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

CNL-17-150

March 9, 2018

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 328

Subject: **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)**

In accordance with the provisions of Title 10 of the *Code of Federal Regulations* (10 CFR) 50.90, "Application for Amendment of License, Construction Permit, or Early Site Permit," Tennessee Valley Authority (TVA) is submitting a request for an amendment to Renewed Facility Operating License Nos. DPR-77 and DPR-79 for Sequoyah Nuclear Plant (SQN), Units 1 and 2, respectively.

SQN has implemented a design change to remove the existing mechanical (Kirk Key) interlocking scheme from the feeder breakers and tie breakers for Essential Raw Cooling Water (ERCW) Motor Control Centers (MCCs) 1A-A and 2A-A. In NRC Inspection Report 05000327/2015007 and 05000328/2015007, the NRC determined that this design change required prior NRC approval. Therefore, TVA is requesting NRC approval to complete the implementation of the design change to remove the mechanical interlock device from the feeder breakers and tie breakers from the ERCW MCCs 1B-B and 2B-B and to revise the ERCW System Description in Section 9.2.2.2 of the SQN Updated Final Safety Analysis Report (UFSAR) to describe the normal and alternate power sources for the ERCW system. This request resolves the issues in NRC Inspection Report 05000327/2015007 and 05000328/2015007. There are no Technical Specification changes associated with this request.

The enclosure provides a description of the proposed changes, technical evaluation of the proposed changes, regulatory evaluation, and a discussion of environmental considerations. Attachment 1 to the enclosure provide the existing UFSAR pages marked-up to show the proposed changes. Attachment 2 to the enclosure provide the existing UFSAR pages retyped with the proposed changes incorporated.

TVA has determined that there are no significant hazards considerations associated with the proposed change and that the TS change qualifies for a categorical exclusion from environmental review pursuant to the provisions of 10 CFR 51.22(c)(9).

The SQN Plant Operations Review Committee has reviewed this proposed change and determined that operation of SQN, in accordance with the proposed change, will not endanger the health and safety of the public.

Additionally, in accordance with 10 CFR 50.91(b)(1), TVA is sending a copy of this letter and the enclosure to the Tennessee Department of Environment and Conservation.

TVA requests approval of this proposed license amendment by February 28, 2019, with implementation within 60 days of approval.

There are no new regulatory commitments contained in this letter. If you have any questions, please contact Ed Schrull at 423-751-3850.

I declare under penalty of perjury that the foregoing is true and correct. Executed on the 9th day of March 2018.

Respectfully,

J. W. Shea
Vice President, Nuclear Regulatory Affairs & Support Services

Enclosure: Evaluation of Proposed Change

cc (Enclosures):

NRC Regional Administrator - Region II
NRC Senior Resident Inspector - Sequoyah Nuclear Plant
NRC SQN Project Manager

ENCLOSURE
TS-SQN-17-04

Evaluation of Proposed Change

Subject: 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)

ATTACHMENTS:

1. Proposed UFSAR Markups
2. Proposed Retyped UFSAR Pages

1.0 SUMMARY DESCRIPTION

Pursuant to Title 10 of the Code of Federal Regulations (10 CFR) 50.90, Tennessee Valley Authority (TVA) is requesting NRC approval to complete the implementation of the design change to remove the mechanical interlock device from the feeder breakers and tie breakers for the Essential Raw Cooling Water (ERCW) Motor Control Centers (MCCs) 1B-B and 2B`B. This LAR also revises the ERCW System Description in Section 9.2.2.2 of the Sequoyah Nuclear Plant (SQN) Updated Final Safety Analysis Report (UFSAR) to describe the normal and alternate power sources for the ERCW system.

2.0 DETAILED DESCRIPTION

2.1 Proposed Changes

TVA is requesting approval to complete the implementation of a design change to remove the existing mechanical (Kirk Key) interlocking scheme from the feeder breakers and tie breakers for ERCW MCCs 1B-B and 2B-B. Upon implementation, the physical control of the ERCW MCC feeder breakers will be replaced with administrative (procedural) controls. The Kirk Key interlock has already been removed from the feeder breakers and tie breakers for ERCW MCCs 1A-A and 2A-A.

Additionally, SQN is proposing to revise UFSAR Section 9.2.2.2 to clarify the normal and alternate power supply for ERCW, as follows:

From:

> Since there are two independent power trains, four of the eight ERCW pumps will be assigned to train A and four to train B. Two each of the traveling screens, screen wash pumps, and strainers will be assigned to the power train corresponding to that of the ERCW pumps which this equipment serves.

To:

> Since there are two independent power trains, four of the eight ERCW pumps will be assigned to train A (1A/2A) and four to train B (1B/2B). Likewise, two of the associated ERCW MCCs are assigned to train A and two to train B. Because the mechanical loads powered from each power train feed into a header/piping system that is shared among both units, there is no need to have unit separation on the associated power sources. The normal and alternate power source for each ERCW MCC are provided by the same train from each unit.

2.2 Background

SQN has 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 physical control of the ERCW MCC feeder breakers was replaced with administrative (procedural) controls as described below in section 3.2.

Based on a review conducted in accordance with 10 CFR 50.59, TVA previously concluded that this design change could be implemented without prior NRC approval. The basis for this conclusion was that the design of the 480V ERCW MCCs after the modification, continued to comply with IEEE Std. 308-1971, Regulatory Guide (RG) 1.6, Rev 0 and RG 1.81, Rev 1. As a result of the NRC violations described below, the corresponding design change to ERCW MCCs 1B-B and 2B-B will not be implemented until after the NRC has approved this LAR.

On September 14, 2015, the NRC issued a non-cited violation (NCV) 05000327, 328/2015007-02 for a failure 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 and 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.

On September 14, 2015, the NRC also issued a Severity Level IV violation (SLIV) for not obtaining a license amendment pursuant to 10 CFR 50.90 prior to implementing the change to remove the mechanical (Kirk Key) interlock from the ERCW feeder breakers, 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 physical control of the Train A ERCW MCC feeder breakers has been replaced with administrative (procedural) controls. While redundancy is maintained through independent trains, a physical barrier (Kirk Key) was replaced with an administrative barrier. If a human performance error (single failure) were to occur and an operator mistakenly closed the cross tie breaker without first opening a feeder breaker, this action could potentially parallel two standby power sources due to the removal of the mechanical interlock. TVA has conservatively considered that independence was impacted by this change. The 10 CFR 50.59 Evaluation that allowed the removal of the Kirk Key interlock from ERCW MCCs 1A-A and 2A-A has been revised. In accordance with NEI guidance (NEI 96-07, Revision 1, “Guidelines for 10 CFR 50.59 Evaluation”) provided in Section 4.3.2, a change, which may reduce system/equipment redundancy, diversity, separation or independence would require prior NRC approval.

2.3 Condition Intended to Resolve

This request resolves the issues described above as documented in NRC Inspection Report 05000327/2015007 and 05000328/2015007 (Reference 4).

3.0 TECHNICAL EVALUATION

3.1 System Description

The ERCW is a two-train system, each shared train having the capability to provide the required cooling water for both units as described in SQN UFSAR Section 9.2.2. These equipment trains are sufficiently independent to guarantee the availability of at least one train at any time. The system has been analyzed for "worst case" heat loads under combinations of maximum river water temperature, design basis accident conditions, normal cooldown requirements, power train failures, etc., for both units. These analyses concluded that sharing of the ERCW system by the two SQN nuclear units does not introduce factors that prevent the system from performing its required function for plant design basis conditions. The system is arranged in such a way that the loss of a complete header or one supply source can be isolated in a manner that does not jeopardize plant safety.

The A and B ERCW headers each have two pumps that are assigned to an emergency diesel generator on loss of offsite power. Total loss of one train, or the loss of an entire plant emergency power train would not prevent safe shutdown of either unit under any credible plant condition. The operation of one train is sufficient to supply all cooling water requirements for the 2-Unit plant for unit cool down, refueling, or post-accident operation as described in the UFSAR. Such an arrangement assures adequate cooling water under both normal and emergency conditions.

The 480V ERCW MCCs support various ERCW loads such as: ERCW strainers, ERCW screen wash pumps, and travelling screens. There are four 480V ERCW MCC boards, 1A-A, 1B-B, 2A-A, and 2B-B, all located in the ERCW building. Each board is fed from its dedicated Unit and train 6.9kV shutdown board (SDBD) (1A-A, 1B-B, 2A-A, and 2B-B). Each 6.9kV SDBD has dedicated preferred (offsite) sources and a standby (diesel generator) power source. The design of the 6.9kV SDBDs meets the requirements of GDC-17, GDC-5, RG 1.6, RG 1.81, and IEEE 308-1971 for redundancy, independence, and multi-unit sharing.

Alternate power may be manually transferred to the 480V ERCW MCC boards. The alternate power source for the A-train 480V ERCW MCC board is from the opposite Unit’s A-train 6.9kV SDBD, and the alternate power source for the B-train 480V ERCW MCC board is from the opposite Unit’s B-train 6.9kV SDBD. Each of the four 480V ERCW MCC boards and its associated loads is considered one load group. Load groups of the opposite train designation and same Unit are redundant to each other (e.g.,1A-A, 1B-B). Load groups of the same train designation and opposite Unit (e.g.,1A-A, 2A-A) are not redundant to each other, because they are part of the same power train and support operation of the same shared ERCW train.

The 480V ERCW MCCs do not have breaker alignment capability for manually connecting redundant load groups. The ability to parallel normal and alternate power sources is contained within a single load group. Should both the A-train normal and alternate power supplies to the 1A-A and 2A-A 480V ERCW MCCs be lost, the B-train normal and alternate power supplies to the 1B-B and 2B-B 480V ERCW MCCs would be available such that sufficient power is maintained to operate the ESF features for a Design Basis Event on one unit and those systems required for concurrent safe shutdown on the other unit.

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.

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.

3.2 Change Evaluation

The proposed change provides the basis for why the Kirk Key interlocks do not perform a design or licensing basis function described in the UFSAR.

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. The parallel connection passes through two transformers, multiple boards, and substantial length of cables, which increase the impedance (resistance) and limit the circulating currents. Additionally, each of the ERCW main feeder breakers is equipped with a thermal trip unit that provides an additional level of protection against the possible heating effects. Regarding fault current, the MCC buses, MCC breakers, and cross-tie breakers are rated to clear the maximum fault current supplied by two paralleled ERCW transformers without affecting the electrical supply. Although, the available fault current could potentially double, the capacity of the MCC buses, MCC breakers, and cross-tie breakers are sufficiently sized to withstand and clear the available fault current. There are two breakers that feed from the two 6.9 kV sources, one above and one below the step down transformers. It would take a failure of more than one breaker to affect either 6.9 kV source, and more than a single failure to affect both 6.9 kV sources.

RG 1.6 states (in part) the following:

- The electrically powered safety loads should be separated into redundant load groups such that the loss of any one group will not prevent the minimum safety functions from being performed.
- Each alternating current (AC) load group should have a connection to the preferred (offsite) and standby (onsite) power source:
    - The standby power source should have no automatic connection to any other redundant load group;

   - At multi-unit sites, the standby power source for one load group may have an automatic connection to a load group of a different unit;
   - A preferred power source bus may serve redundant load groups.

- When operating from the standby power sources, redundant load groups and the redundant standby sources should be independent of each other at least to the following extent:
   - The standby source of one load group should not be automatically paralleled with the standby source of another load group under accident conditions;
   - No provisions should exist for automatically connecting one load group to another load group;
   - No provisions should exist for automatically transferring loads between redundant power sources (i.e., load groups);
   - 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.

RG 1.81 describes the potential undesirable effects of sharing onsite power systems at a multi unit site:

- Sharing of onsite power systems at multi-unit power plant sites generally results in a reduction in the number and capacity of the onsite power sources to levels below those required for the same number of units located at separate sites. The reduced capacity could cause undesirable interactions. Examples of such interactions are (1) the interconnection of engineered safety feature (ESF) control circuits of each unit such that failures and maintenance or testing operations in one unit affect the availability of ESF in other units, (2) coordination required between unit operators in order to cope with an accident in one unit and safe shutdown of the remaining unit(s), and (3) system overload conditions as a consequence of real accident in a unit coincident with a false or spurious accident signal in another unit.

RG 1.81 further states that a device is considered to be shared among units if it is designed to perform the same function in all units.

RG 1.81 recommends (in-part) the following:

- A single failure should not preclude the capability to automatically supply minimum ESF loads in any one unit and safely shut down the remaining unit, assuming a loss of offsite power;
- The interaction between each unit's ESF electric circuits should be limited such that any allowable combination of maintenance and test operations in the units will not preclude the capability to automatically supply power to minimum ESF loads in any unit, assuming a loss of offsite power

IEEE Standard 308-1971 reiterates the RG 1.6 and 1.81 positions described above.

Specifically:

- Sufficient physical separation, electrical isolation, and redundancy shall be provided to prevent the occurrence of common failure mode in the Class 1E systems;

- Multi-unit stations may share preferred and standby power supply capacity between units, given that the total preferred and standby capacity is sufficient to operate the ESF features for a design basis accident (DBA) on one unit and those systems required for concurrent safe shutdown on the remaining unit(s);

- It is permissible to provide inter-unit ties between the Class 1E buses of the units in a multi-unit station, provided any single component failure does not degrade the Class 1E electrical systems of any unit below an acceptable level and provided that the independence of the redundant systems is maintained;

- Shared Class 1E electric systems shall be designed such that the sharing does not increase the probability of a DBA occurring in more than one unit at the same time.

The design of the 480V ERCW MCCs (with or without the mechanical interlock) is consistent with GDC-17, GDC-5, RG 1.6, RG 1.81, and IEEE 308-1971. Redundant load groups are powered by offsite (preferred) and onsite (standby) power sources that are dedicated to each power division's Unit and train designation. In providing sufficient power to operate the ESF functions for a DBE on one unit and those systems required for concurrent safe shutdown on the remaining unit, load groups of the opposite train designation and same Unit (e.g., 1A and 1B) are redundant to each other. Load groups of the same train designation and opposite Unit (e.g., 1A and 2A) are not redundant to each other. Standby power sources from the same train designation and opposite Unit (e.g., 1A and 2A) are considered alternate power sources to a load group.

The physical control of the ERCW MCC feeder breakers has been replaced with administrative controls. While redundancy is maintained through independent trains, an operator could potentially parallel two standby power sources due to the removal of the mechanical interlock.

TVA has evaluated the human performance aspect of adding administrative (procedural) control using the Modified Operator Action Questions in NEI 96-07.

- *The action (including required completion time) is reflected in plant procedures and operator training programs.*

  The action to transfer a 480V ERCW MCC supply is reflected in the TVA procedure for 480V ERCW Motor Control Centers. In addition, the modification package was reviewed for the effect on training. Initial Operator Training includes preventing the inappropriate paralleling sources for electrical boards. Operation of breakers for such instances is considered operator fundamental knowledge. Additionally, this modification was included in Licensed Operator Requalification training as part of the plant status update.

- *The licensee has demonstrated that the action can be completed in the time required considering the aggregate affects, such as workload or environmental conditions, expected to exist when the action is required.*

  The replacement of the mechanical interlock with administrative controls has no change on operator actions required to mitigate design basis accidents. The evolution of transferring the power supply to the 480V ERCW MCCs is performed when there is an issue with the primary supply or to support maintenance activities. The affected breakers have no specified accident mitigation operator actions. Aggregate effects such as work load or environmental conditions are not significant factors in performing the operator actions for ERCW MCC power supply breaker alignment.

- *The evaluation of the change considers the ability to recover from credible errors in performance of manual actions and the expected time required to make such a recovery.*

  The 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. The CV process provides reasonable assurance that a credible error in performance would be detected and corrected prior to component mispositioning. The time to recover would be minimal as a result of the CV being a real time second party verification. 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. This failure would not result in an immediate loss of ERCW flow on the affected train, but the ERCW traveling screens and strainers would be de-energized. This action would result in gradual flow degradation as debris accumulated on the screens and strainers.

- *The evaluation considers the effect of the change on plant systems.*

  The removal of the mechanical interlock has no direct effect on plant systems. The evolution of transferring the power supply to the 480V ERCW MCCs is performed, when there is an issue with the primary supply or to support maintenance activities. The evolution is not performed in response to a plant perturbation. The CV of breaker position when aligning the ERCW MCC power supply provides reasonable assurance that the ERCW system is not adversely affected.

Alternate power supplies to each 480V ERCW MCC from the opposite Unit, same train designation do not interconnect ESF control circuits between Units, and cannot cause system overload conditions as a consequence of a real accident in a Unit coincident with a false or spurious accident in another Unit. Also, the administrative controls to prevent power source paralleling are not performed as a part of accident mitigation actions.

Inadvertently paralleling same train ERCW MCCs does not increase the occurrence of an accident because the existing fault clearing equipment is rated for the allowable fault current that would be seen if the sources were paralleled. There is approximately 6,000 amps available fault current. This value could potentially double to 12,000 amps if the sources were paralleled. Adequate fault protection exists to isolate electrical faults if a fault were to occur while the feeder breakers were paralleled. The worst case fault occurring while the 480V MCCs are paralleled with off-site power or Diesel Generator supplying the MCCs would cause a loss of all of one Train's 480V ERCW MCCs. The opposite train 480V ERCW MCCs would not be affected. The ERCW MCC buses are rated for 22,000 amps of fault current. All molded case circuit breakers have an interrupting rating of not less than 14,000 symmetrical RMS amperes at 480V. Bus tie breakers have an interrupting rating of not less than 22,000 symmetrical RMS amperes. Main circuit breakers have a minimum interrupting rating of 30,000 RMS symmetrical amperes.

3.3 Conclusion

The 480V ERCW MCCs do not have breaker alignment capability for manually connecting redundant load groups. The ability to parallel normal and alternate power sources is contained within a single load group. The purpose of the mechanical interlock was to preclude the paralleling of normal and alternate sources within a same train; its purpose was not to prevent the connection of redundant load groups. If both the A-train normal and alternate power supplies to the 1A-A and 2A-A 480V ERCW MCCs were to be lost, the B-train normal and alternate power supplies to the 1B-B and 2B-B 480V ERCW MCCs would be available such that sufficient power would be maintained to operate the ESF features for a DBE on one unit and those systems required for concurrent safe shutdown on the remaining unit.

Therefore, the design of the 480V ERCW MCCs continues to comply with GDC-17, GDC-5, RG 1.6, RG 1.81, and IEEE 308-1971. Redundant load groups are powered by offsite (preferred) and onsite (standby) power sources that are dedicated to each power division's Unit and train designation. In providing sufficient power to operate the ESF functions for a DBE on one unit and those systems required for concurrent safe shutdown on the remaining unit, ERCW load groups of the opposite train designation and same Unit (1A and 1B) are redundant to each other. ERCW load groups of the same train designation and opposite Unit (1A and 2A) are not redundant to each other. Standby power sources from the same train designation and opposite Unit (1A and 2A) are considered alternate power sources to a load group.

4.0 REGULATORY EVALUATION

4.1 Applicable Regulatory Requirements/Criteria

The General Design Criteria (GDC) contained in Appendix A of 10 CFR 50 establish minimum requirements for the principal design criteria for water-cooled nuclear power plants. The following GDC, regulatory documents, and industry standards establish specific design requirements applicable to independence between redundant power sources and shared systems for multi-unit sites such as SQN: GDC-17, GDC-5, RG 1.6, RG 1.81 and IEEE 308-1971 Conformance with the GDCs is described in Section 3.1.2 of the SQN UFSAR.

The onsite standby AC power systems at SQN Units 1 and 2 are designed to comply with the following applicable regulations and requirements.

- GDC-5 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.

- 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.

- RG 1.6, Revision 0 (Reference 1), "Independence Between Redundant Standby (Onsite) Power Sources and Between Their Distribution Systems," describes an acceptable degree of independence between redundant standby (onsite) power sources and between their distribution systems.

- RG 1.81, Revision 1 (Reference 2) describes the potential undesirable effects of sharing onsite power systems at a multi-unit site.

- IEEE Standard 308-1971 (Reference 3), "Criteria for Class 1E Power Systems for Nuclear Power Generating Stations," provides criteria for the determination of Class 1E power system design features and the requirements for their testing, surveillance, and documentation.

With the implementation of the proposed change, SQN Units 1 and 2 continue to meet the applicable regulations and requirements, subject to the previously approved exceptions.

4.2 Precedent

No applicable precedent has been identified.

4.3 Significant Hazards Consideration

The proposed change to the Sequoyah Nuclear Plant (SQN) completes the design change for the removal of the mechanical interlock device from the feeder breakers and tie breakers for Essential Raw Cooling Water (ERCW) Motor Control Centers (MCCs) and revises the ERCW System Description in Section 9.2.2.2 of the SQN Updated Final Safety Analysis Report (UFSAR) to describe the normal and alternate power sources for the ERCW system.

Tennessee Valley Authority (TVA) has concluded that the proposed change does not involve a significant hazards consideration. TVA's conclusion is based on its evaluation in accordance with Title 10 of the *Code of Federal Regulations* (10 CFR) 50.91(a)(1) of the three standards set forth in 10 CFR 50.92, "Issuance of Amendment," as discussed below:

1. *Does the proposed amendment involve a significant increase in the probability or consequence of an accident previously evaluated?*

   Response: No.

   The proposed change does not alter the safety function of any structure, system, or component, does not modify the manner in which the plant is operated, and does not alter equipment out-of-service time. In addition, this request does not degrade the ability of the ERCW to perform its intended safety function. Therefore, the proposed change does not involve a significant increase in the probability or consequence of an accident previously evaluated.

2. *Does the proposed amendment create the possibility of a new or different kind of accident from any accident previously evaluated?*

   Response: No.

   The proposed change does not involve any physical changes to plant safety related structure, system or component or alter the modes of plant operation in a manner that is outside the bounds of the system design analyses. The proposed change to complete the design change for the removal of mechanical interlock device from the feeder breakers and tie breakers for the ERCW MCCs and to revise the ERCW System Description in Section 9.2.2.2 of the SQN UFSAR to describe the normal and alternate power sources for the ERCW system does not create the possibility for an accident or malfunction of a different type than any evaluated previously in SQN's UFSAR. The proposal does not alter the way any safety related structure, system or component functions and does not modify the manner in which the plant is operated. Therefore, the proposed change does not create the possibility of a new or different kind of accident from any accident previously evaluated.

3. *Does the proposed amendment involve a significant reduction in a margin of safety?*

   Response: No.

   The proposed change to remove the mechanical interlock device from the feeder breakers and tie breakers for ERCW MCCs 1B-B and 2B-B and to revise the ERCW System Description in Section 9.2.2.2 of the SQN UFSAR to describe the normal and alternate power sources for the ERCW system does not reduce the margin of safety because ERCW will continue to perform its safety function. The design features provided by the mechanical interlock device are not described in the SQN UFSAR, are not credited in the SQN accident analysis and do not provide any additional safety margin. The results of accident analyses remain unchanged by this request. Therefore, the proposed change does not involve a significant reduction in a margin of safety.

Based on the above, TVA concludes that the proposed amendment does not involve a significant hazards consideration under the standards set forth in 10 CFR 50.92 (c), and accordingly, a finding of “no significant hazards consideration” is justified.

In conclusion, based on the considerations discussed above, (1) there is reasonable assurance that the health and safety of the public will not be endangered by operation in the proposed manner, (2) such activities will be conducted in compliance with the Commission's regulations, and (3) the issuance of the amendment will not be inimical to the common defense and security or to the health and safety of the public.

5.0 ENVIRONMENTAL CONSIDERATION

A review has determined that the proposed amendment would change a requirement with respect to installation or use of a facility component located within the restricted area, as defined in 10 CFR 20. However, the proposed amendment does not involve (i) a significant hazards consideration, (ii) a significant change in the types or significant increase in the amounts of any effluents that may be released offsite, or (iii) a significant increase in individual or cumulative occupational radiation exposure. Accordingly, the proposed amendment meets the eligibility criterion for categorical exclusion set forth in 10 CFR 51.22(c)(9). Therefore, pursuant to 10 CFR 51.22(b), no environmental impact statement or environmental assessment need be prepared in connection with the proposed amendment.

6.0 REFERENCES

1. Regulatory Guide 1.6 (AEC Safety Guide 1.6), Independence Between Redundant (Onsite) Power Sources and Between Their Distribution Systems, Revision 0

2. Regulatory Guide 1.81, Shared Emergency and Shutdown Electric Systems for Multi-Unit Nuclear Power Plants, Revision 1

3. IEEE 308-1971, Criteria for Class 1E Electric Systems for Nuclear Power Generating Station

4. NRC letter to TVA, "Sequoyah Nuclear Plant - NRC Evaluation of Changes, Tests, and Experiments and Permanent Plant Modifications Inspection Report 05000327/2015007 and 05000328/2015007," dated September 14, 2015 (ML15257A435)

Attachment 1
Proposed FSAR Markups

Since there are two independent power trains, four of the eight ERCW pumps will be assigned to train A (1A/2A) and four to train B (1B/2B). Likewise, two of the associated ERCW MCCs are assigned to train A and two to train B. Because the mechanical loads powered from each power train feed into a header/piping system that is shared among both units, there is no need to have unit separation on the associated power sources. The normal and alternate power source for each ERCW MCC are provided by the same train from each unit. Two each of the traveling screens, screen wash pumps, and strainers will be assigned to the power train corresponding to that of the ERCW pumps which this equipment serves.

9.2.2.3 Safety Evaluation

The ERCW is a two-train system, each train having the capability to provide the maximum required cooling water requirement for both units under any credible plant condition. These equipment trains are sufficiently independent to guarantee the availability of at least one train at any time. The system has been analyzed for "worst case" heat loads under combinations of maximum river water temperature, design basis accident conditions, normal cooldown requirements, power train failures, etc., for both units. It is found through these analyses that sharing of this system by the two nuclear units does not introduce factors that prevent the system from performing its required function for plant design basis condition. Sufficient pump capacity is included to provide design cooling water flows under all conditions and the system is arranged in such a way that even loss of a complete header or one supply source can be isolated in a manner that does not jeopardize plant safety.

The ERCW System has eight pumps (four pumps per train). However, minimum combined safety requirements for one "accident" unit and one "non-accident" unit, or two "non-accident" units, are met by only two pumps on one plant train. The A and B ERCW headers each have two pumps that are assigned to an emergency diesel generator on loss of offsite power. Total loss of one train, or the loss of an entire plant emergency power train will not prevent safe shutdown of either unit under any credible plant condition. Thus, sharing of the ERCW does not compromise safety relative to that of a unitized system.

The only single component carrying loads from two units is the CCS heat exchanger pair OB1/OB2 which serves the Train B safeguards (i.e., engineered safety features equipment) for both units. Should a single failure of this heat exchanger pair or connecting pipe result in the loss of both the B safeguard trains, the A safeguard trains are capable of unit cooldown independent of the B trains. In all other places where a single failure could affect both units, the other train will remain fully functional and is capable of supporting unit cooldown independent of the failed train.

Under extreme flood conditions, the ERCW System provides a heat sink for all closed cycle cooling systems required for this particular condition. The system is designed to continue operation during the post-flood condition in which the loss of the downstream dam has also been assumed.

The system is designed to furnish a continuous supply of cooling water under normal conditions, as well as under the following extreme circumstances:

1. Tornado or other violent weather conditions which might disrupt normal offsite power. The ERCW pumps are shielded from tornadic winds and missiles by the surrounding structure and have alternate feeds from the diesel generators which are housed in a structure also designed for these conditions. In addition, the pumps on power Train A are separated from those on Train B by walls on the pumping station deck.

Attachment 2

Proposed Retyped FSAR Pages

Since there are two independent power trains, four of the eight ERCW pumps will be assigned to train A (1A/2A) and four to train B (1B/2B). Likewise, two of the associated ERCW MCCs are assigned to train A and two to train B. Because the mechanical loads powered from each power train feed into a header/piping system that is shared among both units, there is no need to have unit separation on the associated power sources. The normal and alternate power source for each ERCW MCC are provided by the same train from each unit. Two each of the traveling screens, screen wash pumps, and strainers will be assigned to the power train corresponding to that of the ERCW pumps which this equipment serves.

9.2.2.3 Safety Evaluation

The ERCW is a two-train system, each train having the capability to provide the maximum required cooling water requirement for both units under any credible plant condition. These equipment trains are sufficiently independent to guarantee the availability of at least one train at any time. The system has been analyzed for "worst case" heat loads under combinations of maximum river water temperature, design basis accident conditions, normal cooldown requirements, power train failures, etc., for both units. It is found through these analyses that sharing of this system by the two nuclear units does not introduce factors that prevent the system from performing its required function for plant design basis condition. Sufficient pump capacity is included to provide design cooling water flows under all conditions and the system is arranged in such a way that even loss of a complete header or one supply source can be isolated in a manner that does not jeopardize plant safety.

The ERCW System has eight pumps (four pumps per train). However, minimum combined safety requirements for one "accident" unit and one "non-accident" unit, or two "non-accident" units, are met by only two pumps on one plant train. The A and B ERCW headers each have two pumps that are assigned to an emergency diesel generator on loss of offsite power. Total loss of one train, or the loss of an entire plant emergency power train will not prevent safe shutdown of either unit under any credible plant condition. Thus, sharing of the ERCW does not compromise safety relative to that of a unitized system.

The only single component carrying loads from two units is the CCS heat exchanger pair OB1/OB2 which serves the Train B safeguards (i.e., engineered safety features equipment) for both units. Should a single failure of this heat exchanger pair or connecting pipe result in the loss of both the B safeguard trains, the A safeguard trains are capable of unit cooldown independent of the B trains. In all other places where a single failure could affect both units, the other train will remain fully functional and is capable of supporting unit cooldown independent of the failed train.

Under extreme flood conditions, the ERCW System provides a heat sink for all closed cycle cooling systems required for this particular condition. The system is designed to continue operation during the post-flood condition in which the loss of the downstream dam has also been assumed.

The system is designed to furnish a continuous supply of cooling water under normal conditions, as well as under the following extreme circumstances:

1. Tornado or other violent weather conditions which might disrupt normal offsite power. The ERCW pumps are shielded from tornadic winds and missiles by the surrounding structure and have alternate feeds from the diesel generators which are housed in a structure also designed for these conditions. In addition, the pumps on power Train A are separated from those on Train B by walls on the pumping station deck.