



**SYSTEM ENERGY  
RESOURCES, INC.**

A Middle South Utilities Company

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April 14, 1989

U.S. Nuclear Regulatory Commission  
Director of the Office of Nuclear Reactor Regulation  
Mail Station P1-137  
Washington, D.C. 20555

Attention: Document Control Desk

Gentlemen:

SUBJECT: Grand Gulf Nuclear Station  
Unit 1  
Docket No. 50-416  
License No. NPF-29  
Station Blackout Rule,  
10 CFR 50.63  
AECM-89/0074

The NRC's final Station Blackout Rule (10 CFR 50.63) was effective July 21, 1988. This rule requires that nuclear power plants be capable of maintaining core cooling and appropriate containment integrity for a station blackout of a specified duration. It also requires that licensees submit information defined in paragraph 50.63(c).

Regulatory Guide 1.155, "Station Blackout", which describes a means acceptable to the NRC Staff for meeting the requirements of 10 CFR 50.63, states that NUMARC 87-00, "Guidelines and Technical Bases for NUMARC Initiatives Addressing Station Blackout at Light Water Reactors", provides guidance that is, in large part, identical to the RG 1.155 guidance and is acceptable to the NRC staff for meeting those requirements. The System Energy Resources Inc., (SERI) evaluation for Grand Gulf Nuclear Station (GGNS) was based on NUMARC 87-00, and the attachment is based on NUMARC guidance.

Attached is SERI's response to 10 CFR 50.63. SERI will implement procedure modifications identified in the attachment within 180 days of notification provided by the Director, Office of Nuclear Reactor Regulation in accordance with 10CFR 50.63(c)(3).

In accordance with the requirements of 10 CFR 170.21, an application fee of \$150 is attached to this letter.

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Please advise this office should you require additional information.

Yours truly,

*W J Carter*

WTC:jrs

Attachment: GGNS Response to Station Blackout Rule

Enclosure: Remittance of \$150, Approval Fee

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GGNS RESPONSE TO STATION BLACKOUT RULE (10 CFR 50.63)

On July 21, 1988, the Nuclear Regulatory Commission (NRC) amended its regulations in 10 CFR, 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 station blackout duration. Section 50.63 requires that, for the station blackout 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 station blackout 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 station blackout 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 10 CFR 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.

System Energy Resources, Inc., (SERI) has evaluated the Grand Gulf Nuclear Station (GGNS) 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. (Applicable NUMARC 87-00 sections are shown in parenthesis.)

A. Proposed Station Blackout Duration

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

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

1. AC Power Design Characteristic Group is P1 based on:
  - a. Expected frequency of grid-related LOOPs does not exceed once per 20 years (Section 3.2.1, Part 1A, p. 3-3);
  - b. Estimated frequency of LOOPs due to extremely severe weather places the plant in ESW Group 2 (Section 3.2.1, Part 1B, p. 3-4);
  - c. Estimated frequency of LOOPs due to severe weather places the plant in SW Group 2 (Section 3.2.1, Part 1C, p. 3-7);
  - d. The offsite power system is in the I 1/2 Group (Section 3.2.1, Part 1D, p. 3-10).
2. The emergency AC power configuration group C is based on: (Section 3.2.2, Part 2C, p. 3-13)
  - a. There are 2 emergency AC power supplies not credited as alternate AC power sources (Section 3.2.2, Part 2A, p. 3-15);
  - b. One emergency AC power supply is necessary to operate safe shutdown equipment following a loss of offsite power (Section 3.2.2, Part 2B, p. 3-15).
3. The target 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 20 demands greater than 0.90 consistent with NUMARC 87-00, Section 3.2.4.

#### B. Procedure Description

Plant procedures have been reviewed and modified, if necessary, 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;
2. Severe weather per NUMARC 87-00, Section 4.2.3.

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

1. Station blackout 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 GGNS to cope with a station blackout for four 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 (Section 7.2.1)

It has been determined that 98,000 gallons of water are required for decay heat removal for four hours. The minimum permissible condensate storage tank (CST) level per the GGNS UFSAR and tank design provisions provides 170,000 gallons of water, which exceeds the required quantity for coping with a 4-hour station blackout.

The following procedure change is necessary to utilize this water source.

- o A requirement will be added to the Loss of AC Power Off Normal Event Procedure (ONEP) that directs the operators to maintain RCIC and HPCS suction from the CST. Interlocks must be jumpered to defeat a transfer from the CST to the suppression pool. Implementation of the BWR Owners Group Emergency Procedure Guidelines Revision 4 will require addition of the same requirement to the GGNS Emergency Operating Procedures.

#### 2. Class 1E Battery Capacity (Section 7.2.2)

A battery capacity calculation has been performed pursuant to NUMARC 87-00, Section 7.2.2 to verify that the Class 1E Division II batteries have sufficient capacity to meet station blackout loads for four hours.

The Class 1E Division I batteries were determined to be inadequate to meet station blackout loads for four hours without load-stripping. The following procedure change is necessary to provide a four-hour capacity:

- o A requirement will be added to the Loss of AC Power ONEP to trip the RCIC gland seal compressor if both Division I and II ESF Busses are lost.

#### 3. Compressed Air (Section 7.2.3)

Air-operated valves relied upon to cope with a station blackout for four hours can either be operated manually or have sufficient backup sources independent of the preferred and blacked out unit's Class 1E power supply. Valves requiring manual operation or that need backup sources for operation are identified in plant procedures.

4. Effects of Loss of Ventilation (Section 7.2.4)

- a. The steady state ambient air temperature has been calculated for the following dominant areas of concern:

<u>AREA</u>	<u>TEMPERATURE</u>
HPCS Room	150°F
RCIC Room	124°F

- b. Control Room Complex

The assumption in NUMARC 87-00, Section 2.7.1 that the control room will not exceed 120°F during a station blackout has been assessed.

The control room at GGNS does not exceed 120°F during a station blackout. Therefore, the control room is not a dominant area of concern. Section 2.7.1 of NUMARC 87-00 makes the assumption that control room cabinets are Condition 1 equipment. In order to ensure that this assumption is applicable to GGNS, the following procedure change is required.

- o The Loss of AC Power ONEP will be revised to include guidance for the control room personnel to open control room panel doors of those cabinets containing instrumentation and controls required for achieving and maintaining safe shutdown as soon as practical following loss of both Division I and II ESF busses. The doors will be left open until power is restored to at least one of these busses.
- c. The main steam tunnel is considered a possible dominant area of concern for BWR plants because of a high temperature isolation for decay heat removal equipment. The main steam tunnel has been removed from consideration as a dominant area of concern for GGNS by the following procedure change.
- o A requirement will be added to the Loss of AC Power ONEP to bypass the RCIC steamline high temperature isolation to prevent isolation following loss of steam tunnel cooling.

Reasonable assurance of the operability of station blackout response equipment in the above dominant areas of concern (HPCS and RCIC Rooms) has been assessed using Appendix F to NUMARC 87-00 and/or the Topical Report. No modifications or associated procedures are required to provide reasonable assurance for equipment operability in the dominant areas of concern.

5. Containment Isolation (Section 7.2.5)

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 station blackout conditions can be

positioned (with indication) independent of the preferred and blacked-out unit's Class 1E power supplies. The following procedure change is required to ensure that appropriate containment integrity can be provided under station blackout conditions:

- o A requirement will be added to the Loss of AC Power ONEP to require manual closure of containment isolation valves which could not be eliminated from consideration using the methodology of Section 7.2.5 of NUMARC 87-00 should it be determined that core damage is imminent.

6. Reactor Coolant Inventory (Section 2.5)

The ability to maintain adequate reactor coolant system inventory to ensure that the core is cooled has been assessed for four hours. The relevant 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 Grand Gulf Nuclear Station. The expected rates of reactor coolant inventory loss under SBO conditions do not result in more than a momentary core uncover in a SBO of four hours. Therefore, makeup systems in addition to those currently available under SBO conditions are not required to maintain core cooling under natural circulation (including reflux boiling).

The procedure changes identified in Parts A, B and C above will be completed 180 days after the notification provided by the Director, Office of Nuclear Reactor Regulation in accordance with 10 CFR 50.63(c)(3).