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February 8, 2002

Mr. Christopher I. Grimes
Program Director
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Division of Regulatory Improvement Programs
U.S. Nuclear Regulatory Commission
Washington, DC 20555-0001

SUBJECT: Industry Response to Proposed Staff Guidance on Scoping of Equipment Relied on to Meet the Requirements of the Station Blackout Rule for License Renewal

PROJECT NUMBER: 690

Dear Mr. Grimes:

On November 14, 2001, NEI received the "Proposed Staff Guidance on Scoping of Equipment Relied on to Meet the Requirements of the Station Blackout (SBO) Rule for License Renewal," 10 C.F.R. § 50.63. Meetings were held on January 10 and 15, 2002, to discuss the staff's concerns regarding the treatment of SBO requirements in the context of license renewal scoping activities pursuant to 10 C.F.R. Part 54. As a result of these discussions, the staff forwarded, on January 28, supplemental information supporting its SBO-related concerns and requested industry's review and comment. A follow-up meeting has been scheduled at NRC offices for February 14, 2002. Detailed comments on the staff's proposed position are enclosed.

In summary, the staff contends that the plant systems portion of the switchyard is within the scope of 10 C.F.R. § 54.4 because the ability to recover from a station blackout, which could be accomplished by restoration of offsite power, is included in the provisions of 10 C.F.R. § 50.63 and thereby necessary for compliance with the SBO rule. Our review of the SBO rule and related documents does not support this broad interpretation of the SBO rule and its underlying intent, as it applies to license renewal.

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By way of background, the NRC promulgated the SBO rule to ensure a capability of withstanding a total loss of alternating (AC) electric power for a specified duration and maintaining reactor core cooling during that period. Various scenarios, some out of the control of the plants (grid or weather-induced faults), could cause a loss of offsite power. This assumed loss, concurrent with unavailable emergency AC power sources because of minimum redundancy requirements, results in a station blackout. To guard against such events, the SBO rule focuses on mitigating the consequences of a station blackout by requiring licensees to demonstrate a capability to achieve and maintain a safe shutdown condition for a specified duration. This capability is the function that demonstrates compliance with the station blackout rule. The SBO rule, in conjunction with the implementing regulatory guidance, directs licensees to establish appropriate procedures and training for coping with a station blackout event. Recovery actions may include restoration of power to the emergency busses via onsite or offsite AC power. There is no regulatory requirement regarding a preferred source of AC power for recovery. Specifically, in order to establish whether plant offsite power systems should be included within the scope of license renewal, in accordance with 10 CFR 54.4(a)(3), the following questions must be answered in the affirmative: (1) were plant offsite power systems, structures or components relied on in safety analyses or plant evaluations to perform a function that demonstrates compliance with 10 C.F.R. § 50.63; and (2) if so, is such reliance reflected in the plant's CLB?

Thus, a plant's current licensing basis (CLB) becomes the primary focus of scoping activities under Section 54.4(a)(3). This is because a plant's CLB defines the means by which licensees comply with the SBO rule.

Plant safety evaluations performed to demonstrate compliance with the SBO rule do not, in all cases, rely solely upon the restoration of offsite power for recovery. Recovery procedures may include restoration of AC power to the shutdown busses from any source, including alternate AC, depending on the individual plant's approach to implementation of the SBO rule. Thus, as a matter of law and regulatory interpretation, the NRC should not broadly conclude that (1) offsite power systems are required for each plant to meet the requirements of 10 CFR 54.4(a)(3), and (2) the plant systems portions of the switchyard are included within the scope of license renewal.

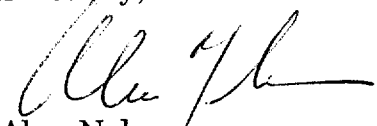
Based on this regulatory analysis, we believe it is incumbent on each license renewal applicant to determine, on a plant-specific basis, the level of reliance placed on the plant systems portion of offsite power to demonstrate compliance with the requirements of 10 CFR 50.63.[1] The current licensing bases for many U. S. nuclear

[1] We note that the SBO rule does not apply to plants licensed to operate prior to July 21, 1988, if the capability to withstand station blackout was specifically

power plants, as defined in 10 CFR 54.3, do not rely exclusively upon recovery of the offsite power system to withstand or recover from a station blackout event. We agree, however, that if a plant's CLB relies upon recovery of the offsite power system to withstand or recover from a station blackout, then the plant systems portion of the switchyard could meet the scoping requirements of Section 54.4(a)(3).

We look forward to meeting with the NRC staff on February 14 to find a practical resolution. If you have any questions, please call me at (202) 739- 8110 or e-mail (apn@nei.org).

Sincerely,



Alan Nelson

Enclosure

c: P.T. Kuo
P. Kang

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addressed in the operating license proceeding and was explicitly approved by the NRC. 10 C.F.R. § 50.63(b).

Enclosure

INDUSTRY COMMENTS ON PROPOSED STAFF GUIDANCE ON SCOPING OF EQUIPMENT RELIED ON TO MEET THE REQUIREMENTS OF THE STATION BLACKOUT RULE (10 CFR 50.63) FOR LICENSE RENEWAL

STAFF POSITION

Consistent with the requirements specified in 10 CFR 54.4(a)(3) and 10 CFR 50.63(a)(1), the plant system portion of the offsite power system should be included within the scope of license renewal. Based on precedent set in maintenance rule guidance (NRC Regulatory Guide 1.160), the switchyard should be considered for inclusion in this scope.

NRC RATIONALE WITH INSERTED INDUSTRY COMMENTS (NRC Rationale shown in italics)

> *The license renewal rule, section 10 CFR 54.4(a)(3), requires that, "all systems, structures, and components relied on in safety analyses or plant evaluations to perform a function that demonstrates compliance with the Commission's regulations for.....station blackout (10 CFR 50.63)" be included within the scope of license renewal.*

Industry Comment 1 – In order to establish whether plant offsite power systems should be included within the scope of license renewal, in accordance with 10 CFR 54.4(a)(3), two questions must be answered.

(1) Were plant offsite power systems, structures or components relied on in safety analyses or plant evaluations to perform a function that demonstrates compliance?
(2) If offsite power systems, structures or components were relied upon (answer to question 1 is yes), is the reliance reflected in the plant's current licensing bases?

The first question is a recasting of the scoping guidance contained in 10 CFR 54.4(a)(3). The second question reflects guidance on scoping provided in the Statements of Consideration for the License Renewal Rule[1] and in additional staff

[1] [60FR22461, May 8, 1995] Section III(c)(iii), Bounding the Scope of Review, ...*Likewise, to limit the potential for unnecessary expansion of the review for the scoping category concerning those systems, structures, and components whose function is relied upon in certain plant safety analyses to demonstrate compliance with the Commission's regulations (i.e., environmental qualification, station blackout, anticipated transient without scram, pressurized thermal shock, and fire protection), the Commission intends that this scoping category include all systems, structures, and components whose function is relied upon to demonstrate compliance with the Commission's regulations. An*

guidance on scoping provided in resolution of License Renewal Issue No. 98-0082, "Scoping Guidance."[2] This guidance was provided to limit the potential for unnecessary expansion of the review for the scoping category.

In order for offsite power systems, structures and components to be considered within the scope of license renewal, the response to both of these questions must be "yes."

While it is incumbent on each applicant for license renewal to confirm, for individual plants, the level of reliance placed on the plant systems portion of offsite power to demonstrate compliance with the requirements of 10 CFR 50.63, we believe a "no" response to the two questions is applicable for most, if not all, nuclear plants. This is further amplified in the comments provided below.

> *The station blackout rule, section 10 CFR 50.63(a)(1), requires that each light-water-cooled power plant licensed to operate be able to withstand and recover from a station blackout of a specified duration that is based upon factors that include: "(iii) The expected frequency of loss of offsite power; and (iv) The probable time needed to recover offsite power." The station blackout rule in this regard is consistent with the staff findings identified in the statement of considerations and NUREG-1032. In particular, with regard to factor (iv), the staff found that offsite power is more likely to be recovered (0.6 hours median time to restore) than the emergency diesel generators (8 hours median time to repair) ending a station blackout event.*

Industry Comment 2 – The station blackout rule requires, as noted above, that the ability to *"withstand and recover from a station blackout of a specified duration"* be based upon, in part, the probable time needed to recover offsite power. The NRC, in developing guidance for use by licensees in implementing the station blackout

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applicant for license renewal should rely on the plant's current licensing bases, actual plant-specific experience, industry-wide operating experience, as appropriate, and existing engineering evaluations to determine those systems, structures, and components that are the initial focus of the license renewal review.

[2] Letter, C.I. Grimes (NRC) to Douglas J. Walters, "License Renewal Issue No. 98-0082, Scoping Guidance," dated August 5, 1999, ""*To identify the SSCs within the scope of the license renewal consistent with the scoping criteria under 10 CFR 54.4 (a), an applicant needs to consider the following:...The SSCs that are relied upon in the plant's CLB to demonstrate compliance with the Commission's regulations identified under 10 CFR 54.4(a)(3). In doing so, an applicant needs to consider those SSCs required to comply with and operate within the Commission regulations based on the applicant's CLB. In determining the SSCs within the scope of the rule under 10 CFR 54.4(a)(3), an applicant also needs to consider, to the extent that it is applicable and appropriate, any plant-specific or industry-wide operating experience that is specifically applicable to the facility*" [emphasis added]."

rule, did base their guidance for acceptable coping durations on the probable time needed to recover offsite power using broadly scoped historical nuclear plant data.

The guidance identified those factors that were found to significantly affect the risk from station blackout. These factors include (1) the plant emergency ac power configuration, (2) EDG reliability and (3) offsite power design characteristics. The offsite power design characteristics factor was based upon the level of independence in the plant offsite power system design, the estimated frequency of loss of offsite power due to severe weather, whether or not sites have the capability and procedures for restoration of offsite power following a loss due to severe weather, and the annual expectation of extremely severe weather. These factors were then used by licensees in the determination of the plant specific coping duration for their plants following the guidance contained in Regulatory Guide 1.155.

The plant specific coping durations, using NRC approved guidance, were determined using factors that reflected the design of the plant offsite power system. While these factors were based, in part, on the expected frequency of loss of offsite power and the probable time needed to recover offsite power, there was no "reliance" on any specific elements or components of offsite power systems to perform a function of "recovery" called for in 10 CFR 54.4(a)(3).

With regard to the factor "(iii) the expected frequency of loss of offsite power", the fundamental assumption of the SBO rule is that a loss of offsite power occurs. Even for plants with the lowest expected frequency of loss of offsite power, an SBO duration of 2 to 4 hours must be considered, depending on emergency diesel generator configuration. For the factor "(iv) the probable time needed to recover offsite power", the main goal of Regulatory Guide 1.155 and NUREG-1032 was to establish bounding SBO durations to ensure plant coping evaluations were rigorous and conservative. When all factors are considered, the time to restore emergency diesel generators appears to be the main factor in establishing durations, because assuming offsite power is restored in .6 hours would be non-conservative. This conclusion is supported by the greater significance emergency diesel generator reliability, availability and onsite AC power configuration has on establishing SBO durations versus the offsite power configuration.

> *Station blackout (SBO) is the loss of offsite and onsite ac electric power to the essential and non-essential switchgear buses in a nuclear power plant. It does not include the loss of ac power fed from inverters powered by station batteries nor loss of ac power from an SBO defined alternate ac power source. The SBO rule was added to the regulations in 10 CFR Part 50 because, as operating experience accumulated, concern arose that the reliability of both the offsite and onsite ac power systems might be less than originally anticipated, even for designs that met the requirements of General Design Criteria 17 and 18. As a result,*

the SBO rule required that nuclear power plants have the capability to withstand and recover from the loss of offsite and onsite ac power of a specified duration (the coping duration).

Industry Comment 3 – The station blackout rule does not exclusively direct or rely on restoration of offsite power as the means of recovery from a station blackout event. The station blackout rule does call for the development of and training on plant procedures to restore ac power using nearby power sources if the emergency ac power system and the normal offsite power sources are unavailable. Plant actions and procedures provide for options that include restoration of onsite as well as offsite power sources. The plant procedures also call for and direct the re-establishment of the primary source of offsite power through the plant's switchyard, as a necessary step to fully restore normal operation following a station blackout. Incorporation of steps necessary to restore offsite power in plant procedures does not translate into a plant-specific reliance on restoration of offsite power.

Licensees' plant evaluations followed the guidance specified in NRC Regulatory Guide (RG) 1.155 and NUMARC 87-00 to determine their required plant specific coping duration. The criteria specified in RG 1.155 to calculate a plant specific coping duration were based upon the expected frequency of loss of offsite power and the probable time needed to restore offsite power, as well as the other two factors (onsite emergency ac power source redundancy and reliability) specified in 10 CFR 50.63(a)(1). In requiring that a plant's coping duration be based on the probable time needed to restore offsite power, 10 CFR 50.63(a)(1) is specifying that the offsite power system be an assumed method of recovering from an SBO. Disregarding the offsite power system as a means of recovering from an SBO would not meet the requirements of the rule and would result in a longer required coping duration. The function of the offsite power system within the SBO rule is, therefore, to provide a means of recovering from the SBO. This meets the criteria within license renewal 10 CFR 54.4(a)(3) as a system that performs a function that demonstrates compliance with the Commission's regulations on SBO.

Industry Comment 4 –Restoration of offsite power is included as one of several means to restore ac power to the plant essential and non-essential busses. However, before offsite power systems can be considered within the scope of the License Renewal rule, per 10 CFR 54.4(a)(3), it must be established that the offsite power systems were "relied on in safety analyses or plant evaluations to perform a function that demonstrates compliance" with the station blackout rule. The "expected frequency of loss of offsite power" and "probable time needed to recover offsite power" factors were based on curve fit historical nuclear plant data of loss of offsite power events. The fact that plant-specific coping durations were "based" on

these factors do not translate to "reliance" on offsite power. In fact, the SBO durations in Regulatory Guide 1.155 were established without consideration of specific actions or equipment required to restore offsite power. As indicated in NUREG-1032, possible factors limiting the ability to cope with a SBO include the systems, structures, and components (SSCs) associated with decay heat removal, reactor coolant system letdown and makeup, DC batteries, compressed air, and operating environments (temperature). At the end of the assumed SBO event duration as established by Regulatory Guide 1.155, these SSCs can be powered from onsite emergency sources if offsite power is not available. As a result, offsite power systems are not relied on in plant evaluations to perform a function that demonstrates compliance with the Commission's regulations for SBO.

To further amplify the absence of any plant specific "reliance" on restoration of offsite power in meeting the requirements of the station blackout rule, it is noted that there are no requirements for plants to verify that offsite power can be restored within the plant-specific coping duration selected for the plant.

> *The use of the offsite power system within 10 CFR 50.63(a)(1) as a means of recovering from an SBO should not be construed to be the only acceptable means of recovering from an SBO. A licensee could recover offsite power or emergency (onsite) power. It is not possible to determine prior to an actual SBO event which source of power can be returned first. As a result, 10 CFR 50.63(c)(1)(ii) and its associated guidance in RG 1.155, Section 1.3 and Section 2 requires procedures to recover from an SBO, including offsite and onsite power. During development of 10 CFR 50.63 the median time to recover an emergency diesel generator was determined to be longer than the median time to recover offsite power. The NRC staff determined that offsite power provided the preferred means to recover from an SBO event and, therefore, chose it as a factor used to calculate a required coping duration under 10 CFR 50.63(a)(1).*

Industry Comment 5 –Our review of the station blackout rule, associated guidance, plant-specific submittals and NRC inspection of plant implementation of the SBO rule found no requirement identifying restoration of offsite power as the "preferred" means to recover from a station blackout event. The station blackout rule specifically addresses requirements for alternate AC power sources and NRC safety evaluation reports of licensee submittals, in response to 10 CFR 50.63, included a general staff position on alternate AC power sources that specifically recognizes the role of alternate AC power sources in restoring offsite power and categorized alternate AC power sources as *optimal, fully capable* or *minimally capable* based upon the capability and capacity of the alternate AC power source to achieve safe-shutdown during an SBO and *"recover therefrom."* NRC inspection of licensee compliance with the SBO rule and the subsequent safety evaluation reports

suggest that alternate ac power sources and emergency diesel generators are the preferred means for restoration of AC power to the emergency busses. Furthermore, the ability to restore offsite power within a specified time frame (coping duration) was not evaluated during NRC inspections.

> *The offsite power systems of U.S. nuclear power plants consist of the country's transmission systems (the grid) and the plant systems that carry that power into the plants' electrical distribution systems which power safety equipment. The staff notes that it is not its intent to impose aging management programs on this country's transmission systems. As a practical matter, its authority in this area is limited. The staff has historically relied upon the well-distributed, redundant, and interconnected nature of the grid to provide the necessary level of reliability to support nuclear power plant operations. For purposes of the license renewal rule, the staff considers that the portion of offsite power equipment that includes the switchyard to the safety related buses should be included within the scope of the rule.*
>
> *Nuclear power plant operators must ensure that the offsite power systems relied upon to meet GDC 17 and 18 are capable of performing their required function. The precedent set in the maintenance rule (10 CFR 50.65) guidance (RG 1.160, rev 2 and NUMARC 93-01, rev 2) indicates that, regardless of what organization actually performs the maintenance, switchyard equipment should be considered for inclusion in the rule. By ensuring that the appropriate offsite power system long-lived passive structures and components within the switchyard and down to the safety related buses are subject to an aging management review, we will ensure that the bases underlying the SBO requirements are maintained over the period of license renewal. This is consistent with the Commission's expectations in including the SBO regulated event under section 10 CFR 54.4(a)(3) of the license renewal rule.*

Industry Comment 6 –If one accepts the NRC's premise that offsite power systems are relied on in safety analyses or plant evaluations to perform a function that demonstrates compliance to the station blackout rule, and thus must be evaluated for the purpose of license renewal, then it becomes difficult to understand how the scope of equipment would be limited to switchyard equipment.

The acceptable coping durations developed in Regulatory Guide 1.155 were based, in part, on the expected frequency of loss of offsite power and the probable time needed to recover offsite power. The research supporting the regulatory guide looked at a wide range of causes for loss of offsite power and the evaluations establishing the probable time needed to recover offsite power looked at a similarly wide range of restoration activities. This research was not, nor should it be, limited

to plant switchyard events and actions taken in the switchyard to restore power. Thus, establishing a boundary at the plant switchyard would appear to be arbitrary and subject to expansion to include the local transmission system or beyond. Further, as noted in the staff rationale following a precedent established in the maintenance rule, ownership or direct responsibility for maintenance can not be used as a defacto criterion for establishing scope per 10 CFR 54.4(a)(3).

> *Alternate ac power sources were accepted under the SBO rule as an alternate means of withstanding an SBO. The definition of an alternate ac power source is contained in 10 CFR 50.2. Based upon our review of 10 CFR 50.63,10 CFR 50.2, the SBO RG 1.155, and the statement of considerations for the SBO rule, the staff finds that the intent of the SBO rule was to accept alternate ac power sources only as a means of coping with an SBO. While the rule did not require a coping analysis for alternate ac sources that could be made available within 10 minutes, it nevertheless required that the coping duration of 10 CFR 50.63(a)(1) be established. It is, therefore, not appropriate to accept alternate ac sources as a means of recovering from a station blackout and to limit the scope of equipment in license renewal, which demonstrates compliance with the SBO rule to such alternate sources.*

Industry Comment 7 – Our review of the station blackout rule and related documents does not support the staff interpretation of SBO rule intent as it applies to alternate ac power sources.

Plant actions and procedures, as a necessary step to fully restore normal operation following a station blackout, call for and direct re-establishment of the primary source of offsite power through the plant's switchyard. This action does not constitute the sole means for recovering from a station blackout. This is supported by technical analyses performed in support of the station blackout rule and in support of the methodology for determining plant-specific coping durations.

NUREG-1032 recognizes, and restoration times account for, power restoration following an SBO using alternate AC power sources. The Introduction section to Appendix A to NUREG-1032 states: "*Within this study, the loss of offsite power has been defined as the interruption of the preferred power supply to the essential and nonessential switchgear buses necessitating or resulting in the use of emergency AC power supplies. A total loss of offsite power is said to have occurred when non-emergency AC power sources become unavailable requiring some diagnosis or special recovery actions, including correcting switching errors, fixing or bypassing faulted equipment, or otherwise making available an alternate standby source of non-emergency AC power*". [emphasis added]

NRC endorsed NUMARC 87-00, "Guidelines and Technical Bases for NUMARC Initiatives Addressing Station Blackout at Light Water Reactors," Assumptions for the Station Blackout Transient are provided in Section 2 of NUMARC 87-00, General Criteria and Baseline Assumptions. Section 2.4.1(1) states: "Following a loss of all off-site power, the reactor automatically trips with sufficient shutdown margin to maintain sub criticality at safe shutdown (i.e., hot standby or hot shutdown as appropriate). The event ends when AC power is restored to shutdown busses from any source, including Alternate AC." [emphasis added]

Many, if not all, NRC Safety Evaluation Reports developed in response to licensee submittals in response to 10 CFR 50.63, included a general staff position on alternate AC power sources. This staff position specifically recognizes the role of alternate AC power sources in restoring onsite power and categorized alternate AC power sources as *optimal, fully capable* or *minimally capable* based upon the capability and capacity of the alternate AC power source to achieve safe-shutdown during an SBO and "recover therefrom."

SUMMARY

The Station Blackout rule was promulgated in response to NRC concern that plants were susceptible to losses of onsite and offsite power. The fundamental objective of the rule was to ensure a capability of withstanding a total loss of AC power for a specified duration and maintaining reactor core cooling during that period. Various scenarios, some beyond the control of licensees (grid or weather induced faults), could cause a loss of offsite power. This assumed loss, concurrent with unavailable AC power sources because of minimum redundancy requirements, results in the station blackout. To guard against these events, the SBO rule focused on mitigating the consequences by requiring licensees to demonstrate a capability to achieve and maintain a safe shutdown condition for a specified duration. This capability is the function that demonstrates compliance. In complying with the station blackout rule (10 CFR 50.63), U.S. nuclear power plants licensees were not required to ensure restoration of offsite power beyond establishment of appropriate procedures and training. Plant safety evaluations performed to demonstrate compliance with the station blackout rule do not rely upon the specific equipment or components of offsite power systems. As such, the offsite power systems do not meet the requirements of 10 CFR 54.4(1)(3) and should not be included within the scope of license renewal.

Industry-wide data on loss of offsite power frequency and duration were used in developing the station blackout rule. However, it is beyond the intent of the license renewal rule to expand the scope of SSCs considered beyond that relied on to address plant specific compliance to regulatory requirements.

The Statements of Consideration for the license renewal rule (60FR22461) provide guidance on the bounds applied when considering SSCs subject to review for license renewal. In its discussion of bounding the scope of review for SSCs necessary to meet 10 CFR 54.4(a)(3), the Commission stated that an applicant should rely on the plant's current licensing bases, to determine those systems, structures, and components that are the initial focus of the license renewal review.

As indicated in *Industry Comment 1* above, in order to establish whether plant offsite power systems should be included within the scope of license renewal, two questions must be answered "yes".

(1) Were plant offsite power systems, structures or components relied on in safety analyses or plant evaluations to perform a function that demonstrates compliance?
(2) If offsite power systems, structures or components were relied upon (answer to question 1 is yes), is the reliance reflected in the plant's current licensing bases?

It is incumbent on each applicant for license renewal to confirm for their plant the level of reliance placed on the plant systems portion of offsite power to demonstrate compliance with the requirements of 10 CFR 50.63. However, as discussed above, we believe the following point to be generally applicable to all U. S. nuclear power plants: The current licensing bases for U. S. nuclear power plants, as defined in 10 CFR 54.3, do not rely upon recovery of the offsite power system to withstand or recover from a station blackout event.