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United Stated Nuclear Regulatory Commission
ATTENTION: Document Con rol Desk
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BRUNSWICK STEAM ELECTRIC PLANT, UNIT NOS. 1 AND 2
DOCKET NOS. 50-325 & 50-324/LICENSE NOS. DPR-71 & DPR-62
SUPPLEMENTAL RESPONSE TO STATION BLACKOUT RULE

Gentlemen:

On March 3, 1989, Carolina Power & Light Company (CP&L) submitted a response to the Station Blackout (SBO) Rule (10CFR50.63) based on the guidelines provided in NUMARC 87-00, "Guidelines and Technical Bases for NUMARC Initiatives Addressing Station Blackout at Light Water Reactors." Representatives from the NRC Staff conducted a review of the background documents which supported the rule response during a visit to our facilities from June 27 to June 30, 1989. Based on the information exchanged during the review discussions, CP&L submitted a revised response to the SBO Rule on October 10, 1989. On January 4, 1990 NUMARC issued a letter requesting each utility to supplement the SBO submittals to the NRC with a letter indicating that either the previous response was based on use of the NUMARC 87-00 guidance, including the clarifications in the attachment to the January 4, 1990 NUMARC letter, or any deviation from the accepted NUMARC 87-00 guidance has been or will be clearly indicated. Carolina Power & Light Company has reviewed the January 4, 1990 NUMARC letter and our previous responses to the SBO Rule for the Brunswick Steam Electric Plant, Unit Nos. 1 & 2 (BSEP). Based on our review, one change to the coping assessment calculation was necessary and deviations from the NUMARC 87-00 methodology were identified. The results of the review are detailed below.

1. Change to Coping Assessment Calculation

   Condensate Inventory For Decay Heat Removal - Based on the additional clarification provided in the NUMARC letter, the maximum condensate inventory was recalculated for the four hour coping period using an 18 gpm leak rate for both recirculation pumps. The previous calculation assumed a 25 gpm leak rate since there was no specific guidance provided for BWR recirculation pumps. The recalculated maximum inventory requirement is less than 98,000 gallons. The BSEP Technical Specification condensate storage tank minimum inventory reserved for HPCI/RCIC operation is 103,738 gallons.

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2. Deviations from NUMARC 87-00 Guidelines and Methods

Loss of Ventilation Assessment Methodology: Average Wall Temperature - The Control Room heatup calculation previously performed used the inner wall temperature to determine the temperature rise. This was based on CP&L's interpretation of the NUMARC 87-00 approach as presented in Appendix E of NUMARC 87-00. Based on the clarification provided in question 2.5 of the NUMARC January 4, 1990 letter, CP&L's previous calculation now constitutes a deviation to the NUMARC 87-00 methodology. However, CP&L believes that our calculation remains valid for the reasons described below.

The compartment heatup model derived in Appendix E of NUMARC 87-00 considers two heat loss paths for determining the bulk air temperature: (1) heat loss by convection through open doors in the compartment, and (2) heat loss to the walls. For the BSEP Control Room, no openings in the compartment were considered. For the heat loss to the walls, NUMARC 87-00 conservatively represents the heat loss as being equal to the natural convection coefficient between the air and the wall. This is a reasonable approach since a transient analysis of a concrete surface would show that the concrete would allow a much higher heat flux than can be transferred between the air and the surface. Therefore, for a short-term transient analysis, the natural convection coefficient becomes the limiting heat loss mechanism. NUMARC 87-00 utilizes the Churchill and Chu correlation for establishing the free convection, which is based on the temperature difference between the air and the wall surface as defined by the Rayleigh number (Equation E-10 in NUMARC 87-00).

The above approach can be applied to transient analysis provided the wall has a high heat capacity (i.e., the surface temperature of the wall does not significantly rise over the duration of the analysis). This constraint applies regardless of the initial temperature profile through the wall. Temperature rise of the BSEP Control Room is not a concern due to the high heat capacity of the wall (24" thick concrete) in relationship to the duration of the analysis (1 hour). The control room wall could have a temperature gradient of approximately $1^{o}F$ per inch (with the surface being close to the initial room temperature) which will have a negligible effect on the heat transferred to the surfaces with a bulk air temperature rise of $42^{o}F$ over 1 hour.

In addition, the control room heatup calculation deviated from the NUMARC 87-00 calculational method in that the calculational approach generally followed the NUMARC 87-00 guidelines, except credit was taken for the heat absorption capacity of the electrical equipment cabinet surface steel.

In summary, the Company believes that the analysis performed for the control room is generally in accordance with the basis of the NUMARC 87-00 approach. The control room heatup calculation was reviewed by representatives from the NRC Staff during their visit to our facilities from June 27 to June 30, 1989.

Loss of Ventilation Assessment Methodology: Potential Dominant Areas of Concern - To document engineering judgement, heatup calculations were also performed for areas that had a potentially significant heat source. Heatup calculations for the four-hour coping period were performed for the service water pump area and the diesel generator building 480V switchgear rooms. The final temperature in the service water pump area was less than 130°F and less than 120°F in the 480V switchgear rooms, so they were judged not to be dominant areas of concern because SBO related equipment can operate in temperatures greater than 160°F.

3. Emergency Diesel Generator (EDG) Target Reliability

A target EDG reliability of 0.975 was selected for use in the evaluations based on the performance of the plant's EDGs. It is CP&L's understanding that this target reliability is to be maintained consistent with the final resolution of Generic Issue B-56.

In summary, Carolina Power & Light Company's previous SBO submittals for BSEP, as modified by this letter, are based on the guidelines provided in NUMARC 87-00 and the clarifications issued by NUMARC on January 4, 1990. Applicability of the NUMARC 87-00 assumptions is documented in our files.

If you should have any questions, please contact Mr. S. D. Floyd at (919) 546-6901.

Very truly yours,

A. B Cutter

JCP/dsm (659ECC)

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