Exelon Nuclear

Exelon Generation Company, LLC
Byron Station
4450 North German Church Road
Byron, IL 61010-9794

www.exeloncorp.com

June 30, 2008

LTR: BYRON 2008-0063
File: 3.11.0320
1.10.0101

U. S. Nuclear Regulatory Commission
ATTN: Document Control Desk
Washington, DC 20555-0001

Byron Nuclear Power Station, Unit 1
Facility Operating License NPF-37
NRC Docket No. STN 50-454

Subject: Byron Station Unit 1 Steam Generator Inservice Inspection Summary Report for Refueling Outage 15

In accordance with Technical Specification 5.6.9, "Steam Generator (SG) Tube Inspection Report," Exelon Generation Company, LLC is reporting the results of the steam generator inspections that were completed during the Byron Station Unit 1, Refueling Outage 15. The attached report is also being submitted in accordance with the requirements of the American Society of Mechanical Engineers (ASME) Boiler and Pressure Vessel Code, 2001 Edition through the 2003 Addenda, Section XI, "Rules for Inservice Inspection of Nuclear Power Plant Components," Article IWA-6000, "Records and Reports," and Paragraph II-890.2.3, "Reporting" of ASME Section V "Nondestructive Examination", Article 8 – Appendix II, "Eddy Current Examination of Non-Ferromagnetic Heat Exchanger Tubing", 2001 Edition through the 2003 Addenda.

If there are any questions regarding this report, please contact W. Grundmann, Regulatory Assurance Manager, at (815) 406-2800.

Respectfully,

David M. Hoots
Site Vice President
Byron Nuclear Generating Station

Attachment: Byron Station Unit 1 Steam Generator Eddy Current Inspection Report
Refueling Outage 15, March 2008

DMH/JRS/TLH/vym

Exelon Generation Company, LLC

BYRON STATION UNIT 1
4450 North German Church Road
Byron, Illinois 61010

COMMERCIAL OPERATION: September 16, 1985

BYRON STATION UNIT 1
STEAM GENERATOR EDDY CURRENT INSPECTION REPORT

REFUELING OUTAGE 15

March 2008

Exelon Generation Company, LLC
200 Exelon Way
Kennett Square, PA 19348

Mailing Address
4300 Winfield Road
Warrenville, IL 60555

Documentation Completed Date: June 16, 2008

TABLE OF CONTENTS

1.0 INTRODUCTION

Byron Station Unit 1 operates with four Babcock & Wilcox Replacement Steam Generators (SGs) in the four loop pressurized water reactor system. The SGs each contain 6633 thermally treated Alloy-690 U-tubes that have a nominal diameter of 0.6875 inches and a nominal thickness of 0.040 inches. The tubes are supported by stainless steel lattice grid structures and fan bars. The tubes are hydraulically expanded into the full depth of the tubesheet. Main Feedwater enters the SGs above the tube bundle through a feedring and J-tubes. The SG configuration is shown in Figure A.1. The replacements SGs were installed during the eighth refueling outage.

In accordance with Byron Station Technical Specification (TS) 3.4.19, "Steam Generator (SG) Tube Integrity", TS 5.5.9, "Steam Generator (SG) Program," and American Society of Mechanical Engineers (ASME) Boiler and Pressure Vessel (B&PV) Code Section XI 2001 Edition through the 2003 Addenda, IWB 2500-1, Examination Category B-Q, Item B16.20, SG eddy current examinations were performed during the Byron Station, Unit 1 Refueling Outage 15.

The Byron Unit 1 SG's are currently in their first 144 effective full power month (EFPM) inspection interval following SG replacement, per TS 5.5.9.d.2. The Byron Unit 1 SG's have operated 102.14 EFPM within the 144 EFPM Inspection Period at Refueling Outage 15. Refueling Outage 15 was neither the inspection period mid-point outage nor the inspection period end-point outage. The mid-point inspection outage was conducted during Refueling Outage 13 (67.9 EFPM within the inspection period) and the end-point inspection outage is expected to be conducted during the Refueling Outage 17 inspection.

The Refueling Outage 15 inspections were performed consistent with the Electric Power Research Institute (EPRI) "PWR Steam Generator Examination Guidelines: Revision 6", applicable interim guidance and Nuclear Energy Institute (NEI) 97-06, "Steam Generator Program Guidelines, Revision 2." Westinghouse Electric Company LLC conducted the field inspection activities from March 27 through April 5, 2007. The following tube inspections were performed during this outage (TS 5.6.9.a).

- 100% Full Length Bobbin Coil in all four SGs
- 100% Plus-Point of the Hot Leg Dents/Dings $\geq$2.0 volts in all four SGs
- 100% Visual Inspection of Previously Installed Welded Tube Plugs
- 100% Visual Inspection of Previously Installed Mechanical Tube Plugs in all four SGs
- 100% Visual Inspection of Newly Installed Tube Plugs

2.0 SUMMARY

The guidance in Revision 6 of the EPRI "PWR Steam Generator Examination Guidelines" (i.e., EPRI Guidelines and applicable interim guidance) was used during this inspection. A degradation assessment was performed prior to each inspection to ensure the proper EPRI Appendix H, "Performance Demonstration for Eddy Current Examination," qualified inspection techniques were used to detect any existing and potential modes of degradation. Each technique was evaluated to ensure that the detection and sizing capabilities are applicable to the Byron Station, Unit 1 site-specific condition in accordance with Section 6.3.2 of the EPRI Guidelines. All data analysts were qualified to Appendix G, "Qualification of Nondestructive Examination Personnel for Analysis of Nondestructive Examination Data," of the EPRI Guidelines (i.e., Qualified Data Analyst (QDA)). All data analyst and acquisition personnel satisfactorily completed site specific performance training and testing. An independent QDA process control review was employed to randomly sample the data to ensure that the analysis resolution process was properly performed and that the field calls were properly reported. An analysis feedback process was implemented that required the data analysts to review their missed calls and overcalls on a daily basis.

The modes of tube degradation found during the current inspection were fan bar wear, and lattice grid support plate wear. Pursuant to EPRI Guideline Section 3.5, "Inspection Results Categories", the results of the inspection were classified as inspection category C-1 for all SG's. There were no scanning limitations during the examinations.

As a result of the current eddy current inspections and response to conditions found, a total of thirteen (13) tubes were preventatively repaired by tube stabilization and tube plugging. Table 2.1 provides the tube plugging levels for each SG. Table 2.2 provides the total number of tubes plugged in the current outage by degradation mode.

TABLE 2.1
Equivalent Tube Plugging Level (TS 5.6.9.f & TS 5.6.9.h)

	SG A	SG B	SG C	SG D	TOTAL
Tubes Previously Plugged	1	1	1	5	8
Tubes Plugged in Cycle 13	0	0	13	0	13
Total Tubes Plugged	1	1	14	5	21
Total Tubes Plugged (%)	0.015%	0.015%	0.21%	0.075%	0.08%

* Each SG contains 6633 Tubes

TABLE 2.2
Tubes Plugged During Refueling Outage 15 (TS 5.6.9.e)

Mode of Degradation	SG A	SG B	SG C	SG D	Total
Fan Bar Wear	0	0	0	0	**0**
Lattice Grid Wear	0	0	0	0	**0**
Foreign Object Wear	0	0	0	0	**0**
Preventatively Plugged	0	0	13	0	**13**
Refueling Outage 15 Plugging Totals	**0**	**0**	**13**	**0**	**13**

3.0 CERTIFICATIONS

3.1 Procedures/Examinations/Equipment

3.1.1 The examination and evaluation procedures used during the eddy current inspection were approved by personnel qualified to Level III in accordance with the 1984 Edition of the American Society for Nondestructive Testing (ASNT) Recommended Practice SNT-TC-1A, "Personnel Qualification and Certification in Nondestructive Testing" and the 1991 and 1995 Editions of the American National Standards Institute (ANSI)/ASNT CP-189, "ASNT Standard for Qualification and Certification of Nondestructive Testing Personnel." Exelon Generation Company, LLC (EGC) procedure ER-AP-335-039, "Multifrequency Eddy Current Data Acquisition of Steam Generator Tubing," Revision 4 and EGC procedure ER-AP-335-040, "Evaluation of Eddy Current Data for Steam Generator Tubing," Revision 3, were used for data acquisition and analysis.

3.1.2 The examinations, equipment, procedures and personnel were in compliance with the following requirements: the EGC and Westinghouse Quality Assurance Programs for Inservice Inspection; Byron Station Technical Specification 5.5.9; 2001 Edition through the 2003 Addenda of the ASME B&PV Code Section XI, "Rules for Inservice Inspection of Nuclear Power Plant Components"; 2001 Edition through the 2003 Addenda of the ASME B&PV Code Section V, "Nondestructive Examination"; Revision 6 of the EPRI PWR SG Examination Guidelines; and NEI 97-06, "Steam Generator Program Guidelines," Revision 2.

3.1.3 Certification packages for examiners, data analysts, and equipment are available at Byron Station. Table A.1 and Table A.2 contained in Attachment A lists all personnel who performed, supervised, or evaluated the data during the current inspection.

3.1.4 Corestar International Corporation Model Omni-200™ Remote Data Acquisition Units (RDAUs) with ANSER Version 8.4.3, Revision 299 software was used to acquire the eddy current data. Analysis was performed with Westinghouse ANSER Version 8.4.3, Revision 299 computer software and Corestar EddyVISION®32 Release 6.3 computer software.

3.1.5 The bobbin coil examinations were performed with a 0.560-inch diameter bobbin coil eddy current probe. A 0.540-inch diameter probe was used in Rows 1 through 8 where there was difficulty traversing the low radius U-bend region.

3.1.6 The special interest and dent/ding rotating coil examinations were performed with a 0.560-inch diameter three-coil rotating plus-point probe that contained a plus-point coil, a 0.115-inch diameter pancake coil and a 0.080-inch diameter pancake coil.

3.1.7 The rotating coil examinations in the U-Bend region were performed with a 0.520-inch diameter rotating plus-point probe.

3.2 Personnel

3.2.1 The personnel who performed the SG eddy current inspection data acquisition were qualified to Level II or Level I in accordance with the 1984 Edition of the ASNT Recommended Practice SNT-TC-1A, "Personnel Qualification and Certification in Nondestructive Testing" or the 1995 Edition of ANSI/ASNT CP-189, "ASNT Standard for Qualification and Certification of Nondestructive Testing Personnel." A list of certified eddy current personnel who performed data acquisition for the examination are contained in Table A.1 of Attachment A.

3.2.2 The personnel who performed the SG eddy current data analysis were qualified to a minimum of Level II, with special analysis training (i.e., Level IIA) in accordance with the 1984 Edition of the ASNT

Recommended Practice SNT-TC-1A, "Personnel Qualification and Certification in Nondestructive Testing" or the 1995 Edition of ANSI/ASNT CP-189, "ASNT Standard for Qualification and Certification of Nondestructive Testing Personnel." A list of certified eddy current personnel who performed data analysis for the examination are contained in Table A.2 of Attachment A

3.2.3 All SG eddy current data analysts were qualified in accordance with EPRI Appendix G for QDA's. In addition, all data analysts were trained and tested in accordance with a site specific performance demonstration program in both the bobbin coil and plus-point inspection data analysis. Resolution analysts were also trained and tested specifically for the performance of data resolution. All analysts were required to achieve a minimum probability of detection of 80% with a 90% minimum confidence level on practical examinations and a minimum score of 80% on the written test prior to analyzing data.

3.2.4 All SG eddy current data acquisition personnel were trained and tested in accordance with a site specific performance demonstration program. The data acquisition operators were required to achieve a written test score of 80% or greater prior to acquiring data.

3.2.5 The SG eddy current analysis was subject to two independent analyses. Primary analysis of all data was performed by personnel from Westinghouse Electric Company, Areva and HRID. Secondary analysis was performed by personnel from NDE Technology, Wiltec, Young Technology Services, Moretech and Anatec. Discrepancies between the two parties required Level III concurrence between both parties for the final resolution. Data Resolution was performed by personnel from Westinghouse, Master-Lee, Moretech and NDE Technologies.

3.2.6 Two independent SG eddy current Level III QDA's who were not part of the resolution team were employed to serve as a process control reviewer, in accordance with EPRI Guidelines, Sections 6.3.3 and 6.7. The Independent Level III QDA randomly sampled the data to ensure the resolution process was properly performed and that the field calls were properly reported. The Independent Level III QDA also provided data acquisition oversight to ensure that the data collection process was in compliance with appropriate procedures, that all essential variables were set in accordance with the applicable Examination Technique Specification Sheet (ETSS) and to provide a data quality check of acquired data. The Independent Level III QDA reported directly to the EGC Nondestructive Examination Level III.

3.2.7 Personnel from Westinghouse Electric Company, Master-Lee and Hudson performed data acquisition.

3.2.8 Real time data quality verifications were performed by personnel qualified as data analysts.

4.0 EXAMINATION TECHNIQUE AND EXAMINATION SCOPE

All eddy current examination techniques used are qualified in accordance with Appendix H of the EPRI PWR SG Examination Guidelines. Each examination technique was evaluated to be applicable to the tubing and conditions of the Byron, Unit 1 SGs.

4.1 SG Tube Examination Techniques (TS 5.6.9.c)

4.1.1 The bobbin coil examinations were performed with a 0.560 inch diameter bobbin coil eddy current probe described in Section 3.1.5. For low row U-Bend regions in Rows 8 and lower, a 0.540-inch diameter bobbin probe was utilized where there was difficulty traversing the U-bend region. The nominal probe inspection speed was 40 inches per second for the 0.560-inch diameter probe and 24 inches per second for the 0.540-inch diameter probe and for the 0.560-inch probe in the low row tubes. Sufficient sampling rates were used to maintain a minimum of 30 samples per inch. The bobbin coil probes were operated at frequencies of 650 kHz, 320 kHz, 160 kHz, and 35 kHz operating in the differential and absolute test modes. In addition, suppression mixes were used to enhance the inspection. These mixes were as follows: 650/160 kHz differential mix, a 320/160 kHz absolute mix, and a 650/320/160 kHz differential mix. The 650/320/160 kHz differential mix was used to aid in detection of foreign objects and foreign object wear.

4.1.2 The rotating coil and plus-point examinations were performed with a 0.560-inch diameter three-coil plus-point eddy current probe described in Section 3.1.6. The nominal probe speed was 0.4 inches per second in straight sections, and 0.1 inches per second for dents and dings. A sampling rate was used to maintain a minimum of 30 samples per inch in the circumferential direction and 25 samples per inch in the axial direction. For dents and dings, a sampling rate was used to maintain a minimum of 30 samples per inch in the circumferential direction and 30 samples per inch in the axial direction. The rotating probes were operated at frequencies of 300 kHz, 200 kHz, 100 kHz and 20 kHz. In addition to the four base frequencies, four process channels were used to display circumferential indications in the positive trace and to provide a suppression mix for indications at the lattice grid

4.1.3 The plus-point examinations in the U-bend regions were performed with a 0.520-inch diameter plus-point probe described in Section 3.1.7. The nominal probe speed was 0.3 inches per second. A sampling rate was used to maintain a minimum of 30 samples per inch in the circumferential direction and 25 samples per inch in the axial direction. The plus-point probe was operated at frequencies of 400 kHz, 300 kHz, 100 kHz, and 20 kHz. In addition to the four base frequencies, four process channels were used to display circumferential indications in the positive trace and to provide a suppression mix for indications at the fan bar support.

4.1.4 The eddy current calibration standards used for the bobbin coil and plus-point inspections met the requirements of Section 6.2.7 of the EPRI PWR Steam Generator Examination Guidelines, Revision 6 and Sections V and XI of the ASME B&PV Code, 2001 Edition through the 2003 Addenda.

4.1.5 The SG eddy current examination techniques used during this inspection were equivalent to the EPRI Appendix H techniques listed in Table 4.1. Each Examination Technique Specification Sheet (ETSS) was evaluated and determined to be applicable to the site conditions.

Table 4.1
EPRI Appendix H Techniques

EPRI ETSS	ETSS Revision	Probe	Description
96004.3	11	Bobbin	Fan Bar Wear and Lattice Grid Wear
96008.1	14	Bobbin	Tube Support Plate (TSP) Outer Diameter Stress Corrosion Cracking (ODSCC)
96010.1	7	Bobbin	Small volume manufacturing burnish marks in free span
96703.1	17	Plus-Point	Dent/Ding Axial PWSCC
96910.1	10	Plus-Point	Support Plate Tapered Wear Flaw Sizing
20510.1	7	Plus-Point	Expansion Transition/Tubesheet (TS) Bulge-Overexpansion Dent/Ding Circumferential PWSCC
20511.1	8	Plus-Point	Expansion Transition/TS Bulge-Overexpansion Axial PWSCC
21409.1	5	Plus-Point	Sludge Pile/Crevice/Expansion Transition Axial ODSCC
21410.1	6	Plus-Point	Expansion Transition/Dent/Ding Circumferential ODSCC
21998.1	4	Plus-Point	Foreign Object Wear/Free Span Volumetric Indications
22401.1	4	Plus-Point	Dent/Ding Axial ODSCC

4.2 SG Tube Inspection Scope (TS 5.6.9.a)

4.2.1 100% of the tubes in all SGs were inspected full length, tube end to tube end, with a bobbin coil probe described in Section 4.1.1 above.

4.2.3 100% of the hot leg dents and dings that are $\geq$2.0 volts were inspected with a plus-point probe described in Section 4.1.2. A total of 2 hot leg dings comprised the 100% hot leg dent/ding inspection population. One was in the 1A SG and the other was in the 1B SG.

4.2.4 Diagnostic examinations were conducted on the following types of indications and conditions using a rotating probe described in Section 4.1.2 and 4.1.3:

- Non-quantifiable indications that were detected by the bobbin coil examination
- Tubes in the vicinity of potential foreign objects in order to determine the extent of tubes potentially affected by the objects.
- A 25% sample of new fan bar wear indications (25 total)
- All new lattice grid wear indications (2 total)

A total of 116 tubes were inspected as a result of these diagnostic examinations.

4.2.5 Attachment B contains tube sheet maps indicating the tube inspections that were performed during Refueling Outage 15.

4.3 Recording of Examination Data

The raw eddy current data and analysis results were recorded on digital data storage media. The data was then loaded into the Westinghouse Eddy Current Data Management System, "ST Max," version 1.21.02. This system was used to track the proper examination of all tubes and it was also used to generate the final eddy current report summaries.

4.4 Witness and Verification of Examination

Eddy current inspections were witnessed and/or verified by the Authorized Nuclear Inservice Inspectors, Mr. Jeff Hendricks and Mr. Lee Malabanan, of the Hartford Steam Boiler of CT of Hartford Connecticut, Chicago Branch, 2443 Warrenville Road, Suite 500, Lisle, Illinois 60532-9871.

The Refueling Outage 15 ASME Form NIS-1, "Owners Report for Inservice Inspections," is contained in Attachment D.

The Refueling Outage 15 ASME Form NIS-2, "Owner's Report for Repair/Replacement Activity" for steam generator mechanical tube plugging activities is contained in Attachment E.

5.0 EXAMINATION RESULTS

5.1 Indications Found (TS 5.6.9.b)

5.1.1 Fan Bar Wear – Tube degradation was found during the Refueling Outage 15 bobbin coil examination in the U-bend region due to fretting of the fan bar supports on the tube. A total of 146 indications in 125 tubes were reported. The EPRI Appendix H bobbin coil examination technique 96004.3 was utilized in this inspection for the depth sizing of fan bar wear. No tubes exceeded the 40% TW repair limit and no tubes were plugged due to fan bar wear. The largest indication found was 20% through wall (TW) and was found in tube R86-C63 in SG 1B. The depth of the fan bar wear ranged from 1% TW to 20% TW. (Table 5.1.1 provides a summary of fan bar wear degradation. Attachment C provides a listing of all tube flaws containing measurable through wall depth and inservice indications, including fan bar wear.

Table 5.1.1
Refueling Outage 15 Fan Bar Wear Summary

	SG A Indications	SG B Indications	SG C Indications	SG D Indications
<10% TW	15	55	16	33
10-19% TW	6	11	4	5
>= 20% TW	0	1	0	0
TOTAL *	21	67	20	38

5.1.2 Foreign Object Wear – There were no indications of foreign object wear detected during the Refueling Outage 15 inspection. See Section 5.2.3 for preventative plugging due to a non-retrievable foreign object with no associated tube wear.

5.1.3 Lattice Grid Wear – Three (3) tubes were found that contained indications of lattice grid wear. The depth of the lattice grid wear ranged from 4% TW to 10% TW as measured by the EPRI Appendix H qualified bobbin coil examination technique 96004.3. No tubes were plugged as a result of lattice grid wear. Table 5.1.3 below provides a summary of tubes that contain lattice grid wear.

TABLE 5.1.3
Refueling Outage 15 Lattice Grid Wear Summary

SG	Row	Column	Support Location	NDE Depth
1B	118	73	07H	10%
1D	51	8	08C	4%
1D	117	78	07H	4%

5.2 Other SG Inspection Results

5.2.1 Hot Leg Dent/Ding Inspection: During Refueling Outage 15, 100% of the hot leg dents and dings $\geq$ 2.0 volts were inspected with a three-coil rotating probe, which included a plus-point coil. A total of two tubes contained dings that met the inspection criteria and were inspected. No indication of degradation was found as a result of these inspections.

5.2.2 Visual Inspection of Installed Tube Plugs – All previously installed welded plugs and previously installed mechanical plugs were visually inspected for signs of degradation and leakage. A total of 2 welded plugs and 14 mechanical plugs were visually inspected. In addition, all plugs installed during this outage (i.e., 26 mechanical plugs in 13 tubes) were also visually inspected and the installation parameters were reviewed for acceptable installation. No anomalies were found.

5.2.3 Tubesheet Visual Inspection– Visual inspection of the secondary tubesheet was performed following sludge lancing activities in each SG. The tube annulus, tube lane, and peripheral tubes (6-8 tubes deep) were visually inspected for foreign material. A total of three foreign objects were found during these inspections. A machine turning was found in the 1BSG, a small drilling chip was found in the 1D G and a piece of gasket material was found in the 1C SG. The machine turning and drilling chip were successfully removed from the SG's. The gasket piece in the 1C SG was not retrieved and remains in the SG, following preventative tube plugging.

Thirteen (13) tubes were preventatively plugged and stabilized that did not contain tube flaws or service induced degradation. The tubes were preventatively removed from service to surround a confirmed foreign object characteristic of gasket material that could not be removed from the 1C steam generator. The foreign object did not cause any tube damage. The object was initially detected by visual inspection. The thirteen tubes removed from service included additional tubes not directly adjacent to the foreign object, but were removed from service to ensure that if the object migrated out of the plugged tube box, the object would be in a lower flow velocity field to ensure any potential tube fretting would be acceptable over the next two operating cycles based on an evaluation. The evaluation considered tube vibration, flow conditions and the mass of the object. Table 5.2.4-1 lists those tubes that were preventatively plugged and stabilized due to the non-retrievable object located on the secondary tubesheet.

Table 5.2.4-1
B1R15 Preventative Tube Plugging/Stabilizing
For Foreign Object-1C SG

Row-Col	Row-Col	Row-Col
107-96	108-97	107-98
106-99	105-98	106-97
103-98	104-97	105-96
106-95	102-97	103-96
104-95	--	--

5.2.4 Attachment C contains tube lists with axial elevations of all tube flaws that contain measurable through wall depth and inservice indications that were found during the Refueling Outage 15 eddy current inspection (TS 5.6.9.d).

6.0 RESULTS OF CONDITION MONITORING (TS 5.6.9.g)

A condition monitoring assessment was performed for each inservice degradation mechanism found during the Refueling Outage 15 inspection. The condition monitoring assessment was performed in accordance with TS 5.5.9.a and NEI 97-06 using the EPRI Steam Generator Integrity Assessment Guidelines, Revision 2. For each identified degradation mechanism, the as-found condition was compared to the appropriate performance criteria for tube structural integrity, accident induced leakage and operational leakage as defined in TS 5.5.9.b. For each damage mechanism a tube structural limit was determined to ensure that SG tube integrity would be maintained over the full range of normal operating conditions and design basis accidents. This includes retaining a safety factor of 3.0 against burst under normal steady state full power operation primary to secondary pressure differential and a safety factor of 1.4 against burst under the limiting design basis accident pressure differential. The structural limit used was based upon 360 degree uniform wall thinning for infinite length assuming ASME Code minimum material properties. The structural limits provided below are conservative in that they assume 360 degree uniform wall thinning for the length of the tube.

Satisfying this structural limit ensures that the SG tube integrity performance criteria for structural integrity, accident induced leakage and operational leakage will be maintained.

The as-found condition of each degradation mechanism found during Refueling Outage 15 was shown to meet the appropriate limiting structural integrity performance parameter with a probability of 0.95 at 50% confidence, including consideration of relevant uncertainties.

No tube pulls or in-situ pressure testing was performed or required during Refueling Outage 15.

Sections 6.1 through 6.3 provide a summary of the condition monitoring assessment for each degradation mechanism. Section 6.4 provides a primary to secondary leakage assessment.

6.1 Fan Bar Wear

The largest fan bar wear indication found during the Refueling Outage 15 inspection was 20% TW as measured by the EPRI Appendix H qualified technique 96004.3, Revision 11. Considering technique and analyst uncertainties, the largest fan bar wear indication found is corrected to 28.1% TW with a 0.95 probability at 50% confidence. This is well below the fan bar wear structural limit of 60% TW.

6.2 Lattice Grid Wear

The largest lattice grid wear indication found during the Refueling Outage 15 inspection was 10% TW as measured by the EPRI Appendix H qualified technique 96004.3, Revision 11. Considering technique and analyst uncertainties, the largest lattice grid wear indication found is corrected to 18.5% TW with a 0.95 probability at 50% confidence. This is well below the lattice grid wear structural limit of 60% TW.

6.3 Foreign Object Wear

There were no indications of foreign object wear detected during the Refueling Outage 15 inspection. Therefore, condition monitoring performance criteria was met for foreign object wear. See Section 5.2.3 for preventative plugging due to a non-retrievable foreign object with no associated tube wear.

6.4 Primary-to-Secondary Leakage Assessment

Byron Station Unit 1 did not observe any operational primary to secondary leakage greater than three gallons per day over the two operating cycles preceding the inspection. The SG tube inspections did not find any potential sources of tube leakage. Chemistry sampling of the Steam Jet Air Ejector and liquid SG blowdown sample locations did not detect any SG operational leakage that was above the detection threshold. Therefore, it was determined that there was no quantifiable SG operational leakage.

7.0 REPAIR SUMMARY (TS 5.6.9.i)

Repairs were conducted in accordance with ASME Section XI, 2001 Edition through the 2003 Addenda. All tube plugging was performed by Westinghouse using Alloy 690 mechanical tube plugging process in accordance with ASME Section XI IWA-4713, "Heat Exchanger Tube Plugging by Expansion." All repairs were performed in accordance with approved Westinghouse procedures. Table 7.1 depicts the repairs conducted during Refueling Outage 15. Table 7.2 lists the tube locations that were repaired in Refueling Outage 15. All tubes plugged during Refueling Outage 15 were associated with a non-retrievable foreign object located on the hot leg secondary tubesheet in the 1C SG.

TABLE 7.1
Summary of Refueling Outage 15 Tube Plugging

REPAIRS PERFORMED	SG A	SG B	SG C	SG D	TOTAL
Tubes Plugged*	0	0	13	0	13
Tubes Stabilized	0	0	13	0	13

* Includes number of tubes stabilized and plugged.

TABLE 7.2
SG Tubes Repaired During Refueling Outage 15

No.	SG	Row	Col	Repair	Stabilizer Leg	Eddy Current Indication	Comment
1	1C	102	97	Plug	Hot Leg	NDD	Note 1
2	1C	103	96	Plug	Hot Leg	NDD	Note 1
3	1C	103	98	Plug	Hot Leg	NDD	Note 1
4	1C	104	95	Plug	Hot Leg	NDD	Note 1
5	1C	104	97	Plug	Hot Leg	NDD	Note 1
6	1C	105	96	Plug	Hot Leg	NDD	Note 1
7	1C	105	98	Plug	Hot Leg	NDD	Note 1
8	1C	106	95	Plug	Hot Leg	NDD	Note 1
9	1C	106	97	Plug	Hot Leg	NDD	Note 1
10	1C	106	99	Plug	Hot Leg	NDD	Note 1
11	1C	107	96	Plug	Hot Leg	NDD	Note 1
12	1C	107	98	Plug	Hot Leg	NDD	Note 1
13	1C	108	97	Plug	Hot Leg	NDD	Note 1

NDD – No Degradation Detected

Note 1: Tube was preventatively plugged to surround a non-retrievable foreign object located on the hot leg tubesheet in the 1C SG. There was no degradation associated with this foreign object.

8.0 DOCUMENTATION

All original optical disks have been provided to EGC and are maintained at Byron Station. The final data sheets and pertinent tube sheet plots are contained in the Westinghouse

Final Outage Reports for Byron Station, Unit 1, Refueling Outage 15 Steam Generator Inspection. The report is also maintained at Byron Station.

9.0 FIGURES/TABLES/ATTACHMENTS

Attachment A

Table A.1	Data Acquisition Personnel Certification List
Table A.2	Data Analysis Personnel Certification List
Figure A.1	Babcock & Wilcox Replacement Steam Generator Byron Unit 1 Configuration
Figure A.2	Byron Station Unit 1 Steam Generator Tubesheet Configuration

Attachment B

Attachment B.1	Hot Leg Bobbin Coil Inspection Scope
Attachment B.2	Cold Leg Bobbin Coil Inspection Scope
Attachment B.3	Special Interest Plus-Point Inspection Scope, Including Hot Leg Dents and Dings

Attachment C

Attachment C.1	1A Steam Generator Inservice Indications
Attachment C.2	1B Steam Generator Inservice Indications
Attachment C.3	1C Steam Generator Inservice Indications
Attachment C.4	1D Steam Generator Inservice Indications

Attachment D

ASME Form NIS-1, "Owners Report for Inservice Inspections"

Attachment E

ASME Form NIS-2, "Owners Report for Repair/Replacement Activity" for 1C SG Tube Plugging

ATTACHMENT A

PERSONNEL CERTIFICATIONS

BABCOCK & WILCOX
REPLACEMENT STEAM GENERATOR
BYRON UNIT 1 CONFIGURATION

TABLE A.1
DATA ACQUISITION PERSONNEL CERTIFICATIONS

No.	Name	Company	Level	QDA
1	Bradley, G	Westinghouse	II	No
2	Chiplaskey, G	Westinghouse	II	No
3	Despaux, C	Westinghouse	II	No
4	Evering, D	Westinghouse	II	No
5	Gault, W	Westinghouse	II	No
6	Lopez, P	Hudson	I	No
7	Miller, G	Westinghouse	II	No
8	Schachte, D	Westinghouse	II	No
9	Scott, A	Westinghouse	II	No
10	Shaffer, E	Master-Lee	IIA	No
11	Taylor, A	Westinghouse	I	No
12	Taylor, C	Hudson	II	No
13	Walsh, M	Westinghouse	II	No

TABLE A.2
DATA ANALYSIS PERSONNEL CERTIFICATIONS

No.	Name	Company	Level	QDA
1	Alspaugh, K	NDE Technology	IIIA	QDA
2	Bernasson, R	Wiltec	IIIA	QDA
3	Bowler, S	Young Technical	IIA	QDA
4	*Brown, M	NDE Technology	IIIA	QDA
5	Case, J	NDE Technology	IIIA	QDA
6	Cvitanovic, N	HRID	IIA	QDA
7	Desflaches, M	Westinghouse	IIA	QDA
8	Dlabik, A	Master-Lee	IIIA	QDA
9	Dzapo, M	HRID	IIA	QDA
10	Funanich, J	MoreTech	III	QDA
11	Herold, M	Infineddy	IIA	QDA
12	Ingenthron, J	Infineddy	IIA	QDA
13	Jones, B	MoreTech	III	QDA
14	Kocher, J	Master-Lee	IIIA	QDA
15	Kolakowski, C	Westinghouse	IIA	QDA
16	Lareau, K	Areva	III	QDA
17	Lewis, C	NDE Technology	IIA	QDA
18	Lynn, V	Master-Lee	IIIA	QDA
19	Maullar, K	Wiltec	IIIA	QDA
20	Mingus, D	MoreTech	IIA	QDA
21	Munk, R	HRID	IIA	QDA
22	Obazenu, D	Anatec	III	QDA
23	Popovich, R	Westinghouse	III	QDA
24	Ready, S	Anatec	IIA	QDA
25	Rengel, A	HRID	IIA	QDA
26	Ribaric, T	Areva	III	QDA
27	Schmitz, K	NDE Technology	IIIA	QDA
28	*Siegel, R	NDE Technology	IIIA	QDA
29	Skirpan, J	NDE Technology	IIA	QDA
30	Terning, G	Westinghouse	III	QDA
31	Tolentino, E	Westinghouse	IIA	QDA
32	Webb, M	MoreTech	IIA	QDA
33	Zerovnik, V	HRID	IIA	QDA

Independent Qualified Data Analyst

FIGURE A.1

Babcock & Wilcox Replacement Steam Generator
Byron Unit 1 Configuration

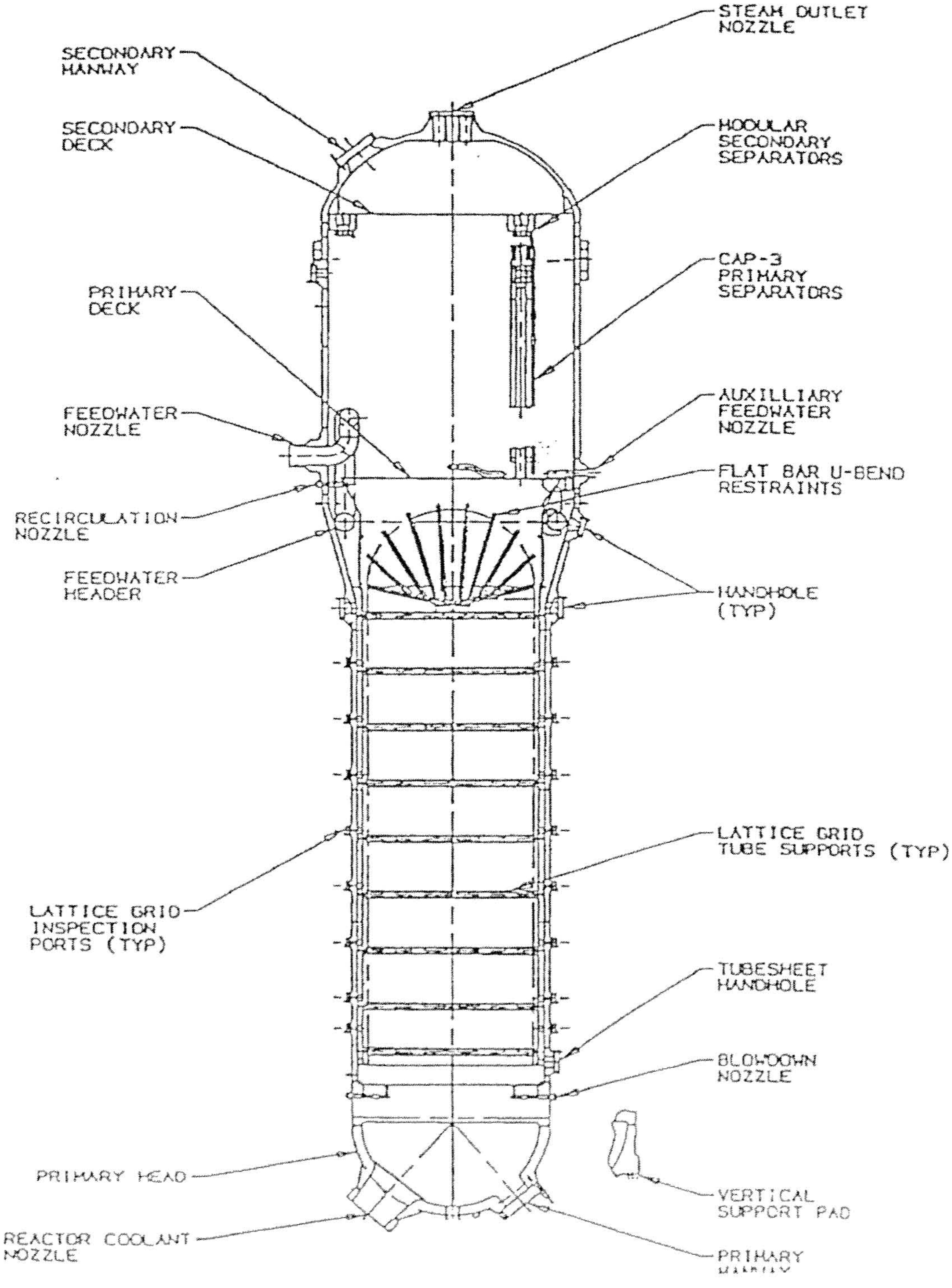

FIGURE A.2
Byron Unit 1 Steam Generator
Tubesheet Configuration (Typical)