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Exelon Nuclear

RS-09-127
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U. S. Nuclear Regulatory Commission
ATTN: Document Control Desk
Washington, DC 20555-0001

Braidwood Station, Units 1 and 2
Facility Operating License Nos. NPF-72 and NPF-77
NRC Docket Nos. STN 50-456 and STN 50-457

Byron Station, Units 1 and 2
Facility Operating License Nos. NPF-37 and NPF-66
NRC Docket Nos. STN 50-454 and STN 50-455

Subject: Revised Information Supporting License Amendment Request Regarding Technical Specifications (TS) for Steam Generator Permanent Alternate Repair Criteria

References:

1. Letter from P. R. Simpson (Exelon Generation Company, LLC) to U. S. Nuclear Regulatory Commission, "License Amendment Request to Revise Technical Specifications (TS) for Permanent Alternate Repair Criteria," dated June 24, 2009

2. Letter from M. J. David (U. S. Nuclear Regulatory Commission) to C. G. Pardee (Exelon Generation Company, LLC), "Braidwood Station, Units 1 and 2, and Byron Station, Unit Nos. 1 and 2 – Request for Additional Information Related to Steam Generator Permanent Alternate Repair Criteria (TAC Nos. ME1613, ME1614, ME1615, and ME1616)," dated July 20, 2009

3. Email from M. J. David (U. S. Nuclear Regulatory Commission) to P. Simpson and L. Schofield (Exelon Generation Company, LLC), "Braidwood & Byron Request for Additional Information Related to Steam Generator Permanent Alternate Repair Criteria (TAC Nos. ME1613 - ME1616)," dated August 6, 2009

4. Letter from P. R. Simpson (Exelon Generation Company, LLC) to U. S. Nuclear Regulatory Commission, "Additional Information Supporting License Amendment Request to Revise Technical Specifications (TS) for Steam Generator Permanent Alternate Repair Criteria," dated August 14, 2009

5. Letter from P. R. Simpson (Exelon Generation Company, LLC) to U. S. Nuclear Regulatory Commission, "Additional Information Supporting License Amendment Request to Revise Technical Specifications (TS) for Steam Generator Permanent Alternate Repair Criteria," dated August 31, 2009

A001

In Reference 1, Exelon Generation Company, LLC (EGC), requested a license amendment for Braidwood Station, Units 1 and 2, and Byron Station, Units 1 and 2, to revise Technical Specifications (TS) 5.5.9, "Steam Generator (SG) Program," to exclude portions of the tube below the top of the steam generator tubesheet from periodic steam generator tube inspections and plugging or repair, and TS 5.6.9, "Steam Generator (SG) Tube Inspection Report," to revise the reporting requirements. Westinghouse Electric Company, LLC, (Westinghouse) WCAP-17072-P, Revision 0, "H*: Alternate Repair Criteria for the Tubesheet Expansion Region in Steam Generators with Hydraulically Expanded Tubes (Model D5)," was submitted with Reference 1 and provided the basis for the proposed change.

In References 2 and 3, the NRC requested that EGC provide additional information in support of their review of Reference 1. Reference 4 provided the requested information, with the exception of responses to RAI Question 4 of Reference 2 and RAI Question 1 of Reference 3, which were provided in Reference 5.

On September 2, 2009, in a teleconference between NRC and industry personnel, NRC indicated concerns with eccentricity of the tube sheet tube bore in normal and accident conditions (i.e., RAI Question 4 of Reference 2 and RAI Question 1 of Reference 3) had not been completely resolved to the satisfaction of the NRC. The NRC further indicated that there was insufficient time to resolve these issues to support approval of the permanent amendment request to support the fall 2009 refueling outages. As such, EGC is revising the proposed changes to the TS contained in Reference 1 to be a one-time change to TS 5.5.9 and TS 5.6.9 for Braidwood Unit 2 fall 2009 refueling outage (A2R14) and Byron Unit 2 spring 2010 refueling outage (B2R15) and their respective subsequent operating cycles. Attachments 1 and 2 provide revised marked-up TS pages for the Braidwood and Byron Stations, respectively. The proposed changes provided in Attachments 1 and 2 supersede the changes previously provided to the NRC in References 1 and 4. Attachment 3 and 4 provide revised marked-up TS Bases pages for the Braidwood and Byron Stations, respectively. The TS Bases pages, which supersede the changes previously provided to the NRC in Reference 1, are provided for information only and do not require NRC approval.

EGC requests that the NRC provide the specific questions remaining to be resolved and that the review of the amendment request for permanent alternate repair criteria (i.e., Reference 1) continues.

The change proposed in Reference 1 (i.e., permanent H*) is based on maintaining structural and leakage integrity in the event of an accident.

From a structural perspective, the 16.95 inch value of H* ensures that tube rupture or tube pull out from the tube sheet will not occur in the event of an accident in the entire life of the plant. Even in the event that all tubes in the steam generator have a 360-degree sever at 16.95 inches, structural integrity of the steam generator tube bundle will be maintained. This assumption bounds the current status of the Braidwood Unit 2 and Byron Unit 2 steam generators with significant margin.

Byron Unit 2 and Braidwood Unit 2 have performed tube sheet inspections in accordance with an approved alternate repair criteria during the last three refueling outages at each unit.

During the most recent Braidwood Unit 2 refueling outage (A2R13 in spring 2008), 3,625 tubes were inspected through the full depth of the hot leg tube sheets, and an additional 14,455 hot leg

tubes were inspected at the tube end region. A total of 331 flaws were identified within 0.5" of the hot leg tube end. Sixteen tubes were required to be plugged. All of the flaws were small and did not challenge structural or leakage integrity performance criteria. The total number of tube end flaws found was small compared to the number of tubes inspected. No flaws were found above the tube end region during this inspection or during previous inspections.

During the most recent Byron Unit 2 refueling outage (B2R14 in fall 2008), 3,808 tubes were inspected through the full depth of the hot leg tube sheet, and an additional 14,106 hot leg tubes were inspected at the tube end region. Additionally, 3660 tubes were inspected at the cold leg tube end region. A total of 65 flaws were identified within 0.5" of the hot leg tube end and no flaws were identified in the cold leg tube end region. All of the flaws were small and did not require any tubes to be plugged. None of the flaws challenged any structural or leakage integrity performance criteria. The total number of tube end flaws found was small compared to the number of tubes inspected. No flaws were found above the tube end region during this inspection or during previous inspections.

A separate inspection program for tube sheet bulges (BLG) and over expansions (OXP) has been implemented at both Braidwood Unit 2 and Byron Unit 2. This inspection program is in accordance with the Braidwood and Byron TS and industry guidance. This inspection program was implemented at each site during the previous three refueling outages. No flaws were identified in any of the inspections.

Based on these inspections, a limited number of flaws existed in the tube sheets of the Braidwood Unit 2 and Byron Unit 2 steam generators. The flaws that have been found are associated with residual stress conditions at the tube ends. No indications of a 360 degree sever has been detected in any steam generator at Unit 2 for either Braidwood or Byron. Consequently, the level of degradation in the Braidwood Unit 2 and Byron Unit 2 steam generators is very limited compared to the assumption of "all tubes severed" that was utilized in the development of the permanent H*. Therefore, structural integrity will be assured for the operating period between inspections allowed by TS 5.5.9, "Steam Generator (SG) Program."

From a leakage perspective, projections of accident induced steam generator tube leakage are based on leakage rate factors applied to leakage detected during normal operation. The multiplication factor used for Braidwood Unit 2 and Byron Unit 2 bounds the expected increased leakage in the event of an accident at each site. The projected accident induced leakage remains the same for both the single cycle and permanent H* amendments. No primary-to-secondary steam generator tube leakage has been detected during the current operating cycles at either Braidwood Unit 2 or Byron Unit 2.

For Braidwood Unit 2 and Byron Unit 2, the number of tubes identified with flaws within the tubesheet is small in comparison to the input assumptions used in the development of the permanent H*. Consequently, significant margin exists between the current state of the steam generators and the conservative assumptions used as the basis for the permanent H*. Structural and leakage integrity will continue to be assured for the operating period between inspections allowed by TS 5.5.9, "Steam Generator (SG) Program" with the implementation of the proposed one-time H*.

EGC requests approval of the proposed license amendments by October 1, 2009, to support implementation during the Braidwood Unit 2 fall 2009 refueling outage (A2R14). Once approved, the amendment will be implemented for Braidwood Unit 2 within 30 days and implemented for Byron Unit 2 prior to conducting SG inspections required by TS 5.5.9 beginning with the Unit 2 spring 2010 refueling outage (B2R15).

Attachment 5 provides Westinghouse letter LTR-SGMP-09-121, "Replacements for Illegible Pages in Prior RAI Response (Reference 1)," dated August 27, 2009. Included in the Attachment are improved versions of Figures RAI 10-1 and 10-2 that were submitted as part of Reference 4.

As Attachment 5 contains information proprietary to Westinghouse, it is supported by an affidavit included in Reference 4. The affidavit, signed by Westinghouse, the owner of the information, set forth the basis on which the information may be withheld from public disclosure by the NRC and addresses with specificity the considerations listed in paragraph (b)(4) of 10 CFR 2.390, "Public inspections, exemptions, requests for withholding." Accordingly, it is requested that the information that is proprietary to Westinghouse be withheld from public disclosure in accordance with 10 CFR 2.390.

EGC has reviewed the information supporting a finding of no significant hazards consideration that was previously provided to the NRC in Reference 1. The requested changes do not expand the scope of the application as originally noticed, and does not impact the conclusions of the NRC's original proposed no significant hazards consideration determination as published in the Federal Register (74 FR 38234).

The regulatory commitments contained in this letter are summarized in Attachment 6. The regulatory commitments provided in Attachment 6 supersede the commitments previously provided to the NRC in References 1 and 4.

Should you have any questions concerning this letter, please contact Ms. Lisa A. Schofield at (630) 657-2815.

I declare under penalty of perjury that the foregoing is true and correct. Executed on the 15th day of September 2009.

Respectfully,

Patrick R. Simpson
Manager – Licensing
Exelon Generation Company, LLC

Attachments:

1. Revised Marked-up Proposed Technical Specifications 5.5.9 and 5.6.9, Braidwood Station
2. Revised Marked-up Proposed Technical Specifications 5.5.9 and 5.6.9, Byron Station
3. Revised Technical Specifications Bases Page for Braidwood Station
4. Revised Technical Specifications Bases Page for Byron Station
5. Westinghouse LTR-SGMP-09-121, "Replacement for Illegible Pages in Prior RAI Response (Reference 1)"
6. Summary of Regulatory Commitments

cc:

NRC Regional Administrator, Region III
NRC Senior Resident Inspector, Braidwood Station
NRC Senior Resident Inspector, Byron Station

ATTACHMENT 1

Revised Marked-up Proposed Technical Specifications 5.5.9 and 5.6.9

Braidwood Station

5.5-8
5.5-9
5.5-10
5.5-11
5.6-6
5.6-7

5.5 Programs and Manuals

5.5.9 Steam Generator (SG) Program (continued)

2. Accident induced leakage performance criterion: The primary to secondary accident induced leakage rate for any design basis accident, other than a SG tube rupture, shall not exceed the leakage rate assumed in the accident analysis in terms of total leakage rate for all SGs and leakage rate for an individual SG. Leakage is not to exceed a total of 1 gpm for all SGs.

3. The operational LEAKAGE performance criteria is specified in LCO 3.4.13, "RCS Operational LEAKAGE."

c. Provisions for SG tube repair criteria.

1. Tubes found by inservice inspection to contain flaws in a non-sleeved region with a depth equal to or exceeding 40% of the nominal wall thickness shall be plugged or repaired, ~~except if permitted to remain in service through application of the alternate repair criteria discussed in TS 5.5.9.c.4. For Unit 2 only, during Refueling Outage 13 and the subsequent operating cycle, flaws identified in the portion of the tube from the top of the tubesheet to 17 inches below the top of the tubesheet shall be plugged or repaired upon detection.~~

INSERT 1

2. Sleeves found by inservice inspection to contain flaws with a depth equal to or exceeding the following percentages of the nominal sleeve wall thickness shall be plugged:

i. For Unit 2 only, TIG welded sleeves (per TS 5.5.9.f.2.i): 32%

3. Tubes with a flaw in a sleeve to tube joint that occurs in the sleeve or in the original tube wall of the joint shall be plugged.

~~4. The following tube repair criteria shall be applied as an alternate to the 40% depth-based criteria of Technical Specification 5.5.9.c.1.~~

5.5 Programs and Manuals

5.5.9 Steam Generator (SG) Program (continued)

i. For Unit 2 only, during Refueling Outage 13 and the subsequent operating cycle, tubes with flaws having a circumferential component less than or equal to 203 degrees found in the portion of the tube below 17 inches from the top of the tubesheet and above 1 inch from the bottom of the tubesheet do not require plugging or repair. Tubes with flaws having a circumferential component greater than 203 degrees found in the portion of the tube below 17 inches from the top of the tubesheet and above 1 inch from the bottom of the tubesheet shall be removed from service. Tubes with axial indications found in the portion of the tube below 17 inches from the top of the tubesheet do not require plugging or repair.

When more than one flaw with circumferential components is found in the portion of the tube below 17 inches from the top of the tubesheet and above 1 inch from the bottom of the tubesheet with the total of the circumferential components greater than 203 degrees and an axial separation distance of less than 1 inch, then the tube shall be removed from service. When the circumferential components of each of the flaws are added, it is acceptable to count the overlapped portions only once in the total of circumferential components. When one or more flaws with circumferential components are found in the portion of the tube within 1 inch from the bottom of the tubesheet, and the total of the circumferential components found in the tube exceeds 94 degrees, then the tube shall be removed from service.

When one or more flaws with circumferential components are found in the portion of the tube within 1 inch from the bottom of the tubesheet and within 1 inch axial separation distance of a flaw above 1 inch from the bottom of the tubesheet, and the total of the circumferential components found in the tube exceeds 94 degrees, then the tube shall be removed from service. When the circumferential components of each of the flaws are added, it is acceptable to count the overlapped portions only once in the total of circumferential components.

5.5 Programs and Manuals

5.5.9 Steam Generator (SG) Program (continued)

d. Provisions for SG tube inspections. Periodic SG tube inspections shall be performed. The number and portions of the tubes inspected and methods of inspection shall be performed with the objective of detecting flaws of any type (e.g., volumetric flaws, axial and circumferential cracks) that may be present along the length of the tube, from the tube-to-tubesheet weld at the tube inlet to the tube-to-tubesheet weld at the tube outlet, and that may satisfy the applicable tube repair criteria. The tube-to-tubesheet weld is not part of the tube. In addition to meeting the requirements of d.1, d.2, and d.3 below, the inspection scope, inspection methods, and inspection intervals shall be such as to ensure that SG tube integrity is maintained until the next SG inspection. An assessment of degradation shall be performed to determine the type and location of flaws to which the tubes may be susceptible and, based on this assessment, to determine which inspection methods need to be employed and at what locations.

INSERT 2

1. Inspect 100% of the tubes in each SG during the first refueling outage following SG replacement.

2. Inspect 100% of the Unit 1 tubes at sequential periods of 144, 108, 72, and, thereafter, 60 effective full power months. The first sequential period shall be considered to begin after the first inservice inspection of the SGs. In addition, inspect 50% of the tubes by the refueling outage nearest the midpoint of the period and the remaining 50% by the refueling outage nearest the end of the period. No SG shall operate for more than 72 effective full power months or three refueling outages (whichever is less) without being inspected.

   Inspect 100% of the Unit 2 tubes at sequential periods of 120, 90, and, thereafter, 60 effective full power months. The first sequential period shall be considered to begin after the first inservice inspection of the SGs. In addition, inspect 50% of the tubes by the refueling outage nearest the midpoint of the period and the remaining 50% by the refueling outage nearest the end of the period. No SG shall operate for more than 48 effective full power months or two refueling outages (whichever is less) without being inspected.

5.5 Programs and Manuals

5.5.9 Steam Generator (SG) Program (continued)

For Unit 1, if

INSERT 3

3. ~~If~~ crack indications are found in any SG tube, then the next inspection for each SG for the degradation mechanism that caused the crack indication shall not exceed 24 effective full power months or one refueling outage (whichever is less). If definitive information, such as from examination of a pulled tube, diagnostic non-destructive testing, or engineering evaluation indicates that a crack-like indication is not associated with a crack(s), then the indication need not be treated as a crack.

e. Provisions for monitoring operational primary to secondary LEAKAGE.

f. Provisions for SG tube repair methods. Steam generator tube repair methods shall provide the means to reestablish the RCS pressure boundary integrity of SG tubes without removing the tube from service. For the purposes of these Specifications, tube plugging is not a repair.

1. There are no approved tube repair methods for the Unit 1 SGs.

2. All acceptable repair methods for the Unit 2 SGs are listed below.

i. TIG welded sleeving as described in ABB Combustion Engineering Inc., Technical Reports: Licensing Report CEN-621-P, Revision 00, "Commonwealth Edison Byron and Braidwood Unit 1 and 2 Steam Generators Tube Repair Using Leak Tight Sleeves, FINAL REPORT," April 1995; and Licensing Report CEN-627-P, "Operating Performance of the ABB CENO Steam Generator Tube Sleeve for Use at Commonwealth Edison Byron and Braidwood Units 1 and 2," January 1996; subject to the limitations and restrictions as noted by the NRC Staff.

5.6 Reporting Requirements

5.6.8 Tendon Surveillance Report

Any abnormal degradation of the containment structure detected during the tests required by the Pre-Stressed Concrete Containment Tendon Surveillance Program shall be reported in the Inservice Inspection Summary Report in accordance with 10 CFR 50.55a and ASME Section XI.

5.6.9 Steam Generator (SG) Tube Inspection Report

A report shall be submitted within 180 days after the initial entry into MODE 4 following completion of an inspection performed in accordance with Specification 5.5.9, Steam Generator (SG) Program. The report shall include:

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 or repaired during the inspection outage for each active degradation mechanism,

f. Total number and percentage of tubes plugged or repaired 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 and tube repairs in each SG,

i. Repair method utilized and the number of tubes repaired by each repair method,

~~j. For Unit 2, following completion of an inspection performed in Refueling Outage 13 (and any inspections performed in the subsequent operating cycle), the number of indications and location, size, orientation, and whether initiated on primary or secondary side for each service induced flaw detected within the thickness of the tubesheet, and the total of the circumferential components and any circumferential overlap below 17 inches from the top of the tubesheet, as determined in accordance with TS 5.5.9 c.4.i,~~

5.6 Reporting Requirements

5.6.9 Steam Generator (SG) Tube Inspection Report (continued)

j → ~~k~~

INSERT 4 →

~~For Unit 2, following completion of an inspection performed in Refueling Outage 13 (and any inspections performed in the subsequent operating cycle),~~ the operational primary to secondary leakage rate observed (greater than three gallons per day) in each steam generator (if it is not practical to assign the leakage to an individual steam generator, the entire primary to secondary leakage should be conservatively assumed to be from one steam generator) during the cycle preceding the inspection which is the subject of the report, and

INSERT 5 →

1. ~~For Unit 2, following completion of an inspection performed in Refueling Outage 13 (and any inspections performed in the subsequent operating cycle), the calculated accident leakage rate from the lowermost 4-inches of tubing for the most limiting accident in the most limiting steam generator.~~

INSERT 1

The following alternate tube repair criteria shall be applied as an alternative to the 40% depth based criteria:

> For Unit 2 during Refueling Outage 14 and the subsequent operating cycle, tubes with service-induced flaws located greater than 16.95 inches below the top of the tubesheet do not require plugging or repair. Tubes with service-induced flaws located in the portion of the tube from the top of the tubesheet to 16.95 inches below the top of the tubesheet shall be plugged or repaired upon detection.

INSERT 2

For Unit 2 during Refueling Outage 14 and the subsequent operating cycle, portions of the tube below 16.95 inches below the top of the tubesheet are excluded from this requirement.

{The text following Insert 2 will start a new paragraph.}

INSERT 3

For Unit 2 during Refueling Outage 14 and the subsequent operating cycle, if crack indications are found in any SG tube from 16.95 inches below the top of the tubesheet on the hot leg side to 16.95 inches below the top of the tubesheet on the cold leg side, then the next inspection for each SG for the degradation mechanism that caused the crack indication shall not exceed 24 effective full power months or one refueling outage (whichever is less).

{The text following Insert 3 will start a new paragraph.}

INSERT 4

For Unit 2 following completion of an inspection performed in Refueling Outage 14 (and any inspections performed in the subsequent operating cycle),

INSERT 5

k. For Unit 2 following completion of an inspection performed in Refueling Outage 14 (and any inspections performed in the subsequent operating cycle), the calculated accident induced leakage rate from the portion of the tubes below 16.95 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 accident is less than 3.11 times the maximum operational primary to secondary leakage rate, the report should describe how it was determined, and

l. For Unit 2 following completion of an inspection performed in Refueling Outage 14 (and any inspections performed in the subsequent operating cycle), the results of monitoring for tube axial displacement (slippage). If slippage is discovered, the implications of the discovery and corrective action shall be provided.

ATTACHMENT 2

Revised Marked-up Proposed Technical Specifications 5.5.9 and 5.6.9

Byron Station

5.5-8
5.5-9
5.5-10
5.5-11
5.6-6
5.6-7

5.5 Programs and Manuals

5.5.9 Steam Generator (SG) Program (continued)

2. Accident induced leakage performance criterion: The primary to secondary accident induced leakage rate for any design basis accident, other than a SG tube rupture, shall not exceed the leakage rate assumed in the accident analysis in terms of total leakage rate for all SGs and leakage rate for an individual SG. Leakage is not to exceed a total of 1 gpm for all SGs.

3. The operational LEAKAGE performance criteria is specified in LCO 3.4.13, "RCS Operational LEAKAGE."

c. Provisions for SG tube repair criteria.

1. Tubes found by inservice inspection to contain flaws in a non-sleeved region with a depth equal to or exceeding 40% of the nominal wall thickness shall be plugged or repaired.

INSERT 1 →

~~except if permitted to remain in service through application of the alternate repair criteria discussed in TS 5.5.9.c.4. For Unit 2 only, during Refueling Outage 14 and the subsequent operating cycle, flaws identified in the portion of the tube from the top of the tubesheet to 17 inches below the top of the tubesheet shall be plugged or repaired upon detection.~~

2. Sleeves found by inservice inspection to contain flaws with a depth equal to or exceeding the following percentages of the nominal sleeve wall thickness shall be plugged:

i. For Unit 2 only, TIG welded sleeves (per TS 5.5.9.f.2.i): 32%

3. Tubes with a flaw in a sleeve to tube joint that occurs in the sleeve or in the original tube wall of the joint shall be plugged.

~~4. The following tube repair criteria shall be applied as an alternate to the 40% depth-based criteria of Technical Specification 5.5.9.c.1:~~

~~i. For Unit 2 only, during Refueling Outage 14 and the subsequent operating cycle, tubes with flaws having a circumferential component less than or equal to 203 degrees found in the portion of the tube below 17 inches from the top of the tubesheet and above 1 inch from the bottom of~~

5.5 Programs and Manuals

5.5.9 Steam Generator (SG) Program (continued)

the tubesheet do not require plugging or repair. Tubes with flaws having a circumferential component greater than 203 degrees found in the portion of the tube below 17 inches from the top of the tubesheet and above 1 inch from the bottom of the tubesheet shall be removed from service. Tubes with axial indications found in the portion of the tube below 17 inches from the top of the tubesheet do not require plugging or repair.

When more than one flaw with circumferential components is found in the portion of the tube below 17 inches from the top of the tubesheet and above 1 inch from the bottom of the tubesheet with the total of the circumferential components greater than 203 degrees and an axial separation distance of less than 1 inch, then the tube shall be removed from service. When the circumferential components of each of the flaws are added, it is acceptable to count the overlapped portions only once in the total of circumferential components.

When one or more flaws with circumferential components are found in the portion of the tube within 1 inch from the bottom of the tubesheet or within 1 inch axial separation distance of a flaw above 1 inch from the bottom of the tubesheet, and the total of the circumferential components found in the tube exceeds 94 degrees, then the tube shall be removed from service. When the circumferential components of each of the flaws are added, it is acceptable to count the overlapped portions only once in the total of circumferential components.

d. Provisions for SG tube inspections. Periodic SG tube inspections shall be performed. The number and portions of the tubes inspected and methods of inspection shall be performed with the objective of detecting flaws of any type (e.g., volumetric flaws, axial and circumferential cracks) that may be present along the length of the tube, from the tube-to-tubesheet weld at the tube inlet to the tube-to-

5.5 Programs and Manuals

5.5.9 Steam Generator (SG) Program (continued)

INSERT 2

tubesheet weld at the tube outlet, and that may satisfy the applicable tube repair criteria. The tube-to-tubesheet weld is not part of the tube. In addition to meeting the requirements of d.1, d.2, and d.3 below, the inspection scope, inspection methods, and inspection intervals shall be such as to ensure that SG tube integrity is maintained until the next SG inspection. An assessment of degradation shall be performed to determine the type and location of flaws to which the tubes may be susceptible and, based on this assessment, to determine which inspection methods need to be employed and at what locations.

1. Inspect 100% of the tubes in each SG during the first refueling outage following SG replacement.

2. Inspect 100% of the Unit 1 tubes at sequential periods of 144, 108, 72, and, thereafter, 60 effective full power months. The first sequential period shall be considered to begin after the first inservice inspection of the SGs. In addition, inspect 50% of the tubes by the refueling outage nearest the midpoint of the period and the remaining 50% by the refueling outage nearest the end of the period. No SG shall operate for more than 72 effective full power months or three refueling outages (whichever is less) without being inspected.

   Inspect 100% of the Unit 2 tubes at sequential periods of 120, 90, and, thereafter, 60 effective full power months. The first sequential period shall be considered to begin after the first inservice inspection of the SGs. In addition, inspect 50% of the tubes by the refueling outage nearest the midpoint of the period and the remaining 50% by the refueling outage nearest the end of the period. No SG shall operate for more than 48 effective full power months or two refueling outages (whichever is less) without being inspected.

5.5 Programs and Manuals

5.5.9 Steam Generator (SG) Program (continued)

For Unit 1, if

INSERT 3

3. ~~If~~ crack indications are found in any SG tube, then the next inspection for each SG for the degradation mechanism that caused the crack indication shall not exceed 24 effective full power months or one refueling outage (whichever is less). If definitive information, such as from examination of a pulled tube, diagnostic non-destructive testing, or engineering evaluation indicates that a crack-like indication is not associated with a crack(s), then the indication need not be treated as a crack.

e. Provisions for monitoring operational primary to secondary LEAKAGE.

f. Provisions for SG tube repair methods. Steam generator tube repair methods shall provide the means to reestablish the RCS pressure boundary integrity of SG tubes without removing the tube from service. For the purposes of these Specifications, tube plugging is not a repair.

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5.6 Reporting Requirements

5.6.8 Tendon Surveillance Report

Any abnormal degradation of the containment structure detected during the tests required by the Pre-Stressed Concrete Containment Tendon Surveillance Program shall be reported in the Inservice Inspection Summary Report in accordance with 10 CFR 50.55a and ASME Section XI.

5.6.9 Steam Generator (SG) Tube Inspection Report

A report shall be submitted within 180 days after the initial entry into MODE 4 following completion of an inspection performed in accordance with Specification 5.5.9, Steam Generator (SG) Program. The report shall include:

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 or repaired during the inspection outage for each active degradation mechanism,

f. Total number and percentage of tubes plugged or repaired 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 and tube repairs in each SG, and

i. Repair method utilized and the number of tubes repaired by each repair method.

~~j. For Unit 2, following completion of an inspection performed in Refueling Outage 14 (and any inspections performed in the subsequent operating cycle), the number of indications and location, size, orientation, and whether initiated on primary or secondary side for each service-induced flaw detected within the thickness of the tubesheet, and the total of the circumferential components and any circumferential overlap below 17 inches from the top of the tubesheet, as determined in accordance with TS 5.5.9 c.4.i,~~

5.6 Reporting Requirements

5.6.9 Steam Generator (SG) Tube Inspection Report (continued)

INSERT 4

~~For Unit 2, following completion of an inspection performed in Refueling Outage 14 (and any inspections performed in the subsequent operating cycle),~~ the operational primary to secondary leakage rate observed (greater than three gallons per day) in each steam generator (if it is not practical to assign the leakage to an individual steam generator, the entire primary to secondary leakage should be conservatively assumed to be from one steam generator) during the cycle preceding the inspection which is the subject of the report, and

INSERT 5

1. ~~For Unit 2, following completion of an inspection performed in Refueling Outage 14 (and any inspections performed in the subsequent operating cycle), the calculated accident leakage rate from the lowermost 4-inches of tubing for the most limiting accident in the most limiting steam generator.~~

INSERT 1

The following alternate tube repair criteria shall be applied as an alternative to the 40% depth based criteria:

> For Unit 2 during Refueling Outage 15 and the subsequent operating cycle, tubes with service-induced flaws located greater than 16.95 inches below the top of the tubesheet do not require plugging or repair. Tubes with service-induced flaws located in the portion of the tube from the top of the tubesheet to 16.95 inches below the top of the tubesheet shall be plugged or repaired upon detection.

INSERT 2

For Unit 2 during Refueling Outage 15 and the subsequent operating cycle, portions of the tube below 16.95 inches below the top of the tubesheet are excluded from this requirement.

{The text following Insert 2 will start a new paragraph.}

INSERT 3

For Unit 2 during Refueling Outage 15 and the subsequent operating cycle, if crack indications are found in any SG tube from 16.95 inches below the top of the tubesheet on the hot leg side to 16.95 inches below the top of the tubesheet on the cold leg side, then the next inspection for each SG for the degradation mechanism that caused the crack indication shall not exceed 24 effective full power months or one refueling outage (whichever is less).

{The text following Insert 3 will start a new paragraph.}

INSERT 4

For Unit 2 following completion of an inspection performed in Refueling Outage 15 (and any inspections performed in the subsequent operating cycle),

INSERT 5

k. For Unit 2 following completion of an inspection performed in Refueling Outage 15 (and any inspections performed in the subsequent operating cycle), the calculated accident induced leakage rate from the portion of the tubes below 16.95 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 accident is less than 3.11 times the maximum operational primary to secondary leakage rate, the report should describe how it was determined, and

l. For Unit 2 following completion of an inspection performed in Refueling Outage 15 (and any inspections performed in the subsequent operating cycle), the results of monitoring for tube axial displacement (slippage). If slippage is discovered, the implications of the discovery and corrective action shall be provided.

ATTACHMENT 3

Revised Technical Specifications Bases Page for Braidwood Station

B 3.4.19-3

BASES

LCO

The LCO requires that SG tube integrity be maintained. The LCO also requires that all SG tubes that satisfy the repair criteria be plugged or repaired in accordance with the Steam Generator Program.

During an SG inspection, any inspected tube that satisfies the Steam Generator Program repair criteria is repaired or removed from service by plugging. If a tube was determined to satisfy the repair criteria but was not plugged or repaired, the tube may still have tube integrity.

In the context of this Specification, a SG tube is defined as the entire length of the tube, including the tube wall and any repairs made to it, between the tube-to-tubesheet weld at the tube inlet and the tube-to-tubesheet weld at the tube outlet. For Unit 2 during Refueling Outage 12 and the subsequent operating cycle, the portion of the tube below 17 inches from the top of the ~~hot leg~~ tubesheet is excluded. The tube-to-tubesheet weld is not considered part of the tube.

14

16.95

A SG tube has tube integrity when it satisfies the SG performance criteria. The SG performance criteria are defined in Specification 5.5.9, "Steam Generator Program," and describe acceptable SG tube performance. The Steam Generator Program also provides the evaluation process for determining conformance with the SG performance criteria.

There are three SG performance criteria: structural integrity, accident induced leakage, and operational LEAKAGE (i.e., primary to secondary LEAKAGE). Failure to meet any one of these criteria is considered failure to meet the LCO.

The structural integrity performance criterion provides a margin of safety against tube burst or collapse under normal and accident conditions, and ensures structural integrity of the SG tubes under all anticipated transients included in the design specification. Tube burst is defined as, "The gross structural failure of the tube wall. The condition typically corresponds to an unstable opening displacement (e.g., opening area increased in response to constant pressure) accompanied by ductile (plastic) tearing of the tube material at the ends of the degradation." Tube collapse is defined as, "For the load displacement curve for a given structure, collapse occurs at the top of the load versus displacement curve where the slope of the curve becomes zero." The structural integrity performance criterion provides guidance on assessing loads that have a significant effect on burst or collapse.

ATTACHMENT 4

Revised Technical Specifications Bases Page for Byron Station

B 3.4.19-3

BASES

LCO

The LCO requires that SG tube integrity be maintained. The LCO also requires that all SG tubes that satisfy the repair criteria be plugged or repaired in accordance with the Steam Generator Program.

During an SG inspection, any inspected tube that satisfies the Steam Generator Program repair criteria is repaired or removed from service by plugging. If a tube was determined to satisfy the repair criteria but was not plugged or repaired, the tube may still have tube integrity.

In the context of this Specification, a SG tube is defined as the entire length of the tube, including the tube wall and any repairs made to it, between the tube-to-tubesheet weld at the tube inlet and the tube-to-tubesheet weld at the tube outlet. For Unit 2 during Refueling Outage 13 and the subsequent operating cycle, the portion of the tube below 17 inches from the top of the ~~hot leg~~ tubesheet is excluded. The tube-to-tubesheet weld is not considered part of the tube.

15

16.95

A SG tube has tube integrity when it satisfies the SG performance criteria. The SG performance criteria are defined in Specification 5.5.9, "Steam Generator Program," and describe acceptable SG tube performance. The Steam Generator Program also provides the evaluation process for determining conformance with the SG performance criteria.

There are three SG performance criteria: structural integrity, accident induced leakage, and operational LEAKAGE (i.e., primary to secondary LEAKAGE). Failure to meet any one of these criteria is considered failure to meet the LCO.

The structural integrity performance criterion provides a margin of safety against tube burst or collapse under normal and accident conditions, and ensures structural integrity of the SG tubes under all anticipated transients included in the design specification. Tube burst is defined as, "The gross structural failure of the tube wall. The condition typically corresponds to an unstable opening displacement (e.g., opening area increased in response to constant pressure) accompanied by ductile (plastic) tearing of the tube material at the ends of the degradation." Tube collapse is defined as, "For the load displacement curve for a given structure, collapse occurs at the top of the load versus displacement curve where the slope of the curve becomes zero." The structural integrity performance criterion provides guidance on assessing loads that have a significant effect on burst or collapse.

ATTACHMENT 6
Summary of Regulatory Commitments

The following table identifies commitments made in this document. (Any other actions discussed in the submittal represent intended or planned actions. They are described to the NRC for the NRC's information and are not regulatory commitments.)

COMMITMENT	COMMITTED DATE OR "OUTAGE"	COMMITMENT TYPE	
		ONE-TIME ACTION (Yes/No)	PROGRAMMATIC ACTION (Yes/No)
EGC commits to monitor for tube slippage as part of the steam generator tube inspection program. Applicable to Braidwood Unit 2 refueling outage A2R14 and Byron Unit 2 refueling outage B2R15 and their respective subsequent operating cycles.	During scheduled inspection required by TS 5.5.9, "Steam Generator (SG) Program," for Braidwood Unit 2 refueling outage A2R14 and Byron Unit 2 refueling outage B2R15 and their respective subsequent operating cycles.	Yes	No
EGC commits to perform a one-time verification of the tube expansion to locate any significant deviations in the distance from the top of the tubesheet to the bottom of the expansion transition (BET). If any deviations are found, the condition will be entered into the corrective action program and dispositioned. Additionally, EGC commits to notify the NRC of significant deviations. Applicable to Braidwood Unit 2 refueling outage A2R14 and Byron Unit 2 refueling outage B2R15.	Required to be completed prior to entering Mode 4 following the steam generator tube inspection performed during Braidwood Unit 2 refueling outage A2R14 and Byron Unit 2 refueling outage B2R15.	Yes	No
For the condition monitoring (CM) assessment, the component of operational leakage from the prior cycle from below the H* distance will be multiplied by a factor of 3.11 and added to the total accident leakage from any other source and compared to the allowable accident induced leakage limit. For the operational assessment (OA), the difference between the allowable accident induced leakage and the accident induced leakage from sources other than the tubesheet expansion region will be divided by 3.11 and compared to the observed operational leakage. An administrative operational leakage limit will be established to not exceed the calculated value. Applicable to Braidwood Unit 2 refueling outage A2R14 and Byron Unit 2 refueling outage B2R15 and their respective subsequent operating cycles.	During scheduled inspection required by TS 5.5.9, "Steam Generator (SG) Program," for Braidwood Unit 2 refueling outage A2R14 and Byron Unit 2 refueling outage B2R15 and their respective subsequent operating cycles.	Yes	No