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Exelon Nuclear

RS-12-028

10 CFR 50.90

March 22, 2012

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 50-45

Subject: Application to Revise Technical Specifications to Adopt TSTF-510, "Revision to Steam Generator Program Inspection Frequencies and Tube Sample Selection"

In accordance with 10 CFR 50.90, "Application for amendment of license, construction permit, or early site permit," Exelon Generation Company, LLC, (EGC) is submitting a request for an amendment to the Technical Specifications (TS) for Braidwood Station, Units 1 and 2, and Byron Station, Units 1 and 2.

The proposed amendment would modify TS requirements regarding steam generator tube inspections and reporting as described in TSTF-510, Revision 2, "Revision to Steam Generator Program Inspection Frequencies and Tube Sample Selection;" however, EGC is proposing certain variations and deviations from TSTF-510 as discussed in Attachment 1.

Attachment 1 provides a description and assessment of the proposed changes, the requested confirmation of applicability, and plant-specific verifications. Attachments 2 and 3 provide the existing TS pages marked up to show the proposed changes for the Braidwood Station and the Byron Station, respectively. Attachments 4 and 5 provide existing TS Bases pages marked up to show the proposed changes for the Braidwood Station and the Byron Station, respectively. The TS Bases pages are provided for NRC information only and do not require NRC approval.

The proposed change has been reviewed by the Braidwood Station and Byron Station Plant Operations Review Committees and approved by their respective Nuclear Safety Review Boards in accordance with the requirements of the EGC Quality Assurance Program.

Approval of the proposed amendment is requested by March 22, 2013, to support implementation during the Byron Unit 2 spring 2013 (B2R17) and Braidwood Unit 1 fall 2013 (A1R17) refueling outages. Once approved, the amendment shall be implemented within 30 days for Byron, Units 1 and 2, and within 60 days for Braidwood, Units 1 and 2.

In accordance with 10 CFR 50.91, "Notice for public comment; State consultation," paragraph (b), a copy of this application, with attachments, is being provided to the designated State Official.

There are no regulatory commitments contained in this letter.

Should have any questions regarding this submittal, please contact Ms. Lisa A. Simpson at (630) 657-2815.

I declare under penalty of perjury that the foregoing is true and correct. Executed on the 22nd day of Month 2012.

Respectfully,

David M. Gullott
Manager – Licensing
Exelon Generation Company, LLC

Attachments:

1) Evaluation of Proposed Changes
2) Proposed Technical Specification Changes for Braidwood Station, Units 1 and 2
3) Proposed Technical Specification Changes for Byron Station, Units 1 and 2
4) Proposed Technical Specification Bases Changes for Braidwood Station, Units 1 and 2
5) Proposed Technical Specification Bases Changes for Byron Station, Units 1 and 2

cc: NRC Regional Administrator, Region III
NRC Senior Resident Inspector, Braidwood Station
NRC Senior Resident Inspector, Byron Station
NRC Project Manager, NRR – Braidwood and Byron Stations
Illinois Emergency Management Agency - Division of Nuclear Safety

ATTACHMENT 1
Evaluation of Proposed Changes

ATTACHMENT 1
Evaluation of Proposed Changes

1.0 DESCRIPTION

The proposed change revises Technical Specifications (TS) 3.4.19, "Steam Generator (SG) Tube Integrity," TS 5.5.9, "Steam Generator (SG) Program," and TS 5.6.9, "Steam Generator (SG) Tube Inspection Report." The proposed changes are needed to address implementation issues associated with the inspection periods, and address other administrative changes and clarifications. In addition, the proposed amendment deletes the current TS allowance to use ABB Combustion Engineering Inc. TIG welded sleeves as a steam generator tube repair method. As a result of this change, there are no available SG tube repair methods; therefore, the proposed amendment deletes TS 5.5.9.f, TS 5.5.9.c.2, TS 5.5.9.c.3, and references to tube repair and sleeves in various TS.

The proposed amendment is consistent with TSTF-510, Revision 2, "Revision to Steam Generator Program Inspection Frequencies and Tube Sample Selection," except as discussed below.

2.0 ASSESSMENT

2.1 Applicability of Published Safety Evaluation

Exelon Generation Company, LLC, (EGC) has reviewed TSTF-510, Revision 2, "Revision to Steam Generator Program Inspection Frequencies and Tube Sample Selection," and the model safety evaluation dated October 27, 2011 (76 FR 66763), as part of the Federal Register Notice for Availability. As described in the subsequent paragraphs, EGC has concluded that the justifications presented in TSTF-510 and the model safety evaluation prepared by the NRC are applicable to Braidwood Station, Units 1 and 2, and Byron Station, Units 1 and 2, and justify this amendment for the incorporation of the changes to the Braidwood Station and the Byron Station TS.

2.2 Optional Changes and Variations

EGC is proposing the following variations from the TS changes described in the TSTF-510, Revision 2, or the applicable parts of the NRC's model safety evaluation dated October 27, 2011.

1. For Braidwood Unit 2 and Byron Unit 2, EGC will implement the proposed TSTF-510 third inspection period during the current period, thereby increasing the current period duration from 60 EFPM to 72 EFPM. As a result, Byron Unit 2 has completed two SG inspections under the requirements of the current TS 5.5.9.d.2. Braidwood Unit 2 has completed one SG inspection and has one planned inspection during the Braidwood Unit 2 fall 2012 refueling outage (A2R16). Increasing the inspection period from 60 EFPM to 72 EFPM also increases the number of refueling outages within the period from three to four. Therefore, SG inspections performed under the current sampling requirements do not meet the minimum sampling requirements of the proposed TS 5.5.9.d.2.

   The proposed minimum inspection sample for the third inspection period is 33% for Byron Unit 2 and Braidwood Unit 2 as a result of three planned inspections within the four refueling outages period to meet the 100% inspection requirement for areas potentially susceptible to degradation that were inspected by the plus-point probe.

The inspections that did not meet the proposed 33% minimum sample were sampled at 25%. EGC will sample the remaining population in future outages to complete 100% of the affected areas prior to the end of the third inspection period. Byron Unit 2 completed 100% full length bobbin coil inspections in each of the first two refueling outages in the third inspection period. Braidwood Unit 2 completed 100% full length bobbin coil inspections in the first refueling outage and is planning 100% full length bobbin coil inspections in the second refueling outage of the third inspection period. Braidwood Unit 2 and Byron Unit 2 are planning 100% full length bobbin coil inspections during each future inspection in the third inspection period.

Both Byron Unit 1 and Braidwood Unit 1 completed 100% inspection of tubes identified with existing and potential damage mechanisms during the first inspection period. The second and subsequent inspection periods will implement the proposed TSTF-510, Revision 2, inspection periods.

EGC will fully implement the minimum sampling requirements and inspection periods in the subsequent inspection periods in accordance with the proposed TS 5.5.9.d.2.

2. EGC proposes to revise the existing requirements of TS 5.5.9.c.2 and TS 5.5.9.f.2 by deleting the ABB Combustion Engineering Inc. (Westinghouse) TIG welded sleeving repair methodology. There are no ABB Combustion Engineering Inc. (Westinghouse) TIG-welded sleeves currently installed in the Braidwood Station, Unit 2, and Byron Station, Unit 2, SGs. EGC has been informed by the sleeve vendor that TIG welded sleeves are no longer commercially available. As a result of this change, there are no available SG tube repair methods at Braidwood Station or Byron Station; therefore, the proposed amendment deletes TS 5.5.9.f, TS 5.5.9.c.2, TS 5.5.9.c.3, and references to tube repair and sleeves in various TS.

3. One of the improvements in TSTF-510 was to revise references to "tube repair criteria" to "tube plugging [or repair] criteria." The WOG Standard TS mark-up of TS Section 5.5.9, "Steam Generator (SG) Program," provided in TSTF-510, Revision 2, contained three versions of paragraph 5.5.9.d.2 (one each for 600MA tubing, 600TT tubing, and 690TT tubing). All three versions contain the following statement:

   > If a degradation assessment indicates the potential for a type of degradation to occur at a location not previously inspected with a technique capable of detecting this type of degradation at this location and that may satisfy the applicable *tube repair criteria*, the minimum number of locations inspected with such a capable inspection technique during the remainder of the inspection period may be prorated. (emphasis added)

   The TSTF has determined that this paragraph contains an administrative error. The italicized phrase in paragraph 5.5.9.d.2 (above) should state "tube plugging [or repair] criteria," consistent with the other changes made in TSTF-510, Revision 2. EGC has corrected this administrative error in the submitted mark-up for TS 5.5.9.d.2. This change meets the original intent of TSTF 510.

4. Revised (clean) TS pages are not included in this amendment request given the outstanding Braidwood and Byron amendment request for Permanent Alternate Repair Criteria dated March 20, 2012, which will impact some of the same TS pages. Providing only mark-ups of the proposed TS changes satisfies the requirements of 10 CFR 50.90 in that the mark-ups fully describe the changes desired. This is an administrative deviation from the NRC's model application dated October 27, 2011, with no impact on the NRC's model safety evaluation published in the same Federal Register notice. As a result of this deviation, the contents and numbering of the attachments for this amendment request differ from the attachments specified in the NRC's model application. Mark-ups of the proposed TS changes for Braidwood Station and Byron Station are provided in Attachments 2 and 3, respectively. Attachments 2 and 3 also provide mark-ups of the four TS pages impacted by the proposed TSTF-510 request and the outstanding request for Permanent Alternate Repair Criteria (i.e., TS pages 5.5-8, 5.5-9, 5.5-10, and 5.6-7). Additionally, mark-ups of the proposed changes to the TS Bases pages for Braidwood Station and Byron Station are provided in Attachments 4 and 5, respectively. Attachments 4 and 5 also provide mark-ups of the one TS Bases page impacted by the proposed TSTF-510 request and the outstanding request for Permanent Alternate Repair Criteria (i.e., TS Bases page B 3.4.19-3). The proposed changes to the TS Bases are provided for NRC information only and do not require NRC approval. Changes to the Bases will be incorporated in accordance with the TS Bases Control Program.

3.0 REGULATORY ANALYSIS

3.1 No Significant Hazards Consideration Determination

EGC requests adoption of an approved change to the standard technical specifications (STS) into the plant specific Technical Specifications (TS) for Braidwood Station, Units 1 and 2, and Byron Station, Units 1 and 2, to revise TS 5.5.9, "Steam Generator (SG) Program," TS 5.6.9, "Steam Generator (SG) Tube Inspection Report," and TS 3.4.19, "Steam Generator Tube Integrity," to address inspection periods and other administrative changes and clarifications.

As required by 10 CFR 50.91(a), an analysis of the issue of no significant hazards consideration is presented below:

1. Does the proposed change involve a significant increase in the probability or consequences of an accident previously evaluated?

   Response: No.

   The proposed change revises the Steam Generator (SG) Program to modify the frequency of verification of SG tube integrity and SG tube sample selection. A steam generator tube rupture (SGTR) event is one of the design basis accidents that are analyzed as part of a plant's licensing basis. The proposed SG tube inspection frequency and sample selection criteria will continue to ensure that the SG tubes are inspected such that the probability of a SGTR is not increased. The consequences of a SGTR are bounded by the conservative assumptions in the design basis accident analysis. The proposed change will not cause the consequences of a SGTR to exceed those assumptions. Therefore, it is concluded that this change does not involve a significant increase in the probability or consequences of an accident previously evaluated.

2. Does the proposed change create the possibility of a new or different kind of accident from any accident previously evaluated?

   Response: No.

   The proposed changes to the Steam Generator Program will not introduce any adverse changes to the plant design basis or postulated accidents resulting from potential tube degradation. The proposed change does not affect the design of the SGs or their method of operation. In addition, the proposed change does not impact any other plant system or component.

   Therefore, it is concluded that this change does not create the possibility of a new or different kind of accident from any accident previously evaluated.

3. Does the proposed change involve a significant reduction in a margin of safety?

   Response: No.

   The SG tubes in pressurized water reactors are an integral part of the reactor coolant pressure boundary and, as such, are relied upon to maintain the primary system's pressure and inventory. As part of the reactor coolant pressure boundary, the SG tubes are unique in that they are also relied upon as a heat transfer surface between the primary and secondary systems such that residual heat can be removed from the primary system. In addition, the SG tubes also isolate the radioactive fission products in the primary coolant from the secondary system. In summary, the safety function of a SG is maintained by ensuring the integrity of its tubes.

   Steam generator tube integrity is a function of the design, environment, and the physical condition of the tube. The proposed change does not affect tube design or operating environment. The proposed change will continue to require monitoring of the physical condition of the SG tubes such that there will not be a reduction in the margin of safety compared to the current requirements.

   The proposed amendment deletes the current TS 5.5.9.c.2 and TS 5.5.9.f.2 allowance to use ABB Combustion Engineering Inc. TIG welded sleeves as a steam generator tube repair method. There are no ABB Combustion Engineering Inc. (Westinghouse) TIG-welded sleeves currently installed in the Braidwood Station, Unit 2, and Byron Station, Unit 2, SGs. EGC has been informed by the sleeve vendor that TIG welded sleeves are no longer commercially available. As a result of this change, there are no available SG tube repair methods for Braidwood Station or Byron Station. The proposed amendment deletes TS 5.5.9.f, TS 5.5.9.c.2, TS 5.5.9.c.3, and references to tube repair and sleeves in various TS. Removing the ability for tube repair methods is conservative; therefore, the proposed change does not involve a significant reduction in a margin of safety.

   Therefore, it is concluded that the proposed change does not involve a significant reduction in a margin of safety.

Based on the above, EGC concludes that the proposed change presents no significant hazards consideration under the standards set forth in 10 CFR 50.92(c), and, accordingly, a finding of "no significant hazards consideration" is justified.

4.0 ENVIRONMENTAL EVALUATION

The proposed change would change a requirement with respect to installation or use of a facility component located within the restricted area, as defined in 10 CFR 20, or would change an inspection or surveillance requirement. However, the proposed change does not involve (i) a significant hazards consideration, (ii) a significant change in the types or significant increase in the amounts of any effluent that may be released offsite, or (iii) a significant increase in individual or cumulative occupational radiation exposure. Accordingly, the proposed change meets the eligibility criterion for categorical exclusion set forth in 10 CFR 51.22(c)(9). Therefore, pursuant to 10 CFR 51.22(b), no environmental impact statement or environmental assessment need be prepared in connection with the proposed change.

ATTACHMENT 2
Proposed Technical Specifications Changes for Braidwood Station, Units 1 and 2

Braidwood Station, Units 1 and 2

Facility Operating License Nos. NPF-72 and NPF-77

Mark-up of Technical Specifications Pages

3.4.19-1
3.4.19-2
5.5-7
5.5-8
5.5-9
5.5-10
5.6-6
5.6-7

3.4 REACTOR COOLANT SYSTEM (RCS)

3.4.19 Steam Generator (SG) Tube Integrity

LCO 3.4.19 SG tube integrity shall be maintained.

AND

plugging

All SG tubes satisfying the tube ~~repair~~ criteria shall be plugged ~~or repaired~~ in accordance with the Steam Generator Program.

APPLICABILITY: MODES 1, 2, 3, and 4.

ACTIONS

----------NOTE----------
Separate Condition entry is allowed for each SG tube.

CONDITION	REQUIRED ACTION		COMPLETION TIME
A. One or more SG tubes satisfying the tube ~~repair~~ criteria and not plugged ~~or repaired~~ in accordance with the Steam Generator Program. (plugging)	A.1	Verify tube integrity of the affected tube(s) is maintained until the next refueling outage or SG tube inspection.	7 days
	AND		
	A.2	Plug ~~or repair~~ the affected tube(s) in accordance with the Steam Generator Program.	Prior to entering MODE 4 following the next refueling outage or SG tube inspection
B. Required Action and associated Completion Time of Condition A not met. OR SG tube integrity not maintained.	B.1	Be in MODE 3.	6 hours
	AND		
	B.2	Be in MODE 5.	36 hours

SURVEILLANCE REQUIREMENTS

SURVEILLANCE		FREQUENCY
SR 3.4.19.1	Verify SG tube integrity in accordance with the Steam Generator Program.	In accordance with the Steam Generator Program
SR 3.4.19.2	Verify that each inspected SG tube that satisfies the tube ~~repair~~ criteria is plugged ~~or repaired~~ in accordance with the Steam Generator Program.	Prior to entering MODE 4 following a SG tube inspection

plugging

5.5 Programs and Manuals

5.5.9 Steam Generator (SG) Program

A Steam Generator Program shall be established and implemented to ensure that SG tube integrity is maintained. In addition, the Steam Generator Program shall include the following ~~provisions~~:

a. Provisions for condition monitoring assessments. Condition monitoring assessment means an evaluation of the "as found" condition of the tubing with respect to the performance criteria for structural integrity and accident induced leakage. The "as found" condition refers to the condition of the tubing during an SG inspection outage, as determined from the inservice inspection results or by other means, prior to the plugging ~~or repair~~ of tubes. Condition monitoring assessments shall be conducted during each outage during which the SG tubes are ~~inspected, plugged, or repaired~~ to confirm that the performance criteria are being met.

inspected or plugged

b. Performance criteria for SG tube integrity. SG tube integrity shall be maintained by meeting the performance criteria for tube structural integrity, accident induced leakage, and operational LEAKAGE.

),

,

1. Structural integrity performance criterion: All in-service steam generator tubes shall retain structural integrity over the full range of normal operating conditions (including startup, operation in the power range, hot standby, and cool down ~~and~~ all anticipated transients included in the design specification~~)~~ 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 applied to the design basis accident primary-to-secondary pressure differentials. Apart from the above requirements, additional loading conditions associated with the design basis accidents, or combination of accidents in accordance with the design and licensing basis, shall also be evaluated to determine if the associated loads contribute significantly to burst or collapse. In the assessment of tube integrity, those loads that do significantly affect burst or collapse shall be determined and assessed in combination with the loads due to pressure with a safety factor of 1.2 on the combined primary loads and 1.0 on axial secondary loads.

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~~ plugging 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~~. The following alternate tube ~~repair~~ plugging 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.

~~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.~~

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

plugging

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.

A degradation assessment

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

installation

~~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.~~

Replace with INSERT 1

~~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.~~

INSERT 1

2. For Unit 1, after the first refueling outage following SG installation, inspect each SG at least every 72 effective full power months or at least every third refueling outage (whichever results in more frequent inspections). In addition, the minimum number of tubes inspected at each scheduled inspection shall be the number of tubes in all SGs divided by the number of SG inspection outages scheduled in each inspection period as defined in a, b, c, and d below. If a degradation assessment indicates the potential for a type of degradation to occur at a location not previously inspected with a technique capable of detecting this type of degradation at this location and that may satisfy the applicable tube plugging criteria, the minimum number of locations inspected with such a capable inspection technique during the remainder of the inspection period may be prorated. The fraction of locations to be inspected for this potential type of degradation at this location at the end of the inspection period shall be no less than the ratio of the number of times the SG is scheduled to be inspected in the inspection period after the determination that a new form of degradation could potentially be occurring at this location divided by the total number of times the SG is scheduled to be inspected in the inspection period. Each inspection period defined below may be extended up to 3 effective full power months to include a SG inspection outage in an inspection period and the subsequent inspection period begins at the conclusion of the included SG inspection outage.

   a) After the first refueling outage following SG installation, inspect 100% of the tubes during the next 144 effective full power months. This constitutes the first inspection period;

   b) During the next 120 effective full power months, inspect 100% of the tubes. This constitutes the second inspection period;

   c) During the next 96 effective full power months, inspect 100% of the tubes. This constitutes the third inspection period; and

   d) During the remaining life of the SGs, inspect 100% of the tubes every 72 effective full power months. This constitutes the fourth and subsequent inspection periods.

3. For Unit 2, after the first refueling outage following SG installation, inspect each SG at least every 48 effective full power months or at least every other refueling outage (whichever results in more frequent inspections). In addition, the minimum number of tubes inspected at each scheduled inspection shall be the number of tubes in all SGs divided by the number of SG inspection outages scheduled in each inspection period as defined in a, b, and c below. If a degradation assessment indicates the potential for a type of degradation to occur at a location not previously inspected with a technique capable of detecting this type of degradation at this location and that may satisfy the applicable tube plugging criteria, the minimum number of locations inspected with such a capable inspection technique during the remainder of the inspection period may be prorated. The fraction of locations to be inspected for this potential type of degradation at this location at the end of the inspection period shall be no less

INSERT 1 (continued)

than the ratio of the number of times the SG is scheduled to be inspected in the inspection period after the determination that a new form of degradation could potentially be occurring at this location divided by the total number of times the SG is scheduled to be inspected in the inspection period. Each inspection period defined below may be extended up to 3 effective full power months to include a SG inspection outage in an inspection period and the subsequent inspection period begins at the conclusion of the included SG inspection outage.

a) After the first refueling outage following SG installation, inspect 100% of the tubes during the next 120 effective full power months. This constitutes the first inspection period;

b) During the next 96 effective full power months, inspect 100% of the tubes. This constitutes the second inspection period; and

c) During the remaining life of the SGs, inspect 100% of the tubes every 72 effective full power months. This constitutes the third and subsequent inspection periods.

5.5 Programs and Manuals

5.5.9 Steam Generator (SG) Program (continued)

affected and potentially affected

4. → ~~3.~~ For Unit 1, 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~~).

results in more frequent inspections

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~~).

affected and potentially affected

results in more frequent inspections

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,

Degradation

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,~~

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

5.6 Reporting Requirements

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

h. → ~~j.~~ For Unit 2 following completion of an inspection performed in Refueling Outage 15 (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

i. → ~~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

j. → ~~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.

THIS MARKUP OF TS PAGE 5.5-8 REFLECTS CHANGES PROPOSED IN THE H* PERMANENT ALTERNATE REPAIR CRITERIA LAR DATED MARCH 20, 2012.

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

14.01

For Unit 2 ~~during Refueling Outage 15 and the subsequent operating cycle~~, tubes with service-induced flaws located greater than ~~16.95~~ 14.01 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~~ 14.01 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.~~

THIS MARKUP OF TS PAGE 5.5-9 REFLECTS CHANGES PROPOSED IN THE H* PERMANENT ALTERNATE REPAIR CRITERIA LAR DATED MARCH 20, 2012.

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. For Unit 2 ~~during Refueling Outage 15 and the subsequent operating cycle~~, portions of the tube below ~~16.95~~ 14.01 inches from the top of the tubesheet are excluded from this requirement.

plugging

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.

A degradation assessment

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

~~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.~~

Replace with INSERT 1

~~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.~~

THIS MARKUP OF TS PAGE 5.5-10 REFLECTS CHANGES PROPOSED IN THE H* PERMANENT ALTERNATE REPAIR CRITERIA LAR DATED MARCH 20, 2012.

5.5 Programs and Manuals

5.5.9 Steam Generator (SG) Program (continued)

affected and potentially affected

4. → ~~3.~~ For Unit 1, 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~~). 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~~).

results in more frequent inspections

14.01

14.01

affected and potentially affected

results in more frequent inspections

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

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

h. → ~~j.~~ For Unit 2 ~~following completion of an inspection performed in Refueling Outage 15 (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

i. → ~~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

14.01

j. → ~~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
Proposed Technical Specifications Changes for Byron Station, Units 1 and 2

Byron Station, Units 1 and 2

Facility Operating License Nos. NPF-37 and NPF-66

Mark-up of Technical Specifications Pages

3.4.19-1
3.4.19-2
5.5-7
5.5-8
5.5-9
5.5-10
5.5-11
5.6-6
5.6-7

3.4 REACTOR COOLANT SYSTEM (RCS)

3.4.19 Steam Generator (SG) Tube Integrity

LCO 3.4.19 SG tube integrity shall be maintained.

AND

plugging

All SG tubes satisfying the tube ~~repair~~ criteria shall be plugged ~~or repaired~~ in accordance with the Steam Generator Program.

APPLICABILITY: MODES 1, 2, 3, and 4.

ACTIONS

----------NOTE----------
Separate Condition entry is allowed for each SG tube.

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. One or more SG tubes satisfying the tube ~~repair~~ criteria and not plugged ~~or repaired~~ in accordance with the Steam Generator Program. (plugging)	A.1 Verify tube integrity of the affected tube(s) is maintained until the next refueling outage or SG tube inspection. AND A.2 Plug ~~or repair~~ the affected tube(s) in accordance with the Steam Generator Program.	7 days Prior to entering MODE 4 following the next refueling outage or SG tube inspection
B. Required Action and associated Completion Time of Condition A not met. OR SG tube integrity not maintained.	B.1 Be in MODE 3. AND B.2 Be in MODE 5.	6 hours 36 hours

SURVEILLANCE REQUIREMENTS

SURVEILLANCE		FREQUENCY
SR 3.4.19.1	Verify SG tube integrity in accordance with the Steam Generator Program.	In accordance with the Steam Generator Program
SR 3.4.19.2	Verify that each inspected SG tube that satisfies the tube ~~repair~~ criteria is plugged ~~or repaired~~ in accordance with the Steam Generator Program.	Prior to entering MODE 4 following a SG tube inspection

plugging

5.5 Programs and Manuals

5.5.9 Steam Generator (SG) Program

A Steam Generator Program shall be established and implemented to ensure that SG tube integrity is maintained. In addition, the Steam Generator Program shall include the following ~~provisions~~:

a. Provisions for condition monitoring assessments. Condition monitoring assessment means an evaluation of the "as found" condition of the tubing with respect to the performance criteria for structural integrity and accident induced leakage. The "as found" condition refers to the condition of the tubing during an SG inspection outage, as determined from the inservice inspection results or by other means, prior to the plugging ~~or repair~~ of tubes. Condition monitoring assessments shall be conducted during each outage during which the SG tubes are ~~inspected, plugged, or repaired~~ to confirm that the performance criteria are being met.

inspected or plugged

b. Performance criteria for SG tube integrity. SG tube integrity shall be maintained by meeting the performance criteria for tube structural integrity, accident induced leakage, and operational LEAKAGE.

),

,

1. Structural integrity performance criterion: All in-service steam generator tubes shall retain structural integrity over the full range of normal operating conditions (including startup, operation in the power range, hot standby, and cool down ~~and~~ all anticipated transients included in the design specification~~)~~ 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 applied to the design basis accident primary-to-secondary pressure differentials. Apart from the above requirements, additional loading conditions associated with the design basis accidents, or combination of accidents in accordance with the design and licensing basis, shall also be evaluated to determine if the associated loads contribute significantly to burst or collapse. In the assessment of tube integrity, those loads that do significantly affect burst or collapse shall be determined and assessed in combination with the loads due to pressure with a safety factor of 1.2 on the combined primary loads and 1.0 on axial secondary loads.

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

For Unit 2 during Refueling Outage 16 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.

~~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.~~

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. For Unit 2 during Refueling Outage 16 and the subsequent operating cycle, portions of the tube below 16.95 inches from the top of the tubesheet are excluded from this requirement.

plugging

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.

A degradation assessment

installation

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.~~

Replace with INSERT 1

INSERT 1

2. For Unit 1, after the first refueling outage following SG installation, inspect each SG at least every 72 effective full power months or at least every third refueling outage (whichever results in more frequent inspections). In addition, the minimum number of tubes inspected at each scheduled inspection shall be the number of tubes in all SGs divided by the number of SG inspection outages scheduled in each inspection period as defined in a, b, c, and d below. If a degradation assessment indicates the potential for a type of degradation to occur at a location not previously inspected with a technique capable of detecting this type of degradation at this location and that may satisfy the applicable tube plugging criteria, the minimum number of locations inspected with such a capable inspection technique during the remainder of the inspection period may be prorated. The fraction of locations to be inspected for this potential type of degradation at this location at the end of the inspection period shall be no less than the ratio of the number of times the SG is scheduled to be inspected in the inspection period after the determination that a new form of degradation could potentially be occurring at this location divided by the total number of times the SG is scheduled to be inspected in the inspection period. Each inspection period defined below may be extended up to 3 effective full power months to include a SG inspection outage in an inspection period and the subsequent inspection period begins at the conclusion of the included SG inspection outage.

   a) After the first refueling outage following SG installation, inspect 100% of the tubes during the next 144 effective full power months. This constitutes the first inspection period;

   b) During the next 120 effective full power months, inspect 100% of the tubes. This constitutes the second inspection period;

   c) During the next 96 effective full power months, inspect 100% of the tubes. This constitutes the third inspection period; and

   d) During the remaining life of the SGs, inspect 100% of the tubes every 72 effective full power months. This constitutes the fourth and subsequent inspection periods.

3. For Unit 2, after the first refueling outage following SG installation, inspect each SG at least every 48 effective full power months or at least every other refueling outage (whichever results in more frequent inspections). In addition, the minimum number of tubes inspected at each scheduled inspection shall be the number of tubes in all SGs divided by the number of SG inspection outages scheduled in each inspection period as defined in a, b, and c below. If a degradation assessment indicates the potential for a type of degradation to occur at a location not previously inspected with a technique capable of detecting this type of degradation at this location and that may satisfy the applicable tube plugging criteria, the minimum number of locations inspected with such a capable inspection technique during the remainder of the inspection period may be prorated. The fraction of locations to be inspected for this potential type of degradation at this location at the end of the inspection period shall be no less

INSERT 1 (continued)

than the ratio of the number of times the SG is scheduled to be inspected in the inspection period after the determination that a new form of degradation could potentially be occurring at this location divided by the total number of times the SG is scheduled to be inspected in the inspection period. Each inspection period defined below may be extended up to 3 effective full power months to include a SG inspection outage in an inspection period and the subsequent inspection period begins at the conclusion of the included SG inspection outage.

a) After the first refueling outage following SG installation, inspect 100% of the tubes during the next 120 effective full power months. This constitutes the first inspection period;

b) During the next 96 effective full power months, inspect 100% of the tubes. This constitutes the second inspection period; and

c) During the remaining life of the SGs, inspect 100% of the tubes every 72 effective full power months. This constitutes the third and subsequent inspection periods.

5.5 Programs and Manuals

5.5.9 Steam Generator (SG) Program (continued)

~~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.~~

affected and potentially affected

4. → ~~3.~~ For Unit 1, 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~~). For Unit 2 during Refueling Outage 16 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~~).

results in more frequent inspections

affected and potentially affected

results in more frequent inspections

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.

5.5 Programs and Manuals

5.5.9 Steam Generator (SG) Program (continued)

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, and~~

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

Degradation

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

5.6 Reporting Requirements

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

h. → ~~j.~~ For Unit 2 following completion of an inspection performed in Refueling Outage 16 (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

i. → ~~k.~~ For Unit 2 following completion of an inspection performed in Refueling Outage 16 (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

j. → ~~l.~~ For Unit 2 following completion of an inspection performed in Refueling Outage 16 (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.

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

14.01

For Unit 2 ~~during Refueling Outage 16 and the subsequent operating cycle~~, tubes with service-induced flaws located greater than ~~16.95~~ 14.01 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~~ 14.01 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.~~

THIS MARKUP OF TS PAGE 5.5-9 REFLECTS CHANGES PROPOSED IN THE H* PERMANENT ALTERNATE REPAIR CRITERIA LAR DATED MARCH 20, 2012.

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. For Unit 2 ~~during Refueling Outage 16 and the subsequent operating cycle~~, portions of the tube below ~~16.95~~ 14.01 inches from the top of the tubesheet are excluded from this requirement.

plugging

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.

A degradation assessment

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

installation

~~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.~~

Replace with INSERT 1

5.5 Programs and Manuals

5.5.9 Steam Generator (SG) Program (continued)

~~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.~~

affected and potentially affected

4. → ~~3.~~ For Unit 1, 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~~). For Unit 2 ~~during Refueling Outage 16 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~~).

results in more frequent inspections

14.01

14.01

affected and potentially affected

results in more frequent inspections

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.

5.6 Reporting Requirements

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

h. → ~~j.~~ For Unit 2 ~~following completion of an inspection performed in Refueling Outage 16 (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

i. → ~~k.~~ For Unit 2 ~~following completion of an inspection performed in Refueling Outage 16 (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

14.01

j. → ~~l.~~ For Unit 2 ~~following completion of an inspection performed in Refueling Outage 16 (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 4
Proposed Technical Specifications Bases Changes for Braidwood Station, Units 1 and 2

Braidwood Station, Units 1 and 2

Facility Operating License Nos. NPF-72 and NPF-77

Mark-up of Technical Specifications Bases Pages

B 3.4.19-3
B 3.4.19-5
B 3.4.19-6
B 3.4.19-7

BASES

plugging

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.

plugging

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.

plugging

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 15 and the subsequent operating cycle, the portion of the tube below 16.95 inches from the top of the tubesheet is excluded. The tube-to-tubesheet weld is not considered part of the tube.

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.

BASES

APPLICABILITY

Steam generator tube integrity is challenged when the pressure differential across the tubes is large. Large differential pressures across SG tubes can only be experienced in MODE 1, 2, 3, or 4.

RCS conditions are far less challenging in MODES 5 and 6 than during MODES 1, 2, 3, and 4. In MODES 5 and 6, primary to secondary differential pressure is low, resulting in lower stresses and reduced potential for LEAKAGE.

ACTIONS

The ACTIONS are modified by a Note clarifying that the Conditions may be entered independently for each SG tube. This is acceptable because the Required Actions provide appropriate compensatory actions for each affected SG tube. Complying with the Required Actions may allow for continued operation, and subsequent affected SG tubes are governed by subsequent Condition entry and application of associated Required Actions.

A.1 and A.2

plugging

Condition A applies if it is discovered that one or more SG tubes examined in an inservice inspection satisfy the tube ~~repair~~ criteria but were not plugged ~~or repaired~~ in accordance with the Steam Generator Program as required by SR 3.4.19.2. An evaluation of SG tube integrity of the affected tube(s) must be made. Steam generator tube integrity is based on meeting the SG performance criteria described in the Steam Generator Program. The SG ~~repair~~ criteria define limits on SG tube degradation that allow for flaw growth between inspections while still providing assurance that the SG performance criteria will continue to be met. In order to determine if a SG tube that should have been plugged ~~or repaired~~ has tube integrity, an evaluation must be completed that demonstrates that the SG performance criteria will continue to be met until the next refueling outage or SG tube inspection. The tube integrity determination is based on the estimated condition of the tube at the time the situation is discovered and the estimated growth of the degradation prior to the next SG tube inspection. If it is determined that tube integrity is not being maintained, Condition B applies.

plugging

A Completion Time of 7 days is sufficient to complete the evaluation while minimizing the risk of plant operation with a SG tube that may not have tube integrity.

BASES

ACTIONS (continued)

If the evaluation determines that the affected tube(s) have tube integrity, Required Action A.2 allows plant operation to continue until the next refueling outage or SG inspection, whichever occurs first, provided the inspection interval continues to be supported by an operational assessment that reflects the affected tubes. However, the affected tube(s) must be plugged ~~or repaired~~ prior to entering MODE 4 following the next refueling outage or SG inspection, whichever occurs first. This Completion Time is acceptable since operation until the next inspection is supported by the operational assessment.

B.1 and B.2

If the Required Actions and associated Completion Times of Condition A are not met or if SG tube integrity is not being maintained, the reactor must be brought to MODE 3 within 6 hours and MODE 5 within 36 hours.

The allowed Completion Times are reasonable, based on operating experience, to reach the desired plant conditions from full power conditions in an orderly manner and without challenging plant systems.

SURVEILLANCE REQUIREMENTS

SR 3.4.19.1

During shutdown periods the SGs are inspected as required by this SR and the Steam Generator Program. NEI 97-06, "Steam Generator Program Guidelines," (Ref. 1), and its referenced EPRI Guidelines, establish the content of the Steam Generator Program. Use of the Steam Generator Program ensures that the inspection is appropriate and consistent with accepted industry practices.

During SG inspections a condition monitoring assessment of the SG tubes is performed. The condition monitoring assessment determines the "as found" condition of the SG tubes. The purpose of the condition monitoring assessment is to ensure that the SG performance criteria have been met for the previous operating period.

plugging

The Steam Generator Program determines the scope of the inspection and the methods used to determine whether the tubes contain flaws satisfying the tube ~~repair~~ criteria. Inspection scope (i.e., which tubes or areas of tubing within the SG are to be inspected) is a function of existing and potential degradation locations. The Steam Generator

BASES

SURVEILLANCE REQUIREMENTS (continued)

Program also specifies the inspection methods to be used to find potential degradation. Inspection methods are a function of degradation morphology, non-destructive examination (NDE) technique capabilities, and inspection locations.

The Steam Generator Program defines the Frequency of SR 3.4.19.1. The Frequency is determined by the operational assessment and other limits in the SG examination guidelines (Ref. 6). The Steam Generator Program uses information on existing degradations and growth rates to determine an inspection Frequency that provides reasonable assurance that the tubing will meet the SG performance criteria at the next scheduled inspection. In addition, Specification 5.5.9 contains prescriptive requirements concerning inspection intervals to provide added assurance that the SG performance criteria will be met between scheduled inspections. INSERT 2

SR 3.4.19.2

plugging

plugging

During an SG inspection, any inspected tube that satisfies the Steam Generator Program ~~repair~~ criteria is ~~repaired or~~ removed from service by plugging. The tube ~~repair~~ criteria delineated in Specification 5.5.9 are intended to ensure that tubes accepted for continued service satisfy the SG performance criteria with allowance for error in the flaw size measurement and for future flaw growth. In addition, the tube ~~repair~~ criteria, in conjunction with other elements of the Steam Generator Program, ensure that the SG performance criteria will continue to be met until the next inspection of the subject tube(s). Reference 1 provides guidance for performing operational assessments to verify that the tubes remaining in service will continue to meet the SG performance criteria.

plugging

~~Steam generator tube repairs are only performed using approved repair methods as described in the Steam Generator Program.~~

plugging

The Frequency of prior to entering MODE 4 following a SG inspection ensures that the Surveillance has been completed and all tubes meeting the ~~repair~~ criteria are plugged ~~or repaired~~ prior to subjecting the SG tubes to significant primary to secondary pressure differential.

INSERT 2

If crack indications are found in any SG tube, the maximum inspection interval for all affected and potentially affected SGs is restricted by Specification 5.5.9 until subsequent inspections support extending the inspection interval.

BASES

plugging

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.

plugging

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.

plugging

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 15 and the subsequent operating cycle~~, the portion of the tube below ~~16.95~~ 14.01 inches from the top of the tubesheet is excluded. The tube-to-tubesheet weld is not considered part of the tube.

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 5
Proposed Technical Specifications Bases Changes for Byron Station, Units 1 and 2

Byron Station, Units 1 and 2

Facility Operating License Nos. NPF-37 and NPF-66

Mark-up of Technical Specifications Bases Pages

B 3.4.19-3
B 3.4.19-5
B 3.4.19-6
B 3.4.19-7

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 16 and the subsequent operating cycle, the portion of the tube below 16.95 inches from the top of the tubesheet is excluded. The tube-to-tubesheet weld is not considered part of the tube.

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BASES

APPLICABILITY

Steam generator tube integrity is challenged when the pressure differential across the tubes is large. Large differential pressures across SG tubes can only be experienced in MODE 1, 2, 3, or 4.

RCS conditions are far less challenging in MODES 5 and 6 than during MODES 1, 2, 3, and 4. In MODES 5 and 6, primary to secondary differential pressure is low, resulting in lower stresses and reduced potential for LEAKAGE.

ACTIONS

The ACTIONS are modified by a Note clarifying that the Conditions may be entered independently for each SG tube. This is acceptable because the Required Actions provide appropriate compensatory actions for each affected SG tube. Complying with the Required Actions may allow for continued operation, and subsequent affected SG tubes are governed by subsequent Condition entry and application of associated Required Actions.

A.1 and A.2

plugging

Condition A applies if it is discovered that one or more SG tubes examined in an inservice inspection satisfy the tube ~~repair~~ criteria but were not plugged~~ or repaired~~ in accordance with the Steam Generator Program as required by SR 3.4.19.2. An evaluation of SG tube integrity of the affected tube(s) must be made. Steam generator tube integrity is based on meeting the SG performance criteria described in the Steam Generator Program. The SG ~~repair~~ criteria define limits on SG tube degradation that allow for flaw growth between inspections while still providing assurance that the SG performance criteria will continue to be met. In order to determine if a SG tube that should have been plugged~~ or repaired~~ has tube integrity, an evaluation must be completed that demonstrates that the SG performance criteria will continue to be met until the next refueling outage or SG tube inspection. The tube integrity determination is based on the estimated condition of the tube at the time the situation is discovered and the estimated growth of the degradation prior to the next SG tube inspection. If it is determined that tube integrity is not being maintained, Condition B applies.

plugging

A Completion Time of 7 days is sufficient to complete the evaluation while minimizing the risk of plant operation with a SG tube that may not have tube integrity.

BASES

ACTIONS (continued)

If the evaluation determines that the affected tube(s) have tube integrity, Required Action A.2 allows plant operation to continue until the next refueling outage or SG inspection, whichever occurs first, provided the inspection interval continues to be supported by an operational assessment that reflects the affected tubes. However, the affected tube(s) must be plugged ~~or repaired~~ prior to entering MODE 4 following the next refueling outage or SG inspection, whichever occurs first. This Completion Time is acceptable since operation until the next inspection is supported by the operational assessment.

B.1 and B.2

If the Required Actions and associated Completion Times of Condition A are not met or if SG tube integrity is not being maintained, the reactor must be brought to MODE 3 within 6 hours and MODE 5 within 36 hours.

The allowed Completion Times are reasonable, based on operating experience, to reach the desired plant conditions from full power conditions in an orderly manner and without challenging plant systems.

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SR 3.4.19.1

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plugging

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BASES

SURVEILLANCE REQUIREMENTS (continued)

The Steam Generator Program also specifies the inspection methods to be used to find potential degradation. Inspection methods are a function of degradation morphology, non-destructive examination (NDE) technique capabilities, and inspection locations.

The Steam Generator Program defines the Frequency of SR 3.4.19.1. The Frequency is determined by the operational assessment and other limits in the SG examination guidelines (Ref. 6). The Steam Generator Program uses information on existing degradations and growth rates to determine an inspection Frequency that provides reasonable assurance that the tubing will meet the SG performance criteria at the next scheduled inspection. In addition, Specification 5.5.9 contains prescriptive requirements concerning inspection intervals to provide added assurance that the SG performance criteria will be met between scheduled inspections. INSERT 2

SR 3.4.19.2

plugging

plugging

During an SG inspection, any inspected tube that satisfies the Steam Generator Program ~~repair~~ criteria is ~~repaired or~~ removed from service by plugging. The tube ~~repair~~ criteria delineated in Specification 5.5.9 are intended to ensure that tubes accepted for continued service satisfy the SG performance criteria with allowance for error in the flaw size measurement and for future flaw growth. In addition, the tube ~~repair~~ criteria, in conjunction with other elements of the Steam Generator Program, ensure that the SG performance criteria will continue to be met until the next inspection of the subject tube(s). Reference 1 provides guidance for performing operational assessments to verify that the tubes remaining in service will continue to meet the SG performance criteria.

plugging

~~Steam generator tube repairs are only performed using approved repair methods as described in the Steam Generator Program.~~

plugging

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If crack indications are found in any SG tube, the maximum inspection interval for all affected and potentially affected SGs is restricted by Specification 5.5.9 until subsequent inspections support extending the inspection interval.

BASES

plugging

LCO

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plugging

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plugging

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