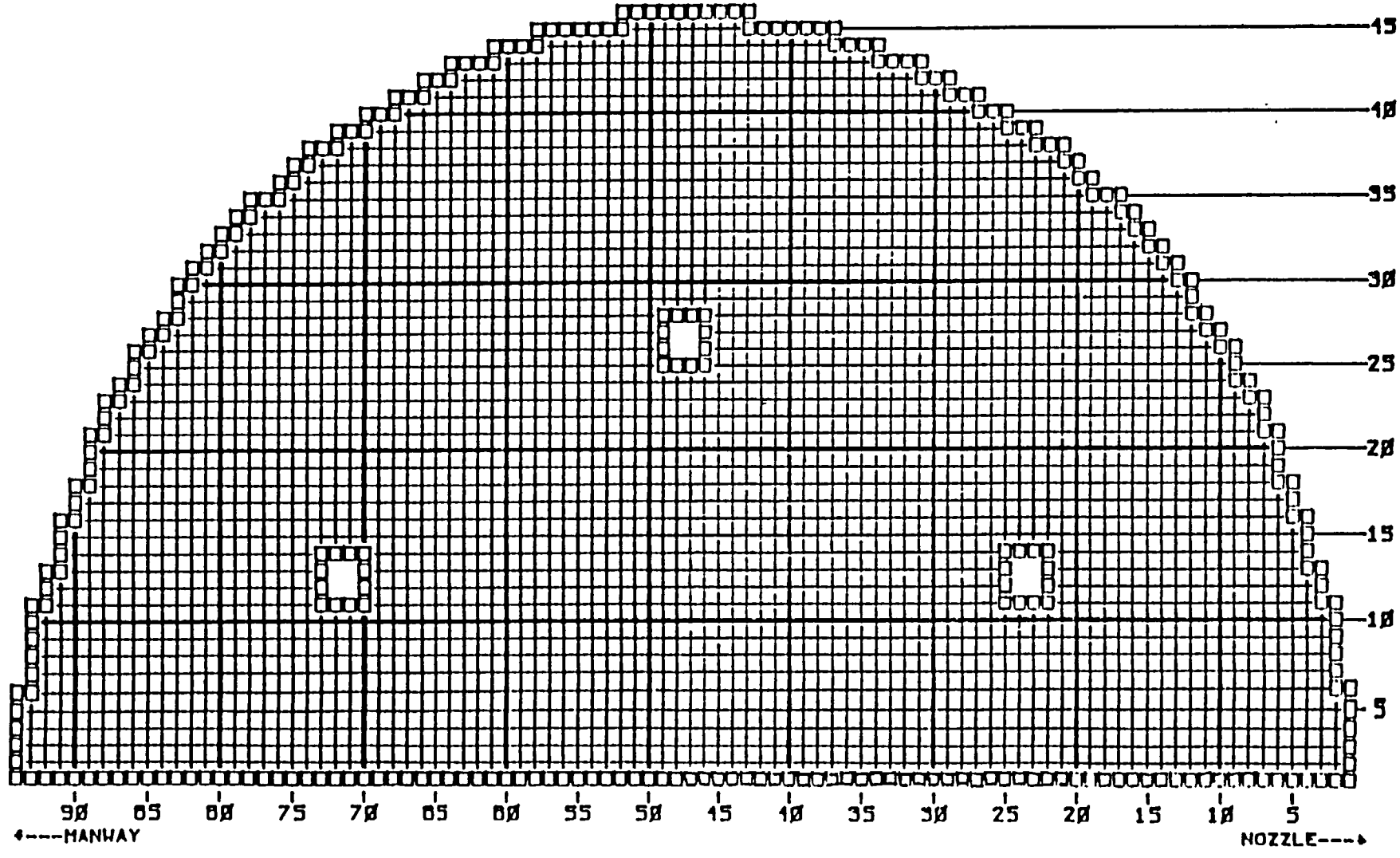
VOL – VOLUMETRIC – Indications of volumetric wall loss indicative of general localized thinning, wear or impingement.

SVI/MVI – SINGLE VOLUMETRIC INDICATION/MULTIPLE VOLUMETRIC INDICATIONS – Indications of volumetric wall loss indicative of general local inter-granular attack (IGA or IGA/SCC).

Series 51F Steam Generator Sketches

SERIES 51-F

MASTER



[REDACTED]