**UNITED STATES**
**NUCLEAR REGULATORY COMMISSION**
REGION II
245 PEACHTREE CENTER AVENUE NE, SUITE 1200
ATLANTA, GEORGIA 30303-1257

September 23, 2013

Mr. Joseph W. Shea
Vice President, Nuclear Licensing
Tennessee Valley Authority
1101 Market Street, LP 3D-C
Chattanooga, TN 37402-2801

SUBJECT: SEQUOYAH NUCLEAR PLANT - NRC COMPONENT DESIGN BASES INSPECTION REPORT 05000327/2013007 AND 05000328/2013007

Dear Mr. Shea:

On August 9, 2013, the U. S. Nuclear Regulatory Commission (NRC) completed an inspection at your Sequoyah Nuclear Plant, Units 1 and 2. The enclosed inspection report documents the inspection results, which were discussed on August 9, 2013, with you and other members of your staff. On September 16, the team leader conducted a supplementary exit with Mr. John Carlin and other members of your staff to present changes to the inspection as a result of the team's review of additional information.

The inspection examined activities conducted under your licenses as they relate to safety and compliance with the Commission's rules and regulations and with the conditions of your licenses. The team reviewed selected procedures and records, observed activities, and interviewed personnel.

Seven NRC-identified findings of very low safety significance (Green), were identified during this inspection, and were determined to involve violations of NRC requirements. Additionally, the enclosed inspection report discusses a finding for which the NRC has not yet reached a preliminary significance determination. As described in Section 1R21.3 of the enclosed report, the team identified that the licensee failed to consider instrument uncertainty and design basis requirements in determining the allotted time for operators to complete time critical actions to swap emergency core cooling pump suction from the refueling water storage tank to the containment sump. The finding did not represent an immediate safety concern because a review of past results indicated that operators were consistently performing the actions in times less than required, as documented by simulator testing.

We intend to complete and issue our final safety significance determination of this finding within 90 days from the date of this letter. The NRC's significance determination process is designed to encourage an open dialogue between your staff and the NRC; however, the dialogue should not affect the timeliness of our final determination. When the NRC has completed this evaluation, the safety significance of this finding will be communicated in a separate correspondence. Because the NRC has not made a final determination in this matter, no notice of violation is being issued for this inspection finding at this time.

The NRC is treating the seven violations of very low safety significance as non-cited violations consistent with Section 2.3.2 of the NRC Enforcement Policy. If you contest these violations or the significance of the violations, you should provide a response within 30 days of the date of this inspection report, with the basis for your denial, to the Nuclear Regulatory Commission, ATTN: Document Control Desk, Washington DC 20555-001; with copies to the Regional Administrator Region II; the Director, Office of Enforcement, United States Nuclear Regulatory Commission, Washington, DC 20555-0001; and the NRC Resident Inspector at Sequoyah. If you disagree with a cross-cutting aspect assignment in this report, you should provide a response within 30 days of the date of this inspection report, with the basis for your disagreement, to the Regional Administrator, Region II; and the NRC Resident Inspector at Sequoyah.

In accordance with 10 CFR 2.390 of the NRC's "Rules of Practice," a copy of this letter, its enclosure, and your response, if any, will be available electronically for public inspection in the NRC Public Document Room or from the Publicly Available Records (PARS) component of the NRC's Agencywide Documents Access and Management System (ADAMS). ADAMS is accessible from the NRC Web site at http://www.nrc.gov/reading-rm/adams.html (the Public Electronic Reading Room).

Sincerely,

***/RA/***

Rebecca L. Nease, Chief
Engineering Branch 1
Division of Reactor Safety

Docket Nos.: 50-327, 50-328
License Nos.: DPR-77, DPR-79

Enclosure:
Inspection Report 05000327/2013007,
05000328/2013007 w/Supplementary
Information

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ADAMS:x ☐ Yes ACCESSION NUMBER:__ML13267A460_____ x☐ SUNSI REVIEW COMPLETE x☐ FORM 665 ATTACHED

| OFFICE | RII:DRS | RII:DRP | RII:DRS | RII:DRS | CONTRACTOR | CONTRACTOR | RII:DRP |
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| SIGNATURE | ***RA*** | ***RA*** | ***RA*** | ***RA*** | ***RA*** | ***RA*** | ***RA*** |
| NAME | WALKER | COOVERT | MAS | PATTERSON | FERRARINI | SKINNER | SHAEFFER |
| DATE | 9/16/2013 | 9/13/2013 | 9/13/2013 | 9/13/2013 | 9/12/2013 | 9/12/2013 | 9/23/2013 |
| E-MAIL COPY? | YES NO | YES NO | YES NO | YES NO | YES NO | YES NO | YES NO |

| OFFICE | RII:DRS | | | | | | |
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| SIGNATURE | ***RA*** | | | | | | |
| NAME | NEASE | | | | | | |
| DATE | 9/23/2013 | 9/ /2013 | 9/ /2013 | 9/ /2013 | 9/ /2013 | 9/ /2013 | 9/ /2013 |
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**U.S. NUCLEAR REGULATORY COMMISSION**

**REGION II**

| | |
|---|---|
| Docket Nos.: | 50-327, 50-328 |
| License Nos.: | DPR-77, DPR-79 |
| Report Nos.: | 05000327/2013007, 05000328/2013007 |
| Licensee: | Tennessee Valley Authority (TVA) |
| Facility: | Sequoyah Nuclear Plant, Units 1 and 2 |
| Location: | Sequoyah Access Road<br>Soddy-Daisy, TN 37379 |
| Dates: | July 8 – August 9, 2013 (onsite) |
| Inspectors: | Shakur Walker, Senior Reactor Inspector (Lead)<br>Nicole Coovert, Reactor Inspector<br>Delza Mas, Reactor Inspector<br>Robert Patterson, Reactor Inspector<br>Victor Ferrarini, Accompanying Personnel<br>George Skinner, Accompanying Personnel |
| Approved by: | Rebecca L. Nease, Chief<br>Engineering Branch 1<br>Division of Reactor Safety |

Enclosure

## SUMMARY

IR 05000327/2013007, 05000328/2013007; 7/8/2013–8/9/2013; Sequoyah Nuclear Plant, Units 1 and 2; Component Design Bases Inspection.

This inspection was conducted by a team of four Nuclear Regulatory Commission (NRC) inspectors from Region II, and two NRC contract personnel. Seven findings of very low safety significance and one apparent violation were identified. The significance of inspection findings are indicated by their color (i.e., greater than Green, or Green, White, Yellow, Red) and determined using Inspection Manual Chapter (IMC) 0609, "Significance Determination Process" dated June 2, 2011. Cross-cutting aspects are determined using IMC 0310; "Components Within the Cross Cutting Areas" dated October 28, 2011. All violations of NRC requirements are dispositioned in accordance with the NRC's Enforcement Policy dated January 28, 2013, revised July 9, 2013. The NRC's program for overseeing the safe operation of commercial nuclear power reactors is described in NUREG-1649, "Reactor Oversight Process" revision 4.

NRC identified and Self-Revealing Findings

Cornerstone: Initiating Events

- Green: The team identified a non-cited violation of 10 CFR 50, Appendix B, Criterion V, "Instructions, Procedures, and Drawings," for the licensee's failure to follow a test control procedure to evaluate indications of excessive check valve leakage prior to changing modes. Specifically, the licensee failed to evaluate the potential inoperability of residual heat removal check valve 2-63-563, which exhibited indications of excessive leakage, as required by procedure NPG-SPP-06.9.1, "Conduct of Testing," prior to transitioning to Mode 3, during startup. This was a performance deficiency. After conducting interviews with operations staff and performing a prompt determination of operability, the licensee concluded that the valve was never inoperable, since the valve subsequently passed its leak rate test in Mode 3 with no maintenance being performed. The operability determination was documented in PER 757559.

  This performance deficiency was determined to be more than minor because it affected the Human Performance attribute of the Initiating Events cornerstone and adversely affected the cornerstone objective of limiting the likelihood of events that upset plant stability and challenge critical safety functions during shutdown as well as power operations. Specifically, failing to evaluate indications of excessive check valve leakage while performing procedure 2-SI-SXV-063-206.0, "ECCS Check Valve Leak Testing" section 6.3.2, adversely affected the cornerstone objective of limiting the likelihood of events that challenge the critical safety function of maintaining the RCS pressure boundary. The team used Inspection Manual Chapter 0609, "Significance Determination Process," Attachment 4, "Initial Characterization of Findings," and Appendix A, "The Significance Determination Process for Findings At-Power," and determined that the finding was of very low safety significance (Green) because the finding would not have affected other systems used to mitigate a LOCA resulting in a total loss of their functions. The team determined that this finding represented present licensee performance and directly involved the cross-cutting area of Human Performance, component of Decision-Making because the licensee did not use conservative assumptions in their decision making when they failed to

evaluate the potential inoperability of check valve 2-63-563 prior to transitioning to Mode 3. [H.1(b)] (Section 1R21.2.3)

Cornerstone: Mitigating Systems

- Green: The team identified a non-cited violation of 10 CFR 50, Appendix B, Criterion III, "Design Control," for the licensee's failure to translate the entire range of allowable emergency diesel generator (EDG) frequencies into design basis documents. The failure to analyze the effects of the technical specification allowable EDG frequency range on the safety-related components powered by the EDGs was a performance deficiency. The licensee entered this issue in their corrective action program as PER 758761 and performed a prompt operability evaluation to determine that the safety-related equipment powered by the EDGs with a limited frequency range variation of 59.9 to 60.1 Hz, would be able to perform their design basis functions under accident conditions. In addition, a review of the results of the EDGs' surveillances indicates no history of being outside the range of 59.9 to 60.1 Hz for the last three years.

  The performance deficiency was determined to be more than minor because it affected the Design Control attribute of the Mitigating Systems cornerstone and adversely affected the cornerstone objective of ensuring the availability, reliability, and capability of safety systems that respond to initiating events to prevent undesirable consequences. Specifically, failure to account for the allowable range of the EDG frequency and not evaluating the impact on safety-related components powered by the EDGs did not ensure the availability and capability of safety-related components to respond to initiating events. The team used Inspection Manual Chapter 0609, "Significance Determination Process," Attachment 4, "Initial Characterization of Findings," and Appendix A, "The Significance Determination Process for Findings At-Power," and determined that the finding was of very low safety significance (Green) because the finding was not a design deficiency resulting in the loss of functionality or operability. The team determined that this finding represented present licensee performance and directly involved the cross-cutting area of Human Performance, component of Resources because the licensee failed to ensure that design calculations affected by EDG frequency were complete and accurate. [H.2(c)] (Section 1R21.2.6)

- Green: The team identified a non-cited violation of 10 CFR 50, Appendix B, Criterion III, "Design Control," for the licensee's failure to properly translate the design and licensing bases for the 125 VDC system into design calculations. The licensee inappropriately credited the battery chargers for voltage support during accident scenarios in their voltage drop calculations, and failed to include vital inverters in the battery load profile. This was a performance deficiency. In response to the team's inquiries, the licensee initiated PER 758465 that provided reasonable expectation of operability by demonstrating that the required voltages would be available. This was based on interpolation of the vendor battery curves considering the maximum loading on the battery for the applicable portions of the duty cycle.

This performance deficiency was determined to be more than minor because it affected the Design Control attribute of the Mitigating Systems cornerstone, and adversely affected the cornerstone objective of ensuring the availability, reliability, and capability of systems that respond to initiating events to prevent undesirable consequences. Specifically, the licensee failed to properly evaluate the 125 VDC system under accident conditions to ensure the capability and availability of 125V control circuits to operate during design basis events. The team used Inspection Manual Chapter 0609, "Significance Determination Process," Attachment 4, "Initial Characterization of Findings," and Appendix A, "The Significance Determination Process for Findings At-Power," and determined that the finding was of very low safety significance (Green) because the finding was not a design deficiency resulting in the loss of functionality or operability. A cross-cutting aspect was not identified because this performance deficiency was not indicative of present licensee performance. (Section 1R21.2.9)

- Green: The team identified a non-cited violation of 10 CFR 50, Appendix B, Criterion III, "Design Control," for the licensee's failure to check the adequacy of the design of the steam generator feedwater isolation valve motor brakes. Specifically, the licensee based voltage acceptance criterion of 74% of 460V for motor brakes used in a design basis calculation on inadequate testing and calculational methods. This was a performance deficiency. In response to the team's concerns, the licensee initiated PER 763818 and provided reasonable expectation of operability of the motor brakes, by use of administratively controlled voltage, pending restoration of full qualification.

  This performance deficiency was determined to be more than minor because it affected the Design Control attribute of the Mitigating Systems cornerstone, and adversely affected the cornerstone objective of ensuring the availability, reliability, and capability of systems that respond to initiating events to prevent undesirable consequences. Specifically, inadequate design criteria did not ensure the availability, reliability, and capability of the steam generator feedwater isolation valve motor brakes to operate under design basis degraded voltage conditions. The team used Inspection Manual Chapter 0609, "Significance Determination Process," Attachment 4, "Initial Characterization of Findings," and Appendix A, "The Significance Determination Process for Findings At-Power," and determined that the finding was of very low safety significance (Green) because the finding was not a design deficiency resulting in the loss of functionality or operability. A cross-cutting aspect was not identified because this performance deficiency was not indicative of present licensee performance. (Section 1R21.2.11)

- Green: The team identified a non-cited violation of TS 6.8.1, Procedures and Programs, the licensee's failure to properly implement maintenance procedures for performing receipt inspection of new 480V circuit breakers. Specifically, the licensee's failure to evaluate the need to report defects and deficiencies, identified on new safety-related 480V circuit breakers, in the corrective action program as prescribed by procedure was a performance deficiency. The licensee corrected the deficiencies prior to putting the breakers in service. This issue was entered into the licensee's corrective action program as PERs 763834 and 759238.

This performance deficiency was determined to be more than minor because if left uncorrected could lead to a more significant safety concern. Specifically, not documenting deficiencies that could adversely affect the breakers in the corrective action program, would not ensure breaker issues were being properly trended and that the issues have been adequately corrected and are not recurring. The team used Inspection Manual Chapter 0609, "Significance Determination Process," Attachment 4, "Initial Characterization of Findings," and Appendix A, "The Significance Determination Process for Findings At-Power," and determined that the finding was of very low safety significance (Green) because it was not a design deficiency resulting in the loss of functionality or operability. The team determined that this finding represented present licensee performance and directly involved the cross-cutting area Human Performance, component of Work Practices because the licensee failed to meet expectations regarding procedural compliance and did not follow procedures related to 480V safety-related breaker receipt inspections. [H.4(b)] (Section 1R21.2.11)

- Green: The team identified a non-cited violation of TS 6.8.1, Procedures and Programs, for the licensee's failure to implement procedures for equipment and maintenance control. The licensee's failure to perform 10 CFR 50.59 reviews of temporary plant changes (e.g., scaffolding and clearances) that existed for greater than 90 days of plant operation was a performance deficiency. The licensee implemented corrective actions to review all of the temporary plant changes. The licensee generated PERs 756276, 753175, and 756308.

  This performance deficiency was determined to be more than minor because it affected the Design Control attribute of the Mitigating Systems cornerstone, and adversely affected the cornerstone objective of ensuring the availability, reliability, and capability of systems that respond to initiating events to prevent undesirable consequences. Specifically, the team identified multiple examples where the licensee failed to evaluate temporary plant changes to ensure those changes did not affect the availability, reliability, and capability of systems that respond to events. The team used Inspection Manual Chapter 0609, "Significance Determination Process," Attachment 4, "Initial Characterization of Findings," and Appendix A, "The Significance Determination Process for Findings At-Power," and determined that the finding was of very low safety significance (Green) because it was not a design deficiency resulting in the loss of functionality or operability. The team determined that this finding represented present licensee performance and directly involved the cross-cutting area of Human Performance, component of Work Practices because licensee failed to meet expectations regarding procedural compliance and did not follow procedures related to performing 50.59 reviews of temporary plant changes that existed for greater than 90 days of plant operation. [H.4(b)] (Section 1R21.3)

- Green: The team identified a non-cited violation of 10 CFR 50, Appendix B, Criterion XVI, "Corrective Action," for the licensee's failure to promptly identify and correct deficiencies in electrical calculations for the safety-related AC electrical distribution system identified during the 2010 CDBI. Specifically, the licensee's failure to identify that safety-related motor operated valve (MOVs) needed to be evaluated for new lower calculated available voltage (degraded voltage) to ensure their operability was a performance deficiency. The licensee initiated PER 753504 and performed a prompt determination of operability

(PDO). The team concluded that the evaluations and compensatory measures described in the PDO provided reasonable expectation of operability.

The performance deficiency was determined to be more than minor because it affected the Design Control attribute of the Mitigating Systems cornerstone, and adversely affected the cornerstone objective of ensuring the availability, reliability, and capability of systems that respond to initiating events to prevent undesirable consequences. Specifically, failure to identify and evaluate that safety-related MOVs could be affected by degraded voltage conditions did not ensure the availability, reliability, and capability of the MOVs to respond to initiating events. The team used Inspection Manual Chapter 0609, "Significance Determination Process," Attachment 4, "Initial Characterization of Findings," and Appendix A, "The Significance Determination Process for Findings At-Power," and determined that the finding was of very low safety significance (Green) because the finding was not a design deficiency resulting in the loss of functionality or operability. The team determined that this finding represented present licensee performance and directly involved the cross-cutting area of Problem Identification and Resolution, component of Corrective Action Program because the licensee failed to identify that safety-related MOVs needed to be evaluated for new lower calculated available voltage (degraded voltage) to ensure their operability. [P.1(c)] (Section 1R21.4)

- To-Be-Determined (TBD): The team identified an Apparent Violation of 10 CFR 50, Appendix B, Criterion III, "Design Control," for the licensee's failure to correctly translate design basis requirements into emergency sub-procedure, ES-1.3, "Transfer to Residual Heat Removal Containment Sump," Rev. 19. Specifically, the time allotted for operators to perform time critical actions to swap emergency core cooling system (ECCS) pump suction from the refueling water storage tank (RWST) to the containment sump during a small break loss of coolant accident (SBLOCA) did not properly account for the instrument uncertainty and the design basis requirement in Updated Final Safety Analysis Report 15.3.1, to ensure the recovery of the core was demonstrated and to ensure continuous operation of the ECCS. This was a performance deficiency. As immediate corrective action, the licensee performed an operability review and documented the results in the corrective action program as PERs 760336 and 758761. The licensee concluded that there were no current operability concerns, and created Standing Order SO-13-025 to reinforce operator time performance requirements.

  The performance deficiency was determined to be more than minor because it affected the Design Control attribute of the Mitigating Systems cornerstone, and adversely affected objective of ensuring the availability, reliability, and capability of containment spray pumps, safety injection pumps, and charging pumps during a SBLOCA. Specifically, the licensee failed to demonstrate that operators would be able to successfully complete the time critical actions prior to reaching 8% RWST tank level, which required operators to secure all pumps taking suction from the RWST, because they did not consider the worst case allowable RWST level instrument uncertainty acceptance criteria along with the design pump flow rates. This action would result in the momentary loss of all ECCS high pressure injection during a SBLOCA and did not ensure the availability, reliability, and capability of the ECCS to respond to initiating events.

The team used Inspection Manual Chapter 0609, “Significance Determination Process,” Attachment 4, “Initial Characterization of Findings,” and Appendix A, “The Significance Determination Process for Findings At-Power.” The safety significance is to be determined pending review and analysis of additional information from the licensee to determine if this finding is representative of an actual loss of the ECCS safety function. As a result, this finding is characterized as TBD. The finding did not represent an immediate safety concern because a review of past results indicated that operators were consistently performing the actions in times less than required, as documented by simulator testing. This finding was not assigned a cross-cutting aspect because the underlying cause was not indicative of present licensee performance. (Section 1R21.3)

## REPORT DETAILS

1. REACTOR SAFETY

Cornerstones: Initiating Events, Mitigating Systems, Barrier Integrity, Security

1R21 Component Design Bases Inspection (71111.21)

.1 Inspection Sample Selection Process

The team selected risk significant components and related operator actions for review using information contained in the licensee's probabilistic risk assessment. In general, this included components and operator actions that had a risk achievement worth factor greater than 1.3 or Birnbaum value greater than 1 $X10^{-6}$. The sample included 16 components (including one associated with containment large early release frequency). In addition, the team reviewed six operating experience items.

The team performed a margin assessment and a detailed review of the selected risk-significant components and operator actions to verify that the design bases had been correctly implemented and maintained. Where possible, this margin was determined by the review of the design basis and Updated Final Safety Analysis Report (UFSAR) response times associated with operator actions. This margin assessment also considered original design issues, margin reductions due to modifications, or margin reductions identified as a result of material condition issues. Equipment reliability issues were also considered in the selection of components for a detailed review. These reliability issues included items related to failed performance test results, significant corrective action, repeated maintenance, maintenance rule status, Regulatory Issue Summary 05-020 (formerly Generic Letter 91-18) conditions, NRC resident inspector input regarding problem equipment, system health reports, industry operating experience, and licensee problem equipment lists. Consideration was also given to the uniqueness and complexity of the design, operating experience, and the available defense-in-depth margins. An overall summary of the reviews performed and the specific inspection findings identified is included in the following sections of the report. Documents reviewed are listed in Attachment 1.

.2 Component Reviews

.2.1 Component Cooling Water (CCS) Surge Tank

a. Inspection Scope

The team reviewed the CCS surge tank, including level instrumentation, to verify its capability to perform the required design function. The review included the licensing and design basis of the tank and instrumentation, review of recent corrective actions, review of recent test procedures and test results, review of associated operating procedures, and interviews with responsible engineering personnel. The team reviewed the calibration procedures associated with the level instrumentation and the most recent inspection of the tank diaphragm to verify the components were capable of performing their functions. The team also conducted walkdowns of the tank and associated equipment to verify the material condition of the components.

b. Findings

No findings were identified.

.2.2 Component Cooling Water 1A1/1A2 Heat Exchanger Valve (FCV-70-8)

a. Inspection Scope

The team reviewed the plant's technical specifications (TS), UFSAR, design criteria documents, and piping and instrumentation drawings (P&IDs) to establish an overall understanding of the design basis of the CCS heat exchanger outlet valve (VLV-070-0008). Component walkdowns were conducted to verify that the installed configurations would support their design basis functions under accident conditions and had been maintained to be consistent with design assumptions. The team also reviewed vendor documentation, system health reports, and corrective action system documents in order to verify that potential degradation was monitored or prevented. In addition, the team interviewed the CCS system and design engineers to verify the current condition of the components.

b. Findings

No findings were identified.

.2.3 Component Cooling Water Pump A Discharge Check Valve (SQN-1-VLV-070-504A)

a. Inspection Scope

The team reviewed the plant's TS, UFSAR, design criteria documents, and P&IDs to establish an overall understanding of the design basis of the CCS discharge check valve (VLV-070-0504A). Component walkdowns were conducted to verify that the installed configurations would support their design basis functions under accident conditions and had been maintained to be consistent with design assumptions. The team also reviewed test results, vendor documentation, system health reports, and corrective action system documents in order to verify that potential degradation was monitored or prevented.

b. Findings

Failure to Evaluate a Potential Condition Adverse to Quality Prior to Mode Change

Introduction: The team identified a finding of very low safety significance (Green) involving a non-cited violation (NCV) of 10 CFR 50, Appendix B, Criterion V, "Instructions, Procedures, and Drawings," for the licensee's failure to evaluate the potential inoperability of residual heat removal (RHR) check valve 2-63-563, which exhibited indications of excessive leakage, as required by procedure NPG-SPP-06.9.1, "Conduct of Testing," prior to transitioning to Mode 3, during startup.

Description: On December 30, 2012, while in Mode 4, plant personnel attempted to test Unit 2 emergency core cooling system (ECCS) check valves per procedure 2-SI-SXV-063-266.0, "ECCS Check Valve Leakage Test." Procedure 2-SI-SXV-063-266.0 stated that the test was to be performed in Mode 4 prior to entering Mode 3. However, this test was required to be performed prior to entering Mode 2 to satisfy TS Surveillance

Requirement 3.4.6.3. The test is achieved by establishing a vent path via the ECCS test header and collecting the leakage over a certain time interval. While performing Step 5 of Section 6.3.2 for check valve 2-63-563, the licensee received indication of high pressure on the ECCS test header, which indicated potential excessive leakage due to the valve not properly seating. After unsuccessfully attempting to retest this valve, the operator aborted the procedure. The licensee then improperly revised the test procedure (via an urgent procedure change form without a proper 50.59 review) to change the performance mode to allow completion of the test in Mode 3 rather than Mode 4. Unit 2 was then placed in Mode 3, reactor coolant system (RCS) pressure was raised, and the check valve test was successfully completed (with higher differential pressure to seat the check valve). The licensee did not evaluate the potential inoperability of check valve 2-63-563, which exhibited indications of excessive leakage, prior to transitioning from Mode 4 to Mode 3.

Procedure NPG-SPP-06.9.1, "Conduct of Testing," states in part, that "problems identified during the test shall be annotated on the Chronological Test Log (CTL) that shall include a description of the problem, the procedure step when/where the problem was identified, the corrective action steps taken to resolve the problem." However, the operator's critical thinking regarding the operability of this valve and the justification for proceeding with the mode change was not documented in the unit narrative logs or in the corrective action program in accordance with the procedure NPG-SPP-06.9.1. After conducting interviews with operations staff and performing a prompt determination of operability (PDO), the licensee concluded that valve was operable, since the valve subsequently passed its leak rate test in Mode 3 with no maintenance being performed. The PDO was documented in problem evaluation report (PER) 757559.

Analysis: The licensee's failure to evaluate the potential inoperability of RHR check valve 2-63-563, which exhibited indications of excessive leakage as required by procedure NPG-SPP-06.9.1, "Conduct of Testing" prior to transitioning to Mode 3, during startup, was a performance deficiency. This performance deficiency was more than minor because it affected the Human Performance attribute of the Initiating Events cornerstone and adversely affected the cornerstone objective of limiting the likelihood of events that upset plant stability and challenge critical safety functions during shutdown as well as power operations. Specifically, failing to evaluate indications of excessive check valve leakage while performing procedure 2-SI-SXV-063-206.0, "ECCS Check Valve Leak Testing" section 6.3.2, adversely affected the cornerstone objective of limiting the likelihood of events that challenge the critical safety function of maintaining the RCS pressure boundary. The team determined the finding could be evaluated using the Significance Determination Process (SDP) in accordance with Inspection Manual Chapter (IMC) 0609, "Significance Determination Process," Attachment 4, "Initial Characterization of Findings" for Initiating Events; and Appendix A, "The Significance Determination Process for Findings At-Power," both issued June 19, 2012. The finding was determined to be of very low safety significance (Green) because the finding would not have affected other systems used to mitigate a LOCA resulting in a total loss of their functions. The team determined that this finding represented present licensee performance and directly involved the cross-cutting area of Human Performance, component of Decision-Making because the licensee did not use conservative assumptions in their decision making, when they failed to evaluate the potential inoperability of check valve 2-63-563 prior to transitioning to Mode 3. [H.1(b)]

Enforcement: Appendix B of 10 CFR Part 50, Criterion V, "Instructions, Procedures, and Drawings," states in part that, "activities affecting quality shall be prescribed by documented instructions, procedures, or drawings, of a type appropriate to the circumstances and shall be accomplished in accordance with these instructions, procedures, or drawings." Contrary to the above, on December 30, 2012, the licensee failed to follow test control procedure NPG-SPP-06.9.1, "Conduct of Testing" to evaluate problems identified during the test. Specifically, indications of excessive check valve leakage were identified and not evaluated prior to changing modes. As a result of this finding, the licensee performed a PDO to establish a reasonable expectation of operability for the RHR check valve. This violation is being treated as an NCV, consistent with Section 2.3.2 of the Enforcement Policy. The violation was entered into the licensee's corrective action program as PER 757559. (NCV 05000327,328/2013007-01, Failure to Evaluate a Potential Condition Adverse to Quality Prior to Mode Change)

.2.4 Centrifugal Charging Pump Room Cooler

a. Inspection Scope

The team reviewed the plant's TS, UFSAR, design criteria documents, and P&IDs to establish an overall understanding of the design basis functions and related accident condition assumptions. A system walkdown was performed in order to verify that the component's installed configuration supported its design function under accident/event conditions. Selected corrective action documents and work orders were reviewed by the team in order to verify that potential degradation was monitored or prevented and that component replacement was consistent with in-service/equipment qualification life. Operating procedures were reviewed to verify that operator actions were consistent for accident/event conditions.

b. Findings

No findings were identified.

.2.5 Containment Sump Strainer Assembly

a. Inspection Scope

The team reviewed UFSAR requirements, design criteria documents, the net positive suction head (NPSH) and containment sump calculations, containment sump strainer drawings, installed strainer pictures, containment sump inspection procedures, and the last two sump inspection surveillance results, to establish an overall understanding of the design basis. The team also reviewed the containment sump strainer assembly design change that provided the installation of the new strainer design. The new strainers are designed to eliminate trash and debris from entering the containment recirculation sump that could affect the operation of the Containment Spray and RHR pumps to operate in the recirculation mode.

b. Findings

No findings were identified.

2.6 Emergency Diesel Generator 1A-A

a. Inspection Scope

The team reviewed the UFSAR, system health reports, design criteria documents, vendor manuals and licensing bases documents to determine the design basis and limiting operating parameters. TS surveillances were reviewed to ensure that the licensing and regulatory commitments were being satisfactorily implemented. The team also reviewed P&ID's to establish an overall understanding of the design basis of the emergency diesel generator (EDG) air start system. Component walkdowns were conducted to verify that the installed configurations would support their design basis function under accident/event conditions and had been maintained to be consistent with design.

b. Findings

1. Failure to Evaluate Impact for Full Range of EDG Frequencies

Introduction: The team identified a finding of very low safety significance (Green) involving an NCV of 10 CFR 50, Appendix B, Criterion III, "Design Control," for the licensee's failure to analyze the effects of the TS allowable EDG frequency range on the safety-related components powered by the EDGs.

Description: During review of design calculation NDQ0063980030, "RWST and Containment RHR Sump Safety and Operational Limits, RWST Setpoint Required Accuracy and LBLOCA, SBLOCA Sump Minimum Levels," Rev. 13, the team identified that the licensee did not account for sustained systematic frequency variations that deviate from the nominal value of 60 Hertz (Hz). Technical Specification 3.8.1.1 requires that four EDGs be operable. Technical Specification surveillance test 4.8.1.1.2.a.4, permits a specific operational range of the EDG frequency, of 58.8 to 61.2 Hz (60 Hz +/- 1.2 Hz).

These frequency variations could lead to alternating current (AC) motors operating 2% slower or faster than assumed in the design basis analyses. The EDGs provide AC power to the safe shutdown and engineered safety feature equipment when offsite power is not available. The frequency of the AC power provided by the EDGs affects the operation of equipment powered by the EDGs. The speed of an AC motor is directly related to the frequency of the AC supply. Due to the relation of motor speed and AC power frequency, AC motors supplied by a power source operating at less-than-nominal frequency conditions will rotate more slowly, resulting in fans and pumps operating at reduced flow rates, while motor operated valve (MOV) motors running at slower speeds can result in increased MOV stroke times. Alternating current motors operating at greater-than-nominal frequency conditions can result in fans and pumps running at higher speeds, therefore increasing flow rates, potentially decreasing NPSH available and decreasing MOV stroke times.

When identified by the team, the licensee entered this issue into their corrective action program as PER 758761. The licensee performed a PDO evaluation, using a frequency range variation based on the surveillance test administrative acceptance criteria of 59.9 to 60.1 Hz, to provide a reasonable expectation that the safety-related equipment powered by the EDGs, will be able to perform their design basis functions under

accident conditions. Additional immediate corrective actions included a review of the results of EDG surveillances which indicated no history of being outside the administrative range of 59.9 to 60.1 Hz for the last three years. Also as part of the immediate corrective actions, the licensee's operators are now required to initiate a PER to evaluate any time the EDGs frequency is outside the administrative range of 59.9 to 60.1 Hz.

Analysis: The team determined that the failure to analyze the effects of the TS allowable EDG frequency range on the safety-related components powered by the EDGs was a performance deficiency. The performance deficiency was determined to be more than minor because it affected the Design Control attribute of the Mitigating Systems cornerstone and adversely affected the cornerstone objective to ensure the availability, reliability, and capability of safety systems that respond to initiating events to prevent undesirable consequences. Specifically, failure to account for the allowable range of the EDG frequency and not evaluating the impact on safety-related components powered by the EDGs did not ensure the availability and capability of safety-related components to respond to initiating events. The team determined the finding could be evaluated using the SDP in accordance with IMC 0609, "Significance Determination Process," Attachment 4, "Initial Characterization of Findings" for Mitigating Systems; and Appendix A, "The Significance Determination Process for Findings At-Power," both issued June 19, 2012. The finding screened as very low safety significance (Green), because it was a design deficiency that did not result in the loss of functionality or operability. The team determined that the underlying cause of the finding was indicative of present licensee performance because the licensee had an opportunity to identify this issue when they revised calculation NDQ0063980030, "RWST and Containment RHR Sump Safety and Operational Limits, RWST Setpoint Required Accuracy and LBLOCA, SBLOCA Sump Minimum Levels," Revision 13, in 2011. The team determined that this finding represented present licensee performance and directly involved the cross-cutting area of Human Performance, component of Resources because the licensee failed to ensure that design calculations affected by EDG frequency were complete and accurate. [H.2(c)]

Enforcement: Appendix B of 10 CFR Part 50, Criterion III, "Design Control," requires, in part, that design control measures be established to assure that applicable regulatory requirements and the design basis are correctly translated into design documents. Contrary to the above, since 2007, the licensee had failed to translate the entire range of allowable EDG frequencies into design basis documents. Specifically, the licensee failed to analyze the effects of the TS allowable EDG frequency range on the safety-related components powered by the EDGs. As a result, the licensee performed a PDO which provided reasonable expectation of operability. This violation is being treated as an NCV, consistent with Section 2.3.2 of the Enforcement Policy. The violation was entered into the licensee's corrective action program as PER 758761. (NCV 05000327,328/2013007-02, Failure to Evaluate Impact for Full Range of EDG Frequency)

2. (Opened) Unresolved Item (URI): Insufficient Diesel Starting Air Pressure following SBO Coping Period

Introduction: The team identified an unresolved item (URI) associated with licensee's capability to meet their station blackout (SBO) mitigation strategy. Specifically, based on the allowable air start check valve leakage and the amount of air used during start attempts of the EDGs, the team found that the licensee did not ensure if adequate starting air pressure would exist to reliably start the EDGs following a SBO.

Description: Title 10 CFR 50.2, "Definitions," defines a SBO as the complete loss of ac power to the essential and nonessential switchgear buses in a nuclear power plant, concurrent with turbine trip and unavailability of the onsite emergency power system. Essentially, this would involve the loss of the offsite power sources as well as the loss of emergency onsite AC power sources. The licensee is committed to coping with an SBO event for a duration of four hours, after which the licensee will recover AC power.

The EDG air start system provides compressed air to start the EDGs. The compressed air is provided by non-safety related air compressors, and is stored in two safety-related air receiver tanks. Receiver tank 'A' is designed to maintain the air between 250 and 300 psig; tank 'B' is designed to maintain between 185 and 200 psig. The EDG air start system is equipped with check valves to maintain the integrity of the safety-related portion of the air start system. The licensee declares the EDG degraded if the receiver tank 'A' is less than 200 psig, due to the inability to meet the five start design basis requirement as described in UFSAR, Section 9.5.6, "Diesel Generator Starting System." The EDG is declared inoperable at pressures below 150 psig on receiver 'B' due to the loss of start capability. This is based on the manufacturer's value at which EDG starting and achieving rated speed and voltage has been demonstrated by testing.

The team noted that the leak rate acceptance criterion outlined in procedure 0-PI-SXV-082-203, "Diesel Starting Air Valve Test," was 5 psig/minute for the EDG air start check valves. At this allowable leak rate, the EDG air start pressure could fall below 150 psig within 1 hour after an SBO and completely depressurize the air receiver within 3 hours after an SBO. This would not support the capability of the EDGs to start at the end of the 4-hour SBO coping period.

In addition to concerns regarding check valve leak rate acceptance criteria, the team noted that postulated failed start attempts during an SBO event would also adversely impact the amount of air that would be available at the end of the 4- hour coping period. Specifically, in a SBO event, the initial failure of the onsite power sources would be followed by a failure of both onsite EDGs to start. The licensee's procedures direct operators to attempt to start the EDGs a second time in the first few minutes of the SBO. The first and second start attempts are postulated to be unsuccessful during an SBO. The loss of offsite and onsite emergency ac power would prevent the air start compressors from recharging the tanks after the failed start attempts.

Based on allowable check valve leakage and the amount of air used during two failed start attempts of the EDGs, the team found that the licensee did not ensure if adequate starting air pressure would exist to reliably start the EDGs in order to recover from an SBO after the 4 hour coping period. The team also found that the licensee had not developed procedural guidance to provide adequate air pressure to reliably start the

EDG in order to recover from a SBO after the 4-hour coping period. The licensee captured these concerns in PER 763335.

This issue remains unresolved pending inspector consultation with NRC headquarters technical staff for clarification of the licensee's current license basis design requirements (with respect to 10 CFR 50.63 compliance), to determine if a performance deficiency exists. This issue is being identified as URI 05000327, 328/2013007-09, Insufficient EDG Starting Air Pressure following SBO Coping Period.

.2.7 Motor Driven Auxiliary Feedwater Pump 1A-A

a. Inspection Scope

The team reviewed the UFSAR, PI&Ds, test data, system health reports, vendor technical manual, pump curves, as well as operating and surveillance procedures to identify design, maintenance, and operational requirements related to pump flow rate, developed head, achieved system flow, NPSH, vortex formation and prevention. These requirements were reviewed for pump operation with the source of water originating from the condensate storage tank. Design calculations as well as documentation of periodic surveillance tests were reviewed to verify that design performance requirements were met. Maintenance, in-service testing, corrective action documents, and design change histories were reviewed to assess the potential for component degradation and the resulting impact on design margins and performance. The team concentrated its efforts on the pump's capability to perform its safety function (i.e., to deliver the required flow rate to the steam generators at the prescribed design pressure). In addition, the team walked down portions of the system to verify that the installed configuration was consistent with design basis information and to visually inspect the material condition of the pumps. Seismic calculations for the pump and attached piping including pump nozzle loadings were reviewed to ensure compliance with design requirements.

b. Findings

No findings were identified.

.2.8 Station Control and Service Air (SCSA) Isolation from Auxiliary Control Air (ACA)

a. Inspection Scope

The team reviewed UFSAR requirements, design criteria documents, system operating instructions and procedures, maintenance work orders, and system diagrams for the station compressed air systems to verify the SCSA system was designed to supply adequate compressed air capacity for general plant service, instrumentation, testing, and control. The team reviewed documents to ensure the ACA system ensures that vital equipment requiring control air will have a continuous air supply under design basis conditions, including safe shutdown earthquake and maximum possible flood. Walkdowns were performed to confirm the ACA system components located in Class I structures are designed to Class I seismic requirements. The team verified the ACA system can automatically isolate from the SCSA system upon loss of air from the SCSA system.

b. Findings

No findings were identified.

.2.9 6.9 kV Shutdown Board 1B-B

a. Inspection Scope

The team reviewed the UFSAR, calculations, maintenance and test procedures, maintenance history, and condition reports associated with 6.9KV Shutdown Board 1B-B. The team also performed walkdowns and conducted interviews with engineering personnel to ensure the capability of this component to perform its desired design basis function. Specifically, the team reviewed:

- Maintenance history to verify the monitoring and correction of potential degradation.
- Calculations for electrical distribution system load flow/voltage drop, short-circuit, and electrical protection and coordination.
- Calculations for 6.9kV Shutdown Board control circuit voltage.
- Protective device settings and circuit breaker ratings to confirm adequate selective protection and coordination of connected equipment during worst-case short circuit conditions.
- Circuit breaker preventive maintenance, inspection, and testing procedures to confirm inclusion of relative industry operating experience and vendor recommendations.
- Results of completed preventive maintenance on 6.9kV switchgear.
- Degraded voltage and loss of voltage relay protection scheme and circuit breaker control logics that initiate automatic bus transfers.
- NRC Information Notice 95-05, "Undervoltage Protection Relay Settings Out of Tolerance Due To Test Equipment Harmonics."

b. Findings

Failure to Properly Translate the Design and Licensing Bases for the 125 VDC System Into Design Calculations

Introduction: The team identified a finding of very low safety significance (Green) involving an NCV of 10 CFR 50, Appendix B, Criterion III, "Design Control," for the licensee's failure to properly translate the design and licensing bases for the 125 VDC system into design calculations. Specifically, the licensee inappropriately credited the battery chargers for voltage support during accident scenarios in their voltage drop calculations, and failed to include vital batteries in the battery load profile.

Description: The team noted that calculation SQN-VDC-VD-1, "125 VDC Vital Instrument Power System Design Verification," incorrectly credited voltage support from the battery chargers when analyzing the voltage available at the 6.9 kV switchgear during accidents. Specifically, the calculation credited a sustained voltage of 128 VDC at the battery charger upstream of the battery board. This approach was contrary to the design basis for the vital batteries in UFSAR Section 8.4.1 which states, in part: "The

vital batteries have adequate capacity for a period of 30 minutes, without chargers, to provide the necessary DC power to perform the required safety functions in the event of a postulated accident in one unit and to safely shutdown the other unit, assuming a single failure."

In response to the team's inquiries, the licensee initiated PER 758465 and performed a PDO, which determined a minimum battery voltage of 114.79 VDC was required to operate the 6.9kV circuit breakers for motors that close concurrently (block load) at the onset of an accident. The PDO also determined that for the remaining 6.9kV breakers that may be required to close during the first minute of the accident but after the initial load block (i.e., containment spray pump), a battery voltage of 113.81 VDC was required. While reviewing the evaluations supporting the PDO, the team found that the 125 VDC supply loading tables for the LOCA scenario from calculation SQN-CPS-057 contained several errors that required re-evaluation in order to determine that adequate voltage for the control circuits would be available. For example, a significant error was the failure to include the 125 VDC supply for the 120V vital inverters (which power the 120 VAC vital instrument buses) in the load profile. This was required because UFSAR Section 8.3.1, Table 8.1.2-1 which lists the 125 VDC system as an available power source for the 120V vital instrument buses. Furthermore, TS L.C.O. 3.8.2.1 only requires that the 120 VAC. Vital Instrument Power Boards be connected to D.C power (125 VDC) to be considered operable in Modes 1 through 4. The 120VAC vital instrument power boards are not required to be connected to the 480 VAC power source; therefore cannot be credited as a power source for the vital instrument boards during a LOCA scenario.

In response to the team's concerns regarding the errors found in evaluations supporting the PDO, the licensee revised the PDO and associated evaluation and was able to include the inverters by identifying other loads in the calculation SQN-CPS-057 tables that would not be required to operate during various scenarios evaluated in the PDO, in order to reduce the total load on the battery to acceptable levels.

The licensee's revised PDO provided a reasonable expectation of operability that the required voltages would be available based on interpolation of vendor battery curves, considering the maximum loading on the battery for the applicable portions of the duty cycle.

The team noted that the new minimum battery voltage could have an impact on the battery service test acceptance criteria delineated in TS surveillance requirement 4.8.2.3.2.d. This TS surveillance requires that the licensee perform a battery service test at least once every 18 months. This is done by verifying that the as-found battery capacity is adequate to supply and maintain, in operable status, all of the actual or simulated emergency loads for two hours when the battery is subjected to a battery service test. Battery terminal voltage varies depending on the instantaneous current being drawn from the battery, and the purpose of the service test is to demonstrate that the battery voltage during any point in the duty cycle is adequate to ensure operability of connected equipment. However, due to the new minimum voltages determined in the PDO (114.79 VDC and 113.81 VDC), the team found that the voltage acceptance criteria of 105 VDC in service test Surveillance Instruction 0-SI-EBT-250-100.4 was not supported by the actual calculated voltage requirements.

In response to the team's concerns, the licensee initiated PER 762795 and described various test results intended to address the lack of proper criteria for the previous performances of Surveillance Instruction 0-SI-EBT-250-100.4. However, the tests described in the PER did not simultaneously bound both the current requirements and voltage results calculated in the PDO for PER 758465, but instead relied on interpolation of the battery curve to evaluate the various test results. This is appropriate for establishing a reasonable expectation of operability, but the team questioned how reference to published design data (the battery curve) could satisfy the test requirements of TS 4.8.2.3.2.d. In response, the licensee implemented corrective actions to conduct a past reportability review against the acceptance criteria and past test results to determine if the TS service test has been historically satisfied in accordance with the test requirements.

Analysis: The team determined the licensee did not properly translate the design basis as stated in UFSAR into design documents. Specifically, the licensee inappropriately credited the battery chargers for voltage support during accident scenarios and failed to include vital inverters in the battery load profile, which was a performance deficiency. The performance deficiency was more than minor because it affected the Design Control attribute of the Mitigating Systems cornerstone, and adversely affected the cornerstone objective of ensuring the availability, reliability, and capability of systems that respond to initiating events to prevent undesirable consequences. Specifically, the licensee failed to properly evaluate the 125 VDC system under accident conditions to ensure the capability and availability of 125V control circuits to operate during design basis events. The team determined the finding could be evaluated using the SDP in accordance with IMC 0609, "Significance Determination Process," Attachment 4, "Initial Characterization of Findings" for Mitigating Systems; and Appendix A, "The Significance Determination Process for Findings At-Power," both issued June 19, 2012. The finding screened as very low safety significance (Green), because it was not a design deficiency resulting in a loss of functionality or operability. The team determined that no cross cutting aspect was applicable to this performance deficiency because this finding was not indicative of present licensee performance.

Enforcement: Appendix B of 10 CFR Part 50, Criterion III, "Design Control," requires, in part, that design control measures be established to assure that applicable regulatory requirements and the design basis are correctly translated into design documents. Contrary to the above, as of July 8, 2013, the licensee's design control measures had failed to ensure the design basis for the vital batteries was adequately translated to design calculations. Specifically, the licensee failed to ensure that the vital batteries had sufficient capacity to support operation of control circuits for 6.9 kV and 480V switchgear during the first 30 minutes of an accident as specified in the UFSAR. As a result, the licensee performed a PDO which provided reasonable expectation of operability. This violation is being treated as an NCV, consistent with Section 2.3.2 of the Enforcement Policy. The violation was entered into the licensee's corrective action program as PER 758465. (NCV 05000327,328/2013007-03, Failure to Properly Translate the Design and Licensing Bases for the 125 VDC System Into Design Calculations)

.2.10 6.9 kV Shutdown Transformer 1B-B

a. Inspection Scope

The team reviewed the UFSAR, system description, drawings, maintenance and test procedures, maintenance histories, and condition reports associated with 6.9KV Shutdown Transformer 1B1-B. The team also performed walkdowns and conducted interviews with system engineering personnel to ensure the capability of this component to perform its desired design basis function. Specifically, the team reviewed:

- Preventive maintenance schedules and procedures for the transformer.
- Loading calculations supporting documentation.
- Calculations for protection settings and alarms.
- Completion of last preventive maintenance work orders.
- Operating Procedures

b. Findings

No findings were identified.

.2.11 480V Shutdown Board 1B-B

a. Inspection Scope

The team reviewed the UFSAR, system description, drawings, maintenance and test procedures, and condition reports associated with 480V Shutdown Board 1B-B. The team also performed walkdowns and conducted interviews with system engineering personnel to ensure the capability of this component to perform its desired design basis function. Specifically, the team reviewed:

- Maintenance history to verify the monitoring and correction of potential degradation.
- Calculations for electrical distribution system load flow/voltage drop, short-circuit, and electrical protection and coordination.
- Calculations for 480V Shutdown Board control circuit voltage.
- Protective device settings and circuit breaker ratings to confirm adequate selective protection and coordination of connected equipment during worst-case short circuit conditions.
- Circuit breaker preventive maintenance, inspection, and testing procedures to confirm inclusion of relative industry operating experience and vendor recommendations.
- Results of completed preventive maintenance on 480V switchgear.
- Work Orders for receipt inspections of new circuit breakers.

b. Findings

1. Inadequate Basis for Steam Generator Feedwater MOV Motor Brake Alternate Voltage Criteria

Introduction: The team identified a finding of very low safety significance (Green) involving an NCV of 10 CFR 50, Appendix B, Criterion III, "Design Control," for the licensee's failure to check the adequacy of the design of the steam generator feedwater isolation valve (SGFWIV) motor brakes. Specifically, the licensee based voltage acceptance criterion of 74% of 460V for motor brakes used in a design basis calculation on inadequate testing and calculational methods.

Description: The motor brake coils for SGFWIV 1 & 2 –FCV-3-33, -47, -87, and -100 were replaced by modification package ECN L6611 in 1986. The purpose of the modification was described as ensuring brake release during conditions, such as safety injection (SI) when voltage levels are low due to the simultaneous actuation of other equipment, by providing coils rated at 80% to address concerns regarding inadequate voltage to the coils. Modification ECN L6611 stated that failure of the motor brakes to disengage would cause excessive motor current flows, motor heating, and slower actuation time for valve movement. The ECN also stated that the minimum required coil rating guaranteed by Limitorque for the replacement coils was 80% of 460V (368V). The team noted that the acceptance criteria used in Calculation SQNETAPAC, Rev. 56 for motor brakes was below the vendor's requirements of 80%. Instead, Calculation SQNETAPAC credited test results performed by the licensee on only three specimens retrieved from the warehouse in 2002. Based on this testing, in Calculation SQNETAPAC, the licensee used an alternate acceptance criterion of 74% of 460V (340V), instead of using the Limitorque value of 80% of 460V (368V). The team further noted that field testing of installed motor brakes provided in preventive maintenance instruction SQN-1- MVOP-003-0047-B only provided for functional testing at normal rated voltage (approximately 460V). No test was performed at either the minimum rated voltage (80% of 460V) or the alternate criteria used in the voltage calculation (74% of 460V). Because of the informal test controls (e.g. test temperature, condition of specimens, etc.), and statistically small number of test specimens (3), the team concluded that licensee's tests were not sufficient to establish a new rating under which the equipment can be expected to operate with the same degree of reliability as it would with the vendor specified ratings. In addition, the licensee failed to otherwise confirm adequate equipment reliability, by performing periodic tests to confirm alternate acceptance criteria of 74% could met.

In response to the team's concerns, the licensee initiated PER 763818 and provided data based on preliminary ETAP calculations showing available motor brake voltages ranging from 80% to 84% of 460V. However, the team noted that the ETAP calculations used for the evaluation credited an administratively controlled switchyard voltage, which limited the magnitude of the voltage dip at SI initiation. Engineering estimations performed by the team indicated that, based on voltages afforded by the degraded voltage relays, voltage could dip approximately 5-6% lower than determined in the licensee's ETAP models, resulting in voltages at the motor brakes of approximately 74%-78% of 460V.

The NRC's response to TVA's dispute of NCV 05000327, 05000328/2010005-03 (ADAMS ML 111780765) stated, in part, "Branch Technical Position PSB-1 set forth an acceptable method for complying with the regulations and demonstrating that the applicable setpoints and time delays are adequate to ensure that all safety-related loads are protected and all required safety-related loads have the required minimum voltage at the component terminal to start and run to support a worst-case design basis event without any credit for administratively controlled voltage." The team concluded that TVA's use of administrative controlled voltage to evaluate the MOV motor brakes was not acceptable and not in conformance with the licensee's current licensing basis; however, the licensee performed a PDO and determined the administrative controls and limited testing were sufficient to provide reasonable expectation of operability of the motor brakes pending restoration of full qualification.

Analysis: The team determined that the licensee based the voltage acceptance criterion of 74% of 460V for motor brakes used in a design basis calculation on inadequate testing and calculational methods. This was a performance deficiency. The performance deficiency was more than minor because it affected the Design Control attribute of the Mitigating Systems cornerstone, and adversely affected the cornerstone objective of ensuring the availability, reliability, and capability of systems that respond to initiating events to prevent undesirable consequences. Specifically, inadequate design criteria did not ensure the availability, reliability, and capability of the steam generator feedwater isolation valve motor brakes to operate under design basis degraded voltage conditions. The team determined the finding could be evaluated using the SDP in accordance with IMC 0609, "Significance Determination Process," Attachment 4, "Initial Characterization of Findings" for Mitigating Systems; and Appendix A, "The Significance Determination Process for Findings At-Power," both issued June 19, 2012. The finding screened as very low safety significance (Green), because it was a not a design that resulted in the loss of functionality or operability. The team determined that no cross-cutting aspect was applicable to this performance deficiency because this finding was not indicative of present licensee performance.

Enforcement: Appendix B of 10 CFR Part 50, Criterion III, "Design Control," requires, in part, that design control measures provide for verifying or checking the adequacy of design, by the performance of design reviews, by the use of alternate or simplified calculational methods, or by the performance of a suitable testing program. Contrary to the above, as of July 8, 2013 the licensee's design control measures had failed to check the adequacy of the design of the SGFWIV motor brakes. Specifically, the voltage acceptance criterion of 74% of 460V for motor brakes used in a design basis calculation was based on inadequate testing and calculational methods. As a result, the licensee entered the issue into the corrective action program and performed a PDO which provided reasonable expectation of operability. This violation is being treated as an NCV, consistent with Section 2.3.2 of the Enforcement Policy. The violation was entered into the licensee's corrective action program as PER 763818. (NCV 05000327,328/2013007-04, Inadequate Basis for AFW MOV Motor Brake Alternate Voltage Criteria)

2. Failure to Document Deficiencies Discovered During Receipt Inspections in the Corrective Action Program

Introduction: The team identified a finding of very low safety significance (Green) involving an NCV of TS 6.8.1, Procedures and Programs, for the licensee's failure to evaluate the need to report defects and deficiencies, identified on new safety-related 480V circuit breakers, in the corrective action program as prescribed by procedure.

Description: The team noted that Work Order 111847366, performed 3/10/2011, for the receipt inspection of new Areva Type DS circuit breakers had documented defects, but did not reference a corrective action document. Defects noted in the work order included loose and flaking material on the arc chutes (foreign material concern), and finger clusters installed incorrectly. Both of these conditions could adversely affect the ability of the circuit breaker to perform its intended safety function and should not have been evident in a new breaker. The receipt inspection was performed in accordance with Procedure MI-10.5, "Westinghouse Type DS Breaker Maintenance," Rev. 0092, Appendix L. Step 7.2 [2] of the procedure, required the performer to evaluate the need for a PER if an adverse condition was noted. Procedure NPG-SPP-03.1, "Corrective Action Program," Section 3.1 requires all personnel to promptly report concerns, problems, degraded conditions, and near misses to supervision and document them in the corrective action program. In response to the team's inquiries, the licensee confirmed that no corrective action documents had been issued when the defects in the circuit breaker were discovered and agreed that the defects should have been entered into the corrective action program for further review and evaluation. The team expanded its review to an additional five work orders for similar inspections and noted defects, or failures to meet acceptance criteria for measurements documented in four of the five work orders, including: a broken secondary contact block, an overcurrent trip switch that would not latch, and finger clusters installed incorrectly. All of the issues were corrected within the work orders prior to the breakers being installed; however, none were identified for further evaluation and none were reported in the corrective action program as defects or deficiencies. Documenting these type deficiencies in the corrective action program is necessary to allow trending of breaker issues and to ensure the issues have been adequately corrected and are not recurring. Moreover, the failure to document and evaluate these receipt inspection deficiencies could result in a 10 CFR Part 21 notification of defect being missed. Based on this sample, the team concluded that the licensee routinely failed to report problems found during receipt inspection of circuit breakers, contrary to the requirements of their maintenance and corrective action program procedures. This issue was entered into the licensee's corrective action program as PERs 763834 and 759238.

Analysis: The team determined that the routine failure to evaluate the need to report defects, identified on new safety-related 480V circuit breakers, in the corrective action program as required by procedure MI-10.5, "Westinghouse Type DS Breaker Maintenance," was a performance deficiency. The finding was more than minor because if left uncorrected could lead to a more significant safety concern. Specifically, not documenting deficiencies that could adversely affect the breakers in the corrective action program, would not ensure breaker issues were being properly trended and that the issues have been adequately corrected and are not recurring. In addition, the finding is similar to IMC 0612 Appendix E, example 4.a because the licensee routinely failed to report problems found during receipt inspections of 480V circuit breakers in the

corrective action program. The team determined the finding could be evaluated using the SDP in accordance with IMC 0609, "Significance Determination Process," Attachment 4, "Initial Characterization of Findings" for Mitigating Systems; and Appendix A, "The Significance Determination Process for Findings At-Power," both issued June 19, 2012. The finding screened as very low safety significance (Green), because it was not a design deficiency that resulted in the loss of functionality or operability. The team determined that this finding represented present licensee performance and directly involved the cross-cutting area Human Performance, component of Work Practices because the licensee failed to meet expectations regarding procedural compliance and did not follow procedures related to 480V safety-related breaker receipt inspections. [H.4(b)]

Enforcement: Technical Specification 6.8.1, states, in part, that "Written procedures shall be established, implemented and maintained covering the activities in Appendix A of Regulatory Guide 1.33, Revision 2, February 1978." NRC Regulatory Guide 1.33, "Quality Assurance Program Requirements (Operation)," Appendix A, "Typical Procedures for Pressurized Water Reactors and Boiling Water Reactors," Section 9.a recommends procedures for performing maintenance. Contrary to TS 6.8.1, since March 20, 2011, the licensee failed to properly implement maintenance procedures for performing receipt inspection of new 480V circuit breakers. Specifically, the licensee failed to identify deficiencies and defects for further evaluation that were found during receipt inspections of 480V safety-related circuit breakers, and subsequently report these problems in the corrective action program. The licensee ensured the issues were corrected prior to installing the breakers in the plant or storing in the warehouse as a spare. This violation is being treated as an NCV, consistent with Section 2.3.2 of the Enforcement Policy. The violation was entered into the licensee's corrective action program as PERs 763834 and 759238. (NCV 05000327,328/2013007-05, Failure to Document Deficiencies Discovered During Receipt Inspections in the Corrective Action Program)

.2.12 Containment Sump Instrumentation

a. Inspection Scope

The team reviewed the setpoints and uncertainty calculations for the instrument loops related to the containment sump instruments operation to verify that the existing setpoints for these instruments were in accordance with the operating limits. Also, the team reviewed the last two completed surveillance procedures and calibration test records for these instruments to verify that the instruments were properly calibrated and maintained in accordance with design output documents and vendor specifications.

b. Findings

No findings were identified.

.2.13 Hydrogen Igniters (LERF sample)

a. Inspection Scope

The team reviewed applicable portions of the plant's TS, UFSAR and system descriptions, to identify design basis requirements for the hydrogen igniters. The team interviewed the system engineer to discuss operation and maintenance history to verify that potentially degraded conditions were being appropriately addressed. Operation procedures for emergency power to the hydrogen igniters were reviewed to verify that component operation and power supply alignment were consistent with design. Test procedures and recent test results were reviewed against design bases documents to verify that acceptance criteria for tested parameters were supported by calculations and that individual tests and analyses served to validate component operation. Preventive and corrective maintenance history; and corrective action system documents were reviewed in order to verify that potential degradation was monitored or prevented.

b. Findings

No findings were identified.

.2.14 125 VDC Vital Battery Charger IV

a. Inspection Scope

The team reviewed battery charger sizing calculation to verify that the chargers were capable of carrying the continuous load after a design basis accident and will charge the batteries back within 12 hours. Also, the team reviewed the last two tests of the battery chargers to look for signs of age-related degradation. A review of the AC voltage calculation was performed to assure satisfactory voltage to the chargers under worst case conditions. In addition, the team verified that the ampere-hours returned to the battery were greater than the ampere-hours removed plus the charging losses. The team reviewed equalizing procedures for the batteries to verify proper voltage. The team performed a walkdown to verify material condition of the 125 VDC Vital Battery Charger IV; and reviewed a sample of corrective action documents to confirm that the licensees adequately identifies, evaluates, and dispositions adverse conditions. The team also reviewed the equipment purchase order and specifications to confirm design specifications were met.

b. Findings

No findings were identified.

.2.15 120 VAC Vital Instrument Power Board 1-I

a. Inspection Scope

The team reviewed the loading and short circuit calculations to verify that the load does not exceed the board capacity and that the current duty does not exceed the equipment protection ratings. Also, AC and DC voltage calculations were reviewed to assure satisfactory voltage to the instrument power board under worst case conditions. Review

of configuration procedures and operational procedures was performed to verify the different alignments for the input power to the instrument power board. The team reviewed maintenance and corrective action records to determine whether the equipment had exhibited adverse performance trends. The team performed a walkdown of the instrument power board to verify material condition. The team also reviewed a sample of corrective action documents to confirm that the licensees adequately identifies, evaluates, and dispositions adverse conditions.

Findings

No findings were identified.

.2.16 125 VDC Vital Battery Board II

a. Inspection Scope

The team reviewed the UFSAR, TS, and design basis documentation to identify the loading requirements for the vital batteries. The team reviewed the inputs to the battery sizing analysis and the battery voltage study; maintenance allowable terminal load resistance; and panel load schedules to verify the adequate sizing of the battery. The battery voltage study was reviewed to verify adequate voltage was available to critical components. The vendor manual was reviewed to verify battery installation and operating instructions were implemented appropriately. Battery TS surveillance tests and inspection results were reviewed to verify that any degradation was identified and anomalies were addressed and corrected. The equipment history as indicated by corrective work orders and condition reports was reviewed to verify that identified equipment problems were corrected. A field walkdown was performed to assess observable material conditions of the batteries. The team also reviewed the load profile calculations for SBO and accident scenarios and the 125 VDC voltage drop calculations to ensure appropriate design requirements were met. Reference Section 2.9 of this report for findings related to the load profile of the 125 VDC vital battery.

b. Findings

No findings were identified.

.3 Related Operator Actions

a. Inspection Scope

The team selected the following six operator actions as part of the sampling to review:

- **HAFR1** – Control MDAFWP to Prevent S/G Overfill Following Initiator and Loss of Air
- **HAHH1** – Place Hydrogen Igniters in Service
- **HAAF1** – Locally Operate TD AFW Valves to Control Flow on SBO
- **HASL1** – Isolate Ruptured Steam Generator
- **HAFR2** – Restore TDAFWP Speed Control Following Initiator and Loss of Air
- **HAMARV** – Handwheel Operation of the Steam Generator Atmospheric Relief Valves S/G 1&4

The team reviewed safe shutdown procedures, emergency and abnormal operating instructions, and operator training material to verify that low margin time critical operator actions could be accomplished as relied upon in design assumptions. The team performed interviews and conducted walk-downs of selected safe shutdown procedures to assess if the time critical operator actions required could be successfully accomplished. Equipment necessary to perform procedural steps was verified to be in the correct locations and available to the operators. The team also reviewed main control room deficiencies and operator burden lists, rounds and turnover deficiencies, and long term clearance orders, scaffolding, and temporary modifications to determine if existing plant issues or configurations may impact operators' ability to complete required manual actions. The team reviewed the basis calculations for the selected operator actions to verify if the design basis was adequately translated into the procedures; also to determine if time critical actions (TCA) with the low margin could impact the licensee's ability to successfully complete the time required action.

b. Findings

1. (Opened) Apparent Violation (AV) Failure to Adequately Translate Design Basis Into Procedure Acceptance Criteria Time to Perform Operator Action (RWST Swapover)

Introduction: An Apparent Violation (AV) of 10 CFR 50, Appendix B, Criterion III, "Design Control," was identified for the licensee's failure to correctly translate design basis requirements into emergency procedure, ES-1.3, "Transfer to Residual Heat Removal Containment Sump," Rev. 19. Specifically, the time allotted for operators to perform TCAs to swap ECCS pump suction from the refueling water storage tank (RWST) to the containment sump during a small break loss of coolant accident (SBLOCA) did not properly account for instrument uncertainty and the accident analysis design basis requirements described in UFSAR, Section 15.3.1, to ensure the recovery of the core was demonstrated and to ensure continued operation of the ECCS.

Description: The licensee's USFAR described function, system operation, and requirements for ECCS in Section 3.1.2, "Conformance with NRC General Design Criteria - Overall Requirements," stated, in part, that the primary function of the ECCS was to deliver borated cooling water to the reactor core in the event of a LOCA. This limited the fuel-clad temperature and thereby ensured that the core would remain intact and in place and fuel damage would not exceed that stipulated as a basis in the safety analysis (Chapter 15). In addition, UFSAR Section 6.1, "Engineered Safety Features – General," stated, in part, that the ECCS protected the fuel cladding following a LOCA by providing a timely, continuous and adequate supply of borated water to the RCS and, ultimately, the reactor core. The ECCS provides high head injection through safety injection pumps (SIPs) and centrifugal charging pumps (CCPs), and low head injection through residual heat removal pumps (RHRPs) and accumulator injection immediately following an accident. Low head/high head recirculation is used in the long-term recovery period.

Section 6.3.2.2, "Equipment and Component Design," of the UFSAR described the system operation of ECCS. The operation of the ECCS following a LOCA, was divided into two distinct modes: (1) the injection mode in which any reactivity increase following the postulated accidents was terminated, initial cooling of the core was accomplished, and coolant lost from the primary system in the case of a LOCA was replenished; and

(2) the recirculation mode in which long term core cooling was provided during the accident recovery period.

In the event of a SBLOCA, as stated in USFAR, Section 15.3.1, an intermediate small break would be large enough to cause a significant RCS mass loss. The depressurization rate would be slow enough for those breaks to minimize pumped injection and ultimately, the small break transient would be mitigated by the pumped ECCS injection and/or the passive (accumulator) injection. As a result, during a SBLOCA, the licensee would rely on the injection of high pressure ECCS pumps to inject above the pressure of the reactor, which would be depressurizing at a slow rate. Low pressure injection from the RHRPs and the accumulator would not occur until later in the event response timeline due to reactor pressure still being higher than RHRPs shutoff head pressure. Therefore, during a SBLOCA, there would be times when the SIPs and CCPs would be the only ECCS injection source. In contrast, during a large break LOCA, a significant RCS mass loss and a fast depressurization rate would occur, establishing continuous flow using low pressure injection through RHRPs and accumulators.

During normal operation system line-up, ECCS components would be in stand-by mode of operation aligned to the RWST. In the event of a LOCA, a safety injection signal would be initiated and all ECCS pumps would receive an auto-start signal. Based upon containment pressure, two containment spray pumps (CSPs) would be running, and CCPs and SIPs pumps would be injecting into the reactor based upon reactor vessel pressure. The RHRPs would be running; however, they would not be injecting, until after the reactor has significantly depressurized to lower pressures. When the RWST reaches 27% level, the operators receive a control room annunciator which would direct them to procedure ES-1.3, “Transfer to Residual Heat Removal Containment Sump,” in order to align suction for the ECCS pumps and CSPs from the RWST to the containment sump. The procedural and automatic actions transition ECCS from the injection phase to the recirculation phase; however initially, recirculation would be through the same paths as the injection phase.

The team reviewed the licensee’s calculations, SQN-SQS2-0110, “Emergency and Abnormal Operating Procedure Setpoints,” Rev. 21, and NDQ0063980038, “RWST and Containment RHR Sump Safety and Operational Limits, Setpoint Required Accuracy, and LBLOCA and SBLOCA Sump Minimum Levels,” Rev. 14, to determine the basis of the RWST water levels, pump flow rates, and operator times for critical actions. The calculations stated, in part, that TCAs were a manual action or series of actions that must be completed within a specified time to meet the plant licensing basis.

There are two significant RWST level setpoints related to TCAs: low level at 27% and low-low level at 8% tank level. As discussed above, during normal system line-up, the water supply to the CSPs, SIPs, and the CCPs are aligned to the RWST. During a SBLOCA, once the tank lowers to 27% level, several actions occur: a MCR alarm is annunciated for “RWST Lo-Level;” an automatic swapover of a suction valve from the RWST to the containment sump; and two TCAs start concurrently. The first TCA is for the operators to stop one CSP within two minutes in order to slow down the rate of RWST inventory usage. The second TCA is performed in parallel and requires the operators to manually complete, within 8 minutes, the recirculation valve swapover alignment for the CCPs and SIPs, when RCS pressure is above the shutoff head of the RHRPs. The total operator action time of 8 minutes was based upon the calculated time for the RWST level to decrease from low level (27%) to low-low level (8%). In addition,

at 8% RWST level or lower, a second MCR alarm is annunciated for “RWST Lo-Lo Level” and the operators are procedurally required to secure all pumps taking suction from RWST, which are the CSP, SIPs, and CCPs.

The calculation justifications stated that the RWST setpoints selected would ensure that ECCS flow would not be interrupted during a LOCA. In addition, during a SBLOCA, the pressure in the RCS is high enough to prevent flow into the RCS from the RHR pumps so, the setpoint selection was to also ensure that there was enough water in the RWST between the low level setpoint and the low-low level setpoint to allow time for the manual realignment of the SIPs and CCPs to the discharges of the RHR pumps for high-head recirculation. These setpoints and time requirements were translated into procedure ES-1.3, which directed the control room operators to perform TCAs during a SBLOCA.

Technical Specification Bases 3/4.5, “ECCS System,” stated, in part, that the CCPs and SIPs were credited in a SBLOCA event and that this event established the flow and discharge head at the design point for the CCPs. Using design flow for the CSPs, CCPs, and SIPs, combined with the allowed times to perform the two TCAs for RWST swapover at 27% level, the team determined that the 8% tank level would be reached prior to completing the TCAs, which would require operators to secure these pumps. At this point in the SBLOCA event, ECCS injection would be stopped. In addition, calculation SQN-SQS2-0110, stated, “If the alignment of the CCPs and SIPs is not completed within the above times, then these pumps would be shutdown at RWST low-low level and restarted after the valve manipulations for the recirculation are completed. As previously discussed, with RCS pressure above the shutoff head of the RHRPs, there could be some time period when no ECCS injection occurs. During this time period, decay heat removal would be from boiling of the water in the reactor vessel. No fuel damage would occur until the core becomes uncovered, which would add several minutes to time available to align the CCPs and SIPs for recirculation.” However, because UFSAR Section 15.3.1 required continued operation of the ECCS, the team determined that this calculation justification did not meet design basis requirements.

The team also identified that the licensee’s calculations did not consider the impacts of RWST instrument inaccuracies and worst case allowable calibration specifications, in conjunction with the pump flow rates from the RWST. As a result, the calculations did not accurately validate that that time allotted for the operators to perform the actions (8 minutes) would ensure success in meeting the design basis requirements.

The team reviewed the licensee’s calibration surveillances for the RWST level instruments associated with the 27% and 8% tank levels. The team identified that the TS allowable tolerances for the 27% level instruments were between 26.69% to 28.09% level. For the 8% level instruments, the allowable calibration was 7.80% +/- 2.09%. The worst case allowable was 26.69% for RWST low level and 9.89% for RWST low-low level. As a result, the team identified that with the worst case allowable instrument setpoints, combined with the design pump flow rates, the time allotted by the procedure (8 minutes) for operators to perform the TCAs for RWST swapover during a SBLOCA did not ensure successful performance of the actions prior to reaching the RWST low-low level. Operators are required to secure all ECCS pumps taking suction from the RWST when the low-low level alarm comes in. Based on the team’s calculations using worst case instrument uncertainty and design pump run-out flows, the team determined there was approximately only 6.5 minutes available to complete the swapover before having to secure ECCS. The two primary functions for ECCS, injection and

recirculation, would be lost until realignment to the sump was made to restore core cooling.

In response to this concern, the licensee performed an immediate operability determination that indicated operators, as demonstrated by two previous simulator test runs, were consistently performing the TCAs in less time (6 minutes and 8 seconds was longest recorded) than the 6.5 minutes calculated by the team. In addition, Standing Order SO-13-025 was created to recognize the non-conservative acceptance criteria and reinforce operator time performance requirements. The licensee performed two PDOs to provide a reasonable expectation of operability. One PDO, PER 760336, evaluated the past two years of instrument calibration as-found results and actual pump flow rates based upon piping design and pump curves with respect to reactor pressure. The second PDO, PER 758761, evaluated the impacts of EDG over/under frequency on ECCS pumps, due to the allowable TS tolerances.

Analysis: The team determined that the licensee's failure to consider instrument uncertainty and design basis requirements in determining the allotted time for operators to complete ECCS suction swapover from the RWST to the sump was a performance deficiency. This failure resulted in the potential for ECCS flow to be interrupted during a SBLOCA, which does not meet UFSAR design requirements. The performance deficiency was determined to be more than minor because it affected the Design Control attribute of the Mitigating Systems cornerstone and adversely affected the cornerstone objective of ensuring the availability, reliability, and capability of CSP, SIPs, and CCPs during a SBLOCA. Specifically, the licensee failed to demonstrate that the operators would be able to successfully complete the TCAs prior to reaching 8% RWST tank level, at which time the operators would be required to secure all ECCS pumps taking suction from the RWST, because they did not consider level instrument uncertainty acceptance criteria along with the design pump flow rates. This action would result in the momentary loss of all ECCS high pressure injection during a SBLOCA and did not ensure the availability, reliability, and capability of the ECCS to respond to initiating events.

The team used IMC 0609, "Significance Determination Process," Attachment 4, "Initial Characterization of Findings," for Mitigating Systems and Appendix A, "The Significance Determination Process for Findings At-Power," both issued June 19, 2012, to evaluate the finding. The safety significance is to be determined pending review and analysis of additional information from the licensee to determine if this finding is representative of an actual loss of the ECCS safety function. As a result, this finding is characterized as TBD.

The finding does not present an immediate safety concern because the licensee performed an immediate operability determination that indicated operators, as documented by two previous simulator test runs, were consistently performing the TCAs in less time (6 minutes and 8 seconds was longest recorded), than the 6.5 minutes calculated by the team. The licensee also issued Standing Order SO-13-025 to reinforce operator time performance requirements as a compensatory measure and performed immediate operability and PDO evaluations to provide a reasonable expectation of operability based on operator time performances of the TCAs in the simulator and actual test data for the RWST level instruments.

This finding was not assigned a cross-cutting aspect because the underlying cause was not indicative of present licensee performance.

Enforcement: Appendix B of 10 CFR Part 50, Criterion III, "Design Control," requires, in part, that measures shall be established to assure that applicable regulatory requirements and the design basis are correctly translated into specifications, drawings, procedures, and instructions. Contrary to the above, since plant startup, the licensee failed to correctly translate design basis requirements into procedure, ES-1.3, to ensure that the time allotted for operator actions to swap ECCS pump suction from the RWST to the containment sump during a SBLOCA would ensure continuous operation of the ECCS. The licensee performed immediate operability and PDO evaluations to provide a reasonable expectation of operability based on operator time performances of the TCAs in the simulator and actual calibration data for the RWST level instruments. The licensee initiated PER 760336 to evaluate the finding and determine the appropriate final corrective actions. This apparent violation is identified as AV 05000327,328 /2013007-06, Failure to Adequately Translate Design Basis Into Procedure Acceptance Criteria Time to Perform Operator Action.

2. Failure to Perform 50.59 Screens for Scaffolds and Clearances

Introduction: The team identified a finding of very low safety significance (Green) involving a NCV of TS 6.8.1, Procedures and Programs, for the licensee's failure to implement procedures for equipment and maintenance control. Specifically, the licensee failed to perform 10 CFR 50.59 reviews of temporary plant changes that existed for greater than 90 days of plant operation.

Description: Procedure MMTP-102, "Requirements for 10 CFR 50.59 and/or 10 CFR 72.48," Section 3.3.8, "Erection of Scaffolds/Temp Work Platforms and Ladders," stated in part, that scaffolds which met the seismic requirements; and scaffolds that required a site engineering evaluation, required a 10 CFR 50.59 review prior to being in place for more than 90 days of power operation.

During plant walkdowns, the team identified a total of 24 scaffolds that were installed in the plant for greater than 90 days of power operation without a 50.59 reviews performed. Of the 24 scaffolds, 16 met the seismic requirements for a 50.59 review in MMTP-102 and were in Class I/Category I structures. Eight scaffolds met the MMTP-102 requirement for a 50.59 review, because a site engineering evaluation had been required. The team identified a specific example, under Work Order 114358607, where scaffolding was installed since February 4, 2013 at essential raw cooling water pump 'B' and a 50.59 review had not been performed. The scaffolding placement resulted in the physical blocking of a fire extinguisher on the wall, which was not in compliance with procedure step 3.1.1.I.1, of MMTP-102. The licensee generated PERs 753927, 75112, 751944, 753328 and Service Request (SR) 761981, 761987 regarding the non-compliance with procedure MMTP-102.

The team also identified 87 clearance orders in the plant for greater than 90 days for which a 50.59 review had not been performed. Section 3.6.2.A. of procedure, NPG-SPP-10.2, "Clearance Procedure to Safely Control Energy," Rev. 0005, stated, that clearances were to be reviewed on a monthly basis by Operations department to identify clearances near or greater than 60 days old for the purpose of ensuring completion of a 10 CFR 50.59. The procedure also required that the Operations Manager be informed

of all clearances in place for greater than 180 days. In addition, Section 5.1[3] of procedure, 0-PI-OPS-000-000.1, "Operations Periodic Administrative Reviews," stated, that Operations would perform the following for all active clearances with danger tags near or greater than 45 days old: 1) evaluate clearances against NPG-SPP-09.4, 10 CFR 50.59 Evaluations of Changes, Tests, and Experiments, Appendix A, Rev. 0006; 2) ensure a Service Request was initiated for Engineering to determine whether a temporary modification was needed and initiate 10 CFR 50.59 screening review for each clearance identified in above; and 3) verify that a 10 CFR 50.59 review was completed prior to exceeding an age of 90 days old.

The team identified that the vital battery room IV exhaust fan 2B2-B, had become inoperable on February 23, 2010 and the component was danger tagged out of service on December 9, 2010. The licensee had not performed a 50.59 review on the clearance as required by procedures NPG-SPP-10.2 and 0-PI-OPS-000-000.1. Section 8.3, Ventilation, of the UFSAR stated that each battery room had redundant ventilation systems to prevent the accumulation of explosive gases. With the exhaust fan 2B2-B inoperable since February 2010, a configuration review of the 2B2-A train was performed. The licensee subsequently identified two times when 2B2-A train was out of service for greater than 8 hours and no compensatory actions were completed as required per Step 3.0.C, of procedure, 0-SO-30-11, "Onsite Electrical Board Rooms – Heating, Ventilation, and Cooling," Rev. 39. The licensee documented these two occurrences in SR 762662. A review of the plant conditions and 2B2-A train availability, the team determined that there were no additional plant risks due to the 2B2-B being out of service for over three years. The licensee generated PERs 756276, 753175, and 756308 (Apparent Cause Evaluation); and SRs 762662, 762762, 755770, 755771, 755772, 755773, 755774, 755775, 758363, and 755783 regarding the non-compliance with procedures NPG-SPP-10.2, 0-PI-OPS-000-000.1, and NPG-SPP-09.4. The licensee implemented corrective actions to review all of the scaffolding and clearances which were greater than 90 days.

Analysis: The team determined that the licensee's failure to perform 50.59 reviews of temporary plant changes that existed for greater than 90 days of plant operation is a performance deficiency. The performance deficiency was determined to be more than minor because it affected the Design Control attribute of the Mitigating Systems cornerstone and adversely affected the cornerstone objective of ensuring the availability, reliability, and capability of systems that respond to initiating events to prevent undesirable consequences. Specifically, the team identified multiple examples where the licensee failed to evaluate temporary plant changes to ensure those changes did not affect the availability, reliability, and capability of systems that respond to events. The performance deficiency was also similar to Example 4.a, Insignificant Procedural Errors, in IMC 0612, Appendix E, "Examples of Minor Issues," because the licensee routinely failed to perform engineering evaluations on similar issues. The team determined the finding could be evaluated using the SDP in accordance with IMC 0609, "Significance Determination Process," Attachment 4, "Initial Characterization of Findings" for Mitigating Systems; and Appendix A, "The Significance Determination Process for Findings At-Power," both issued June 19, 2012. The finding screened as very low safety significance (Green), because the finding was not a design deficiency resulting in the loss of functionality or operability. The team determined that this finding represented present licensee performance and directly involved the cross-cutting area of Human Performance, component of Work Practices because licensee failed to meet expectations regarding procedural compliance and did not follow procedures related to

performing 50.59 reviews of temporary plant changes that existed for greater than 90 days of plant operation. [H.4(b)]

Enforcement: Technical Specification 6.8.1, states, in part, that "Written procedures shall be established, implemented and maintained covering the activities in Appendix A of Regulatory Guide 1.33, Revision 2, February 1978." NRC Regulatory Guide 1.33, "Quality Assurance Program Requirements (Operation)," Appendix A, "Typical Procedures for Pressurized Water Reactors and Boiling Water Reactors," Section 9.a recommends procedures for performing maintenance. Contrary to the above, the licensee failed to implement procedures for equipment and maintenance control. Specifically, as of August 9, 2013, the licensee failed to implement procedures MMTP-102, NPG-SPP-10.2, 0-PI-OPS-000-000.1, and NPG-SPP-09.4, by not performing 50.59 reviews for 24 scaffolds and 87 clearance orders that were in place for greater than 90 days old of plant operation. As immediate corrective actions, the licensee entered the issue into their corrective action program and initiated an apparent cause evaluation to assess the issue, removed several of the scaffolds, and evaluated all of the temporary modifications greater than 90 days. This violation is being treated as an NCV, consistent with Section 2.3.2 of the NRC Enforcement Policy. The violation was entered into the licensee's corrective action program as PER 753175. (NCV 05000327,328 /2013007-07, Failure to Perform 50.59 Screens for Scaffolds and Clearances)

.4 Operating Experience (Six Samples)

a. Inspection Scope

The team reviewed seven operating experience issues for applicability at Sequoyah Nuclear Plant. The team performed an independent review for these issues and where applicable, assessed the licensee's evaluation and disposition of each item. The issues that received a detailed review by the team included:

- Generic Letter 89-13, Service Water System Problems Affecting Safety-Related Equipment
- Generic Letter 96-05, Periodic Verification of Design-Basis Capability of Safety-Related Power-Operated Valves
- RIS 2005-29, Anticipated Transient That Could Develop Into More Serious Events
- IN 2010-23, Malfunctions of Emergency Diesel Generator Speed Switch Circuits
- IN 2013-05, Battery Expected Life and Its Potential Impact on Surveillance Requirements
- NRC Sequoyah Component Design Bases Inspection (CDBI) Report 05000327, 328/2010007

b. Findings

Inadequate Corrective Action for 2010 Degraded Voltage Issues

Introduction: The team identified a finding of very low safety significance (Green) involving a NCV of 10 CFR Part 50, Appendix B, Criterion XVI, "Corrective Action," for the licensee's failure to promptly identify and correct deficiencies in electrical calculations for the safety-related AC electrical distribution system identified during the 2010 CDBI. Specifically, the licensee had failed to identify that safety-related MOVs needed to be evaluated for new lower calculated available voltage (degraded voltage) to ensure their operability.

Description: Following the 2010 CDBI, TVA initiated PER 297965 to address NRC concerns regarding methodologies used in their degraded voltage calculations. The operability evaluation for PER 297965 performed on 12/23/2010 stated that no change to the existing calculation methodology was required but that a functional evaluation was recommended. The functional evaluation performed on 1/4/2011 re-affirmed that methodologies crediting minimum grid voltage and non-safety related tap changers to ensure minimum voltage to safety-related equipment were acceptable. This conclusion was contrary to the findings in NCV 05000327, 05000328/2010005-03. The licensee disputed NCV 05000327, 05000328/2010005-03 by letter dated March 31, 2011. The NRC, by letter dated June 21, 2011 (ML111780765), denied TVA's dispute of the NCV and directed TVA to initiate corrective actions to correct the performance deficiency. The 2013 CDBI team noted that the licensee had not revised the operability evaluation in PER 297965 in response to the NRC's position stated in the June 21, 2011, letter upholding the NCV. Specifically, the licensee did not document whether their calculations were in conformance with NRC requirements for degraded voltage protection, and whether there was reasonable expectation of operability. In response to the team's inquiries, the licensee stated that they had revised calculations to address the issues raised during the 2010 CDBI, including calculations SQNETAPAC and MS-T106-0008. The licensee also stated that these calculations reflected the assumptions and methodologies which they intended to use to resolve the 2010 CDBI concerns. These calculations had been completed and checked in April 2013, but were pending final approval signature. The team reviewed pending Calculations SQNETAPAC, pending Rev. 57 and MS-T106-0008, pending Rev. 005 and found the following errors:

1. The analysis of motors that block load at the onset of an accident credited administratively controlled voltage rather than the lower voltages afforded by the undervoltage relay setpoints defined in TS.
2. The analysis for the degraded voltage non-accident time delay used system voltage based on the minimum administratively controlled grid voltage, rather than the lower voltage afforded by the undervoltage relay setpoints defined in TS.
3. The available voltages for Generic Letter (GL) 89-10 MOVs that operate during steady state conditions after block loading were considerably lower than previously analyzed, and the licensee had not entered this condition into the corrective action program or performed an evaluation to assess operability.
4. The analysis for starting individual motors treated the 6900V bus as a fixed voltage source, rather than allowing voltage to dip, thereby producing non-conservative motor terminal voltage results.

In response to the team's observations stated above, the licensee initiated PERs 763032, 763331, 753504, and 763332 to address the errors. For items 1, 2, and 4 above, the team did not identify new operability concerns that had not been evaluated. However, in item 3 above, the team found that licensee Calculation SQNETAPAC, pending Rev. 57, resulted in substantially lower voltage available to the MOVs for which they had not been analyzed for operability.

In response to the team's concerns, the licensee initiated PER 753504 and performed a PDO. In this PDO, the license determined that 81 MOVs would have lower voltage than previously analyzed. Of these, 18 were determined to have inadequate torque based on the methodologies prescribed by Limitorque Technical Update 98-01, to which Sequoyah is committed. The licensee reevaluated these 18 MOVs using alternate methodologies, chiefly the Commonwealth Edison methodology which had been previously determined by the NRC as acceptable; however, this methodology was considered to be non-conforming to the licensee's current licensing basis. In addition, the licensee identified several MOVs that were determined to be acceptable based on their current field setup parameters, but which would not be acceptable for the entire range of setup parameters specified in design documents. As a result, the licensee identified an interim action to place MOV testing procedure 0-MI-EMV-317-144.0 on administrative hold to prevent adjustments to MOVs that would place them outside the evaluations in the PDO. In addition, the PDO determined that several MOVs would require more frequent testing based on the reduced margins determined in the evaluations. The team concluded that the evaluations and compensatory measures described in the PDO provided reasonable assurance of operability pending final resolution.

Analysis: The failure to identify that safety-related MOVs needed to be evaluated for new lower calculated available voltage (degraded voltage) to ensure their operability was a performance deficiency. The finding was more than minor because it affected the Design Control attribute of the Mitigating Systems cornerstone, and adversely affected the cornerstone objective of ensuring the availability, reliability, and capability of systems that respond to initiating events to prevent undesirable consequences. Specifically, failure to identify and evaluate that safety-related MOVs could be affected by degraded voltage conditions did not ensure the availability, reliability, and capability of the MOVs to respond to initiating events. The team determined the finding could be evaluated using the SDP in accordance with IMC 0609, "Significance Determination Process," Attachment 4, "Initial Characterization of Findings" for Mitigating Systems; and Appendix A, "The Significance Determination Process for Findings At-Power," both issued June 19, 2012. The finding screened as very low safety significance (Green), because the finding was not a design deficiency resulting in the loss of functionality or operability. The team determined that this finding represented present licensee performance and directly involved the cross-cutting area of Problem Identification and Resolution, component of Corrective Action Program because the licensee failed to identify that safety-related MOVs needed to be evaluated for new lower calculated available voltage (degraded voltage) to ensure their operability. [P.1(c)]

Enforcement: Appendix B of 10 CFR Part 50, Criterion XVI, "Corrective Action," states, in part, "Measures shall be established to assure that conditions adverse to quality are promptly identified and corrected." Contrary to the above, since April, 2013, the licensee had failed to promptly identify and correct deficiencies in electrical calculations for the safety-related AC electrical distribution system noted during the 2010 CDBI. Specifically, the licensee failed to identify that safety-related MOVs needed to be evaluated for new

lower calculated available voltage to ensure their operability. As a result, the licensee entered the issue into their corrective action program and performed a PDO which provided reasonable expectation of operability. This violation is being treated as an NCV, consistent with Section 2.3.2 of the NRC Enforcement Policy. The violation was entered into the licensee's corrective action program as PER 758465. (NCV 05000327,328 /2013007-08, Inadequate Corrective Action for 2010 Degraded Voltage Issues)

4OA6 Meetings, Including Exit

On August 9, 2013, the team leader presented the inspection results to Mr. Shea and other members of the licensee's staff. On September 16, the team leader conducted a supplementary exit with Mr. John Carlin and other members of the licensee's staff to present changes to the inspection as a result of the team's review of additional information. The inspectors verified that no proprietary information was retained by the inspectors or documented in this report.

ATTACHMENT: SUPPLEMENTARY INFORMATION

## SUPPLEMENTARY INFORMATION

KEY POINTS OF CONTACT

Licensee personnel:
Mike McBrearty, Site Licensing Manager
Donnie Lee, Engineering Team Manager
Rusty Proffitt, Site Licensing

NRC personnel
G. Smith, NRC Senior Resident
W. Deschaine, NRC Resident Inspector
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LIST OF ITEMS OPENED, CLOSED, AND DISCUSSED

Open

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| 05000327,328 /2013007-06 | AV | Failure to Adequately Translate Design Basis Into Procedure Acceptance Criteria Time to Perform Operator Action (Section 1R21.3) |
| 05000327,328 /2013007-09 | URI | Insufficient EDG Starting Air Pressure Following SBO Coping Period (Section 1R21.6) |

Opened and Closed

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| 05000327, 328/2013007-01 | NCV | Failure to Evaluate a Potential Condition Adverse to Quality Prior to Mode Change (Section 1R21.2.3) |
| 05000327, 328/2013007-02 | NCV | Failure to Evaluate Impact for Full Range of EDG Frequency (Section 1R21.2.6) |
| 05000327, 328/2013007-03 | NCV | Failure to Properly Translate the Design and Licensing Bases for the 125 VDC System Into Design Calculations (Section 1R21.2.9) |
| 05000327, 328/2013007-04 | NCV | Inadequate Basis for AFW MOV Motor Brake Alternate Voltage Criteria (Section 1R21.2.11) |
| 05000327, 328/2013007-05 | NCV | Failure to Document Deficiencies Discovered During Receipt Inspections in the Corrective Action Program (Section 1R21.2.11) |
| 05000327, 328/2013007-07 | NCV | Failure to Perform 50.59 Screens for Scaffolds and Clearances (Section 1R21.3) |
| 05000327, 328/2013007-08 | NCV | Inadequate Corrective Action for 2010 Degraded Voltage Issues (Section 1R21.4) |

LIST OF DOCUMENTS REVIEWED

Licensing Documents
TS, Current
TS Bases, Current
UFSAR, Current
SER and Supplements

Calculations
MDN-000-000-2010-0204, SQN Probabilistic Risk Assessment (PRA) – Human Reliability Analysis (HRA), Rev. 2
MDN-000-000-2010-0205, SQN PRA - Thermal Hydraulic Analysis Notebook, Level 1, Rev. 0
MDN-000-000-2010-0206, SQN PRA – Level 2 Analysis, Rev. 1
SQN-SQS2-0110, Emergency and Abnormal Operating Procedure Setpoints, Rev. 21
NDQ0063980038, RWST and Containment RHR Sump Safety and Operational Limits, Setpoint Required Accuracy, and LBLOCA and SBLOCA Sump Minimum Levels, Rev. 14
SQN82D53EPMRWB111886, Diesel Generator Starting Air System Air Usage, Receiver Tank Volume Design ,and Instrument Setpoints , Rev. 2
SQN82053EPMCC021291, Low Pressure Setpoint for DG Starting Air Tanks, Rev 2
MDQ0072980034, CCP, SIP, CSP, and RHR Pump NPSH Evaluation, Rev. 6
MDQ1072980024, Unit 1 Containment Spray System Hydraulic Analysis, Rev. 5
NDQ0063980038, RWST and Containment RHR Sump Safety and Operational Limits, RWST Setpoint Required Accuracy and LBLOCA, SBLOCA Sump Minimum Levels, Rev. 14
82D53EPMCC021291, Low Pressure Setpoint for DG Starting Air Tanks, Rev. 2
82D53EPMRWB111886, Diesel Generator Starting Air System Air Usage, Receiver Tank Volume Design and Instrument Setpoints, Rev. 2
SCG-4M-00175, Seismic Qualification of Motor Driven Auxiliary Feedwater (MDAFW) Pumps, Rev. 9
2219280000, Minimum Head Required for the Turbine-Driven and Motor Driven Altxiliary Feedwater (AFW) Pumps, Rev. 24
03053EPMGLC031193, Condensate Storage Tank (CST) Usable Volume for Aux Feedwater Use, Rev. 8
N2-03-A-010A, Alternate Analysis Piping Auxiliary Feedwater, Rev. 1
SQN-70-D053, Isolation Setpoint of CDWE Unit, CCS, SQN, Rev. 2
B87 030113001, ERCW Flow Balanced Hydraulic Model, Rev. 12
00D53EPMRJP061091, 89-10 Scoping Calc MOV POP Calculation, Rev. 15
MDQ00099920110249, JOG Classification, Rev. 0
NDQ0000880019, Flood Level Inside Torus Room, Corner Rooms, and HPCI Room Due to Feedwater Line Break in the Main Steam Valve Vault, Rev. 5
NDQ0063980038, RWST and Containment RHR Sump Safety and operational Limits, RWST Setpoint Required Accuracy and LBLOCA, SBLOCA Sump Minimum Levels, Rev. 13
SQN-EEB-MS-TI28-002, Instrument Accuracy Calc 1-LT-68-402, -403, -404, 2-LT-68-402, -403, -404, Demonstrated Accuracy Calculation, Rev. 6
SQN-EEB-MS-TI28-002, Instrument Accuracy Calc 1-LT-68-402, -403, -404, 2-LT-68-402, -403, -404, Demonstrated Accuracy Calculation, Rev. 3
SQN-EEB-MS-TI28-0049, Instrument Accuracy Calc 2-LT-63-176, -177, -178, -179 Containment Sump Switchover, Rev. 7
SQN-EEB-MS-TI28-0048, Instrument Accuracy Calc 2-LT-63-176, -177, -178, -179, Containment Sump Level Indication, Rev. 5
SQN-EEB-MS-TI28-0013, Instrument Accuracy Calc 1-LT-63-176, -177, -178, -179, Containment Sump Switchover, Rev. 10

SQN-EEB-MS-TI28-0010, Instrument Accuracy Calc 1-LT-63-176, -177, -178, -179, Containment Sump Level Indication, Rev. 8
2-L-63-179, Setpoint And Scaling Document, Rev. 7
1-L-63-178, Setpoint and Scaling Document, Rev. 10
1-L-63-177, Setpoint And Scaling Document, Rev. 9
1-L-63-176, Setpoint And Scaling Document, Rev. 9
SQN-IC-025, Integrated Computer System (ICS) Accuracy Evaluation, Rev. 1
SQN-CPS-007, Diesel Generator (DG) Battery Capacity Evaluation, Rev. 5
27DAT, Demonstrated Accuracy Calculation 27DAT, Rev. 8
SQN-APS-003, 480VAC APS Class 1E Load Center Coordination Study, Rev. 074
SQN-CPS-057, Vital Power Control System Loading Channel I and Continuous Loading Evaluation Protective Devices in the 120V AC Vital Instrument Power Boards, Rev. 80
SQN-CPS-058, Vital Power Control System Loading Channel II and Continuous Loading Evaluation of Protective Devices in the 120V AC Vital Instrument Power Boards, Rev. 80
SQN-CPS-059, Vital Power Control System Loading Channel III and Continuous Loading Evaluation of Protective Devices in the 120V AC Vital Instrument Power Boards, Rev. 69
SQN-EEB-MS-TI-0008 Degraded Voltage Analysis, Rev. 4
SQN-EEB-MS-TI-0008 Degraded Voltage Analysis, Rev. 5
SQNETAPAC, Auxiliary Power System, Rev. 56
SQNETAPAC, Auxiliary Power System, Rev. 57
SQN-VD-VDC-1, 125 VDC Vital Instrument Power System Design Verification, Rev. 4

Design Basis Documents

SQN-DC-V-11.8, Sequoyah Nuclear Plant - Diesel Generator And Auxiliary Systems, Rev. 9
General Design Criteria Document No. SQN-DC-V-13.9.8, Sequoyah Nuclear Plant –Auxiliary Feed Water, Rev. 6
Design Criteria Document No. SQN-DC-V11.2, Sequoyah Nuclear Plant 125 V Vital Battery System, Rev. 11
Design Criteria Document No. SQN-DC-V-27.3, Sequoyah Nuclear Plant – Safety Injection System, Rev. 20

Drawings

1.2-47W803-2, Flow Diagram Auxiliary Feedwater, Rev. 67
1,2-47W859-1, CCS Flow Diagram, Rev. 54
1,2-47W859-2, CCS Flow Diagram, Rev. 31
1,2-47W859-3, CCS Flow Diagram, Rev. 33
1,2-47W859-4, CCS Flow Diagram, Rev. 21
2-47W811-1, SIS Flow Diagram, Rev. 60
L-1479, Surge Tank Drawing, 10/13/71
1-2000E51-6, Internal Wiring Diagram Rack 10 Protection Set III (Units 1) Rev. 0
1-1080273-37, Process Control Block Diagram RWST & Containment Sump Levels Protection Sets I Thru IV (Unit 1), Rev. 0
1-47W611-63-2, Mechanical Logic Diagram Safety Injection System, Rev. 4
1-45N1632-11, Wiring Diagrams Miscellaneous Controls Connection Diagrams SH 11, Rev. 2
1,2-45N631-4, Wiring Diagrams Air Conditioning System Schematic Diagrams SH 4 (Units 1 & 2), Rev. 0
1,2-45N631-3, Wiring Diagrams Air Conditioning System Schematic Diagrams, Sheet 3, Rev. 1
1-2000E45-9, Internal Wiring Diagram Rack 4 Protection Set I (Cont Sump Level and RCS WR Press Loop 1), Rev. 1
1-2000E54-6, Internal Wiring Diagram Rack 13 Protection Set IV, Rev. 0
I-2000E48-8, Internal Wiring Diagram Rack 7 Protection Set II, Rev. 0

1,2-45N703-2, Wiring Diagram 125V Vital Battery Board II Single Line, Sheet 2, Rev. 32
1,2-45N779-26, Wiring Diagrams 480V Shutdown Aux Power Schematic Diagram SH 26 (Units 1 & 2), Rev. 30
1,2-45N779-18, Wiring Diagrams 480V Shutdown Aux Power Schematic Diagram SH-18 (Units 1 & 2), Rev. 4
1, 2 -45N779-1, 480V SHTDN Auxiliary Power Schematic Diagrams Sh-1, Rev. 5
1, 2 -45N779-2, 480V SHTDN Auxiliary Power Schematic Diagrams Sh-1, Rev. 19
1, 2 -45N779-3, 480V SHTDN Aux Power Schematic Diagrams Sh-3, Rev. 30
1, 2 -45N779-5, 480V SHTDN Aux Power Schematic Diagrams Sh-5, Rev. 19
1, 2-15E500-1, Key Diagram Station Aux Power System, Rev. 35
1, 2-45N747-2, Wiring Diagrams 480V Unit Board 1B Single Line, Rev. 24
1, 2-45N749-3, Wiring Diagrams 480V Shutdown Board 1B1-B Single Line, Rev. 51
1, 2-45N751-1, Wiring Diagrams Reactor MOV BD 1A1-A, Rev. 56
1, 2-45N751-5, Wiring Diagrams 480V Reactor MOV BD 1B1-B Sh-1, Rev. 65
1, 2-45N765-1, 6900 Volt Shutdown Aux Power Schematic Diagram Sh-1, Rev. 24
1, 2-45N765-2, 6900 Volt Shutdown Aux Power Schematic Diagram Sh-2, Rev. 25
1, 2-45N765-3, 6900 Volt Shutdown Aux Power Schematic Diagram Sh-3, Rev. 22
1, 2-45N765-4, 6900 Volt Shutdown Aux Power Schematic Diagrams Sh-4, Rev. 3
1, 2-45N765-5, 6900 Volt Shutdown Aux Power Schematic Diagrams Sh-5, Rev. 15
1, 2-45N765-8, 6900 Volt Shutdown Aux Power Schematic Diagrams Sh-8, Rev. 6
1, 2-45N765-9, 6900 Volt Shutdown Aux Power Schematic Diagrams Sh-9, Rev. 3
1-45N721-1, Wiring Diagrams 6900V Unit Boards 1A & 1B Single Lines, Rev. 23
1-45N724-2, Wiring Diagrams 6900V Shutdown BD 1B-B Single Line, Rev. 22

Procedures
AOP-P.01, Loss of Offsite Power, Rev 31.
AOP-M.02, Abnormal Operating Procedures Loss of Control Air, Rev. 21
AOP-R.02, Shutdown LOCA, Rev. 18
EA-250-2, Load Shed of 250V DC Loads After Station Blackout, Rev. 9
EA-250-1, Load Shed of Vital Loads After Station Blackout, Rev. 16
ECA-0.2, Recovery from Loss of All AC Power with SI Required, Rev. 10
ES-0.2, Natural Circulation Cooldown, Rev. 15
ES-1.3, Transfer to RHR Containment Sump, Rev. 19
ECA-0.0, Loss of All AC Power, Rev. 23, Rev. 26
ES-1.3, Transfer to RHR Containment Sump, Rev. 19
ES-0.1, Reactor Trip Response, Rev. 32
E-1, Loss of Reactor or Secondary Coolant, Rev. 24
EA-3-2, Local Control of Turbine Driven AFW LCVS, Rev. 3
E-3, Steam Generator Tube Rupture, Rev. 18
EA-1-2, Local Control of S/G PORVS, Rev. 4
AOP-P.02, Loss of 125V DC Vital Battery Board, Rev. 14
MI-10.4, 6900V Breaker Inspection ABB Type, Rev. 68
MI-10.5, Westinghouse Type DS Breaker Maintenance, Rev. 0102
NPG-SPP-03.1, Corrective Action Program, Rev. 0006
NPG-SPP-03.1.4, Corrective Action Program Screening and Oversight, Rev. 0013
SQN-1MVOP-003-0047 –B, PM# 4000011002 Attachment A
1-PI-OPS-000-003.0, Periodic Stroking of Unit 1 Time Critical Valves, Rev. 5
2-PI-OPS-000-003.0, Periodic Stroking of Unit 2 Time Critical Valves, Rev. 7
NPG-SPP-09.5, Temporary Modifications, Rev. 0005
0-PI-OPS-000-004.0, Periodic Validation of Time Critical Actions Using Simulator, Rev. 0005
1-AR-M6-E, Annunciator Response, Rev. 24

2-AR-M6-E, Annunciator Response, Rev. 27
MMTP-102, Erection of Scaffolds/Temp Work Platforms and Ladders, Rev. 0008
NPG-SPP-10.2, Clearance Procedure to Safely Control Energy, Rev. 0005
0-PI-OPS-000-000.1, Operations Periodic Administrative Reviews, Rev. 0004
NPG-SPP-09.4, 10 CFR 50.59 Evaluations of Changes, Tests, and Experiments, Appendix A, Rev. 0006
0-SO-30-11, Onsite Electrical Board Rooms – Heating, Ventilation, and Cooling, Rev. 39
NPG-SPP-06.9.1, Conduct of Testing, Rev. 7
NPG-SPP-09.4, 50.59 Evaluations of Changes, Test and Experiments, Rev. 6
SQN-DC-V-13.9.3, Auxiliary Building Ventilation and Cooling Systems, Rev. 5
0-MA-REM-000-001.0, Extended Station Blackout, Rev. 6
0-SO-74-1, RHR System, Rev. 86
0-GO-1, Unit Startup from Cold Shutdown to Hot Standby, Rev. 70
0-TI-SXX-000-006.0, Check Valve Program, Rev. 0
0-TI-MXX-000-001.4, Non-Intrusive Check Valve Testing, Rev. 3
0-SO-70-1, Component Cooling Water System “B” Train, Rev. 43
0-PI-EBM-000-001.1, Battery Equalize Charge, Rev. 10
0-PI-EBM-000-001.3, Single Battery Cell High Level Equalize Charge, Rev. 4
0-PI-EBM-000-001.2, Battery Bank High Level Equalize Charge, Rev. 25
0-PI-EBM-000-001.4, High Level Equalization of 250 Vdc Station Batteries, Rev. 9
0-SO-250-2, 120 Volt AC Vital Instrument Power System, Rev. 51
0-SO-250-1, 125 Volt DC Vital Power System, Rev. 54
0-PI-EXX-201-001.0, Maintenance Guidelines for Locating Various Grounds on up to 480V AC Ungrounded Systems, Rev. 0014
0-SI-EBT-250-100.4, Modified Performance Testing Of 125VDC Vital Batteries and 125VDC Vital Battery Charger Test, Rev. 0026
1-SI-OPS-202-621.B, Periodic Functional Test Of Voltage Relays On 6.9KV SDBD 1B-B Rev. 0004
1-SI-TDC-202-235.B, 6.9kV Shutdown Board Loss Of Voltage, And Degraded Voltage Relay Calibration Train B (18 Months), Rev.14
1-SI-TDC-202-737.B, Periodic Calibration And Functional Test Of 6.9 kV Protective Relays And Ammeter For Shutdown Board 1b-B Panel 21, Rev. 7
1-SI-SIN-063-009.0, Surveillance Instruction Containment Sump Inspection, Rev. 3
1-SI-OPS-082-007.A, Electrical Power System Diesel Generator 1 A-A, Rev 52
1-SI-OPS-082-024.A, 1A-A D/G 24 Hour Run and Load Rejection Testing, Rev 26
1-SI-OPS-082-026.A, Loss of Offsite Power with Safety Injection D/G 1A-a Test, Rev. 44
1-SO-3-2, System Operating Instruction Auxiliary Feedwater System, Rev. 47
1-SO-63-1, Cold Leg Injection Accumulators, Rev. 49
1-SI-OPS-074-128.0, Unit 1 RHR Discharge Piping Vent, Rev. 31
2-SI-OPS-074-128.0, Unit 2 RHR Discharge Piping Vent, Rev. 18
2-SO-63-1, Cold Leg Injection Accumulators, Rev. 37

<u>Completed Procedures</u>
0-SI-EBT-250-100.4, Modified Performance Testing of 125Vdc Vital Batteries and 125Vdc Vital Battery Charger Test, Rev. 19, dates 2/22/10, 3/14/11, 1/11/13, and 12/22/11.
0-SI-EBT-250-100.4, Modified Performance Testing of 125Vdc Vital Batteries and 125Vdc Vital Battery Charger Test, Rev. 19, dates 6/25/09 and 4/4/11.
0-SI-EBT-250-100.3, 125Vdc Battery II and Charger Annual Inspection, Rev. 15, dates 1/11/13, 1/23/12, and 4/11/11.

0-SI-EBT-250-100.3, 125Vdc Battery IV and Charger Annual Inspection, Rev. 16, dates 3/6/13 and 1/3/12.
0-SI-EBT-250-100.2, 125Vdc Battery II Quarterly Operability, Rev.18, dates 1/7/13, 1/11/13, and 4/22/13.
0-SI-EBT-250-100.2, 125Vdc Battery IV Quarterly Operability, Rev.18, date 4/4/13.
0-SI-EBT-250-100.5, 125Vdc Vital Battery & Charger 5yr Performance Test, Rev. 13, dates 9/9/05, 9/1/00, 9/23/09, and 8/29/03.
0-SI-EBT-250-100.4, 125V Vital Bat & Bat Chgr I 18mo Perf Test, 4/7/13
0-SI-EBT-250-100.4, 125V Vital Bat & Bat Chgr I 18mo Perf Test, 7/2/11
0-SI-EBT-250-100.4, 125V Vital Bat & Bat Chgr I 18mo Perf Test, 8/26/09
0-Sl-EBT-250-100.4, Modified Performance Testing Of 125VDC Vital Batteries and 125VDC Vital Battery Charger Test, 1/11/13
1-SI-OPS-202-621.B, Periodic Functional Test Of Voltage Relays On 6.9kv SD Bd 1B-B, 3/13/10
1-SI-TDC-202-235.B, 6.9kv Shutdown Board Loss Of Voltage, Overvoltage, And Degraded Voltage Relay Calibration Train B, 12/19/09
1-SI-TDC-202-235.B, 6.9kv Shutdown Board Loss Of Voltage, Overvoltage, And Degraded Voltage Relay Calibration Train B, 7/6/12
1-SI-TDC-202-235.B, 6.9kv Shutdown Board Loss Of Voltage, Overvoltage, And Degraded Voltage Relay Calibration Train B, 1/4/11
1-SI-TDC-202-235.B, 6.9kv Shutdown Board Loss Of Voltage, Overvoltage, And Degraded Voltage Relay Calibration Train B, 1/7/10
1-SI-TDC-202-737.B, 6.9kv SD Bd 1B Pnl 21 Protective Relays & Ammeter Cal and FT, 2/10/11
1-SI-TDC-202-737.B, 6.9kv SD Bd 1B Pnl 21 Protective Relays & Ammeter Cal and FT, 8/8/12
1-PI-EBT-250-731.0, 120v AC Vital Inverter Functional Test, Rev. 4, dates 11/11/04 and 10/15/07.
2-PI-EBT-250-731.0, 120v AC Vital Inverter Functional Test, Rev. 6, dates 6/2/08, 7/15/11and 4/29/05.
2-SI-SXV-063-206.0, RHR Cold Leg Check Valve Backseat Test, 12/30/12
2-SI-SXV-063-206.0, RHR Cold Leg Check Valve Backseat Test, Rev. 18, 12/31/12
2-SI-SXV-074-218.0, Leak Rate Test FCV-74-1 and FCV-74-2, 12/29/13
LT-70-63C, Surge Tank Demineralized Water Inlet Level, 7/25/11
LT-70-63A, Surge Tank Demineralized Water Inlet Level, 6/14/12
N-VT-1, Visual Inspection of Surge Tank, 9/23/10
1-SI-SXV-000-201.1, Full Stroking of Cat A and B Valves, 5/16/12
2-SI-SXV-000-201.1, Full Stroking of Cat A and B Valves, 8/30/12
1-SI-SXP-070-201, A CCS Pump 1A XI Test, 10/21/12
1-SI-SXP-070-201, A CCS Pump 1A XI Test, 9/17/12
1-SI-SXP-070-201, A CCS Pump 1A XI Test,7/19/12
1-PI-OPS-000-003.0, Periodic Stroking of Unit 1 Time Critical Valves, Rev. 5, Dated 03/27/12
2-PI-OPS-000-003.0, Periodic Stroking of Unit 2 Time Critical Valves, Rev. 7, Dated 12/20/12
0-PI-OPS-000-004.0, Periodic Validation of TCAs Using Simulator, Rev. 0005, 04/17/13

Reviewed PERs (Problem Evaluation Reports)

| | | |
|---|---|---|
| PER 763335 | PER 470469 | PER 052035 |
| PER 734974 | PER 639316 | PER 152400 |
| PER 281882 | PER 661755 | PER 208636 |
| PER 290603 | PER 666449 | PER 223905 |
| PER 538284 | PER 695185 | PER 248644 |
| PER 694381 | PER 219482 | PER 275514 |
| PER 740635 | PER 028246 | PER 275770 |

| | | |
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| PER 279628 | PER 225499 | PER 226612 |
| PER 631922 | PER 693740 | PER 232964 |
| PER 661019 | PER 694459 | PER 286231 |
| PER 677627 | PER 221396 | PER 297965 |
| PER 702753 | PER 693740 | PER 455047 |
| PER 708758 | PER 713100 | PER 455080 |
| PER 734137 | PER 713192 | PER 467825 |
| PER 739715 | PER 692488 | PER 468303 |
| PER 739727 | PER 176889 | PER 512158 |
| PER 91967 | PER 178526 | PER 671454 |
| PER 61967-001 | PER 178612 | PER 712019 |
| PER 619457 | PER 225534 | PER 712030 |

Self Assessment Reports
CRP-LIA-02-003, Operating Experience, 4/26/02

Completed Work Orders
00-003689-000, 5th vital battery room roof leak, 4/24/00
08-776789-000, Calibrate Service Air Isolation Pressure Control Loop and Replace Pressure Regulator & Blowdown Air Lines, Rev. 0
111510207, Calibrate service air isolation pressure control loop and replace pressure regulator & Blowdown Air, Rev. 0
112200685, Check for Frequency Drift for Inverter (1-I) and then Adjust as Needed, 11/1/11
09-775083-000, 5 yr Repetitive PM to Inspect Breaker, 2/6/12
07-772709-000, 10 yr Repetitive PM to Refurbish Breaker, 3/9/12
06-775721-000, 10 yr Repetitive PM to Refurbish Breaker, 2/27/12
112729449, Swap RX BLDG ISOL VLV FCV-32-81 BKR, 8/25/13
07-774563-000, 10 year Maintenance, 5/13/08
08-777886-000, Check for Frequency Drift for Inverter (1-I) and the Adjust as Needed, 6/14/09
07-780002-000, Check for Frequency Drift for Inverter (1-I) and the Adjust as Needed, 6/2/08
111138419, 1-PI-EBT-250-731.01 120v Vital Inverter 1-I FT, 1/21/13
113236125, 0-SI-EBT-250-100.2 125v Vital Batt IV Oper, 10/3/12
113658932, 0-SI-EBT-250-100.2 125v Vital Batt IV Oper, 1/1/13
112867501, 1-SI-EIV-268-305.B H2 Mitigation Sys. Temp. Check, 3/20/12
113127045, 1-SI-EIV-268-305.B H2 Mitigation Sys. Temp. Check, 1/20/12
112867479, 1-SI-EIV-268-305.A H2 Mitigation Sys. Temp. Check, 3/20/12
04-781444-000, Replace Discrete Capacitors (C1) and Resistors (R1) on 125V Vital Battery Charger IV, 1/31/05
04-781443-000, Replace Amplifier Card in 125V Vital Battery Charger IV, 3/1/05
08-775827-000, Replace Resitors (R1) on the 125V Vital Battery Charger II, 8/31/10
04-774924-000, Replace Discrete Capacitors (C1) and Resistors (R1) on the 125V Vital Battery Charger II, 5/6/04
04-774752-000, Replace the Amplifier Card in the 125V Vital Battery Charger II and Perform the Necessary Load Test to Prove Operability and Allow Return to Service, 5/6/04
09-774139-000, Replace Resistors (R1) on 125V Vital Battery Charger IV, 2/11/10
110699944, 125v Vital Battery Room IV “B” Exhaust Fan not Operating, 12/6/10
110752299, Replace Circuit Breaker with Molded Case Switch, Implementing EDC E22208, 3/8/11
110752762, Replace Breaker with New Tested QA1Breaker for U2C17 5% Sampling (480V Shutdown Board 2B1-B NOR BUS ALT FDR), 4/26/11

110752799, Replace Breaker with New Tested QA1Breaker for U2C17 5% Sampling (480V Shutdown Board 2B2-B NOR BUS ALT FDR), 4/26/11
111016312, Replace the Amplifier Card in the 125V Vital Battery Charger II, 7/26/11
111138417, SI-305.1 U1 H2 Mitigation Sys Igniter Temp Measure Train A & B, 11/13/10
111739051, Replace Amplifier card in 125V Vital Battery Charger IV, 2/8/12
111857293, SI-305.2 U2 H2 Mitigation Sys Igniter Temp Measure Train A & B, 6/13/11
112332346, Replace Circuit Breaker by Implementing EDC-E22208A and PIC P22279A, 7/1/13
112729402, Perform Molded Case Breaker Testing by the End of U2R18, 5/15/12
112729445, Perform Molded Case Breaker Testing by the end of U2R18, 6/20/12
112729454, Perform Molded Case Breaker Testing by the end of U2R18, 5/15/12
112729468, Perform Molded Case Breaker Testing by the end of U2R18, 11/8/12
112750854, 2-SI-EIV-268-305.B H2 Mitigation Sys. Current Check, 4/26/12
112807636, 1-SI-EIV-268-305.B H2 Mitigation Sys. Current Check, 5/7/12
112966764, 1-SI-EIV-268-305.A H2 Mitigation Sys. Current Check, 6/12/12
113034754, 2-SI-EIV-268-305.B H2 Mitigation Sys. Current Check, 7/23/12
113100317, 2-SI-EIV-268-305.A H2 Mitigation Sys. Current Check, 7/31/12
113100470, 1-SI-EIV-268-305.B H2 Mitigation Sys. Current Check, 8/7/12
113235418, 1-SI-EIV-268-305.A H2 Mitigation Sys. Current Check, 9/11/12
113401300, 2-SI-EIV-268-305.A H2 Mitigation Sys. Current Check, 12/28/12
113432438, 2-SI-EIV-268-305.B H2 Mitigation Sys. Current Check, 12/28/12
113434151, 1-SI-EIV-268-305.B H2 Mitigation Sys. Current Check, 11/6/12
113507153, 1-SI-EIV-268-305.A H2 Mitigation Sys. Current Check, 12/11/12
114243593, RHR System Isolation Valve Adjustments, 12/30/12
09-776386-000, Periodic Calibration PM on Surge Tank Demin Water Inlet, 7/20/11
112306366, CCS Surge Tank A Level Instrumentation Calibration, 6/6/12
112874872, Stroke A Train, Common & Cntm. Isolation Valves for all Modes, 5/16/12
113188769, Stroke A Train, Common & Cntm. Isolation Valves for all Modes, 8/30/12
111842240, Periodic Validation of Time Critical Actions (Non-Fire), 4/17/13
111781180, Periodic Validation of Time Critical Actions for Fire Safe Shutdown, 1/24/11
111995606, Periodic Stroking of Unit 1 Time Critical Valves, 3/27/12
112619126, Periodic Stroking of Unit 2 Time Critical Valves, 12/20/12
2-SI-ICC-063-053.4, Channel Calibration of RWST Level IV Rk 13 Loop L-63-53, 2/24/10
111577685, 2-SI-ICC-063-053.4 RWST Level Ch IV Rk 13 Loop L-63-53 CC, 7/6/11
2-SI-ICC-063-052.3, Channel Calibration of RWST Level Ch III Rack 10 Loop L-63-52, 2/2/10
111577686, 2-SI-ICC-063-052.3 RWST Level Ch III Rk 10 Loop L-63-52 CC, 7/14/11
2-SI-ICC-063-051.2, Channel Calibration of RWST Level Ch II Rack 7 Loop L-63-51, 2/3/10
111577691, 2-SI-ICC-063-051.2 RWST Level Ch II Rk 7 Loop L-63-51 CC, 7/14/11
111932700, 2-SI-ICC-063-050.1 RWST Level Ch I Rk 3 Loop L-63-50 CC, 10/11/11
2-SI-ICC-063-050.1, Channel Calibration of RWST Level Ch I Rack 3 Loop L-63-50, 4/21/10
1-SI-ICC-063-053.4, Channel Calibration of RWST Level IV Rk 13 Loop L-63-53, 9/04/09
111577620, 1-SI-ICC-063-053.4 RWST Level Ch IV Rk 13 Loop L-63-53 CC, 6/20/11
1-SI-ICC-063-052.3, Channel Calibration of RWST Level Ch III Rack 10 Loop L-63-52, 9/03/09
111577471, 1-SI-ICC-063-052.3 RWST Level Ch III Rk 10 Loop L-63-52 CC, 7/15/11
1-SI-ICC-063-051.2, Channel Calibration of RWST Level Ch II Rack 7 Loop L-63-51, 9/02/09
111577678, 1-SI-ICC-063-051.2 RWST Level Ch II Rk 7 Loop L-63-51 CC, 7/13/11
1-SI-ICC-063-050.1, Channel Calibration of RWST Level Ch I Rack 3 Loop L-63-50, 1/15/10
111577682, 1-SI-ICC-063-050.1 RWST Level Ch I Rk 3 Loop L-63-50 CC, 7/15/11
05-770505-000, Inspection of ITE 7.5HK-500 Breakers and Siemens 6900V Vacuum Breakers, 1/24/05
07-778363-000, 9 yr Repetitive PM to refurbish Breaker, 9/28/11
08-770185-000, 54 month Repetitive PM to Inspect Breaker, 12/21/10

09-771378-000, 10 yr Repetitive PM to refurbish Breaker, 2/26/09
09-771386-000, 10 yr Repetitive PM to refurbish Breaker, 4/23/09
111847366, 10 yr Repetitive PM to refurbish Breaker, 3/10/11
111847367, 10 yr Repetitive PM to refurbish Breaker, 12/9/11
112105718, 10 yr Refurbish of the breaker, 10/18/11
112159952, 10 yr Refurbish of the breaker, 11/2/11
112159960, 10 yr Refurbish of the breaker, 8/1/11
112451975, 10 yr Refurbish of the breaker, 8/5/11
112613143, 480V Shutdown Board 2B1-B has slight ground on ”B” Phase, 11/4/11
112984048, Megger immersion heater and replace if needed, 1/24/12
112984052, Megger immersion heater and replace if needed, 12/31/11
114412440, Verify Cause of 2B1-B 480v Shutdown Board Transfer Failure, 12/156/13

Modifications
D22178, Modify Containment sump screens as required by NEI methodology, Rev. A
SQN-0-2013-012, Provide Temporary Power from Spare 125 Volt DC Charger 2-S Transfer Switch to 125 Volt DC Battery Boards I and II, Rev. 0
TACF 0-12-011-067, Essential Raw Cooling Water, Rev. 1
ECN L6611, Replace Brake Coil on Limitorque Motor Operated Valves 1&2-FCV-3-33, -47, -87, & -100, Rev. 1

Miscellaneous Documents
SQN-VTD-E130-0010, Electric-Products Installation, Operation and Maintenance of Horizontal - AC - Synchronous Generators, Rev. 6
MSQ~-VTD-EI47-0010, E.M.D. 64SE4 Turbocharged Engine Maintenance Manual, Rev. 16
0-SI-OPS-082-252.0, Diesel Generator Interdependence test, Rev. 8
0-AR-DG-1A-LCL, Diesel Generator 1A-A Local Panel, Rev. 17
0-SO-82-1, System Operating Instruction Diesel Generator 1A-A, Rev. 42
0-SO-82-5, System Operating Instruction Diesel Generator 1A-A Support Systems, Rev. 21
PMTI-SQN-21854, DG 1A-A Starting Air 5 Start Capacity verification, Rev. 0
SQN-VTM-I075-0250, Vendor Technical Manual for Ingersoll-Rand Company Auxiliary Feedwater Pumps, Rev. 13
0-SO-33-1, System Operating Instruction Service Air System, Rev 17
0-TI-SXX-000-146.0, Program for Implementing NRC Generic Letter 89-13, Rev. 4
1-PI-SFT-070-001.0, Performance Testing of Component Cooling Heat Exchangers 1A1, 1A2 Rev. 19
OPDP-1, Conduct of Operations 12/29-13/12
NEI 96-07, 50.59 Guidance, Rev. 1
S10 130604 802, Proposed TS Bases or TRM Change LCO 3.5.3, 3/24/12
2-SI-SXV-063-206.0PCF-021, 50.59 Screening for Check Valve Testing, Rev. 0
TSBC 12-02 ECCS Shutdown Evaluation Form, 3/24/12
TSC 07-05, Units 1 & 2 TSC for ECCS, 4/21/09
SQN-DC-V-7.4, Essential Raw Cooling Water System, Rev. 28
SQN-DC-V-13.9.9, Component Cooling Water System, Rev. 24
SQN-DC-V-13.9.3, Aux Building Ventilation & Cooling, Rev. 5
Active SR MOV with Safety Function List
GL 96-05 NRC Correspondence
VD-P340-4210, Monoflange MK 2FII Butterfly Valve
GL 89-10 NRC Correspondence
Safety-related MOV Exclusion form
Nuclear Engineering Set Point and Scaling Documents, Rev. 8

SQN-VTD-P319-0030, Instruction Manual Three Phase Magnetic Amplified Controlled Battery Charger/Eliminator, Rev. 3
Docket No. 50-362 Licensee Event Report No. 2009-002 San Onofre Nuclear Generating Station, Unit 3
NRC Information Notice 2010-23: Malfunctions of Emergency Diesel Generator Speed Switch Circuits
PMCR 617458, PM Change/Deferral - Perform Doble Testing on transformer, 10/01/12
Sequoyah Nuclear Plant - NRC Component Design Basis Inspection Report 05000327/2010007, 05000328/2010007, May 24, 2010
Sequoyah Nuclear Plant - NRC Integrated Inspection Report 05000327/2010005, 05000328/2010005, January 28, 2011
SME OE Review Response - Level D PER 286231SR285539 - Perform Review of NRC IN 2010-23 Malfunctions of EOG Speed Switch Circuits, 12/16/10
Specification 8-83738, 125-Volt Vital Battery Charger, 5/19/72
SQN-VTD-S250-0060, Vendor Technical Document for Solidstate Controls, Inc. Instruction/Technical Manual fo 20kVA UPS, Rev. 9
SQN-VTM-G182-0030, Gould Inc. (Formerly I-T-E Imperial Corporation) Indoor and Outdoor Metal Clad Switchgear and Components, Rev. 47.
SQN-VTM-W120-0200, Westinghouse Type DS Low Voltage Switchgear, Type DS Circuit Breakers And Associated Equipment, Rev. 49
Steam Generator Feedwater Isolation Valve Motor Brake Test Reports, 2/4/02
OPL271S906, Large Break LOCA with Transfer to RHR Containment Sump Simulator Evaluation, Rev. 0
OPL271E-1, E-1 Loss of Reactor or Secondary Coolant Lesson Plan, Rev. 3
SQN Main Control Room Deficiencies Status
Unit 1/ Unit 2 Non-Outage Control Room Annunciators/Deficiencies, 07/09/13
AUO Rounds Deficiencies, 07/8/13
Unit 1/ Unit 2 MCR, AUO, Shift Manager Turnover and Rounds Sheets, 07/10/13
Open T-Mods List, dated 07/10/13
Unit 0 Clearance Orders Greater Than 90 days Old, 07/23/2013
Unit 1 Clearance Orders Greater Than 90 days Old, 07/12/2013
Unit 2 Clearance Orders Greater Than 90 days Old, 07/12/2013

Work Order
111159651, U1R17 1-SI-SIN-063-009.0 U1 Cntmt Sump Inspection. Rev. 0
111940499, U1R18 1-SI-SIN-063-009.0 U1 Cntmt Sump Inspection. Rev. 0
113995423, 1-SI-SXP-003-201.A MDAFW Pump 1A XI Test, Rev. 0
113663532, 1-SI-SXP-070-201.A CCS Pump 1A Xi Test, Rev. 0
112613143, 480V Shutdown Board 2B1-B has slight ground on"B" Phase, 11/4/11
112869004, Hard Ground on B phase. Please investigated and repair
112952847, Dsl Gen 1B-B Immersion Heater 1B1 Contactor
112953055, Dsl Gen 2A-A Immersion Heater 2A1 Contactor
112984036, megger test immersion heater
112984050, megger immersion heater
113263416, 1B1-B 480V SDBD has hard 'b' phase ground
114412440, Verify Cause of 2B1-B 480v Shutdown Board Transfer Failure

PERs Generated Due to this Inspection
PER 675233, 2013 CDBI – During CDBI review no NESSDs were found for 3-PI-73-1A
PER 758613, Temp Mod for ERCW greater than 90 days w/ no evaluation
PER 757959, Removed Vital Battery board breakers not tested

PER 760362, NRC identified - Weakness in 50.59 implementation
PER 760336, Insufficient time for operator action (standing order)
PER 758761, NRC identified - Evaluation of EDG frequency range allowed by TS PDO
PER 759100, NRC identified weakness in Temp Mod procedure
PER 759798, NRC identified TS discrepancy with vital inverters
PER 751273, ERCW pumping station housekeeping substandard
PER 751172, Ladders installed in vital battery room
PER 757559, NRC identified - Potential violation of TS LCO 3.0.4
PER 757988, NRC identified - Failure to screen TSSR procedure change for 50.59 review
PER 756304, NRC-identified issue related to SQN PRA
PER 756279, NRC identified, work orders lost for 480 V SD board ground isolation
PER 756276, NRC-identified issue with long-term inoperability of vital battery room exhaust fan
PER 754923, NRC identified, inadequate extent of condition for FSAR assumed time challenges
PER 752407, NRC identified shutdown risk issue related to Mode 4 LOCA
PER 752311, NRC identified issues in Vital Battery Room V
PER 751944, NRC-identified concern regarding scaffold which may impact sprinklers
PER 751923, Deficiencies in Extent of Condition for flooding PER (NRC identified)
PER 756308, Failure to comply with 50.59 review requirements for old clearances
PER 753175, NRC-identified scaffolding program implementation deficiencies
PER 753829, Calculation SQN-VD-VDC-1 does not contain analysis of battery only block start after LOCA
PER 755388, Calculation SQN-CPS-057 discrepancies
PER 753920, The Unit 1 Aux Building AUO turnover sheet did not list any compensatory actions associated with monitoring RHR suction pressure indicators
PER 753919, Lights out in Unit 1 West Valve Vault Room, NRC identified
PER 752336, NRC identified ARP enhancement
PER 753927, Ladders installed contrary to MMTP-102, NRC identified
PER 753344, NRC identified Ops training issue related to new AUO task
PER 753336, NRC identified, oil leak on D/G engine 1A1
PER 753328, NRC identified scaffold blocking fire extinguisher
PER 753327, NRC identified, oil leak on D/G 2B1
PER 753504, 2013 NRC CDBI Issue: Pending revision to ETAP calculation results in lower voltages for MOV operation (PDO)
PER 752299, Gratings clogged in ERCW pumping station (NRC identified)
PER 750697, 2013-CDBI Self Assessment identified design criteria discrepancy (deficiency)
PER 750706, 2013-CDBI Self Assessment identified vendor manual discrepancy (deficiency)
PER 763332, ETAP Calculation Voltage Source on Swing Bus
PER 763331, Non Accident Degraded Voltage Time Delay
PER 763032, CDBI Issue on Degraded Voltage ETAP Methodology
PER 763335, EDG Air Start Check Valve Leakage Acceptance Criteria
PER 763416, 6.9 Shutdown Board rear fasteners missing and loose
PER 762795, CDBI Issue on Surveillance Testing Practice for Vital Batteries
PER 753504, 2013 NRC CDBI Issue: Pending revision to ETAP calculation results in lower voltages for MOV operation
PER 758465, 2013 CDBI concern: UFSAR conflict with SQN vital battery analysis and testing
PER 762691, CDBI 2013 – Administrative error discovered in unissued calculation SQN-EEB-MS-TI06-0008
PER 763818, 2013 CDBI NRC identified concern with SQNETAPAC acceptable voltage limit for motor brakes