



APR 06 2000

L-2000-079  
10 CFR § 50.73

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

Re: Turkey Point Unit 3  
Docket No. 50-250  
Reportable Event: 2000-001-00  
Date of Event: March 11, 2000  
Steam Generator Tube Plugging Places  
Steam Generator 3B in Category C-3

The attached Licensee Event Report 250/2000-001-00 is being submitted pursuant to the requirements of 10 CFR § 50.73 to provide notification of the subject event.

If there are any questions, please contact us.

Very truly yours,

A handwritten signature in black ink, appearing to read 'R. J. Hovey', with a long horizontal flourish extending to the right.

R. J. Hovey  
Vice President  
Turkey Point Nuclear Plant

OIH  
Attachment

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

IE22

**LICENSEE EVENT REPORT (LER)**

(See reverse for required number of digits/characters for each block)

Estimated burden per response to comply with this mandatory information collection request: 50 hrs. Reported lessons learned are incorporated into the licensing process and fed back to industry. Forward comments regarding burden estimate to the Records Management Branch (T-6 F33), U.S. Nuclear Regulatory Commission, Washington, DC 20555-0001, and to the Paperwork Reduction Project (3150-0104), Office of Management and Budget, Washington, DC 20503. If an information collection does not display a currently valid OMB control number, the NRC may not conduct or sponsor, and a person is not required to respond to, the information collection.

**FACILITY NAME (1)**  
Turkey Point Unit 3

**DOCKET NUMBER (2)**  
05000250

**PAGE (3)**  
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**TITLE (4)**  
Steam Generator Tube Plugging Places Steam Generator 3B in Category C-3

EVENT DATE (5)			LER NUMBER (6)			REPORT DATE (7)			OTHER FACILITIES INVOLVED (8)	
MONTH	DAY	YEAR	YEAR	SEQUENTIAL NUMBER	REVISION NUMBER	MONTH	DAY	YEAR	FACILITY NAME	DOCKET NUMBER
03	11	2000	2000	- 001	- 00	04	06	2000		
									FACILITY NAME	DOCKET NUMBER

**OPERATING MODE (9)** N

**POWER LEVEL (10)** 0

**THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR §: (Check one or more) (11)**

<input type="checkbox"/> 20.2201(b)	<input type="checkbox"/> 20.2203(a)(2)(v)	<input type="checkbox"/> 50.73(a)(2)(i)	<input type="checkbox"/> 50.73(a)(2)(viii)
<input type="checkbox"/> 20.2203(a)(1)	<input type="checkbox"/> 20.2203(a)(3)(i)	<input checked="" type="checkbox"/> 50.73(a)(2)(ii)	<input type="checkbox"/> 50.73(a)(2)(x)
<input type="checkbox"/> 20.2203(a)(2)(i)	<input type="checkbox"/> 20.2203(a)(3)(ii)	<input type="checkbox"/> 50.73(a)(2)(iii)	<input type="checkbox"/> 73.71
<input type="checkbox"/> 20.2203(a)(2)(ii)	<input type="checkbox"/> 20.2203(a)(4)	<input type="checkbox"/> 50.73(a)(2)(iv)	<input checked="" type="checkbox"/> OTHER
<input type="checkbox"/> 20.2203(a)(2)(iii)	<input type="checkbox"/> 50.36(c)(1)	<input type="checkbox"/> 50.73(a)(2)(v)	Specify in Abstract below or in NRC Form 366A
<input type="checkbox"/> 20.2203(a)(2)(iv)	<input type="checkbox"/> 50.36(c)(2)	<input type="checkbox"/> 50.73(a)(2)(vii)	

**LICENSEE CONTACT FOR THIS LER (12)**

**NAME** Olga Hanek, Licensing Engineer

**TELEPHONE NUMBER (Include Area Code)** (305) 246 - 6607

**COMPLETE ONE LINE FOR EACH COMPONENT FAILURE DESCRIBED IN THIS REPORT (13)**

CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO EPIX	CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO EPIX
B	AB	SG	W120	Y	-	-	-	-	-
-	-	-	-	-	-	-	-	-	-

**SUPPLEMENTAL REPORT EXPECTED (14)**

**YES** (If yes, complete EXPECTED SUBMISSION DATE). X **NO**

**EXPECTED SUBMISSION DATE (15)**

MONTH	DAY	YEAR

**ABSTRACT (Limit to 1400 spaces, i.e., approximately 15 single-spaced typewritten lines) (16)**

On March 11, 2000, with Turkey Point Unit 3 in a refueling outage, eddy current testing of the Unit 3 steam generators identified that more than one percent of the first sample (1 tube of 96 tubes selected) in the B steam generator exceeded program acceptance criteria. This placed the B steam generator inspection results into Category C-3. As required by the Turkey Point Technical Specifications 3/4.4.5, "Steam Generators," Table 4.4-2, a 4-hour, non-emergency report to the Nuclear Regulatory Commission was made pursuant to 10 CFR 50.72(b)(2)(i).

The inspection of the three steam generators was completed on March 16, 2000. A total of 69 tubes in the three steam generators were plugged as a result of this inspection. Five of these tubes were plugged due to mechanical wear at the anti-vibration bars in the u-bend; one of these tubes exceeded the plugging limit specified in the Turkey Point Units 3 and 4 Technical Specification, Section 4.4.5.4.a, and the other four were preventatively plugged prior to exceeding the limit. The remaining 64 tubes contained possible corrosion degradation or original manufacturing indications, and were plugged on detection. Turkey Point maintains a comprehensive steam generator program to minimize steam generator tube degradation.

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TEXT (If more space is required, use additional copies of NRC Form 366A) (17)

Event Description

On March 11, 2000, with Turkey Point Unit 3 in refueling shutdown, eddy current testing of the three Unit 3 steam generators [AB:SG] identified that more than one percent of the first sample (1 tube of 96 tubes selected) in the B steam generator exceeded program acceptance criteria. This placed the B steam generator inspection results into Category C-3. As required by the Turkey Point Technical Specifications 3/4.4.5, "Steam Generators," Table 4.4-2, FPL made a 4-hour, non-emergency report to the NRC pursuant to 10 CFR 50.72(b)(2)(ii). The inspection of the three steam generators was completed on March 16, 2000. A total of 69 tubes in the three steam generators were plugged as a result of this inspection. The total number of tubes plugged include 25 in steam generator A, 28 in steam generator B, and 16 in steam generator C. Five of these tubes were plugged due to mechanical wear at the anti-vibration bars in the u-bend; one of these tubes exceeded the plugging limit specified in the Turkey Point Units 3 and 4 Technical Specification, Section 4.4.5.4.a, and the other four were preventatively plugged prior to exceeding the limit. The remaining 64 tubes contained possible corrosion degradation or original manufacturing indications, and were conservatively plugged on detection since a qualified depth sizing technique is not available.

Background

The Turkey Point Unit 3 steam generators are Westinghouse replacement Model 44F units that were placed in service in 1982. The replacement units include improvements in design and materials over the original units, including alloy 600 thermally treated tubing, low stress tube-to-tubesheet hydraulic expansion joints, and stainless steel quatrefoil tube supports.

This inspection was the 10th inspection of the current steam generators. The operating age of the steam generators was approximately 12.2 Effective Full-Power Years.

Inspection Scope and Results

The planned outage scope was designed to meet Technical Specification requirements as well as the FPL Steam Generator Integrity Program. This is the first outage that enhanced inspections were conducted in accordance with the current standards of industry good practice.

The planned scope for the Spring 2000 Unit 3 outage inspection included bobbin coil techniques for the full length of 50% of the tubes in each steam generator, including all tubes with known degradation, i.e., mechanical wear at anti-vibration bars. In addition, rotating probe techniques were planned for 20% of the hot leg top-of-tubesheet (HL TTS) area, row 1 and 2 U-bends and hot leg dents for each steam generator. The 20% HL TTS inspection was subdivided into first, second and third samples of 3%, 6% and 11% respectively to determine sample results in accordance with Technical Specification Table 4.4-2. This was the first inspection in which extensive rotating probe inspection of the HL TTS area was being conducted.

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On March 11, 2000, a volumetric indication was reported near the secondary face of the tubesheet in the B steam generator. The indication reported was located in a tube that was selected for the first sample, which included 96 tubes. Because this single defective tube resulted in a greater than 1% defective classification (Category C-3), FPL made a 4-hour, non-emergency report to the NRC as required by Turkey Point Technical Specification 3/4.4.5 and 10 CFR 50.72(b)(2)(ii). Expansion to 100% of the B steam generator HL TTS was also required by Turkey Point Technical Specification 3/4.4.5. In addition a sample equal to 6% in the other 2 steam generators was required.

On March 12, 2000, as the expanded inspection in steam generator B proceeded, additional volumetric and circumferential indications were reported. The circumferential indications were reported as originating on the outside diameter (OD) and inside diameter (ID) surface of the tubing.

In steam generator A, the initial planned 20% HL TTS inspection bounded the 6% HL TTS inspection required by Turkey Point Technical Specifications as a result of the C-3 classification in the B steam generator. The results of the first sample inspection did not identify any indications. The results of the second sample inspection (contained within the 20% inspection) placed the A steam generator in category C-2, requiring a third sample of 12% HL TTS, in accordance with the Turkey Point Technical Specifications. The third sample was also classified category C-2, but no further expansion was required by Technical Specifications. The total first, second and third samples completed equaled 21% of the total HL TTS tube population. While Technical Specifications did not require expansion beyond the 21% HL TTS sample in steam generator A, expansion to 100% HL TTS was determined to be an appropriate action based on current industry guidance.

No indications were reported in the 20% HL TTS sample of steam generator C. However management determined a 100% HL TTS inspection was prudent in steam generator C based on the results from steam generator A and B.

The examination was concluded on March 16, 2000. A summary of the inspection findings and the total number of tubes plugged during this inspection were as follows:

Steam Generator	Circumferential Inside Diameter (ID) Outside Diameter (OD)	Volumetric Outside Diameter (OD)	Wear Anti- Vibration Bar	Total Plugged
A	7 ID, 3 OD	13 OD	2	25
B	2 ID, 3 OD	22 OD	1	28
C	6 ID, 2 OD	6 OD	2	16

All volumetric and circumferential indications were detected by the rotating probe, and generally were not detectable by the bobbin probe technique due to their proximity to tube geometry changes at the HL TTS.

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The indications were located very near the top-of-tubesheet on the hot leg. The circumferential indications are characterized as initiated from the ID of some of the tubes and the OD of others. The volumetric indications are noted only on the OD of the tubing. Wear at anti-vibration bar contacts in the U-bend and mechanical damage due to loose parts have been the only damage mechanisms reported in prior inspections.

Steam generator tubes with circumferential and volumetric indications were plugged on detection. Additionally, tubes with indications of wear that exceeded, or were predicted to exceed the through-wall limit of Plant Technical Specifications during cycle 18 operation were also plugged. Tube plugging, including stabilization of circumferential indications, was concluded on March 16, 2000.

Cause of the Event

An investigation was conducted to determine the cause of the tube degradation identified during this inspection. This investigation included a review of the steam generator design features, manufacturing information, inspection techniques, and historical and current chemistry programs. Due to the lack of prior rotating probe inspection data, and the limited number of defects identified by the industry for thermally treated alloy 600 tubing, the results are inconclusive for the circumferential and volumetric indications. Based on the data evaluated, two potential causes can be considered; 1) the indications are true indications generated by stress corrosion cracking and intergranular attack; or 2) the indications are false positive indications induced from manufacturing anomalies or deposits that exist at the top-of-tubesheet, or by inspection techniques associated with the rotating probe. The number of indications found is an inspection transient related to the first time extended use of the rotating probe eddy current technology at Turkey Point.

It is conservative to conclude that some or all of the observed indications are stress corrosion cracking and intergranular attack. Stresses necessary to induce corrosion cracking and intergranular attack are most probably due to the design / manufacturing of the steam generators, specifically the tube to tubesheet joint. These stresses in combination with environmental conditions may produce corrosive attack.

In addition, historical data and industry experience reviews are ongoing to better assess the possible root causes including the possibility that false positive indications were either induced from manufacturing anomalies existing at the top-of-tubesheet, or from inspection techniques associated with the rotating probe.

Safety Consequences and Safety Analysis Impact

The large break loss-of-coolant accident analysis of record assumes that 20 percent of the tubes in each steam generator are plugged. Including the tubes plugged during the March 2000 outage, the following number of tubes (out of 3,214 for each steam generator) are currently plugged in each steam generator:

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Steam Generator	Total tubes plugged	% of tubes plugged
A	45	1.4
B	56	1.7
C	51	1.6

The plugging percentage for each steam generator remains within the current Updated Final Analysis Report allowable limit of 20 percent. Also, evaluation of the indications concluded that they would have performed adequately during postulated accident conditions. Therefore, this event did not compromise the health and safety of plant personnel or the general public.

Corrective Actions

- 1) The original inspection scope was expanded to cover 100% of the HL TTS in all steam generators in order to provide a complete baseline with the rotating probe technology.
- 2) Tubes with indications of potential corrosion degradation found using a rotating probe technique were plugged and stabilized as needed. Five tubes were plugged due to mechanical wear at the anti-vibration bars in the u-bend.
- 3) Historical data and industry experience reviews are ongoing to better assess the possible root causes including the possibility that false positive indications were either induced from manufacturing anomalies existing at the top-of-tubesheet, or from inspection techniques associated with the rotating probe.
- 4) The chemistry program is continually reviewed for enhancement opportunities and compliance with the latest industry guidance. Turkey Point has initiated the addition of ethenolamine (ETA) to reduce iron transport to the steam generators.
- 5) Aggressive sludge removal techniques continue to be used, including high volume bundle flushing.

Similar Events

There were no similar events reported for Turkey Point Units 3 and 4 since the replacement of the steam generators in 1982 and 1983 respectively.

EIIS Codes are shown in the format [EIIS SYSTEM:IEEE component function identifier, second component function identifier (if appropriate)]