



Tennessee Valley Authority, 1101 Market Street, Chattanooga, Tennessee 37402

CNL-19-016

January 30, 2019

10 CFR 50.4
10 CFR 50.90

ATTN: Document Control Desk
U.S. Nuclear Regulatory Commission
Washington, D.C. 20555-0001

Sequoyah Nuclear Plant, Units 1 and 2
Renewed Facility Operating License Nos. DPR-77 and DPR-79
NRC Docket Nos. 50-327 and 50-328

Subject: Response to Request for Additional Information Regarding Sequoyah Nuclear Plant, Units 1 and 2 License Amendment Request to Modify Essential Raw Cooling Water Motor Control Center Breakers and to Revise the Updated Final Safety Analysis Report for Sequoyah Nuclear Plant Units 1 and 2 (SQN-TS-17-04) (EPID L-2018-LLA-0060)

- References:
1. TVA Letter to NRC, CNL-17-150, "Sequoyah Nuclear Plant, Units 1 and 2 License Amendment Request to Modify Essential Raw Cooling Water Motor Control Center Breakers and to Revise the Updated Final Safety Analysis Report Sequoyah Nuclear Plant Units 1 and 2 (SQN-TS-17-04)," dated March 9, 2018 (ML18071A349)
 2. TVA Letter to NRC, CNL-18-054, "Supplement to Sequoyah Nuclear Plant, Units 1 and 2 License Amendment Request to Modify Essential Raw Cooling Water Motor Control Center Breakers and to Revise the Updated Final Safety Analysis Report Sequoyah Nuclear Plant Units 1 and 2 (SQN-TS-17-04)," dated April 11, 2018 (ML18102B430)
 3. NRC Electronic Mail to TVA, "Request for additional information - Sequoyah Nuclear Plant, Units 1 and 2, Request to Modify Essential Raw Cooling Water Motor Control Center Breakers and to Revise Updated Final Analysis Report (SQN-TS-17-04) (EPID: L-2018-LLA-0060)," dated December 10, 2018 (ML18344A075)

In Reference 1, Tennessee Valley Authority (TVA) submitted a request for an amendment to Renewed Facility Operating License Nos. DPR-77 and DPR-79 for the Sequoyah Nuclear Plant (SQN), Units 1 and 2, respectively. The proposed change would modify the essential raw cooling water (ERCW) motor control center breakers and revise the Updated Final Safety Analysis Report for SQN Units 1 and 2 (SQN-TS-17-04). In Reference 2, TVA supplemented the license amendment request.

In Reference 3, the Nuclear Regulatory Commission transmitted a request for additional information (RAI) and requested a response by January 31, 2019. The enclosure to this letter provides the TVA response to the RAI.

The enclosure to this letter does not change the no significant hazards consideration contained in the Reference 1. There are no new regulatory commitments made in this letter. Please address any questions regarding this request to Michael A. Brown at 423-751-3275.

I declare under penalty of perjury that the foregoing is true and correct. Executed on this 30th day of January 2019.

Respectfully,

A handwritten signature in blue ink, appearing to read "E. K. Henderson", with a long horizontal flourish extending to the right.

E. K. Henderson
Director, Nuclear Regulatory Affairs

Enclosure:

Response to Request for Additional Information Regarding Sequoyah Nuclear Plant,
Units 1 and 2 License Amendment Request to Modify Essential Raw Cooling Water
Motor Control Center Breakers and to Revise the Updated Final Safety Analysis
Report for Sequoyah Nuclear Plant Units 1 and 2 (SQN-TS-17-04)
(EPID L-2018-LLA-0060)

cc (Enclosure):

NRC Regional Administrator - Region II
NRC Senior Resident Inspector - Sequoyah Nuclear Plant
NRC Project Manager – Sequoyah Nuclear Plant
Director, Division of Radiological Health - Tennessee State Department of
Environment and Conservation (w/o enclosure)

Enclosure

Response to Request for Additional Information Regarding Sequoyah Nuclear Plant, Units 1 and 2 License Amendment Request to Modify Essential Raw Cooling Water Motor Control Center Breakers and to Revise the Updated Final Safety Analysis Report for Sequoyah Nuclear Plant Units 1 and 2 (SQN-TS-17-04) (EPID L-2018-LLA-0060)

NRC Introduction

By the letter dated March 9, 2018 (Agencywide Documents Access and Management System (ADAMS) Accession No. ML18071A349), Tennessee Valley Authority (TVA), submitted a request to amend the licenses for Sequoyah Nuclear Plant (SQN) Units 1 and 2 to modify the essential raw cooling water (ERCW) motor control center (MCC) breakers and revise the Updated Final Safety Analysis Report (UFSAR). SQN implemented a design change to remove the existing mechanical (Kirk Key) interlocking scheme from the feeder breakers and tie breakers for ERCW MCCs 1A-A and 2A-A. The mechanical interlock for the ERCW MCC feeder breakers was replaced with administrative (procedural) controls. The NRC staff has reviewed the license amendment request (LAR) and determined that additional information is required for the staff to complete the review. The staff's request for additional information (RAI) follows. The draft RAI was emailed in draft form on November 30, 2018, and the TVA staff responded that they did not need a clarification call on the draft RAI and there was no proprietary or sensitive information. The TVA staff requested, and NRC agreed, a RAI response date of January 31, 2019, due to the current outages for both units and upcoming holidays.

Regulatory Basis

Appendix A, "General Design Criteria for Nuclear Power Plants" to Title 10 of the Code of Federal Regulations (10 CFR) Part 50, "Domestic Licensing of Production and Utilization Facilities" states the following:

- Criterion 5—Sharing of structures, systems, and components, requires that structures, systems, and components important to safety, including the onsite electric power supplies and distribution systems, shall not be shared among nuclear power units unless it can be shown that such sharing will not significantly impair their ability to perform their safety functions, including, in the event of an accident in one unit, an orderly shutdown and cool down of the remaining units.*
- Criterion 17—Electric power systems, requires, in part, that the onsite electric power supplies, including the onsite electric distribution system, shall have sufficient independence and redundancy to perform their safety functions assuming a single failure.*

The Nuclear Regulatory Commission (NRC) staff reviews the human performance aspects of LARs using the guidance in Standard Review Plan Chapter 18 and NUREG-1764 Rev. 1, "Guidance for the Review of Changes to Human Actions" (ADAMS Accession No. ML072640413). In accordance with the generic risk categories established in Appendix A to NUREG-1764, the tasks under review involve human actions associated with a risk-important system. Due to the risk importance, the NRC staff will perform a Level II human factors review per the guidance in Section 4 of NUREG-1764, Rev. 1. NUREG-1764, Section 4, "Level II Review Guidance," includes the following 4 areas of review:

- 1. General Deterministic Review*
- 2. Analysis*

Enclosure

3. *Design of Human System Interface (HSI), Procedures, and Training*
4. *Human Action Verification*

RAI 1

The general deterministic review guidance in NUREG-1764 states that the licensee should provide adequate assurance that the change does not compromise defense in depth. If the administrative controls were to fail (tie-breakers left closed), discuss whether the normal and alternate power supplies aligned to an ERCW MCC belonging to a train (e.g. "A" train) could be out of phase if the 6.9kV shutdown boards (1A and 2A) are powered from offsite power.

TVA Response to RAI 1

If administrative controls were to fail and the tie-breakers left closed, the supplies to the ERCW MCCs from each unitized source will not be out of phase if the 6.9kV shutdown boards (1A and 2A) are powered from offsite power. Defense in depth of the SQN auxiliary power system would not be compromised. Both the 161kV and 500kV grids feeding the switchyard are in phase, connected through an intertie transformer that is Y-Y with no phase shift.

Normal supply from offsite power to the auxiliary power system (APS) is through the main and unit station service transformers (USSTs). Main transformers are Y-D with the high side leading the low, and the USSTs are D-Y with the low side leading the high, thus reversing (or canceling) the phase shift. This configuration maintains the plant power system directly in phase with offsite power. Alternate power may be supplied through plant common station service transformers (CSSTs), which are Y-Y with no phase shift. In all alignments with offsite power, the SQN APS is in phase with both units and the switchyard supply.

Phasing of the APS boards is controlled by configuration management and shown on the following drawings, which reflects the configuration control of the plant board phasing.

- Drawing 1, 2-15E500-1 shows single line representation and overview of the supply path from the switchyard to the ERCW MCCs.
- Drawing 1, 2-35W736-1 shows phasing of cables connected to 480V ERCW MCC 1A-A, both supply and the crosstie to the 480V ERCW MCC 2A-A.
- Drawing 1, 2-35W746-5 shows phasing of cables connected from ERCW MCCs to the ERCW 6.9kV/480V transformers and feeders from the 6.9kV shutdown boards (SDBD).
- Drawing 1-33-51068-D61 shows cables feeding from 6.9kV SDBD 1A-A to the ERCW transformer.
- Drawing 1-33-47035-D266 shows cables feeding to 6.9kV SDBD 1A-A from Unit Board 1B.
- Drawing 1-33-47035-D867 shows feeder cables from Unit Board 1B to 6.9kV SDBD 1A-A.
- Drawing 1, 2-45N324 shows the phasing of all transformers from the offsite power supply to the APS.

Additionally, performance of SQN Technical Specification (TS) Surveillance Requirement (SR) 3.8.1.8 demonstrates that the load side of the USSTs and CSSTs are in phase. The fast transfer performed by this SR takes place in under six cycles, so if there were a transformer phase shift, then there would be significant circuit disturbance and the SR would not pass. Therefore, successful completion of this SR is sufficient to demonstrate that the normal and alternate power supplies to the ERCW MCCs are in phase.

Enclosure

RAI 2

The analysis review guidance in NUREG-1764 states that the licensee should perform a functional and task analysis to identify how personnel will know when the human action is necessary and has been performed correctly. Describe the procedures and administrative controls that will be used to:

- *Identify when it is acceptable to align the alternate power supply to an ERCW MCC (to ensure that the alternate power supply is only aligned for maintenance purposes),*
- *Identify when it is not appropriate to perform the action (to ensure that the alternate power supplies are not aligned when powered from the emergency diesel generators),*
- *Verify that the ERCW bus that will be powered by its alternate power supply is de-energized prior to aligning the alternate supply, and*
- *Verify that the breaker alignment is correct after restoration of normal breaker alignment.*

TVA Response to RAI 2

Alignment of the ERCW MCCs is governed by the SQN System Operating Instructions 1,2-SO-201-9, "480V ERCW Motor Control Centers." Precaution 3.1.K in these procedures and a note in each section to realign ERCW MCC power supplies requires an engineering evaluation in accordance with drawing 1,2-15E500-3. Table 3 of drawing 1,2-15E500-3 describes the alignment restrictions and limitations for the electrical distribution system. Aligning ERCW MCC from alternate power is not a "Normal Alignment," which is defined as "ALL 6.9KV AND 480V BOARDS RECEIVING POWER FROM THEIR NORMAL SUPPLY AS SHOWN ON SHEETS 1 AND 2." Note 10 of Table 3 requires that any alignment not specified by this table to be evaluated by SQN electrical design engineering prior to implementation.

The above evaluation is requested by operations and provided in the form of an engineering work request in accordance with TVA procedure NPG-SPP-09.0, "Conduct of Engineering," Section 3.2.9.C, "Engineering Work Requests." This requirement evaluates any restrictions on concurrent alignments to ensure operability of emergency diesel generators and offsite power sources during the period of alternate alignment. An emergency diesel generator supplying a 6.9KV Shutdown Board would not be considered a normal alignment and such an alignment is only normally performed during the performance of SQN TS SR 3.8.1.18, "AC Sources - Operating."

The required actions to transfer to alternate and back to normal power are detailed in 1,2-SO-201-9, Sections 8.1 through 8.4. As this is a "dead bus" transfer, steps are present to check annunciation of loss of voltage via annunciation [loss of power to the ERCW multiplexer/de-multiplexer (MUX/DEMUX) for 1A-A, or MCC undervoltage for other boards.] In addition, 1,2-SO-201-9, Sections 8.1 through 8.4, contain a step to check that the bus is dead prior to proceeding to steps to connect to alternate supply.

Sections 8.3 and 8.4 of 1,2-SO-201-9 perform the return to normal from alternate power alignment for the ERCW MCCs. These sections require operators to perform an independent verification of the correct lineup (i.e., tie breaker off and normal feeder breaker on).

Enclosure

RAI 3

The HSI, procedures, and training review guidance in NUREG-1764 states that the licensee should describe any known operating experience issues. Describe any relevant operating experience related to failure of administrative controls, breaker manipulations, or concurrent/independent verification techniques and how that operator experience has been considered in the proposed LAR.

TVA Response to RAI 3

TVA reviewed SQN condition reports associated with misposition events and did not identify any relevant operating experience (OE) at SQN related to failure of administrative controls, breaker manipulations, or concurrent/independent verification techniques that would affect procedural requirements related to the ERCW MCCs.

As stated in the referenced letter:

“TVA procedure for 480V ERCW MCCs has concurrent verification (CV) to reduce the likelihood of a human performance event. Five manual actions with CV steps involving four circuit breakers must be taken to manually make the transfer from the MCC normal supply to the alternate supply. An operations procedure step would have to be incorrectly followed and incorrectly verified (CV) for this failure to occur.”

Additionally, TVA has revised SQN procedures 1,2-SO-201-9 to include details on expected annunciators and an additional check to prevent unintended paralleling of ERCW transformers. These methods are in alignment with NPG-SPP-22.206, “Verification Program.” The response to RAI-2 further describes the administrative controls, breaker manipulations, and concurrent/independent verification techniques along with defense-in-depth measures to provide reasonable assurance of prevention of credible errors.

Reference

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