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)

WOLF CREEK NUCLEAR OPERATING CORPORATION

WOLF CREEK GENERATING STATION

DOCKET NO. 50-482

1.0 INTRODUCTION

The NRC staff's safety evaluation (SE) pertaining to the Wolf Creek Nuclear Operating Corporation's (the licensee's) response to the Station Blackout (SBO) Rule, 10 CFR 50.63, was transmitted to the licensee by letter dated January 16, 1992. The staff's SE found the licensee's proposed method of coping with an SBO to be incomplete, and listed several recommendations. The licensee responded to the staff's SE by letter dated March 24, 1992.

The licensee's responses were reviewed by an NRC contractor, Science Applications International Corporation (SAIC), and by the staff. The results of the contractor's review are documented in the attached SAIC Technical Evaluation Report (TER) SAIC-92/6680, "Wolf Creek Generating Station, Station Blackout Evaluation," dated May 8, 1992, (Attachment 1).

2.0 EVALUATION

The licensee's responses to each of the staff's recommendations are evaluated below.

2.1 Station Blackout Duration (SE Section 2.1)

In the SE, the staff noted that the tornado frequency (0.0003282) claimed by the licensee differed from that (0.0003815) presented in NUMARC 87-00. This resulted in a severe weather (SW) classification of "2" based on the licensee's calculation as compared to "3" based on NUMARC 87-00. This in return resulted in a required 0.95 EDG target reliability based on the licensee's calculation as compared to 0.975 based on NUMARC 87-00. Accordingly, the SE recommended the following:

SE Recommendation: For the reasons stated above, the licensee needs to change the EDG reliability target from 0.95 to 0.975 in order to remain a 4-hour SBO coping duration plant. The EDG target reliability change should be included in the documentation supporting the SBO submittals that is to be maintained by

the licensee. Alternatively, the licensee needs to change the coping duration to 8 hours and reevaluate the plant for an 8-hour coping duration.

Licensee Response: The licensee provided for staff review the evaluation documentation based on site specific data from NUREG/CR-4461 and the National Severe Storms Forecast Center. Calculations were made for three regions for comparison purposes. These were for 125 nautical miles around Burlington, for the State of Kansas, and for a 5-degree box centered on 37.5 degrees North and 97.5 degrees West. The highest annual frequency per square mile (0.0003282) of tornadoes with wind speeds equal to more than 123 mph occurred for the 5-degree box. The licensee used this value and (using NUMARC 87-00) calculated an estimated frequency of loss of offsite power equal to 0.00946, and an SW classification of "2."

Staff Evaluation: The staff has reviewed the licensee's calculation and finds it to be acceptable. Therefore, the staff agrees with the licensee's determination that Wolf Creek is a 4-hour coping duration, 0.95 EDG target reliability plant.

2.2 Class 1E Battery Capacity (SE Section 2.2.2)

SE Recommendation: In the SE the staff stated that the licensee should describe the load profile, method, and assumptions (e.g., temperature correction factor, design margin, aging factor) which were used to determine that the battery capacity is adequate for 4 hours. The SE stated that if the calculation package provides this information, the licensee should provide the package for the staff to review.

Licensee Response: The licensee extended the USAR load profile table for Class 1E batteries 1 and 4 and provided the extended table for staff review. The licensee noted that the profile was conservative because certain loads occurring at 139, 199, and 239 minutes would not be expected to occur. For battery sets 1 and 4 (the batteries with the least margin), the calculation shows a 12.8 percent design margin above an 11 percent margin for temperature correction, and a 25 percent margin for aging.

Staff Evaluation: Although the staff does not agree completely with the assumed load profile used in the calculation (see attached TER), the staff finds that the non-conservatisms used are essentially balanced by the conservatisms, such that we can conclude that the batteries are adequate assuming that all SBO loads are included in the calculation and that a minimum battery voltage of 1.75 volts per cell is adequate for the SBO loads.

2.3 Compressed Air (SE Section 2.2.3)

SE Recommendation: In the SE, the staff recommended that the licensee should ensure the habitability of the areas where valves will be manually operated during an SBO event.

Licensee Response: In the response, the licensee indicated that only those safety-related air-operated valves controlling the steam generator atmospheric relief and those controlling the turbine-driven auxiliary feedwater pump discharge are required to remove decay heat during an SBO event. The auxiliary feedwater pump steam supply valves fail open on a loss of air supply, which ensures steam supply to the auxiliary feedwater turbine. The turbine discharge valves and steam generator atmospheric relief valves have a safety-related backup compressed gas supply system available to ensure valve operation for the 4-hour coping duration. Therefore, manual operation of the valves upon loss of the primary air supply during an SBO event is not necessary.

Staff Evaluation: Based on its review, the staff finds the licensee's response acceptable and, therefore, considers this SE issue related to the compressed air system resolved.

2.4 Effects of Loss of Ventilation (SE Section 2.2.4)

Based on the information received, the staff had not been able to conclude that the effects of loss of ventilation during an SBO event at the Wolf Creek plant had been properly evaluated.

SE Recommendation: In the SE, the staff recommended that the licensee should provide the detailed information of the heat-up calculations.

2.4.1 Control Room, Inverter/Switchgear Room(s)

Licensee Response: In the response, the licensee indicated that a calculation (GK-MW-004) was performed to demonstrate that the control room can cope for 4 hours with a loss of HVAC. The equipment and cabinet doors and corridor doors to be opened are included in plant operations procedure EMG C-0 "Loss of All AC Power." The licensee did not address the effects of loss of ventilation in the inverter/switchgear room(s).

Staff Evaluation: The licensee has not provided the detailed information as requested for the heat-up calculation. Based on the information received, the staff has not been able to conclude that the effects of loss of ventilation in the control room, or inverter/switchgear room(s) during an SBO event have been properly evaluated.

The staff considers the two-year clock for implementation of the SBO Rule in accordance with 10 CFR 50.63 (c)(4) to begin upon receipt by the licensee of this SSE. Therefore, the licensee should expeditiously take the necessary actions to resolve this concern to comply with the SBO Rule. The following information and the documentation related to these analyses should be included with the other documentation to be maintained by the licensee in support of the SBO Rule implementation for possible future NRC audit:

A. Compu.. - Code or Methodology

a. A description of the Code or methodology (if NUMARC-87 methodology is not used) including how the heat sinks, structures, etc., were modeled.

b. Document as to whether the above Code or methodology has been verified in some other application or reviewed by some independent group.

B. Analysis

a. The surface area, thickness, initial temperatures, heat transfer coefficients, thermal properties, etc., of each of the heat sinks and structures used in the analysis.

b. The volume of the rooms. For the control room, state the air space above the ceiling, and describe how the air space above the ceiling was treated.

c. The heat loads (i.e., equipment, personnel, lighting, etc.) used in the analysis.

2.4.2 Turbine-Driven Auxiliary Feedwater Pump (AFWP) Room

Licensee Response: In the response, the licensee presented an analysis in detail for the staff to review. The licensee, using the guidance (with the exception for the piping heat generation calculation) described in NUMARC 87-00, performed an analysis to determine the effects of loss of ventilation in the AFWP room during an SBO event. For the piping heat generation calculation, the licensee conservatively assumed twice the heat load provided by the steam piping insulation. The calculated peak AFWP room temperature is 150°F with all corridor doors open. Subsequently, the licensee concluded that the turbine-driven auxiliary feedwater pump will be operable following an SBO event provided all doors in the adjacent corridor are opened.

Staff Evaluation: Based on its review and provided that the licensee will establish a procedure for opening all the doors in the adjacent corridor, the staff finds the above licensee's response acceptable and, therefore, considers the part of the SE issue related to the effects of loss of ventilation in the AFWP room during an SBO event resolved.

2.4.4 Containment

Licensee Response: In the response, the licensee indicated that safety-related equipment in the containment is designed to withstand a loss of coolant accident event which far exceeds containment conditions during an SBO.

Staff Evaluation: The Wolf Creek plant containment is a typical large dry containment. Based on its review of similar large dry containments designed for Westinghouse reactors, the staff agrees with the licensee that the LOCA/MSLB temperature profile at the Wolf Creek plant will bound the temperature profile resulting from a 4-hour SBO event. Therefore, the staff considers the part of this SE issue related to the effects of loss of ventilation in the containment during an SBO event resolved.

2.5 Quality Control And Technical Specifications (SE Section 2.5)

SE Recommendation: In the SE, the staff recommended that the licensee verify that the SBO equipment is covered by an appropriate QA program consistent with the guidance of RG 1.155. This evaluation should be documented as part of the documentation supporting the SBO Rule response.

Licensee Response: The licensee responded that upon identification of any non-safety-related equipment or systems that are required to meet the requirements of 10 CFR 50.63, QA shall develop a Special Scope QA Program to meet the requirements of RG 1.155, Appendix A.

Staff Evaluation: The staff accepts the licensee's commitment to develop a QA program for SBO-related equipment in accordance with RG 1.155, Appendix A. The identified equipment and QA program should be referenced in the documentation to be maintained by the licensee in support of the SBO Rule implementation for possible future NRC audit.

2.6 EDG Reliability Program (SE Section 2.6)

SE Recommendation: In the SE, the staff stated that it is the staff's position that an EDG reliability program should be developed in accordance with the guidance of RG 1.155, Section 1.2. If an EDG reliability program currently exists, the program should be evaluated and adjusted in accordance with RG 1.155. Confirmation that such a program is in place or will be implemented should be included in the documentation that is to be maintained by the licensee in support of the SBO submittals.

Licensee Response: The licensee briefly described its EDG reliability program under administrative procedure ADM 01-244 and stated that the procedure meets the guidance of RG 1.155, Position 1.2.

Staff Evaluation: The staff finds the licensee's response to be acceptable, and considers the EDG reliability program issue resolved.

3.0 SUMMARY AND CONCLUSION

The licensee's March 24, 1992, response to the staff's January 16, 1992, SE was reviewed by an NRC contractor, SAIC, and by the staff. The staff finds the licensee's response to be incomplete. The staff has concerns as to the adequacy of the heat-up analyses in the control room and inverter/switchgear

room(s) during an SBO. The staff's final regulatory assessment of the above issue is documented in this SSE (Section 2.4). Therefore, no further submittals will be required on this issue.

The staff considers the two-year clock for implementation of the SBO Rule in accordance with 10 CFR 50.63(c)(4) to begin upon receipt by the licensee of this SSE. Therefore, the licensee should take the necessary actions to ensure complete compliance with the SBO Rule as indicated in the SE and this SSE. The documentation related to these analyses and actions required should be included with the other documentation to be maintained by the licensee in support of SBO Rule implementation for future NRC audit.

Attachment:
Supplemental TER

Principal Contributor: A. Toalston

Date: June 16, 1992