Public Service
Electric and Gas
Company

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July 9, 1987

NLR-N87118

United States Nuclear Regulatory Commission
Document Control Desk
Washington, DC 20555

Gentlemen:

REQUEST FOR LICENSE AMENDMENT
FACILITY OPERATING LICENSE DPR-70 AND DPR-75
SALEM GENERATING STATION - UNIT NOS. 1 AND 2

In accordance with the Atomic Energy Act of 1954, as amended, and the regulations thereunder, we hereby transmit our request for amendment and our analyses of the changes to Facility Operating Licenses DPR-70 and DPR-75 for the Salem Generating Station Unit Nos. 1 and 2, respectively.

This amendment consists of revised channel descriptions and relay setpoints for the Second Level Undervoltage Protection System. These changes are necessary to support implementation of final corrective actions developed by Public Service Electric and Gas Company subsequent to the August 26, 1986, false loss of offsite power at Salem Unit No. 2. A check in the amount of $150.00 is enclosed as required by 10 CFR 170.21.

Pursuant to the requirements of 10 CFR 50.91, a copy of this request for Amendment has been sent to the State of New Jersey, Department of Environmental Protection. This submittal consists of one (1) signed original and thirty-seven (37) copies.

Should there be any questions regarding this matter, please feel free to contact us.

Sincerely,

Attachment

A001
1/1

Rec'd w/check $150.00

C Mr. D. C. Fischer
USNRC Licensing Project Manager

Mr. T. J. Kenny
USNRC Senior Resident Inspector

Mr. D. M. Scott, Chief
Bureau of Nuclear Engineering
Department of Environmental Protection
380 Scotch Road
Trenton, NJ 08628

Ref: SGS LCR 87-06

STATE OF NEW JERSEY)
) SS.
COUNTY OF SALEM)

Corbin A. McNeill, being duly sworn according to law deposes and says:

I am Senior Vice President of Public Service Electric and Gas Company, and as such, I find the matters set forth in our letter dated July 9, 1987 , concerning Salem Generating Station License Change Request 87-06, are true to the best of my knowledge, information and belief.

Subscribed and Sworn to before me
this 9th day of July, 1987

Notary Public of New Jersey

LARAINE Y. BEARD
Notary Public of New Jersey
My Commission Expires May 1, 1991

My Commission expires on _____

SECOND LEVEL UNDERVOLTAGE PROTECTION SYSTEM

LICENSE CHANGE REQUEST 87-06

DESCRIPTION

1. Change Item 7 of Table 3.3-3 as indicated in Attachment 1.

2. Change Item 7 of Table 3.3-4 as indicated in Attachment 2.

REASON FOR CHANGE

Table 3.3-3 Item 7.a

This item is being revised to be consistent with the channel description format used for other items in this Table. This is an editorial change only. No modification is being made to the primary undervoltage protection system.

Table 3.3-3 Item 7.b

The second level undervoltage protection system is being redesigned as a result of an event which occurred at Salem Unit No. 2 on August 26, 1986. Immediately following a reactor trip with safety injection, the Unit 2 vital buses began flip-flopping between the No. 21 and 22 Station Power Transformers (SPT) (preferred source of power) until they eventually separated from the offsite power system. The present design provides for the transfer of a vital bus to the alternate SPT whenever the secondary voltage for its designated SPT drops below 91% of rated bus voltage for greater than 10 seconds. This function is controlled by 2 relays on each vital bus. These relays are positioned such that they monitor the secondary voltage of each of the SPT (1 per SPT). In addition to initiating the transfer function these relays provide a transfer permissive signal such that a vital bus can not be transferred unless the alternate SPT has an acceptable secondary voltage. A separate relay monitors vital bus voltage and provides an input to each of the three Safeguards Equipment Controllers (SEC) such that, for a sustained degraded voltage (<91% for >13 seconds) condition on 2 out of 3 vital buses, all vital buses are separated from the offsite source and sequenced onto the emergency source.

This design is unacceptable for the following reasons: 1) the potential exists for damaging safety related motors as a result of frequent starts during flip-flopping of the vital buses between the SPTs, and 2) General Design Criterion (GDC) 17 requires that the connection between the offsite and onsite power systems be maintained for all expected transients.

As redesigned, the transfer function will be eliminated. The existing transfer relays will be replaced with relays of similar design but with improved setpoint drift characteristics. These new relays (2 per bus) would be connected to operate in parallel with the present vital bus degraded voltage relay. The present vital bus degraded voltage relay will also be replaced with an upgraded relay. The interface with the SEC would then be reconfigured from its present 2 out of 3 bus design to a 2 out of 3 relay per bus design. A failure analysis (Attachment 3) has been completed for each component in the system and demonstrates that no single failure will result in the creation of an unanalyzed condition. The new configuration: 1) eliminates the possibility of vital bus flip-flopping, 2) provides for the separation of the vital buses from the preferred source on an individual basis only, and 3) satisfies GDC 17 relative to maintaining the connection between the offsite source and the onsite distribution system, as clarified in the following paragraphs.

For this configuration, two situations exist whereby a single vital bus could be separated from its offsite source (SPT) when the offsite source is operating within expected limits. The first case occurs as a result of a failure of the relay providing the No. 1 input to the affected SEC, coincident with a LOCA signal. This is judged to be acceptable on the following bases: 1) the affected vital bus is automatically loaded onto its emergency source and is available for accident mitigation, 2) the separation occurs only as a result of a failure of the relay providing the No. 1 input to the SEC, and 3) this feature exists as part of the original system design.

The second case occurs as a result of a postulated malfunction of a single SPT such that its secondary output is less than the setpoint of the second level undervoltage system but greater than the setpoint of the primary undervoltage system. This unlikely condition would have to occur for the SPT which is supplying power to two of the three vital buses. For this scenario, the second level undervoltage system would operate as designed such that after 13 seconds the affected buses would be separated from the offsite source and loaded onto the emergency source.

However, sufficient time exists (≈10 seconds) between the separation from the preferred source and the sequencing of the bus onto the emergency source, to allow the operation of the primary undervoltage system. The primary undervoltage system would sense a loss of power to the affected buses and, upon completion of its 2 out of 3 bus logic, cause the remaining vital bus (supplied from the alternate SPT) to be separated from the preferred source. This condition has been evaluated and found to be acceptable for the following reasons:

1) Expected failure mechanisms for this type of transformer generally result in complete loss of secondary voltage.

2) The scenario described above only occurs when two vital buses are being supplied power by the affected transformer. As only one of the two SPTs per unit can be loaded in such a fashion, the probability of an invalid separation occurring is further reduced.

3) In the unlikely event that this condition should occur, the bus which is separated from the functioning SPT is loaded onto its emergency source, thereby ensuring its availability in the event of an accident.

It should also be noted that the same scenario would occur if the PSE&G bulk power system is operating below expected limits. However, separation from the offsite source is allowable for this condition.

In addition to the single bus undervoltage feature previously discussed, the Reactor Coolant Pump (RCP) bypass permissive feature is also being retained from the original system design. This feature temporarily bypasses the degraded voltage protection circuitry to allow the starting of a RCP.

Table 3.3-4 Item 7.b

This table is being revised to: 1) incorporate the revised trip setpoint for the second level undervoltage protection relays, and 2) to correct the allowable value for second level undervoltage protection. The present Technical Specification allowable value for second level undervoltage protection is in error as it does not reflect an allowance for line loss due to cable length (≈0.7%). However, the present trip setpoint for the second level undervoltage protection system (≥91%) provides sufficient margin to account for these losses.

The new trip setpoint of ≥91.6% is based on the results of detailed analyses of the Salem Generating Station electrical distribution system transient response characteristics. Those analyses indicate that, at the PSE&G bulk power system minimum expected value of 505 kv and for a LOCA on one Salem Unit and a concurrent orderly shutdown of the other Unit, vital bus voltage will recover to a worse case value of ≈92.9%. The minimum allowable trip value and trip setpoint are derived using the 90% minimum motor terminal voltage requirement as a starting point, and then applying appropriate allowances as required by R.G. 1.105.

SIGNIFICANT HAZARDS DETERMINATION

1) The proposed changes do not involve a significant increase in the probability of occurrence or consequences of an accident previously evaluated. The failure analysis provided in Attachment 3 demonstrates that no single failure results in the existence of an unanalyzed condition. Additionally, the second level undervoltaqe protection system does not provide an input to the Reactor Protection System nor can it cause any one of the incoming 500 Kv sources to be isolated from the Salem Station electrical distribution system. All equipment used in the system will be seismically qualified. Therefore, the probability of occurrence of an accident remains unchanged.

   The second level undervoltage system is required to protect against those events (e.g. bulk power system degradation) which result in a degraded voltage at the vital buses but which do not result in a complete loss of voltage. The modified system continues to satisfy this requirement as previously discussed. Additionally, by eliminating the ability to transfer between SPTs, the potential for damage to safety related motors from frequent starts is eliminated. The increased redundancy in the SEC logic inputs provides greater assurance that the system will perform its intended function. Therefore, the consequences of previously analyzed accidents remain unchanged.

2) The proposed changes do not create the possibility of a new or different kind of accident from any accident previously evaluated. As demonstrated in Attachment 3, no single failure will result in the existence of an unanalyzed condition. The second level undervoltage system does not provide any input to the Reactor Protection System nor can it cause any one of the incoming 500 KV sources to be isolated from the Salem Station electrical distribution system. The modified design eliminates the possibility of flip-flopping of the vital buses between offsite power

sources and thereby assures the availability of all safety related equipment.

3) The proposed changes do not involve a significant reduction in a margin of safety. The changes to the second level undervoltage system maintain the existing margin of safety by eliminating the transfer between offsite sources, thereby assuring that the integrity of safety related electrical equipment is maintained. The additional redundancy provided in the revised design enhances the overall reliability of the system and further assures that the system function will be completed.

The Commission has provided guidance concerning the application of the standards for determining whether a significant hazards consideration exists by providing certain examples (51 FR 7744) of amendments that are not likely to involve significant hazards consideration. The changes to Table 3.3-3 item 7.a are editorial in nature and are made to be consistent with the notation used for Item 7.b and in other sections of the Table. The change to Table 3.3-4, Item 7.b, ALLOWABLE VALUE, is to correct an existing error in the Technical Specifications. As such, these changes are similar to example 2.e(i) contained in the guidance provided. The changes to Table 3.3-4 item 7.b are similar to those described in example 2.e(ii) in that the new TRIP SETPOINT constitutes a more restrictive requirement than previously included in the Technical Specifications. The changes to Table 3.3-3, Item 7.b do not conform to any example cited in the guidance, however; these changes have been demonstrated to meet the screening criteria of 10 CFR 50.92. It is therefore concluded that these changes also <u>do not</u> involve a significant hazards consideration.