U.S. NUCLEAR REGULATORY COMMISSION

STANDARD REVIEW PLAN

Appendix 8-A BRANCH TECHNICAL POSITIONS

The branch technical positions (BTPs) included in this appendix represent guidelines intended to supplement the acceptance criteria established in U.S. Nuclear Regulatory Commission (NRC) regulations, guidance presented in regulatory guides (RGs), and recommendations found in applicable standards of the Institute of Electrical and Electronics Engineers (IEEE) standards (stds.). To complete its review of a particular application, the staff must determine an acceptable resolution for each technical problem or question of interpretation that arises in the detailed review of plant designs. When the same technical problem or question of interpretation arises in several cases, the staff's determination on the point at issue is formalized in a BTP. The BTP outlines an acceptable approach to a particular issue to ensure a uniform treatment of the issue by staff reviewers. The approaches taken in the BTPs, like the approaches taken in RGss, are not mandatory, but they do provide defined, acceptable, and immediate solutions to some of the technical problems and questions of interpretation that arise in the review process. In some instances, RGs may be developed from BTPs once sufficient experience in their use has accumulated. The BTPs listed below are applicable to Chapter 8 of the Standard Review Plan (SRP) and have been included in this appendix for convenience.

BTP ICSB (PSB)[1]	Title
4	Requirements on Motor-Operated Valves in the ECCS Accumulator Lines
8	Use of Diesel-Generator Sets for Peaking
11	Stability of Offsite Power Systems
18	Application of the Single Failure Criterion to Manually Controlled Electrically Operated Valves
21	Supplemental Guidance for Bypass and Inoperable Status Indication for

1 These BTPs were formerly the responsibility of the Electrical, Instrumentation and Control System Branch (EICSB), Instrumentation and Control System Branch (ICSB), and/or Power Systems Branch (PSB) (outdated NRC Branch designations). Their ICSB and/or PSB designations have been retained to provide continuity and correlation with completed reviews.

<u>BTP PSB</u>	Engineered Safety Features Systems
1	Adequacy of Station Electric Distribution System Voltages
2	Criteria for Alarms and Indications Associated with Diesel-Generator Unit Bypassed and Inoperable Status

BRANCH TECHNICAL POSITION ICSB-4 (PSB)
REQUIREMENTS ON MOTOR-OPERATED VALVES IN THE ECCS ACCUMULATOR LINES

A. BACKGROUND

For many postulated loss-of-coolant accidents, the performance of the emergency core cooling system (ECCS) in pressurized-water reactor plants depends upon proper functioning of the safety injection tanks (also referred to as “accumulators” or “flooding tanks” in some applications). In these plants, a motor-operated isolation valve (MOIV) and two check valves are provided in series between each safety injection tank and the reactor coolant (primary) system.

The MOIVs must be considered to be “operating bypasses” because, when closed, they prevent the safety injection tanks from performing the intended protective function. IEEE Std. 279 has a requirement for “operating bypasses” which states that the bypasses of a protective function will be removed automatically whenever permissive conditions are not met. This Branch Technical Position provides specific guidance in meeting the intent of IEEE Std. 279 for safety injection tank MOIVs. See Reference 3 for further background information regarding this issue.

B. BRANCH TECHNICAL POSITION

To meet the intent of IEEE Std. 279, the design of the MOIV system should incorporate the following features for safety injection tanks:

1. Automatic opening of the valves when either primary coolant system pressure exceeds a preselected value (to be specified in the technical specifications) or a safety injection signal is present. Both primary coolant system pressure and safety injection signals should be provided to the valve operator.

2. Visual indication in the control room of the open or closed status of the valve.

3. An audible and visual alarm, independent of item 2, above, that is actuated by a sensor on the valve when the valve is not in the fully open position.

4. Use of a safety injection signal to remove automatically (override) any bypass feature that may be provided to allow an isolation valve to be closed for short periods of time when the reactor coolant system is at pressure (in accordance with provisions of the technical specifications).

Conformance with the relevant criteria for operating bypasses described in IEEE Std. 603, as endorsed in RG 1.153, constitutes an acceptable alternative approach.

It should be noted that BTP ICSB-18 (PSB) may also be applied to these isolation valves and should be used, when applicable, in conjunction with this Branch Technical Position.

It should also be noted that IEEE Std. 1290 provides information on motor-operated valve protection, control, and testing.

C. REFERENCES

1. Regulatory Guide 1.153, “Criteria for Power, Instrumentation, and Control Portions of Safety Systems.”

2. BTP ICSB-18 (PSB), “Application of the Single Failure Criterion to Manually Controlled Electrically Operated Valves.”

3. Arkansas 1, Unit 1, Safety Evaluation Report, January 23, 1973.

4. IEEE Std. 603-1991, “Criteria for Safety Systems for Nuclear Power Generating Stations.”

5. IEEE Std. 279-1971, “Criteria for Protection Systems for Nuclear Power Generating Stations.”

6. IEEE Std. 1290-1996, “IEEE Guide for Motor Operated Valve (MOV) Motor Application, Protection, Control, and Testing in Nuclear Power Generating Stations,” 1996.

BRANCH TECHNICAL POSITION ICSB-8 (PSB)
USE OF DIESEL-GENERATOR SETS FOR PEAKING

A. BACKGROUND

General Design Criterion 17 requires that provisions be included to minimize the probability of losing electric power from any of the remaining supplies as a result of, or coincident with, loss of the main generator, loss of power from the grid, or loss of standby power supplies. Additionally, IEEE Std. 308, as endorsed by RG 1.32, requires that the preferred (offsite) and standby power supplies should not have a common failure mode. Common failure mode is defined as "a mechanism by which a single design-basis event can cause redundant equipment to be inoperable." Although IEEE Std. 308 does not preclude the use of emergency diesels for nonsafety purposes, the staff concludes that the potential for common failure modes should preclude interconnection of onsite and offsite power sources except for short periods for the purpose of load testing.

Review of the use of emergency diesel-generator sets for peaking service leads to the conclusion that the required frequent interconnection of the preferred and standby power supplies increases the probability of their common failure.

B. BRANCH TECHNICAL POSITION

The staff's position regarding the use of onsite emergency power diesel-generator sets for purposes other than that of supplying standby power when needed is that such use should be prohibited. In particular, emergency power diesel-generator sets should not be used for peaking service.

C. REFERENCES

1. 10 CFR Part 50, Appendix A, General Design Criterion 17, "Electric Power Systems."

2. Regulatory Guide 1.32, "Criteria for Safety-Related Electric Power Systems for Nuclear Power Plants."

3. IEEE Std. 308-2001, "IEEE Standard Criteria for Class 1E Systems for Nuclear Power Generating Stations."

BRANCH TECHNICAL POSITION ICSB-11 (PSB)
STABILITY OF OFFSITE POWER SYSTEMS

A. BACKGROUND

The staff has traditionally required each applicant to perform stability studies for the electrical transmission grid that would be used to provide the offsite power sources to the plant. The basic requirement is that loss of the largest operating unit on the grid will not result in loss of grid stability and availability of offsite power to the plant under consideration. Isolated power systems of limited generating capacity are inherently less stable than equivalent systems with supporting grid interties. It is also obvious that limited systems are more vulnerable to natural disasters, such as tornadoes or hurricanes.

The staff developed Draft RG 1.206 to address anticipated combined license applications submitted under 10 CFR Part 52. Detailed information and guidance are provided in Section C.I.8 of RG 1.206 which provides that applicants submit detailed analyses and studies for staff review.

In addition, IEEE Std. 242 and IEEE Std. 399 provide technical information and guidance regarding the protection and performance of the offsite electric power system.

B. BRANCH TECHNICAL POSITION

1. The staff has concluded, from a review of appropriate reliability data, that power systems with supporting grid interties meet the grid availability criterion with some margin. This conclusion is applicable to the review of most plants located on the U.S. mainland.

2. A strong indication exists that an isolated system large enough to justify inclusion of a nuclear unit will also meet this criterion. However, as a conservative approach, the staff will examine the generating capacity of a system, including interties if available, available to withstand outage of the largest unit. If the available capacity is judged marginal in its ability to provide adequate stability of the grid, additional measures should be taken. These may include provisions for additional capability and margin for the onsite power system beyond the normal requirements or other measures that may be appropriate in a particular case. The additional measures to be taken should be determined on an individual case basis.

C. REFERENCES

1. Regulatory Guide 1.206, “Combined License Applications for Nuclear Power Plants (LWR Edition),” 2007.

2. IEEE Std. 242-2001, “Recommended Practice for Protection and Coordination of Industrial and Commercial Power Systems,” 2001.

3. IEEE Std. 399-1997, “Recommended Practice for Power Systems Analysis,” 1997.

BRANCH TECHNICAL POSITION ICSB-18 (PSB)
APPLICATION OF THE SINGLE FAILURE CRITERION TO MANUALLY CONTROLLED ELECTRICALLY OPERATED VALVES

A. BACKGROUND

When a single failure in an electrical system can result in a loss of capability to perform a safety function, the effect on plant safety must be evaluated. This is necessary regardless of whether the loss of safety function is caused by a component failing to perform a requisite mechanical motion or by a component performing an undesirable mechanical motion.

This position establishes the acceptability of disconnecting power to electrical components of a fluid system as one means of designing against a single failure that might cause an undesirable component action. These provisions are based on the assumption that the component is then equivalent to a similar component that is not designed for electrical operation (e.g., a valve that can be opened or closed only by direct manual operation). These provisions also assume that no single failure can both restore power to the electrical system and cause mechanical motion of the components served by the electrical system. The validity of these assumptions should be verified when applying this position.

B. BRANCH TECHNICAL POSITION

1. Failures of components in electrical systems, including valves and other fluid system components, in both the “fail to function” sense and the “undesirable function” sense, should be considered in designing against a single failure, even though the valve or other fluid system component may not be called upon to function in a given safety operational sequence.

2. When it is determined that failure of an electrical system component can cause undesired mechanical motion of a valve or other fluid system component, and this motion results in loss of the system safety function, it is acceptable, in lieu of design changes that also may be acceptable, to disconnect power to the electric systems of the valve or other fluid system component. The plant technical specifications should include a list of all electrically operated valves, and the required positions of these valves, to which the requirement for removal of electric power is applied in order to satisfy the single failure criterion.

3. Electrically operated valves that are classified as “active” valves (i.e., are required to open or close in various safety system operational sequences, but are manually controlled) should be operated from the main control room. Such valves may not be included among those valves from which power is removed in order to meet the single failure criterion unless (1) electrical power can be restored to the valves from the main control room, (2) valve operation is not necessary for at least 10 minutes following occurrence of the event requiring such operation, and (3) it is demonstrated that there is reasonable assurance that all necessary operator actions will be performed within the time shown to be adequate by the analysis. The plant technical specifications should include a list of the required positions of manually controlled, electrically operated valves and should identify those valves to which the requirement for removal of electric power is applied in order to satisfy the single failure criterion.

4. When the single failure criterion is satisfied by removal of electrical power from valves described in items 2 and 3, above, these valves should have redundant position indication in the main control room, and the position indication system should, itself, meet the single failure criterion.

5. The phrase “electrically operated valves” includes both valves operated directly by an electrical device (e.g., a motor-operated valve or a solenoid-operated valve) and those valves operated indirectly by an electrical device (e.g., an air-operated valve with an air supply controlled by an electrical solenoid valve).

C. REFERENCES

None.

BRANCH TECHNICAL POSITION ICSB-21
SUPPLEMENTAL GUIDANCE FOR BYPASS AND INOPERABLE STATUS INDICATION FOR ENGINEERED SAFETY FEATURES SYSTEMS

A. BACKGROUND

The guidance of RG 1.47 needs further details as to the methods for providing an acceptable design for the bypass and inoperable status indicators for engineered safety feature (ESF) systems. The purpose of this Branch Technical Position is to provide supplemental guidance for implementing RG 1.47. This Branch Technical Position also supplements the criteria for bypass and inoperable status indication described in IEEE Std. 603, as endorsed by RG 1.153.

B. BRANCH TECHNICAL POSITION

The design criteria for bypass and inoperable status indication systems for ESFs should reflect the importance of providing accurate information for the operator and reducing the possibility for the indicating equipment to adversely affect the monitored safety systems. In developing the design criteria, the following should be considered:

1. The bypass indicators should be arranged to enable the operator to determine the status of each safety system and whether continued reactor operation is permissible.

2. When a protective function of a shared system can be bypassed, indication of that bypass condition should be provided in the control room of each affected unit.

3. The means by which the operator can cancel erroneous bypass indications, if provided, should be justified by demonstrating that the postulated cases of erroneous indications cannot be eliminated by another practical design.

4. Unless the indication system is designed in conformance with criteria established for safety systems, it should not be used to perform functions that are essential to safety. Administrative procedures should not require immediate operator action based solely on the bypass indications.

5. The indication system should be designed and installed in a manner that precludes the possibility of adverse effects on plant safety systems. Failure or bypass of a protective function should not be a credible consequence of failures occurring in the indication equipment, and the bypass indication should not reduce the required independence between redundant safety systems.

6. The indication system should include a capability of assuring its operable status during normal plant operation to the extent that the indicating and annunciating function can be verified.

C. REFERENCES

1. Regulatory Guide 1.47, “Bypassed and Inoperable Status Indication for Nuclear Power Plant Safety Systems.”

2. Regulatory Guide 1.153, “Criteria for Power, Instrumentation, and Control Portions of Safety Systems.”

3. IEEE Std. 603-1991, “Criteria for Safety Systems for Nuclear Power Generating Stations.”

BRANCH TECHNICAL POSITION PSB-1
ADEQUACY OF STATION ELECTRIC DISTRIBUTION SYSTEM VOLTAGES

A. <u>BACKGROUND</u>

Events at the Millstone station have shown that adverse effects on the Class 1E loads can be caused by sustained low grid voltage conditions when the Class 1E buses are connected to offsite power. Loss-of-voltage relays, which generally have a low-voltage pickup setting in the range of .7 per unit voltage or less, will not detect these low-voltage conditions. See Reference 2 for further background information regarding these events.

The Millstone events also demonstrated that improper voltage protection logic can itself cause adverse effects on the Class 1E systems and equipment, such as spurious load shedding of Class 1E loads from the standby diesel generators and spurious separation of Class 1E systems from offsite power resulting from normal motor starting transients.

An event at the Arkansas Nuclear One station and the subsequent analysis performed disclosed the possibility of degraded voltage conditions existing on the Class 1E buses, even those with normal grid voltages, as a result of deficiencies in equipment between the grid and the Class 1E buses or by the starting transients experienced during certain accident events not originally considered in the sizing of these circuits. See Reference 3 for further background information regarding this event.

Regulatory Issue Summary (RIS) 2000-24 summarizes the staff's concerns about grid reliability challenges that industry deregulation might impose and potential voltage inadequacies of offsite power sources.

NUREG-1793 discusses the interfaces of the AP1000 passive plant design with the offsite alternating current power system. This report also presents assumptions on the performance of the offsite power system following loss of offsite power (LOOP) required for supporting Chapter 15 analyses.

Information Notice IN 2000-06 informed licensees of possible concerns regarding the voltage adequacy of offsite power sources (i.e., power from the transmission system to nuclear power plants). This notice documents specific examples from plant operating experience.

IEEE Std. 741 provides the principal design criteria, design features, and testing requirements for protection of Class 1E power systems and equipment powered from those systems. This standard includes informative sections on degraded voltage protection and protection concerns associated with auxiliary system automatic bus transfer.

B. <u>BRANCH TECHNICAL POSITION</u>

1. In addition to the undervoltage scheme provided to detect LOOP at the Class 1E buses, a second level of undervoltage protection with time delay should be provided to protect the Class 1E equipment. This second level of undervoltage protection should satisfy the following criteria:

    a. The selection of undervoltage and time delay setpoints should be determined from an analysis of the voltage requirements of the Class 1E loads at all onsite system distribution levels.

    b. Two separate time delays should be selected for the second level of undervoltage protection based on the following conditions:

        1. The first time delay should be long enough to establish the existence of a sustained degraded voltage condition (i.e.,

something longer than a motor-starting transient). Following this delay, an alarm in the control room should alert the operator to the degraded condition. The subsequent occurrence of a safety injection actuation signal (SIAS) should immediately separate the Class 1E distribution system from the offsite power system. In addition, the degraded voltage relay logic should appropriately function during the occurrence of an SIAS followed by a degraded voltage condition.

2. The second time delay should be limited to prevent damage to the permanently connected Class 1E loads. Following this delay, if the operator has failed to restore adequate voltages, the Class 1E distribution system should be automatically separated from the offsite power system. The bases and justification for such an action must be provided in support of the actual delay chosen.

c. The voltage sensors should be designed to satisfy the following applicable requirements derived from IEEE Std. 279 and/or IEEE Std. 603, as endorsed by RG 1.153:

1. Class 1E equipment should be used and should be physically located at and electrically connected to the Class 1E switchgear.

2. An independent scheme should be provided for each division of the Class 1E power system.

3. The undervoltage protection should include coincidence logic on a per bus basis to preclude spurious trips of the offsite power source.

4. The voltage sensors should automatically initiate the disconnection of offsite power sources whenever the voltage setpoint and time delay limits (cited in item 1.b.2 above) have been exceeded.

5. Capability for test and calibration during power operation should be provided.

6. Annunciation must be provided in the control room for any bypasses incorporated in the design.

d. The technical specifications should include limiting conditions for operations, surveillance requirements, trip setpoints, and maximum and minimum allowable values for the first level of undervoltage protection (LOOP) relays and the second-level (degraded voltage) protection sensors and associated time delay devices.

2. The Class 1E bus load shedding scheme should automatically prevent shedding during sequencing of the emergency loads to the bus. The load shedding feature should, however, be reinstated upon completion of the load sequencing action. The technical specifications must include a test requirement to demonstrate the operability of the automatic load shedding features at least once every refueling outage/cycle.

An adequate basis must be provided if the load shedding feature is retained during the above load sequencing of the emergency loads to the bus.

3. The voltage levels at the safety-related buses should be optimized for the maximum and minimum load conditions that are expected throughout the anticipated range of voltage variations of the offsite power sources by appropriate adjustment of the voltage tap settings of the intervening transformers. The tap settings selected should be based on an analysis of the voltage at the terminals of the Class 1E loads. The analyses performed to determine minimum operating voltages should typically consider maximum unit steady-state and transient loads for events, such as a unit trip, loss-of-coolant accident, startup or shutdown, with the offsite power supply (grid) at minimum anticipated voltage and only the offsite source being considered available. Maximum voltages should be analyzed with the offsite power supply (grid) at maximum expected voltage concurrent with minimum unit loads (e.g., cold shutdown, refueling). A separate set of the above analyses should be performed for each available connection to the offsite power supply.

4. The analytical techniques and assumptions used in the voltage analyses cited in item 3 above must be verified by actual measurement. The verification and test should be performed before initial full-power reactor operation on all sources of offsite power by taking the following actions:

   a. Loading the station distribution buses, including all Class 1E buses down to the 120/208-volt level, to at least 30 percent

   b. Recording the existing grid and Class 1E bus voltages and bus loading down to the 120/208-volt level at steady-state conditions and during the start of both a large Class 1E and non-Class 1E motor (not concurrently)

      Note: To minimize the number of instrumented locations (recorders) during the motor-starting transient tests, the bus voltages and loading need only be recorded on that string of buses that previously showed the lowest analyzed voltages from item 3 above.

   c. Using the analytical techniques and assumptions of the previous voltage analyses cited in item 3 above, and the measured existing grid voltage and bus loading conditions recorded during conduct of the test, calculate a new set of voltages for all the Class 1E buses down to the 120/208-volt level

   d. Compare the analytically derived voltage values against the test results

With good correlation between the analytical results and the test results, the test verification requirement will be met. That is, the validity of the mathematical model used to perform the analyses of item 3 will have been established, thereby establishing the validity of the results. In general the test results should not be more than 3 percent lower than the analytical results; however, the difference between the two, when subtracted from the voltage levels determined in the original analyses, should never be less than the Class 1E equipment-rated voltages.

C. <u>REFERENCES</u>

1. Regulatory Guide 1.153, “Criteria for Power, Instrumentation, and Control Portions of Safety Systems.”

2. Millstone Unit No. 2, Safety Evaluation Supporting Amendment No. 16 to License No. DPR-65.

3. NRC Summary of Meeting for Arkansas Nuclear One Incident of September 16, 1978, February 9, 1979.

4. IEEE Std. 279-1971, “Criteria for Protection Systems for Nuclear Power Stations.”

5. IEEE Std. 603-1991, “Criteria for Safety Systems for Nuclear Power Generating Stations.”

6. NRC Information Notice 2000-06, “Offsite Power Voltage Inadequacies,” March 27, 2000.

7. NRC Regulatory Issue Summary 2000-24, “Concerns About Offsite Power Voltage Inadequacies and Grid Reliability Challenges due to Industry Deregulation,” December 21, 2000.

8. NUREG-1793, “Final Safety Evaluation Report Related to Certification of the AP1000 Standard Design,” September 2004.

9. IEEE Std. 741-1997, “IEEE Standard Criteria for the Protection of Class 1E Power Systems and Equipment in Nuclear Power Generating Stations.”

BRANCH TECHNICAL POSITION PSB-2
CRITERIA FOR ALARMS AND INDICATIONS ASSOCIATED WITH
DIESEL-GENERATOR UNIT
BYPASSED AND INOPERABLE STATUS

A. BACKGROUND

RG 1.47 and IEEE Std. 603, as endorsed by RG 1.153, describe acceptable methods for complying with the requirements of IEEE Std. 279 with respect to indicating the bypass or inoperable status of portions of the protection system, systems actuated or controlled by the protection system, and auxiliary or supporting systems that must be operable for the protection system and the system it actuates to perform their safety-related functions. Branch Technical Position ICSB-21 describes supplemental guidance for ESF system bypass or inoperable status indication. This Branch Technical Position (PSB-2) provides more specific guidance on meeting the provisions of RG 1.47 as they pertain to diesel-generator units. Diesel-generator units, as reflected in RG 1.9, consist of the engine, governor, exhaust system, generator, associated excitation and voltage regulation system, combustion air system, cooling water system up to the supply, fuel supply system, lubricating oil system, starting energy sources, starting system and autostart/load features, automatic and manual controls, test features, protective trip and lockout features, local/remote control transfer features, and the diesel-generator breaker.

Operating experience (see Ref. 5) has shown that there have been incidents in which diesel-generator units failed to respond to an automatic start signal because control switches or lockout and shutdown relays (which require manual reset) were left in the shutdown condition without control room operators being aware of their status. The principal reasons for this lack of awareness were (1) sharing of annunciator stations for both disabling and nondisabling alarm conditions, (2) wording on annunciator windows for disabling conditions that did not specifically say a diesel-generator unit was unavailable for an emergency demand, and (3) disabling conditions that were not annunciated in the control room.

Examples of bypass or deliberately induced inoperable conditions that can render diesel-generator units incapable of adequately responding to an emergency demand include nonreset of trips/lockouts, improper mode or control switch positioning, loss of control voltage, and low starting air pressure.

For the operator to act appropriately to supply emergency power when required in the operation of diesel-generator units, it is essential that accurate and sufficient information about the status of the units (e.g., a unit is under test, a unit is locked out for repair, maintenance, or otherwise unavailable) be available upon which to base decisions.

B. BRANCH TECHNICAL POSITION

1. Diesel-generator unit bypass or deliberately induced inoperability status should be automatically indicated in the control room when the bypass or deliberately induced inoperable condition can be expected to occur more frequently than once per year and can render the unit unavailable to adequately respond to an automatic or operator-initiated emergency demand. Manually induced indication may be desirable and is permitted for diesel-generator unit bypass or deliberately induced inoperability status for those conditions expected to occur less frequently than once per year.

2. All status indication should be sufficiently precise to prevent misinterpretation. Furthermore, disabling or bypass indicators should be separate from nondisabling indicators and should be physically arranged to enable the operator to clearly determine the status of each diesel-generator unit. An acceptable design includes a separate alarm for each disabling condition or a single shared alarm with reflash capability. The alarms should be displayed in the control room

and at the diesel-generator unit for all disabling conditions, with wording that indicates that the diesel-generator unit is incapable of adequately responding to an emergency demand.

3. When a shared diesel-generator unit can be bypassed, indication of that bypass condition should be provided in the control room of each affected unit.

4. The indication system should be designed and installed to preclude the possibility of adverse effects on the diesel-generator units. Failures in the indication equipment should not result in diesel-generator unit failure or bypass of the diesel-generator unit, and the bypass indication should not reduce the required independence between redundant diesel-generator units.

5. The indication system should be capable of ensuring its operable status during normal plant operation to the extent that the indicating and annunciating function can be verified.

6. RG 1.9, positions C.1.6 through C.1.8, contains further guidance to be addressed regarding status and anomalous conditions indication and alarms for diesel-generators.

C. REFERENCES

1. Regulatory Guide 1.9, “Selection, Design, Qualification, and Testing of Emergency Diesel Generator Units Used As Class 1E Onsite Electric Power Systems at Nuclear Power Plants.”

2. Regulatory Guide 1.47, “Bypassed and Inoperable Status Indication for Nuclear Power Plant Safety Systems.”

3. Regulatory Guide 1.153, “Criteria for Power, Instrumentation, and Control Portions of Safety Systems.”

4. Branch Technical Position ICSB-21, “Supplemental Guidance for Bypass and Inoperable Status Indication for Engineered Safety Features Systems,” Appendix 8-A to Standard Review Plan Chapter 8 and Appendix 7-A to Standard Review Plan Chapter 7.

5. IE Circular 77-16, “Emergency Diesel Generator Electrical Trip Lock-Out Features,” December 13, 1977.

6. IEEE Std. 279-1971, “Criteria for Protection Systems for Nuclear Power Stations.”

7. IEEE Std. 603-1991, “Criteria for Safety Systems for Nuclear Power Generating Stations.”

SRP Appendix 8-A

Description of Changes

This SRP section affirms the technical accuracy and adequacy of the guidance previously provided in (Draft) Revision 1, dated April 1996 of this SRP See ADAMS accession number ML052070493.

The technical changes are incorporated in Revision 3, dated 2007:

Review Responsibilities - Reflects changes in review branches resulting from reorganization and branch consolidation. Change is reflected throughout the SRP.

BTP ICSB 4

1. Revised to reflect IEEE Std. 603-1991, as endorsed by RG 1.153, as an acceptable alternative for addressing operating bypasses for safety-related systems.

2. Revised to reflect IEEE Std. 1290-1996 as a source of information for motor-operated valve protection, control, and testing.

BTP ICSB 11

1. Revised to reflect RG 1.206, IEEE Std. 242-2001, and IEEE Std. 399-1997 as sources of information on stability of offsite power systems.

2. Revised to remove reference to plants in Puerto Rico.

BTP ICSB 21

1. Revised to reflect IEEE Std. 603-1991, as endorsed by RG 1.153, as an acceptable alternative for addressing bypass and inoperable status indication for safety-related systems.

BTP PSB 1

1. Revised to reflect IEEE Std. 603-1991, as endorsed by RG 1.153, as an acceptable alternative for addressing the design of voltage sensors for undervoltage protection schemes on Class 1E buses of safety-related systems.

2. Revised to reflect IN 2000-06, RIS 2000-24, NUREG-1793, and IEEE Std. 741-1997 as additional sources of information related to degraded voltages.

3. Revised paragraph 1.b.1 to clarify functioning of degraded voltage relay logic with regard to the sequence of SIAS and undervoltage signals.

4. Revised paragraph 1.d for consistency with terminology used in Standard Technical Specifications.

5. Revised paragraph 2 to clarify technical specification testing requirements.

BTP PSB 2

1. Revised to reflect IEEE Std. 603-1991, as endorsed by RG 1.153, as an acceptable alternative for addressing bypass and inoperable status indication for diesel generator units.

2. Revised to reflect RG 1.9 as an additional source of guidance for addressing bypass and inoperable status indication for diesel generator units.