



UNITED STATES
NUCLEAR REGULATORY COMMISSION

WASHINGTON, D. C. 20555

SUPPLEMENTAL SAFETY EVALUATION

BY THE OFFICE OF NUCLEAR REACTOR REGULATION

STATION BLACKOUT RULE (10 CFR 50.63)

FLORIDA POWER CORPORATION

CRYSTAL RIVER UNIT 3

DOCKET NO. 50-302

1.0 INTRODUCTION

The NRC staff's Supplemental Safety Evaluation (SSE) of the Florida Power Corporation's (the licensee) response to the NRC staff's initial Safety Evaluation (SE) pertaining to the Station Blackout (SBO) rule, 10 CFR 50.63, was transmitted to the licensee by letter dated May 6, 1991. The staff's SSE found the licensee's proposed method of coping with an SBO to be acceptable except with respect to the emergency diesel generator (EDG) reliability program and loss of ventilation to the control room and to the inverters. The licensee responded to the staff's SSE by letters dated June 13, 1991, July 3, 1991, and October 28, 1991.

2.0 EVALUATION

The licensee's responses to the staff's concerns are evaluated below.

2.1 Emergency Diesel Generator Reliability Program (SSE Section 2.1)

SSE Evaluation: The SSE requested the licensee to state that its EDG reliability program will be in accordance with Regulatory Guide (RG) 1.155, Section 1.2.

Licensee Response: The licensee stated that it has implemented Performance Test PT-354, "EDG Reliability and Unavailability Program," effective January 4, 1991. The program implements elements 1 through 4 of RG 1.155, Section 1.2. Element 5, management oversight, is addressed through management review of corrective action plans following any diesel generator start or load-run failure.

Staff Evaluation: The staff finds that the licensee has adequately addressed this issue regarding the EDG reliability program.

2.2 Class 1E Battery Capacity (SSE Section 2.2)

SSE Evaluation: In the SSE, the staff stated that the licensee should specifically state that the updated battery calculations (load profile) will equal or envelope the load profile imposed by the normal battery-backed plant monitoring and electrical system controls in the control room during the SBO event.

Licensee Response: The licensee stated that the SBO calculation is being updated to reflect the revised coping strategy which FPC will implement following installation of the non-1E battery. This activity is required to demonstrate compliance with 10 CFR 50.63 and FPC's 10 CFR Part 50, Appendix B design control program. The updated battery calculation (load profile) will equal or envelope the load profile imposed by the normal battery-backed plant monitoring and electrical system controls in the control room needed for the SBO event. Some unneeded loads may be manually stripped as allowed by NUMARC 87-00. This manu. stripping (if any) will be reflected in the battery calculations.

Staff Evaluation: Although the licensee has committed to demonstrate the adequacy of the station batteries, it should complete its coping strategy, perform the battery capacity analysis, and take necessary actions to ensure battery capacity adequacy for an SBO event and recovery therefrom. The documentation for this analysis and the actions required should be included with the other documentation to be maintained by the licensee in support of SBO rule implementation for possible future NRC audit.

2.3 Loss of Ventilation (SSE Section 2.4)

2.3.1 Inverter Room:

SSE Evaluation: In the SSE, the staff noted that the licensee stated that the highest expected temperature in the inverter room during an SBO event was 142°F, which was higher than the qualified temperatures (122°F for inverters A, B, C and D; 104°F for inverter E). Accordingly the licensee used an Arrhenius analysis to demonstrate that the inverters would remain operable during a 4-hour duration SBO event. The staff indicated that the Arrhenius analysis was not considered appropriate for assessing the operability of inverters at temperatures substantially above their design or qualified temperature unless substantiated by the test results. The staff was concerned that a sudden failure, not an aging-type failure, would occur for an inverter when it reaches a temperature substantially above its qualified rating. Therefore, the staff recommended that the licensee should provide appropriate cooling to the inverters, or demonstrate by test that the inverters will not fail at the expected temperature plus a reasonable margin.

Licensee Response: The licensee recalculated the inverter room heat-up using an average wall temperature approach to determine an aggregate wall surface temperature, and found the final room temperature to be 138.6°F. To support the operability of the inverters at 138.6°F temperature, the licensee performed an industry search and obtained a copy of a test report for a similar inverter manufactured by the same vendor (Solidstate Controls, Inc.) as the inverter at Crystal River Unit 3 (CR-3). The report documents the successful completion of two tests of 8 hours each at a temperature in excess of the temperature calculated in the most recent revision of the inverter room heat-up calculation. The licensee concluded that the test report is applicable to the CR-3 inverters.

Staff Evaluation: Based on its review and provided that the licensee verifies that the inverter back panel was closed during the test, and that the vintage of the tested inverter is similar to that used at CR-3, the staff agrees with the licensee that the inverters will remain operational during a 4-hour SBO event. Documentation of these matters should be included with the other documentation to be maintained by the licensee in support of SBO rule implementation for possible future NRC audit.

2.3.2 Control Room:

SSE Evaluation: In the SSE, the staff stated that the licensee should take immediate steps to determine how temperature will be maintained at an acceptable level for operators and to assure SBO equipment operability in the control room.

Licensee Response: In its response, the licensee stated that the temperature in the control room will be maintained at an acceptable level for the operators, and to assure SBO equipment operability, by opening the control room doors to allow fresh air from the turbine building to enter, and by removing a limited number of ceiling tiles, allowing greater air circulation within the control room. The requirements for these actions will be incorporated into the SBO procedure.

Staff Evaluation: It appears that the licensee is relying on the natural circulation of air through the door opening to maintain the control room temperature at an acceptable level for both operators and equipment operability. However, the licensee has not provided an analysis to demonstrate that an acceptable temperature level will be achieved even with the doors opened and the ceiling tiles removed. In addition, the licensee has not addressed the procedure which will require the operators to take action within 30 minutes during an SBO event to open instrument cabinet doors per the guidance described in NUMARC 87-00. Therefore, the licensee should perform an analysis and take necessary actions to ensure that acceptable temperature levels will be maintained in the control room during an SBO. The documentation for this analysis and the actions required should be included with the other documentation to be maintained by the licensee in support of SBO rule implementation for possible future NRC audit.

2.4 Reactor Coolant Inventory (SSE Section 2.6)

SSE Evaluation: In the SSE, the staff requested that the licensee provide a copy of the inventory analysis, or a summary of the assumptions used and the results obtained, since this was not available during the staff's original audit.

Licensee Response: The licensee provided a summary and its assumptions and results obtained for its reactor coolant inventory analysis.

Staff Evaluation: The staff finds the licensee's response to be acceptable. The staff's consultant (SAIC) performed an independent analysis and also concluded that there is adequate coolant inventory for the 4-hour SBO event and recovery therefrom. Based on the above, the staff finds this issue has been satisfactorily addressed.

3.0 SUMMARY AND CONCLUSION

The staff has reviewed the licensee's responses to the staff's May 6, 1991, SSE pertaining to the SBO rule (10 CFR 50.63). The staff finds the licensee's responses to be acceptable, but for control room heat-up (Section 2.3.2), Class 1E battery adequacy (Section 2.2), and inverter heat-up (Section 2.3.1), additional analyses and other actions are required to assure complete compliance with the SBO rule, as indicated in the SSE.

This SSE documents the NRC's final regulatory assessment of the licensee's proposed conformance to the SBO rule. No further submittals are required. The staff considers the 2-year clock for implementation of the SBO rule in accordance with 10 CFR 50.63(c)(4), to begin upon receipt of this SSE by the licensee. The licensee should take the necessary actions to address the issues above to assure complete compliance with the SBO rule. The documentation for the analyses and actions required to satisfactorily address these concerns should be included with the other documentation to be maintained by the licensee in support of SBO rule implementation for possible future NRC audit.

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Date:

Attachment:

SAIC-92/6674 "Supplemental Technical Evaluation Report, Crystal River Unit 3, Station Blackout Evaluation," March 17, 1992.