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

Attention: Mr. R. F. Wunder

Gentlemen:

Subject: VIRGIL C. SUMMER NUCLEAR STATION (VCSNS)
DOCKET NO. 50/395
OPERATING LICENSE NO. NPF-1
SAFETY EVALUATION REPORT ON STATION
BLACKOUT ANALYSIS (REG 880002)

South Carolina Electric & Gas Company has reviewed the Safety Evaluation Report (SER) for VCSNS Station Blackout (SBO), prepared by the NRC staff, and the Technical Evaluation Report (TER), prepared by its contractor, Science Applications International Corporation (SAIC). SCE&G responses to the recommendations presented in the SER are documented in Enclosure 1.

If you have any questions concerning this matter, please contact Mr. Manuel W. Gutierrez at (803)345-4392.

Very truly yours,

J. L. Skolds

John L. Skolds

MWG:JLS:lcd
Enclosure

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RTS (REG 880002)
File (811.05, Reg. Guide 1.155)

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VIRGIL C. SUMMER NUCLEAR STATION
RESPONSE TO NRC'S SAFETY EVALUATION
REPORT ON VCSNS STATION BLACKOUT ANALYSIS

SER Section 2.2.3 - Compressed Air

"Recommendation: The licensee should provide assurance of the habitability in the areas where the above-cited valves are located for the duration of an SBO event." Above-cited valves refers to air operated valves needed for coping with an SBO: Steam Generator Power Operated Relief Valves (SG PORVs) and Emergency Feedwater Control Valves (EFWCVs).

SCE&G Response:

Steam Generator Power Operated Relief Valves

Air operated SG PORVs requiring manual operator action for decay heat removal are located in relatively large areas (east and west penetration access areas and adjacent Intermediate Building). The heat input into these areas is from insulated steam lines and piping accessories attached to these lines. Ventilation systems in these areas have been routinely removed from service to support maintenance activities for periods of time longer than four hours, and operator access to these areas for routine activity has been maintained.

Ambient temperatures for the two relief valves in the penetration access areas have been determined by actual testing as indicated on page 7-26 of VCSNS Station Blackout Evaluation, GAI Report No. 2782. The testing was conducted during normal plant operation by shutting down all ventilation supply and exhaust fans in the area and allowing the temperature to rise. The heat input during normal operation results in higher temperatures than an SBO event due to the increased number of heat sources. The only heat source present during an SBO event is the main steam piping up to the main steam isolation valves. The maximum ambient temperature recorded was 130°F in the east penetration access area, while the west penetration area reached a peak temperature of 120°F in a time period well in excess of six hours.

The third relief valve is contained in an adjoining area of the Intermediate Building, whose volume is bounded by the test area volumes and with a section of main steam pipe providing a heat source whose surface area is bounded by the main steam pipe surface in the test areas. Thus, the test data of page 7-26 is considered to demonstrate habitability for operation.

Emergency Feedwater Control Valves

The three emergency feedwater control valves requiring manual operation during an SBO event are located in an area in the Intermediate Building with a volume at least twice the size of the penetration access areas. The only

heat source in this area during an SaO event is the 4-inch main steam supply line to the emergency feedwater pump turbine.

Therefore, reasonable assurance is provided for access to these areas to perform the required actions in response to an SBO event.

SER Section 2.2.4.1, Control Room and Relay Room

"Recommendation: The licensee should reevaluate the temperature rise in the control room and relay room using conservative initial temperatures, corresponding to the technical specification temperature limit or the maximum values allowed under administrative procedures, and using conservative parameters, as described in the SAIC TER for the heat-up calculations. If the licensee's administrative procedures do not specify an operating temperature limit, the licensee should establish administrative procedures or revise the existing procedures to maintain the control room and relay room temperatures at or below the initial room temperatures used in the heat-up analysis. In addition, the licensee should provide a procedure which will require the operators to open the instrument cabinet doors within 30 minutes following an SBO event in accordance with the guidance described in NUMARC 87-00."

SCE&G Response

Control Room

The most significant heat loads are those associated with inverter and battery backed loads, as identified in Attachment 7 of GAI Report No. 2782. These loads were determined by reviewing existing calculations and load lists along with conservative assumptions, for which rational justification is provided. AC and DC loads were addressed.

The heat load calculation for the control room considers the heat transfer across interfaces (through walls, including gypsum board, false ceilings, etc.). For the adjacent Technical Support Center and offices, it is assumed that no heat flow is transferred through the walls. Since these areas would heat up less rapidly than the control room and any heat flow would be out of the control room, this is conservative.

Operating personnel were not included in the calculation since a staff of eight (8) members under stress condition will generate less than two (2) KW, and the total load generated from energized equipment for the four (4) hour SBO duration was 14.8 KW. The existing calculation for establishing average area ambient conditions within the control room, assuming total loss of power and subsequent loss of HVAC, provides for a total continuous load of 29 KW, which envelopes the additional 2 KW for operating personnel. This load (29 KW) results in a temperature increase to 120°F at the end of four (4) hours following a loss of ac power (reference Sheet 1 of Attachment 7 to GAI Report 2782).

The following initial temperatures were used in the heat up calculation: Control room 75°F, Outside air 107°F, Adjacent rooms 77°F (reference VCSNS/GAI AEA Calculation Code 2.4.8.1).

Redundant air handling units are provided. Each unit is designed to provide full flow tempered air and maintain the control room temperature at 75°F ± 2°F, under worst heat load conditions.

The control room temperature is monitored and recorded once per shift. Review of recorded temperatures indicate that the control room is maintained at less than 75°F greater than 98% of the time.

Equipment and components required for coping with an SBO, located within cabinets in the control room, were evaluated and justification for operability was provided in section 7.2.4.2 of VCSNS Station Blackout Evaluation, GAI Report No. 2792. A listing of the vital components required for coping with an SBO event is provided in the above section and in attachment 7 to section 7 of the same report. Reasonable assurance for operability was addressed based on establishing that the equipment and components were tested and exposed to temperatures equal to or greater than the 120°F calculated ambient room temperature, and were demonstrated to remain operable during or following the test. Main Control Board components were evaluated based on temperatures used during aging tests and SBO operability limits established by Appendix F to NUMARC 87-00. Nuclear instrumentation cabinets and installed components were exposed to two 12-hour temperature cycles of 120°F for a period of 24 hours. Internal temperatures for the nuclear instrumentation cabinets will not exceed the temperature experienced during extreme tests.

Internal temperatures for the main control board were not calculated, but the temperatures to which its Class 1E, SBO required, non-solid state or electronic components were subjected during tests significantly exceeded the 120°F SBO temperature.

The closed door configuration of these cabinets is the seismically qualified configuration.

Relay Room

During our recent refueling outage, RF6, the six Westinghouse 7.5 KVA inverters were replaced with four 10 KVA inverters. Their efficiencies, based on actual load conditions as provided by the vendor, will be used to determine new heat loads. The relay room heat-up calculation is being revised to account for this change. Preliminary evaluation indicates little or no change to the heat load.

The relay room temperature was determined by developing a transient thermal model using the TSAP computer program. The model considers room air conditions, energy addition from equipment, energy flow to and absorption by concrete walls, floors, ceilings, and energy flow to and from adjacent rooms through the wall or natural circulation through an opened door. Heat

transfer across all interfaces (walls, floors, and ceilings) is considered. Wall gradients are calculated based on appropriate boundary temperature before the beginning of the transient. The relay room temperature is initially assumed to be at 77°F. The calculated worst case environmental zone temperature is 74°F. Adjacent areas are initially at 77°F, and the turbine building is held at 104°F.

In order to reduce the relay room ambient temperatures, the area time/temperature calculation took credit for opening doors to the north and east electrical chases and the double doors to the turbine building. Redundant full capacity air handling units, each capable of providing full flow tempered air, are designed to maintain the relay room temperature at 75°F ± 2°F and the worst case heat load conditions and normally maintain the relay room temperature at near 70°F. The relay room temperature is not normally monitored or recorded; however, an alarm, set at 80°F, provides an indication of a high temperature condition in the relay room.

Although the initial temperature used in the calculation could be more conservative, the relay room temperature used is still a conservative representation of the operating condition. A minor ductwork air path modification was made (reference MRF 20171A) to maintain lower relay room temperature. Post modification testing verified that the room temperature was reduced from 77°F to 70°F. Additionally, SCE&G will record the temperature in the room for a period of time which will allow acquisition of temperature data to further verify that the temperature is maintained below 77°F. Based on existing data, SCE&G has the confidence that the relay room temperature is maintained below 77°F greater than 98% of the time. Certain areas adjacent to the concrete walls of the relay room could be assigned more conservative temperatures, but these temperatures will not bring significant changes to the relay room temperature. More conservative temperatures for these areas adjacent to the relay room will be used in the ongoing revision of the temperature calculation for the relay room, which is taking into account the new inverters.

SER Section 2.2.4.2, Steam Turbine Driven AFW Pump Room

"Recommendation: The licensee should (1) verify and confirm that all the potential heat sources have been considered in its analysis, and (2) verify and confirm that the surface temperature of 50°C used in the analysis for high energy lines is consistent with that of an SBO event."

SCE&G Response:

The temperature calculation for this area assumes approximately 100% additional load, above the major piping in this area, to account for miscellaneous small piping, drains, traps, etc. A closer review of the small piping and piping accessories in this area reduces the allowed margin to about 70%. Therefore, the calculated heat load is not affected by the inclusion of miscellaneous small piping in the area.

The 50°C for the insulation surface temperature was chosen for personnel protection. A review of existing pipe insulation and fluid temperatures following an SBO event indicates that the surface temperature would be less than 50°C. Therefore, actual room temperature would be less than 144°F.

SER Section 2.5

"Recommendation: The Licensee should verify and confirm that the SBO equipment is or will be covered by an appropriate QA program consistent with the guidance of RG 1.155, Appendix A. Verification that such a program is in place should be included as part of the documentation supporting the SBO rule."

SCE&G Response

Equipment required to cope with an SBO event is under the VCSNS Quality Assurance Program that meets the requirements of Regulatory Guide 1.155, Appendix A.

SER Section 2.6

"Recommendation: It is the staff position that an EDG reliability program should be implemented which meets, as a minimum, 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, Section 1.2."

SCE&G Response

VCSNS has an EDG reliability program which meets the guidance of RG 1.155, Section 1.2. Current VCSNS EDG reliability is greater than 95%.