ATTACHMENT C-1

MARKED UP PAGES FOR
PROPOSED CHANGES TO APPENDIX A
TECHNICAL SPECIFICATIONS OF
FACILITY OPERATING LICENSES
NPF-72, AND NPF-77

BRAIDWOOD STATION UNITS 1 & 2
REVISED PAGES:

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*NOTE: THESE PAGES HAVE NO CHANGES BUT ARE INCLUDED FOR CONTINUITY.

3/4.4.5 STEAM GENERATORS

LIMITING CONDITION FOR OPERATION

3.4.5 Each steam generator shall be OPERABLE.

APPLICABILITY: MODES 1, 2, 3 and 4.

ACTION:

With one or more steam generators inoperable, restore the inoperable steam generator(s) to OPERABLE status prior to increasing T_{avg} above 200°F.

SURVEILLANCE REQUIREMENTS

4.4.5.0 Each steam generator shall be demonstrated OPERABLE by performance of the following augmented inservice inspection program and the requirements of Specification 4.0.5.

4.4.5.1 Steam Generator Sample Selection and Inspection - Each steam generator shall be determined OPERABLE during shutdown by selecting and inspecting at least the minimum number of steam generators specified in Table 4.4-1.

4.4.5.2 Steam Generator Tube* Sample Selection and Inspection - The steam generator tube minimum sample size, inspection result classification, and the corresponding action required shall be as specified in Table 4.4-2. The inservice inspection of steam generator tubes shall be performed at the frequencies specified in Specification 4.4.5.3 and the inspected tubes shall be verified acceptable per the acceptance criteria of Specification 4.4.5.4. When applying the expectations of 4.4.5.2.a through 4.4.5.2.c, previous defects or imperfections in the area repaired by the sleeve are not considered an area requiring reinspection. The tubes selected for each inservice inspection shall include at least 3% of the total number of tubes in all steam generators; the tubes selected for these inspections shall be selected on a random basis except:

a. Where experience in similar plants with similar water chemistry indicates critical areas to be inspected, then at least 50% of the tubes inspected shall be from these critical areas;

b. The first sample of tubes selected for each inservice inspection (subsequent to the preservice inspection) of each steam generator shall include:

*When referring to a steam generator tube, the sleeve shall be considered a part of the tube if the tube has been repaired per Specification 4.4.5.4.a.10.

1) All tubes that previously had detectable tube wall penetrations greater than 20% that have not been plugged or sleeved in the affected area, and all tubes that previously had detectable sleeve wall penetrations that have not been plugged,

2) Tubes in those areas where experience has indicated potential problems,

3) At least 3% of the total number of sleeved tubes in all four steam generators or all of the sleeved tubes in the generator chosen for the inspection program, whichever is less. These inspections will include both the tube and the sleeve, and

4) A tube inspection (pursuant to Specification 4.4.5.4a.8) shall be performed on each selected tube. If any selected tube does not permit the passage of the eddy current probe for a tube inspection, this shall be recorded and an adjacent tube shall be selected and subjected to a tube inspection.

Insert A

c. The tubes selected as the second and third samples (if required by Table 4.4-2) during each inservice inspection may be subjected to a partial tube inspection provided:

1) The tubes selected for these samples include the tubes from those areas of the tube sheet array where tubes with imperfections were previously found, and

2) The inspections include those portions of the tubes where imperfections were previously found.

Replace with Insert B

d. ~~For Unit 1 Cycle 5, implementation of the tube support plate interim plugging criteria limit requires a 100% bobbin coil probe inspection for all hot leg tube support plate intersections and all cold leg intersections down to the lowest cold leg tube support plate with outer diameter stress corrosion cracking (ODSCC) indications. An inspection using a rotating pancake coil (RPC) probe is required in order to show OPERABILITY of tubes with flaw-like bobbin coil signal amplitudes greater than 1.0 volt but less than or equal to 2.7 volts. For tubes that will be administratively plugged or repaired, no RPC inspection is required. The RPC results are to be evaluated to establish that the principal indications can be characterized as ODSCC.~~

The results of each sample inspection shall be classified into one of the following three categories:

Category	Inspection Results
C-1	Less than 5% of the total tubes inspected are degraded tubes and none of the inspected tubes are defective.

INSERT A For Braidwood Station Only
(4.4.5.2.b)

5) For Unit 1, tubes left in service as a result of application of the tube support plate plugging criteria shall be inspected by bobbin coil probe during all future outages.

INSERT B For Braidwood Station Only
(4.4.5.2.d)

d. For Unit 1 Cycle 6, implementation of the tube support plate interim plugging criteria limit requires a 100% bobbin coil probe inspection for all hot leg tube support plate intersections and all cold leg intersections down to the lowest cold leg tube support plate with outer diameter stress corrosion cracking (ODSCC) indications. The determination of tube support plate intersections having ODSCC indications shall be based on the performance of at least a 20% random sampling of tubes inspected over their full length.

SURVEILLANCE REQUIREMENTS (Continued)

C-2	One or more tubes, but not more than 1% of the total tubes inspected are defective, or between 5% and 10% of the total tubes inspected are degraded tubes.
C-3	More than 10% of the total tubes inspected are degraded tubes or more than 1% of the inspected tubes are defective.

Note: In all inspections, previously degraded tubes or sleeves must exhibit significant (greater than 10% of wall thickness) further wall penetrations to be included in the above percentage calculations.

SURVEILLANCE REQUIREMENTS (Continued)

4.4.5.3 Inspection Frequencies - The above required inservice inspections of steam generator tubes shall be performed at the following frequencies:

a. The first inservice inspection shall be performed after 6 Effective Full Power Months but within 24 calendar months of initial criticality. Subsequent inservice inspections shall be performed at intervals of not less than 12 nor more than 24 calendar months after the previous inspection. If two consecutive inspections, not including the preservice inspection, result in all inspection results falling into the C-1 category or if two consecutive inspections demonstrate that previously observed degradation has not continued and no additional degradation has occurred, the inspection interval may be extended to a maximum of once per 40 months;

b. If the results of the inservice inspection of a steam generator conducted in accordance with Table 4.4-2 at 40-month intervals fall in Category C-3, the inspection frequency shall be increased to at least once per 20 months. The increase in inspection frequency shall apply until the subsequent inspections satisfy the criteria of Specification 4.4.5.3a.; the interval may then be extended to a maximum of once per 40 months; and

c. Additional, unscheduled inservice inspections shall be performed on each steam generator in accordance with the first sample inspection specified in Table 4.4-2 during the shutdown subsequent to any of the following conditions:

   1) Reactor-to-secondary tube leaks (not including leaks originating from tube-to-tube sheet welds) in excess of the limits of Specification 3.4.6.2c., or

   2) A seismic occurrence greater than the Operating Basis Earthquake, or

   3) A Condition IV loss-of-coolant accident requiring actuation of the Engineered Safety Features, or

   4) A Condition IV main steam line or feedwater line break.

SURVEILLANCE REQUIREMENTS (Continued)

4.4.5.4 Acceptance Criteria

a. As used in this specification:

1) Imperfection means an exception to the dimensions, finish or contour of a tube or sleeve from that required by fabrication drawings or specifications. Eddy-current testing indications below 20% of the nominal tube or sleeve wall thickness, if detectable, may be considered as imperfections;

2) Degradation means a service-induced cracking, wastage, wear or general corrosion occurring on either inside or outside of a tube or sleeve;

3) Degraded Tube means a tube or sleeve containing unrepaired imperfections greater than or equal to 20% of the nominal tube or sleeve wall thickness caused by degradation;

4) % Degradation means the percentage of the tube or sleeve wall thickness affected or removed by degradation;

5) Defect means an imperfection of such severity that it exceeds the plugging or repair limit. A tube or sleeve containing an unrepaired defect is defective;

6) Plugging or Repair Limit means the imperfection depth at or beyond which the tube shall be removed from service by plugging or repaired by sleeving in the affected area. The plugging or repair limit imperfection depth is equal to 40% of the nominal wall thickness. ~~For Unit 1 Cycle 5, this definition does not apply to the region of the tube subject to the tube support plate interim plugging criteria limit, i.e., the tube support plate intersections. Specification 4.4.5.4.a.11 describes the repair limit for use within the tube support plate intersection of the tube~~;

Replace with Insert C

7) Unserviceable describes the condition of a tube if it leaks or contains a defect large enough to affect its structural integrity in the event of an Operating Basis Earthquake, a loss-of-coolant accident, or a steam line or feedwater line break as specified in 4.4.5.3c., above;

8) Tube Inspection means an inspection of the steam generator tube from the point of entry (hot leg side) completely around the U-bend to the top support of the cold leg. For a tube that has been repaired by sleeving, the tube inspection shall include the sleeved portion of the tube, and

INSERT C For Braidwood Station Only
(4.4.5.4.a.6)

For Unit 1 Cycle 6, this definition does not apply to tube support plate intersections for which the voltage based plugging criteria are being applied. Refer to 4.4.5.4.a.11 for the repair limit applicable to these intersections;

9) Preservice Inspection means an inspection of the full length of each tube in each steam generator performed by eddy current techniques prior to service to establish a baseline condition of the tubing. This inspection shall be performed prior to initial POWER OPERATION using the equipment and techniques expected to be used during subsequent inservice inspections.

10) Tube Repair refers to a process that reestablishes tube serviceability. Acceptable tube repairs will be performed by the following processes:

a) Laser welded sleeving as described by Westinghouse report WCAP-13698, Rev. 1, or

b) Kinetic welded sleeving as described by Babcock & Wilcox Topical Report BAW-2045PA, Rev. 1.

Tube repair includes the removal of plugs that were previously installed as a corrective or preventative measure. A tube inspection per 4.4.5.4.a.8 is required prior to returning previously plugged tubes to service.

Replace with Insert D

~~11) Tube Support Plate Interim Plugging Criteria Limit for Unit 1 Cycle 5 is used for the disposition of a steam generator tube for continued service that is experiencing ODSCC confined within the thickness of the tube support plates. For application of the tube support plate interim plugging criteria limit, the tube's disposition for continued service will be based upon standard bobbin coil probe signal amplitude of flaw-like indications. The plant specific guidelines used for all inspections shall be consistent with the eddy current guidelines in Appendix A of WCAP-13854 as appropriate to accommodate the additional information needed to evaluate tube support plate signals with respect to the voltage parameters as specified in Specification 4.4.5.2. Pending incorporation of the voltage verification requirements in ASME standard verification, an ASME standard calibrated against the laboratory standard will be utilized in Unit 1 steam generator inspections for consistent voltage normalization.~~

~~1. A tube can remain in service with a flaw-like bobbin coil signal amplitude of less than or equal to 1.0 volt, regardless of the depth of the tube wall penetration, provided Item 3 below is satisfied.~~

~~2. A tube can remain in service with a flaw-like bobbin coil signal amplitude greater than 1.0 volt but less than or equal to 2.7 volts provided an RPC inspection does not detect degradation and provided Item 3 below is satisfied.~~

3. ~~The projected end of cycle distribution of crack indications is verified to result in total primary to secondary leakage less than 9.1 gpm (includes operational and accident leakage). The basis for determining expected leak rates from the projected crack distribution is provided in WCAP-14046, "Braidwood Unit 1 Technical Support for Cycle 5 Steam Generator Interim Plugging Criteria" dated May 1994.~~

4. ~~A tube with a flaw-like bobbin coil signal amplitude of greater than 2.7 volts shall be plugged or repaired.~~

~~Certain tubes identified in WCAP-14046, "Braidwood Unit 1 Technical Support for Cycle 5 Steam Generator Interim Plugging Criteria," dated May 1994, shall be excluded from application of the tube support plate interim plugging criteria limit. It has been determined that these tubes may collapse or deform following a postulated LOCA + SSE.~~

b. The steam generator shall be determined OPERABLE after completing the corresponding actions (plug or repair in the affected area all tubes exceeding the plugging or repair limit) required by Table 4.4-2.

4.4.5.5 Reports

a. Within 15 days following the completion of each inservice inspection of steam generator tubes, the number of tubes plugged or repaired in each steam generator shall be reported to the Commission in a Special Report pursuant to Specification 6.9.2;

b. The complete results of the steam generator tube inservice inspection shall be submitted to the Commission in a Special Report pursuant to Specification 6.9.2 within 12 months following the completion of the inspection. This Special Report shall include:

1) Number and extent of tubes inspected,

2) Location and percent of wall-thickness penetration for each indication of an imperfection, and

3) Identification of tubes plugged or repaired.

c. Results of steam generator tube inspections which fall into Category C-3 shall be reported in a Special Report to the Commission pursuant to Specification 6.9.2 within 30 days and prior to resumption of plant operation. This report shall provide a description of investigations conducted to determine cause of the tube degradation and corrective measures taken to prevent recurrence.

INSERT D For Braidwood Station Only
(4.4.5.4.a.11)

11) For Unit 1 Cycle 6, the Tube Support Plate Interim Plugging Criteria Limit is used for the disposition of a steam generator tube for continued service that is experiencing outer diameter stress corrosion cracking confined within the thickness of the tube support plates. At tube support plate intersections, the repair limit is based on maintaining steam generator tube serviceability as described below:

a) Degradation attributed to outside diameter stress corrosion cracking within the bounds of the hot leg tube support plate with bobbin voltage less than or equal to 3.0 volts will be allowed to remain in service.

b) Degradation attributed to outside diameter stress corrosion cracking within the bounds of the cold leg tube support plate with bobbin voltage less than or equal to 1.0 volt will be allowed to remain in service.

c) Degradation attributed to outside diameter stress corrosion cracking within the bounds of the hot leg tube support plate with bobbin voltage greater than 3.0 volts will be repaired or plugged except as noted in 4.4.5.4.a.11)e) below.

d) Degradation attributed to outside diameter stress corrosion cracking within the bounds of the cold leg tube support plate with bobbin voltage greater than 1.0 volt will be repaired or plugged except as noted in 4.4.5.4.a.11)f) below.

e) Indications of potential degradation attributed to outside diameter stress corrosion cracking within the bounds of the hot leg tube support plate with a bobbin voltage greater than 3.0 volts but less than or equal to 10.0 volts may remain in service if a rotating pancake coil inspection does not detect degradation. Indications of outside diameter stress corrosion cracking degradation with bobbin voltage greater than 10.0 volts at the hot leg tube support plates will be plugged or repaired.

INSERT D (cont) For Braidwood Station Only
(4.4.5.4.a.11)

f) Indications of potential degradation attributed to outside diameter stress corrosion cracking within the bounds of the cold leg tube support plate with a bobbin voltage greater than 1.0 volt but less than or equal to 2.7 volts may remain in service if a rotating pancake coil inspection does not detect degradation. Indications of outside diameter stress corrosion cracking degradation with bobbin voltage greater than 2.7 volts at the cold leg tube support plates will be plugged or repaired.

g) Certain intersections as identified in WCAP-14046, Section 4.7, will be excluded from application of the voltage-based repair criteria as it is determined that these intersections may collapse or deform following a postulated LOCA+SSE event.

INSERT D (cont) For Braidwood Station Only
(4.4.5.4.a.11)

h) If, as a result of leakage due to a mechanism other than ODSCC at the tube support plate intersection, or some other cause, an unscheduled mid-cycle inspection is performed, the following repair criteria apply instead of 4.4.5.4.11)e)for indications at the hot leg tube support plate indications, or 4.4.5.4.11)f) for indications at the cold leg tube support plate intersections. If bobbin voltage is within expected limits, the indication can remain in service. The expected bobbin voltage limits are determined from the following equation:

$$V < \frac{\frac{\Delta t}{CL}(V_{SL} - V_{BOC}) + V_{BOC}}{1 + (0.2)(\frac{\Delta t}{CL})}$$

where:
V = measured voltage
V_{BOC}= voltage at BOC
Δt = time period of operation to unscheduled outage
CL = cycle length (full operating cycle length where operating cycle is the time between two scheduled steam generator inspections)
V_{SL} = 20 volts for the hot leg tube support plate intersections; 4.75 volts for the cold leg tube support plate intersections.

SURVEILLANCE REQUIREMENTS (Continued)

Replace with Insert E

~~d. For Unit 1 Cycle 5, the results of inspection for all tubes in which the tube support plate interim plugging criteria limit has been applied shall be reported to the Commission pursuant to Specification 6.9.2 following completion of the steam generator tube inservice inspection and prior to Cycle 5 operation. The report shall include:~~

~~1. Listing of the applicable tubes,~~

~~2. Location (applicable intersections per tube) and extent of degradation (voltage), and~~

~~3. Projected Steam Line Break (MSLB) Leakage.~~

INSERT E For Braidwood Station Only
(4.4.5.5.d)

d. For Unit 1 Cycle 6, implementation of the voltage-based repair criteria to tube support plate intersections, reports to the Staff shall be made as follows:

1) Notify the Staff prior to returning the steam generators to service should any of the following conditions arise:

a) If estimated leakage based on the actual measured end-of-cycle voltage distribution would have exceeded the leak limit (for postulated main steam line break utilizing licensing basis assumptions) during the previous operation cycle.

b) If circumferential crack-like indications are detected at the tube support plate intersections.

c) If indications are identified that extend beyond the confines of the tube support plate.

d) If the calculated conditional burst probability exceeds 1×10^{-2}, notify the NRC and provide an assessment of the safety significance of the occurrence.

2) The final results of the inspection and the tube integrity evaluation shall be reported to the Staff pursuant to Specification 6.9.2 within 90 days following restart.

3/4.4.8 SPECIFIC ACTIVITY

LIMITING CONDITION FOR OPERATION

3.4.8 The specific activity of the reactor coolant shall be limited to:

a. Less than or equal to 1 microCurie per gram DOSE EQUIVALENT I-131, and~~**~~

b. Less than or equal to $100/\bar{E}$ microCuries per gram of gross radioactivity.

APPLICABILITY: MODES 1, 2, 3, 4, and 5.

ACTION:

MODES 1, 2 and 3*:

a. With the specific activity of the reactor coolant greater than 1 microCurie per gram DOSE EQUIVALENT I-131 for more than 48 hours during one continuous time interval or exceeding the limit line shown on Figure 3.4-1, be in at least HOT STANDBY with T_{avg} less than 500°F within 6 hours; and

b. With the specific activity of the reactor coolant greater than $100/\bar{E}$ microCuries per gram, be in at least HOT STANDBY with T_{avg} less than 500°F within 6 hours.

*With T_{avg} greater than or equal to 500°F.

~~**For Unit 1 Cycle 5, reactor coolant DOSE EQUIVALENT I-131 will be limited to 0.35 microCuries per gram.~~

3/4.4.5 STEAM GENERATORS (continued)

~~For Unit 1 Cycle 5, tubes experiencing outer diameter stress corrosion cracking within the thickness of the tube support plates will be dispositioned in accordance with Specification 4.4.5.4.a.11~~.

Whenever the results of any steam generator tubing inservice inspection fall into Category C-3, these results will be reported to the Commission pursuant to Specification 6.9.2 prior to resumption of plant operation. Such cases will be considered by the Commission on a case-by-case basis and may result in a requirement for analysis, laboratory examinations, tests, additional eddy-current inspection, and revision of the Technical Specifications, if necessary.

Replace with Insert F.

INSERT F For Braidwood Station Only
(Bases 3/4.4.5)

For Unit 1 Cycle 6, tubes experiencing outer diameter stress corrosion cracking within the thickness of the tube support plates will be dispositioned in accordance with Specification 4.4.5.4.a.11.

Application of the 3.0 volts hot leg Interim Plugging Criteria (IPC) requires that selected SG tubes be expanded at the Tube Support Plate (TSP) intersections in accordance with WCAP-14273, "Technical Support for Alternative Plugging Criteria with Tube Expansion at Tube Support Plate Intersections for Byron and Braidwood Unit 1 Model D-4 Steam Generators." These expansions limit the motion of the TSP on a main steam line break, thus reducing the probability of burst for SG tubes left in service in accordance with IPC to negligible levels.

The operating period may be adjusted to less than the full operating cycle to meet the maximum site allowable primary-to-secondary leakage limit for End of Cycle Main Steam Line Break conditions. The leakage limit, 9.4 gpm, includes the accident leakage from a faulted steam generator and the operational leakage of the three remaining intact steam generators equal to the Specification 3.4.6.c leakage limit.

ATTACHMENT C-2

MARKED UP PAGES FOR
PROPOSED CHANGES TO APPENDIX A
TECHNICAL SPECIFICATIONS OF
FACILITY OPERATING LICENSES
NPF-37 AND NPF-66

BYRON STATION UNITS 1 & 2
REVISED PAGES

3/4 4-13*
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3/4 4-17a
3/4 4-17b*
B 3/4 4-3a

*NOTE: THESE PAGES HAVE NO CHANGES BUT ARE INCLUDED FOR CONTINUITY.

NOTE: Inserts A, B, C, and E are not used for Byron.

3/4.4.5 STEAM GENERATORS

LIMITING CONDITION FOR OPERATION

3.4.5 Each steam generator shall be OPERABLE.

APPLICABILITY: MODES 1, 2, 3 and 4.

ACTION:

With one or more steam generators inoperable, restore the inoperable steam generator(s) to OPERABLE status prior to increasing T_{avg} above 200°F.

SURVEILLANCE REQUIREMENTS

4.4.5.0 Each steam generator shall be demonstrated OPERABLE by performance of the following augmented inservice inspection program and the requirements of Specification 4.0.5.

4.4.5.1 Steam Generator Sample Selection and Inspection - Each steam generator shall be determined OPERABLE during shutdown by selecting and inspecting at least the minimum number of steam generators specified in Table 4.4-1.

4.4.5.2 Steam Generator Tube* Sample Selection and Inspection - The steam generator tube minimum sample size, inspection result classification, and the corresponding action required shall be as specified in Table 4.4-2. The inservice inspection of steam generator tubes shall be performed at the frequencies specified in Specification 4.4.5.3 and the inspected tubes shall be verified acceptable per the acceptance criteria of Specification 4.4.5.4. When applying the expectations of 4.4.5.2.a through 4.4.5.2.c, previous defects or imperfections in the area repaired by the sleeve are not considered an area requiring reinspection. The tubes selected for each inservice inspection shall include at least 3% of the total number of tubes in all steam generators; the tubes selected for these inspections shall be selected on a random basis except:

a. Where experience in similar plants with similar water chemistry indicates critical areas to be inspected, then at least 50% of the tubes inspected shall be from these critical areas;

b. The first sample of tubes selected for each inservice inspection (subsequent to the preservice inspection) of each steam generator shall include:

*When referring to a steam generator tube, the sleeve shall be considered a part of the tube if the tube has been repaired per Specification 4.4.5.4.a.10.

SURVEILLANCE REQUIREMENTS (Continued)

1) All tubes that previously had detectable tube wall penetrations greater than 20% that have not been plugged or sleeved in the affected area, and all tubes that previously had detectable sleeve wall penetrations that have not been plugged,

2) Tubes in those areas where experience has indicated potential problems,

3) At least 3% of the total number of sleeved tubes in all four steam generators or all of the sleeved tubes in the generator chosen for the inspection program, whichever is less. These inspections will include both the tube and the sleeve, and

4) A tube inspection (pursuant to Specification 4.4.5.4a.8) shall be performed on each selected tube. If any selected tube does not permit the passage of the eddy current probe for a tube inspection, this shall be recorded and an adjacent tube shall be selected and subjected to a tube inspection.

5) For Unit 1, tubes left in service as a result of application of the tube support plate plugging criteria shall be inspected by bobbin coil probe during all future outages.

c. The tubes selected as the second and third samples (if required by Table 4.4-2) during each inservice inspection may be subjected to a partial tube inspection provided:

1) The tubes selected for these samples include the tubes from those areas of the tube sheet array where tubes with imperfections were previously found, and

2) The inspections include those portions of the tubes where imperfections were previously found.

d. For Unit 1, Cycle 7 implementation of the tube support plate interim plugging criteria limit requires a 100% bobbin coil probe inspection for all hot leg tube support plate intersections and all cold leg intersections down to the lowest cold leg tube support plate with outer diameter stress corrosion cracking (ODSCC) indications. The determination of the tube support plate intersections having ODSCC indications shall be based on the performance of at least a 20% random sampling of tubes inspected over their full length.

e. A random sample of at least 20 percent of the total number of sleeves shall be inspected for axial and circumferential indications at the end of each cycle. In the event that an imperfection of 40 percent or greater depth is detected, an additional 20 percent of the unsampled sleeves shall be inspected, and if an imperfection of 40 percent or greater depth is detected in the second sample, all remaining sleeves shall be inspected. These inservice inspections will include the entire sleeve and the tube at the heat treated area. The inservice inspection for the sleeves is required until the corrosion resistance for the laser welded or kinetically welded joints in tubes that bound the material parameters of the tubes installed in the steam generators has been demonstrated acceptable. If conformance with the acceptable criteria of Specification 4.4.5.4 for tube structural integrity is not confirmed, the tubes containing the sleeves in question shall be removed from service.

The results of each sample inspection shall be classified into one of the following three categories:

Category	Inspection Results
C-1	Less than 5% of the total tubes inspected are degraded tubes and none of the inspected tubes are defective.
C-2	One or more tubes, but not more than 1% of the total tubes inspected are defective, or between 5% and 10% of the total tubes inspected are degraded tubes.
C-3	More than 10% of the total tubes inspected are degraded tubes or more than 1% of the inspected tubes are defective.

Note: In all inspections, previously degraded tubes or sleeves must exhibit significant (greater than 10% of wall thickness) further wall penetrations to be included in the above percentage calculations.

4.4.5.3 Inspection Frequencies - The above required inservice inspections of steam generator tubes shall be performed at the following frequencies:

a. The first inservice inspection shall be performed after 6 Effective Full Power Months but within 24 calendar months of initial criticality. Subsequent inservice inspections shall be performed at intervals of not less than 12 nor more than 24 calendar months after the previous inspection. If two consecutive inspections, not including the preservice inspection, result in all inspection results falling into the C-1 category or if two consecutive inspections demonstrate that previously observed degradation has not continued and no additional degradation has occurred, the inspection interval may be extended to a maximum of once per 40 months;

b. If the results of the inservice inspection of a steam generator conducted in accordance with Table 4.4-2 at 40-month intervals fall in Category C-3, the inspection frequency shall be increased to at least once per 20 months. The increase in inspection frequency shall apply until the subsequent inspections satisfy the criteria of Specification 4.4.5.3a.; the interval may then be extended to a maximum of once per 40 months; and

c. Additional, unscheduled inservice inspections shall be performed on each steam generator in accordance with the first sample inspection specified in Table 4.4-2 during the shutdown subsequent to any of the following conditions:

1) Reactor-to-secondary tube leaks (not including leaks originating from tube-to-tube sheet welds) in excess of the limits of Specification 3.4.6.2c., or

2) A seismic occurrence greater than the Operating Basis Earthquake, or

3) A Condition IV loss-of-coolant accident requiring actuation of the Engineered Safety Features, or

4) A Condition IV main steam line or feedwater line break.

4.4.5.4 Acceptance Criteria

a. As used in this specification:

1) Imperfection means an exception to the dimensions, finish or contour of a tube or sleeve from that required by fabrication drawings or specifications. Eddy-current testing indications below 20% of the nominal tube or sleeve wall thickness, if detectable, may be considered as imperfections;

2) Degradation means a service-induced cracking, wastage, wear or general corrosion occurring on either inside or outside of a tube or sleeve;

3) Degraded Tube means a tube or sleeve containing unrepaired imperfections greater than or equal to 20% of the nominal tube or sleeve wall thickness caused by degradation;

4) % Degradation means the percentage of the tube or sleeve wall thickness affected or removed by degradation;

5) Defect means an imperfection of such severity that it exceeds the plugging or repair limit. A tube or sleeve containing an unrepaired defect is defective;

6) Plugging or Repair Limit means the imperfection depth at or beyond which the tube shall be removed from service by plugging or repaired by sleeving in the affected area. The plugging or repair limit imperfection depth is equal to 40% of the nominal wall thickness;

For Unit 1 Cycle 7, this definition does not apply to tube support plate intersections for which the voltage-based plugging criteria are being applied. Refer to 4.4.5.4.a.11 for the repair limit applicable to these intersections;

7) Unserviceable describes the condition of a tube if it leaks or contains a defect large enough to affect its structural integrity in the event of an Operating Basis Earthquake, a loss-of-coolant accident, or a steam line or feedwater line break as specified in 4.4.5.3c., above;

8) Tube Inspection means an inspection of the steam generator tube from the point of entry (hot leg side) completely around the U-bend to the top support of the cold leg. For a tube that has been repaired by sleeving, the tube inspection shall include the sleeved portion of the tube, and

9) Preservice Inspection means an inspection of the full length of each tube in each steam generator performed by eddy current techniques prior to service to establish a baseline condition of the tubing. This inspection shall be performed prior to initial POWER OPERATION using the equipment and techniques expected to be used during subsequent inservice inspections.

10) Tube Repair refers to a process that reestablishes tube serviceability. Acceptable tube repairs will be performed by the following processes:

a) Laser welded sleeving as described in a Westinghouse Technical Report currently approved by the NRC, subject to the limitations and restrictions as noted by the NRC staff, or

b) Kinetic welded sleeving as described in a Babcock & Wilcox Nuclear Technologies Technical Report currently approved by the NRC, subject to the limitations and restrictions as noted by the NRC staff.

Tube repair includes the removal of plugs that were previously installed as a corrective or preventative measure. A tube inspection per 4.4.5.4.a.8 is required prior to returning previously plugged tubes to service.

Replace with Insert D

11) For Unit 1 Cycle 7, the Tube Support Plate Interim Plugging Criteria Limit is used for the disposition of a steam generator tube for continued service that is experiencing outer diameter stress corrosion cracking confined within the thickness of the tube support plates. At tube support plate intersections, the repair limit is based on maintaining steam generator tube serviceability as described below:

a) Degradation attributed to outside diameter stress corrosion cracking within the bounds of the tube support plate with bobbin voltage less than or equal to 1.0 volt will be allowed to remain in service.

b) Degradation attributed to outside diameter stress corrosion cracking within the bounds of the tube support plate with bobbin voltage greater than 1.0 volt will be repaired or plugged except as noted in 4.4.5.4.a.11)c) below.

c) Indications of potential degradation attributed to outside diameter stress corrosion cracking within the bounds of the tube support plate with a bobbin voltage greater than 1.0 volt but less than or equal to 2.7 volts may remain in service if a rotating pancake coil inspection does not detect degradation. Indications of outside diameter stress corrosion cracking degradation with bobbin voltage greater than 2.7 volts will be plugged or repaired.

SURVEILLANCE REQUIREMENTS (Continued)

d) Certain intersections as identified in WCAP-14046, Section 4.7, will be excluded from application of the voltage-based repair criteria as it is determined that these intersections may collapse or deform following a postulated LOCA+SSE event.

e) If, as a result of leakage due to a mechanism other than ODSCC at the tube support plate intersection, or some other cause, an unscheduled mid-cycle inspection is performed, the following repair criteria apply instead of 4.4.5.4.11)c). If bobbin voltage is within expected limits, the indication can remain in service. The expected bobbin voltage limits are determined from the following equation:

$$V < \frac{\frac{\Delta t}{CL}(V_{SL}-V_{BOC})+V_{BOC}}{1+(0.2)(\frac{\Delta t}{CL})}$$

where:

V	=	measured voltage
V_{BOC}	=	voltage at BOC
Δt	=	time period of operation to unscheduled outage
CL	=	cycle length (full operating cycle length where operating cycle is the time between two scheduled steam generator inspections)
V_{SL}	=	4.5 volts

b. The steam generator shall be determined OPERABLE after completing the corresponding actions (plug or repair in the affected area all tubes exceeding the plugging or repair limit) required by Table 4.4-2.

4.4.5.5 Reports

a. Within 15 days following the completion of each inservice inspection of steam generator tubes, the number of tubes plugged or repaired in each steam generator shall be reported to the Commission in a Special Report pursuant to Specification 6.9.2;

b. The complete results of the steam generator tube inservice inspection shall be submitted to the Commission in a Special Report pursuant to Specification 6.9.2 within 12 months following the completion of the inspection. This Special Report shall include:

1) Number and extent of tubes inspected,

2) Location and percent of wall-thickness penetration for each indication of an imperfection, and

3) Identification of tubes plugged or repaired.

SURVEILLANCE REQUIREMENTS (Continued)

c. Results of steam generator tube inspections which fall into Category C-3 shall be reported in a Special Report to the Commission pursuant to Specification 6.9.2 within 30 days and prior to resumption of plant operation. This report shall provide a description of investigations conducted to determine cause of the tube degradation and corrective measures taken to prevent recurrence.

d. For Unit 1 Cycle 7, implementation of the voltage-based repair criteria to tube support plate intersections, reports to the Staff shall be made as follows:

1) Notify the Staff prior to returning the steam generators to service should any of the following conditions arise:

a) If estimated leakage based on the actual measured end-of-cycle voltage distribution would have exceeded the leak limit (for postulated main steam line break utilizing licensing basis assumptions) during the previous operation cycle.

b) If circumferential crack-like indications are detected at the tube support plate intersections.

c) If indications are identified that extend beyond the confines of the tube support plate.

d) If the calculated conditional burst probability exceeds 1×10^{-2}, notify the NRC and provide an assessment of the safety significance of the occurrence.

2) The final results of the inspection and the tube integrity evaluation shall be reported to the Staff pursuant to Specification 6.9.2 within 90 days following restart.

3/4.4.5 STEAM GENERATORS (Continued)

Replace With Insert F

~~For Unit 1 Cycle 7, tubes experiencing outer diameter stress corrosion cracking within the thickness of the tube support plates will be dispositioned in accordance with Specification 4.4.5.4.a.11. The operating period may be adjusted to less than the full operating cycle to meet the maximum site allowable primary-to-secondary leakage limit for End of Cycle Main Steam Line Break conditions. The leakage limit, 12.8 gpm, includes the accident leakage from a faulted steam generator and the operational leakage of the three remaining intact steam generators equal to the Specification 3.4.6.2.c leakage limit.~~

Whenever the results of any steam generator tubing inservice inspection fall into Category C-3, these results will be reported to the Commission pursuant to Specification 6.9.2 prior to resumption of plant operation. Such cases will be considered by the Commission on a case-by-case basis and may result in a requirement for analysis, laboratory examinations, tests, additional eddy-current inspection, and revision of the Technical Specifications, if necessary.

INSERT D-For Bryon Station Only
(4.4.5.4.a.11)

11) For Unit 1 Cycle 7, the Tube Support Plate Interim Plugging Criteria Limit is used for the disposition of a steam generator tube for continued service that is experiencing outer diameter stress corrosion cracking confined within the thickness of the tube support plates. At tube support plate intersections, the repair limit is based on maintaining steam generator tube serviceability as described below:

a) Degradation attributed to outside diameter stress corrosion cracking within the bounds of the hot leg tube support plate with bobbin voltage less than or equal to 3.0 volts will be allowed to remain in service.

b) Degradation attributed to outside diameter stress corrosion cracking within the bounds of the cold leg tube support plate with bobbin voltage less than or equal to 1.0 volt will be allowed to remain in service.

c) Degradation attributed to outside diameter stress corrosion cracking within the bounds of the hot leg tube support plate with bobbin voltage greater than 3.0 volts will be repaired or plugged except as noted in 4.4.5.4.a.11)e) below.

d) Degradation attributed to outside diameter stress corrosion cracking within the bounds of the cold leg tube support plate with bobbin voltage greater than 1.0 volt will be repaired or plugged except as noted in 4.4.5.4.a.11)f) below.

e) Indications of potential degradation attributed to outside diameter stress corrosion cracking within the bounds of the hot leg tube support plate with a bobbin voltage greater than 3.0 volts but less than or equal to 10.0 volts may remain in service if a rotating pancake coil inspection does not detect degradation. Indications of outside diameter stress corrosion cracking degradation with bobbin voltage greater than 10.0 volts at the hot leg tube support plates will be plugged or repaired.

INSERT D (cont)For Bryon Station Only
(4.4.5.4.a.11)

f) Indications of potential degradation attributed to outside diameter stress corrosion cracking within the bounds of the cold leg tube support plate with a bobbin voltage greater than 1.0 volt but less than or equal to 2.7 volts may remain in service if a rotating pancake coil inspection does not detect degradation. Indications of outside diameter stress corrosion cracking degradation with bobbin voltage greater than 2.7 volts at the cold leg tube support plates will be plugged or repaired.

g) Certain intersections as identified in WCAP-14046, Section 4.7, will be excluded from application of the voltage-based repair criteria as it is determined that these intersections may collapse or deform following a postulated LOCA+SSE event.

INSERT D (cont)For Bryon Station Only
(4.4.5.4.a.11)

h) If, as a result of leakage due to a mechanism other than ODSCC at the tube support plate intersection, or some other cause, an unscheduled mid-cycle inspection is performed, the following repair criteria apply instead of 4.4.5.4.11)e)for indications at the hot leg tube support plate indications, or 4.4.5.4.11)f) for indications at the cold leg tube support plate intersections. If bobbin voltage is within expected limits, the indication can remain in service. The expected bobbin voltage limits are determined from the following equation:

$$V < \frac{\frac{\Delta t}{CL}(V_{SL} - V_{BOC}) + V_{BOC}}{1 + (0.2)(\frac{\Delta t}{CL})}$$

where:
V = measured voltage
V_{BOC}= voltage at BOC
Δt = time period of operation to unscheduled outage
CL = cycle length (full operating cycle length where operating cycle is the time between two scheduled steam generator inspections)
V_{SL} = 20 volts for the hot leg tube support plate intersections; 4.75 volts for the cold leg tube support plate intersections.

INSERT F For Bryon Station Only
(Bases 3/4.4.5)

For Unit 1 Cycle 7, tubes experiencing outer diameter stress corrosion cracking within the thickness of the tube support plates will be dispositioned in accordance with Specification 4.4.5.4.a.11.

Application of the 3.0 volts hot leg Interim Plugging Criteria (IPC) requires that selected SG tubes be expanded at the Tube Support Plate (TSP) intersections in accordance with WCAP-14273, "Technical Support for Alternative Plugging Criteria with Tube Expansion at Tube Support Plate Intersections for Byron and Braidwood Unit 1 Model D-4 Steam Generators." These expansions limit the motion of the TSP on a main steam line break, thus reducing the probability of burst for SG tubes left in service in accordance with IPC to negligible levels.

The operating period may be adjusted to less than the full operating cycle to meet the maximum site allowable primary-to-secondary leakage limit for End of Cycle Main Steam Line Break conditions. The leakage limit, 12.8 gpm, includes the accident leakage from a faulted steam generator and the operational leakage of the three remaining intact steam generators equal to the Specification 3.4.6.c leakage limit.

ATTACHMENT D

EVALUATION OF SIGNIFICANT HAZARDS CONSIDERATIONS FOR
PROPOSED CHANGES TO APPENDIX A
TECHNICAL SPECIFICATIONS OF
FACILITY OPERATING LICENSES
NPF-72, AND NPF-77

Commonwealth Edison has evaluated this proposed amendment and determined that it involves no significant hazards considerations. According to Title 10 Code of Federal Regulations Section 50 Subsection 92 Paragraph c (10 CFR 50.92 (c)), a proposed amendment to an operating license involves no significant hazards considerations if operation of the facility in accordance with the proposed amendment would not:

1. Involve a significant increase in the probability or consequences of an accident previously evaluated; or

2. Create the possibility of a new or different kind of accident from any accident previously evaluated; or

3. Involve a significant reduction in a margin of safety.

A. INTRODUCTION

Commonwealth Edison (ComEd) proposes to amend Byron and Braidwood Technical Specification (TS) 3.4.5, "Steam Generators," the bases for TS 3.4.5, and Braidwood TS 3.4.8, "Specific Activity."

The changes proposed to TS 3.4.5 will increase the bobbin coil probe, voltage based, Steam Generator (SG) Tube Support Plate (TSP) Interim Plugging Criteria (IPC) limit for Outside Diameter Stress Corrosion Cracking (ODSCC)indications at the hot leg TSP intersections. These changes will apply to Braidwood Unit 1, Cycle 6, and Byron Unit 1, for the remainder of Cycle 7.

The footnote to Braidwood TS 3.4.8.a concerning Unit 1 Cycle 5 Reactor Coolant System dose equivalent Iodine-131 (I-131) concentration will be deleted.

For Braidwood, additional changes are proposed to make the Braidwood TS more consistent with Draft Generic Letter 94-XX, "Voltage Based Repair Criteria for the Repair of Westinghouse Steam Generator Tubes Affected by Outside Diameter Stress Corrosion Cracking" (Draft Generic Letter), dated August 12, 1994. These changes are not needed for Byron since Draft Generic Letter guidance has already been incorporated in the Byron TS.

For both Byron Unit 1 and Braidwood Unit 1, ComEd is requesting an increase in the IPC voltage from 1.0 volt to 3.0 volts for ODSCC indications at hot leg TSP intersections. The Rotating Pancake Coil (RPC) probe confirmation limit for ODSCC at hot leg TSP intersections will increase from 2.7 volts to 10.0 volts.

For Byron, the structural limit voltage used in the equation for determining voltage acceptance criteria for an unplanned outage is increased from 4.5 volts to 20 volts for hot leg intersections, and 4.75 volts for cold leg intersections. For Braidwood, the equation for mid-cycle unplanned outage voltage acceptance criteria is added to the specification for conformance with the Draft Generic Letter.

For Braidwood, the allowable SG Main Steam Line Break (MSLB) leakage limit is increased from 9.1 gpm to 9.4 gpm to correct an oversight in the original IPC submittal. Braidwood's probability of tube burst limit is decreased from 2.5×10^{-2} to 1.0×10^{-2} consistent with the Draft Generic Letter. The footnote to Braidwood TS 3.4.8.a which limits Unit 1 Cycle 5 RCS dose equivalent I-131 to 0.35 microCuries per gram (µci/gm) is being deleted. Other changes are being made to Braidwood TS to make them more consistent with the requirements of the Draft Generic Letter.

Finally, bases changes are being made to both Braidwood and Byron TS in order to accurately reflect the changes made to the individual specifications.

B. NO SIGNIFICANT HAZARDS ANALYSIS

1. The proposed change does not involve a significant increase in the probability or consequences of an acc 'ent previously evaluated.

Tube burst is precluded during normal operating plant conditions since the tube support plates are adjacent to the degraded regions of the tube in the tube to tube support plate crevices. During accident conditions, ie., main steam line break (MSLB), relative tube to TSP movement may occur, which can expose a crack length portion to freespan conditions. Testing has shown that the burst pressure correlates to the crack length that is exposed to the freespan, regardless of the length that is still contained within the TSP bounds. Therefore, a more appropriate methodology has been established for addressing leakage and burst considerations that is based on limiting potential TSP displacements during postulated MSLB events, thus reducing the freespan exposed crack length to minimal levels. The tube expansion process to be employed in conjunction with this TS change is designed to provide postulated TSP displacements that result in negligible tube burst probabilities due to the minimal freespan exposed crack lengths.

A thermal hydraulic model was developed to determine TSP loading during MSLB conditions. A safety factor of 2 was conservatively applied to these loads to envelope the collective uncertainties in the analyses. Various operating conditions were evaluated and the most limiting operating condition was used in the analyses. An additional independent model was used to verify the thermal hydraulic results.

The tube burst probability assessment used a conservative assumption that all hot leg TSP intersections (32,046) contained throughwall cracks equal to the postulated displacement and that the crack lengths were located within the TSP edge. Alternatively, it was assumed that all hot leg TSP intersections contained throughwall cracks equal to the thickness of the TSP. The postulated TSP motion was conservatively assumed to be uniform and equal to the maximum displacement calculated. The total burst probability for all 32,046 throughwall indications given a uniform MSLB displacement of 0.31" is calculated to be $1x10^{-5}$. This is a factor of 1000 less than the Draft Generic Letter burst probability limit of $1x10^{-2}$. Therefore, the functional design criteria for tube expansion is to limit the TSP motion to 0.31" or less. However, the design goal for tube expansion limits the TSP MSLB motion to less than 0.1", which results in a total tube burst probability of $1x10^{-10}$ for all 32,046 postulated throughwall indications.

Additional tubes will be expanded to provide redundancy should the required expansions fail. This redundancy ensures that the maximum TSP displacement is limited to 0.31" to meet the functional design criteria.

The structural limit for the hot leg SG tube repair criteria with tube expansion is based on axial tensile loading requirements to preclude axial tensile severing of the tube. Axially oriented ODSCC does not significantly impact the axial tensile loading of the tube, therefore, the more limiting degradation mode with respect to affecting the tube structural limit at TSPs is cellular corrosion. Tensile tests that measure the force required to sever a tube with cellular corrosion and uncorroded cross sectional areas are used to establish the lower bound structural limit. Based upon these tests, a lower bound 95% confidence level structural voltage limit of 37 volts was established for cellular corrosion. This limit meets the Regulatory Guide (RG) 1.121, "Basis for Plugging Steam Generator Tubes," structural requirements based upon the normal operating pressure differential with a safety factor of 3.0 applied. Due to the limited database supporting this value, the structural limit was conservatively reduced to 20 volts. Accounting for voltage growth and Non-Destructive Examination (NDE) uncertainty, the upper limit for RPC confirmation is 10 volts for hot leg TSP intersections.

The freespan tube burst probability must be calculated for the cold leg TSP indications to be within the requirements of the Draft Generic Letter. The freespan structural voltage limit is calculated using correlations from the database described in the Draft Generic Letter, with the inclusion of the recent Byron and Braidwood tube pull results. This structural limit is 4.75 volts. The repair limit for cold leg indications continues to be 1.0 volt and 2.7 volts for leaving a non-confirmed RPC indication inservice.

Per the Draft Generic Letter, MSLB leak rate and tube burst probability analyses are required prior to returning to power and are to be included in a report to the Nuclear Regulatory Commission (NRC) within 90 days of restart. If allowable limits on leak rates and burst probability are exceeded, the results are to be reported to the NRC and a safety assessment of the significance of the results is to be performed.

A postulated MSLB outside of containment but upstream of the Main Steam Isolation Valve (MSIV) represents the most limiting radiological condition relative to the IPC. The ODSCC voltage distribution at the TSP intersections are projected to the end of the cycle and MSLB leakage is calculated. A site specific calculation has determined the allowable MSLB leakage limit for the Byron 1 and Braidwood 1 sites. These limits use the recommended Iodine-131 transient spiking values consistent with NUREG-0800, "Standard Review Plan" and ensure site boundary doses are within a small fraction of the 10 CFR 100 requirements. The projected MSLB leakage rate calculation methodology described in WCAP-14046, "Braidwood Unit 1 Technical Support for Cycle 5 Steam Generator Interim Plugging Criteria," and WCAP-14273, "Technical Support for Alternative Plugging Criteria with Tube Expansion at Tube Support Plate Intersections for Braidwood and Byron Unit 1 Model D-4 Steam Generators," will be used to calculate End Off Cycle (EOC) leakage. This method includes an alternate Probability Of Detection (POD) function and uses the accepted leak rate versus bobbin voltage correlation methodology (full Monte Carlo) for calculating leak rate, as described in the Draft Generic Letter. The database used for the leak and burst correlations is consistent with that described in the Draft Generic Letter with the inclusion of the Byron 1 and Braidwood 1 tube pull results. The EOC voltage distribution is developed from the POD adjusted Beginning Of Cycle (BOC) voltage distributions and uses Monte Carlo techniques to account for variances in growth and uncertainty.

The Electric Power Research Institute (EPRI) leak rate correlation is based on free span indications that have burst pressures above the MSLB pressure differential. There is a low but finite probability that indications may burst at a pressure less than MSLB. With limited TSP motion due to tube expansion, the tube is constrained by the TSP and tube burst is precluded. However, the flanks of the crack open up to contact the Inside Diameter (ID) of the TSP hole and result in a primary to secondary leak rate potentially exceeding that obtained from the EPRI correlation. This phenomenon is known as an overpressurized condition. There have been no occurrences of this type in the total leak rate database obtained to date. Therefore, it is conservative and acceptable to use the probability of free span burst in conjunction with a bounding leak rate for the overpressurized condition to obtain the overpressurization condition leak rates. When this is done, the dose at the site boundary resulting from the predicted leakage is shown to be significantly less than 10% of 10 CFR 100 limits.

Modification of the Braidwood Specifications for conformance with the Draft Generic Letter requirements is primarily administrative and does not impact any accidents previously evaluated. The decrease in the allowed burst probability from 2.5×10^{-2} to 1.0×10^{-2} is conservative. Byron Station has previously incorporated these requirements.

Returning the Braidwood Unit 1 Reactor Coolant System (RCS) dose equivalent I-131 concentration limit to the TS 3.4.8.a requirement of 1.0 µci/gm from 0.35 µci/gm will not impact any accidents previously evaluated. Analyses described in WCAP 14046 and WCAP 14273 show that the resulting 2 hour doses at the Braidwood site boundary will not exceed an appropriately small fraction of 10 CFR 100 dose guideline values following a SG tube rupture accident in conjunction with the predicted MSLB leakage calculated in accordance with this submittal.

Raising the Braidwood allowable MSLB leakage limit from 9.1 gallons per minute (gpm) to 9.4 gpm corrects an oversight in Braidwood's original IPC submittal. The original submittal neglected to include the 0.1 gpm operational leakage from the three intact SGs per TS 3.4.6.2.c. Thus this change is in conformance with Braidwood's current TS and does not have any impact on any accidents previously evaluated.

Implementation of the 3.0 volts voltage repair limit for the hot leg support plate intersections does not adversely affect steam generator tube integrity and results in acceptable dose consequences. By effectively eliminating tube burst at hot leg TSP intersections, the likelihood of a tube rupture is substantially reduced and the probability of occurrence of an accident previously evaluated is reduced. Therefore, the proposed amendment does not result in any significant increase in the probability or consequences of an accident previously evaluated within the Byron Unit 1 and Braidwood Unit 1 Updated Final Safety Analysis Report (UFSAR).

2. **The proposed change does not create the possibility of a new or different kind of accident from any accident previously evaluated.**

Implementation of the proposed steam generator tube plugging criteria with tube expansion does not introduce any significant changes to the plant design basis. Use of the criteria does not provide a mechanism which could result in an accident outside of the region of the tube support plate elevations as ODSCC does not extend beyond the thickness of the tube support plates. Neither a single or multiple tube rupture event would be expected in a steam generator in which the plugging criteria has been applied.

The tube burst assessment involves a Monte Carlo simulation of the site specific voltage distribution to generate a total burst probability that includes the summation of the probabilities of 1 tube bursting, 2 tubes bursting, etc. For the hot leg TSP intersections, the total probability of burst, by design, is estimated to be 1×10^{-10} with all tube expansions functional. Accounting for the unlikely event of expansion failures, a sufficient number of redundant expansions exist to ensure that the burst probability remains below 1×10^{-5}. This includes the conservative assumption that all 32,046 hot leg TSP intersections contain throughwall indications. This level of burst probability is considered to be negligible when compared to the Draft Generic Letter limit of 1×10^{-2}.

In addressing the combined effects of Loss Of Coolant Accident (LOCA) + Safe Shutdown Earthquake (SSE) on the SG as required by General Design Criteria (GDC) 2, it has been determined that tube collapse may occur in the steam generators at some plants. The tube support plates may become deformed as a result of lateral loads at the wedge supports located at the periphery of the plate due to the combined effects of the LOCA rarefaction wave and SSE loadings. The resulting pressure differential on the deformed tubes may cause some of the tubes to collapse. There are two issues associated with SG tube collapse. First, the collapse of SG tubing reduces the RCS flow area through the tubes. The reduction in flow area increases the resistance to flow of steam from the core during a LOCA which, in turn, may potentially increase Peak Clad Temperature (PCT). Second, there is a potential that partial throughwall cracks in tubes could progress to throughwall cracks during tube deformation or collapse. The tubes subject to collapse will be identified via a plant specific analysis and excluded from application of the voltage-based criteria. This analysis will be included in a revision to WCAP-14046 which is currently scheduled to be submitted to the NRC in February of 1995.

ComEd will continue to apply a maximum primary to secondary leakage limit of 150 gallons per day (gpd)(0.1 gpm) through any one SG at Byron and Braidwood to help preclude the potential for excessive leakage during all plant conditions. The RG 1.121 criterion for establishing operational leakage limits that require plant shutdown are based on detecting a free span crack prior to resulting in primary-to-secondary operational leakage which could potentially develop into a tube rupture during faulted plant conditions. The 150 gpd limit provides for leakage detection and plant shutdown in the event of an unexpected single crack leak associated with the longest permissible free span crack length.

Tube burst is precluded during normal operation due to the proximity of the TSP to the tube and during a postulated MSLB event with tube expansion. The 150 gpd limit provides a conservative limit for plant shutdown prior to reaching critical crack lengths should significant crack extension unexpectedly occur outside the thickness of the TSP.

Returning the Braidwood Unit 1 RCS dose equivalent I-131 concentration limit to the TS 3.4.8.a requirement of 1.0 µci/gm from 0.35 µci/gm will not introduce any changes to the design basis for Braidwood Station. Analyses described in WCAP 14046 and WCAP 14273 show that the resulting 2 hour doses at the Braidwood site boundary will not exceed an appropriately small fraction of 10 CFR 100 dose guideline values following a SG tube rupture accident in conjunction with the predicted MSLB leakage calculated in accordance with this submittal.

Raising the Braidwood allowable MSLB leakage limit from 9.1 gpm to 9.4 gpm corrects an oversight in Braidwood's original IPC submittal. The original submittal neglected to include the 0.1 gpm operational leakage from the three intact SGs per TS 3.4.6.2.c. Thus this change is in conformance with Braidwood's current TS and does not introduce any changes to the design basis for Braidwood Station.

Modification of the Braidwood Specifications for conformance with the Draft Generic Letter requirements is primarily administrative and will not alter the plant design basis. The decrease in the allowed burst probability from $2.5x10^{-2}$ to $1.0x10^{-2}$ is conservative. Byron Station has previously incorporated these requirements.

With implementation of the 3.0 volt plugging criteria for the hot leg support plate intersections, steam generator tube integrity continues to be maintained through inservice inspection, tube repair and primary to secondary leakage monitoring. By effectively eliminating tube burst at hot leg TSP intersections, the potential for multiple tube ruptures is essentially eliminated. Therefore, the possibility of a new or different kind of accident from any previously evaluated is not created.

3. The proposed change does not involve a significant reduction in a margin of safety.

The use of the voltage-based bobbin coil tube support plate elevation plugging criteria with tube expansion at Byron Unit 1 and Braidwood Unit 1 is demonstrated to maintain steam generator tube integrity commensurate with the criteria of RG 1.121. RG 1.121 describes a method acceptable to the NRC staff for meeting GDC 14, 15, 31, and 32 by reducing the probability or the consequences of steam generator tube rupture. This is accomplished by determining an eddy current inspection voltage value which represents a limit for leaving a SG tube in service. Tubes with flaw-like voltage indications beyond this limiting value must be removed from service by plugging or repaired by sleeving. Upon implementation of the 3.0 volt hot leg criteria, even under the worst case conditions, the occurrence of ODSCC at the tube support plate elevations is not expected to lead to a steam generator tube rupture event during normal or faulted plant conditions. The EOC distribution of crack indications at the tube support plate elevations will be confirmed to result in acceptable primary to secondary leakage during all plant conditions such that radiological consequences are not adversely impacted.

Addressing RG 1.83 considerations, implementation of the hot leg tube support plate intersection bobbin coil voltage based repair criteria of 3.0 volts is supplemented by: enhanced eddy current inspection guidelines to provide consistency in voltage normalization, a 100% eddy current inspection sample size at the tube support plate elevations, and RPC inspection requirements for indications left inservice to characterize the principal degradation as ODSCC.

For the leak and burst assessments, the population of indications in the voltage distribution is dependant on the POD function. The purpose of the POD function is to account for indications that may not be identified by the data analyst. Based upon analysis of actual plant data by a joint EPRI/ComEd/Duke Power study an alternate POD function was developed. This is a voltage-based function that varies with voltage. The POD study concludes that larger indications have a higher probability of being detected. A lower 95% confidence level is applied to the POD curve for IPC application. The use of this alternate POD provides a more representative BOC distribution than that provided by the uniform Draft Generic Letter POD value of 0.6.

Returning the Braidwood Unit 1 RCS dose equivalent I-131 concentration limit to the TS 3.4.8.a requirement of 1.0 µci/gm from 0.35 µci/gm will not involve a reduction in a margin of safety. Analyses described in WCAP 14046 and WCAP 14273 show that the resulting 2 hour doses at the Braidwood site boundary will not exceed an appropriately small fraction of 10 CFR 100 dose guideline values following a SG tube rupture accident in conjunction with the predicted MSLB leakage calculated in accordance with this submittal.

Raising the Braidwood allowable MSLB leakage limit from 9.1 gpm to 9.4 gpm corrects an oversight in Braidwood's original IPC submittal. The original submittal neglected to include the 0.1 gpm operational leakage from the three intact SGs per TS 3.4.6.2.c. Thus this change is in conformance with Braidwood's current TS and does not involve a reduction in a margin of safety.

Modification of the Braidwood Specifications for conformance with the Draft Generic Letter requirements is primarily administrative and will not reduce any safety margins. The decrease in the allowed burst probability from 2.5×10^{-2} to 1.0×10^{-2} is conservative. Byron Station has previously incorporated these requirements.

Implementation of the tube support plate elevation repair limits will decrease the number of tubes which must be repaired. The installation of steam generator tube plugs or sleeves reduces the RCS flow margin. Thus, implementation of the alternate plugging criteria will maintain the margin of flow that would otherwise be reduced in the event of increased tube plugging.

Thus, the implementation of this amendment does not result in a significant reduction in a margin of safety.

Therefore, based on the above evaluation, Commonwealth Edison has concluded that these changes involve no significant hazards considerations.

ATTACHMENT E

ENVIRONMENTAL ASSESSMENT FOR
PROPOSED CHANGES TO APPENDIX A
TECHNICAL SPECIFICATIONS OF
FACILITY OPERATING LICENSES
NPF-72, AND NPF-77

Commonwealth Edison Company (ComEd) has evaluated this proposed license amendment request against the criteria for identification of licensing and regulatory actions requiring environmental assessment in accordance with Title 10, Code of Federal Regulations, Part 51, Section 21 (10 CFR 51.21). ComEd has determined that this proposed license amendment request meets the criteria for a categorical exclusion set forth in 10 CFR 51.22(c)(9). This determination is based upon the following:

1. The proposed licensing action involves the issuance of an amendment to a license for a reactor pursuant to 10 CFR 50 which changes a requirement with respect to installation or use of a facility component located within the restricted area, as defined in 10 CFR 20, or which changes an inspection or a surveillance requirement. This proposed license amendment request proposes to amend Byron and Braidwood Technical Specification (TS) 3.4.5, "Steam Generators," the bases for TS 3.4.5, and Braidwood TS 3.4.8, "Specific Activity."

   The changes proposed to TS 3.4.5 will increase the bobbin coil probe, voltage based, Steam Generator (SG) Tube Support Plate (TSP) Interim Plugging Criteria (IPC) limit for Outside Diameter Stress Corrosion Cracking (ODSCC)indications at the hot leg TSP intersections. These changes will apply to Braidwood Unit 1, Cycle 6, and Byron Unit 1, for the remainder of Cycle 7.

   The footnote to Braidwood TS 3.4.8.a concerning Unit 1 Cycle 5 Reactor Coolant System dose equivalent Iodine-131 (I-131) concentration will be deleted.

For Braidwood, additional changes are proposed to make the Braidwood TS more consistent with Draft Generic Letter 94-XX, "Voltage Based Repair Criteria for the Repair of Westinghouse Steam Generator Tubes Affected by Outside Diameter Stress Corrosion Cracking" (Draft Generic Letter), dated August 12, 1994. These changes are not needed for Byron since Draft Generic Letter guidance has already been incorporated in the Byron TS.

2. This proposed license amendment request involves no significant hazards considerations;

3. there is no significant change in the types or significant increase in the amounts of any effluent that may be released offsite; and

4. there is no significant increase in individual or cumulative occupational radiation exposure.

Therefore, pursuant to 10 CFR 51.22(b), neither an environmental impact statement nor an environmental assessment is necessary for this proposed license amendment request.

ATTACHMENT F

WCAP-14273

Technical Support for Alternative Plugging Criteria with Tube Expansion at Tube Support Plate Intersections for Braidwood 1 and Byron 1 Model D-4 Steam Generators (Non-Proprietary)

February 1995