NEXTera ENERGY POINT BEACH

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NRC 2017-0046
TS 5.6.8

U.S. Nuclear Regulatory Commission
ATTN: Document Control Desk
Washington, DC 20555

Point Beach Nuclear Plant, Unit 2
Docket 50-301
Renewed License No. DPR-27

Spring 2017 Unit 2 (U2R35)
Steam Generator Tube Inspection Report

Pursuant to the requirements of Point Beach Nuclear Plant (PBNP) Technical Specification, TS 5.6.8 "Steam Generator Tube Inspection Report," NextEra Energy Point Beach, LLC is submitting the 180-day Steam Generator Tube Inspection Report. The enclosure to this letter provides the results of the spring 2017, Unit 2 (U2R35) steam generator tube inspections.

If you have questions or require additional information, please contact me at 920-755-7854.

Sincerely,

NextEra Energy Point Beach, LLC

Eric Schultz
Licensing Manager

Enclosure

cc: Administrator, Region III, USNRC
Project Manager, Point Beach Nuclear Plant, USNRC
Resident Inspector, Point Beach Nuclear Plant, USNRC
PSCW

ENCLOSURE 1

NEXTERA ENERGY POINT BEACH, LLC
POINT BEACH NUCLEAR PLANT, UNIT 2

SPRING 2017 UNIT 2 (U2R35)
STEAM GENERATOR TUBE INSPECTION REPORT

9 pages follow

Enclosure 1

U2R35 Steam Generator Tube Inspection Report

Background

This report is provided in accordance with Point Beach Technical Specification Section 5.6.8, "Steam Generator Tube Inspection Report" for the inspection of the Unit 2 Steam Generators (SGs) conducted in March/April, 2017 during refueling outage U2R35. The U2R35 inspection was the second inspection in the 2nd Inspection Period (120 EFPM). The inspections performed during the U2R35 Refueling Outage (RFO) satisfied the inspection requirements defined in Point Beach Technical Specification Section 5.5.8.d.2.ii.

Shown below is a schedule of inspections in the 2nd Inspection Period (120 EFPM):

U2R32 in 2012: ECT Performed in both SGs
U2R33 in 2014: No ECT Performed
U2R34 in 2015: No ECT Performed
U2R35 in 2017: ECT Performed in both SGs
U2R36 in 2018: No ECT Planned
U2R37 in 2020: No ECT Planned
U2R38 in 2021: ECT Inspection Planned for both SGs

Point Beach Unit 2 contains two (2) Westinghouse Model Delta 47F steam generators (SGs), which were installed in 1997 to replace the original Unit 2 SGs. The replacement Delta 47F SGs are tubed with thermally treated Inconel 690 (I690TT) tubing. At the completion of Cycle 35 (U2R35), the Unit 2 SGs had accumulated 17.1 Effective Full Power Years (EFPY) of operation since replacement. The hot leg operating temperature (T-Hot) of Point Beach Unit 2 is currently ~605 degrees F.

Following the U2R35 refueling outage, Point Beach Unit 2 initially entered MODE 4 on April 10, 2017, which marked the beginning of Cycle 36 for Unit 2. Pursuant to Point Beach Technical Specification 5.6.8, this Steam Generator Tube Inspection Report is required to be submitted to the NRC within 180 days after initial entry into MODE 4.

Implementation of TSTF-510 (Reference 1) was approved by License Amendments 254 and 258 (Reference 2) on Nov. 25, 2015, and incorporated into the Point Beach Technical Specifications to make changes to the sections pertaining to SG tube integrity, the SG program (inspection frequency), and the SG Tube Inspection Report. When TSTF-510 was implemented at Point Beach, the inspection period durations for Unit 2 were adjusted (per the approved license amendments) as follows:

- 1st inspection period (144 EFPM) was not adjusted, remains at 144 EFPM.
- 2nd inspection period (108 EFPM) was adjusted to 120 EFPM
- 3rd inspection period (72 EFPM) was adjusted to 96 EFPM.
- 4th and subsequent inspection periods (60 EFPM) adjusted to 72 EFPM.

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U2R35 Steam Generator Tube Inspection Report

The examination performed during U2R35 met the requirements of the following:

- Technical Specification 5.5.8 "Steam Generator (SG) Program"
- Steam Generator Management Program: Pressurized Water Reactor Steam Generator Examination Guidelines: Revision 7. EPRI, Palo Alto, CA. 2007 TR-1013706.
- EPRI Report 1019038, Steam Generator Management Program (SGMP): Steam Generator Integrity Assessment Guidelines, Revision 3, November, 2009
- The U2R35 inspection scope and plan were based on the Degradation Assessment that was prepared prior to the refueling outage.

Steam Generator Tube Inspection Report

Note: The previous SG Tube Inspection Report from U2R32 is available under NRC Adams Accession # ML13140A015 (Reference 3). Subsequent NRC RAI's (and Nextera Responses) for the U2R32 report are available under NRC Adams Accession # ML13288A142 (Reference 4).

Following is the Steam Generator Tube Inspection Report for U2R35:

Each applicable reporting requirement of TS 5.6.8 is addressed below in items "a" through "g" for the U2R35 inspection in 2017.

a. The Scope of Inspections Performed on each SG

(Both SGs were examined during U2R35).

The inspection program for the Unit 2 Steam Generators consisted of:

Bobbin Probe

- 100% full length in rows 3 and higher; Row 1 & 2 examinations limited to the hot leg (HL) and cold leg (CL) straight sections.

+Point™ Rotating Probe

- 34% of tight radius u-bends in Row 1
- 34% of tight radius u-bends in Row 2
- 100% of HL freespan Dings/Dents >5.0 volts between TSH and 07H +1.00".
- 100% Dings/Dents >5.0 volts in the u-bends
- 100% Dings/Dents >5.0 volts at HL tube supports.
- All Hot Leg and Cold Leg Periphery Expansion Transitions - +3"/-3" from top of tubesheet. "Periphery Tubes" are defined as the three outer-most peripheral tubes exposed to the annulus, and Rows 1 through 4 along the tube free lane

- All tubes adjacent to reported foreign objects from U2R35 Foreign Object Search and Retrieval (FOSAR).
- All tubes adjacent to reported Possible Loose Part (PLP) from U2R35 +Point™ examination.
- All tubes adjacent to PLP indications reported during U2R32 +Point™ examination.
- Diagnostic rotating probe examinations (Special interest, SI) were completed as required based on the results of the bobbin coil.

Plug Visual Inspection

100% of the installed tube plugs in the Unit 2 SG B were visually inspected during U2R35.

This included:

- Four (4) HL plugs and four (4) CL plugs in SG B
- There are no tubes plugged in SG A.

All previously-installed tube plugs were confirmed to be in their correct locations, and showed no visible signs of leakage based on the visual examination. No degradation of the tube plugs was identified.

Primary Side Inspections to address Westinghouse NSAL 12-01

Channel head bowl scan visual inspection of each SG per recommended actions in Westinghouse NSAL 12-1 "Steam Generator Channel Head Degradation" January 5, 2012 (Reference 5). No degradation was found during the visual inspection of the primary-side channel head bowls in either SG. No erosion or corrosion-related degradation was identified anywhere in the channel head of the SGs.

Secondary Side Cleaning and Inspections

The following secondary side work was performed in both steam generators:

- Sludge Lancing at the top of tubesheet and top of the Flow Distribution Baffle (FDB)
- FOSAR
- Upper Steam Drum internals visual inspection (in one selected SG, SG B)
- Upper Tube Bundle visual inspection through top inspection port (in one selected SG, SG B).

The sludge lancing process resulted in the removal of the following amounts of sludge:

- 16.0 lbs of sludge from SG A,
- 20.5 lbs of sludge from SG B.

Post sludge lancing FOSAR was performed at the top of the tubesheet and top of the Flow Distribution Baffle, in the HL and CL of both SGs. During FOSAR, two (2) newly-identified foreign objects were reported in SG A. There were no objects identified in SG B. Both of the foreign objects identified in SG A were small-grade wire bristles up to ~0.031" in diameter.

One of the wire bristles was retrieved; the other was not removed based on an engineering evaluation which shows it will not pose a threat to tube integrity over the next 3 cycles, and will likely be removed from the SG during normal SG operation. The location of the non-retrieved wire bristle will be visually examined the next time that FOSAR is performed.

There are no fixed foreign objects being tracked in the Unit 2 SGs. There was no foreign object wear reported by visual or ECT inspections.

In addition to the FOSAR, primary side eddy current inspections using the rotating +Point™ coil were performed on all periphery tubes at the top-of-tubesheet locations (in the hot leg and cold leg of both SGs). No foreign object wear was reported during the periphery tube +Point™ coil examinations.

Upper Steam Drum Inspection

Upper Steam Drum visual inspections were performed in one SG (SG B). The upper internal components inspected included primary separators, secondary separator perforated plates, feedring, J-nozzles, thermal sleeve, and general areas. No erosion or corrosion-related degradation was observed during any of the upper steam drum inspections.

During the SG B feedring inspection, special cameras were used to inspect the feedring j-nozzles. After the cameras were removed from the steam generator, two small pieces of material (each measuring .244" X .060") made of Nitinol (a Nickel/Titanium alloy) were noticed to be missing from the two cameras. The missing pieces from the cameras were never found or retrieved, so it is not known if the pieces were left in the SG or if the missing pieces became detached while the cameras were outside the SG. However, to be conservative, it is assumed that the foreign objects remain in the SG. An engineering evaluation for these foreign objects was performed, and it was determined that the foreign objects can safely remain in the SG for 3 cycles of operation.

Upper Tube Bundle Inspection

An inner tube bundle inspection was performed above the 7th (uppermost) broached Tube Support Plate (TSP) location in SG B to determine the general secondary side conditions in the upper tube bundle. There was no visible sludge on top of the support plate. The flow holes in the open tube lane and the tri-foil broached support openings were open. No scale or deposits could be seen on the tubes. The overall condition noted during the inner tube bundle inspection was very clean.

b. Degradation Mechanisms Found

There were no indications of corrosion-related tube degradation reported during the U2R35 inspections.

The U2R35 examination results for Point Beach Unit 2 identified mechanical wear at the following locations:

- Mechanical Wear Indications at Anti-vibration Bars (AVBs)
- Mechanical Wear at Broached Tube Support Plates (TSPs)

Mechanical Wear Indications at AVBs

Table 3 lists the AVB wear indications reported during U2R35. In SG A, there were nine (9) AVB wear indications in six (6) tubes. All nine (9) AVB wear indications were sized with the bobbin coil. The deepest wear indication in SG A was 10% through-wall (TW). None of the AVB wear indications required plugging per Technical Specifications and all remained in service. There were no AVB wear indications in SG B.

Mechanical Wear Indications at Broached TSPs

Table 4 lists the broached TSP wear indications (in both SGs) identified in U2R35. In SG A, there were three (3) TSP wear indications in two (2) tubes. In SG B, there was one (1) TSP wear indication.

The results of the sizing showed wear at each of the broached TSP locations with wear depths ranging from 2% to 7% through-wall. Table 4 shows all broached TSP wear indications (in both SGs).

c. Nondestructive examination techniques utilized for each degradation mechanism

The following is the list of EPRI technique sheets (ETSSs) used for detection for the specific types of degradation listed below.

Table 1
U2R35 Detection Techniques

AVB Wear	96041.1 (Bobbin Coil)
TSP/FDB Wear	96004.1 (Bobbin Coil)
TSP/FDB Wear	96910.1 (+Point™ Coil)
Loose Part (Foreign Object) Wear	27091.2 (Bobbin Coil)
Loose Part (Foreign Object) Wear	21998.1 (+Point™ Coil)
Ding/Dent ODSCC	24013.1; 10013.1 (Bobbin Coil)
Ding/Dent ODSCC	22401.1; 21409.1; 21410.1 (+Point™ Coil)
Volumetric/Freespan	21998.1 (+Point™ Coil)

Only two types of degradation were detected during U2R35; wear at AVBs and wear at broached TSPs. The following list provides the EPRI technique sheets (ETSSs) used for sizing those specific types of degradation.

Table 2
U2R35 Sizing Techniques

AVB Wear	96041.1 (Bobbin Coil)
Broached TSP Wear	96910.1 (+Point™ Coil)

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

The table below lists the AVB wear indications reported in U2R35.

Table 3
U2R35 AVB Wear

SG	ROW	COLUMN	%TW	LOCATION
A	82	69	4	AV1 -0.12"
A	79	62	9	AV3 -0.05"
A	79	62	7	AV4 +0.07"
A	78	59	5	AV4 +0.18"
A	78	59	4	AV5 +0.16"
A	79	66	5	AV5 +0.00"
A	84	63	3	AV5 -0.05"
A	84	45	10	AV5 -0.02"
A	84	45	3	AV6 -0.26"

The table below lists the Broached TSP wear reported in U2R35.

Table 4
U2R35 Broached TSP Wear

SG	ROW	COLUMN	%TW	LOCATION
A	12	53	3	06H -0.49"
A	12	53	4	06H -0.56"
A	15	64	2	05H -0.68"
B	1	26	7	05C -0.50"

Note: There were no wear indications reported at the FDB in either SG.
There were no foreign object wear indications reported in either SG.

e. Number of tubes plugged during the inspection outage for each degradation mechanism,

No tubes were plugged during U2R35.

f. The number and percentage of tubes plugged to date, and the effective plugging percentage in each steam generator,

No tube repair methods (i.e. sleeving) are approved for Point Beach Unit 2 that would have an effect on the effective plugging percentages. Therefore, the applicable effective plugging percentage is synonymous with the % Plugged shown in Table 5 below.

Table 5
Total Tubes Plugged and Plugging Percentage

	SG A	SG B
Total Tubes Plugged	0 of 3499	4 of 3499
Plugging Percentage	0.000%	0.114%

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

All SG tubes during the U2R35 outage met the condition monitoring (CM) requirements for structural and leakage integrity. No evidence of corrosion degradation was detected. No primary to secondary leakage was reported since the last inspection. No indications were found to exceed structural limits. The next inspection is planned for the U2R38 outage. (A primary-side inspection is not planned for the U2R36 or U2R37 outage.) The following section provides more detailed discussion of the conditioning monitoring performed at U2R35.

AVB Wear

The condition monitoring limit for AVB wear is 48% TW. The reported maximum depth of the AVB indications at U2R35 was 10%TW, which is well below the condition monitoring limit. Therefore, condition monitoring was satisfied for AVB wear in SG A. No AVB wear was detected in SG B.

Wear at Tube Support Plates

The condition monitoring limit for flat wear at TSP is 41% TW. The reported maximum depth of the TSP wear indications at U2R35 was 7%TW, which is well below the condition monitoring limit. Therefore, condition monitoring was satisfied for tube wear at broached TSPs.

In summary, all wear indications detected in U2R35 met CM requirements. As a result, no tubes required in-situ pressure testing for burst or leakage, and no tube pulls were required. Therefore, all tubes met the structural and leakage integrity requirements of the Point Beach Unit 2 Technical Specifications.

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U2R35 Steam Generator Tube Inspection Report

Appendix A
Acronyms

AVB	Anti Vibration Bar
CL	Cold Leg
ECT	Eddy Current Testing
EFPM	Effective Full Power Months
EPRI	Electric Power Research Institute
ETSS	Examination Technique
FDB	Flow Distribution Baffle
FOSAR	Foriegn Object Search and Retrieval
HL	Hot Leg
OD	Outside Diameter
ODSCC	Outside Diameter Stress Corrosion Cracking
PLP	Possible Loose Part
RAI	Request for Additional Information
RFO	Refueling Outage
SG	Steam Generator
TSP	Tube Support Plate
%TW	Percent Throughwall Depth

Enclosure 1

U2R35 Steam Generator Tube Inspection Report

Appendix B
References

References

1) NRC Document TSTF-510, Rev 2, "Revision to Steam Generator Program Inspection Frequencies and Tube Sample Selection".

2) NRC License Amendment 254 and 258, Letter dated November 25, 2015 "Point Beach Nuclear Plant, Units 1 and 2 – Issuance of Amendments for the Steam Generator Technical Specifications, to Reflect Adoption of TSTF-510 RE: (TAC NOS. MF6043 and MF6044)." (ADAMS Accession No. ML15293A457).

3) "Fall 2012 Unit 2 (U2R32) Steam Generator Tube Inspection Report" (NRC Adams Accession # ML13140A015). Document Date 5/16/2013.

4) "Response to Request for Additional Information Fall 2012 Unit 2 (U2R32) Steam Generator Tube Inspection Report". (NRC Adams Accession # ML13288A142). Document Date 10/14/2013.

5) Westinghouse Nuclear Safety Advisory Letter (NSAL) 12-01, Steam Generator Channel Head Degradation, 01/05/2012.