



April 12, 1989

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U.S. Nuclear Regulatory Commission  
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Gentlemen:

ULNRC- 1973

**DOCKET NUMBER 50-483  
CALLAWAY PLANT  
STATION BLACKOUT  
NRC TAC No. 68524**

On July 21, 1988, the Nuclear Regulatory Commission (NRC) amended its regulations in 10 C.F.R., 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 (LOOP), 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 C.F.R. 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.

Union Electric has evaluated Callaway Plant 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 parentheses.)

A. Proposed Station Blackout Duration

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

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

1. The AC Power Design Characteristic Group is "P1", because:
  - a. The expected frequency of grid-related LOOPS does not exceed once per 20 years (Section 3.2.1, Part 1A, p. 3-3);
  - b. The estimated frequency of LOOPS due to extremely severe weather places the plant in ESW Group 1 (Section 3.2.1, Part 1B, p. 3-4);
  - c. The estimated frequency of LOOPS due to severe weather places the plant in SW Group 2 (Section 3.2.1, Part 1C, p. 3-7); and
  - d. The offsite power system is in the I1/2 Group (Section 3.2.1, Part 1D, p. 3-10);
2. The emergency AC power configuration group is "C" because: (Section 3.2.2, Part 2C, p. 3-13)

- a. There are two emergency AC power supplies not credited as alternate AC power sources (Section 3.2.2, Part 2A, p. 3-15); and
  - 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.

The selection of this value is consistent with NUMARC 87-00, Section 3.2.4 and is based on having a nuclear unit average EDG reliability for the last 100 demands greater than 0.95.

#### B. Procedure Description

Procedures have been reviewed to assure compliance with the guidelines of NUMARC 87-00, Section 4. The results of this review are as follows:

1. The station blackout response guidelines of NUMARC 87-00, Section 4.2.1 will be met by plant procedures ECA-0.0, Loss of All AC Power; OTO-GK-00001, Loss of Control Room HVAC with High Control Room Temperature; OTS-UB-00001, Security Diesel Generator Operability Test; OTS-ZZ-00002, Technical Support Center Diesel Generator Operability Test and Emergency Start Sequence; and OTS-ZZ-00003, Emergency Operations Facility Diesel Generator Operability Test and Emergency Start Sequence. Changes necessary to meet NUMARC 87-00 will be incorporated into ECA-0.0. No changes to OTO-GK-00001, OTS-UB-00001, OTS-ZZ-00002, or OTS-ZZ-00003 are required.
2. The AC power restoration guidelines of NUMARC 87-00, Section 4.2.2, are met by Load Dispatch Office Operating Order "Restoration of AC Supply to Callaway Plant" and by plant procedure ECA-0.1, Loss of All AC Power Recovery Without Safety Injection. No changes to these procedures are necessary.
3. The severe weather preparation guidelines of NUMARC 87-00, Section 4.2.3, are met by plant procedure OTO-ZZ-00004, High Winds/Tornado Off Normal. No change to this procedure is necessary.

#### C. Summary of Coping Assessment

The ability of Callaway Plant to cope with a station blackout for four hours in accordance with NUMARC 87-00, Section 3.2.5 and as determined in Part 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 using guidelines in Section 7.2.1 of NUMARC 87-00 that 158,000 gallons of water are required for decay heat removal for a four-hour coping duration. The minimum permissible condensate storage tank level per Technical Specifications provides 281,000 gallons of water, which exceeds the required quantity for coping with a four-hour station blackout.

2. Class 1E Battery(ies) 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 battery(ies) has sufficient capacity to meet station blackout loads for four hours.

3. Compressed Air (Section 7.2.3)

Air-operated valves relied upon to cope with a station blackout for four hours have sufficient backup air sources independent of the blacked out unit's preferred and Class 1E power supplies. The valves are identified in plant procedures.

4. Effects of Loss of Ventilation (Section 7.2.4)

The calculated steady state ambient air temperature for the steam driven AFW pump room (the dominant area of concern for a PWR) during a station blackout induced loss of ventilation is 136.4°F.

Reasonable assurance of the operability of station blackout response equipment in the above dominant area of concern has been assessed using Appendix F to NUMARC 87-00 and/or the Topical report. No modifications are required to provide reasonable assurance for equipment operability.

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. Calculations verify that the control room at the Callaway Plant will not exceed 120°F during a station blackout. Therefore, the control room is not a dominant area 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

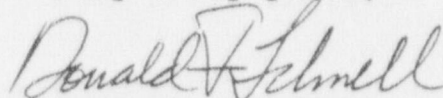
being closed or that must be operated (cycled) under station blackout conditions can be positioned (with indication) independent of the preferred Class IE power supplies. No plant modifications were determined to be required to ensure that appropriate containment integrity can be provided under SBO conditions. Procedure ECA-O.O will be revised to include all actions necessary to assure containment integrity.

6. Reactor Coolant Inventory (Section 2.5)

The ability to maintain adequate reactor coolant system inventory to ensure that the core is cooled for four hours has been assessed. A plant-specific analysis was used for this assessment. The expected rates of reactor coolant inventory loss under SBO conditions do not result in uncovering the core in an SBO of four hours. Therefore, makeup systems under SBO conditions are not required to maintain core cooling under natural circulation (including reflux boiling).

No modifications are proposed for Callaway Plant. The procedure changes identified in Parts B and C above will be completed 3 months after the notification provided by the Director, Office of Nuclear Reactor Regulation in accordance with 10 C.F.R. 50.63(c)(3).

Very truly yours,

  
Donald F. Schnell

DAO/plh

STATE OF MISSOURI )  
                          )       S S  
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Donald F. Schnell, of lawful age, being first duly sworn upon oath says that he is Senior Vice President-Nuclear and an officer of Union Electric Company; that he has read the foregoing document and knows the content thereof; that he has executed the same for and on behalf of said company with full power and authority to do so; and that the facts therein stated are true and correct to the best of his knowledge, information and belief.

By Donald F. Schnell  
Donald F. Schnell  
Senior Vice President  
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SUBSCRIBED and sworn to before me this 12<sup>th</sup> day of April, 1989.

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