ATTACHMENT E

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

BYRON STATION UNIT 1
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*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.

Insert B

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.

INSERT A
(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
(4.4.5.2.d)

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 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)

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;

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
(4.4.5.4.a.6)

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;

SURVEILLANCE REQUIREMENTS (Continued)

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.

Insert E

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.

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.

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INSERT E
(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 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.

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.

INSERT E (cont.)
(4.4.5.4.a.11)

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

TABLE 4.4-1

MINIMUM NUMBER OF STEAM GENERATORS TO BE INSPECTED DURING INSERVICE INSPECTION

Preservice Inspection	Yes
No. of Steam Generators per Unit	Four
First Inservice Inspection	Two
Second & Subsequent Inservice Inspections	One[1]

TABLE NOTATION

1. The inservice inspection may be limited to one steam generator on a rotating schedule encompassing 3 N % of the tubes (where N is the number of steam generators in the plant) if the results of the first or previous inspections indicate that all steam generators are performing in a like manner. Note that under some circumstances, the operating conditions in one or more steam generators may be found to be more severe than those in other steam generators. Under such circumstances the sample sequence shall be modified to inspect the most severe conditions. Each of the other two steam generators not inspected during the first inservice inspections shall be inspected during the second and third inspections. The fourth and subsequent inspections shall follow the instructions described above.

TABLE 4.4-2

STEAM GENERATOR TUBE INSPECTION

1ST SAMPLE INSPECTION			2ND SAMPLE INSPECTION		3RD SAMPLE INSPECTION	
Sample Size	Result	Action Required	Result	Action Required	Result	Action Required
A mininum of S Tubes per S. G.	C-1	None	N.A.	N.A.	N.A.	N.A.
	C-2	Plug or repair defective tubes and inspect additional 2S tubes in this S. G.	C-1	None	N.A.	N.A.
			C-2	Plug or repair defective tubes and inspect additional 4S tubes in this S. G.	C-1	None
					C-2	Plug or repair defective tubes
					C-3	Perform action for C-3 result of first sample
			C-3	Perform action for C-3 result of first sample	N.A.	N.A.
	C-3	Inspect all tubes in this S. G., plug or repair defective tubes and inspect 2S tubes in each other S. G. Notification to NRC pursuant to §50.72 (b)(2) of 10 CFR Part 50	All other S. G.s are C-1	None	N.A.	N.A.
			Some S. G.s C-2 but no additional S. G. are C-3	Perform action for C-2 result of second sample	N.A.	N.A.
			Additional S. G. is C-3	Inspect all tubes in each S. G. and plug or repair defective tubes. Notification to NRC pursuant to §50.72(b)(2) of 10 CFR Part 50	N.A	N.A.

$S = 3\frac{N}{n}\%$ Where N is the number of steam generators in the unit, and n is the number of steam generators inspected during an inspection

3/4.4.5 STEAM GENERATORS

The Surveillance Requirements for inspection of the steam generator tubes ensure that the structural integrity of this portion of the RCS will be maintained. The program for inservice inspection of steam generator tubes is based on a modification of Regulatory Guide 1.83, Revision 1. Inservice inspection of steam generator tubing is essential in order to maintain surveillance of the conditions of the tubes in the event that there is evidence of mechanical damage or progressive degradation due to design, manufacturing errors, or inservice conditions that lead to corrosion. Inservice inspection of steam generator tubing also provides a means of characterizing the nature and cause of any tube degradation so that corrective measures can be taken.

The plant is expected to be operated in a manner such that the secondary coolant will be maintained within those chemistry limits found to result in negligible corrosion of the steam generator tubes. If the secondary coolant chemistry is not maintained within these limits, localized corrosion may likely result in stress corrosion cracking. The extent of cracking during plant operation would be limited by the limitation of steam generator tube leakage between the Reactor Coolant System and the Secondary Coolant System (reactor-to-secondary leakage = 500 gallons per day per steam generator). Cracks having a reactor-to-secondary leakage less than this limit during operation will have an adequate margin of safety to withstand the loads imposed during normal operation and by postulated accidents. Operating plants have demonstrated that reactor-to-secondary leakage of 500 gallons per day per steam generator can readily be detected by radiation monitors of steam generator blowdown. Leakage in excess of this limit will require plant shutdown and an unscheduled inspection, during which the leaking tubes will be located and plugged or repaired by sleeving. The technical bases for sleeving are described in Westinghouse report WCAP-13698 Rev. 1 and Babcock & Wilcox Topical Report BAW-2045PA Rev. 1.

Wastage-type defects are unlikely with proper chemistry treatment of the secondary coolant. However, even if a defect should develop in service, it will be found during scheduled inservice steam generator tube examinations. Plugging or sleeving will be required for all tubes with imperfections exceeding the plugging or repair limit of 40% of the tube nominal wall thickness. If a sleeved tube is found to contain a through wall penetration in the sleeve of equal to or greater than 40% of the nominal wall thickness, the tube must be plugged. The 40% plugging limit for the sleeve is derived from Reg. Guide 1.121 analysis and utilizes a 20% allowance for eddy current uncertainty and additional degradation growth. Inservice inspection of sleeves is required to ensure RCS integrity. Sleeve inspection techniques are described in Westinghouse Report WCAP-13698 Rev. 1 and Babcock & Wilcox Topical Report BAW-2045PA Rev. 1. Steam Generator tube and sleeve inspections have demonstrated the capability to reliably detect degradation that has penetrated 20% of the pressure retaining portions of the tube or sleeve wall thickness. Commonwealth Edison will validate the adequacy of any system that is used for periodic inservice inspection of the sleeves and, as deemed appropriate, will upgrade testing methods as better methods are developed and validated for commercial use.

Insert G

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 G

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.

ATTACHMENT F

EVALUATION OF SIGNIFICANT HAZARDS CONSIDERATIONS FOR PROPOSED CHANGES TO APPENDIX A TECHNICAL SPECIFICATIONS OF FACILITY OPERATING LICENSES NPF-37 and NPF-66

Commonwealth Edison Company (ComEd) has evaluated this proposed license amendment request and determined that it involves no significant hazards considerations. According to Title 10, Code of Federal Regulations, Part 50, Section 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.

In the most recent Byron Unit 1 Cycle 5 Refueling Outage (B1R05), conducted in the spring of 1993, a steam generator (SG) tube inservice inspection was performed in accordance with the current Technical Specification Surveillance Requirement (TSSR) 4.4.5.0. The results of this inspection identified a total of 1105 bobbin coil indications at the tube support plate (TSP) locations. Using a rotating pancake coil (RPC) probe to confirm these indications, 556 indications were determined to be flawed due to outside diameter stress corrosion cracking (ODSCC) at the TSPs in 530 SG tubes. The 530 tubes were removed from service by plugging. This increased the overall plugging total for Byron Unit 1 to 847 tubes or 4.6% of the tubes. Of the 847 tubes plugged to date, 671 were plugged due to ODSCC at the tube support plate locations.

For the upcoming Byron Unit 1 Refueling Outage (B1R06), predictions on the number of pluggable indications using the current depth-based acceptance criteria are approximately 1950 tubes. With the approval of the voltage-based Interim Plugging Criteria (IPC) for Unit 1 Cycle 7 as proposed, the predicted number of tubes requiring repair by plugging or sleeving could be reduced to approximately

600. This represents a savings of approximately $5.2M in plugging and sleeving repair costs alone. In addition, IPC implementation saves a minimum of 24 days in critical path outage time and eliminates the associated replacement power costs. Also, permitting these tubes to remain in service maximizes RCS flow and heat transfer area availability and minimizes RCS loop asymmetries and loss of rated thermal power.

ComEd proposes to amend the following Byron Technical Specification:

Specification 3/4.4.5 REACTOR COOLANT SYSTEM-STEAM GENERATORS

This proposed license amendment request will modify Specification 3.4.5 to allow an eddy current bobbin coil probe voltage-based steam generator tube support plate IPC to be applied for Byron Unit 1. Technical Specification Bases Section 3/4.4.5, STEAM GENERATORS will also be modified to reflect these changes.

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

   Consistent with Regulatory Guide (RG) 1.121, "Basis for Plugging Degraded PWR Steam Generator Tubes," Revision 0, August 1976, the traditional depth-based criteria for SG tube repair implicitly ensures that tubes accepted for continued service will retain adequate structural and leakage integrity during normal operating, transient, and postulated accident conditions. It is recognized that defects in tubes permitted to remain in service, especially cracks, occasionally grow entirely through-wall and develop small leaks. Limits on allowable primary-to-secondary leakage established in Technical Specifications ensure timely plant shutdown before the structural and leakage integrity of the affected tube is challenged.

   The proposed license amendment request to implement voltage amplitude SG tube support plate Interim Plugging Criteria for Byron Unit 1 Cycle 7 meets the requirements of RG 1.121. The IPC methodology demonstrates that tube leakage is acceptably low and tube burst is a highly improbable event during either normal operation or the most limiting accident condition, a postulated main steam line break (MSLB) event. Requesting a single cycle applicability is more conservative than the guidance contained in the draft Generic Letter on voltage-based repair criteria issued for comment on August 12, 1994.

   Adequate SG tube leakage integrity during normal operating conditions is assured by limiting allowable primary-to-secondary leakage to 150 gpd per SG or 600 gpd total. Currently, this limit is administratively controlled.

However, a license amendment request was submitted on 06/03/94 to incorporate this limit into the Byron Technical Specifications. During normal operating conditions, the tube support plate constrains the ODSCC affected area of the tube to provide additional strength that precludes burst. Any leakage of a tube exhibiting ODSCC at the TSP is fully bounded by the existing SG tube rupture analysis included in the Byron UFSAR. Therefore, probability of failure of a tube left in service or consequences of tube failure during normal operating conditions is not significantly increased by the application of IPC.

During transients, the TSP is conservatively assumed to displace due to the thermal-hydraulic loads associated with the transient. This may partially expose a crack which is within the boundary of the TSP during normal operations to free span conditions. Burst is therefore conservatively evaluated assuming the crack is fully exposed to free span conditions. The structural eddy current bobbin coil voltage limit for free-span burst is 4.54 volts. This limit takes into consideration a 1.43 safety factor applied to the steam line break differential pressure that is consistent with RG 1.121 requirements. With additional considerations for growth rate assumptions and an upper 95% confidence estimate on voltage variability, the maximum voltage indication that could remain in service is reduced to 2.7 volts. For added conservatism, the allowable indication voltage is further reduced in the proposed amendment to a 1.0 volt confirmed ODSCC indication limit. All indications greater than 1.0 volt will be subject to an RPC examination. Tubes with RPC confirmed ODSCC indications will be plugged or sleeved. Any ODSCC indications between 1.0 volt and 2.7 volts which are not confirmed as ODSCC will be allowed to remain in service since these indications are not as likely to affect tube structural integrity or leakage integrity over the next operating cycle as the indications that are detectable by both bobbin and RPC inspections.

The eddy current inspection process has been enhanced to address RG 1.83, "Inservice Inspection of PWR Steam Generator Tubes," Revision 1, July 1975, considerations as well as the EPRI SG Inspection Guidelines. Enhancements in accordance with NUREG-1477 and Appendix A of the Catawba IPC report (WCAP-13698) are in place to increase detection of ODSCC indications and to ensure reliable, consistent acquisition and analysis of data. Based on the conservative selection of the voltage criteria and the increased ability to identify ODSCC, the probability of tube failure during an accident is also not significantly increased due to application of requested IPC.

For consistency with current offsite dose limits, the site allowable leakage limit during a MSLB has been conservatively calculated to be 12.8 gpm.

This leakage limit includes maximum allowable operational leakage from the unaffected SGs and the accident leakage from the affected SG. As a requirement for operation following application of IPC, the projected distribution of crack indications over the operating period must be verified to result in primary to secondary accident leakage less than the site allowable leakage limit. Thus, the consequences of a MSLB remain unchanged.

For an unscheduled mid-cycle inspection as a result of leakage due to mechanisms other than ODSCC at support plates or some other cause, the ODSCC indication limit is represented by 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

Assuming linear flaw growth from BOC to EOC and a maximum structural limit of 4.5 volts, the voltage expected for an identified flaw at any time in the cycle can be predicted. The allowed voltage limit for an unscheduled inspection, as identified by the equation given above, reduces the predicted straightline growth voltage to ensure conservatism in the limit. A flaw which has not exceeded the predicted voltage growth at any point in the cycle would not be expected to exceed the structural limit at end of cycle or negatively impact the burst probability calculated based on results from the last scheduled inspection. Therefore, it is acceptable to leave the tube in service.

Therefore, as implementation of the 1.0 volt IPC for Byron Unit 1 Cycle 7 does not adversely affect steam generator tube integrity and results in acceptable dose consequences, the proposed license amendment request does not result in any significant increase in the probability or consequences of an accident previously evaluated within the Byron Updated Final Safety Analysis Report.

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 SG tube IPC for Byron Unit 1 Cycle 7 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 the tube support plate elevations since industry experience indicates that ODSCC originating within the tube support plate does not extend significantly beyond the thickness of the support plate. This criteria only applies to ODSCC contained within the region of the tube bounded by the tube support plate.

In addressing the combined effects of Loss of Coolant Accident (LOCA) coincident with a Safe Shutdown Earthquake (SSE) on the SG (as required by General Design Criteria 2), it has been determined that tube collapse of select tubes may occur in the SGs at some plants, including Byron Unit 1. 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 through-wall cracks in tubes could progress to through-wall cracks during tube deformation or collapse.

A number of tubes have been identified, in the "wedge" locations of the SG TSPs, that demonstrate the potential for tube collapse during a LOCA + SSE event. Because of this potential, these tubes have been excluded from application of the voltage-based SG TSP IPC.

Therefore, neither a single or multiple tube rupture event would be expected in a steam generator in which IPC has been applied.

ComEd has implemented a maximum primary to secondary leakage limit of 150 gpd through any one SG at Byron to help preclude the potential for excessive leakage during all 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. The 150 gpd limit provides adequate leakage detection and plant shutdown criteria in the event an unexpected single crack results in leakage that is associated with the longest permissible free span crack length. Since tube burst is precluded during normal operation due to the proximity of the TSP to the tube and the potential exists for the crevice to become uncovered

during MSLB conditions, the leakage from the maximum permissible crack must preclude tube burst at MSLB conditions. Thus, the 150 gpd limit provides a conservative limit to prompt plant shutdown prior to reaching critical crack lengths under MSLB conditions.

Upon implementation of the 1.0 volt IPC for Byron Unit 1 Cycle 7, steam generator tube integrity continues to be maintained through inservice inspection and primary-to-secondary leakage monitoring. 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 probe SG TSP IPC for Byron Unit 1 Cycle 7 will maintain steam generator tube integrity commensurate with the criteria of RG 1.121 as discussed above. Upon implementation of the criteria, even under the worst case conditions, the occurrence of ODSCC at the TSP elevations is not expected to lead to a steam generator tube rupture event during normal or faulted plant conditions. The distribution of crack indications at the TSP elevations result in acceptable primary-to-secondary leakage during all plant conditions and radiological consequences are not adversely impacted by the application of IPC.

The installation of SG tube plugs and sleeves reduces the RCS flow margin. As noted previously, implementation of the SG TSP IPC will decrease the number of tubes which must be repaired by plugging or sleeving. Thus, implementation of IPC will retain additional flow margin that would otherwise be reduced due to increased tube plugging. Therefore, no significant reduction in the margin of safety will occur during Cycle 7 as a result of the implementation of this proposed license amendment request.

Although not relied upon to prove adequacy of the proposed amendment request, the following analyses demonstrate that significant conservatisms exist in the methods and justifications described above:

LIMITED TUBE SUPPORT PLATE DISPLACEMENT

An analysis was performed to verify the extent of limited TSP displacement during accident conditions (MSLB). Application of minimum TSP displacement assumptions reduce the likelihood of a tube burst to negligible levels.

Consideration of limited TSP displacement would also reduce potential MSLB leakage when compared to the leakage calculated assuming free span indications.

PROBABILITY OF DETECTION

The Electric Power Research Institute (EPRI) Performance Demonstration Program analyzed the performance of approximately 20 eddy current data analysts evaluating data from a unit with 3/4" inside diameter and 0.049" wall thickness tubes. The results of this analysis clearly show that the detectability of larger voltage indications is increased which lends creditability for application of a POD of > 0.6 for ODSCC indications larger than 1.0 volt.

RISK EVALUATION OF CORE DAMAGE

As part of ComEd's evaluation of the operability of Byron Unit 1 Cycle 7, a risk evaluation was completed. The objective of this evaluation was to compare core damage frequency under containment bypass conditions, with and without the interim plugging criteria applied at Byron Unit 1.

The total Byron core damage frequency is estimated to be 3.09E-5 per reactor year with a total contribution from containment bypass sequences of 3.72E-8 per reactor year according to the results of the current individual plant evaluation (IPE). Operation with the requested IPC resulted in an insignificant increase in core damage frequency resulting from MSLB with containment bypass conditions.

Therefore, based on the evaluation above, ComEd has concluded that this proposed license amendment request does not involve a significant hazards consideration.