

NRR-DMPSPEm Resource

From: Lee, Samson
Sent: Tuesday, August 21, 2018 8:41 AM
To: Wells, Russell Douglas
Cc: Hon, Andrew
Subject: additional information needs identified during audit - 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)
Attachments: additional information needs during audit - electrical engineering (8-21-18).docx

Mr. Wells,

The NRC staff is continuing the regulatory audit for the subject Sequoyah license amendment request. Attached are additional information needs identified in the electrical engineering area. Please propose logistics to facilitate the audit.

Thanks,
Sam

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From: Lee, Samson

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**ADDITIONAL INFORMATION NEEDS IDENTIFIED DURING THE REGULATORY AUDIT
FOR SEQUOYAH NUCLEAR PLANT, UNITS 1 AND 2, TO SUPPORT REVIEW OF THE
LICENSE AMENDMENT REQUEST (LAR) REGARDING REMOVAL OF “KIRK KEY”
INTERLOCK FROM FEEDER BREAKERS AND TIE BREAKERS FOR ESSENTIAL RAW
COOLING WATER MOTOR CONTROL CENTER
DOCKET NOS. 50-327 AND 50-328 (EPID: L-2018-LLA-0060)**

BACKGROUND

By letter dated March 9, 2018 (Agencywide Document Access Management System (ADAMS) Accession No. ML18071A349), as supplemented by letter dated April 11, 2018 (ADAMS Accession No. ML18102B430), Tennessee Valley Authority (TVA), the licensee for Sequoyah Nuclear Plant (SQN), Units 1 and 2, requested the U.S. Nuclear Regulatory Commission (NRC) staff approval to modify Essential Raw Cooling Water (ERCW) Motor Control Center (MCC) Breakers and revise the Updated Final Safety Analysis Report (UFSAR) for SQN Units 1 and 2 to clarify the normal and alternate power supply for ERCW.

In accordance with a Regulatory Audit Plan dated July 18, 2018 (ADAMS Accession No. ML18199A322), the NRC staff began the audit with an entrance phone call on July 26, 2018. The NRC staff has identified additional information needs in the electrical engineering area, which are discussed below as talking points. As necessary, please make available technical staff or contractors who are familiar with the information to assist the NRC staff during the audit.

ADDITIONAL INFORMATION NEEDS IDENTIFIED DURING THE REGULATORY AUDIT

Regulatory Requirements

General Design Criterion (GDC) 17 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.

General remark No 1 in the UFSAR, Table 8.2.1-1, states: “All normal and alternate breakers which supply a given bus are interlocked to prevent paralleling sources.” According to this table, all ERCW MCCs 1A-A, 1B-B, 2A-A, and 2B-B have both normal and alternate power supplies which are interlocked.

Talking Point 1

In the LAR, the licensee stated that the original design of the 480V ERCW MCCs included a mechanical interlock (Kirk Key), which prevented paralleling of the normal and alternate power supply on each MCC. The mechanical interlock was provided with the original MCC procurement in the original purchase specification. The Kirk Key provides a mechanical interlock between these same-train normal and alternate power sources.

Provide a discussion that explains the technical basis for the mechanical interlock in the original

MCC procurement, and the technical basis for why the need for mechanical interlock is no longer applicable in its design, use, and operation as described in the UFSAR.

Talking Point 2

In the LAR, the licensee stated that the existing ERCW feeder breakers are obsolete. The replacement breakers were evaluated through TVA's equivalency process. However the replacement breakers have a slightly different physical footprint, which prevents the existing Kirk Key interlocking scheme to be mounted onto the breaker. Therefore, the removal of the Kirk Key interlock was required to install the new ERCW MCC feeder breakers. The existing mechanical interlock was replaced with administrative controls.

Please provide a discussion of the following:

- (1) Describe the physical and mechanical difference in the make and footprint of original and replacement breakers;
- (2) UFSAR Figure 8.1.2-1 shows that ERCW MCC tie-breakers as normally closed (NC). According to UFSAR, Table 8.2.1-1, each ERCW MCC is supplied from only one source (either a normal or alternate source). Please provide a discussion that clarifies this discrepancy including a markup of UFSAR Chapter 8, Table 8.2.1-1, Figure 8.1.2-1, as necessary.

Talking Point 3

In the LAR, the licensee stated that replacing the Kirk Key mechanical interlocks with administrative controls does introduce the possibility of aligning two ERCW transformers to a single MCC in the event that the administrative controls are not effective. However, this action would not affect the ability of the ERCW system to perform its safety function. The paralleling of the two ERCW transformers onto a single MCC increases the available short circuit current and causes circulating currents that can heat and damage equipment. The effects of circulating currents are minimized in this case, due to the high impedance of the connection and similarity/symmetry of the circuit design.

Please provide a discussion of the following:

- (1) Describe the potential increase in current and voltages and subsequent possible tripping of breakers connected to 6.9 kV shutdown boards (1A/2A, or 1B/2B), and ERCW MCCs (1A/2A, or 1B/2B), if inadvertently paralleled (by operator error) through the ERCW MCCs tie-breakers under the following scenarios: (a) two 6.9 kV shutdown boards (1A/2A, or 1B/2B) when fed by two offsite power sources with out-of-phase conditions; (b) two 6.9 kV shutdown boards when fed by EDGs with out-of-phase conditions.
- (2) Describe potential increase in current and voltages and subsequent possible tripping of EDG(s), if the EDGs are inadvertently paralleled (by operator error) through ERCW MCCs tie-breakers, with out-of-phase conditions.

Talking Point 4

In the LAR, the licensee stated that the breakers interrupting capability and selective coordination ensures that only the affected train ERCW MCCs are electrically isolated. The result of this

failure is the loss of 480V power supply to one train of ERCW MCCs.

The LAR does not describe the availability of both trains of ERCW MCCs required for safe shutdown of the plant can be adversely impacted by the similar common mistake of operator(s). Provide a discussion explaining whether other considerations of other possible methods to avoid the connection between the same-train normal and alternate power sources such as: (a) rack-out/disconnection of tie-breakers, (b) shunt tip of one of the main breakers to the MCCs if two sources are paralleled through tie-breakers, (c) alarm in the control room if the normal and alternate sources are inadvertently closed in any train were evaluated.