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AVAILABILITY OF ELECTRIC POWER SOURCES

A. INTRODUCTION

This guide describes guidelines that the staff of the U.S. Nuclear Regulatory Commission (NRC) considers acceptable when the number of available electric power sources are less than the number of sources required by the limiting conditions for operation (LCOs) for a facility. This regulatory guide applies to single- and multiple-unit plants and is consistent with the improved standard technical specifications (iSTS) (NUREG-1430 through NUREG-1434 (Refs. 1–5)). The LCO-required actions and specified completion times referred to in this guide are based on the completion times presented in Regulatory Guide 1.93, Revision 0, "Availability of Electric Power Sources," issued December 1974, which have been incorporated into the required actions in the iSTS.

Title 10, Section 50.36(c)(2), of the *Code of Federal Regulations* (10 CFR 50.36(c)(2)) (Ref. 6), requires that the technical specifications include the LCOs, which are defined as the lowest functional capability or performance levels of equipment required for safe operation of the facility. Furthermore, the same regulations require that, when an LCO of a nuclear reactor is not met, the licensee shall shut down the reactor or follow any remedial action permitted by the technical specifications until the condition can be met.

General design criterion (GDC) 17, "Electric Power Systems," of Appendix A, "General Design Criteria for Nuclear Power Plants," to 10 CFR Part 50, "Domestic Licensing of Production and Utilization Facilities" (Ref. 6), requires the following:

- 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

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Electronic copies of this guide and other recently issued guides are available through the NRC's public Web site under the Regulatory Guides document collection of the NRC Library at http://www.nrc.gov/reading-rm/doc-collections/ and through the NRC's Agencywide Documents Access and Management System (ADAMS) at http://www.nrc.gov/reading-rm/adams.html, under Accession No. ML090550661. The regulatory analysis may be found in ADAMS under Accession No. ML101870610.

This guide was issued after consideration of comments received from the public. The public comments and NRC staff response to them may be found in ADAMS under Accession No. ML090550693.

containment integrity and other vital functions are maintained in the event of postulated accidents.

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

- 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 to 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 specified 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.

    - 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.

For nuclear power plants (NPPs) that were not licensed in accordance with GDC 17, the updated final safety analysis report provides the applicable design criteria.

The NRC issued Generic Letter (GL) 2006-02, "Grid Reliability and the Impact on Plant Risk and Operability of Offsite Power," on February 1, 2006 (Ref. 7), to obtain, in part, information on the following issues from its licensees:

- the use of protocols between the NPP and the transmission system operator (TSO), independent system operator, or reliability coordinator/reliability authority and the use of transmission load flow analysis tools by TSOs to assist NPPs in monitoring grid conditions to determine the operability of offsite power systems under plant technical specifications; and

- the use of NPP/TSO protocols and analysis tools by TSOs to assist NPPs in monitoring grid conditions for consideration in maintenance risk assessments.

This regulatory guide contains information collection requirements covered by 10 CFR Part 50 that the Office of Management and Budget (OMB) approved under OMB control number 3150-0011. The NRC may neither conduct nor sponsor, and a person is not required to respond to, an information collection request or requirement unless the requesting document displays a currently valid OMB control number. The NRC has determined that this document is a rule as designated in the Congressional Review Act (5 U.S.C. 801-808). However, it is not a major rule as designated by the Congressional Review Act, and OMB has verified this determination.

B. DISCUSSION

Background

In accordance with GDC 17, an electric power system is required to supply power to loads important to safety in an NPP. Nuclear plants with more power sources than the number of sources required by GDC 17 may be able to withstand the multiple failures and still satisfy the LCOs. However, during the normal course of operation, any NPP may lose power sources to the extent that the LCOs are not met. This regulatory guide provides specific guidance to address situations in which the number of electric power source is less than the adequate number of power sources.

Loss of Offsite Power

For NPPs licensed in accordance with the GDC in Appendix A to 10 CFR Part 50, GDC 17 provides the design criteria for onsite and offsite electrical power systems. For NPPs not licensed in accordance with the GDC in Appendix A, the updated final safety analysis report provides the applicable design criteria. These reports set forth criteria similar to GDC 17, which requires, among other things, that an offsite electric power system be provided to permit the functioning of certain SSCs important to safety in the event of anticipated operational occurrences and postulated accidents.

The technical specifications of operating NPPs include the operational restrictions resulting from the loss of power sources. In general, plant technical specifications require the operability of the offsite power system as a part of the LCOs and specify actions to be taken when the offsite power system is inoperable. Plant operators should be aware of (1) the capability of the offsite power system to supply power during operation and (2) situations that can result in a loss of offsite power or inadequate voltage following a trip of the plant or other transmission contingencies (which could potentially degrade the offsite power supplies) identified by the grid operator. If the offsite power system cannot provide the requisite power during normal operation or in the event of a trip of the unit, the licensee should declare the system inoperable and follow pertinent plant technical specification provisions.

The transmission network (grid) is the source of power to the offsite power system. Accordingly, licensees should perform grid reliability evaluations (by verifying with the grid operator that both offsite circuits are operable) as part of the maintenance risk assessment required by 10 CFR 50.65, "Requirements for Monitoring the Effectiveness of Maintenance at Nuclear Power Plants" (Ref. 8) (known as the Maintenance Rule), before performing "grid-risk-sensitive" maintenance activities. If the grid reliability evaluation indicates that degraded grid reliability conditions may exist during maintenance activities, the licensees should consider rescheduling any grid-risk-sensitive maintenance activities. If some overriding need exists to perform grid-risk-sensitive activities under existing or imminent conditions of degraded grid reliability, the licensee should consider alternate equipment protection measures and compensatory actions to manage or minimize the risk.

A licensee's ability to comply with technical specifications for offsite power may depend on grid conditions and plant status. In particular, maintenance on, and the degraded conditions of, the key elements of the plant switchyard and offsite power grid can affect the operability of the offsite power system, especially during times of high grid load and high grid stress. A communication protocol with the plant's TSO, combined with knowledge of the TSO capabilities, can help the NPP operator understand changes in the grid that can affect plant operations. The capability and reliability of the power grid is important to the licensee and can be used to determine the effects of these changes on the operability of the plant's offsite electrical power system.

Data collected in response to GL 2006-02 demonstrated that the majority of TSOs serving NPP sites have analysis tools which give the TSO the capability to determine the impact of the loss or unavailability of various transmission system elements, or contingencies, on the condition of the grid. The transmission systems can generally cope with several contingencies without undue impairment of grid reliability, but it is important that the NPP operator know when the transmission system near the NPP can no longer sustain NPP voltage based on the TSO's analysis of N-1 contingencies.[1] This knowledge helps the operator understand the general condition of the NPP offsite power system. To satisfy the Maintenance Rule, the NPP operator should know the grid's condition before taking a risk-significant piece of equipment out of service and should monitor it for as long as the equipment remains out of service.

As a part of the maintenance risk assessment required by 10 CFR 50.65(a)(4), licensees should perform grid reliability evaluations. To perform meaningful and comprehensive grid reliability evaluations, it is essential that the NPP licensee communicate with the TSO before and periodically during the performance of any grid-risk-sensitive activities. The communication between the NPP operator and grid TSO should enable the NPP operator to obtain up-to-date information on existing and projected grid conditions for use in maintaining a current and valid risk assessment and in managing possibly changing risk. The communication with the TSO should include whether a loss of NPP electrical output could impact the local grid, as well as activities that increase the likelihood of a plant trip or a loss of offsite power.

Passive plant designs may not require multiple power sources if those passive plant designs rely on passive safety-related systems for core cooling and containment integrity and may have to be evaluated on a case-by-case basis. These passive safety-related systems do not require offsite electric power for valves and the related instrumentation. If offsite power is not available, the nonsafety-related onsite diesel generators should be available for important plant functions. These nonsafety-related diesel generators do not require any technical specification requirements. The basis for the regulatory treatment of nonsafety systems applies to those nonsafety systems that perform risk-significant functions and which are, therefore, candidates for regulatory oversight. However, if an offsite power system or a diesel generator is found to be inoperable at these plants, the licensee should make a concerted effort to restore the inoperable offsite ac source or the diesel generator to operable status within a reasonable time period.

For evolutionary plant designs that have three or four safety trains and have excess redundancy in their onsite power systems, the restrictions imposed on such plants on the loss of required onsite power sources may differ from those recommended in this guide and should be evaluated on a case-by-case basis.

Operational Restrictions

The operational restrictions (based on the intent of GDC 17) in the technical specifications are based on the following three assumptions:

1. Meeting the Limiting Conditions for Operation

By meeting the LCO limits governing the safety function of electric power systems, NPPs can be confident that the capability and performance levels of equipment required for safe operation of the NPP are sufficient to withstand a "worst-case" transmission system contingency (also known as the N-1 contingency).

[1] N-1 Contingency: An unexpected failure or outage of a single component, such as a generator, a transmission line, or a transformer.

2. Period of Continued Operation

Upon loss of some required electric circuits, it may be prudent to complete any actions required by technical specifications for continued operation at power. These decisions should be based on an evaluation of the safety significance associated with orderly shutdown as compared to the safety significance associated with continued operation. For example, if the orderly shutdown will cause the offsite power source to become inoperable or otherwise cause transmission system degradation, the nuclear plant operator may conclude that continued power operation is a safer overall course of action provided that all actions required by the technical specifications are completed in the required completion time. The plant may delay shutdown up to the maximum time allowed by technical specifications provided that these activities do not risk further degradation of the electric power system or in any way jeopardize plant safety. If an orderly shutdown is determined to be the safer course of action, the plant should commence an orderly shutdown in parallel with efforts to restore the inoperable power source or sources to operable status. If continued power operation is determined to be the safer course, the plant operator or the TSO should use the period of continued operation to restore the inoperable or degraded power system elements and prepare for an orderly shutdown of the plant within the plant-specific completion time allowed by the technical specifications.

In summary, in order to provide a reasonable level of confidence in safety, the period of continued operation is based on 1) the necessary time to perform corrective maintenance, 2) the capacity and capability of the remaining electric power sources, and 3) the low probability of a design basis accident occurring during this period.

3. Orderly Shutdown

If compliance with the technical specification LCO has not been restored within the required completion time limits, the nuclear plant operator shall promptly initiate an orderly shutdown in accordance with technical specifications and plant procedures. If resources are available, the plant operator should take all actions to improve the inoperable or degraded condition during the plant shutdown. During the plant shutdown, the TSO may take systemwide actions, such as increasing power generation or dropping selected loads, to ensure that the plant shutdown does not cause power grid instability or inadequate offsite power voltage. If the technical specification LCO is restored during the shutdown, the plant operator may terminate the shutdown and, assuming no other restrictions exist, return the plant to rated power in accordance with the plant-specific technical specifications. However, the plant operator should also consider that the initiating condition may worsen and that a manual or automatic trip of the plant may be required or may occur.

Levels of Power System Degradation

To better define the seven levels of power system degradation, this regulatory guide describes the scenario of each set of circumstances.

1. The available offsite ac power sources are one less than the LCO.

This degradation level means that one of the required offsite ac sources is not available, and therefore, the offsite ac power system has no redundancy. Thus, operation could safely continue if the availability of the remaining power sources is verified; however, because the system is degraded below the LCO, the technical specifications identify a time limit on continued operation. Operating experience indicates that availability and reliability are higher for typical offsite ac power sources than those of a typical onsite ac power source. Thus, if risk is evaluated in terms of availability and capability, the risk

associated with the loss of an offsite power source (the source with higher availability) would appear to be more severe. However, this apparent difference in severity is usually offset by easier maintenance of the offsite power source.

However, if the loss of an offsite source occurs because of an event associated with extensive consequences, such as a severe ice storm or forest fire, the event has severe implications. The risks associated with such an offsite loss would be compounded by the following:

- The ability to quickly restore the offsite sources would likely be lost.
- The remaining offsite circuit could be susceptible to the same cause.
- The consequential trip probability of a number of generating units would be higher because of the potential loss of loads and/or faults on the transmission system.
- The availability and capability of the offsite power system might be affected.

In the event that one offsite ac power source is lost as a result of a fire, ice storm, or similar event, the licensee should evaluate the susceptibility of the second offsite ac power source for a potential common-cause failure. If the second offsite ac power source comes from an unaffected pathway, is underground, or possesses other unique design features, it may not be susceptible to a common-cause failure.

Licensees should make a concerted effort to restore the offsite ac power source during this restricted time period and should ensure that the remaining power source can accommodate the plant shutdown in accordance with the plant-specific technical specifications.

2. The available onsite ac power sources are one less than the LCO.

This degradation level means that one required source of the onsite ac power system is not available for safe shutdown or to mitigate the effects of an event. In a single-unit plant, this typically means that one diesel generator is inoperable. In certain multiple-unit plants that share onsite ac supplies, this typically means that the available onsite supply does not have the capacity to mitigate the effects of events in both units.

Since this degradation level can represent a loss of redundancy of the onsite ac power source to mitigate the effects of an event, the licensee should restrict the time allowed for continued operation. In the absence of one onsite power source, the intent of GDC 17 is twofold:

- Avoid the risk associated with transients associated with shutdown.
- Minimize the risk associated with the level of degradation by limiting its exposure time.

Licensees should make a concerted effort to restore the onsite ac power source during the completion time period allowed by the technical specifications and should verify that the remaining offsite power source can accommodate the plant shutdown in accordance with the plant-specific technical specifications.

3. The available offsite ac power sources are two less than the LCO.

This degradation level means that the offsite power system is not available or does not have the capability to achieve a safe shutdown and mitigate the effects of an event when coupled with the predicted loss of generation that occurs along with the unit trip or shutdown. However, the onsite ac system is not degraded. Thus, this level generally corresponds to the total loss of the offsite power sources.

Because of the normally high availability of offsite sources, this level of degradation may appear to be more severe than the next two degradation levels discussed below. However, two factors tend to decrease the severity of this degradation level as compared with the next two degradation levels. First, the configuration of the redundant onsite ac power system that remains available for this degradation level is not susceptible to a single bus or switching failure, whereas the next degradation level may be susceptible. Second, the time required to detect and restore an unavailable offsite power source is generally much less than that required for detecting and restoring an unavailable onsite ac power source.

This level of degradation can be caused by a variety of events, including the loss of two offsite circuits, the loss of the electric grid, the predicted loss of local electric grid voltage support caused by a loss of generation associated with a unit trip or shutdown (i.e., post-trip inadequate voltage predicted by the TSO real-time contingency analysis tool), or any other condition that renders offsite power unavailable for safe-shutdown and emergency purposes. Because the onsite power system has not been degraded and because a simultaneous loss of offsite power and a loss-of-coolant accident were postulated as a design basis, a brief interval (to be consistent with the LCO) of continued operation is allowed if the onsite sources of ac power, independent of grid condition, are operable and can act as a substitute train of ac power, in accordance with the plant-specific technical specifications. Note that some nuclear power units are designed to cause an automatic shutdown or initiate load rejection at this level of degradation when an actual loss of offsite power occurs. The units that initiate load rejection are considered to remain operating within the context of this regulatory guide.

4. The available offsite and onsite ac power sources are each one less than the LCO.

This level of power system degradation results from the loss of individual redundancy in both the offsite and onsite ac power systems. Because two different sources of power provide power system redundancy, the reliability, and thus the safety, of this degradation level appears to be slightly higher than that of the previous degradation level. However, the susceptibility of this power system to a single bus or switching failure could offset this apparent improvement. For example, the failure of an emergency power distribution bus that is energized by either the single available offsite circuit or the single available onsite ac supply could render all emergency ac power from that source ineffective. Moreover, if the offsite and onsite power were available to only one train, a bus fault could render all emergency power unavailable.

Based on these considerations, the allowed technical-specification completion time imposed at this level of degradation is more restrictive than that of the previous degradation level.

5. The available onsite ac power sources are two less than the LCO.

At this degradation level, the onsite ac power system cannot support a safe shutdown and cannot mitigate the effects of an accident in the event of a loss of offsite power. In a single unit, this usually means that two diesel generators are inoperable. In multiple units that share onsite ac supplies, this degradation level usually means that the available onsite supplies, if any, do not have the capacity to mitigate the effects of an event in one unit and safely shut down the other unit or units.

Because the offsite power system is the only source of ac power at this level of degradation, the licensee should evaluate the risk associated with continued operation against that associated with immediate controlled shutdown. (Immediate shutdown could cause grid instability, thus resulting in a total loss of ac power.) However, because any inadvertent generator trip could potentially result in a total loss of ac power, the technical specifications severely restrict the time allowed for continued operation. In addition, all work that could potentially trip the unit should be suspended. The intent of GDC 17 is twofold:

- Avoid the risk associated with immediate controlled shutdown.
- Minimize the risk associated with this level of electrical degradation by limiting the operating time (in the applicable technical specification LCO modes) and by limiting activities that could cause an inadvertent plant shutdown.

Licensees should make a concerted effort to restore at least one onsite ac power source during the allowed technical-specification completion time period and during the shutdown required by the technical specifications. Licensees should also coordinate with the TSO to ensure that the offsite power system can accommodate the plant shutdown in accordance with the plant-specific technical specifications.

6. The available onsite dc power sources are one less than the LCO.

This degradation level occurs when the available dc power sources do not have the required redundancy; however, the remaining train or trains of the dc power system are able to complete a safe shutdown and mitigate the effects of an event. Because a subsequent degradation in an onsite ac or dc system could jeopardize unit safety (e.g., a subsequent single failure could render the entire power system ineffective on a generator trip), the technical specifications restrict the time allowed for continued operation. If the affected dc source is restored during the allowed technical-specification completion time, unrestricted operation may resume. If not, the licensee should promptly shut down the unit in an orderly manner to comply with the technical specifications. In addition, the licensee should closely monitor the required functions of the dc system during the shutdown period and take corrective actions, if required, to ensure safety.

The passive designs (such as the AP1000) that depend heavily on dc power systems for core cooling and containment integrity typically have batteries that last for 72 hours. The design of batteries to meet the long-duration, constant-current demands required of passive designs may have monitoring requirements (recommended by their manufacturers) that differ from those required in current designs. Therefore, the licensee should critically monitor the required functions of these batteries during the shutdown period and take corrective actions, if required, to ensure that these batteries will perform their functions for the long duration as designed.

7. The available inverters are one less than the LCO.

The inverters are the safety-related inverters from the safety-related batteries to 120 or the 125 volt (V) safety-related buses. The function of the inverters is to convert and transfer power from DC (safety-related batteries) to AC (120V or 125V safety-related buses). The 120V or 125V safety-related buses are used for control power and instrumentation of circuits.

This degradation level means that the available inverters do not have the required redundancy; however, the remaining trains of the inverter power system have full functional capability to prevent a reactor trip. Because a subsequent single failure of another inverter could cause a reactor trip, the

licensee should severely restrict the time allowed for continued operation. If the affected inverter is restored within this time period, unrestricted operation may resume. If not, the unit should promptly be brought to an orderly shutdown.

C. REGULATORY POSITION

The regulatory positions in this section are based on the grid operator's capability to ensure the adequacy of the offsite power system through contingency analyses and plant design features and on the licensee's ability to manage risk-significant maintenance and surveillance activities.

The intent of each of the following regulatory positions is to ensure that an NPP is in an acceptably safe operating mode whenever the available electric power sources are less than the technical specification LCO. Accordingly, this section discusses the seven levels of degradation of the electric power system in order of increasing degradation; the technical specifications specify the required actions and the required action completion time for each degraded level. Whenever the technical specifications allow unrestricted operation to resume, such resumption should be contingent on the verification of the capability of the restored sources. Similarly, whenever the technical specifications allow power operation to continue during a specific degradation level, such continued power operation should be contingent upon the plant-specific technical specification requirements and the following considerations:

- the reliability, availability, and capability of the remaining sources;
- the required maintenance activities do not further degrade the power system or in any way jeopardize plant safety; and
- continued compliance with the required actions stipulated for each LCO specified in the plant-specific technical specifications.

The conduct of maintenance or surveillance activities should be evaluated to determine compliance with 10 CFR 50.65.

If there is any inconsistency with respect to completion times between this regulatory guide and the plant-specific technical specifications, the plant-specific technical specification should be used.

The NPP operator should refer to the interface requirements specified in North American Electric Reliability Corporation Standard NUC-001-2, "Nuclear Plant Interface Coordination," dated January 22, 2010 (Ref. 9), for coordination between the NPP operators and transmission entities for the purpose of ensuring the safe operation and shutdown of the NPP.

The accuracy and conservatism of the post-trip voltages predicted by the online grid analysis tool should be determined after each actual trip. If notified by the TSO that a trip of the NPP would result in inadequate offsite power post-trip voltages or in other transmission contingencies that would result in offsite power voltages less than the NPP design requirements, the NPP operator should determine the effect on technical-specification-related equipment and follow the actions specified in the plant-specific technical specifications.

1. The available offsite ac power sources are one less than the LCO.

If the available offsite ac power sources are one less than the LCO, power operation may continue for a period that should not exceed 72 hours if the electric grid system capability and reserves are such that a subsequent single failure would not cause a total loss of offsite power. Subsequent single failure to be considered is a trip of the unit's generator and related offsite power failures (e.g., ice storm, forest fire).

If these conditions for continued power operation are met and if the affected source is restored within 72 hours, unrestricted operation may resume. Conversely, if the actions required by the technical specifications for continued power operation are met, but the source is not restored within 72 hours, the licensee should shut down the unit in accordance with plant-specific technical specifications.

2. The available onsite ac power sources are one less than the LCO.

If the available onsite ac power sources are one less than the LCO, power operation may continue for a period that should not exceed 72 hours, provided that the redundant diesel generator is assessed within 24 hours to be free from common-cause failure or is verified to be operable in accordance with plant-specific technical specifications.

If the affected source is restored within the time period specified in the plant-specific technical specifications, unrestricted operation may resume. Conversely, if the conditions for continued power operation are met, but the source is not restored within the time period specified in the plant-specific technical specifications, the unit should be shut down.

3. The available offsite ac power sources are two less than the LCO.

If the available offsite ac power sources are two less than the LCO, power operation may continue for 24 hours or for the time period specified in the plant-specific technical specifications if it appears likely that at least one of the offsite sources can be restored within that time. If these conditions for continued power operation are met and if both offsite sources are restored within 24 hours or within the time period specified in the plant-specific technical specifications, unrestricted operation may resume. If only one offsite source is restored within 24 hours, power operation may continue for a total time that should not exceed 72 hours, in accordance with the conditions described in Regulatory Position 1. Conversely, if no offsite source is restored within the first 24-hour period of continued power operation, within 6 hours the licensee should promptly bring the unit to a hot-shutdown condition for boiling-water reactors (Mode 3) and to a hot-standby condition for pressurized-water reactors (Mode 3) or as specified in plant-specific technical specifications.

4. The available offsite and onsite ac power sources are each one less than the LCO.

If the available offsite and onsite ac power sources are each one less than the LCO, power operation may continue for 12 hours if it appears highly likely that at least one of the affected sources can be restored within 12 hours and if the electric grid system capacity and voltage are such that a subsequent single failure would not cause a total loss of offsite power. Subsequent single failure to be considered is a trip of the unit's generator and related offsite power failures (e.g., ice storm, forest fire).

If these conditions for continued power operation are met and if both sources are restored within 12 hours, unrestricted operation may resume. If either an offsite or an onsite ac source is restored within 12 hours, power operation may continue for a total time that should not exceed 72 hours, in accordance with the condition described in Regulatory Position 1 (or Regulatory Position 2) for the loss of one ac

source. Conversely, if neither an offsite source nor an onsite source is restored within the first 12 hours of continued power operation, the licensee should shut down the plant in accordance with plant-specific technical specifications.

5. The available onsite ac power sources are two less than the LCO.

If the available onsite ac electric power sources are two less than the LCO, power operation may continue for a period that should not exceed 2 hours. If both onsite ac electric power sources are restored within these 2 hours, unrestricted operation may resume. If only one onsite ac power source is restored within these 2 hours, power operation may continue for a total time that should not exceed 72 hours in accordance with the conditions described in Regulatory Position 2 for the loss of one onsite ac source. Conversely, if no onsite ac source can be restored within the first 2 hours of continued power operation, the licensee should shut down the plant in accordance with plant-specific technical specifications.

6. The available onsite dc power sources are one less than the LCO.

If the available onsite dc power sources are one less than the LCO, power operation may continue for a period that should not exceed 2 hours. If the affected dc source is restored within these 2 hours, unrestricted operation may resume. If not, the licensee should shut down the plant in accordance with plant-specific technical specifications. The licensee should closely monitor the required functions of the dc system during the shutdown process and take necessary actions (such as cross-connecting a supply or shedding optional loads) to ensure safe shutdown.

7. The available inverters are one less than the LCO.

If the available inverters are one less than the LCO, power operation may continue for a period that should not exceed the 24-hour time period specified in the standard technical specifications. If the affected inverter is restored within this time period, unrestricted operation may resume. If not, the licensee should shut down the plant in accordance with plant-specific technical specifications.

D. IMPLEMENTATION

The purpose of this section is to provide information on how applicants and licensees[2] may use this guide and information regarding the NRC's plans for using this regulatory guide. In addition, it describes how the NRC staff complies with the Backfit Rule (10 CFR 50.109) and any applicable finality provisions in 10 CFR Part 52.

Use by Applicants and Licensees

Applicants and licensees may voluntarily[3] use the guidance in this document to demonstrate compliance with the underlying NRC regulations. Methods or solutions that differ from those described in this regulatory guide may be deemed acceptable if they provide sufficient basis and information for the NRC staff to verify that the proposed alternative demonstrates compliance with the appropriate NRC regulations. Current licensees may continue to use guidance the NRC found acceptable for complying

[2] In this section, "licensees" refers to licensees of nuclear power plants under 10 CFR Parts 50 and 52; and the term "applicants," refers to applicants for licenses and permits for (or relating to) nuclear power plants under 10 CFR Parts 50 and 52, and applicants for standard design approvals and standard design certifications under 10 CFR Part 52.

[3] In this section, "voluntary" and "voluntarily" means that the licensee is seeking the action of its own accord, without the force of a legally binding requirement or an NRC representation of further licensing or enforcement action.

with the identified regulations as long as their current licensing basis remains unchanged**.** The acceptable guidance may be a previous version of this regulatory guide.

Licensees may use the information in this regulatory guide for actions which do not require NRC review and approval such as changes to a facility design under 10 CFR 50.59. Licensees may use the information in this regulatory guide or applicable parts to resolve regulatory or inspection issues.

Use by NRC Staff

During regulatory discussions on plant specific operational issues, the staff may discuss with licensees, various actions consistent with staff positions in this regulatory guide, as one acceptable means of meeting the underlying NRC regulatory requirement. Such discussions would not ordinarily be considered backfitting even if prior versions of this regulatory guide are part of the licensing basis of the facility. However, unless this regulatory guide is part of the licensing basis for a facility, the staff may not represent to the licensee that the licensee's failure to comply with the positions in this regulatory guide constitutes a violation.

If an existing licensee voluntarily seeks a license amendment or change and (1) the NRC staff's consideration of the request involves a regulatory issue directly relevant to this new or revised regulatory guide and (2) the specific subject matter of this regulatory guide is an essential consideration in the staff's determination of the acceptability of the licensee's request, then the staff may request that the licensee either follow the guidance in this regulatory guide or provide an equivalent alternative process that demonstrates compliance with the underlying NRC regulatory requirements. This is not considered backfitting as defined in 10 CFR 50.109(a)(1) or a violation of any of the issue finality provisions in 10 CFR Part 52.

The NRC staff does not intend or approve any imposition or backfitting of the guidance in this regulatory guide. The NRC staff does not expect any existing licensee to use or commit to using the guidance in this regulatory guide, unless the licensee makes a change to its licensing basis. The NRC staff does not expect or plan to request licensees to voluntarily adopt this regulatory guide to resolve a generic regulatory issue. The NRC staff does not expect or plan to initiate NRC regulatory action which would require the use of this regulatory guide. Examples of such unplanned NRC regulatory actions include issuance of an order requiring the use of the regulatory guide, requests for information under 10 CFR 50.54(f) as to whether a licensee intends to commit to use of this regulatory guide, generic communication, or promulgation of a rule requiring the use of this regulatory guide without further backfit consideration.

Additionally, an existing applicant may be required to adhere to new rules, orders, or guidance if 10 CFR 50.109(a)(3) applies.

Conclusion

This regulatory guide is not being imposed upon current licensees and may be voluntarily used by existing licensees. In addition, this regulatory guide is issued in conformance with all applicable internal NRC policies and procedures governing backfitting. Accordingly, the NRC staff issuance of this regulatory guide is not considered backfitting, as defined in 10 CFR 50.109(a)(1), nor is it deemed to be in conflict with any of the issue finality provisions in 10 CFR Part 52.

If a licensee believes that the NRC is either using this regulatory guide or requesting or requiring the licensee to implement the methods or processes in this regulatory guide in a manner inconsistent with

the discussion in this Implementation section, then the licensee may file a backfit appeal with the NRC in accordance with the guidance in NUREG-1409 and NRC Management Directive 8.4.

REFERENCES[4]

1. NUREG-1430, "Standard Technical Specifications—Babcock and Wilcox Plants: Specifications (Volume 1) and Bases (Volume 2)," Revision 3, U.S. Nuclear Regulatory Commission, Washington, DC, June 2004.

2. NUREG-1431, "Standard Technical Specifications—Westinghouse Plants: Specifications (Volume 1) and Bases (Volume 2)," Revision 3, U.S. Nuclear Regulatory Commission, Washington, DC, June 2004.

3. NUREG-1432, "Standard Technical Specifications—Combustion Engineering Plants: Specifications (Volume 1) and Bases (Volume 2)," Revision 3, U.S. Nuclear Regulatory Commission, Washington, DC, June 2004.

4. NUREG-1433, "Standard Technical Specifications—General Electric Plants (BWR/4): Specifications (Volume 1) and Bases (Volume 2)," Revision 3, U.S. Nuclear Regulatory Commission, Washington, DC, June 2004.

5. NUREG-1434, "Standard Technical Specifications—General Electric Plants (BWR/6): Specifications (Volume 1) and Bases (Volume 2)," Revision 3, U.S. Nuclear Regulatory Commission, Washington, DC, June 2004.

6. 10 CFR Part 50, "Domestic Licensing of Production and Utilization Facilities," U.S. Nuclear Regulatory Commission, Washington, DC.

7. GL 2006-02, "Grid Reliability and the Impact on Plant Risk and the Operability of Offsite Power," U.S. Nuclear Regulatory Commission, Washington, DC, February 1, 2006 (ADAMS Accession No. ML060180352).

8. 10 CFR 50.65, "Requirements for Monitoring the Effectiveness of Maintenance at Nuclear Power Plants," U.S. Nuclear Regulatory Commission, Washington, DC.

9. NUC-001-2, "Nuclear Plant Interface Coordination," North American Electric Reliability Corporation, Princeton, NJ, January 22, 2010.[5]

10. 10 CFR 50.63, "Loss of All Alternating Current Power," U.S. Nuclear Regulatory Commission, Washington, DC.

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[4] Publicly available NRC published documents are available electronically through the Electronic Reading room on the NRC's public Web site at: http://www.nrc.gov/reading-rm/doc-collections/. The documents can also be viewed on-line or printed for a fee in the NRC's Public Document Room (PDR) at 11555 Rockville Pike, Rockville, MD; the mailing address is USNRC PDR, Washington, DC 20555; telephone 301-415-4737 or (800) 397-4209; fax (301) 415-3548; and e-mail PDR.Resource@nrc.gov.

[5] Copies of North American Electric Reliability Standards may be obtained from the North American Electric Reliability Corporation (NERC) and are available electronically at NERC's Web site (http://www.nerc.com/index.php) or by contacting NERC Headquarters at 116-390 Village Boulevard, Princeton, NJ 08540-5721; telephone (609) 452-8060; fax (609) 452-9550.