TENNESSEE VALLEY AUTHORITY
1101 Market Street, Chattanooga, Tennessee 37402

CNL-21-001

October 29, 2021

10 CFR 50.90

U.S. Nuclear Regulatory Commission
ATTN: Document Control Desk
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: **Application to Modify the Sequoyah Nuclear Plant, Unit 1 and Unit 2, Technical Specification Table 3.3.1-1, "Reactor Trip System Instrumentation" (SQN-TS-21-01)**

References:

1. TVA Letter to NRC, dated September 23, 2020, "Application to Modify the Sequoyah Nuclear Plant Units 1 and 2 Technical Specification to Allow for Transition to Westinghouse RFA-2 Fuel" (ML20267A617)

2. NRC Letter to TVA, dated October 26, 2021, "Sequoyah Nuclear Plant, Units 1 and 2 – Issuance of Amendment Nos. 356 and 349 Regarding the Transition to Westinghouse Robust Fuel Assembly-2 (RFA-2) Fuel (EPID L-2020-LLA-0216)" (ML21210A172)

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 the Sequoyah Nuclear Plant (SQN), Units 1 and 2.

This proposed license amendment will delete the requirement for the power range neutron flux rate-high negative rate trip function. This function is specified in Technical Specification (TS) Table 3.3.1-1, "Reactor Trip System Instrumentation," as Function 3.b, "Power Range Neutron Flux Rate-High Negative Rate." This license amendment request is consistent with the NRC-approved methodology presented in Westinghouse Topical Report, WCAP-11394-P-A, "Methodology for the Analysis of the Dropped Rod Event," dated January 1990. This methodology assumes no direct reactor trip or automatic power reduction to mitigate the consequences of dropped rod cluster control assemblies (RCCA). The dropped RCCA analyses were performed as part of the transition from Framatome fuel to Westinghouse RFA-2 fuel. Information concerning this transition and the related analyses was presented to the NRC in Reference 1. Nuclear Regulatory Commission (NRC) has approved this fuel transition and the use of related analyses methodologies in Reference 2. This renders the WCAP-11394 methodology as the basis for the dropped rod analysis of record with the installation of the first Westinghouse RFA-2 fuel assemblies in the reactor cores, currently scheduled for November 2022 for SQN Unit 1 and March 2023 for SQN Unit 2.

The enclosure to this submittal provides a description and technical evaluation of the proposed change, a regulatory evaluation, and a discussion of environmental considerations. Attachment 1 to the enclosure provides the existing SQN Units 1 and 2 TS pages marked up to show the proposed changes. Attachment 2 to the enclosure provides the proposed SQN Units 1 and 2 TS pages retyped to show the changes incorporated. Attachment 3 provides a markup of the SQN Unit 1 TS Bases. Only the Unit 1 TS Bases pages have been provided, as the Unit 2 changes will be nearly identical except for some editorial differences. Changes to the existing TS Bases are provided for information only and will be implemented under the TS Bases Control Program.

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

TVA requests approval of the proposed license amendment within one year from the date of this submittal. The TS changes are to be implemented for each unit prior to startup following loading of the first Westinghouse RFA-2 fuel. This is planned for November 2022 for SQN Unit 1 and March 2023 for SQN Unit 2.

There are no new regulatory commitments associated with this submittal. If you have any questions about this proposed change, please contact Kimberly D. Hulvey, Senior Manager, Fleet Licensing, at (423) 751-3275.

I declare under penalty of perjury that the foregoing is true and correct. Executed on this 29th day of October 2021.

Respectfully,

James T. Polickoski
Director, Nuclear Regulatory Affairs

Enclosure: Evaluation of the Proposed Change

cc: See Page 3

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

Enclosure

Evaluation of the Proposed Change

Evaluation of the Proposed Change

Subject: Application to Modify the Sequoyah Nuclear Plant Unit 1 and Unit 2 Technical Specification Table 3.3.1-1 “Reactor Trip System Instrumentation” (SQN-TS-21-01)

CONTENTS

Attachments:
1. Proposed TS Changes (Markups) for SQN Units 1 and 2
2. Proposed TS Changes (Final Typed) for SQN Units 1 and 2
3. Proposed TS Bases Changes (Markups) for SQN Unit 1 (For Information Only)

1.0 SUMMARY DESCRIPTION

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 the Sequoyah Nuclear Plant (SQN), Units 1 and 2, respectively.

This proposed license amendment will delete the requirement for the power range neutron flux rate - high negative rate trip function. This function is specified in Technical Specification (TS) Table 3.3.1-1, "Reactor Trip System Instrumentation," as Function 3.b, "Power Range Neutron Flux Rate - High Negative Rate." The proposed changes are consistent with the Nuclear Regulatory Commission (NRC) approved methodology presented in Westinghouse Topical Report, WCAP-11394-P-A, "Methodology for the Analysis of the Dropped Rod Event," dated January 1990.

2.0 DETAILED DESCRIPTION

2.1 System Design and Operation

The reactor trip system (RTS) initiates a unit shutdown, based on the values of selected unit parameters, to protect against violating the core fuel design limits and reactor coolant system (RCS) pressure boundary during anticipated operational occurrences (AOOs) and to assist the engineered safety features (ESF) systems in mitigating accidents. The protection and monitoring systems have been designed to assure safe operation of the reactor. This is achieved by specifying limiting safety system settings (LSSS) in terms of parameters directly monitored by the RTS, as well as specifying limiting conditions for operation (LCOs) on other reactor system parameters and equipment performance.

As currently monitored within the RTS, there are four Power Range Neutron Flux - High Negative Rate channels arranged in a two-out-of-four logic per unit. The LCO requires all four Power Range Neutron Flux - High Negative Rate channels to be operable in Mode 1 or 2, when there is potential for a multiple control rod drop accident to occur. In Mode 3, 4, 5, or 6, the Power Range Neutron Flux - High Negative Rate Trip Function does not have to be operable because the core is not critical and departure from nucleate boiling (DNB) is not a concern.

2.2 Reason for the Proposed Change

This proposed change will eliminate an unnecessary trip function. This avoids unnecessary automatic reactor trip initiating events in response to control rod drop events.

There have been 3 reactor trips on SQN Unit 1 since 2015 due to a dropped control rod causing the High Negative Rate Trip to actuate. Licensee Event Reports 2021-001-00, 2019-003-01, and 2015-001-01 document these reactor trips. It is possible that the reactor trips could have been avoided if the High Negative Rate Trip function was not operating. This would have avoided an unnecessary reactor transient.

As will be discussed in section 3.0 below, documented analysis within WCAP-11394-P-A and SQN analysis show that design departure from nucleate boiling ratio (DNBR) limits continue to be met utilizing the new RCCA methodology.

2.3 Description of the Proposed Change

The license amendment request (LAR) proposes the following changes to the SQN Units 1 and 2 TS Table 3.3.1-1, Function 3, “Power Range Neutron Flux Rate.” Function 3b, “High Negative Rate” would be removed from the Table 3.3.1-1 as shown below. Function 3a, “High Positive Rate” would be relabeled to remove the “a” designation since it will be the only remaining portion of the function.

SQN Unit 1 Table 3.3.1-1, Reactor Trip System Instrumentation

FUNCTION	APPLICABLE MODES OR OTHER SPECIFIED CONDITIONS	REQUIRED CHANNELS	CONDITIONS	SURVEILANCE REQUIREMENTS	ALLOWABLE VALUE	NOMINAL TRIP SETPOINT
3.Power Range Neutron Flux Rate						
~~a.~~ High Positive Rate	1,2	4	E	SR 3.3.1.7 (b)(c) SR 3.3.1.11(b)(c)	<6.3% RTP with time constraint ≥ 2 sec	5% RTP with time constraint ≥ 2 sec
~~b. High Negative Rate~~	~~1,2~~	~~4~~	~~E~~	~~SR 3.3.1.7(b)(c)~~ ~~SR 3.3.1.11(b)(c)~~ ~~SR 3.3.1.14~~	~~≤ 6.3% RTP with time constraint ≥ 2 sec~~	~~5% RTP with time constraint ≥ 2 sec~~

SQN Unit 2 Table 3.3.1-1, Reactor Trip System Instrumentation

FUNCTION	APPLICABLE MODES OR OTHER SPECIFIED CONDITIONS	REQUIRED CHANNELS	CONDITIONS	SURVEILANCE REQUIREMENTS	ALLOWABLE VALUE	NOMINAL TRIP SETPOINT
3.Power Range Neutron Flux Rate						
~~a.~~ High Positive Rate	1,2	4	E	SR 3.3.1.7 (b)(c) SR 3.3.1.11(b)(c)	<6.3% RTP with time constraint ≥ 2 sec	5% RTP with time constraint ≥ 2 sec
~~b. High Negative Rate~~	~~1,2~~	~~4~~	~~E~~	~~SR 3.3.1.7(b)(c)~~ ~~SR 3.3.1.11(b)(c)~~ ~~SR 3.3.1.14~~	~~≤ 6.3% RTP with time constraint ≥ 2 sec~~	~~5% RTP with time constraint ≥ 2 sec~~

In Reference 1, a Core Operating Limits Report template and related changes to TS 5.6.3, "Core Operating Limits Report" were proposed based on the analyses performed to transition from Framatome fuel to Westinghouse fuel. The analyses performed included the dropped rod cluster control assembly (RCCA) analysis, which is based on the methodology contained in WCAP-11394-P-A. WCAP-11394-P-A was not included in the proposed TS 5.6.3 methodology list because it did not meet the definition of "a named formal report that includes the values of cycle-specific parameter limits" set forth in Generic Letter 88-16 (Reference 2). Reference 1 was approved by the NRC, including changes to TS 5.6.3, in Reference 3. This amendment request does not change the conclusions of Reference 3.

Attachment 1 to this enclosure provides the existing SQN Units 1 and 2 TS pages marked up to show the proposed changes. Attachment 2 provides the proposed SQN Units 1 and 2 TS pages retyped to show the changes incorporated. Attachment 3 provides a markup of the SQN Unit 1 TS Bases. Only the Unit 1 TS Bases pages have been provided, as the Unit 2 changes will be nearly identical except for some editorial differences. Changes to the existing TS Bases are provided for information only and will be implemented under the TS Bases Control Program.

3.0 TECHNICAL EVALUATION

3.1 Use of WCAP-11394-P-A

The original design basis for the Power Range Neutron Flux - High Negative Rate Trip Function was to mitigate the consequences of one or more dropped RCCAs, an incident of moderate frequency. In the event of one or more dropped RCCAs, the RTS would detect the rapidly decreasing neutron flux (i.e., high negative flux rate) due to the dropped RCCA(s) and would trip the reactor, thus terminating the transient and ensuring that the DNBR limits were met.

The negative flux rate trip was established originally to end a rod drop or RCCA drop transient that could exceed the DNBR limits. In 1982 Westinghouse submitted WCAP-10297, "Dropped Rod Methodology for Negative Flux Rate Trip Plants." WCAP-10297 concluded that the negative flux trip was required only if the plant exceeded a threshold value of reactivity worth, depending on plant design and fuel type. The Westinghouse Owners Group submitted WCAP-11394-P entitled, "Methodology for the Analysis of the Dropped Rod Events," that was approved by the NRC staff. WCAP-11394-P-A concluded that the Westinghouse plants had sufficient reactivity margin that the negative flux trip was not required regardless of the rod or RCCA worth. WCAP-11394-P-A specified that the use of the method should be demonstrated subject to plant and fuel designs. The NRC staff noted in its approval of WCAP-11394-P-A that no further cycle-specific review was necessary provided that the applicant stated that the analyses described in WCAP-11394-P-A have been performed and the results indicate that the Power Range Neutron Flux - High Negative Rate Trip need not be assumed in the dropped RCCA analyses.

The NRC Safety Evaluation Report for WCAP-11394-P concluded that the analysis contained an acceptable methodology for analyzing the dropped RCCA event for which no credit is taken for any direct reactor trip due to the dropped RCCA(s) or for an automatic power reduction due to the dropped RCCA(s). No limitations and conditions were applied to the use of WCAP-11394-P in the NRC Safety Evaluation Report. The analysis of the SQN dropped RCCA event is performed in accordance with the methodology contained in WCAP-11394-P-A, in which the Power Range Neutron Flux - High Negative Rate Trip is not assumed in the dropped RCCA analyses. Therefore, the Power Range Neutron Flux - High Negative Rate Reactor Trip

Function is not required to ensure that the design DNBR limits are met, and this trip function can be eliminated.

3.2 SQN Analysis

The proposed changes to the SQN TS are based on analyses performed using the NRC-approved methodology presented in WCAP-11394-P-A. This methodology assumes no direct reactor trip or automatic power reduction to mitigate the consequences of the dropped RCCA(s). The dropped RCCA analyses were performed as part of the transition from Framatome fuel to Westinghouse RFA-2 fuel. Information concerning this transition and the related analyses was presented to the NRC in Reference 1. NRC has approved this fuel transition and the use of related methodologies in Reference 3. This enables the WCAP-11394-P-A methodology to become the basis for the dropped RCCA analysis of record with the installation of the first Westinghouse RFA-2 fuel assemblies in the reactor cores, currently scheduled for November 2022 for SQN Unit 1 and March 2023 for SQN Unit 2.

Due to the plant specific nature of the core physics characteristics and the thermal-hydraulic dropped rod limit lines, plant specific data are combined with the appropriate correlation and set of statepoints to verify that the DNBR design basis is met for the dropped RCCA(s) event for every fuel cycle design per the WCAP-11394-P-A methodology. Therefore, there is no adverse impact that increases the risk to the health and safety of the public as a result of the proposed changes to the SQN TS.

The dropped RCCA(s) analyses do not rely on actuation of the Power Range Neutron Flux - High Negative Rate Trip function to mitigate the consequences of the event. These analyses were performed in accordance with the NRC-approved methodology for the analysis of dropped RCCA(s) events contained in WCAP 11394-P-A. The key reload-related analysis assumptions and confirmation that the DNBR design basis is met are confirmed as part of the reload safety analysis for each reactor core reload. Therefore, the conclusion that the DNBR design basis is met for a dropped RCCA(s) event remains valid for the proposed TS changes, which are based on the NRC-approved methodology contained in WCAP 11394-P-A.

The SQN cycle-specific reload process ensures and confirms that the dropped RCCA analysis, which is performed in accordance with methodology contained in WCAP-11394-P-A consistent with the NRC's Safety Evaluation Report for Topical Report WCAP-11394-P, remains bounding. The Power Range Neutron Flux - High Negative Rate Trip function is not credited in the SQN cycle-specific dropped RCCA analysis, and the analysis and limits are in accordance with WCAP-11394-P-A. The SQN reload evaluations for future operating cycles will reflect this analysis and acceptance criteria. No other safety analyses are impacted by this change, since no other safety analyses credit the Power Range Neutron Flux - High Negative Rate Trip function.

3.3 Technical Specification Requirements

The proposed TS change to delete TS 3.3.1 Function 3.b, Power Range Neutron Flux - High Negative Rate Function is not affected by the requirements of 10 CFR 50.36(c)(2)(ii), Criterion 1 through Criterion 4, which require a TS to be established for each item meeting one or more of these criteria. This function does not meet any of the four criteria as outlined in the response for each criterion given below.

Criterion 1: Installed instrumentation that is used to detect, and indicate in the control room, a significant abnormal degradation of the reactor coolant pressure boundary.

Discussion: The Power Range Neutron Flux - High Negative Rate Trip is not used for detection and indication in the control room of any degradation of the reactor coolant pressure boundary.

Criterion 2: A process variable, design feature, or operating restriction that is an initial condition of a design basis accident or transient analysis that either assumes the failure of or presents a challenge to the integrity of a fission product barrier.

Discussion: The Power Range Neutron Flux - High Negative Rate Trip is not an initial condition of a design basis accident or transient analysis.

Criterion 3: A structure, system, or component that is part of the primary success path and which functions or actuates to mitigate a design basis accident or transient that either assumes the failure of or presents a challenge to the integrity of a fission product barrier.

Discussion: No credit is taken for the Power Range Neutron Flux - High Negative Rate Trip in the SQN accident analysis. The Power Range Neutron Flux - High Negative Rate Trip is not considered as part of the primary success path related to the integrity of a fission product barrier.

Criterion 4: A structure, system, or component which operating experience or probabilistic risk assessment has shown to be significant to public health and safety.

Discussion: The Power Range Neutron Flux - High Negative Rate is not relied upon as a signal to initiate a reactor trip for any events modeled in the scope of the Probabilistic Risk Assessment model. The Power Range Neutron Flux - High Negative Rate Trip function is not significant to public health and safety in that no credit was taken for this trip in any accident analysis. Accident analyses performed assuming no credit for the Power Range Neutron Flux - High Negative Rate trip function have demonstrated that the trip function is not needed to protect the public health and safety.

3.4 Conclusions

SQN will use the NRC-approved methodology in WCAP-11394-P-A for each fuel cycle to ensure the minimum DNBR is maintained above the DNBR safety limit. The High Negative Rate Trip function is not credited in the cycle-specific dropped RCCA analysis, the analysis conforms to WCAP-11394-P-A, and SQN will continue to meet the applicable DNBR limits. The regulatory requirements for TS are met without the inclusion of the High Negative Rate Trip function.

4.0 REGULATORY EVALUATION

4.1 Applicable Regulatory Requirements and Criteria

Regulation

The regulation in 10 CFR 50.36(a)(1), "Technical specifications," states, in part, that: "Each applicant for a license authorizing operation of a production or utilization facility shall include in his application proposed technical specifications in accordance with the requirements of this section…" The discussion above addresses the impact of this regulation on this proposed TS change.

General Design Criteria

The Sequoyah Nuclear Plant was designed to meet the intent of the Proposed General Design Criteria for Nuclear Power Plant Construction Permits published in July 1967. The Sequoyah construction permit was issued in May 1970. The Updated Final Safety Analysis Report (UFSAR), however, addresses the NRC General Design Criteria (GDC) published as Appendix A to 10 CFR 50 in July 1971.

> *Criterion 10 - Reactor design.* The reactor core and associated coolant, control, and protection systems shall be designed with appropriate margin to assure that specified acceptable fuel design limits are not exceeded during any condition of normal operation, including the effects of anticipated operational occurrences.

Compliance with GDC 10 is described in Section 3.1.2 of the SQN UFSAR.

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

4.2 Precedent

Southern Nuclear submitted a license amendment for Farley Nuclear Plant to remove the Power Range Neutron Flux - High Negative Rate Reactor Trip Function from their TS (Reference 4). The NRC approved that request in Reference 5. The scope of the precedent is the same as the scope of this request.

4.3 No Significant Hazards Consideration

Tennessee Valley Authority (TVA) is requesting an amendment to Renewed Facility Operating License Nos. DPR-77 and DPR-79 for the Sequoyah Nuclear Plant (SQN) Units 1 and 2, respectively. This proposed license amendment will delete the requirement for the Power Range Neutron Flux - High Negative Rate Function. This function is specified in Technical Specification (TS) Table 3.3.1-1, "Reactor Trip System Instrumentation," as Function 3.b, "Power Range Neutron Flux Rate - High Negative Rate." The proposed changes are consistent with the Nuclear Regulatory Commission (NRC) approved methodology presented in Westinghouse Topical Report, WCAP-11394-P-A, "Methodology for the Analysis of the Dropped Rod Event," dated January 1990.

TVA has evaluated whether or not a significant hazards consideration is involved with the proposed amendments by focusing on the three standards set forth in Title 10 of the *Code of Federal Regulations* (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 removal of the Power Range Neutron Flux - High Negative Rate Function from the SQN TS does not increase the probability or consequences of accidents resulting from dropped rod cluster control assembly (RCCA) events analyzed utilizing the NRC-approved WCAP-11394-P-A. The dropped RCCA accident analysis does not rely on the Power Range Neutron Flux - High Negative Rate trip to safely shut down the plant. All other reactor trip system protection functions are not impacted by the deletion of this trip function. The safety analysis of the plant is unaffected by the proposed change. Since the safety analysis is unaffected, the calculated radiological releases associated with the analysis are not affected.

Therefore, the proposed change does not involve a significant increase in the probability or consequences 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 alter the design assumptions, conditions, or configuration of the facility or the manner in which the plant is operated. No new accident scenarios, failure mechanisms, or limiting single failures are introduced as a result of deleting the Power Range Neutron Flux - High Negative Rate trip function. The proposed change does not challenge the performance or integrity of any safety-related systems or components.

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 margin of safety is related to the ability of the fission product barriers to perform their design functions during and following an accident. These barriers include the fuel cladding, the reactor coolant system, and the containment. The performance of these fission product barriers is not affected by the proposed change.

The margin of safety associated with the acceptance criteria of any accident is unchanged. It has been demonstrated that the Power Range Neutron Flux - High Negative Rate trip function can be deleted by the NRC-approved methodology described in WCAP-11394-P-A. In utilizing this NRC-approved methodology for Updated Final Safety Analysis Report Chapter 15 transient analyses, it has been demonstrated that analysis credit for the Power Range Neutron Flux - High Negative Rate trip function is not required to maintain the limits of departure from nucleate boiling (DNB) for dropped rod and RCCA events. The proposed change will have no effect on the availability, operability, or performance of safety related systems and components.

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.

4.4 Conclusion

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, or would change an inspection or surveillance requirement. 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. TVA Letter to NRC, "Application to Modify the Sequoyah Nuclear Plant Units 1 and 2 Technical Specification to Allow for Transition to Westinghouse RFA-2 Fuel, " (SQN-TS-20-09), dated September 23, 2020 (ML20267A617)

2. Generic Letter 88-16, "Removal of Cycle-Specific Parameter Limits from Technical Specifications," dated October 4, 1988 (ML031200485)

3. NRC Letter to TVA, dated October 26, 2021, "Sequoyah Nuclear Plant, Units 1 and 2 – Issuance of Amendment Nos. 356 and 349 Regarding the Transition to Westinghouse Robust Fuel Assembly-2 (RFA-2) Fuel (EPID L-2020-LLA-0216)" (ML21210A172)

4. Southern Nuclear Operating Company, Inc., Letter to NRC, "Joseph M. Farley Nuclear Plant - Units 1 and 2 Request to Revise Technical Specifications to Delete Reactor Trip System, Function 3.b, Power Range Neutron Flux - High Negative Rate," dated September 27, 2005 (ML052720582)

5. NRC Letter to Southern Nuclear Operating Company, Inc., "Joseph M. Farley Nuclear Plant, Units 1 and 2 RE: Issuance of Amendments," dated February 27, 2006 (ML053190381)

Attachment 1

Proposed TS Changes (Markups) for SQN, Units 1 and 2

Table 3.3.1-1 (page 1 of 9)
Reactor Trip System Instrumentation

FUNCTION	APPLICABLE MODES OR OTHER SPECIFIED CONDITIONS	REQUIRED CHANNELS	CONDITIONS	SURVEILLANCE REQUIREMENTS	ALLOWABLE VALUE	NOMINAL TRIP SETPOINT
1. Manual Reactor Trip	1,2	2	B	SR 3.3.1.12	NA	NA
	3[a], 4[a], 5[a]	2	C	SR 3.3.1.12	NA	NA
2. Power Range Neutron Flux						
a. High	1,2	4	D	SR 3.3.1.1 SR 3.3.1.2 SR 3.3.1.7[b][c] SR 3.3.1.11[b][c] SR 3.3.1.14	≤ 111.4% RTP	109% RTP
b. Low	1[d],2	4	E	SR 3.3.1.1 SR 3.3.1.8[b][c] SR 3.3.1.11[b][c] SR 3.3.1.14	≤ 27.4% RTP	25% RTP
3. Power Range Neutron Flux Rate						
~~a.~~ High Positive Rate	1,2	4	E	SR 3.3.1.7[b][c] SR 3.3.1.11[b][c]	≤ 6.3% RTP with time constant ≥ 2 sec	5% RTP with time constant ≥ 2 sec
~~b. High Negative Rate~~	~~1,2~~	~~4~~	~~E~~	~~SR 3.3.1.7[b][c]~~ ~~SR 3.3.1.11[b][c]~~ ~~SR 3.3.1.14~~	~~≤ 6.3% RTP with time constant ≥ 2 sec~~	~~5% RTP with time constant ≥ 2 sec~~

(a) With Rod Control System capable of rod withdrawal or one or more rods not fully inserted.

(b) If the as-found channel setpoint is outside its predefined as-found tolerance, then the channel shall be evaluated to verify that it is functioning as required before returning the channel to service.

(c) The instrument channel setpoint shall be reset to a value that is within the as-left tolerance around the Nominal Trip Setpoint (NTSP) at the completion of the surveillance; otherwise, the channel shall be declared inoperable. Setpoints more conservative than the NTSP are acceptable provided that the as-found and as-left tolerances apply to the actual setpoint implemented in the Surveillance procedures (field setting) to confirm channel performance. The methodologies used to determine the as-found and as-left tolerances are specified in UFSAR, Section 7.1.2.

(d) Below the P-10 (Power Range Neutron Flux) interlocks.

Table 3.3.1-1 (page 1 of 9)
Reactor Trip System Instrumentation

FUNCTION	APPLICABLE MODES OR OTHER SPECIFIED CONDITIONS	REQUIRED CHANNELS	CONDITIONS	SURVEILLANCE REQUIREMENTS	ALLOWABLE VALUE	NOMINAL TRIP SETPOINT
1. Manual Reactor Trip	1,2	2	B	SR 3.3.1.12	NA	NA
	3[(a)], 4[(a)], 5[(a)]	2	C	SR 3.3.1.12	NA	NA
2. Power Range Neutron Flux						
a. High	1,2	4	D	SR 3.3.1.1 SR 3.3.1.2 SR 3.3.1.7[(b)(c)] SR 3.3.1.11[(b)(c)] SR 3.3.1.14	≤ 111.4% RTP	109% RTP
b. Low	1[(d)],2	4	E	SR 3.3.1.1 SR 3.3.1.8[(b)(c)] SR 3.3.1.11[(b)(c)] SR 3.3.1.14	≤ 27.4% RTP	25% RTP
3. Power Range Neutron Flux Rate						
~~a.~~ High Positive Rate	1,2	4	E	SR 3.3.1.7[(b)(c)] SR 3.3.1.11[(b)(c)]	≤ 6.3% RTP with time constant ≥ 2 sec	5% RTP with time constant ≥ 2 sec
~~b. High Negative Rate~~	~~1,2~~	~~4~~	~~E~~	~~SR 3.3.1.7[(b)(c)]~~ ~~SR 3.3.1.11[(b)(c)]~~ ~~SR 3.3.1.14~~	~~≤ 6.3% RTP with time constant ≥ 2 sec~~	~~5% RTP with time constant ≥ 2 sec~~

(a) With Rod Control System capable of rod withdrawal or one or more rods not fully inserted.

(b) If the as-found channel setpoint is outside its predefined as-found tolerance, then the channel shall be evaluated to verify that it is functioning as required before returning the channel to service.

(c) The instrument channel setpoint shall be reset to a value that is within the as-left tolerance around the Nominal Trip Setpoint (NTSP) at the completion of the surveillance; otherwise, the channel shall be declared inoperable. Setpoints more conservative than the NTSP are acceptable provided that the as-found and as-left tolerances apply to the actual setpoint implemented in the Surveillance procedures (field setting) to confirm channel performance. The methodologies used to determine the as-found and as-left tolerances are specified in UFSAR, Section 7.1.2.

(d) Below the P-10 (Power Range Neutron Flux) interlocks.

Attachment 2

Proposed TS Changes (Final Typed) for SQN, Units 1 and 2

Table 3.3.1-1 (page 1 of 9)
Reactor Trip System Instrumentation

FUNCTION	APPLICABLE MODES OR OTHER SPECIFIED CONDITIONS	REQUIRED CHANNELS	CONDITIONS	SURVEILLANCE REQUIREMENTS	ALLOWABLE VALUE	NOMINAL TRIP SETPOINT
1. Manual Reactor Trip	1,2	2	B	SR 3.3.1.12	NA	NA
	3(a), 4(a), 5(a)	2	C	SR 3.3.1.12	NA	NA
2. Power Range Neutron Flux						
a. High	1,2	4	D	SR 3.3.1.1 SR 3.3.1.2 SR 3.3.1.7(b)(c) SR 3.3.1.11(b)(c) SR 3.3.1.14	≤ 111.4% RTP	109% RTP
b. Low	1(d), 2	4	E	SR 3.3.1.1 SR 3.3.1.8(b)(c) SR 3.3.1.11(b)(c) SR 3.3.1.14	≤ 27.4% RTP	25% RTP
3. Power Range Neutron Flux Rate High Positive Rate	1,2	4	E	SR 3.3.1.7(b)(c) SR 3.3.1.11(b)(c)	≤ 6.3% RTP with time constant ≥ 2 sec	5% RTP with time constant ≥ 2 sec

(a) With Rod Control System capable of rod withdrawal or one or more rods not fully inserted.

(b) If the as-found channel setpoint is outside its predefined as-found tolerance, then the channel shall be evaluated to verify that it is functioning as required before returning the channel to service.

(c) The instrument channel setpoint shall be reset to a value that is within the as-left tolerance around the Nominal Trip Setpoint (NTSP) at the completion of the surveillance, otherwise, the channel shall be declared inoperable. Setpoints more conservative than the NTSP are acceptable provided that the as-found and as-left tolerances apply to the actual setpoint implemented in the Surveillance procedures (field setting) to confirm channel performance. The methodologies used to determine the as-found and as-left tolerances are specified in UFSAR Section 7.1.2.

(d) Below the P-10 (Power Range Neutron Flux) interlocks.

Table 3.3.1-1 (page 1 of 9)
Reactor Trip System Instrumentation

FUNCTION	APPLICABLE MODES OR OTHER SPECIFIED CONDITIONS	REQUIRED CHANNELS	CONDITIONS	SURVEILLANCE REQUIREMENTS	ALLOWABLE VALUE	NOMINAL TRIP SETPOINT
1. Manual Reactor Trip	1,2	2	B	SR 3.3.1.12	NA	NA
	3[(a)], 4[(a)], 5[(a)]	2	C	SR 3.3.1.12	NA	NA
2. Power Range Neutron Flux						
a. High	1,2	4	D	SR 3.3.1.1 SR 3.3.1.2 SR 3.3.1.7[(b)(c)] SR 3.3.1.11[(b)(c)] SR 3.3.1.14	≤ 111.4% RTP	109% RTP
b. Low	1[(d)], 2	4	E	SR 3.3.1.1 SR 3.3.1.8[(b)(c)] SR 3.3.1.11[(b)(c)] SR 3.3.1.14	≤ 27.4% RTP	25% RTP
3. Power Range Neutron Flux Rate High Positive Rate	1,2	4	E	SR 3.3.1.7[(b)(c)] SR 3.3.1.11[(b)(c)]	≤ 6.3% RTP with time constant ≥ 2 sec	5% RTP with time constant ≥ 2 sec

(a) With Rod Control System capable of rod withdrawal or one or more rods not fully inserted.

(b) If the as-found channel setpoint is outside its predefined as-found tolerance, then the channel shall be evaluated to verify that it is functioning as required before returning the channel to service.

(c) The instrument channel setpoint shall be reset to a value that is within the as-left tolerance around the Nominal Trip Setpoint (NTSP) at the completion of the surveillance, otherwise, the channel shall be declared inoperable. Setpoints more conservative than the NTSP are acceptable provided that the as-found and as-left tolerances apply to the actual setpoint implemented in the Surveillance procedures (field setting) to confirm channel performance. The methodologies used to determine the as-found and as-left tolerances are specified in UFSAR Section 7.1.2.

(d) Below the P-10 (Power Range Neutron Flux) interlocks.

Attachment 3

Proposed TS Bases Changes (Markups) for SQN, Unit 1
(For Information Only)

BASES

APPLICABLE SAFETY ANALYSES (continued)

There are three RCCA misalignment accidents which are analyzed. They include one or more dropped RCCAs, a dropped RCCA bank, and a statically misaligned RCCA (Ref. 4). A different type of misalignment occurs if one rod fails to insert upon a reactor trip and remains stuck fully withdrawn. This condition requires an evaluation to determine that sufficient reactivity worth is held in the control rods to meet the SDM requirement, with the maximum worth rod stuck fully withdrawn.

For the dropped RCCA(s) or dropped RCCA bank misalignment accident, a negative reactivity insertion will result. ~~For those dropped RCCA(s) that do not result in a reactor trip, p~~Power may be reestablished either by reactivity feedback or control bank withdrawal. Following a dropped rod event in manual rod control, the plant will establish a new equilibrium condition. The equilibrium process without control system interaction is monotonic, thus removing power overshoot as a concern and establishing the automatic rod control mode of operation as the limiting case. Analysis of the automatic rod control case, assuming no trip or power reduction, ensures the safety limits for departure from nucleate boiling ratio are satisfied.

~~For the dropped RCCA bank misalignment accident, a reactivity insertion of greater than 500 pcm which will be detected by the power range negative neutron flux rate trip circuitry. The reactor is then tripped. The core is not adversely affected during this period since power is decreasing rapidly. Following the reactor trip, normal shutdown procedures are followed to further cool down the plant.~~

Two types of analysis are performed in regard to static rod misalignment (Ref. 3). With control banks at their insertion limits, one type of analysis considers the case when any one rod is completely inserted into the core. The second type of analysis considers the case of a completely withdrawn single rod and Control Bank D is fully inserted to its insertion limit. Satisfying limits on departure from nucleate boiling ratio in both of these cases bounds the situation when a rod is misaligned from its group by ±12 steps.

Another type of misalignment occurs if one RCCA fails to insert upon a reactor trip and remains stuck fully withdrawn. This condition is assumed in the evaluation to determine that the required SDM is met with the maximum worth RCCA also fully withdrawn (Ref. 4).

Shutdown and control rod OPERABILITY and alignment are directly related to power distributions and SDM, which are initial conditions assumed in safety analyses. Therefore, they satisfy Criterion 2 of 10 CFR 50.36(c)(2)(ii).

APPLICABLE SAFETY ANALYSES, LCO, and APPLICABILITY (continued)

There are four Power Range Neutron Flux – Low channels arranged in a two-out-of-four logic. The LCO requires all four of the Power Range Neutron Flux - Low channels to be OPERABLE.

In MODE 1, below the Power Range Neutron Flux (P-10 setpoint), and in MODE 2, the Power Range Neutron Flux - Low trip must be OPERABLE. This Function may be manually blocked by the operator when two out of four power range channels are greater than approximately 10% RTP (P-10 setpoint). This Function is automatically unblocked when three out of four power range channels are below the P-10 setpoint. Above the P-10 setpoint, positive reactivity additions are mitigated by the Power Range Neutron Flux - High trip Function.

In MODE 3, 4, 5, or 6, the Power Range Neutron Flux - Low trip Function does not have to be OPERABLE because the reactor is shut down and the NIS power range detectors cannot detect neutron levels in this range. Other RTS trip Functions and administrative controls provide protection against positive reactivity additions or power excursions in MODE 3, 4, 5, or 6.

3. Power Range Neutron Flux Rate – High Positive Rate

The Power Range Neutron Flux Rate trips use the same channels as discussed for Function 2 above.

~~a. Power Range Neutron Flux - High Positive Rate~~

The Power Range Neutron Flux - High Positive Rate trip Function ensures that protection is provided against rapid increases in neutron flux that are characteristic of an RCCA drive rod housing rupture and the accompanying ejection of the RCCA. This Function compliments the Power Range Neutron Flux - High and Low Setpoint trip Functions to ensure that the criteria are met for a rod ejection from the power range.

There are four Power Range Neutron Flux – High Positive Rate channels arranged in a two-out-of-four logic. The LCO requires all four of the Power Range Neutron Flux - High Positive Rate channels to be OPERABLE.

In MODE 1 or 2, when there is a potential to add a large amount of positive reactivity from a Rod Ejection Accident (REA), the Power Range Neutron Flux - High Positive Rate trip must be OPERABLE. In MODE 3, 4, 5, with Rod Control System capable

BASES

APPLICABLE SAFETY ANALYSES, LCO, and APPLICABILITY (continued)

of rod withdrawal or one or more rods not fully inserted, or in MODE 6, the Power Range Neutron Flux - High Positive Rate trip Function does not have to be OPERABLE because other RTS trip Functions and administrative controls will provide protection against positive reactivity additions. Also, in MODE 3, 4, or 5, with Rod Control System incapable of rod withdrawal and all rods fully inserted, there is a sufficient degree of SDM in the event of an REA. In MODE 6, no rods are withdrawn and the SDM is increased during refueling operations. The reactor vessel head is also removed or the closure bolts are detensioned preventing any pressure buildup. In addition, the NIS power range detectors cannot detect neutron levels present in this mode.

~~b. Power Range Neutron Flux - High Negative Rate~~

~~The Power Range Neutron Flux - High Negative Rate trip Function ensures that protection is provided for multiple rod drop accidents. At high power levels, a multiple rod drop accident could cause local flux peaking that would result in a nonconservative local DNBR. DNBR is defined as the ratio of the heat flux required to cause a DNB at a particular location in the core to the local heat flux. The DNBR is indicative of the margin to DNB. No credit is taken for the operation of this Function for those rod drop accidents in which the local DNBRs will be greater than the limit.~~

~~There are four Power Range Neutron Flux – High Negative Rate channels arranged in a two-out-of-four logic. The LCO requires all four Power Range Neutron Flux - High Negative Rate channels to be OPERABLE.~~

~~In MODE 1 or 2, when there is potential for a multiple rod drop accident to occur, the Power Range Neutron Flux - High Negative Rate trip must be OPERABLE. In MODE 3, 4, 5, or 6, the Power Range Neutron Flux - High Negative Rate trip Function does not have to be OPERABLE because the core is not critical and DNB is not a concern. In MODE 6, no rods are withdrawn and the required SDM is increased during refueling operations. In addition, the NIS power range detectors cannot detect neutron levels present in this MODE.~~

ACTIONS (continued)

E.1 and E.2

Condition E applies to the following reactor trip Functions:

- Power Range Neutron Flux - Low,
- Overtemperature ΔT,
- Overpower ΔT,
- Power Range Neutron Flux - High Positive Rate,
- ~~Power Range Neutron Flux - High Negative Rate,~~ and
- Pressurizer Pressure - High.

A known inoperable channel must be placed in the tripped condition within 72 hours. Placing the channel in the tripped condition results in a partial trip condition requiring only one-out-of-two logic for actuation of the two-out-of-three trips and one-out-of-three logic for actuation of the two-out-of-four trips. The 72 hours allowed to place the inoperable channel in the tripped condition is justified in Reference 8.

If the inoperable channel cannot be placed in the trip condition within the specified Completion Time, the unit must be placed in a MODE where these Functions are not required OPERABLE. An additional 6 hours is allowed to place the unit in MODE 3. Six hours is a reasonable time, based on operating experience, to place the unit in MODE 3 from full power in an orderly manner and without challenging unit systems.

The Required Actions have been modified by a Note that allows placing the inoperable channel in the bypassed condition for up to 12 hours while performing routine surveillance testing of the other channels. The 12 hour time limit is justified in Reference 8.