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

Subject: Virgil C. Summer Nuclear Station
Docket No. 50/395
Operating License No. NPF-12
Station Blackout

Gentlemen:

On July 21, 1988, the Nuclear Regulatory Commission (NRC) amended its regulations in 10CFR, Part 50. A new section, 50.63, was added which requires that each light-water-cooled nuclear power plant be able to withstand and recover from a station blackout (SBO) of a specified duration. Utilities are expected to have the baseline assumptions, analyses and related information used in their coping evaluation available for NRC review. It also identifies the factors that must be considered in specifying the SBO duration. Section 50.63 requires that, for the SBO duration, the plant be capable of maintaining core cooling and appropriate containment integrity. Section 50.63 further requires that each licensee submit the following information:

1. A proposed SBO duration including a justification for the selection based on the redundancy and reliability of the onsite emergency AC power sources, the expected frequency of loss of offsite power, and the probable time needed to restore offsite power;
2. A description of the procedures that will be implemented for SBO events for the duration (as determined in 1 above) and for recovery therefrom; and
3. A list and proposed schedule for any needed modifications to equipment and associated procedures necessary for the specified SBO duration.

The NRC has issued Regulatory Guide 1.155, "Station Blackout," which describes a means acceptable to the NRC Staff for meeting the requirements of 10CFR 50.63. Regulatory Guide (RG) 1.155 states that the NRC Staff has determined that NUMARC 87-00, "Guidelines and Technical Bases for NUMARC Initiatives Addressing Station Blackout At Light Water Reactors," also provides guidance that is in large part identical to the RG 1.155 guidance and is acceptable to the NRC Staff for meeting these requirements.

Table 1 to RG 1.155 provides a cross-reference between RG 1.155 and NUMARC 87-00 and notes where the RG takes precedence.

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South Carolina Electric & Gas Company (SCE&G) has evaluated the Virgil C. Summer Nuclear Station against the requirements of the SBO rule using guidance from NUMARC 87-00 except where RG 1.155 takes precedence. The results of this evaluation are detailed below.

A. Proposed Station Blackout Duration

NUMARC 87-00, Section 3 was used to determine a proposed SBO duration of 4 hours. No modifications were required to attain this proposed coping duration category.

The following plant factors were identified in determining the proposed SBO duration:

1. AC Power Design Characteristic Group is P1 based on:
 - a. Expected frequency of grid-related loss-of-offsite-power (LOOP) does not exceed once per 20 years;
 - b. Estimated frequency of LOOP due to extremely severe weather (ESW) places the plant in ESW Group 3;
 - c. Estimated frequency of LOOP due to severe weather (SW) places the plant in SW Group 1;
 - d. The offsite power system is in the I1/2 Group.
2. The Emergency AC Power Configuration Group is C based on:
 - a. There are two emergency AC power supplies not credited as alternate AC power sources;
 - b. One emergency AC power supply is necessary to operate safe shutdown equipment following a LOOP.
3. The target emergency diesel generator (EDG) reliability is 0.95.
 - a. A target EDG reliability of 0.95 was selected based on having a nuclear unit average EDG reliability for the last 100 demands greater than 0.95; consistent with NUMARC 87-00, Section 3.2.4.

B. Procedure Description

Plant procedures have been reviewed and verified to meet the guidelines in NUMARC 87-00, Section 4 in the following areas:

1. AC power restoration per NUMARC 87-00, Section 4.2.2;
 - a. EOP-6.0, "Loss of All AC Power"
 - b. EOP-6.1, "Loss of All AC Power Recovery without SI Required"

- c. EOP-6.2, "Loss of All AC Power Recovery with SI Required"
2. Severe weather per NUMARC 87-00, Section 4.2.3;
 - a. EPP-015, "Natural Emergency (Earthquake, Tornado)"

Plant procedures have been reviewed and changes necessary to meet NUMARC 87-00 will be implemented in the following areas:

1. SBO response per NUMARC 87-00, Section 4.2.1;
2. Procedure changes associated with any modifications required after assessing coping capability per NUMARC 87-00, Section 7.

C. Proposed Modifications and Schedule

The ability of Virgil C. Summer Nuclear Station to cope with a SBO for 4 hours in accordance with NUMARC 87-00, Section 3.2.5 and as determined in Section "A" above, was assessed using NUMARC 87-00, Section 7 with the following results:

1. Condensate Inventory For Decay Heat Removal

It has been determined from Section 7.2.1 of NUMARC 87-00 that 61,604 gallons of water are required for decay heat removal for 4 hours. The minimum permissible condensate storage tank level per technical specifications provides 172,700 gallons of water, which exceeds the required quantity for coping with a 4 hour station blackout.

No plant modifications or procedure changes are needed to utilize these water sources.

2. Class 1E Battery Capacity

A battery capacity calculation has been performed pursuant to NUMARC 87-00, Section 7.2.2 that verifies the Class 1E batteries have sufficient capacity to meet SBO loads for 4 hours assuming loads not needed to cope with a SBO are stripped. However, this option of load stripping to extend battery capacity to meet the 4 hour SBO coping duration requirement is not considered the most prudent method.

The following options to extend the battery capacity to meet a 4 hour SBO coping duration were considered:

1. Replacement of the existing battery with a higher capacity battery.
2. Addition of a dedicated power source to supply power to the battery chargers.

3. Addition of a dedicated battery to be connected when the existing battery is depleted.

SCE&G will be implementing option 2 above.

3. Compressed Air

Air-operated valves relied upon to cope with a SBO for 4 hours can be operated manually. Valves requiring manual operation are identified in plant procedures.

4. Effects of Loss of Ventilation

The calculated steady state ambient air temperature for the turbine driven emergency feedwater pump room (the dominant area of concern for a pressurized water reactor) during a SBO induced loss of ventilation is 144°F.

The assumption in NUMARC 87-00, Section 2.7.1 that the control room will not exceed 120°F during a SBO has been assessed. The control room at Virgil C. Summer Nuclear Station does not exceed 120°F during a SBO.

Areas determined to be dominant areas of concern are listed below:

1. Turbine Driven Emergency Feedwater Pump Room #12-10
2. Main Control Room #63-05
3. Relay Room #36-11
4. Intermediate Building Area #36-02
5. East Penetration Access Area #PAI-36-01
6. West Penetration Access Area #PAA-36-01
7. Reactor Building Area #12-01W
8. Reactor Building Area #12-01SW
10. Reactor Building Area #12-01SE
11. Reactor Building Area #12-03
12. Reactor Building Area #12-07
13. Reactor Building Area #12-08
14. Reactor Building Area #36-01W
15. Reactor Building Area #37-01
16. Reactor Building Area #37-02
17. Reactor Building Area #63-01NNE
18. Reactor Building Area #63-01E
19. Reactor Building Area #63-01S
20. Reactor Building Area #63-01SE
21. Reactor Building Area #63-01W

Reasonable assurance of the operability of SBO response equipment in the above dominant areas of concern has been assessed using Appendix F to NUMARC 87-00 and/or the Topical Report. With the exception of Relay Room #36-11, no modifications or associated procedures are required to provide reasonable assurance for equipment operability. In order to maintain temperatures that assure equipment operability in Relay Room #36-11, EOP-6.0 will be revised to require the opening of the doors from the relay room to the cable chase area and to the turbine building.

5. Containment Isolation

The plant list of containment isolation valves has been reviewed to verify that valves which must be capable of being closed or that must be operated (cycled) under SBO conditions can be positioned (with indication) independent of the preferred and blacked-out unit's Class 1E power supplies. No plant modifications and/or associated procedure changes were determined to be required to ensure that appropriate containment integrity can be provided under SBO conditions.

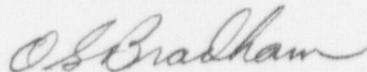
6. Reactor Coolant Inventory

The ability to maintain adequate reactor coolant system inventory to ensure that the core is cooled has been assessed for 4 hours. The generic analyses listed in Section 2.5.2 of NUMARC 87-00 were used for this assessment and are applicable to the specific design of Virgil C. Summer Nuclear Station. The expected rates of reactor coolant inventory loss under SBO conditions do not result in core uncover in a SBO. Therefore, makeup systems are not required to maintain core cooling under natural circulation (including reflux boiling).

The modifications and associated procedure changes identified in Parts A, B and C will be completed within two years after the notification provided by the Director, Office of Nuclear Reactor Regulation in accordance with 10CFR 50.63(c)(3), or no later than the end of the sixth refueling outage, whichever is later. The sixth refueling outage is currently scheduled for the fall of 1991.

Should you have any questions, please call at your convenience.

Very truly yours, ---



O. S. Bradham

MDB/OSB:lcd
Attachment

c: See Page 6

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