



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

September 14, 2015

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 EVALUATION OF CHANGES, TESTS,
AND EXPERIMENTS AND PERMANENT PLANT MODIFICATIONS INSPECTION
REPORT 05000327/2015007 AND 05000328/2015007**

Dear Mr. Shea:

On July 31, 2015, the U.S. Nuclear Regulatory Commission (NRC) completed an inspection at your Sequoyah Nuclear Plant, and discussed the results of this inspection with Mr. Carlin and other members of your staff. Inspectors documented the results of this inspection in the enclosed inspection report.

NRC inspectors documented five findings of very low safety significance (Green) in this report. Five of these findings involved violations of NRC requirements; one of these violations was determined to be Severity Level IV under the traditional enforcement process.

If you contest the violations or significance of the NCVs, you should provide a response within 30 days of the date of this inspection report, with the basis for your denial, to the U.S. Nuclear Regulatory Commission, ATTN: Document Control Desk, Washington DC 20555-0001; with copies to the Regional Administrator, Region II; the Director, Office of Enforcement, U.S. Nuclear Regulatory Commission, Washington, DC 20555-0001; and the NRC resident inspector at the Sequoyah Nuclear Plant.

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 the Sequoyah Nuclear Plant.

In accordance with Title 10 of the *Code of Federal Regulations* 2.390, "Public Inspections, Exemptions, Requests for Withholding," 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

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/

Jonathan H. Bartley, Chief
Engineering Branch 1
Division of Reactor Safety

Docket Nos.: 05000327, 05000328
License Nos.: DPR-77, DPR-79

Enclosure: Inspection Report 05000327/2015007
and 05000328/2015007 w/Attachment:
Supplementary Information

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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.: 05000327/2015007, 05000328/2015007

Licensee: Tennessee Valley Authority (TVA)

Facility: Sequoyah Nuclear Plant, Units 1 and 2

Location: Soddy-Daisy, TN 37379

Dates: July 20 to 31, 2015

Inspectors: T. Fanelli, Reactor Inspector (Team Leader)
D. Terry-Ward, Construction Inspector
P. Carman, Construction Inspector
J. Bennett, (Intern)

Approved by: Jonathan H. Bartley, Chief
Engineering Branch 1
Division of Reactor Safety

Enclosure

SUMMARY

Inspection Report (IR) 05000327/2015007, 05000328/2015007; 07/20-31/15; Sequoyah Nuclear Plant Units 1 & 2; NRC Evaluations of Changes, Tests, and Experiments and Permanent Plant Modifications.

This report covers a two-week, on-site inspection by three regional inspectors. The inspectors identified one severity level (SL) IV non-cited violation (NCV), and four Green NCVs. The significance of inspection findings is indicated by their color (Green, White, Yellow, Red) using the NRC 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 December 04, 2014. All violations of NRC requirements are dispositioned in accordance with the NRC's Enforcement Policy, dated January 28, 2013. The Nuclear Regulatory Commission's (NRC's) program for overseeing the safe operation of commercial nuclear power reactors is described in NUREG-1649, "Reactor Oversight Process," Revision 4, dated December 2006.

NRC-Identified and Self-Revealing Findings

Cornerstone: Mitigating Systems

Green: The inspectors identified a Green non-cited violation (NCV) of 10 CFR Part 50, Appendix B, Criterion III, Design Control, for the licensee's failure to control safety related calculations that reviewed equipment essential to the function of Class 1E electrical systems. The issue was entered into the licensee's corrective action program as CRs 1059281 and 1064042. Planned corrective actions were to revise the calculations.

The inspectors determined that the performance deficiency was determined to be more than minor because it was associated with the Design Control attribute of the Mitigating Systems Cornerstone. The failure to plan and control updates to safety related calculations to review the suitability of new molded case circuit breakers in Class 1E electrical systems adversely affected the cornerstone objective of ensuring the availability, reliability, and capability of the systems that respond to initiating events to prevent undesirable consequences. The finding was determined to have a cross-cutting aspect in the resolution area of Problem Identification and Resolution [P.3], because the licensee failed to take effective corrective actions to address issues in a timely manner commensurate with their safety significance. (Section 1R17.b.1)

Green: The inspectors identified a Green non-cited violation (NCV) of 10 CFR 50 Appendix B Criterion III, "Design Control," for the licensee's failure to ensure that plant licensing and design basis for shared Class 1E electrical systems were controlled and maintained. The licensing and design basis of shared electrical systems required mechanical interlocks to prevent an operator error that could parallel these diverse power sources in accordance with IEEE 308-1971 and Regulatory Guides 1.81 and 1.6. A modification removed the kirk-key interlocks. The issue was entered into the licensee's corrective action program as CR 1064736. The licensee has administrative controls in place to limit the risk of this configuration pending determination of corrective actions.

The inspectors determined that the performance deficiency was more than minor because it was associated with the Design Control attribute of the Mitigating Systems Cornerstone and the removal of mechanical interlocks that separated diverse shared electrical systems

adversely affected the cornerstone objective of ensuring the availability, reliability, and capability of systems that respond to initiating events to prevent undesirable consequences. The finding was determined to have a cross-cutting aspect in the conservative bias area of Human Performance [H.14] because the licensee's decision making-practices did not emphasize prudent choices over those that are simply allowable. (Section 1R17.b.2)

SLIV: The inspectors identified a SLIV violation of 10CFR 50.59.c.(2).ii, "Changes, tests and experiments," for the licensee's failure to obtain a license amendment prior to implementing a change to the onsite emergency and shutdown AC electric systems supplying the shared Essential Raw Cooling Water (ERCW) systems. The change removed the kirk key interlocking system from the tie breakers that originally prevented an operator error that would parallel the Unit 1A and Unit 2A 480V AC motor control centers (MCCs). The issue was entered into the licensee's corrective action program as CR 1076179. The licensee has administrative controls in place to limit the risk of this configuration pending determination of corrective actions.

The inspectors determined that the performance deficiency was more than minor because there was a reasonable likelihood that the change required Commission review and approval prior to implementation and the failure to request approval impacted the regulatory process. Specifically, the departure from acceptance criteria identified in IEEE 308, RG 1.81, and RG 1.6 more than minimally increased the likelihood of occurrence of an ERCW power train malfunction. (Section 1R17.b.3)

Green: The inspectors identified three examples of a Green non-cited (NCV) of 10 CFR 50 Appendix B, Criterion XVI, "Corrective Action, for the licensee's failure to identify and correct a conditions adverse to quality that were associated with processes for evaluating Class 1E critical characteristics for molded case circuit breakers. The issue was entered into the licensee's corrective action program as CRs 1064483, 1064744, 1064479, 1059273 and 1064731. Planned corrective actions were to update procedures to document critical thinking in evaluating CRs and include additional critical characteristics.

The inspectors determined that the performance deficiency was more than minor because it was associated with the Equipment Performance attribute of the Mitigating Systems Cornerstone and the failure to identify and correct nonconformances in Class 1E equipment and the failure to resolve adverse conditions with evaluating Class 1E critical characteristics adversely affected the cornerstone objective of ensuring the availability, reliability, and capability of systems that respond to initiating events to prevent undesirable consequences. The finding was determined to have a cross-cutting aspect in the change management area of Human Performance [H.3] because Leaders failed to use a systematic process for evaluating and implementing change so that nuclear safety remains the overriding priority. (Section 1R17.b.4)

Green: The inspectors identified a Green non-cited violation (NCV) of 10 CFR Part 50, Appendix B, Criterion III, "Design Control," for the licensee's failure to verify the adequacy of defined shelf life and design life characteristics of Class 1E electrical equipment. The issue was entered into the licensee's corrective action program as CR 1064785.

The inspectors determined that the performance deficiency was more than minor because it was associated with the Design Control attribute of the Mitigating Systems Cornerstone and the failure to ensure the Class 1E static and dynamic performance characteristics were identified and evaluated adversely affected the cornerstone objective of ensuring the

availability, reliability, and capability of the SSCs that responds to initiating events to prevent undesirable consequences. The finding was determined to have a cross-cutting aspect in the change management area of Human Performance [H.3] because Leaders failed to use a systematic process for evaluating and implementing change so that nuclear safety remains the overriding priority. (Section 1R17.b.5)

REPORT DETAILS

1. REACTOR SAFETY

Cornerstones: Initiating Events, Mitigating Systems, and Barrier Integrity

1R17 Evaluations of Changes, Tests, Experiments and Permanent Plant Modifications (71111.17T)

a. Inspection Scope

Evaluations of Changes, Tests, and Experiments: The inspectors reviewed eight safety evaluations performed pursuant to Title 10, *Code of Federal Regulations* (CFR) 50.59, "Changes, tests, and experiments," to determine if the evaluations were adequate and that prior NRC approval was obtained as appropriate. The inspectors also reviewed 18 screenings where licensee personnel had determined that a 10 CFR 50.59 evaluation was not necessary. The inspectors reviewed these documents to determine if:

- the changes, tests, or experiments performed were evaluated in accordance with 10 CFR 50.59 and that sufficient documentation existed to confirm that a license amendment was not required;
- the safety issues requiring the changes, tests or experiments were resolved;
- the licensee conclusions for evaluations of changes, tests, or experiments were correct and consistent with 10 CFR 50.59; and
- the design and licensing basis documentation used to support the change was updated to reflect the change.

The inspectors used, in part, Nuclear Energy Institute (NEI) 96-07, "Guidelines for 10 CFR 50.59 Implementation," Revision 1, to determine acceptability of the completed evaluations and screenings. The NEI document was endorsed by the NRC in Regulatory Guide 1.187, "Guidance for Implementation of 10 CFR 50.59, Changes, Tests, and Experiments," dated November 2000.

This inspection constituted 7 evaluation samples and 13 screening and/or applicability determination samples as defined in Inspection Procedure (IP) 71111.17-04.

Permanent Plant Modifications: The inspectors reviewed 10 permanent plant modifications that had been installed in the plant during the last three years. The modifications reviewed are listed below:

- DCN 23082, Option To Use Either GE Breaker Model TFJ236J110WL or TFJ236J125WL
- DCN 23288, Replace Undersized Thermal Overload Units With Properly Sized Units
- DCN 23070, Replace Motor SQN-2-MTRB-063-0073-BEC 242408, Containment Spray Pump Full Flow Recirculation Modification, Rev. 0
- DCN 23216-03, Modify Handswitch SQN-2-HS-062-0108C-A
- DCN 22386-03, Modify SQN-2-FCV-001-0022 -T Internals (Poppet Cover & Stem) & Install Packing

- DCN 22546-11, Fire Area FAA-054, Room 714-A01, Ab Corridor: Install 3-Way Valve For 2-LCV-3-156, -164 to Allow A Local Means of Venting off the Air to the LCV
- DCN 23396, Issue Design Output Portion of the EOP Setpoint Calculation SQS20110.
- DCN 22546-06, To Credit 690-A1 and 714-A1 For TDAFWP 2S-S, Cables 2SG229S, 2SG250S, 2SG251S, and 2SG252S Will Be Rerouted to Avoid 714-A1 and 690-A1. These Will Instead Be Routed Through the Control Bldg On Elevation 706, and 685.
- DCN 22889-18, This DCN Will Replace the Custom Pull Up Module. Rack 2-R-5
- DCN 23492, Replace Obsolete RWST Level Transmitter

The modifications were selected based upon risk significance, safety significance, and complexity. The inspectors reviewed the modifications selected to determine if:

- the supporting design and licensing basis documentation was updated;
- the changes were in accordance with the specified design requirements;
- the procedures and training plans affected by the modification had been adequately updated;
- the test documentation as required by the applicable test programs had been updated; and
- post-modification testing adequately verified system operability and/or functionality.

The inspectors also used applicable industry standards to evaluate acceptability of the modifications and performed walkdowns of accessible portions of the modifications. Documents reviewed are listed in the Attachment.

This inspection constituted 10 permanent plant modification samples as defined in IP 71111.17-04.

b. Findings

b.1 **Failure to maintain control of and update safety related design output documents (electrical calculations)**

Introduction: The inspectors identified a Green non-cited violation (NCV) of 10 CFR Part 50, Appendix B, Criterion III, Design Control, for the licensee's failure to control safety related calculations that reviewed equipment essential to the function of Class 1E electrical systems.

Description: The Sequoyah (SQN) Quality Assurance Program (QAP) document Section 7 "Design Control," Subsection 7.2.3 "Design Analysis," stated, in part, "The performance of design analysis shall be planned and controlled. The suitability of application of materials, parts, equipment, and processes essential to the function of a structure, system, or component shall be reviewed to ensure that functional requirements are met."

The inspectors reviewed Procurement Engineering Group (PEG) package 1071185AO that evaluated replacement Cutler-Hammer MDL3800 molded case circuit breakers (MCCBs) for equivalency to existing and obsolete Westinghouse MCCBs. These MCCBs were used in Class 1E applications. The PEG package specified new technical

details for the MDL3800 such as new calibrated trip curves that were different from the existing MCCBs. The inspectors determined that SQN-APS-003, "480VAC APS Class 1E Load coordination study," Rev. 79 was not controlled and updated to review the new trip curves for suitability. A similar performance deficiency was identified in the last Triennial Fire Protection Inspection (TFPI) in NCV 2014007-03. In response, the licensee initiated Problem Evaluation Reports (PERs) 848756 and 875748. These PERs identified that PEG packages 1071185AO and 1163452HO specified new technical details for MCCBs that were not updated to applicable safety related calculations including in SQN-APS-003. Because of the inspector's questions, the licensee identified that safety related calculation, D2SDG-P213350, was not updated with the new MCCB technical details specified in PEG package 1163452HO, which was identified in PER 848756. These PERs were referenced in the TFPI report 2014007 as associated with the NCV. The licensee closed these PERs without completing corrective actions to update the calculations.

The inspectors noted that in addition to PEG packages 1071185AO and 1163452HO, Drawing 1, 2-35W716-1 "Wiring Diagrams 480V MOT Cont Ctr 1A-A, 2A-A Single Lines", Rev. 27 also referenced PEG package CQL602X-EQIV. The inspectors requested that the licensee confirm that all safety related calculations were updated for the PEG's packages referenced on the drawing. The licensee determined that calculation SQN-APS-003 was not updated to include the new MCCB technical details specified in CQL602X-EQIV. The PERs initiated because of the TFPI violation did not identify this PEG package.

The inspectors determined that the licensee did not plan and control design analyses in safety related calculations (design outputs) to review Class 1E equipment for suitability as specified by the QAP. The licensee initiated condition reports (CRs) 1059281 and 1064042 to assess the findings. Planned corrective actions included updating the calculations.

Analysis: The licensee's failure to assure that the performance of design analysis was planned and controlled and that the suitability of application of parts and equipment essential to the function of a structure, system, or component was reviewed to ensure that functional requirements were met, as specified in the QAP Section 7 "Design Control," was a performance deficiency. The performance deficiency was determined to be more than minor because it was associated with the Design Control attribute of the Mitigating Systems Cornerstone. The failure to plan and control updates to safety related calculations to review the suitability of new molded case circuit breakers in Class 1E electrical systems adversely affected the cornerstone objective of ensuring the availability, reliability, and capability of the systems that respond to initiating events to prevent undesirable consequences. The finding was screened in accordance with NRC IMC 0609, "Significance Determination Process," dated April 29, 2015; Appendix A, "The Significance Determination Process (SDP) for Findings At-Power," dated June 19, 2012. Using IMC 0609, Appendix A, Exhibit 2, "Mitigating Systems Screening Questions," the finding screened to green, because the deficiency affected the design or qualification of a mitigating SSC but the SSC maintained its operability or functionality. The finding was determined to have a cross-cutting aspect in the resolution area of Problem Identification and Resolution [P.3], because the organization failed to take effective corrective actions to address issues in a timely manner commensurate with their safety significance.

Enforcement: Title 10 CFR Part 50, Appendix B, Criterion III, "Design Control," states, in part, that measures shall also be established for the selection and review for suitability of application of materials, parts, equipment, and processes that are essential to the safety-related functions of the structures, systems and components. Contrary to the above since April 15, 2014, the licensee failed to establish measures for the selection and review for suitability of application of materials, parts, equipment, and processes that are essential to the safety-related functions of the structures, systems and components. Specifically, the NRC identified examples where the licensee's design control measures failed to review for suitability technical details for components used in Class 1E systems that were specified in PEG package's 1071185AO, CQL602X-EQIV and 1163452HO. The finding was entered into the licensee's corrective action program as CRs 1059281 and 1064042. Planned corrective actions were to revise the calculations. Because the finding was of very low safety significance (Green) and was entered into the licensee's corrective action program this violation will be treated as an NCV consistent with section 2.3.2 of the NRC enforcement policy. This violation is identified as NCV 05000327, 328/2015007-01, Failure to maintain control of and update safety related design output documents (electrical calculations).

b.2 **Failure to Meet Design Basis Requirements to Provide Interlocks Between Shared Onsite Emergency and Shutdown AC Electric Systems**

Introduction: The inspectors identified a Green NCV of 10 CFR 50 Appendix B Criterion III, "Design Control," for the licensee's failure to ensure that plant licensing and design basis for shared Class 1E electrical systems were controlled and maintained. The licensing and design basis of shared electrical systems required mechanical interlocks (kirk-key) to prevent an operator error that could parallel these diverse power sources in accordance with IEEE 308-1971 and Regulatory Guides 1.81 and 1.6. A modification removed the kirk-key interlocks.

Description: On April 2, 2014, the licensee implemented a design modification, DCN 23085 that removed the kirk key interlocks from the crosstie breakers for the Unit 1A and Unit 2A shared Essential Raw Cooling Water (ERCW) 480V AC motor control centers (MCCs). The UFSAR Section 8.1.5 "Design Criteria and Standards" for the Electric Power Systems, stated, in part, "The design meets the intent of IEEE 308-1971 "IEEE Standard Criteria for Class 1E Electric Systems for Nuclear Power Generating Stations," Regulatory Guide (RG) 1.81 "Shared Emergency and Shutdown Electric Systems for Multi-Unit Nuclear Power Plants," and RG 1.6 "Independence between Redundant Standby (Onsite) Power Sources and between Their Distribution Systems." Standard IEEE 308-1971 Section 4.1 "General" stated, in part, "the Class 1E electric systems shall be designed to assure that any Single act or event that can cause multiple equipment malfunctions will not cause a loss of electric power to a number of engineered safety features (ESF)." Regulatory Guide 1.81 "position 2," stated, in part, "for multi-unit nuclear power plants, the design of shared onsite emergency and shutdown A.C. electric systems should conform to the recommendations contained in Regulatory Guides 1.6." Regulatory Guide 1.6 position D.4.d, stated, in part, "If means exist for manually connecting redundant load groups together, at least one interlock should be provided to prevent an operator error that would parallel their standby power sources." The original design of the crosstie breakers for the Unit 1A and Unit 2A shared Essential Raw Cooling Water (ERCW) 480V AC MCCs used kirk-key interlocks. The interlocks prevented a single operator act from paralleling the power sources, which met the licensing basis.

The UFSAR Section 1.2.2.7 "Plant Electrical System," specifies that, "For Unit 1, the Plant Electric Power System consists of the main generator, the common station service transformers, the diesel generators, the batteries, and the electric distribution system." The UFSAR description for unit 2 is the same. The UFSAR Sections 9.2.2.2 and 9.2.2.3 [ERCW] System Description and Safety Analysis, described four independent diesels generator power trains (two divisions per plant) starting four independent ERCW pumps that are divided into two common ERCW header trains. The safety analysis described the ERCW electrical design was for the loss of an entire plant emergency power train (one of the four divisions).

The inspectors determined that each ERCW power divisions independently met the definition of a redundant "Standby Power Source" each with individual "Load Group" as described in RG 1.6. This design provided diversity and defense in depth for the shared power systems. The divisions were incompatible as specified by RG1.6. An inadvertent Interconnection between these Standby AC Power Sources could cause undesirable interactions, as specified by RG 1.81. The original kirk key interlock design prevented these undesirable consequences before they were removed. The licensee was required to maintain at least one interlock to prevent an operator error that could parallel the shared onsite emergency and shutdown AC electric systems.

Analysis: The licensee's failure to ensure that at least one interlock was provided between the Unit 1A and Unit 2A ERCW power trains to prevent a single act or event from paralleling their power sources as specified by IEEE 308-1971, RG1.81, and RG1.6, was a performance deficiency. The performance deficiency was more than minor because it was associated with the Design Control attribute of the Mitigating Systems Cornerstone and the removal of mechanical interlocks that separated diverse shared electrical systems adversely affected the cornerstone objective of ensuring the availability, reliability, and capability of systems that respond to initiating events to prevent undesirable consequences. The finding was screened in accordance with NRC IMC 0609, "Significance Determination Process," dated April 29, 2015; Appendix A, "The Significance Determination Process (SDP) for Findings At-Power," dated June 19, 2012. Using IMC 0609, Appendix A, Exhibit 2, "Mitigating Systems Screening Questions," the finding was screened to green, because the deficiency affected the design or qualification of a mitigating SSC but the SSC maintained its operability or functionality. The finding was determined to have a cross-cutting aspect in the conservative bias area of Human Performance [H.14] because the licensee's decision making-practices did not emphasize prudent choices over those that are simply allowable.

Enforcement: 10 CFR Part 50, Appendix B, Criterion III, "Design Control," stated, in part, that "measures shall include provisions to assure that appropriate quality standards are specified and included in design documents and that deviations from such standards are controlled." Contrary to the above since 2014, the licensee failed to include provisions to assure that appropriate quality standards were specified and included in design documents and that deviations from such standards were controlled. Specifically, design changes to the Unit 1A and Unit 2A ERCW power sources failed to include IEEE 308-1971, Regulatory Guides 1.81 and 1.6 and that deviations from them were controlled subject to design control measures commensurate with those applied to the original design. The issue was entered into the licensee's corrective action program as CR 1064736. The licensee has administrative controls in place to limit the risk of this configuration pending determination of corrective actions. Because the finding was of very low safety significance (Green) and was entered into the licensee's corrective

action program this violation will be treated as an NCV consistent with section 2.3.2 of the NRC enforcement policy. This violation is identified as NCV 05000327, 328/2015007-02, Failure to meet Design Basis Requirements to have Interlocks between Shared systems.

b.3 Failure to request a licensee amendment prior to removing interlocks from shared onsite emergency and shutdown AC electric systems.

Introduction: The inspectors identified a SLIV violation of 10CFR 50.59.c.(2).ii "Changes, tests and experiments" for the licensee's failure to obtain a license amendment prior to implementing a change to the onsite emergency and shutdown AC electric systems supplying the shared Essential Raw Cooling Water (ERCW) systems. The change removed the kirk key interlock from the tie breakers that originally prevented an operator error that would parallel the Unit 1A and Unit 2A 480V AC MCCs.

Description: The licensee is committed to the Nuclear Energy Institute (NEI) standard 96-07 to meet the requirements of 10 CFR 50.59. Standard NEI 96-07 Section 4.3.2, which, stated, in part, "Although this criterion [10 CFR 50.59.c.(2).ii] allows minimal increases, licensees must still meet applicable regulatory requirements and other acceptance criteria to which they are committed (such as contained in regulatory guides and IEEE standards). Further, departures from the design and performance standards as outlined in the General Design Criteria (Appendix A to Part 50) are not compatible with a "no more than minimal increase" standard." The UFSAR Section 8.1.5 "Design Criteria and Standards" for the Electric Power Systems, stated, in part, "The design meets the intent of IEEE 308-1971, Regulatory Guide (RG) 1.6, and RG 1.81." The original design of the ERCW system used tie breakers to interconnect the Unit 1A MCC to the Unit 2A MCC in order to operate both from one division of AC power. Either of the Units could provide this functional diversity and defense in depth. Kirk key interlocks on the tie breakers prevented inadvertent interconnections between the two MCCs power sources. As indicated by RG 1.81 and RG 1.6, inadvertent interconnections between units could cause undesirable interactions. A modification to the MCCs removed these kirk key interlocks and the licensee failed to identify that the design departed from the acceptance criteria outlined in the design and performance standards mentioned above. Further, the removal of the kirk key interlock made credible the possibility of a single act or event paralleling the two MCCs power sources, which could now cause undesirable interactions. The inspectors determined that this modification more than minimally increased the likelihood of occurrence of a malfunction of the shared ERCW A train, which would have required NRC approval prior to implementation.

Analysis: The licensee's change to the facility resulted in a departure from acceptance criteria in design and performance standards, which resulted in a more than a minimal increase in the likelihood of occurrence of a malfunction as specified by NEI 96-07 Chapter 4, was a performance deficiency. The performance deficiency was determined to be more than minor because there was a reasonable likelihood that the change required Commission review and approval prior to implementation and the failure to request approval impacted the regulatory process. Specifically, the departure from acceptance criteria identified in IEEE 308, RG 1.81, and RG 1.6 reasonably required commission review and approval prior to implementation. Using IMC 0609, Appendix A, Exhibit 2, "Mitigating Systems Screening Questions," the finding was screened to green, because the deficiency affected the design or qualification of a mitigating SSC but the SSC maintained its operability or functionality. Because this violation was evaluated as

having very low safety significance (i.e., green) by the SDP it was dispositioned as a severity level (SL) IV.

Enforcement: 10CFR 50.59.c.(2).ii stated, “A licensee shall obtain a license amendment pursuant to Sec. 50.90 prior to implementing a proposed change, test, or experiment if the change, test, or experiment would result in more than a minimal increase in the likelihood of occurrence of a malfunction of a structure, system, or component (SSC) important to safety previously evaluated in the final safety analysis report (as updated).” Contrary to the above since 2014, the licensee did not obtain a license amendment pursuant to Sec 50.90 prior to implementing the change to kirk-key interlocks, which created a more than minimal increase in the likelihood of occurrence of a malfunction of a SSC important to safety previously evaluated in the UFSAR. The issue was entered into the licensee’s corrective action program as CR 1076179. The licensee has administrative controls in place to limit the risk of this configuration pending determination of corrective actions. Because the finding was of very low safety significance (SLIV) and was entered into the licensee’s corrective action program this violation will be treated as an NCV consistent with section 2.3.2.a of the NRC enforcement policy. This violation is identified as NCV 05000327, 328/2015007-03, Failure to request a licensee amendment prior to removing interlocks from shared onsite emergency and shutdown AC electric systems.

b.4 Failure to identify and correct conditions adverse to quality

Introduction: The inspectors identified three examples of a Green NCV of 10 CFR 50 Appendix B, Criterion XVI “Corrective Action,” for licensee’s failure to identify and correct conditions adverse to quality that were associated with the processes for evaluating Class 1E critical characteristics for molded case circuit breakers.

Description: Sequoyah (SQN) issued PER 406695 “SQN review of Watts Bar Nuclear (WBN) PER 403095 – Commercial Grade Dedication Process.” The PER was closed 2/12/2013 with the comment that “No SQN site specific cause identified. This PER will consist of actions to review the WBN disposition of PER 403095.” The inspectors identified that the WBN PER identified weaknesses in the TVA Nuclear Power Group (NPG) procedures for identification and verification of Class 1E critical characteristics. The Quality Assurance Program (QAP) Section 10 “Adverse Conditions,” Subsection 10.1 “General” stated, in part, “adverse conditions, including non-conforming items ..., shall be identified, evaluated, corrected, tracked, trended, and when required, reported to appropriate levels of management.” Subsection 10.2.2, “Corrective Action for Adverse Conditions” states, in part, “shall promptly identify and resolve adverse conditions.” The inspectors identified examples where the licensee failed to identify non-conforming items in the corrective action program (CAP), and failed to perform adequate critical characteristic evaluations using the corporate procedures as described in PER 403095. Examples were identified associated with PEG package 1071185AO prepared for DCN 23085. Additional examples were identified associated with equivalent change technical evaluation (EQV) 23082 prepared for Engineering Change Package (ECP) 23082A. One example where a nonconformance was not entered into the CAP, resulted in a Design Change Notification (DCN), which inappropriately accommodated nonconforming items instead of correcting the nonconformances as specified by the QAP. The inadequate critical characteristics evaluations did not recognize or evaluate circuit breaker interfaces, circuit breaker weight differences, circuit breaker actuating mechanisms, and circuit breaker temperature compensation mechanisms.

The inspectors reviewed TVA NPG Procedure NEP-8.4, "Equivalency Evaluation for Procurement and Use of Replacement Material and Items," Rev. 001, section 3.2.2 which stated in part "In performing the Equivalency Evaluation, the Procurement Engineer determines whether there are any differences in the physical design characteristics of the replacement item affecting its fit, form, function, manufacturing, or material." The inspectors interviewed the Procurement Engineering Group (PEG) staff and determined that in some instances they relied on part numbers to procure and verify the adequacy of electrical equipment rather than identify the critical characteristics necessary for the component application. Further, the methods identified for procurement engineers in the TVA NPG procedures to identify Class 1E critical characteristics did not provide adequate technical details, which resulted in vague interpretations by procurement engineers.

Example one: The inspectors reviewed PEG package 1071185AO, which purchased replacement molded case circuit breakers (MCCB) under an equivalency process for applications in the plant. The inspectors noted that the Engineering Evaluation, stated, in part, "the requirement for kirk-key interlock has been removed...the existing interlock will be reused." Correspondences from the third party dedicator stated, in part, "TVA should identify required auxiliary devices for this breaker. In bold TVA's response stated, that "As noted above, we have determined that this breaker will not require the addition of a kirk key interlock since the existing interlock will be reused." The existing kirk-key interlock system was not listed as a critical design characteristic and the interlock dimensions were not evaluated for equivalency. Sometime after receipt of the MCCBs, while performing installation, SQN identified that the existing kirk key interlocks were not compatible with the new MCCBs. The inspectors requested the documents, which should have been generated per the SQN QAP and site procedures upon discovery of the above incompatibilities. The inspectors determined that the QAP Section 10.2.1 "Control of non-conforming items," stated, in part, "Organizations responsible for items determined to be non-conforming during receipt, inspection, construction... modifications... shall identify... and segregate the non-conforming item from acceptable items to prevent... installation..." The TVA Standard Program Procedure (SPP) NPG-SPP-22.300, Correction Action Program, Rev. 0003, stated, in part, "An individual discovering a problem takes immediate actions to address it... actions include reporting the problem... as required and initiating or ensuring the initiation of a problem report document." The licensee provided PERs 315158 and 356903, which were initiated during previous installation attempts. Neither PER was initiated to resolve the non-conforming condition. The inspectors determined that no corrective action was initiated to address the non-conforming condition when this issue was identified. Further, this was identified as an example of deficiencies in the evaluation of Class 1E critical characteristics as presented in PER 406695. As a result of the issues identified by the inspector's, CR 1064483 was initiated.

Example two: A new operating handle feature was added to MCCBs and they were noted under critical characteristic items for review. However, the equivalency evaluation for PEG package 1071185AO stated, in part, "For TVA use: no handles are used on the breaker for opening and closing actions, therefore evaluation is not required." However, after work related to DCN 23085 attempted to install the handle it was identified that the "rotary style breaker handle would not function with the new Cutler Hammer MDL3800 breakers." The inspectors identified that the handles were used for opening and closing the MCCBs. This was identified as another example of deficiencies in the evaluation of

Class 1E critical characteristics as presented in PER 406695. As a result of the issues identified by the inspector's, CRs 1064744 and 1064479 were initiated.

Example three: The inspectors determined from ECP 23082 titled "Option to use either GE breaker model TFJ236110WL or TFJ236125WL," Rev. A, that the "EQV [the equivalency evaluation] gives the option to use either GE breaker model number TFJ236110WL or TFJ236125WL for breaker 2-BCTC-016-0727 which feeds ice condenser air handling units." The inspectors reviewed SQN-APS-003 referenced by the evaluation and determined that the ambient temperature compensation features on the new circuit breakers were not identified or evaluated as critical characteristics. This was identified as another example of deficiencies in the evaluation of Class 1E critical characteristics as presented in PER 406695. As a result of the issues identified by the inspector's, CR 1064731 was initiated.

Analysis: The licensee's failure to identify and correct conditions adverse to quality for nonconforming items and resolve adverse conditions identified in SQN PER 406695 that were associated with evaluating Class 1E critical characteristics, as specified by the QAP Sections 10.2.1 and 10.2.2 was a performance deficiency. The performance deficiency was determined to be more than minor because it was associated with the Equipment Performance attribute of the Mitigating Systems Cornerstone and the failure to identify and segregate nonconforming items and resolve adverse conditions with evaluating Class 1E critical characteristics as identified in SQN PER 406695 adversely affected the cornerstone objective of ensuring the availability, reliability, and capability of systems that respond to initiating events to prevent undesirable consequences. The finding was screened in accordance with NRC IMC 0609, "Significance Determination Process," dated April 29, 2015; Appendix A, "The Significance Determination Process (SDP) for Findings At-Power," dated June 19, 2012. Using IMC 0609, Appendix A, Exhibit 2, "Mitigating Systems Screening Questions," the finding was screened to green, because the deficiency affected the design or qualification of a mitigating SSC but the SSC maintained its operability or functionality. The finding was determined to have a cross-cutting aspect in the change management area of Human Performance [H.3] because Leaders failed to use a systematic process for evaluating and implementing change so that nuclear safety remains the overriding priority.

Enforcement: 10 CFR Part 50, Appendix B, Criterion XVI, "Corrective Actions," stated, in part, that that "Measures shall be established to assure that conditions adverse to quality, such as failures, malfunctions, deficiencies, deviations, defective material and equipment, and nonconformance's are promptly identified and corrected." Contrary to the above since 2013, the licensee failed to assure that conditions adverse to quality, such as failures, malfunctions, deficiencies, deviations, defective material and equipment, and nonconformance's with procurement processes were promptly identified and corrected. Specifically, the licensee failed to identify and correct nonconformances with Class 1E electrical equipment prior to installation, and failed to identify and correct deficiencies in the evaluation of Class 1E critical characteristics identified in PER 406695. The issue was entered into the licensee's corrective action program as CRs 1064483, 1064744, 1064479, 1059273 and 1064731. Planned corrective actions were to update procedures to document critical thinking in evaluating CRs and include additional critical characteristics. Because the finding was of very low safety significance (Green) and was entered into the licensee's corrective action program this violation will be treated as an NCV consistent with section 2.3.2 of the NRC enforcement policy. This

violation is identified as NCV 05000327, 328/2015007-04, Failure to identify and correct inadequate procurement evaluation processes.

b.5 Failure to Establish Static Performance Characteristics for the Qualification of Class 1E Electrical Equipment

Introduction: The inspectors identified a Green NCV of 10 CFR Part 50, Appendix B, Criterion III, "Design Control," for the licensee's failure to verify the adequacy of defined shelf life and design life characteristics of Class 1E equipment i.e. molded case circuit breakers.

Description: The inspectors reviewed procurement packages for DCNs 23085 and 23082 that purchased Class 1E molded case circuit breakers (MCCBs) to assess the qualification criteria. The inspectors identified that the licensee did not establish qualification criteria for design life. The licensee had some MCCBs installed and in service for more than 20 years. The licensee provided a white paper that concluded, "regulatory guidance and SQN UFSAR consistently exempt 1E equipment in a mild environment from the requirement to specify a qualified life. Maintenance and testing programs are recognized as an acceptable method of monitoring aging effects for equipment, which is not subjected to significant environmental stresses. SQN [Sequoyah] 1E breaker test program, Surveillance, and periodic maintenance program provides aging monitoring." The licensee's white paper indicated that qualification is required only for harsh environmental service conditions. The inspectors noted that qualified life is the defined period of time for which satisfactory performance can be demonstrated for a specific set of service conditions. Service conditions included normal operating conditions, which included mild environments. Further, the SQN licensing basis required the qualification of Class 1E equipment for normal operating conditions so that it will reliably perform its safety function on a continuing basis. With age, the probability of Class 1E equipment failure increases.

The UFSAR Section 8.1.5 "Design Criteria and Standards," for electric power stated, in part, "design meets the intent of those standards and guides... IEEE Std 279-1971, IEEE Std 308-1971, and IEEE No. 323-1971." Standard IEEE 279-1971, Section 4 "Requirements," Subsection 4.4 "Equipment Qualification," stated, in part, "the protection system equipment shall meet, on a continuing basis, the performance requirements, for the range of transient and steady-state conditions of both the energy supply and the environment during normal, abnormal, and accident circumstances throughout which the system must perform, determined to be necessary for achieving the system requirements." Standard IEEE 308-1971 Section 4.7 "Equipment Qualification" required similar qualification. Standard IEEE 323-1971 Section 1 "Scope" and Section 2 "Purpose" stated, in part, the standard "describes the basic requirements for demonstrating the qualification of Class 1 electrical equipment as required in IEEE 279 and IEEE 308." Standard IEEE 323-1971 Section 5, "Method and Documentation," specified, in part, "the qualification method shall establish that each type of equipment is qualified for its application. The documentation shall include:

- The application requirements
- The equipment specifications, and data from the qualification method used.
- The service conditions and design basis event conditions to be simulated.

- The type test data shall contain the static and dynamic performance characteristics.”

The inspectors determined that, the static and dynamic performance characteristics over normal service conditions described conditions related to shelf life and design life. Per IEEE definitions, static and dynamic performance characteristics were defined as the operating limits given for no appreciable changes over long time intervals, such as shelf life, and appreciable changes resulting from the application of an energy source, such as would occur within the expected design life. Normal operating conditions were defined as those that create “operating stresses such as voltage, current loading, and mechanical loading including anticipated overloads and periodic testing, but not including accidents or other extraordinary events.” The design life was defined as “the time during which satisfactory performance can be expected for a specific set of service conditions.” The inspectors noted that the primary consideration of design life qualification was degradation associated with aging over long time intervals, and thus unpredictable failures. The inspectors determined that aging from normal environmental effects as well as induced aging from normal service conditions such as electrical and mechanical loading affected the design life. This included the range of transient and steady-state conditions of both the energy supply and the environment during normal, abnormal, and accident circumstances throughout which the system must perform. This included the determination of the shelf life for normal environmental aging. The licensee did not establish the Class 1E static and dynamic performance characteristics under the full range of service conditions as specified by IEEE 323-1971 and required by IEEE 279 and IEEE 308.

Analysis: The failure to define Class 1E static and dynamic performance characteristics as specified by IEEE 323, Section 5 and as required by IEEE 279 and IEEE 308 was a performance deficiency. The performance deficiency was determined to be more than minor because it was associated with the Design Control attribute of the Mitigating Systems Cornerstone and the failure to ensure the Class 1E static performance characteristics were identified and evaluated adversely affected the cornerstone objective of ensuring the availability, reliability, and capability of the SSCs that responds to initiating events to prevent undesirable consequences. The finding was screened in accordance with NRC IMC 0609, “Significance Determination Process,” dated April 29, 2015; Appendix A, “The Significance Determination Process (SDP) for Findings At-Power,” dated June 19, 2012. Using IMC 0609, Appendix A, Exhibit 2, “Mitigating Systems Screening Questions,” the finding was screened to green, because the deficiency affected the design or qualification of a mitigating SSC but the SSC maintained its operability or functionality. The finding was determined to have a cross-cutting aspect in the change management area of Human Performance [H.3] because Leaders failed to use a systematic process for evaluating and implementing change so that nuclear safety remains the overriding priority.

Enforcement: 10 CFR Part 50, Appendix B, Criterion III, “Design Control,” stated, in part, that “Measures shall be established for the selection and review for suitability of application of materials, parts, equipment, and processes that are essential to the safety-related functions of the structures, systems and components.” Contrary to the above, since 2013, the licensee failed to establish measures for the selection and review for suitability of application of materials, parts, equipment, and processes that are essential to the safety-related functions of the structures, systems and components. Specifically, the licensee failed to establish measure for the selection and review for suitability of

static and dynamic performance characteristics used in the design and qualification of Class 1E electrical equipment. Because the finding was of very low safety significance (Green) and was entered into the licensee's corrective action program as CR 1064785, this violation will be treated as an NCV consistent with section 2.3.2 of the NRC enforcement policy. This violation is identified as NCV 05000327, 328/2015007-05, Failure to Identify Qualification Criteria Associated with Class 1E Electrical Component Static Performance characteristics.

40A6 Meetings, Including Exit

On July 31, 2015, the inspectors presented inspection results to Mr. Preston Pratt and other members of your licensee's staff. On September 10, the inspectors re-exited the inspection results with Mr. Preston Pratt and other members of your licensee's staff. The inspectors verified that any proprietary information retained by the inspectors in order to resolve any violations or unresolved items would be disposed of properly upon resolution of the issues.

ATTACHMENT: SUPPLEMENTARY INFORMATION

SUPPLEMENTARY INFORMATION

KEY POINTS OF CONTACT

Licensee personnel

J. Carlin, SQN Vice President
P. Pratt, SQN Plant Manager
W. Pierce, Director of Engineering
K. Smith, Director of Training
T. Marshall, Director of Operations
E. Henderson, Licensing Manager
Z. Kitts, Licensing Engineer
R. Travis, Licensing Engineer
J. Campbell, Electrical Manager
M. Rankin, 10 CFR 50.59 Program Owner
J. Alfultis, Sr. Manager Projects
C. Roneen, Sr. Manager Design Engineering
H. Elbeitam, Engineering Support
D. Porter, SQN Operations Support

NRC personnel

W. Deschaine, Resident Inspector, Sequoyah
G. Smith, Senior Resident Inspector, Sequoyah

LIST OF ITEMS OPENED, CLOSED, DISCUSSED, AND UPDATED

Opened and Closed

05000327, 328/2015007-01	NCV	Failure to maintain control of and update safety related design out documents (electrical calculations)
05000327, 328/2015007-02	NCV	Failure to meet Design Basis Requirements to have Interlocks between Shared systems
05000327, 328/2015007-03	NCV	Failure to request a licensee amendment prior to removing interlocks from shared onsite emergency and shutdown AC electric systems
05000327, 328/2015007-04	NCV	Failure to identify and correct inadequate procurement evaluation processes
05000327, 328/2015007-05	NCV	Failure to Identify Qualification Criteria Associated with Class 1E Electrical Component Static Performance Characteristics

LIST OF DOCUMENTS REVIEWED

10 CFR 50.59 Evaluations

- DCN 23216-01, Modify Handswitch SQN-1-HS-062-0108C-A
- DCN 22497-03, Documentation Only
- DCN 22617, Install New Unit 2 Generator Circuit Breaker, Replace USSTs 2A & 2B, Replace Unit 2 USST Buswork
- DCN 22621-01, Install One Relay and Four Fuses to Rack 2-R-73, Two Relays to Rack 2-R-75 and One Relay and Four Fuses to Rack 2-R-78, dated 01/30/2012
- DCN 22621-02, Wiring Connections in 2-R-73 Between Existing Relays R090 and LR8168 and New Relay 8297B, dated 01/30/2012
- DCN 23085-03, Replace Breaker Handle, Breaker Operating Mechanism and Remove Kirk-Key Interlock, dated 04/02/2014
- DCN 22471, Implement Reactor Building Structural Modifications Required to Support Steam Generator Replacement.
- DCN 22688-04, Modifications Associated With Damper Located in DG Room 2B-B

10 CFR 50.59 Screenings

- DCN 23053-02, MFPS 2B Seal Injection Controller Replacement
- DCN 22564-01, Replace the Valve Disk of 1-FCV-3-136a and 1-FCV-3-136b and Implement New Thrust Settings as a Result of the Increased Valve Factor Required to Meet Job Requirements.
- DCN 22624-4, Revise GI 89-10 Calculation and 47A941 Drawing Series For New Maximum Allowable Unseating Thrust of 1-FCV-68-332
- DCN 22624-2, Replace Motor On Actuator of 1-FCV-63-6 and Revise GL 89-10 Calculation and 47a941 Drawing Series
- DCN 22540-02, Wiring Termination Changes For Alternate Feeder Breaker 1716 of U1 6.9kv SDBD 1A-A
- DCN 23380, Revise Drift Term For Low-Low Alarm Bistable to Support Manual Time Critical Action Evaluation
- DCN 23239, Replace Level Transmitter 2-LT-63-177
- DCN 22542-01, 1-PMP-70-038-B: Reroute Power Cables 1PL4742B and 1PL4743B From 480v Shutdown Board 1B1-B to CCS Pump Motor Without Passing Through the U1 Side of the AB Elev 714.0 and Maintaining 20 Ft Separation Between CCS Pump 1A-A and Associated Cables
- DCN 22544-16, Abandon Power Cable and Spare One Control Cable for 1-FCV-74-12. Use Existing Spare Control Cable From 1-FCV-63-39 Unused Power Cable and One Control Cable From 1-FCV-62-98 to Reroute Power and Control Cables to 1-FCV-74-12. Install New Cable and Conduit to Connect to these Existing Spare/Unused Cables For 1-FCV-74-12. Spare RMOV Bd 1A1-A Compartment 3C and Spare Remaining Unused Control Cables for 1-FCV-68-98. Remove Local Handswitch and Respective Red/Green Indicating Lights for Valve 1-FCV-62-98
- DCN 22546, Resolve Multiple Spurious Operation Concerns With Aux Feedwater System Related to Appendix R
- DCN 23195, Install Two Channels of Spent Pool Level Instruments With Remote Readout In MCR or Other Location
- DCN 22526, Replace Boric Acid Flow Meter 2-F-62-139 With ASME Qualified Device
- DCN 22528-05, Replace the SAE Gr 2 Bolting With SAE Gr 8 Bolting on 2-FCV-70-89
- DCN 22564-02, Replace the Valve Disk of 1-FCV-3-179a and 1-FCV-3-179b and Implement New Thrust Settings As A Result of the Increased Valve Factor Required to Meet Job Requirements.

DCN 22625-05, Revise GL 89-10 Calculation and 47A941 Series Drawing For Valve 2-FCV-68-333 to Include the Implementation of the Newly Established Maximum Allowable Unseating Thrust

DCN 22437, Modify Steam Generator Manway Platforms to Improve Accessibility For Replacement Steam Generators.

DCN 23270-01, Motor Replacement (1-MTRB-003-0047-B) For Valve 1-FCV-003-0047-B Will Be Performed By Wo 113312383.

DCN 22542-04, 2-Pmp-70-069-A - the Local Handswitches and Cables For Ccs PMP 2A-A Will Be Disconnected For Consistency and Eliminate All Fire Caused Spurious Failures For these Pumps Due to these Cables.

Permanent Plant Modifications

DCN 23082, Option To Use Either GE Breaker Model TFJ236J110WL or TFJ236J125WL

DCN 23288, Replace Undersized Thermal Overload Units With Properly Sized Units

DCN 23070, Replace Motor SQN-2-MTRB-063-0073-BEC 242408, Containment Spray Pump Full Flow Recirculation Modification, Rev. 0

DCN 23216-03, Modify Handswitch SQN-2-HS-062-0108C-A

DCN 22386-03, Modify SQN-2-FCV-001-0022 -T Internals (Poppet Cover & Stem) & Install Packing

DCN 22546-11, Fire Area FAA-054, Room 714-A01, Ab Corridor: Install 3-Way Valve For 2-LCV-3-156, -164 to Allow A Local Means of Venting off the Air to the LCV

DCN 23396, Issue Design Output Portion of the EOP Setpoint Calculation SQS20110.

DCN 22546-06, To Credit 690-A1 and 714-A1 For TDAFWP 2S-S, Cables 2SG229S, 2SG250S, 2SG251S, and 2SG252S Will Be Rerouted to Avoid 714-A1 and 690-A1. These Will Instead Be Routed Through the Control Bldg On Elevation 706, and 685.

DCN 22889-18, This DCN Will Replace the Custom Pull Up Module. Rack 2-R-5

DCN 23492, Replace Obsolete RWST Level Transmitter

Licensing Bases Documents

Updated Final Safety Analysis Report

Technical Specifications and Bases

Technical Requirements Manual

Calculations

39866-CALC-C-050, Code Reconciliation for Steel Containment Vessel Modification DCN D22471A, Rev. 1

AREVA 32-9129996, Original Steam Generator – Replacement Steam Generator Comparison Document, Unit 2, Rev. 1

AREVA 51-9155373-000, SQN Non-LOCA Disposition of Events for CCPIT Isolation Valve Stroke Time Change

WCAP-12455, Tennessee Valley Authority Sequoyah Nuclear Plant Units 1 and 2 Containment Integrity Analyses for Ice Weight Optimization Engineering Report, Rev. 1

WCAP-12455 Supplement 1R, Tennessee Valley Authority Sequoyah Nuclear Plant Units 1 and 2 Containment Integrity Re-analyses Engineering Report, Rev. 1

SCG1S803, Evaluation of Shield Building Dome Access Opening, Rev. 4

SCG1S805, Steam Generator Enclosure Modification, Rev. 0

SCG1S806, Steam Generator Enclosure Modification – Design of Roof Support Frames, Rev. 2

SCG1S807, SQN Unit 2 Shield Building Dome Analysis, Rev. 0

SQN-APS-003, 480VAC APS Class 1E load coordination study, Rev. 79

2-FCV-63-073, Documentation of Design Basis review, required thrust calc, and valve & Actuator Capability Assessment for 2-FCV-63-73, Rev. 004

SQN-EPS-008, Cable Ampacity Study – Voltage Level V4 & V5 in Tray, Rev. 015
SQNETAPAC, Auxiliary Power System, Rev. 053

Corrective Action Documents

CR 848756 (PER), SQN TFP1 2014007 TB-04-13 breaker substitutions have been approved without calc update, closed 09/08/2014.

CR 406695 (PER), SQN review of WBN PER 403095 – Commercial Grade dedication Process, closed 09/08/2014

PER 315158, the new breaker is different from the existing breaker and will need to be modified before installation, 02/16/11

PER 365903, new breaker is different from the existing breaker, 02/13/12

PER 675922

Procedures

0-MI-IXX-000-000.R, AOV Regulator Setpoint Verification, Rev. 3

1-PI-OPS-000-003.0, Periodic Stroking of Unit 1 Time Critical Valves

AOP-C.04, Shutdown from Auxiliary Control Room, Rev. 37

NPG-SPP-09.4, 10 CFR 50.59 Evaluations of Changes, Tests, and Experiments, Rev. 9

SQN-DC-V-3.0, Classification of Piping, Pumps, Valves, and Vessels, Rev. 19

TVA-NQA-PLN89-A Quality Assurance Program Description, Rev. 0031

NPG-SPP-22.303, CR Actions, Closure and Approvals”, Rev. 0006

NEDP-2, Design Calculation Process Control, Rev. 0018

NEDP-8.2, Technical Evaluation for Procurement of Safety Related and Quality Related Materials, Items, and Services, Rev. 0001

NEDP-8.4, Equivalency Evaluation for Procurement and Use of Replacement Materials and Items, Rev. 001

NPG-SPP-06.9.3, Post- Modification Testing, Rev. 0006

NPG-SPP-09.3, Plant Modifications and Engineering Change Control, Rev. 0018

NPG-SPP-09.4, 10 CFR 50.59 Evaluation of Changes, Tests, and Experiments, Rev. 0009

NPG-SPP-09.9, 10 CFR 72.48 Evaluations of Changes, Tests, and Experiments for Independent Spent Fuel Storage Installation, Rev. 0003

NPG-SPP-22.300, Corrective Action Program, Rev. 0003

Drawings

1, 2-35W716-1 “Wiring Diagrams 480V MOT Cont Ctr 1A-A, 2A-A Single Lines”, Rev. 27

1, 2-35W716-2 “Wiring Diagrams 480V MOT Cont Ctr 1B-B, 2B-B Single Lines”, Rev. 31

11448-ESK-5F Elementary Diagram, 4160V Component Cooling Pumps, Surry Power Station Unit 1, Rev. 17, Sheet 1 of 1

11448-ESK-5F Elementary Diagram, 4160V Component Cooling Pumps, Surry Power Station Unit 1, Rev. 17, Sheet 1 of 1

1, 2-47B630-78-1 Spent Fuel Pool, Level Instruments Configuration Settings, Rev. 1

1, 2-47B630-78-2 Spent Fuel Pool, Level Instruments Configuration Settings, Rev. 0

1, 2-47B630-78-3 Spent Fuel Pool, Level Instruments Configuration Settings, Rev. 0

1, 2-45N639-3, Wiring Diagram CO2 Fire Protection System Schematic Diagrams Sheet-3, Rev. 15

1,2-45N765-16, Wiring Diagrams 6900V Shutdown Aux Power Schematic Diagram Sheet-16

1,2-47W611-3-3, Mechanical Logic Diagram Auxiliary Feedwater System, Rev. 39

1-47W611-62-4, Mechanical Logic Diagram Chem & Volume Control Sys, Rev. 24

1,2-47W848-12, Compressed Air System Flow Diagram, Rev. 47

Miscellaneous Documents

1-SO-201-9, operating instructions 480V ERCW Motor Control Centers, Rev. 0025
 2-SO-201-9, operating instructions 480V ERCW Motor Control Centers, Rev. 002
 05000327/2014007 and 05000328/2014004 Sequoyah Nuclear Plant, Units 1 and 2 - NRC
 Inspection Report
 WNA-GO-00127-GEN, Spent Fuel Pool Instrumentation System Standard Product technical.
 Rev. 03
 WNA-IG-00506-TVA, Spent Fuel Instrumentation System Configuration, Rev. 1
 WNA-TR-03149-GEN, SFPIS Standard Product, Final Design Verification Summary Report,
 Rev. 03
 WNA-DS-02957-GEN, Spent Fuel Pool Instrumentation System Design Specification, Ref. 3
 WNA-PT-00188-GEN, Spent Fuel Pool Instrumentation System (SFPIS) Standard Product Test,
 Rev. 02
 SQN letter, S-415, March 23, 2011, "Sequoyah Centrifugal Charging Pump Injection Tank
 (CCIPT) Isolation Valve Stroke Time Increase Evaluation-N2N-072"
 TVA Letter to the NRC, December 22, 2010, "Request to Employ Alternative Testing to IWE-
 5221 Requirements in American Society of Mechanical Engineers Boiler and Pressure Vessel
 Code, Section XI (2001 Edition with 2003 Addenda), Request Number 2-APP-J-1
 TI-79, Low Voltage Breaker Trip Characteristics Curves, Rev. 0006
 TI-79, Attachment 1, Low Voltage Breaker Trip Characteristics Curves, effective date: 02-14-
 2014
 TI-79, Attachment 2, Time-Current Curves, effective date: 02-14-2014
 1071185AO, PEG PKG, Rev. 003

Work Orders

Work Order 115065174, implements DCN D23085 stage 4 in conjunction with WO 114227788,
 work week 2016/03/14
 Work Order 115065173, implements DCN D23085 stage 2 in conjunction with WO 111848065,
 work week 2025/10/13
 Work Order 114227788, replace existing Westinghouse MC3800 breaker with new Cutler
 Hammer MDL3400 breaker, work week 2016/03/14
 Work Order 112729648, perform molded case breaker testing in accordance with O-MI-317-
 EBR-010.0 as well as breaker testing, dated: pre-test date 1/20/11
 Work Order 111848065, perform molded case breaker testing, work week 2015/03/02
 111857017, Replace Air Regulator and Pressure Relief Valve and repair air line leaks,
 10/31/2012

Work RequestsCondition Reports generated as a result of the inspection

CR 1059281 Calculation SQN-APS-003 not updated.
 CR 1058859 NRC identified duct cover not properly latched.
 CR 1058860 NRC identified oil saturated pads in Transformer Yard.
 CR 1058865 NRC identified deteriorated label under Unit 2 CGB.
 CR 1058867 NRC identified unattached ground cable in Transformer Yard.
 CR 1059387 Appendix R light pack deficiency.
 CR 1059273 NRC identified a PEG Pkg containing a discrepancy.
 CR 1059356 NRC identified Appendix R lighting deficiencies.
 CR 1059406 NRC-identified temporary equipment deficiencies.
 CR 1059392 Fire Protection Report lighting errors.

- CR 1061916 Incorrect information in DCN 22437A 50.59.
- CR 1062204 Calculation SQN-APS-003 revision log typo.
- CR 1063734 FSAR Figures were not updated for DCN 23216.
- CR 1063937 Lack of UNIDs and periodic calibration for SBO air bottles.
- CR 1064042 Calculations SQN-APS-003 and D2SDJ-P213350 not updated for PEG packages.
- CR 1064479 PEG pkg did not identify fit problems with breaker kirk key.
- CR 1064483 Breaker not placed on hold after field fit problem identified.
- CR 1064731 ECP 23082 comparative analysis did not include ambient temperature compensation.
- CR 1064736 Evaluate if removal of Kirk Key Interlock causes common mode failure between Unit 1 and Unit 2.
- CR 1064744 Initial discovery CR 315158 did not determine why the breaker did not fit properly with the Kirk Key.
- CR 1064785 Evaluate if adequate qualification criteria for electrical components per IEEE 323-1974 are included in DCNs 23085 and 23082.
- CR 1064803 DCN 22437 Containment Analysis input assumptions and 50.59 conclusions

LIST OF ACRONYMS USED

AC	Alternating Current
CR	Condition Report
DCN	Design Chance Notice
ECP	Engineering Change Package
EQV	Equivalent
ESF	Engineered Safety Feature
ERCW	Essential Raw Cooling Water
GE	General Electric
IEEE	Institute of Electrical and Electronic
IMC	Inspection Manual Chapter
MCC	Motor Control Center
MCCB	Motor Control Center Breakers
NEI	Nuclear Energy Institute
NLI	Nuclear Logistic
PEG	Procurement Engineering Group
PER	Problem Evaluation Report
QA	Quality Assurance
QAP	Quality Assurance Program
REG	Regulatory Guide
SSC	Structures, Systems, and Components
SDP	Significance Determination Process
SL	Severity Level
SQN	Sequoyah Nuclear
TFPI	Triennial Fire Protection Inspection
TVA	Tennessee Valley Authority
UFSAR	Updated Final Safety Analysis Report
VIO	Violation