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March 30, 1990

U. S. Nuclear Regulatory Commission
Washington, DC 20555

ATTENTION: Document Control Desk

SUBJECT: Calvert Cliffs Nuclear Power Plant
Unit Nos. 1 & 2; Docket Nos. 50-317 & 50-318
Supplemental Station Blackout Submittal

REFERENCES: (a) Letter from G. C. Creel (BG&E) to Document Control Desk dated April 14, 1989, Response to Station Blackout Rule: 10 CFR 50.63

(b) Letter from B. Lee (NUMARC) to NUMARC Board of Directors, dated January 4, 1990, Station Blackout Implementation: Request for Supplemental SBO Submittal to NRC

Gentlemen:

Reference (a) provided our response to the station blackout rule (10 CFR 50.63). In that response we indicated that we had followed NUMARC-87-00 methodology to determine our coping category and verify plant response to a station blackout (SBO) event. As required by Reference (b), we have reviewed our original response and have determined that some clarification of our original submittal is required. Attached is the clarification.

Should you have any further questions regarding this matter, we will be pleased to discuss them with you.

Very truly yours,

GCC/PSF/db

Attachment

Cert. #P483302651

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cc: D. A. Brune, Esquire
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ATTACHMENT (1)

GENERAL APPROACH

The current approach to station blackout (SBO) requires that the facility be able to cope with a loss of AC power for 4 hours. Both units are assumed to have a loss of AC power for 4 hours and, as described in Reference (a), are capable of coping with this loss. A major plant modification is being implemented which will change the method of coping with a SBO event. A project has been initiated to add two additional Class 1E emergency diesel generators (EDG) to the three existing EDGs. These will be fully functional as safety-related accident response diesels. In addition, one of the existing diesels will be modified to meet all of the criteria for an alternate AC power source for SBO. The addition of these diesels will reduce our coping category from 4 hours to 1 hour when the fifth diesel is available as an alternate AC source. When the AAC source is not available (i.e., when aligned as an auto-start 1E diesel) the coping category would be 4 hours. The size and scope of the project has resulted in a schedule of approximately 5 years duration before the diesels are considered operable. A more complete schedule will be provided after issuance of the SBO Safety Evaluation Report by the NRC.

ALTERNATE CALCULATIONAL METHODOLOGIES

The majority of the analysis follows the guidelines of NUMARC 87-00 and the supplemental NUMARC guidance. There are some areas where alternate methodologies were used because a) the NUMARC assumptions were not valid for Calvert Cliffs, b) NUMARC data was different from plant specific data, c) NUMARC assumptions were not considered conservative from a nuclear safety standpoint, or d) the NUMARC method was overly conservative and would have caused costly and unnecessary modifications. Detail about these cases is given below:

1. All rooms containing SBO equipment required for the coping duration, which had significant heat sources, were evaluated as though they were "dominant areas of concern" (DACs). The heat sources were determined and the four hour temperature was calculated. Operability of equipment was then verified. NUMARC 87-00 only required the AFW pump rooms to be so evaluated.

2. The snowfall value of 9 inches per year contained in NUMARC 87-00 Table 3-3 did not match site specific data. A value of 15 inches was used for the site based on historical data from a nearby weather station.

   The tornado probability for the site was determined from an analysis by the National Severe Storms Forecast Center. A higher probability of 0.00000827 was used in lieu of the NUMARC valve of 0.0000077.

   The 75 to 124 mph storm probability of 0.062 per year contained in NUMARC 87-00 Table 3-3 did not match site specific data. A value of 0.1316 was used for the site based on historical wind data from a nearby weather station.

3. The design margin applied in two of the four battery capacity calculations was 5% in lieu of the 10% to 15% recommended in IEEE 485. This was considered acceptable because of the accuracy of the method used to determine the battery load.

4. The power operated relief valves (PORVs) and their associated blocking MOVs will be modified so that they can be powered from the vital DC system instead of the present design which requires AC power from the diesels. If the pressure transient following the unit trip causes relief valves on the primary system to operate, PORVs (which have blocking MOVs) will lift instead of the code safety valves (which have no blocking MOVs). Potential leakage due to a valve not reseating can then be isolated. This modification was not required by the NUMARC guidance because all relief valves are assumed to operate and reseat properly. Since there have been cases in the industry of relief valves not reseating and there is no method of making up primary inventory during a blackout, it was considered conservative to make this modification.

5. Detailed room heat up calculations were performed for nine different areas of the plant. In four of these (main steam penetration room, east piping penetration rooms, 27' switchgear rooms, and 45' switchgear rooms) the NUMARC methodology was generally followed. In two cases (cable spreading rooms, and Containments), alternative methods were used to calculate room temperatures. This was necessary to model time dependent heat sources and, in the case of the containment, to model the steel liner. For the remaining three cases (control room, data acquisition rooms, and auxiliary feedwater pump rooms), a modified NUMARC method was used. This was necessary because large portions of the walls were not poured concrete, or were much thicker than 8 inches, or insulated pipes had to be modeled. Detailed justifications are available for this modified method.

VERIFICATION OF ASSUMPTIONS

Assumptions are addressed in the Calvert Cliffs Nuclear Power Plant Station Blackout Analysis. The major assumptions given in Reference (b) are listed below along with a brief statement describing our position.

1. Restoration of AC power after the blackout was assumed to be from an onsite diesel. This was because restoration could take well in excess of the four hour coping duration for major grid blackouts. In support of this assumption, battery load studies considered all equipment necessary to start a diesel and close the appropriate breakers. This DC load included diesel field flashing, switchgear closing coils and charging motors.

2. Documentation exists to show that expected RCP seal leakage will be well below 25 gpm. However, 25 gpm was used in the primary system inventory calculation.

3. A room heat up calculation was performed for the containments and the main steam piping penetration rooms to verify the temperatures did not exceed LOCA/HELB profiles. In the containment, RCS leakage was considered as a heat source.

   Where possible, wall temperature measurements were used to determine initial room conditions for heat up analysis. In some cases, operator temperature logs were researched. In a few other cases, estimates were made based on environmental qualification information and the FSAR.

Walls with an initial temperature gradient between the two surfaces were given special treatment. For some, the average was used for input into the NUMARC methodology. In cases where the thickness substantially exceeds eight inches, only a partial average was determined to be needed.

To make a large enough heat sink available in the main control room, portions of the drop ceiling will be permanently opened up. Procedurally opening the ceiling at the onset of a blackout was considered impractical.

Additionally analyses were performed to justify taking partial credit for filled concrete block walls in some rooms as heat sinks.

The only room doors to be opened are for the auxiliary feedwater pump rooms. These open into the turbine building which is both large and cooler than the auxiliary feedwater pump room and is considered an acceptable heat sink.

4. Minimum battery room temperatures were used to calculate battery capacities. A modification to the battery room HVAC system will be made to assure the temperature will not fall below this minimum.

MODIFICATIONS REQUIRED

Other than the addition of two EDGs, several modifications are required to ensure the units can cope with a SBO for 4 hours. These modifications are:

- o repower the PORVs from the batteries
- o repower the PORV block valves from the batteries
- o repower one channel of the Reactor Vessel Level Monitoring System from the batteries
- o open up 30% of the control room drop ceiling
- o repower various control room indicator lights from the batteries

A schedule for completion of these modifications will be provided after issuance of the SBO SER by the NRC.

EDG RELIABILITY PROGRAM

The target reliability chosen for our EDGs is 0.975. Reliability is tracked and will be maintained. The NUMARC Board of Directors approved an initiative which provides guidance for determining when the EDG reliability is not met and considerations for re-establishing the target reliability. The NUMARC guidance will be evaluated along with the proposed revision to Regulatory Guide 1.9 to ensure that the EDG reliability targets are met.