Entergy

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July 19, 2007

Re: Indian Point Unit 3
Docket No. 50-286
NL-07-083

Document Control Desk
U. S. Nuclear Regulatory Commission
Mail Stop O-P1-17
Washington, DC 20555-0001

Subject: **Steam Generator Tube Inspection Report for Spring 2007 Refueling Outage**

Reference: 1. NRC letter to Entergy dated August 18, 2004 regarding Evaluation of Steam Generator Tube Inspection Results for 2003. [ML042300253]

Dear Sir or Madam:

Entergy Nuclear Operations, Inc (Entergy) is providing in Attachment I the Steam Generator Tube Inspection Report required by Indian Point 3 Technical Specification 5.6.8. The subject inspection was performed from March 15th through March 19th, 2007 during the Spring 2007 Refueling Outage (3R14).

The scope of the inspection included all four steam generators, which are Westinghouse Model 44F with thermally treated Alloy 690 tubes. At the time of the inspection, the steam generators had approximately 137 effective full power months of operation since the first inservice inspection performed in 1990. All four steam generators were found to be in compliance with condition monitoring requirements. The previous inspection (Reference 1) was performed during the Spring 2003 Refueling Outage (3R12).

There are no new commitments identified in this submittal. If you have and questions or require additional information, please contact me at 914-734-6670.

Sincerely,

T. R. Jones
Licensing Manager
Indian Point Energy Center

cc: next page

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NRR

cc:

Mr. John P. Boska, Senior Project Manager, NRC NRR DORL
Mr. Samuel J. Collins, Regional Administrator, NRC Region I
NRC Resident Inspector's Office, Indian Point 3
Mr. Paul Eddy, NYS Department of Public Service

ATTACHMENT I TO NL-07-083

STEAM GENERATOR TUBE INSPECTION REPORT

FOR

INDIAN POINT 3 SPRING 2007 REFUELING OUTAGE (3R14)

ENTERGY NUCLEAR OPERATIONS, INC
INDIAN POINT NUCLEAR GENERATING UNIT 3
DOCKET 50-286

Steam Generator Tube Inspection Report for
Indian Point 3 Spring 2007 Refueling Outage (3R14)

1.0 Examination Program Description

At the time of the Spring 2007 refueling outage (3R14) at Indian Point 3, the steam generators (SGs) had accumulated approximately 137 effective full power months (EFPM) of operation since the first in-service inspection performed in 1990. The steam generators were replaced in 1989 and each have 3214 tubes made from thermally treated Alloy 690. The reactor coolant system operates with a hot leg temperature of 599°F. Refueling outage 3R14 was the refueling outage nearest the endpoint of the first inspection period of 144 EFPM as defined in section 5.5.8.d.2 of the Technical Specifications. The steam generator inspections were performed from March 15th through 19th, 2007.

The following information is provided as required in section 5.6.8 of the Technical Specifications.

a. The scope of inspections performed on each SG,
b. Active degradation mechanisms found,
c. Nondestructive examination techniques utilized for each degradation mechanism,
d. Location, orientation (if linear), and measured sizes (if available) of service induced indications,
e. Number of tubes plugged during the inspection outage for each active degradation mechanism,
f. Total number and percentage of tubes plugged to date,
g. The results of condition monitoring, including the results of tube pulls and in-situ testing, and
h. The effective plugging percentage for all plugging in each SG.

The tubesheet map and location landmarks are provided in Figure One and Figure Two, respectively.

2.0 Scope of Inspections Performed on each SG

The following SG inspection scope was performed on all 4 SGs except as noted:

2.1 Bobbin inspection over the full length of 50% of the tubes in rows 3-45 (about 1515 tubes/SG) in a patterned inspection of every other pair of columns.

2.1.1 In addition, those tubes not inspected since the first ISI in 1990 and not captured in this pattern were added to the inspection plan. This added 324 and 117 tubes in 33 and 34 SGs respectively.

2.2 Bobbin inspection of the hot and cold straight leg sections of 50% of the tubes in rows 1 and 2 aligning with the same columns as the patterned inspection for full length bobbin (about 92 tubes/SG).

2.2.1 In addition, those tubes in row one on both hot and cold legs not inspected in 2003 and not captured in this pattern were added to the inspection plan.

2.3 Plus-point inspection of the U-bend sections of those row 1 and 2 tubes inspected in 2.2 above but not 2.2.1 (about 92 tubes/SG) plus any row 3 tubes that could not pass a nominal size bobbin probe. Plus-point probes were used in rows 1 and 2 because the tight radius of the bend does not permit quality data to be collected with the bobbin probe.

2.3.1 In addition, those tubes whose row 1 and 2 U-bend sections were not inspected since the first ISI in 1990 were added to the inspection plan. This added 19 and 21 tubes to 31 and 32 SG respectively.

2.4 Plus-point inspection of the HOT leg expansion transitions from TTS+3 to TTS-3 inches of 20% of the tubes in a patterned inspection (about 643 tubes/SG) that captured tubes not previously inspected in prior patterns to the extent practical. The purpose of this inspection was to collect baseline information of the tube expansion transition region for comparison should this region be considered for potential degradation mechanisms.

2.5 Plus-point inspection of the HOT leg expansion transitions from TTS+3 to TTS-3 inches of all HOT leg peripheral tubes (defined as 3 tubes in from the annulus in column, row and diagonal directions and all row 1 and 2 tubes) (about 550 tubes/SG not covered by 20% patterned inspection). The purpose for this inspection was to identify possible loose parts and loose part wear in what are considered the most susceptible regions of the SG.

2.6 Plus-point inspection of the COLD leg expansion transitions from TTS+3 to TTS-3 inches of all COLD leg peripheral tubes (defined as 3 tubes in from the annulus in column, row and diagonal directions and all row 1 and 2 tubes) (about 700 tubes/SG). The purpose for this inspection was to identify possible loose parts and loose part wear in what are considered the most susceptible regions of the SG.

2.7 Special interest inspections as necessary to disposition possible degradation signals from the routine inspections including all dents/dings ≥ 5 volts and a 20% sample of dents/dings 2.00 – 4.99 volts in the HOT leg straight sections.

Summary of 3R14 SG Inspections (Number of Tests)

Inspection	31 SG	32 SG	33 SG	34 SG	Total
Bobbin - Full length bobbin (rows 3-45)	1518	1517	1841	1634	6510
Bobbin – Hot leg straight section (rows 1 & 2)	107	107	134	108	456
Bobbin – Cold leg straight section (row 1 & 2)	107	107	134	108	456
Plus Pt. – U-Bends (rows 1 & 2)	111	113	91	90	405
Plus Pt. – Hot leg TTS	1226	1216	1235	1248	4925
Plus Pt. – Cold leg TTS	699	694	697	696	2786
Plus Pt. – Special interest	45	4	1	28	78

3.0 Active Degradation Mechanisms Found

The only tube degradation mechanism found during the SG inspection in 3R14 was freespan wear in two tubes. The wear was due to contact with sludge lancing equipment used in 2001 that has not been used since. Although these tubes were inspected in 2003, the indications were not called at that time because they were at or below the threshold for detection based on the data at the time. The degradation was conservatively sized less than the repair limit and the tubes were left in service. Since the wear was the result of contact with maintenance equipment, the existing wear will not change in the future.

4.0 Nondestructive Examination Techniques Utilized

NDE Techniques used for Potential Degradation Mechanisms

Degradation	Detection Probe	Detection ETSS	Sizing Probe	Sizing ETSS
Wear at AVB supports, support plates & FDB	Bobbin	96004.1	Bobbin	96004.1
Wear at tube support plates and flow distribution baffle plate	Bobbin	96004.1	+Point	96910.1
Wear due to loose parts; volumetric indications	Bobbin +Point	96001.1 21998.1	+Point	21998.1
Axial ODSCC in dents/ding (>5 volts)	+Point	21409.1	+Point	(1)

NDE Techniques used for Information Purposes Only

Degradation	Detection Probe	Detection ETSS	Sizing Probe	Sizing ETSS
Pitting	Bobbin	96005.2	+Point	21998.1
U-bend axial ODSCC	+Point	21409.1	+Point	(1)
U-bend circumferential ODSCC	+Point	21410.1	+Point	(2)
Axial ODSCC at expansion transitions	+Point	21409.1	+Point	(1)
Circumferential ODSCC at expansion transitions	+Point	21410.1	+Point	(2)

Note (1) The Vp-p method from CEOG Task 1151
Note (2) EPRI TR-107197

5.0 Location, Orientation and Measured Sizes of Service Induced Indications

SGID	Row	Col	Orien	Ind	%TW	Loc	Inch	Comment
31	1	8	Axial	VOL	26	TSC	16.34	Wear due contact with sludge lance equipment in 2001
31	1	27	Axial	VOL	29	TSC	16.16	Wear due contact with sludge lance equipment in 2001

6.0 Number of Tubes Plugged During 3R14 for each Active Degradation Mechanism

No tubes were plugged for degradation during 3R14, however, two adjacent tubes in 31 SG were administratively plugged due to a metallic object wedged between the two tubes that could not be retrieved despite several attempts. The object was detected during secondary side visual inspections and confirmed with eddy current. The tubes were evaluated for stabilization which was determined unnecessary given the location and extent of circumferential contact. The tube plugging list from 3R14 is below.

SG	Tube	Indication Location	Degradation Depth %TW	Reason for Plugging
31	R29 C79	TSH +0.57	<Detectable	Irretrievable Object
31	R29 C80	TSH +0.26	<Detectable	Irretrievable Object

7.0 Total Number and Percentage of Tubes Plugged to Date

	SG 31	SG 32	SG 33	SG 34	Total
Total Number of Tubes	3214	3214	3214	3214	12856
Number of Plugged Tubes	3	6	3	4	16
% of Tubes Plugged to Date	0.09%	0.19%	0.09%	0.12%	0.12%

8.0 Results of Condition Monitoring

The 3R14 refueling outage represented the end of the eighth fuel cycle after steam generator replacement and the end of the first inspection period following the first in-service inspection in 1990. Consequently, all four steam generators were inspected. A Condition Monitoring assessment was performed, on a defect-specific basis, to demonstrate compliance with integrity criteria by the comparison of 3R14 NDE measurements with calculated burst and leakage integrity limits. Calculated integrity limits, including consideration for appropriate uncertainties, burst and leak analytical correlations, material properties, NDE technique, and analyst uncertainties were provided in the degradation assessment report. All indications in this inspection were below the calculated integrity limits and, therefore, met integrity requirements without further testing. Based upon the inspection results, all four steam generators were found to be in compliance with Condition Monitoring requirements.

All measured tube degradation was less than the condition monitoring limit. No in-situ pressure testing was required nor were any tubes pulled for examination.

9.0 Effective Plugging Percentage for all Plugging in each SG

	SG 31	SG 32	SG 33	SG 34	Total
Total Number of Tubes	3214	3214	3214	3214	12856
Number of Sleeved Tubes	0	0	0	0	0
Number of Plugged Tubes	3	6	3	4	16
Effective Tube Plugging %	0.09%	0.19%	0.09%	0.12%	0.12%

Note: Since there are no sleeves installed and the safety analyses credit plugged tubes with the same value regardless of location, the effective tube plugging is equivalent to the percentage of tubes plugged.

FIGURE ONE
Indian Point 3 Steam Generator Tubesheet Map

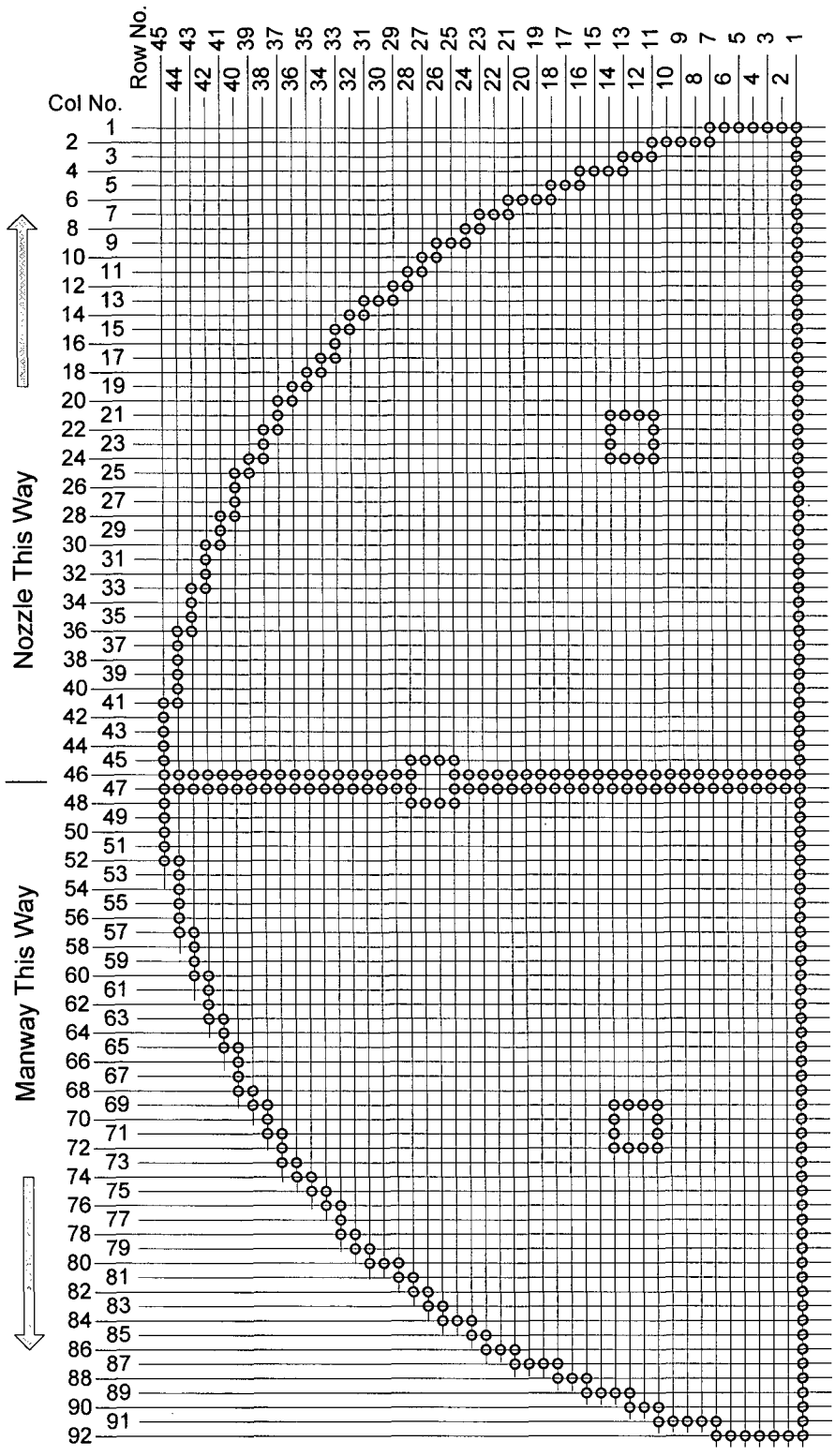
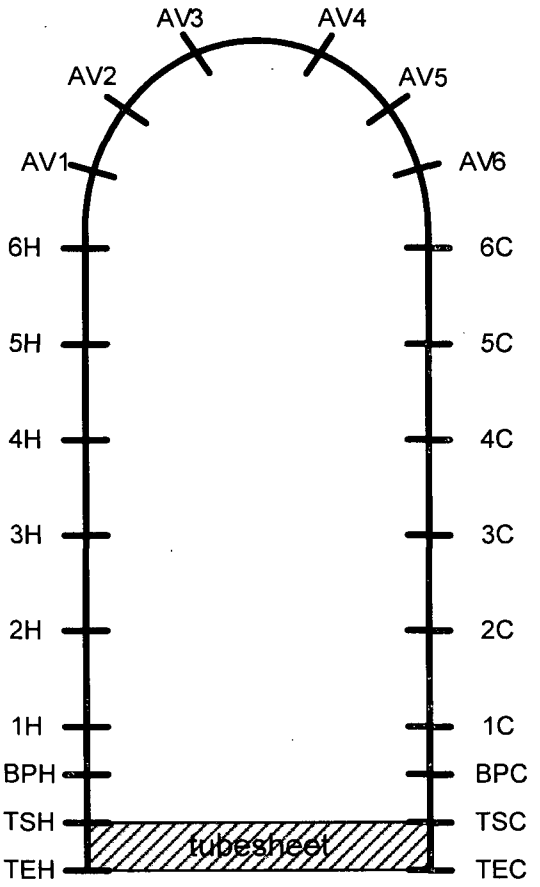


FIGURE TWO

Indian Point 3
Steam Generator
Location Landmarks



Westinghouse Model 44F
Steam Generator

Legend

AV = Anti-Vibration Bar (AVB
C = cold leg support plate (TSP)
H = hot leg support plate (TSP)
# = number of support structure
BP = baffle plate (FDB)
TS = tubesheet (Hot or Cold)
TE = tube end (Hot or Cold