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L-2010-075
10 CFR 50.36

U. S. Nuclear Regulatory Commission
Attn: Document Control Desk
Washington, D.C. 20555-00001

Re: Turkey Point Unit 4
Docket No. 50-251
Steam Generator Tube Inspection Report

The attached Turkey Point Unit 4 End of Cycle (EOC) 24 Steam Generator Tube Inspection Report is submitted to NRC in accordance with Turkey Point Technical Specification 6.9.1.8, and within 180 days after the initial entry to MODE 4 following completion of the inspections performed in accordance with Technical Specification 6.8.4.j, Steam Generator (SG) Program.

The report includes the following:

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,
h. The effective plugging percentage for all plugging in each SG,
i. The primary to secondary leakage rate observed in each SG during the cycle preceding the inspection which is the subject of the report,
j. The calculated accident induced leakage rate from the portion of the tubes below 17.28 inches from the top of the tubesheet for the most limiting accident in the most limiting SG, and
k. The results of monitoring for tube axial displacement (slippage).

A001
NRR

Should there be any questions, please contact Robert Tomonto at (305) 246-7327.

Sincerely,

Michael Kiley
Vice President
Turkey Point Nuclear Plant

Enclosure
Attachments

cc: Regional Administrator, Region II, USNRC.
Senior Resident Inspector, USNRC, Turkey Point Plant

Background

This report is provided in accordance with Turkey Point Unit 4 Technical Specification 6.9.1.8, "Steam Generator Tube Inspection Report" for the inspection conducted November 5-13, 2009, during the End of Cycle (EOC) 24 refueling outage. The EOC 24 refueling outage was the second refueling outage in the third inspection period (60 EFPM) of the Westinghouse model 44F steam generators (SGs) replaced in April, 1983. The SGs had accumulated 20.37 Effective Full Power Years (EFPY) of operation at the EOC 24. The Steam Generator Tubing Inspection performed during the EOC 24 refueling outage is the only inspection scheduled in the first half of the third inspection period.

Following the EOC 24 refueling outage, Turkey Point Unit 4 initially entered HOT SHUTDOWN (Mode 4) on November 24, 2009. Pursuant to Turkey Point Unit 4 Technical Specification 6.9.1.8, this report is required to be submitted to the NRC 180 days after initial entry into MODE 4, or by May 24, 2010.

The EOC 24 SG tube inspections were conducted in all three SGs (4A, 4B, & 4C) as described below.

a. The scope of inspection performed on each steam generator

The scope of this examination is summarized in Table 1 below and is established to meet the following requirements:

a. Technical Specification 6.8.4.j "Steam Generator (SG) Program"
b. Steam Generator Management Program: Pressurized Water Reactor Steam Generator Examination Guidelines: Revision 7. EPRI, Palo Alto, CA: 2007. 1013706.

The basis for bobbin and +Point™ tube examinations is given in Table 1.

TABLE 1
BASIS FOR TUBE EXAMINATION SAMPLES

Technique	Examination Sample	Required or Supplemental	Basis	Potential Degradation
Bobbin	100% full length in rows 3 and higher. Row 1 & 2 examinations were limited to the hot leg and cold leg straight sections.	Required[1]	Degradation Assessment	Wear/ ODSCC
	Screening of 100% of dings ≤ 5 volts in straight sections (verticals) This included tubes with low-voltage u-bend offset tubes.	Required[1]	Degradation Assessment	ODSCC
+Point™	100% of the hot leg tubesheet to the extent of TTS + 3.00" to -17.28". The hot leg full depth tubesheet examination included two unexpanded tubes in S/G "A" and five unexpanded tubes in S/G "B" identified with previous NTE indications (No Tube Expansion). (No tubes were identified with NTE indications in S/G "C".) Note: Unexpanded tubes were plugged in accordance with commitments made for license amendment 236 (Ref. 1).	Required[1]	ENG CSI-2.2, Rev. 31, Checklist item 1.D, and the Degradation Assessment.	Foreign Object Wear PWSCC ODSCC
	Cold Leg Periphery Expansion Transitions - +3"/-2" from top of tubesheet. Two outermost peripheral tubes exposed to the annulus, and all open row 1 and 2 tubes in columns 1-92 completed the periphery examination.	Required	ENG CSI-2.2, Rev. 31, Checklist item 1.D., and the Degradation Assessment.	Foreign Object Wear
	CL full depth tubesheet One unexpanded tube in S/G "A" and one unexpanded tube in S/G "B" identified with previous NTE indications (No Tube Expansion) required a full tubesheet inspection. (No tubes were identified with NTE indications in S/G "C"). Note: Unexpanded tubes were plugged in accordance with commitments made for license amendment 236 (Ref. 1).	Required	ENG CSI-2.2, Rev. 31, Checklist item 1.D., and the Degradation Assessment.	PWSCC ODSCC
	Tight radius u-bends – 100% of row 1 and 2	Required[1]	Degradation Assessment.	PWSCC ODSCC
	100% of hot leg freespan dings ≥ 5 volts between TSH and 06H +1.00".	Required[1]	Degradation Assessment.	PWSCC ODSCC
	100% of u-bend dings	Required[1]	Degradation Assessment.	PWSCC ODSCC
	100% of hot leg dents/dings at structures.	Required[1]	Degradation Assessment.	PWSCC ODSCC

1. A 100% sample size is supplemental. The minimum sample size required by the SG Program is 50%.

b. Active degradation mechanism found

The EOC 24 bobbin and +Point™ examination results for Turkey Point Unit 4 identified mechanical wear as an existing degradation mechanism at the following locations:

- Anti-vibration bar (AVB) contact points in the u-bends
- Broached tube support contact points
- Flow Baffle Plates

No other degradation mechanisms were identified in this inspection.

c. Nondestructive examination techniques utilized for each degradation mechanism

TABLE 2 – Turkey Point Unit 4 Examination Techniques for EOC 24 (October 2009)

Technique		Industry Qualification	Damage Mechanism	Demonstrated Applicability	Extended Applicability	Depth Sizing Technique Applied	Site-Specific Review Deemed Acceptable	
							Detection	Sizing
1	Bobbin	96001.1 Revision 11	Thinning	Top of Tubesheet and TSP	Above Tubesheet	Differential Mix Phase Analysis	Yes	For Information
2	Bobbin	96004.1 Revision 12	Wear	AVBs TSPs Diagonal and Vertical Straps	None	Differential Mix Amplitude Analysis (Using Vert-Max)	Yes	For Service
3	Bobbin	96004.2 Revision 12	Wear	AVBs TSPs Diagonal and Vertical Straps	None	Absolute Mix Amplitude Analysis (Using Vert-Max)	Yes	For Information
4	Bobbin	96005.2 Revision 9	Pitting	Freespan in the Presence of Copper	Sludge Pile	Not Sized with Bobbin	Yes	For Information
5	Bobbin	24013.1 Revision 2	ODSCC	Freespan Dings ≤5.00 Volts	None	Not Sized with Bobbin	Yes	For Information
6	Bobbin	I-28411 Revision 2	Axial ODSCC	Drilled TSP With / Without Dents < 2.0 Volts	None	Not Sized with Bobbin	Yes	For Information
7	Bobbin	I-28412 Revision 2	Axial ODSCC	Freespan	None	Not Sized with Bobbin	Yes	For Information
8	Bobbin	I-28413 Revision 2	Axial ODSCC	Broached TSP, Sludge Pile	None	Not Sized with Bobbin	Yes	For Information
9	Bobbin	27091.2 Revision 0	PLP Wear	PLP Wear (part not present)	Part Present	N/A	Yes	N/A
10	+Point™	96511.1/.2 Revision 16	PWSCC	Low Row U-bend	None	Single Frequency Phase Analysis	Yes	For Information
11	+Point™	20510.1 Revision 7	Circ PWSCC	Expansion Transition	Dent, Dings, Non-Dented Support Structures, Tubesheet	Single Frequency Phase Analysis	Yes	For Information
12	+Point™	20511.1 Revision 8	Axial PWSCC	Expansion Transition	Non-Dented Support Structures, Tubesheet	Single Frequency Phase Analysis	Yes	For Information
13	+Point™	96703.1 Revision 17	Axial PWSCC	Dent	Non-Dented Support Structures, Tubesheet	Single Frequency Phase Analysis	Yes	For Information
14	+Point™	22401.1 Revision 4	Axial ODSCC	Dented Support Structures	None	Single Frequency Phase Analysis	Yes	For Information
15	+Point™	96910.1 Revision 10	Wear	Broached TSP	None	Differential Mix Amplitude Analysis (Using Vert-Max)	Yes	For Service
16	+Point™	21998.1 Revision 4	Volumetric	Freespan	None	Single Frequency Amplitude Analysis (Using Peak-Peak)	Yes	For Service only if non-corrosion
17	+Point™	22842.3 Revision 5	Circ ODSCC	Dented Support Structures	None	Length Sizing using From/To	Yes	For Information
18	+Point™	21410.1* Revision 5	Circ ODSCC	Expansion transition	TSP, Freespan, Sludge Pile, Tubesheet, Dents, Dings, U-bend Axial / Circ **	Single Frequency Phase Analysis	Yes	For Information

* The sizing parameters in EPRI ETSS 21410.1 are equivalent to those listed in EPRI Report TR 107197-P1

Table 2 continued

Technique		Industry Qualification	Damage Mechanism	Demonstrated Applicability	Extended Applicability	Depth Sizing Technique Applied	Site-Specific Review Deemed Acceptable	
							Detection	Sizing
19	+Point™	96701.1 Revision 12	Circ PWSCC	Expansion Transition	Dents, Dings, Tubesheet	Single Frequency Amplitude Analysis (Using Peak-Peak) Based on Max Depth Phase	Yes	For Information
20	+Point™	27901.1 27902.1 27903.1 27904.1 27905.1 27906.1 27907.1 Revision 0	PLP Wear	PLP Wear Morphology Dependent (part not present)	None	PLP Wear Morphology Dependent (part not present)	Yes	For Service
21	+Point™	I- 28424 Revision 2	Axial ODSCC	Sludge Pile	None	Not qualified	Yes	No
22	+Point™	I-28425 Revision 2	Axial ODSCC	Freespan, Broached TSP	None	Not qualified	Yes	No
23	+Point™	I-28431 Revision 1	Axial ODSCC	Sludge Pile	None	Single Frequency Amplitude Analysis	No	For Information
24	+Point™	I-28432 Revision 1	Axial ODSCC	Freespan, Broached TSP	None	Single Frequency Amplitude Analysis	No	For Information
25	.115 Pancake	21401.1 Revision 5	Axial ODSCC	All Locations except Ubends, Dents, Expansions	None	Single Frequency Phase Analysis	+Point™ is the primary detection coil	For Information
26	.115 Pancake	21402.1 Revision 5	Circ ODSCC	Expansion Transition	Sludge Pile	Single Frequency Phase Analysis		For Information
27	.115 Pancake	21503.1 Revision 4	Axial PWSCC	Expansion Transition	Sludge Pile	Single Frequency Phase Analysis	+Point™ is the primary detection coil	For Information
28	.115 Pancake	21504.1 Revision 4	Circ PWSCC	Expansion Transition	Sludge Pile	Single Frequency Phase Analysis		For Information
29	.115 Pancake	99998.1 Revision 5	Pitting	Freespan in the Presence of Copper	None	Single Frequency Amplitude Analysis (Using Peak-Peak)	Info only: Use 96005.2 for pits in the sludge pile	For Information
30	.115 Pancake	96911.1 Revision 9	Wear	Broached TSP	PLP Wear	Absolute Mix Amplitude Analysis (Using Vert-Max)	+Point™ is the primary detection coil	For Service
31	.080 HF Pancake	21505.1 Revision 3	Axial PWSCC	Expansion Transition	Sludge Pile	Single Frequency Phase Analysis		For Information
32	.080 HF Pancake	21506.1 Revision 4	Circ PWSCC	Expansion Transition	Sludge Pile	Single Frequency Phase Analysis		For Information
33	+Point™	21409.1 Revision 4	Axial ODSCC	support structures. Freespan region sludge pile and tubesheet crevice	Expansion Transition Axial / Circ *	Single Frequency Phase Analysis	Yes	For Information

- The sizing parameters in EPRI ETSS 21410.1 are equivalent to those listed in EPRI Report TR 107197-P1.

d. Location orientation (if linear) and measured sizes (if available) of service induced indications

Please see Attachments 1, 2 & 3 for indication listings for SG 4A, 4B and 4C respectively. All wear indications are on the outer surface of the tubing and the predominant orientation is axial.

e. Number of tubes plugged during the inspection for each nonconforming condition

Table 3 - Turkey point Unit 4 Tube Plugging EOC 24

Condition	SG 4A	SG 4B	SG 4C	Total
No Tube Expansion (NTE) for H* criteria (1)	3	6	0	9
Bottom Expansion Transition (BET) for H* criteria (2)	0	1	0	1
Preventative Tube Plug (PTP) for Indication with no qualified sizing technique (3)	1	0	0	1
Total	4	7	0	11

(1) Tubes with no tube expansion were determined to represent significant deviations in the location of the bottom of the expansion transition (BET) in accordance with commitment #2 in FPL letter L-2009-209 dated September 30, 2009 (Ref. 1).
(2) SG B R24C19 hot leg BET was located 1.07" below the top of tubesheet. This BET variation was not considered significant, but was conservatively removed from service.
(3) Row 33 column 78 in SG 4A was preventively plugged due to the presence of a wear indication associated with the AV3 structure and a coincident dent signal. No qualified sizing technique was available to allow the tube to remain in service.

f. Total number and percentage of tubes plugged to date

Table 4

Turkey Point Unit 4 Steam Generator Cumulative Tube Plugging Summary EOC 24		
SG	**# Plugged**	**% Plugged**
4A	**33**	**1.03%**
4B	**20**	**0.62%**
4C	**11**	**0.34%**

g. The results of condition monitoring including the results of the tube pulls and in-situ testing

All tubes inspected met the tube integrity performance criteria in TS 6.8.4.j.b and condition monitoring requirements. No tubes required in-situ pressure testing. No tube removal was required.

h. The effective plugging percentage for all plugging in each steam generator

No tube repair methods (i.e. sleeving) are approved for Turkey Point Unit 4 that would have an effect on the effective plugging percentages. Therefore, the effective plugging percentage is synonymous with the % Plugged in item f. above.

Note: Report items i, j, and k. are applicable following completion of inspections performed through Refueling Outage 25 [EOC 24] at Unit 4 (and any inspections performed in the subsequent operating cycles until the next scheduled inspection).

i. The primary to secondary leakage rate in each SG (if it is not practical to assign the leakage to an individual SG, the entire primary to secondary leakage should be conservatively assumed to be from one SG) during the cycle preceding the inspection which is subject to the report.

No primary to secondary leakage was reported during the preceding cycle of operation.

j. The calculated accident induced leakage rate from the portion of the tubes below 17.28 inches from the top of the tubesheet for the most limiting accident in the most limiting SG. In addition, if the calculated accident induced leakage rate from the most limiting SG is less than 1.82 times the maximum operational primary to secondary leakage rate, the report should describe how it was determined, and

The accident induced leakage rate from the portion of the tubes below 17.28 inches from the top of the tubesheet is calculated as a ratio of observed normal operating leakage that cannot be attributed to a source other than the tubesheet expansion region. For the operating period preceding the EOC 24 inspection, no operational primary-to-secondary leakage has been observed. Further, there are no degradation mechanisms that have the potential for leakage.

For Turkey Point Unit 4, the maximum operational primary to secondary leakage rate from the portion of the tubes below 17.28 inches from the top of the tubesheet is multiplied by a factor of 1.82 to determine the accident induced leakage. Since no operational primary-to-secondary leakage has been observed, the calculated accident induced leakage rate the portion of the tubes below 17.28 inches from the top of the tubesheet is zero.

Therefore, neither the normal operating leakage limit nor the accident induced leakage limits will be challenged during the next operating period.

k. The results of monitoring for tube axial displacement (slippage). If slippage is discovered, the implications of the discovery and corrective action shall be provided.

Monitoring for tube slippage was completed in accordance with commitment #1 in Ref. 1. No tube slippage was discovered based on the results of the EOC 24 SG inspections.

References

1. FPL Letter L-2009-209 to the US NRC, dated September 30, 2009 "Turkey Points Unit 3 and 4, Docket Nos. 50-250 and 50-251, Response to Request for Additional Information, License Amendment Request for H*: Alternate Repair Criteria for Steam Generator Tubesheet Expansion Region".

Abbreviations

CSI - Component Support and Inspections
SG - Steam Generator
ISI - In-service Inspection
ECT - Eddy Current Testing
NEI – Nuclear Energy Institute
EPRI – Electric Power Research Institute

Acronyms

H/L -	Hot Leg
C/L -	Cold Leg
VOL -	Volumetric Indication
SVI -	Single Volumetric Indication
PIT -	Pit Indication
PLP -	Possible Loose Part
WAR -	Mechanical Wear
TWD -	Through Wall Depth
TSH -	Tubesheet Hot Leg
TEH -	Tube End Hot Leg
TSC -	Tubesheet Cold Leg
TEC –	Tube End Cold
PTP -	Preventative Tube Plug

ADDITIONAL INFORMATION

The following information is included to assist the staff in their review of the information provided in this report. Secondary side maintenance activity information is not required by TS Section 6.9.1.8. However, this information is being provided based on NRC requests for additional information regarding previous reports submitted by FPL in accordance with this specification.

Secondary Side Maintenance Activities

Secondary Side Maintenance Activities during the EOC 24 refueling outage include the following:

- Upper Bundle Flush
- Sludge Lance
- FOSAR (Foreign Object Search and Retrieval)
- Upper Bundle and Top Down Inspection in SG 4C

Upper bundle flush and sludge lancing was completed in all three steam generators. The processes recovered 26.5 lbs of sludge from SG 4A, 24.5 lbs from SG 4B and 17.0 lbs from SG 4C. Pre and post bundle flush upper bundle and top down inspections were completed in SG 4C. These inspections showed that the steam generators remain relatively clean with no significant buildup of deposits, and that the support flow holes remain open.

Post sludge-lancing FOSAR was performed on all three steam generators. Foreign objects actively tracked are included in Table 5. Several of the objects in Table 5 are sludge scale or hardened sludge fragments, which are not considered a credible threat to tube integrity, but were investigated and are documented here for completeness. The objects in Table 5 were evaluated for potential impact on plant operation and tube integrity and were determined to be acceptable for the planned operating period. Foreign objects removed during EOC 24 refueling outage and thus not actively tracked are included in Table 6. No tube degradation was associated with any of the objects in Table 5 and 6.

Table 5

Turkey Point Unit 4 SG Secondary Side
Foreign Objects Summary Table (Actively Tracked)
Status as of EOC 24 Refueling Outage

Item	S/G	Description	Initial Location And Basis	TP4-23 Location & Basis (11/2006)	TP4-24 Location & Basis (4/20/08)	TP4-25 Location & Basis 11/09
1.	4A	1/16' x 2" Wire	H/L R22/23 C46	ECT PLP Object embedded In hard sludge retrieval unsuccessful	Seen by FOSAR 04/08 no retrieval attempted , fixed in location	Based on 12/09 review of video, object not seen.
2.	4A	1/32" x 1" wire coil	H/L R12/13 C36 Previously C38 ECT PLP at C36	ECT PLP Object embedded In hard sludge on tube retrieval unsuccessful	Located in hard sludge pile region, no retrieval attempted	Wire bristle imbedded in hard deposit seen by FOSAR 11/10/09
3.	4A	1/16" x 2" Weld Rod	H/L R10/11 C76/77 SSI Report shows C75/76	Seen by FOSAR 11/06 Retrieval attempts unsuccessful	Seen by FOSAR 04/08, no retrieval attempted, fixed in location	Seen by FOSAR 11/10/09 no retrieval attempted, remains fixed in location
4.	4A	0.4"dia by 0.13" Metal snap shaped object	C/L R 13/14 C45/46	N/A	N/A	Seen by FOSAR 11/10/09 Wedged tightly. Retrieval Unsuccessful
5.	4A	Small hard pile	H/L R20 C36	N/A	N/A	PLP Visual confirmed 11/09. Retrieval not possible.
6.	4A	Long rod shaped ~ 1"x 0.1" ~ 2" above tubesheet	H/L R22 C44	N/A	N/A	PLP Visual confirmed 11/09. Retrieval not possible.
7.	4A	Adhered tube scale	H/L R34 C62	N/A	N/A	PLP Visual confirmed 11/09. Retrieval not possible.

Table 5 (continued)

Turkey Point Unit 4 SG Secondary Side
Foreign Objects Summary Table (Actively Tracked)
Status as of EOC 24 Refueling Outage

Item	S/G	Description	Initial Location And Basis	TP4-23 Location & Basis (11/2006)	TP4-24 Location & Basis (4/20/08)	TP4-25 Location & Basis 11/09
8.	4B	~ 0.25" irregular round Sludge Rock	H/L R13 C76	N/A	N/A	PLP Visual confirmed 11/09. Retrieval not possible.
9.	4B	Hard sludge pile	H/L R17 C 42-58	N/A	N/A	PLP Visual confirmed 11/09.
10.	4B	~ 0.5 x ~ 0.25 rectangular sludge rock	H/L R23 C 58	N/A	N/A	PLP Visual confirmed 11/09 object wedged tightly. Retrieval unsuccessful.
11.	4C	0.1" x 0.15" x 0.5" oblong metallic object	H/L R 20/21 C 47	ECT verified presence Based on look back	ECT Skip Cycle	PLP Visual confirmed 11/09 object wedged tightly. Retrieval unsuccessful.
12.	4C	Wedge shaped sludge rock 0.1 x 0.3 x 1.5"	H/L R24 C33	N/A	N/A	PLP Visual confirmed 11/09 object wedged tightly. Retrieval unsuccessful.

Table 6

Turkey Point Unit 4 SG Secondary Side
Foreign Objects Removed during EOC 24 Refueling Outage

Item	S/G	Description	Initial Location And Basis	TP4-25 Location & Basis 11/09
1	4A	3" x .03" dia. wire	H/L Annulus Around R 45	Seen by FOSAR 11/10/09 Retrieved
2	4A	Wire bristle	H/L Annulus Around R 45	Seen by FOSAR 11/10/09 Retrieved
3	4A	0.150" by 0.010" by 3" Flex Gasket	C/L Annulus Around R 45	Seen by FOSAR 11/10/09 Retrieved
4	4B	~ 4" x ~ .125" dia. Non ferretic steel rod, possibly tooling steel	H/L Annulus Around R 45	Seen by FOSAR 11/10/09 Retrieved
5	4B	~1.25" x 0.0625"dia. magnetic rod shaped object	H/L R36 C51	Seen by FOSAR 11/10/09 Retrieved

SG 4A Indication Listings	
Listing Description	**Page No.**
Tubes Plugged Listing	2
Bobbin WEAR at AVB locations 20-100%TWD	2
Bobbin WEAR at AVB locations 1-19% TWD	2
WEAR (WAR) sized by +Point™ probe 1-100% (Broach/Baffle)	3
WEAR (WAR) sized by +Point™ probe 1-100% (AVB)	3

Turkey Point Unit 4 (EOC-24)
SG 4A Tubes Plugged Listing

11/09 - EOC24

EOC24 ECT Results for Tubes Repaired by Plugging

ROW	COL	VOLTS	DEG	CHN	IND	%TW	LOCATION	EXT	EXT	UTIL 1	UTIL 2	CAL #	LEG	PROBE
5	4				PTP			TEH	TEC			2	COLD	720UL
		2.99	26	2	NTE	TSC	+0.00	TEH	TEC			2	COLD	720UL
18	44				PTP			TEH	TEC			3	COLD	720UL
		2.63	38	2	NTE	TSH	+0.00	TEH	TEC			3	COLD	720UL
23	62	3.74	219	2	NTE	TSH	+0.00	TEH	TEC			12	COLD	720UL
					PTP			TEH	TEC			12	COLD	720UL
33	78	0.62	123	P5	WAR	AV3	+0.05	AV3	AV3	34	96910.1	57	HOT	6801P
			0	P5	CLP	AV3	+0.05	AV3	AV3	0.48	0.46	57	HOT	6801P
		0.73	149	P1	DSI	AV3	-0.02	TEH	TEC	LAR		11	COLD	720UL
					PTP			TEH	TEC			11	COLD	720UL
		2.52	177	P1	DNG	AV3	-0.15	TEH	TEC			11	COLD	720UL

Total Tubes : 4

Note: Tubes with No Tube Expansion (NTE) were plugged in accordance with commitments made for license amendment 226. For tubes identified with "WAR" in the "IND" column, the %TW depth is identified in the Util 1 field.

Turkey Point Unit 4 (EOC-24)
SG 4A

11/09 - EOC24

Bobbin WAR at AVB's 20-100%TWD

ROW	COL	VOLTS	DEG	CHN	IND	%TW	LOCATION	EXT	EXT	UTIL 1	UTIL 2	CAL #	LEG	PROBE

Total Tubes : 0 No indications reported in this range
Total Records: 0

Turkey Point Unit 4 (EOC-24)
SG 4A

11/09 - EOC24

Bobbin WAR at AVB's 1-19%TWD

ROW	COL	VOLTS	DEG	CHN	IND	%TW	LOCATION	EXT	EXT	UTIL 1	UTIL 2	CAL #	LEG	PROBE
26	20	0.22	94	P2	TWD	10	AV1 +0.37	TEH	TEC			6	COLD	720UL
32	74	0.39	112	P2	TWD	14	AV1 +0.08	TEH	TEC			12	COLD	720UL
		0.38	26	P2	TWD	13	AV2 +0.06	TEH	TEC			12	COLD	720UL
33	72	0.59	68	P2	TWD	18	AV1 +0.08	TEH	TEC			12	COLD	720UL
35	67	0.37	104	P2	TWD	10	AV4 -0.19	TEH	TEC			11	COLD	720UL
37	65	0.63	58	P2	TWD	15	AV2 +0.06	TEH	TEC			11	COLD	720UL
		0.48	116	P2	TWD	12	AV3 +0.32	TEH	TEC			11	COLD	720UL
		0.73	70	P2	TWD	17	AV4 -0.06	TEH	TEC			11	COLD	720UL

Total Tubes : 5
Total Records: 8

Turkey Point Unit 4 (EOC-24)
SG 4A

11/09 - EOC24

+Point™ WAR at Supports (Broach supports and Baffle plates)

ROW	COL	VOLTS	DEG	CHN	IND	%TW	LOCATION		EXT	EXT	UTIL 1	UTIL 2	CAL #	LEG	PROBE
4	58	0.20	112	P5	WAR	02H	+0.47		02H	02H	12	96910.1	44	HOT	680PP
13	4	0.35	90	P5	WAR	BAH	-0.27		BAH	BAH	18	96910.1	44	HOT	680PP
39	28	0.12	105	P5	WAR	BAH	+0.12		BAH	BAH	8	96910.1	44	HOT	680PP

Total Tubes : 3
Total Records: 3

Notes: The qualified EPRI sizing technique used for depth estimates is identified in the Util 2 field.
For tubes identified with "WAR" in the "IND" column, the %TW depth is identified in the Util 1 field.

11/09 - EOC24

+Point™ WAR at AVBs

ROW	COL	VOLTS	DEG	CHN	IND	%TW	LOCATION		EXT	EXT	UTIL 1	UTIL 2	CAL #	LEG	PROBE
33	78	0.62	123	P5	WAR	AV3	+0.05		AV3	AV3	34	96910.1	57	HOT	6801P

Total Tubes : 1
Total Records: 1

Notes: The qualified EPRI sizing technique used for depth estimates is identified in the Util 2 field.
For tubes identified with "WAR" in the "IND" column, the %TW depth is identified in the Util 1 field.
Tube R33 C78 was repaired because the indication was coincident with a ding.

SG 4B Indication Listings	
Listing Description	**Page No.**
Tubes Plugged Listing	2
Bobbin WEAR at AVB locations 20-100%TWD	2
Bobbin WEAR at AVB locations 1-19% TWD	3
WEAR (WAR) sized by +Point™ probe 1-100% (Broach/Baffle)	3
WEAR (WAR) sized by +Point™ probe 1-100% (AVB)	4

Turkey Point Unit 4 (EOC-24)
SG 4B Tubes Plugged Listing

11/09 - EOC24

EOC24 ECT Results for Tubes Repaired by Plugging

ROW	COL	VOLTS	DEG	CHN	IND	%TW	LOCATION		EXT	EXT	UTIL 1	UTIL 2	CAL #	LEG	PROBE
5	66	3.39	230	2	NTE	TSH	+0.00		TEH	TEC			17	COLD	720UL
					PTP				TEH	TEC			17	COLD	720UL
9	12	7.38	199	2	NTE	TSH	+0.00		TEH	TEC			9	COLD	720UL
					PTP				TEH	TEC			9	COLD	720UL
10	67	4.27	217	2	NTE	TSH	+0.00		TEH	TEC			17	COLD	720UL
					PTP				TEH	TEC			17	COLD	720UL
12	39	5.10	224	2	NTE	TSH	+0.00		TEH	TEC			27	COLD	720UL
					PTP				TEH	TEC			27	COLD	720UL
23	12	3.24	24	2	NTE	TSC	+0.00		TEH	TEC			1	COLD	720UL
					PTP				TEH	TEC			1	COLD	720UL
24	19				PTP				TEH	TEC			2	COLD	720UL
		55.38	191	2	PID	TEH	+1.00	TO+21.79	TEH	TEC	HR		2	COLD	720UL
31	37	3.74	219	2	NTE	TSH	+0.00		TEH	TEC			8	COLD	720UL
					PTP				TEH	TEC			8	COLD	720UL

Total Tubes : 7

Note: Tube R24 C19 was preventively plugged due to the presence of a larger than optimum crevice of 1.07" (Bottom of Expansion Transition, BET). Tubes with No Tube Expansion (NTE) were plugged in accordance with commitments made for license amendment 226.

Turkey Point Unit 4 (EOC-24)
SG 4B

11/09 - EOC24

Bobbin WAR at AVB's 20-100%TWD

ROW	COL	VOLTS	DEG	CHN	IND	%TW	LOCATION	EXT	EXT	UTIL 1	UTIL 2	CAL #	LEG	PROBE

Total Tubes : 0 No indications were reported in this range.
Total Records: 0

Turkey Point Unit 4 (EOC-24)
SG 4B

11/09 - EOC24

Bobbin WAR at AVB's 1-19%TWD

ROW	COL	VOLTS	DEG	CHN	IND	%TW	LOCATION		EXT	EXT	UTIL 1	UTIL 2	CAL #	LEG	PROBE
21	6	0.34	57	P2	TWD	9	AV3	+0.00		TEH	TEC		1	COLD	720UL
23	50	0.31	54	P2	TWD	9	AV3	-0.09		TEH	TEC		12	COLD	720UL
27	72	0.44	69	P2	TWD	12	AV2	+0.11		TEH	TEC		16	COLD	720UL
		0.40	102	P2	TWD	11	AV1	+0.00		TEH	TEC		16	COLD	720UL
27	82	0.33	62	P2	TWD	10	AV4	+0.17		TEH	TEC		16	COLD	720UL
30	65	0.53	108	P2	TWD	14	AV2	+0.39		TEH	TEC		14	COLD	720UL
30	73	0.44	98	P2	TWD	12	AV4	-0.15		TEH	TEC		16	COLD	720UL
		0.35	122	P2	TWD	10	AV3	+0.02		TEH	TEC		16	COLD	720UL
		0.35	79	P2	TWD	10	AV2	+0.00		TEH	TEC		16	COLD	720UL
31	13	0.35	99	P2	TWD	9	AV4	+0.02		TEH	TEC		1	COLD	720UL
33	16	0.36	118	P2	TWD	10	AV4	+0.00		TEH	TEC		1	COLD	720UL
33	62	0.36	121	P2	TWD	11	AV2	-0.30		TEH	TEC		14	COLD	720UL
34	46	0.52	121	P2	TWD	13	AV2	-0.43		TEH	TEC		9	COLD	720UL
		0.40	30	P2	TWD	11	AV2	+0.64		TEH	TEC		9	COLD	720UL
35	54	0.51	72	P2	TWD	14	AV3	+0.24		TEH	TEC		12	COLD	720UL
38	58	0.40	117	P2	TWD	11	AV3	+0.32		TEH	TEC		14	COLD	720UL

Total Tubes : 12
Total Records: 16

Turkey Point Unit 4 (EOC-24)
SG 4B

11/09 - EOC24

+Point™ WAR at Supports (Broached support and Baffle Plates)

ROW	COL	VOLTS	DEG	CHN	IND	%TW	LOCATION		EXT	EXT	UTIL 1	UTIL 2	CAL #	LEG	PROBE
5	12	0.31	65	P5	WAR		04H	+0.50	04H	04H	10	96910.1	53	HOT	680PP
31	60	0.46	125	P5	WAR		02H	-0.27	02H	02H	16	96910.1	53	HOT	680PP
35	70	0.26	103	P5	WAR		BAH	-0.36	TSH	BAH	10	96910.1	53	HOT	680PP
40	26	0.14	96	P5	WAR		BAH	+0.02	TSH	01H	6	96910.1	53	HOT	680PP
		0.20	88	P5	WAR		BAH	-0.31	TSH	01H	8	96910.1	53	HOT	680PP
44	38	0.32	99	P5	WAR		04C	+0.58	04C	04C	14	96910.1	58	COLD	680PP

Total Tubes : 5
Total Records: 6

Note: The qualified EPRI sizing technique used for depth estimates is identified in the Util 2 field. For tubes identified with "WAR" in the "IND" column, the %TW depth is identified in the Util 1 field.

Turkey Point Unit 4 (EOC-24)
SG 4B

11/09 - EOC24

+Point™ WAR at AVBs

ROW	COL	VOLTS	DEG	CHN	IND	%TW	LOCATION	EXT	EXT	UTIL 1	UTIL 2	CAL #	LEG	PROBE

Total Tubes : 0
Total Records: 0

No wear indications were reported at the Anti-vibration Bars with +Point™

SG 4C Indication Listings	
Listing Description	**Page No.**
Tubes Plugged Listing	2
Bobbin WEAR at AVB locations 20-100%TWD	2
Bobbin WEAR at AVB locations 1-19% TWD	2
WEAR (WAR) sized by +Point™ probe 1-100% (Broach/Baffle)	3
WEAR (WAR) sized by +Point™ probe 1-100% (AVB)	3

Turkey Point Unit 4 (EOC-24)
SG 4C Tubes Plugged Listing

No tubes were plugged in SG 4C

Turkey Point Unit 4 (EOC-24)
SG 4C

11/09 - EOC24

Bobbin WAR at AVB's 20-100%TWD

ROW	COL	VOLTS	DEG	CHN	IND	%TW	LOCATION		EXT	EXT	UTIL 1	UTIL 2	CAL #	LEG	PROBE
32	70	0.70	112	P2	TWD	22	AV1	+0.28	TEH	TEC			16	COLD	720UL
35	31	0.77	103	P2	TWD	22	AV2	+0.32	TEH	TEC			3	COLD	720UL

Total Tubes : 2
Total Records: 2

Turkey Point Unit 4 (EOC-24)
SG 4C

11/09 - EOC24

Bobbin WAR at AVB's 1-19%TWD

ROW	COL	VOLTS	DEG	CHN	IND	%TW	LOCATION		EXT	EXT	UTIL 1	UTIL 2	CAL #	LEG	PROBE
12	4	0.24	62	P2	TWD	10	AV4	+0.13	TEH	TEC			1	COLD	720UL
13	4	0.34	130	P2	TWD	15	AV4	+0.17	TEH	TEC			2	COLD	720UL
22	7	0.30	140	P2	TWD	12	AV2	+0.02	TEH	TEC			1	COLD	720UL
22	82	0.22	107	P2	TWD	9	AV1	+0.30	TEH	TEC			16	COLD	720UL
22	83	0.25	93	P2	TWD	9	AV4	-0.08	TEH	TEC			18	COLD	720UL
24	12	0.31	76	P2	TWD	14	AV4	+0.00	TEH	TEC			2	COLD	720UL
26	82	0.31	20	P2	TWD	12	AV1	+0.15	TEH	TEC			16	COLD	720UL
27	80	0.30	98	P2	TWD	12	AV3	-0.11	TEH	TEC			16	COLD	720UL
27	81	0.28	107	P2	TWD	11	AV1	+0.17	TEH	TEC			16	COLD	720UL
		0.31	94	P2	TWD	12	AV4	+0.00	TEH	TEC			16	COLD	720UL
30	15	0.29	132	P2	TWD	13	AV1	+0.00	TEH	TEC			2	COLD	720UL
30	75	0.25	103	P2	TWD	12	AV2	+0.41	TEH	TEC			15	COLD	720UL
31	80	0.29	17	P2	TWD	11	AV3	+0.17	TEH	TEC			14	COLD	720UL
32	16	0.47	46	P2	TWD	19	AV2	+0.09	TEH	TEC			2	COLD	720UL
32	70	0.40	134	P2	TWD	14	AV3	-0.06	TEH	TEC			16	COLD	720UL
33	76	0.28	76	P2	TWD	13	AV1	+0.17	TEH	TEC			15	COLD	720UL
34	17	0.31	59	P2	TWD	11	AV1	-0.08	TEH	TEC			3	COLD	720UL
34	53	0.25	148	P2	TWD	11	AV1	-0.17	TEH	TEC			13	COLD	720UL
34	75	0.31	105	P2	TWD	14	AV4	+0.00	TEH	TEC			15	COLD	720UL
36	74	0.20	21	P2	TWD	8	AV3	-0.02	TEH	TEC			14	COLD	720UL
37	71	0.19	120	P2	TWD	8	AV1	+0.13	TEH	TEC			16	COLD	720UL
37	73	0.23	90	P2	TWD	9	AV3	-0.30	TEH	TEC			14	COLD	720UL
39	69	0.24	49	P2	TWD	10	AV2	-0.11	TEH	TEC			16	COLD	720UL
40	68	0.14	51	P2	TWD	6	AV2	-0.26	TEH	TEC			16	COLD	720UL

Total Tubes : 23
Total Records: 24

Turkey Point Unit 4 (EOC-24)
SG 4C

11/09 - EOC24

+Point™ WAR at Supports (Broach support and Baffle Plate)

ROW	COL	VOLTS	DEG	CHN	IND	%TW	LOCATION		EXT	EXT	UTIL 1	UTIL 2	CAL #	LEG	PROBE
35	75	0.23	99	P5	WAR		06H	+0.23	06H	06H	10	96910.1	55	HOT	680PP

Total Tubes : 1
Total Records: 1

Note: The qualified EPRI sizing technique used for depth estimates is identified in the Util 2 field. For tubes identified with "WAR" in the "IND" column, the %TW depth is identified in the Util 1 field.

Turkey Point Unit 4 (EOC-24)
SG 4C

11/09 - EOC24

+Point™ WAR at AVBs

ROW	COL	VOLTS	DEG	CHN	IND	%TW	LOCATION	EXT	EXT	UTIL 1	UTIL 2	CAL #	LEG	PROBE

Total Tubes : 0
Total Records: 0

No wear indications were reported at the Anti-vibration Bars with +Point™