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BEC0 88- 102
Proposed Change 88- 03
June 30, 1988

License DPR-35
Docket 50-293

PROPOSED TECHNICAL SPECIFICATION CHANGE
DEGRADED VOLTAGE TRIP AND ALARM SETPOINTS

Dear Sir:

Pursuant to 10CFR50.90, Boston Edison Company (BEC0) proposes the following revisions to Facility Operating License No. DPR-35, Appendix A. The requested change is to Technical Specification Trip and Alarm setpoints for degraded voltage protection.

An application fee of one hundred and fifty dollars (\$150.00) will be electronically transferred to your offices in accordance with the requirements of 10CFR Part 170.12(c).

R. G. Bird
R. G. Bird

GGW/jcp/1894

Attachments
1 signed original and 37 copies

cc: See next page

Commonwealth of Massachusetts)
County of Suffolk)

Then personally appeared before me, Ralph G. Bird, who being duly sworn, did state that he is Senior Vice President - Nuclear of Boston Edison Company and that he is duly authorized to execute and file the submittal contained herein in the name and on behalf of Boston Edison Company and that the statements in said submittal are true to the best of his knowledge and belief.

My commission expires:

APR 03 1992
DATE

Gerald G. Whitney
NOTARY PUBLIC

Gerald G. Whitney
Notary Public
My Commission Expires April 3, 1992

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BOSTON EDISON COMPANY

U.S. Nuclear Regulatory Commission

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ATTACHMENT A TO BECO LETTER 88-102

Proposed Technical Specification Change to
Degraded Voltage Trip and Alarm Setpoints

Proposed Changes:

On page 49, Table 3.2.B; Instrumentation that Initiates or Controls the Core and Containment Cooling Systems

Change the Remarks for the Core Spray and LPCI Pump Start Times

From: "In conjunction with loss of power initiates sequential starting of CSCS pumps."

To: "Initiates sequential starting of CSCS pumps on any auto start."

On page 50a, Table 3.2.B; Instrumentation That Initiates or Controls The Core And Containment Cooling Systems

Change Trip Level Setting

From: 3745V \pm 2%

To: 3868V \pm 0.5%

On page 53a, Table 3.2.B.1; Instrumentation That Monitors Emergency Bus Voltage

Change Setting

From: 3850V \pm 2%

To: 3959V \pm 0.5%

Add to the Remarks, on page 53a

"Provides permissive to initiate load shedding in conjunction with LOCA signal."

On page 197, Section 3.9.B.6; Operation With Inoperable Equipment

Change that portion of the first sentence in Section 3.9.B.6

From: "less that 3950 but above 3745"

To: "less than 3959V but above 3868V"

Reason for Change

A recent self-initiated effort to improve inhouse analysis capability for electrical power distribution system (EPDS) design and control identified the need to change the trip and alarm setpoints for the PNPS degraded voltage relays. The existing setpoints are based on an incorrect assumption made in 1976 that, if 4160V and 480V load center buses do not fall below 90% rated voltage, the voltage supplied to the end equipment would be greater than the equipment manufacturer's recommended minimum values. LER 88-003-00, "Low Setpoints of Degraded Grid Voltage Relays due to Error in Model Used in Analysis" dated Feb. 29, 1988, provided written notification of this discovery and listed as corrective actions additional analysis to determine the correct setpoints and to propose technical specification changes accordingly.

The attached proposed changes to the degraded voltage trip and alarm setpoints have been determined as the result of additional analysis of the EPDS for PNPS. The study indicated the trip setpoint should be set at $3868V \pm 0.5\%$ in order that the safety related devices on the worse case motor control center to have sufficient voltage for proper and safe operation. The alarm setpoint should be set at $3959 \pm 0.5\%$ to allow for required operator action and permit load shedding when required during a LOCA. The installation of newer, more reliable, and higher quality solid state relays allows the revised setpoints and tolerances to be used.

The proposed degraded voltage trip setpoint of 3868V, with a tolerance of 0.5%, yields 3849V as the lowest allowed trip setpoint. This setpoint provides adequate margin over the minimum bus voltage which assures the adequacy of the 480V power supply. The corrected degraded voltage trip setpoint calculations indicated a 480V motor control center voltage of 434V will occur when the 4KV bus is at 3849V (assuming worse case LOCA loading conditions with load shedding initiated). This provides 4V of margin over the corrected minimum acceptable voltage of 430V.

Based on this trip setpoint the relays will reset at a maximum of 3907 volts. This voltage is the 4160V bus voltage that corresponds to a switchyard voltage of 340 KV under maximum LOCA loading with load shedding initiated. The 340 KV switchyard voltage is the minimum switchyard voltage expected after a trip.

The degraded voltage alarm relay is also being used to enable load shedding on the safety related buses. The proposed degraded voltage alarm setpoint of 3959V, with a tolerance of $\pm 0.5\%$, yields 3939V as the lowest allowed alarm setpoint. This setpoint provides adequate margin over the minimum bus voltage which assures the adequacy of the 480V power supply. The corrected degraded voltage alarm setpoint calculation indicated that, with worse case LOCA loading conditions, but without load shedding initiated, a 480V bus voltage of 434V will result when there is 3939V on the 4KV bus. Therefore, if 4KV bus voltage drops below the lowest allowed alarm setpoint, load shedding must be initiated to assure the adequacy of the 480 V power supply when a signal indicating a LOCA is received.

Attachment A to BECo Letter 88-102

During conditions when the plant is being supplied from the startup transformer, and supply voltage remains below the degraded voltage trip setpoint for longer than 9.2 seconds; 1) the startup transformer supply breakers for both safety related 4160V buses are opened, 2) the safety-related buses are deenergized, and 3) the diesel generators are started. Ten seconds after the bus is deenergized, if the diesel generator is within acceptable speed and voltage, the diesel supply breaker closes to supply its safety-related buses. Required safety-related equipment will then sequence onto the diesels. Conversely, during conditions where the plant is being supplied from the startup transformer, and supply voltage does not remain below the degraded voltage setpoint for longer than 9.2 seconds, the 4160V safety-related buses remain energized from the startup transformer at the voltage the startup transformer is supplying. This voltage may be only slightly above the degraded voltage setpoint; however, with the existing 3745V setpoint, safety-related end devices will not have adequate voltage to operate properly. The degraded voltage setpoints are, therefore, being raised to assure the supply voltage to safety-related equipment remains adequate under this operating condition.

During conditions where the plant is being supplied from the startup transformer and the supply voltage remains below the alarm setpoint for 9.2 seconds an alarm will result. In addition, alarm relay contacts in the load shed logic will close providing a permissive for load shedding if a LOCA occurs.

Coincident with the proposed setpoint changes, we are performing the following modifications under 10CFR50.59:

1. Installation of new degraded voltage relays with improved sensitivity (pick-up to drop-out ratio) to accommodate higher trip and alarm setpoints. Except for the use of the alarm relay contacts in the load shed logic, the new relays will use the same wiring to perform the same function as original design.
2. Change to the load shedding logic that would activate the same load shedding sequence for LOCA conditions when on the startup transformer as when on the diesel generator (existing design). This load shedding, when initiated by a LOCA signal, will occur only when the EPDS voltage is below the degraded voltage alarm setting (nominal 3959 V \pm 0.5%).

In addition to the logic changes, we have provided the following:

- A. Addition of load shedding alarms for improved operator information.
 - B. Removal of Feedwater Pump Auxiliary Lube Oil Pump from load shedding under all conditions to improve availability of the Feedwater System.
3. Sequencing of Core Spray and PWR pump motors to prevent large voltage drops during motor starting for all LOCA conditions whether on startup transformer (added) or on the diesel generators or shutdown transformer (existing design).
 4. Relocate the station heating water pumps and station hot water boilers from the safety-related buses to non-safety related buses.

Other technical specification changes being proposed are desired to maintain continuity within the technical specifications. For example, the "Remarks" portion of pages 49 and 53a are similar to the "Bases" sections of Technical Specifications and are provided for operator information. These "Remarks" are being reworded to provide the operators with a more detailed description of the load shedding logic associated with the degraded voltage relays.

Also, the alarm setpoint on page 197, section 3.9.B.6, is being changed to reflect the new setpoint. The remainder of the action statement is unchanged (directing the operator to transfer the safety-related buses to the diesel generators when safety bus voltage drops below the degraded voltage alarm setpoint, but above the degraded voltage trip setpoint). This action allows a conservative range for paralleling the diesel generators to the safety-related 4160V buses when powered from the Unit Auxiliary Transformer to preclude both: a) damaging safety-related equipment by operation under sustained degraded voltage, and b) connecting the diesel generator to a severely degraded electrical power grid system.

Safety Evaluation and Determination of No Significant Hazards Considerations

10CFR50.91 requires that at the time a licensee requests an amendment, it must provide to the Commission its analysis using the standards in 10CFR50.92, to determine no significant hazards considerations. In accordance with 10CFR50.91, we have performed an analysis for the proposed degraded voltage setpoint changes and their effect on the following affected safety systems:

1) Auxiliary Power Distribution System (APDS)

The purpose of the degraded voltage protection relays is to ensure safety-related equipment requiring power from the APDS is supplied sufficient voltage to ensure proper operation and to preclude equipment damage.

If the Startup Transformer secondary voltage drops below the degraded voltage trip setpoint, and stays for more than 9.2 seconds, the safety-related buses will trip and be loaded onto the diesel generators. Also, if the startup transformer secondary voltage drops below the degraded voltage alarm voltage setpoint and stays for more than 9.2 seconds during a LOCA when operating from the startup transformer, the existing diesel generator load shed logic will be initiated. This will reduce station loading sufficiently to maintain acceptable 480 volt bus voltage down to the degraded voltage trip setpoint discussed above. The 9.2 second time delay for the alarm relays are the same as the trip relays.

The 9.2 second time delay on the trip and alarm relays has not been changed. Since only the voltage setpoints and associated tolerances of the relays are being changed, the response of the degraded voltage relays to degraded voltage is essentially unchanged from the original design.

Initiation of load shed logic when operating on the startup transformer when the 4KV bus voltage is below the alarm setpoint trips non-essential loads and sequences the restart of safety-related loads required to mitigate the consequences of a LOCA. Initiation of load

shedding when on the diesel generator or shutdown transformer is included in the existing design basis. Therefore, the safety performance of the APDS is not reduced.

Raising the degraded voltage setpoints and using tighter, more conservative setpoint tolerances does not affect the operation of safety-related equipment as relied upon in the accident analysis other than its initiation at a higher voltage which ensures the voltage at the safety-related devices continues to be maintained above the voltage where proper operation can be assured.

2) Standby AC Power Source (Diesel Generators)

The degraded voltage trip signal will start both Diesel Generators after the Startup and Unit Auxiliary supply breakers to A5 and A6 are opened.

An analysis was performed to determine the probability of Pilgrim experiencing a sustained degraded voltage condition. The study identified an approximate 4% probability that grid voltage could degrade to below 340KV, with an expected duration of 2.7 hours, thus leading to an automatic diesel start. This event assumes that a number of major generators on the grid, as well as Pilgrim, are off the line due to forced outages. Assuming 1988 peak loading conditions, this is equivalent to about one additional automatic diesel start in 25 years.

Another condition analyzed was if the regional electric power pool alerted Boston Edison of an existing grid condition where the 345KV line could drop below 340KV if Pilgrim were to experience a forced outage. To preclude this occurrence, when notified we would use existing station procedures to manually start and maintain the diesels in standby. The probability of a precautionary start of Pilgrim's diesels is about one additional start every four years.

Weighing the negligible impact of diesel generator start on diesel generator availability against the negative impact of degraded voltage on safety-related components, we conclude overall plant safety is not significantly impacted by raising the degraded voltage trip and alarm setpoints.

3) Core Spray System (CSS)

The Core Spray pump time delay of 1/3rd second, imposed when the CSS is powered by the diesel generators or shutdown transformer, is now imposed when the system is on the startup transformer. Therefore, the 1/3rd second time delay will be initiated on any automatic pump start.

This modification is being made to support the revised degraded voltage setpoints. As this time delay of 1/3rd seconds is the same as that assumed in the LOCA analysis for operation of the Core Spray System from the diesel generators or shutdown transformer, the safety performance of the Core Spray System is not affected.

4) Residual Heat Removal (RHR)

A 5 second time delay will be imposed on any automatic start of A&B RHR pumps and a 10 second time delay will be imposed on any automatic start of C&D RHR pumps.

This modification is being made to support the revised degraded voltage setpoints. As these delays of 5 seconds and 10 seconds are the same as those currently assumed in the LOCA analysis for operation of the RHR System from the diesel generators or shutdown transformer, the safety performance of the RHR system is not affected.

In summary, this proposed amendment does not create a significant hazards consideration because:

1. The proposed amendment will not involve a significant increase in the probability or consequences of an accident previously evaluated. Raising the degraded voltage setpoints does not affect the operation of equipment relied on in the accident analysis because the voltage at the safety-related devices continues to be maintained above the voltage where proper operation can be assured.

The proposed changes are being made to maintain the existing protection provided by the degraded voltage protection relays. Previously evaluated performance of safety systems will not be degraded by raising the degraded voltage trip and alarm setpoints.

2. The proposed amendment will not create the possibility of a new or different kind of accident from any accident previously evaluated. It is concluded from the above system evaluations that the proposed degraded voltage setpoints do not change any accident analyses previously evaluated for the affected systems. Safety-related equipment continues to be provided adequate voltage to perform their intended safety functions.
3. The proposed amendment will not involve a significant reduction in the margin of safety. For the reasons stated in one and two above and in the individual systems analyses in this section, it is concluded that the proposed changes do not alter or remove other existing technical specifications and do not reduce the margin of safety for equipment relied on in the accident analysis.

This change has been reviewed and recommended for approval by the Operations Review Committee, and reviewed by the Nuclear Safety Review and Audit Committee.

Schedule of Change

This change will be put into effect upon receipt of approval by the NRC.