

AUG 24 1987

MEMORANDUM FOR: Themis P. Speis, Deputy Director
for Generic and Regulatory Issues
Office of Nuclear Regulatory Research

FROM: Aleck W. Serkiz, Senior Task Manager
Reactor and Plant Safety Issues Branch
Division of Reactor and Plant Systems, RES

SUBJECT: SUMMARY OF MEETING WITH NUCLEAR UTILITY GROUP
ON STATION BLACKOUT (NUGSBO) ON USI A-44

MEETING DATE: August 20, 1987

LOCATION: Phillips Building
7920 Norfolk Avenue
Bethesda, Maryland

PURPOSE OF
MEETING: The purpose of this meeting was to continue discussions
of guidelines and procedures dealing with NUMARC Initiative
2. This was the 13th meeting held with NUGSBO since the
first meeting in July 1986.

ATTENDEES: See attached attendee list

REFERENCES:

- (1) Letter to NRC Chairman Palladino from J. H. Miller,
NUMARC, June 17, 1986.
- (2) NUGSBO 8720, "Assuring the Adequacy of Station
Blackout Response Procedures - Guidelines and
Technical Bases," Revision 0.0, August 10, 1987
(prepared by the Nuclear Utility Group on Station
Blackout).
- (3) NUGSBO 8750, "Assessing the Ability to Cope with a
Station Blackout Event - Procedures and Technical
Bases, Revision 2.0, August 10, 1987 (prepared by
NUGSBO).
- (4) NUGSBO 8710, "Assessment of Coping Duration
Requirements, Revision 2.0, October 14, 1986
(prepared by NUGSBO).

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This meeting was a continuation of previous discussions from the August 11, 1987 and August 13, 1987 meetings.

The outcome of this meeting was:

- 1). The NRC staff has provided NUGSBO their review comments on NUGSBO-8720 and -8750 (References 2 and 3). An exchange of views has taken place and the documents will be revised by NUGSBO to account for the staff's concerns.
- 2). Closure on Reference 4 is still outstanding. P. Baranowsky (NRR) and J. Flack (RES) need to confer with S. Maloney (NUGSBO) on several outstanding questions that Maloney has. Maloney is to contact Baranowsky next week.
- 3). NUGSBO will prepare a single initiatives document to facilitate staff final review and for referencing in RG 1.155. A preliminary draft of the contents for such a document is enclosed. NUGSBO indicated they will target August 31, 1987 for completion of such a combined report.
- 4). The staff and NUGSBO discussed A-44 rule definitions of alternate AC (AAC) power, station blackout (SBO), Q/A guidance, etc. A copy of the current rule language (labeled Enclosure 1, August 20, 1987) was provided to NUGSBO to facilitate discussions. Some clarifications were made and agreed to by both parties.

NUGSBO does not agree with the staff's need for Q/A and tech spec requirements for AAC and non-safety related equipment. Further discussions are planned for this topic.

The staff pointed out that the paragraph (e) - previously proposed as a revision to GDC-17 has been moved into the body of the rule (10 CFR 50.56). NUGSBO questioned the need for wording related to "maintaining containment integrity."

- 5). Brief discussions were held on differences of opinion and needs related to section 1 of RG 1.155, that deal with EDG reliability and the staff indicated that further discussions are in progress internally. The staff also indicated to NUGSBO a willingness to reference NSAC/108 criteria and test definitions related to EDG testing for use in the calculation of EDG reliability.

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The next meeting was targeted for September 11, 1987, at which time NUGSBO's compiled report and RG 1.155 would be discussed for the final time. If agreement is reached that the NUGSBO report meets the staff's needs, then RG 1.155 would reference (in appropriate fashion) such a report.

Original Signed by:
A. W. Serkiz

Aleck W. Serkiz, Senior Task Manager
Reactor and Plant Safety Issues Branch
Division of Reactor and Plant Systems, RES

cc: B. Sheron
W. Minners
A. Thadani
F. Rosa
A. Rubin
P. Baranowsky
S. Crockett
J. M. McGarry III (BCP&R)
M. ChidJers (NU)
PDR

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NAME	: ASerkiz:jf	: PNorman	: KKhie1	:	:	:	:
DATE	: 08/24/87	: 08/24/87	: 08/24/87	:	:	:	:

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Attendees

August 20, 1987
NUGSBO/NRC MEETING

<u>Name</u>	<u>Affiliation</u>	<u>Phone</u>
Al Serkiz	NRC/RES/RPSIB	301-492-7487
Steve Floyd	CP&L/NUGSBO	919-836-6901
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John Rota	DEVONRUE/NUGSBO	617-426-4550
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Chu-yu Liang	NRC/SRXB	301-492-9459
Paul Gill	NRC/NRR/SELB	301-492-9474
Faust Rosa	NRC/NRR/SELB	301-492-9466
Dom Tondi	NRC/NRR/SELB	301-492-9490
Paul Norian	NRC/RES/RPSI	301-492-7112

Rec'd 8-20-87

AWs

Preliminary Draft (not complete)

PROPOSED SINGLE INITIATIVES DOCUMENT

Scope

The single document includes the three existing NUGSBO documents listed below and additional information concerning Initiatives 3 and 4.

"Assessment of Coping Durations Requirements"

"Assuring the Adequacy of Station Blackout Response Procedures - Guidelines and Technical Basis"

"Assessing the Ability to Cope with a Station Blackout Event - Procedures and Technical Bases"

Proposed New Single Document Title:

"Guidelines and Technical Bases for NUMARC Initiatives Addressing Station Blackout at Light Water Reactors," NUGSBO 8700

Proposed New Single Document Contents:

1. Introduction
 - 1.1 Objective
 - 1.2 Document Structure
 - 1.3 NUMARC Initiatives
 - 1.4 Action Plan
2. Baseline Assumptions
 - 2.1 Initial Plant Conditions
 - 2.2 Initiating Event
 - 2.3 Station Blackout Transient
 - 2.4 Reactor Coolant Inventory Loss
 - 2.5 Operator Action
 - 2.6 Effects of Loss of Ventilation
 - 2.7 System Crosstie Capability
 - 2.8 Instrumentation and Controls
 - 2.9 Containment Isolation Valves

3. Assessment of Coping Duration

3.1 Overview

3.2 Procedure

3.3 Supporting Information

4. Station Blackout Response Procedures

4.1. Overview

4.2 Operating Procedures Guidelines

4.2.1 Station Blackout Response
Guidelines

4.2.2 AC Power Restoration
Guidelines

4.2.3 Severe Weather Guidelines

4.3 Supporting Information

5. Cold Fast Starts

6. AC Power Availability

7. Coping with a Station Blackout Event

7.1 Overview

7.2 Coping Analysis

7.2.1 Condensate Inventory for Decay
Heat Removal

7.2.2 Class 1E Battery Capacity

7.2.3 Compressed Air

7.2.4 Loss of Ventilation

7.3 Supporting Information

Appendices

A. Definitions

B. Alternate AC Power Criteria

C. Sample AAC Configurations

D. EDG Reliability Program

E. References

(8/20/87)

On the basis of station blackout studies conducted for USI A-44, and presented in the reports referenced above, the NRC staff has developed a draft regulatory guide entitled "Station Blackout" ⁽³⁾ which presents guidance on (1) maintaining a high level of reliability for emergency diesel generators, (2) developing procedures and training to restore offsite and onsite emergency ac power should either one or both become unavailable, and (3) selecting a plant-specific acceptable station blackout duration which the plant would be capable of surviving without core damage. Application of the methods in this guide would result in selection of an acceptable station blackout duration (e.g., 4 or 8 hours) depending on the specific plant design and site-related characteristics. However, applicants and licensees could propose alternative methods to that specified in the regulatory guide in order to justify other acceptable durations for station blackout capability.

Additionally, the regulatory guide on station blackout presents guidance on quality assurance and specifications for alternate ac source(s) and non-safety related equipment required for coping with station blackout. The equipment installed to meet the station blackout rule must be implemented such that it does not degrade the existing safety related systems. This is to be accomplished by making the non-safety related equipment independent to the extent practicable from existing safety related systems. The guidance provided in the draft regulatory guide illustrates the specifications that the staff would find acceptable for non-safety systems and equipment. The quality assurance guidance for the non-safety related equipment specify which requirements of the following sections of Appendix B are to be applied to non-safety related equipment: (1) organization, (2) program, (3) design control, (4) procurement document control, (5) design control, (6) instructions, procedures and drawings, (7) document control, (8) identification and control of purchased items, (9) control of special processes, (10) inspection, (11) test control, (12) control of measuring and test equipment, (13) inspection, test and operating status, (14) corrective action, (15) quality assurance records, (16) handling, storage and shipping, (17) non-conformance, (18) Audits.

Based on the rule and regulatory guide, those plants with an already low risk from station blackout would be required to withstand a station blackout for a

2. In §50.2, definitions of "Alternate ac Source" and of "station blackout" are added in the alphabetical sequence to read as follows:

§50.2 Definitions

"Alternate ac source" means an alternating current (ac) power source that is available to and located at or nearby a nuclear power plant and meets the following requirements: (i) is ~~not~~ normally ~~directly~~ connected to the preferred or onsite emergency ac power systems, (ii) has minimum potential for common mode failure with offsite power or the onsite emergency ac power sources, (iii) is available in a timely manner after the onset of station blackout, (iv) has sufficient capacity and reliability for operation of all systems normally used and for the time required to bring and maintain the plant in hot shutdown.

Commitable to unit

"Station blackout" means the complete loss of alternating current (ac) electric power to the essential and nonessential switchgear buses in a nuclear power plant (i.e., loss of offsite electric power system concurrent with turbine trip and unavailability of the onsite emergency ac power system^{*}). Station Blackout does not include the loss of available ac power to buses fed by station batteries through inverters or by alternate ac sources as defined in this section, nor does it assume a concurrent single failure or a design basis accident. AT a multi-unit site, station blackout is assumed to occur in only one unit.

* At single unit sites, any emergency ac power source(s) in excess of the number required to meet the minimum redundancy requirements (ie single failure) for safe shut down is assumed to be available and may be designated as an alternate power source(s) provided it meets the applicable criteria.
At multi-unit site, the emergency ac power sources of a non-blackout unit are assumed to be available and may be designated as alternate ac power sources provided they meet the applicable criteria.

THE SPECIFIED STATION BLACKOUT DURATION SHALL BE BASED ON THE FOLLOWING FACTORS:
(1) THE REDUNDANCY OF THE ONSITE EMERGENCY AC POWER SOURCES, (2) THE RELIABILITY
OF THE ONSITE EMERGENCY AC POWER SOURCES, (3) THE EXPECTED FREQUENCY
OF LOSS OF OFFSITE POWER, AND (4) THE PROBABLE TIME NEEDED TO RESTORE
OFFSITE POWER. THE REACTOR CORE AND ASSOCIATED COOLANT, CONTROL, AND
PROTECTION SYSTEMS, INCLUDING STATION BATTERIES, SHALL PROVIDE SUFFICIENT
CAPACITY AND CAPABILITY TO ASSURE THAT THE CORE IS COOLED AND CONTAINMENT
INTEGRITY IS MAINTAINED IN THE EVENT OF A STATION BLACKOUT FOR THE SPECIFIED
DURATION.

3. A new §50.63 is added to read as follows:

§50.63 Loss of all alternating current power

(a) Requirements. Each light-water-cooled nuclear power plant licensed to operate must be able to withstand and recover from a station blackout as defined in §50.2 for a specified duration, ~~in accordance with the requirements in paragraph (e) of General Design Criterion 17 of Appendix A of this part.~~ Near term operating licenses that have not been licensed prior to [insert the effect date of this amendment] must comply with the rule on the same schedule as those plants already licensed to operate.

(b) Limitation of Scope. Paragraphs (c) and (d) of this section do not apply to those plants licensed to operate prior to [insert the effective date of this amendment] if the capability to withstand station blackout was considered in the operating license proceeding and a specified duration was accepted as the licensing basis for the facility.

(c) Implementation ~~Determination of Station Blackout Duration~~

(1) Information Submittal: For each light-water-cooled nuclear power plant licensed to operate on or before [insert the effective date of this amendment], the licensee shall submit to the Director of the Office of Nuclear Reactor Regulation by [insert a date 270 days after the effective date of this amendment]:

(1) A proposed station blackout duration to be used in determining compliance with paragraph ^(a)~~(e)~~ of General Design Criterion 17 of Appendix A of this ~~part~~ ^{Section}, including a justification for the selection based on--

- (A) The availability of the nearby alternate ac power sources that are independent of the station offsite and onsite ac power distribution system;
- (B) The reliability of the onsite emergency AC power sources;
- (C) The expected frequency of loss of offsite power; and
- (D) The probable time needed to restore offsite power;

(ii) An identification of the factors, if any, that ^(a) limit the capability of the plant to meet the requirements of paragraph ~~(e)~~^(a) of Criterion 17 this section for the specified station blackout duration proposed in the response to paragraph (c)(1)(i) of this section;

(iii) A description of the procedures that have been established for station blackout events for the duration determined in paragraph (c)(1)(i) of this section and for recovery therefrom; and

(iv) A list of modifications to equipment and associated procedures necessary, if any, to meet the requirements of paragraph ^(a)~~(e)~~ of Criterion 17 this section for the specified station blackout duration determined in paragraph (c)(1)(i) of this section, and a proposed schedule for implementing the stated modifications.

(2) Alternate ac sources: An alternate ac power source(s) as defined in §50.2 will constitute acceptable station blackout coping capability provided an analysis is performed that demonstrates the plant has this capability from onset of the station blackout until the alternate ac source(s) is started and lined up to operate all required shutdown equipment. The time required for startup of this equipment shall be demonstrated by test. An alternate ac source(s) serving a multiple unit site where onsite emergency ac sources are

not shared between units shall have, as a minimum, the capacity and capability for coping with a station blackout in any of the units; at sites where onsite emergency ac sources are shared between units, the alternate ac source(s) shall have the capacity and capability as required to assure that all units can be brought to and maintained in hot shutdown. If the alternate ac source(s) meets the above requirements and can be demonstrated to be available within 10 minutes of the onset of station blackout, then no coping analysis is required.

(2) (3) Regulatory Assessment: After consideration of the information submitted in accordance with paragraph (c) (1) of this section, the Director, Office of Nuclear Reactor Regulation, will notify the licensee of Director's determination of the conclusions regarding the adequacy of the proposed specified station blackout duration to be used in determining the proposed equipment modifications and procedures and the proposed schedule for implementing the procedures and modifications for compliance with paragraph (e) of General Design Criterion 17 of Appendix A of this ^{Section} ~~Part~~.

(d) -- Implementation -- Schedule for Implementing Equipment Modifications --

(1) (4) Implementation Schedule: For each light-water-cooled nuclear power plant licensed to operate on or before [insert the effective date of this amendment], the licensee shall, within ~~180~~ 30 days of the notification provided in accordance with paragraph (c) (1) (3) of this section, submit to the Director of the Office of Nuclear Reactor Regulation a schedule commitment for implementing any equipment and associated procedure modifications necessary to meet the requirements of paragraph (e) ^(a) of General Design Criterion 17 of Appendix A of this ^{Section} ~~Part~~. This submittal must include an explanation of the schedule and a justification if the schedule does not provide for completion of the modifications within two years of the notification provided in accordance with paragraph (c)(2) of this section. The licensee and the NRC staff shall mutually agree upon the final schedule for implementing modifications necessary to comply with the requirements of paragraph (e) ^(a) of ~~Criterion 17~~ ^{this} ~~Section~~ ^{Section}.

(2) -- The licensee and the NRC staff shall mutually agree upon a final schedule for implementing modifications necessary to comply with the requirements of paragraph (e) of Criterion 27.

~~4. In Appendix A, General Design Criterion 17 is revised read as follows:~~

~~APPENDIX A--General Design Criteria for Nuclear Power Plants~~

~~* * * * *~~

~~II. Protection by Multiple Fission Product Barriers~~

~~* * * * *~~

~~Criterion 17--Electric power systems. (a) An onsite electric power system and an offsite electric power system shall be provided to permit functioning of structures, systems, and components important to safety. The safety function for each system (assuming the other system is not functioning) shall be to provide sufficient capacity and capability to assure that (1) specified acceptable fuel design limits and design conditions of the reactor coolant pressure boundary are not exceeded as a result of anticipated operational occurrences and (2) the core is cooled and containment integrity and other vital functions are maintained in the event of postulated accidents.~~

~~(b) The onsite electric supplies, including the batteries, and onsite electric distribution system, shall have sufficient independence, redundancy, and testability to perform their safety functions assuming a single failure.~~

~~(c) Electric power from the transmission network to the onsite electric distribution system shall be supplied by two physically independent circuits (not necessarily on separate rights of way) designed and located so as to minimize the extent practical the likelihood of their simultaneous failure under operating and postulated accident and environmental conditions. A switchyard common to both circuits is acceptable. Each of these circuits shall be designed to be available in sufficient time following a loss of all onsite alternating current power supplies and the other offsite electric power circuit, to assure that specific acceptable fuel design limits and design~~

~~conditions of the reactor coolant pressure boundary are not exceeded. One of these circuits shall be designed to be available within a few seconds following a loss of coolant accident to assure that core cooling, containment integrity, and other vital safety functions are maintained.~~

~~(d) Provisions shall be included to minimize the probability of losing electric power from any of the remaining supplies as a result of, or coincident with, the loss of power generated by the nuclear power unit, the loss of power from the transmission network, or the loss of power from the onsite electric power supplies.~~

~~(e) The reactor core and associated coolant, control, and protection systems, including the station batteries, shall provide sufficient capacity and capability to assure that the core is cooled and containment integrity is maintained in the event of a station blackout (as defined in §50.2) for a specified duration. The following factors shall be considered in specifying the station blackout duration: (1) the redundancy of the onsite emergency ac power sources, (2) the reliability of the onsite emergency ac power sources, (3) the expected frequency of loss of offsite power, and (4) the probable time needed to restore offsite power.~~

Dated at Washington, DC, this ____ day of _____ 1987.

For the Nuclear Regulatory Commission.

Samuel J. Chilk
Secretary of the Commission.

Underlined text indicates additional paragraph to GDC 17.

AUG 24 1987

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