

April 26, 2012

MEMORANDUM TO: Thomas B. Blount, Deputy Director
Division of Reactor Safety
Region IV

FROM: Robert A. Nelson, Deputy Director */RA/*
Division of Policy and Rulemaking
Office of Nuclear Reactor Regulation

SUBJECT: REVISED RESPONSE TO TASK INTERFACE AGREEMENT –
REQUIREMENTS FOR TESTING STATION BATTERIES FOR STATION
BLACK-OUT CONDITIONS AT THE SAN ONOFRE NUCLEAR
GENERATING STATION, TIA 2009-002 (TIA 2011-014)

By letter dated December 18, 2008, Region IV, Division of Reactor Safety, requested assistance from the Office of Nuclear Reactor Regulation (NRR) in answering the following questions regarding the requirements for testing station batteries for station black-out (SBO) conditions at the San Onofre Nuclear Generating Station (SONGS):

1. If the SBO event duty cycle should be considered a design duty cycle;
2. If the SBO event duty cycle is considered a design duty cycle, does this require SONGS to test the batteries in accordance with the technical specification surveillance requirements to the SBO conditions;
3. If the SBO event duty cycle is not considered a design duty cycle, what, if any NRC requirements exist for testing the batteries to the SBO event duty cycle; and
4. Is testing to demonstrate battery performance using the SBO event duty cycle a backfit for 10 CFR 50.63, the Technical Specifications, or other regulatory requirement?

The NRR staff responded to the subject Task Interface Agreement in a letter dated April 28, 2010 (Agencywide Documents Access and Management System Accession No. ML101130021). Based on further review, the NRR staff is revising its assessment that was included as an enclosure to the April 28, 2010, letter.

The NRR staff's revised assessment is documented in the enclosed staff evaluation.

Docket Nos.: 50-361, 50-362

Enclosure:
As stated

CONTACT: Holly D. Cruz, NRR/DPR
(301) 415-1053

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TASK INTERFACE AGREEMENT (TIA) 2011-014
REQUIREMENTS FOR TESTING STATION BATTERIES FOR STATION BLACK-OUT
CONDITIONS AT THE SAN ONOFRE NUCLEAR GENERATING STATION (SONGS)

1.0 INTRODUCTION

By letter dated December 18, 2008, Agencywide Documents Access and Management System (ADAMS) Accession No. ML0835401312, the U.S. Nuclear Regulatory Commission (NRC) Region IV Office requested assistance from Office of Nuclear Reactor Regulation (NRR) in providing answers to the following TIA questions regarding testing of station batteries at SONGS.

1. [Should] the SBO [station black-out] event duty cycle ... be considered a design duty cycle?
2. If the SBO event duty cycle is considered a design duty cycle, does this require SONGS to test the batteries in accordance with the Technical Specification (TS) Surveillance Requirements (SRs) to the SBO conditions?
3. If the SBO event duty cycle is not considered a design duty cycle, what, if any NRC requirements exist for testing the batteries to the SBO event duty cycle?
4. Is testing to demonstrate battery performance using the SBO event duty cycle a backfit for 10 CFR 50.63, the TSs, or another regulatory requirement?

The NRR staff responded to the subject TIA in a letter dated April 28, 2010 (ADAMS Accession No. ML101130021). Based on further review, the NRR staff is revising their assessment that was included as an enclosure to the April 28, 2010, letter. The NRR staff's revised assessment is discussed below.

2.0 BACKGROUND

On September 3, 2008, a NRC Region IV inspection team completed a component design basis triennial baseline inspection at SONGS. The inspection team determined that SONGS was not testing the safety-related 125 Volt direct current station batteries for the SBO event duty cycle, the most limiting event that the battery would experience. The team questioned if TS SR 3.8.4.7 (Service Test) applied to the SBO event duty cycle for the batteries. The licensee indicated that testing was not required because Title 10 of the *Code of Federal Regulations* (10 CFR) Section 50.63 only required a coping analysis to be done, and that they (SONGS) never received any correspondence from the NRC indicating a requirement to test the batteries using the SBO event duty cycle. Furthermore, NUREG-1776, "Regulatory Effectiveness of the Station Black-Out Rule," published in 2003, page B-4, lists all modifications SONGS completed for Units 2 and 3 in order to comply with the SBO rule. This included two items: modifying its procedures to include load stripping from the batteries during SBO events in order to cope for 4 hours, and adding a cross-tie to the site-wide electrical system.

ENCLOSURE

In discussion of the issue with Region IV inspection staff, there was recognition that testing may be required by NRC regulatory requirements such as TS SR 3.8.4.7, General Design Criteria (GDC) 1, "Quality standards and records," and GDC 18, "Inspection and testing of electric power systems," of Appendix A to 10 CFR Part 50, and Criterion XI, "Test Control," of Appendix B to 10 CFR Part 50. Following additional discussions with Region IV inspection staff, a decision was reached to submit the concern as a TIA.

The NRC issued Amendment Nos. 218 and 211, ADAMS Accession No. ML083330097, on November 28, 2008 for SONGS Units 2 and 3, respectively. These amendments revised TS Section 3.8.4. Specifically, the SR 3.8.4.7 requirements were replaced by SRs 3.8.4.3 and 3.8.4.4. Therefore, discussion of SR 3.8.4.7 in this evaluation refers to the current SRs 3.8.4.3 and 3.8.4.4.

3.0 EVALUATION

Question 1: [Should] the SBO event duty cycle ... be considered a design duty cycle?

Yes. Section 8.3.2.1.2.1, "Battery Capacity," of the SONGS Final Safety Analysis Report (FSAR) identifies two limiting design functions (i.e., duty cycles) of the battery. These design functions include mitigating the loss of voltage (LOV)/safety injection actuation signal (SIAS) duty cycle and the SBO duty cycle. Any duty cycle that is part of the design bases (i.e., as identified in the FSAR) for the plant is considered a design duty cycle. For SONGS, both of these duty cycles are considered design duty cycles. The primary difference between the two duty cycles is that the LOV/SIAS duty cycle contains a higher peak loading (i.e., critical period) with 90-minute duration while the SBO duty cycle contains a lower peak loading but requires 4-hour duration (i.e., critical period).

As mentioned above, the Region IV inspection team determined that the SBO event duty cycle is the most limiting event that the battery would experience based on UFSAR Chapter 8 information that specifically tied the sizing design to Battery Sizing Calculation E4C-017 that the inspection team reviewed as part of the original design basis inspection. Based on this, the team questioned if TS SR 3.8.4.7 (Service Test) applied to the SBO event duty cycle for the batteries. As part of its review, the staff requested the licensee to explain how it verifies the capability of the safety-related (Class 1E) station batteries to supply the SBO load profile (i.e., duty cycle). Based on our review of the licensee's response, the staff considers both the LOV/SIAS duty cycle and the SBO event duty cycle to be equally the most limiting events the battery would experience. Our decision is based on the principle differences between the two duty cycles and the similar resulting consequences. In other words, the LOV/SIAS duty cycle is the most limiting from a peak loading standpoint and the SBO event duty cycle is the most limiting due to its extended duration. The failure to mitigate the consequences of either of these events could challenge the integrity of the reactor core and the containment building. However, the only design duty cycle that is required to be tested in accordance with TS SR 3.8.4.7 is the duty cycle that is derived from the Design Basis Accident (DBA) or transient analyses of postulated events in Chapters 6 and 15 of the SONG's FSAR (i.e., the LOV/SIAS duty cycle).

Since the SBO event duty cycle is not described in either Chapter 6 or 15 of the SONGS FSAR, TS SR 3.8.4.7 does not apply. While testing to the SBO event duty cycle is not required in accordance with TS SR 3.8.4.7, the staff expects the licensee to demonstrate, by testing, that

the batteries will perform satisfactorily during an SBO event. Testing would provide assurance that the station batteries will perform satisfactorily when called upon.

Question 2: If the SBO event duty cycle is considered a design duty cycle, does this require SONGS to test the batteries in accordance with the TS SRs to the SBO conditions?

Response: No, testing the batteries in accordance with the TS SRs to SBO conditions is only applicable if the SBO duty cycle is derived from the DBA or transient analyses of postulated events analyzed in Chapters 6 and 15 of the SONGS FSAR. In accordance with 10 CFR 50.36, TSs are derived from the analyses and evaluation in the safety analysis report and TS testing is for structures systems and components that meet one or more criterion in 50.36(c)(2)(ii). SBO equipment is not represented in SONG's FSAR Chapters 6 and 15; therefore the capability of this equipment to meet the coping strategies of the SBO rule would not be tested in accordance with TS.

The SBO rule 10 CFR 50.63 became a final rule on June 21, 1988, and Regulatory Guide (RG) 1.155, "Station Blackout" was issued in August of 1988. RG 1.155 describes a method acceptable to the NRC staff for complying with the Commission regulation that requires nuclear power plants to be capable of coping with a SBO for a specified duration. This RG applies to SONGS. RG 1.155 Appendix B, "Guidance Regarding System and Station Equipment Specifications" states that Technical Specifications should be consistent with the Interim Commission Policy Statement on Technical Specifications (52 FR 3789) as applicable.

The Interim Commission Policy Statement on Technical Specifications stated,

The following criteria delineate those constraints on design and operation of nuclear power plants that are derived from the plant safety analysis report and are required to be in Technical Specifications in accord with 10 CFR 50.36.

Criterion 1: Installed instrumentation that is used to detect, and indicate in the control room, a significant abnormal degradation of the reactor coolant pressure boundary....

Criterion 2: A process variable that is an initial condition of a Design Basis Accident (DBA) or Transient Analyses that either assumes the failure of or presents a challenge to the integrity of a fission product barrier....

Criterion 3: A structure, system, or component that is part of the primary success path and which functions or actuate to mitigate a Design Basis Accident or Transient that either assumes the failure of or presents a challenge to the integrity of a fission product barrier....

In a letter dated February 6, 1992, the NRC staff reviewed SONGS plan and schedule for conformance to 10 CFR 50.63 and determined that contingent upon the satisfactory resolution of seven recommendations made in the safety evaluation, SONGS conforms to the SBO rule. In the letter the NRC staff wrote:

The staff has taken the position that TS are required for SBO response equipment. However, the question of how specifications for the SBO equipment

will be applied is currently being considered generically by the NRC in the context of the Technical Specification Improvement Program and remains open at this time. In the interim, the staff expects plant procedures to reflect the appropriate testing and surveillance requirements to ensure the operability of the necessary SBO equipment. If the staff later determines that TS regarding the SBO equipment are warranted, licensees will be notified of the implementation requirements.

On September 14, 1992, ADAMS Accession No. ML101090096, the NRC staff reviewed SONGS's response to the seven recommendations made in the January 6, 1992 letter and found them to be acceptable.

On July 22, 1993, the "Final Policy Statement on Technical Specifications Improvements for Nuclear Power Reactors" (58 CFR 39132) became effective. The Final Policy Statement introduced a fourth criterion to 10 CFR 50.36(c)(2), "Limiting Conditions of Operations." Criterion four includes any structure, system, or component which operating experience or probabilistic safety assessment has shown to be significant to public health and safety.

On February 9, 1996, in accordance with the "Final Policy Statement on Technical Specifications Improvements for Nuclear Power Reactors," SONGS updated their TS to be consistent with NUREG-1432, "Standard Technical Specifications, Combustion Engineering Plants." The SBO event duty cycle is not included in NUREG-1432 surveillance requirements for station batteries. Therefore, the SBO event duty cycle was not included in TS SRs for SONGS station batteries. Revising SONGS TS SRs to require testing to the SBO conditions to verify that the battery will be capable of performing the intended SBO safety function would be a backfit per 10 CFR 50.109.

Additional information is provided in the answer to question 4.

Testing to the LOVS/SIAS duty cycle is required by TS SR 3.8.4.7, however, testing to the SBO duty cycle is not required to be tested in accordance with TS SR 3.8.4.7.

Question 3: *If the SBO event duty cycle is not considered a design duty cycle, what, if any NRC requirements exist for testing the batteries to the SBO event duty cycle?*

Response: Not applicable. See response to Questions 1 and 2.

Question 4: *Is testing to demonstrate battery performance using the SBO event duty cycle a backfit for 10 CFR 50.63, the TSs, or another regulatory requirement?*

Response: Yes. It could be a backfit.

10 CFR 50.63, "Loss of all alternating current power" requires that all nuclear power plants be capable of coping with a SBO for some specified period of time. The period of time for a specific plant will be determined based on a comparison of the individual plant's design with factors that have been identified as the main contributions to risk of core damage resulting from SBO. The summary for 10 CFR 50.63 (53 FR 23203) states, "The Commission believes that § 50.63 of 10 CFR Part 50 will bring about a significant increase in protection to the public health

and safety.” The objective of 10 CFR 50.63 is to reduce the risk of severe accidents resulting from SBO by maintaining highly reliable ac electric power systems and, as additional defense-in-depth, assuring that plants can cope with a SBO for some period of time.

RG 1.155 describes a method acceptable to the NRC staff for complying with the Commission regulation that requires nuclear power plants to be capable of coping with a SBO for a specified duration. This RG applies to all light-water-cooled nuclear power plants. RG 1.155 references that GDC 1 and GDC 18 apply to safety-related equipment needed to cope with SBO and other safety functions. GDC 1 requires, in part, that structures, systems, and components important to safety shall be designed, fabricated, erected, and tested to quality standards commensurate with the importance of the safety functions to be performed. Where generally recognized codes and standards are used, they shall be identified and evaluated to determine their applicability, adequacy, and sufficiency and shall be supplemented or modified as necessary to assure a quality product in keeping with the required safety function. GDC 18 includes a requirement for appropriate periodic testing and inspection of electric power systems important to safety. In addition, Criterion III, “Design Control,” of Appendix B to 10 CFR Part 50, requires that measures shall be established to assure that applicable regulatory requirements and the design basis, as defined in § 50.2 and as specified in the license application, for those structures, systems, and components to which this appendix applies are correctly translated into specifications, drawings, procedures, and instructions. Criterion V, “Instructions, Procedures, and Drawings,” of Appendix B to 10 CFR Part 50 requires instructions, procedures, or drawings for activities that affect quality. The instructions, procedures, or drawings shall include appropriate quantitative or qualitative acceptance criteria for determining that important activities have been satisfactorily accomplished. Criterion XI of Appendix B to 10 CFR Part 50 requires that a test program shall be established to assure that all testing required to demonstrate that structures, systems, and components will perform satisfactorily in service is identified and performed in accordance with written test procedures which incorporate the requirements and acceptance limits contained in applicable design documents. Appendix B applies to all activities affecting the safety-related functions of structures, systems, and components. These activities include designing, purchasing, fabricating, handling, shipping, storing, cleaning, erecting, installing, inspecting, testing, operating, maintaining, repairing, refueling, and modifying. Mitigating the consequence of an SBO event is not considered a safety-related function for the SONGS station batteries. Therefore, Appendix B is not applicable to the SONGS station batteries for non-safety related functions such as those required to support mitigation of an SBO event.

On July 22, 1993, the “Final Policy Statement on Technical Specifications Improvements for Nuclear Power Reactors” (58 CFR 39132) became effective. The Final Policy Statement added a fourth criterion to 10 CFR 50.36(c)(2), “Limiting Conditions of Operations.” Criterion four states: “A structure, system, or component which operating experience or probabilistic safety assessment has shown to be significant to public health and safety.”

SONGS cannot provide four hours of coping without the availability of their station batteries. Given: (1) the significant increase in protection to the public health and safety from being able to cope with a SBO, and (2) the risk of core damage resulting from a SBO, the NRC staff finds testing the station batteries to the SBO duty cycle to verify coping requirements of 10 CFR 50.63 could meet criterion four of 10 CFR 50.36.

Performing a single Service Test that bounds both the LOV/SIAS and SBO duty cycles satisfies two key items: meet the intent of the regulations and technical specification requirements for testing stationary batteries (battery service test), and does not subject the battery to excessive testing that may unnecessarily degrade the battery.

10 CFR 50.36(c)(3), "Surveillance Requirements," requires that TSs include SRs, which "are requirements relating to test, calibration, or inspection to assure that the necessary quality of systems and components is maintained, that facility operation will be within safety limits, and that the limiting conditions for operation will be met." TS SR testing of the station batteries to verify Operability typically demonstrates that the battery will be capable of performing the intended safety function(s).

Adding a requirement to SONGS TS SR 3.8.4.7 that will require the licensee to verify that the battery capacity and capability is adequate to supply the required SBO design duty cycle, when subjected to a battery service test every 24 months, would be a more restrictive change to SONGS technical specifications. Such a change represents a modification of the procedures required to operate the facility resulting from a new or amended provision in the Commission rules. Pursuant to 10 CFR 50.109, such a change would be a backfit and would need to be accomplished in the appropriate process.

4.0 CONCLUSION

Based on review of TIA 2009-02, the NRR staff finds the following:

- 1) The LOV/SIAS and SBO event duty cycles should both be considered design duty cycles. However, only the LOV/SIAS duty cycle is required to be tested in accordance with TS SR 3.8.4.7.
- 2) The licensee is not required to test the station batteries to the SBO duty cycle in accordance with TS SR 3.8.4.7.
- 3) Requiring the licensee to test the station batteries in accordance with TS 3.8.4.7 would be a backfit.

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