Commonwealth Edison
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February 21, 1995

U.S. Nuclear Regulatory Commission
Document Control Desk
Washington, D.C. 20555

Subject: Application for Amendment to Facility Operating Licenses:

Byron Nuclear Power Station, Units 1 and 2
NPF-37/66; NRC Docket Nos. 50-454/455

Braidwood Nuclear Power Station, Units 1 and 2
NPF-72/77; NRC Docket Nos. 50-456/457

"Resistance Temperature Detector Bypass Elimination"

Pursuant to 10 CFR 50.90, Commonwealth Edison Company (ComEd) proposes to amend Appendix A, Technical Specifications of Facility Operating Licenses NPF-37, NPF-66, NPF-72 and NPF-77. The proposed amendment request addresses Technical Specification changes as a result of the Resistance Temperature Detector Bypass Elimination (RTDBE) modification. The modification will remove the bypass piping and valves and replace them with the fast response RTDs mounted in thermowells welded directly in the Reactor Coolant System loop piping. The following sections of the Technical Specifications are affected:

1. Table 2.2-1, "Reactor Trip System Instrumentation Trip Setpoints,"
2. Bases of Section 2.2, "Limiting Safety System Settings,"
3. Table 3.3-4, "Engineered Safety Features Actuation System Instrumentation Trip Setpoints," and
4. Table 4.3-1, "Reactor Trip System Instrumentation Surveillance Requirements."

The amendment package consists of the following:

Attachment A:	Description and Safety Analysis of Proposed Changes to Appendix A
Attachment B:	Proposed Changes to the Technical Specification Pages for Byron and Braidwood Stations
Attachment C:	Evaluation of Significant Hazards Consideration
Attachment D:	Environmental Assessment
Attachment E:	Westinghouse letter CAE-95-105/CCE-95-112, "Reactor Trip Response Time Safety Evaluation SECL-95-015," dated January 30, 1995

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Approval of the proposed Technical Specification and implementation of the modification will likely result in significant reductions in occupational exposure due to the elimination of crud traps and the reduced maintenance associated with removal of the RTD bypass manifold system. Radiation exposure is accumulated not only in maintaining the RTD bypass manifold system, but in performing any work near the RTD bypass manifold system. Removal of the RTD bypass manifold system is expected to result in a radiation dose savings of approximately 52 person-rem per refueling cycle per unit.

Byron and Braidwood Stations request review and approval of the proposed amendment be completed by September 1, 1995. Approval by this date is necessary to support implementation during the refueling outage for Braidwood Unit 1, currently scheduled for September 1995.

To the best of my knowledge and belief, the statements contained in this document are true and correct. In some respects these statements are not based on my personal knowledge, but on information furnished by other ComEd employees, contractor employees, and/or consultants. Such information has been reviewed in accordance with company practice, and I believe it to be reliable.

Please address any further comments or questions regarding this mater to this office.

Sincerely,

OFFICIAL SEAL
MARY JO YACK
NOTARY PUBLIC STATE OF ILLINOIS
MY COMMISSION EXPIRES 11/29/97

Denise M. Saccomando
Nuclear Licensing Administrator

Mary Jo Yack 2/21/95

Attachments

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ATTACHMENT A

DESCRIPTION AND SAFETY ANALYSIS OF
PROPOSED CHANGES TO APPENDIX A
TECHNICAL SPECIFICATIONS OF
FACILITY OPERATING LICENSES
NPF-37, NPF-66, NPF-72, AND NPF-77

Commonwealth Edison (ComEd) proposes a plant modification for the Byron and Braidwood units that will modify the system used to obtain representative reactor coolant system (RCS) hot and cold leg temperatures. The existing system has historically required a significant amount of maintenance primarily due to valve leakage. The system is also a source of crud traps and contributes to high exposure levels during maintenance in the general area of the system.

A. DESCRIPTION OF THE PROPOSED CHANGE

The proposed Technical Specification changes and associated plant modification will remove the existing Resistance Temperature Detector (RTD) manifold system used to obtain representative hot and cold leg RCS temperatures on all four reactor coolant loops. The RTD bypass manifold piping and valves will be replaced with fast response RTDs mounted in thermowells welded directly in the RCS loop piping. This amendment request proposes annotating references to the current RTD bypass manifold system which will not apply following installation of the RTD/thermowell system. The following sections of the Technical Specifications are affected:

1) Table 2.2-1, "Reactor Trip System Instrumentation Trip Setpoints",

2) Bases of Section 2.2, "Limiting Safety System Settings",

3) Table 3.3-4, "Engineered Safety Features Actuation System Instrumentation Trip Setpoints", and

4) Table 4.3-1, "Reactor Trip System Instrumentation Surveillance Requirements".

B. DESCRIPTION AND BASES OF THE CURRENT REQUIREMENT

Description and Bases of Current System Requirements:

In the current system design, the RTD bypass manifold system is used to obtain representative hot and cold leg temperatures. Separate bypass manifolds are used for each reactor coolant loop. A representative hot leg temperature is obtained by mixing flow from three scoop connections. These scoops extend into the flow stream (at locations 120° apart in the cross-sectional plane) on each reactor coolant hot leg. Each scoop has five flow holes which sample hot leg flow. The hot leg bypass flow exits to a return line shared with the cold leg manifold flow from the corresponding reactor coolant loop. Flow for the cold leg bypass manifold is obtained downstream of the reactor coolant pump discharge. One connection is considered adequate to obtain a representative cold leg temperature due to the mixing action of the pump. The hot and cold bypass manifold piping join to form a common discharge line. The combined flow discharges to the suction side of the reactor coolant pump. The typical existing RTD bypass manifold system consists of over 400 feet of reactor coolant pressure boundary piping, 52 associated valves, over 150 hangers including on the average 64 snubbers, 8 sets of flanges and 8 RTD manifolds per unit.

The hot and cold leg RTD manifolds each contain an active RTD and a spare RTD. The RTDs extend directly (without thermowells) into the flow path of the coolant passing through the bypass manifold. This minimizes the response time of the RTDs. The RTD outputs are used to calculate the loop delta T (ΔT) and loop T average (T_{avg}) signals, which are utilized by the reactor protection and control systems. The loop ΔT and loop T_{avg} signals are used in the Overtemperature Delta T (OTΔT) and Overpower Delta T (OPΔT) reactor protection signals. In addition, the RTD outputs are used for rod control, turbine runback, pressurizer level and other control systems.

Description and Bases of Current Technical Specification Requirements:

1) <u>Table 2.2-1, "Reactor Trip System Instrumentation Trip Setpoints"</u>

   Table 2.2-1 provides the Reactor Trip System Instrumentation trip setpoints and allowable values. Detailed descriptions of the OTΔT and OPΔT trip functions are included in the Table notations. The following notes will be affected by the proposed modification:

   a. Note 1 currently defines ΔT as the measured ΔT by the RTD Manifold Instrumentation.

   b. Note 1 also defines τ_3 and τ_6 as the time constants utilized in the lag compensators for the individual loop ΔT and measured T_{avg} signals, respectively. The values of τ_3 and τ_6 are currently 0 seconds.

c. Note 2 provides the allowable value for the OTΔT trip setpoint. To accommodate the instrument drift assumed to occur between operational tests and the accuracy to which setpoints can be measured and calibrated, allowable values are provided for reactor trip setpoints. Operation with setpoints less conservative than the trip setpoint but within the allowable value is acceptable since an allowance has been made in the safety analyses to accommodate this error. The allowable value for the OTΔT trip setpoint is dependent on the implementation of the Positive Moderator Temperature Coefficient (PMTC)/RCS Reduced Thermal Design Flow (RTDF)/Increased Steam Generator Tube Plugging (SGTP) program. The footnotes provide the cycle specific implementation schedule. Prior to implementation of the PMTC/RTDF/SGTP program on the affected unit, the allowable value for OTΔT is 3.71% of ΔT span. Following implementation of the PMTC/RTDF/SGTP program on the affected unit, the allowable value is 1.16% of ΔT span.

d. Correspondingly, Note 4 provides the allowable value for the OPΔT trip setpoint. This value is similarly dependent on implementation of the PMTC/RTDF/SGTP program. Prior to implementation of the PMTC/RTDF/SGTP program on the affected unit, the allowable value for OPΔT is 2.31 % of ΔT span. Following implementation of the PMTC/RTDF/SGTP program on the affected unit, the allowable value is 3.08 % of ΔT span.

2) <u>Bases of Section 2.2, "Limiting Safety System Settings"</u>

The OTΔT trip function provides core protection to prevent Departure from Nucleate Boiling (DNB) for all combinations of pressure, power, coolant temperature, and axial power distribution, provided the transient is slow with respect to piping and transit delays from the core to the temperature detectors, and pressure is within the range between the Pressurizer High and Low pressure trips. The OPΔT trip function provides assurance of fuel integrity under all possible overpower conditions, limits the required range for OTΔT trip, and provides a backup to the High Neutron Flux trip. Both the OTΔT and OPΔT trip setpoints include dynamic compensation for piping delays from the core to the loop temperature detectors. The transit delays from the core to the temperature detectors is specified as 4 seconds in a parenthetical reference in the description of the OTΔT trip function.

3) <u>Table 3.3-4, "Engineered Safety Features Actuation System Instrumentation Trip Setpoints"</u>

Table 3.3-4 provides the Engineered Safety Features (ESF) Actuation System Instrumentation trip setpoints and allowable values. The setpoints are the nominal values at which the bistables are set. To accommodate the instrument drift assumed to occur between operational test and the accuracy to which setpoints can be measured and calibrated, allowable values for the setpoints have been specified. The Low-Low T_{avg} (P-12) ESF setpoint is currently specified as greater than or equal to 550°F and the allowable value as greater than or equal to 547.2°F.

4) Table 4.3-1, "Reactor Trip System Instrumentation Surveillance Requirements"

Surveillance Requirement 4.3.1.1 requires that each Reactor Trip System instrumentation channel and interlock and the automatic trip logic be demonstrated operable by the performance of the Reactor Trip System Instrumentation Surveillance Requirements specified in Table 4.3-1. The channel calibration frequency requirements are provided in Table 4.3-1. The OTΔT reactor trip channel calibration frequency is annotated by Note 13. Note 13 indicates that the channel calibration for the OTΔT reactor trip system shall include the RTD bypass loop flow rate. The purpose of this note is to ensure that the RTD bypass flow rate meets the minimum requirements when calibrating the OTΔT channel. Obtaining representative RCS temperatures with the existing RTD bypass manifold system is dependent on having sufficient RTD bypass flow rate. Therefore, channel calibration of the OTΔT reactor trip function should consider RTD bypass flow rate.

C. NEED FOR REVISION OF THE REQUIREMENT

The RTD bypass piping system has historically required a significant amount of maintenance. A primary reason for maintenance is valve leakage from valve packing or mechanical joints. Maintenance of the RTD bypass piping has resulted in plant shutdowns at some utilities, including two at Commonwealth Edison's Byron Nuclear Station, for a combined 31 days of outage time. Additionally, the RTD bypass piping system is a source of crud traps for radioactive particulates, which contribute to high exposure levels during routine maintenance. Radiation exposure is accumulated not only in maintaining the RTD bypass manifold system, but in performing any work near the RTD bypass manifold system. Removal of the RTD bypass manifold system is expected to result in a radiation dose savings of approximately 52 person-rem per refueling cycle per unit. Replacement of the RTD bypass manifold system with the thermowell-mounted fast response RTD system will eliminate forced outages associated with maintenance of the RTD bypass manifold system, resulting in a significant cost savings while maintaining the same required level of plant protection.

D. DESCRIPTION AND BASES OF THE REVISED REQUIREMENT

Description and Bases of Proposed Modification:

The proposed plant modification will remove the RTD bypass piping on all four reactor coolant loops. The existing RTD bypass return line will be cut and capped at the reactor coolant crossover header. In place of the direct immersion single-element RTDs mounted in the manifolds, thermowell-mounted dual element fast response RTDs will be used. A major benefit in using thermowell-mounted RTDs is that a faulty RTD may be replaced without breaching the RCS pressure boundary. The hot leg scoops will be modified to accept new thermowells. The thermowell will be positioned to provide an average temperature reading for each scoop (the thermowell tip will be located at the third flow hole). A hole will be drilled through the end of each hot leg scoop to facilitate flow past the RTD. Water will enter through the existing flow holes, flow past the thermowell-mounted RTD, and exit through the new hole. The current cold leg RTD bypass penetration nozzle will also be modified to accept a thermowell-mounted fast response RTD. The thermowell will extend approximately 3.3" into the flow stream.

The new thermowell-mounted dual element fast response RTDs, manufactured by Weed Instrument Company, Inc. (model N9004E), will be placed in each of the three existing hot leg scoops and in the cold leg penetration of each loop. One element of each RTD will be active; the other will serve as an installed spare. The three hot leg temperature signals will be electronically averaged in the reactor protection system (RPS) to produce a representative hot leg temperature. This will necessitate the addition of a number of new cards to the 7300 Process Protection Cabinets, resulting in the removal of a two-tier card frame and the addition of a three tier card frame for each protection cabinet. The spare RTD element will be wired to the 7300 cabinets to facilitate switching to the spare element at the racks in the event of a failure of the active element. The added 7300 hardware is compatible with the existing 7300 electronic hardware now used.

In the existing bypass piping system, flow in a given loop is not necessarily balanced among the three hot leg scoops. Flow imbalance between scoops is primarily due to variations in bypass piping resistance. These flow imbalances lead to temperature measurement inaccuracies. By removing the bypass piping, temperature measurement inaccuracies caused by flow imbalances are eliminated. The proposed design measures hot leg temperature at the third (center) flow hole within each scoop. The measured temperature is considered the average coolant temperature passing through the flow scoop. If, however, the radial temperature gradient is not linear along the length of the flow scoop, an inaccuracy is introduced. The uncertainty due to flow imbalances is evaluated to be equal to or greater than the sampling uncertainty that may be introduced in measuring temperature at the third flow hole. Additionally, since the new design will utilize three RTDs for each hot leg temperature measurement, it is statistically a more accurate temperature measurement than the RTD manifold method which uses only one RTD for each hot leg temperature measurement. Thus, the method of measuring coolant temperature with thermowell-mounted fast response RTDs has been analyzed to be at least as effective as the RTD bypass system.

To assess whether the new method of obtaining hot leg temperature yields results consistent with the RTD bypass manifold system, the ΔT readings of each loop will be compared before and after installation of the proposed modification. A comparison of ΔT values (normalized to full power) will be performed. Any unexpected differences or anomalies will be evaluated and addressed. The impact of this new method of obtaining a representative T_{avg} signal is not expected to affect control systems that rely on T_{avg} as an input signal because these control systems receive their inputs after the RCS temperature signal has been processed.

Instrument uncertainty calculations account for drift. The response time of the thermowells/RTDs will be checked using the Loop Current Step Response (LCSR) test prior to plant startup, following the refuel outage. Subsequent testing will be performed each cycle per the Technical Specification requirements to verify that RTDs have not drifted unacceptably. Cross-calibration is an acceptable method of calibrating the RTDs, since it is considered highly improbable that a majority of the RTDs will drift in the same direction at the same time. Industry experience of other utilities who have previously performed this modification supports this conclusion.

The effects of temperature streaming are also considered in instrument uncertainty calculations. Based on information provided by Westinghouse, the impact of temperature streaming in the cold leg is considered insignificant. The Reactor Coolant Pump (RCP) provides adequate coolant mixing. Due to inadequate mixing of coolant leaving various regions of the reactor core, temperature streaming exists in the hot leg. The use of three flow scoops located at 120° increments along the circumference of the hot leg compensates for the streaming effects resulting from temperature gradients in the RCS. However, instrument uncertainty calculations include a hot leg streaming process measurement accuracy (PMA) term to account for this effect.

RCS flow measurement uncertainty is dependent on the accuracy of hot and cold leg temperature measurement. A maximum RCS flow measurement uncertainty (FMU) of ± 3.5% is used as discussed in the bases of Technical Specifications 3/4.2.2 and 3/4.2.3, "Heat Flux Hot Channel Factor, and RCS Flowrate and Nuclear Enthalpy Rise Hot Channel Factor". RCS FMU calculations have been performed and demonstrate the conservatism in using an RCS FMU of ± 3.5%. An evaluation was performed as a result of the proposed modification to ensure that the RCS FMU remains bounding for the fast response RTD/thermowell system.

The RTD response time is incorporated in the safety analyses. In particular, RTD response time is modeled in the OTΔT and OPΔT trip functions. The overall response time modeled in the safety analyses for the existing RTD bypass piping system is 8 seconds. The overall response time is the elapsed time from the time the temperature change in the RCS exceeds the trip setpoint until the rods are free to fall. More specifically, 6 seconds is modeled as a first order lag term and 2 seconds as pure delay on the reactor trip signal. The 6 second lag term includes such factors as: RTD bypass piping fluid transport delay, RTD bypass piping thermal lag, RTD response time, and RTD electronic filtering. The 2 second delay on reactor trip addresses such factors as electronics delay, trip breakers and gripper release. The proposed fast response RTD/thermowell system also has an overall response time of 8 seconds.

Signal conditioning (filtering) of the individual loop ΔT and T_{avg} signals is represented by τ_3 and τ_6 , respectively, in the OTΔT and OPΔT equations in Technical Specification Table 2.2-1. With the current bypass manifold system, the filter is not required since the existing RTDs do not respond rapidly to local temperature variances within the reactor coolant loop. The bypass piping and manifold provide adequate mixing of the coolant, eliminating any local temperature variances. Therefore, the values of τ_3 and τ_6 are currently specified as 0 seconds, effectively turning off the electronic filter. The new fast response RTDs may respond to temperature spikes which are not representative of actual RCS bulk fluid temperature. Signal conditioning may be required to eliminate these temperature spikes. Although, the current Technical Specifications do not provide for any signal conditioning, the 8 second total response time used in safety analyses has sufficient margin to account for a typical 2 second time constant for signal conditioning. In addition, Westinghouse has evaluated the effects of a redistribution of the time responses between the total lag term (currently modeled at 6 seconds) and electronics delay term (currently modeled at 2 seconds). Westinghouse documented their conclusions in Safety Evaluation SECL-95-015, "OTΔT and OPΔT Reactor Trip Response Time Safety Evaluation", see Attachment E. Based on these evaluations, the actual distribution between the total lag and electronics delay terms is inconsequential. As long as the total response time remains $\leq$ 8 seconds, the safety analyses acceptance criteria continue to be met. Therefore, the current safety analyses remain bounding.

The time distribution for the parameters is different between the two designs. The existing design includes a transport time for RCS fluid to reach the RTD, located in the manifold. However, the RTDs are directly immersed into the coolant, providing a fast response. The proposed design no longer has the transport delay. Because the RTDs will be mounted in thermowells, the response time of the RTD/thermowell combination will increase over the existing system. In addition, a T_{hot} average summator card will be added to the 7300 cabinet to electronically average the T_{hot} signals. The change in electronics delay in adding the summator card is insignificant.

The following table provides response times for the existing and proposed systems:

Response Time Parameters for RCS Temperature Measurement

	Bypass System		Proposed System	
	Modeled	Nominal	Modeled	Nominal
RTD Bypass Piping and Thermal Lag (sec)	---[1]	2.0[4]	---	0.0
RTD Response Time (sec)	---	4.0	---	4.4[2]
RTD Filter Time Constant (sec)	---	0.0	---	2.0
Total Lag (sec)	6.0	6.0	6.0[3]	6.4[3]
Electronics Delay (sec)	2.0	0.5	2.0[3]	0.5
Total Response Time (sec)	8.0	6.5	8.0	6.9

Notes:

1) The dashed lines indicate a value that is not explicitly modeled/measured.
2) The RTD response time includes a ten percent error allowance to account for Loop Current Step Response (LCSR) measurement tolerances.
3) Westinghouse has evaluated the effects of a redistribution of the time responses between the total lag term and electronics delay term and has concluded that, as long as the total response time remains ≤ 8 seconds, the safety analyses acceptance criteria remain unchanged and continue to be met.
4) This 2 second value is not measured, but has been provided by Westinghouse as the appropriate Byron/Braidwood-specific design value for the piping/thermal delay in the bypass system.

In comparing the modeled total response time with those typically measured (nominal), it can be seen that the modeled times include considerable margin. With the proposed modification, actual measured total time response including measurement uncertainty is anticipated to be approximately 6.9 seconds. This would provide adequate margin for potential degradation of RTD response over a fuel cycle.

The response time of the installed thermowells/RTDs will be checked using the LCSR test prior to plant startup, following the refuel outage. The LCSR methodology provides results to within ± 10% accuracy. The acceptance criteria for RTD response time testing will account for this inaccuracy.

The proposed modification has been reviewed for conformance with the Institute of Electrical and Electronics Engineers (IEEE) 279-1971 criteria, associated General Design Criteria, Regulatory Guides, and other applicable industry standards. The single failure criterion is satisfied by the proposed modification, since the independence of redundant protection sets is maintained. The new RTD/thermowell system meets the equipment seismic and environmental qualification requirements of IEEE standards 344-1975 and 323-1974, respectively. The proposed changes do not affect the protection system capabilities to initiate a reactor trip. The 2 of 4 voting coincidence logic of the protection sets is maintained. Therefore, the proposed modification meets all appropriate IEEE criteria, industry standards and other guidelines.

The thermowells will be fabricated and installed in accordance with the American Society of Mechanical Engineers (ASME) Boiler and Pressure Vessel Code Section III, 1974 Edition with Addenda and code cases in effect up to and including the Summer 1975 Addenda. In-service Inspection shall be in accordance with ASME Section XI, 1983 Edition with Summer of 1983 Addenda.

Description and Bases of Proposed Technical Specifications:

1) <u>Table 2.2-1, "Reactor Trip System Instrumentation Trip Setpoints"</u>

a. Reference to the RTD manifold will be eliminated in Note 1. Note 1 will be revised to define ΔT as the measured ΔT by RTD Instrumentation.

b. Note 1 also defines τ_3 and τ_6 as the time constants utilized in the lag compensators for the individual loop ΔT and measured T_{avg}, respectively. The time constant on the lag compensator can be adjusted to serve as an electronic filter for signal conditioning. Technical Specification Table 2.2-1 currently defines the value of the time constants, τ_3 and τ_6, as 0 seconds which effectively turns off the electronic filter. As discussed previously, signal conditioning (electronic filtering) may be required to eliminate temperature spikes not indicative of actual RCS conditions that may be sensed by fast response RTDs. Therefore, ComEd proposes revising the value of the time constants, τ_3 and τ_6, to be less than or equal to 2 seconds following implementation of the modification. A value of 2 seconds is used, as industry experience has shown that a 2 second filter is adequate in eliminating temperature spikes. The values of τ_3 and τ_6 will be annotated to reflect applicability based on implementation of the modification on the respective units.

c. Note 2 provides the allowable value for the OTΔT trip setpoint. The proposed modification provides slightly more accurate RTDs, has a minor effect on T_{hot} streaming process measurement accuracy, and modifies the 7300 logic. Thus, the allowable value has been affected. The allowable value following installation of the proposed modification will be 1.33% of ΔT span. The revised value will be annotated to coincide with implementation of the modification on the respective units.

d. Correspondingly, Note 4 provides the allowable value for the OPΔT trip setpoint. The allowable value following installation of the proposed modification will be 3.65% of ΔT span. The revised value will be annotated to coincide with implementation of the modification on the respective units.

2) <u>Bases of Section 2.2, "Limiting Safety System Settings"</u>

The OTΔT and OPΔT trip setpoint equations include dynamic compensation for piping delays from the core to the loop temperature detectors. The impact of installing fast response RTD/thermowell system on dynamic compensation for piping and transport delays from the core to the loop temperature detectors was appropriately considered. The distribution of the time delays varies between the RTD manifold system and the fast response RTD/thermowell system. However, the overall response time remains the same between the two designs. The effect of the difference in distribution of time delays on the safety analyses has been evaluated. It has been concluded that the existing analyses remain bounding because the impact of redistributing the time delay is negligible.

Included in the bases for OTΔT is a parenthetical reference which incorrectly implies that the piping and transit delay from the core to the temperature detectors is 4 seconds. In actuality, the 4 second parenthetical reference corresponds to the RTD response time, part of the previously defined 8 second total response time. The fluid transport delay in going from the core to the bypass system is modeled separately in the OPΔT and OTΔT trip functions and is, therefore, also accounted for in the safety analyses. The parenthetical reference to a specific time value for piping and transit delay from the core to the temperature detectors will be deleted from the description of the OTΔT trip function. The description of the OPΔT trip function is not affected by the proposed modification because a specific value for piping delays from the core to the temperature detectors is not provided.

3) Table 3.3-4, "Engineered Safety Features Actuation System Instrumentation Trip Setpoints"

The allowable value for the Low-Low T_{avg} (P-12) ESF setpoint is similarly affected due to the proposed modification. The new Low-Low T_{avg} allowable value has been calculated to be greater than or equal to 546.9°F. The revised value will be annotated to coincide with implementation of the modification on the respective units.

4) Table 4.3-1, "Reactor Trip System Instrumentation Surveillance Requirements"

Note 13 in Table 4.3-1 indicates that the channel calibration for the OTΔT reactor trip system shall include the RTD bypass loops flow rate. The proposed modification places the thermowell-mounted RTDs directly into the flow scoops (hot leg) and penetration (cold leg), eliminating the bypass piping. Therefore, ComEd proposes annotating Note 13, and indicating its applicability dependent on implementation of the modification on the respective units.

E. IMPACT OF THE PROPOSED CHANGE

The proposed modification replaces the existing bypass piping system with thermowell-mounted RTDs. The new system is functionally equivalent to the existing one. Because the hot leg RTDs are mounted directly in the scoops, temperature measurement inaccuracies caused by imbalances in the flow scoop sample flow are eliminated. The method of measuring coolant temperature with thermowell-mounted fast response RTDs has been analyzed to be at least as effective as the RTD bypass system. Cross-calibration testing will be performed each cycle per the Technical Specification requirements to ensure there is no degradation of the RTDs.

The RTD outputs are utilized by the reactor protection and control systems. The control systems receiving input from the RTDs include: rod control, turbine runback, pressurizer level and other control systems. These control systems receive their signal after it has been processed at the 7300 protection cabinets and are therefore unaffected by the proposed modification.

RTD failures will continue to be identified using existing control board indicators and alarms, i.e., T_{avg} deviation alarms, ΔT deviation alarms, T_{avg}-T_{ref} deviation alarms, and shiftly/daily rounds which verify all T_{avg} and ΔT indications. If the deviation alarm for a channel is received, or if a channel check during operator rounds reveals one or more channels deviating, a comparison is performed utilizing the plant process computer or by taking voltage readings at the process instrumentation cabinets. If an RTD is determined to be inoperable, its associated channel is placed in a tripped condition using plant procedures. When the channel is placed in the tripped condition, a work request is typically initiated to identify the problem and perform whatever actions are necessary to return the channel to an operable condition. These actions can include utilizing the spare lead on the active RTD element, if possible, or connecting the installed spare element in place of the failed RTD element. Switching to a spare RTD is simplified, since the spares will be wired back to the rack. The channel is then tested and returned to service.

The OTΔT and OPΔT trip functions are unaffected by the change. The dynamic compensation term of the OTΔT and OPΔT setpoint equations has changed to allow for electronic filtering of the RTD signal. No other changes to the setpoint equation result from the proposed modification. The overall response time of the proposed system is consistent with the existing system. However, the distribution of response times between the total lag (pipe transport delay, RTD response and electronic filter delay) and the electronic delay has changed. This redistribution has been evaluated. The safety analyses acceptance criteria continue to be met, as long as the overall time response remains less than 8 seconds. As concluded in Attachment C, the proposed amendment does not result in an increase in the probability or consequences of a previously evaluated accident, nor are any new accidents created. Additionally, the margin of safety is not impacted by the proposed modification.

F. SCHEDULE REQUIREMENTS

Commonwealth Edison requests that the review and approval of the proposed amendment be completed to support implementation during the fifth refueling outage for Braidwood Unit 1, currently scheduled to begin in September 1995.