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

CNL-19-072

July 14, 2019

10 CFR 50.90
10 CFR 50.91

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

Sequoyah Nuclear Plant, Unit 2
Renewed Facility Operating License No. DPR-79
NRC Docket No. 50-328

Subject: **Sequoyah Nuclear Plant Unit 2 - Technical Specification Change - Reactor Vessel Level Instrumentation Inoperable - Exigent Amendment (SQN-TS-2019-03)**

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," and 10 CFR 50.91(a)(6), "Notice for public comment; State consultation," Tennessee Valley Authority (TVA) is submitting an exigent request for an amendment to Renewed Facility Operating License (RFOL) No. DPR-79 for Sequoyah Nuclear Plant (SQN) Unit 2 for Nuclear Regulatory Commission (NRC) approval.

SQN Unit 2 Technical Specification (TS) Table 3.3.3-1, "Post Accident Monitoring Instrumentation," Function 15c, requires two Reactor Vessel Level Instrumentation Upper Range channels to be operable in Modes 1, 2 and 3. At 0915 hours eastern daylight time (EDT) on July 1, 2019, while SQN Unit 2 was in Mode 1, the reactor vessel level instrumentation system (RVLIS) upper range level channel A was declared inoperable due to the channel indication being outside of its allowable range (i.e., high). This placed the unit into the 30-day Completion Time of Condition A of SQN Unit 2 TS 3.3.3, "Post Accident Monitoring (PAM) Instrumentation."

During troubleshooting, TVA determined that the RVLIS upper range level channel B was also increasing similar to the A channel. After further investigation and troubleshooting, at 1436 hours EDT on July 12, 2019, the RVLIS upper range level channel B was also declared inoperable. This placed SQN Unit 2 into Condition C of SQN Unit 2 TS 3.3.3, which requires restoration of one channel to operable status within seven days. After that expiration, TS 3.3.3, Condition H will require SQN Unit 2 to be in Mode 3 within six hours and Mode 4 in 12 hours.

The inoperability of the RVLIS upper range level channels was entered into the TVA Corrective Action Program. TVA's troubleshooting and investigation determined that the most likely cause of the RVLIS upper range level inoperability is due to blockage in the RVLIS upper tap on the reactor head, which is a common sensing line shared between the two trains. Blockage in the common sensing line was also confirmed as the most likely cause by Westinghouse and an independent third party.

The location of the tap and associated piping and valves are inside the reactor cavity and access to this location requires lifting of the reactor vessel missile shield. As discussed in the enclosure to this license amendment request (LAR), troubleshooting and repairs to the RVLIS upper range level channels cannot be performed until SQN Unit 2 enters Mode 5 (Cold Shutdown). Thus, either channel cannot be restored to operable status with SQN Unit 2 currently at power, and within the seven-day Completion Time of Condition C of SQN Unit 2 TS 3.3.3, which expires at 1436 hours EDT on July 19, 2019.

This proposed exigent LAR requests NRC approval of a one-time change to SQN Unit 2 TS Table 3.3.3-1, Function 15c to permit the RVLIS upper range level channels to not be operable for the remainder of the SQN Unit 2 Operating Cycle 23. SQN Unit 2 is scheduled to start the Cycle 23 refueling outage in Spring 2020. The proposed new Note (g) to TS Table 3.3.3-1, Function 15c states that if SQN Unit 2 enters Mode 5 prior to the Unit 2 Cycle 23 refueling outage, TVA will further validate the cause of the inoperability of the RVLIS upper range level channels and the RVLIS upper range level channels will be restored to OPERABLE status prior to plant startup.

TVA is also proposing a revision to the SQN Unit 2 RFOL to implement the compensatory measures described in Section 3.8, "Additional Compensatory Measures," of the enclosure during the timeframe the RVLIS upper range level channels are not required to be operable for the remainder of Cycle 23. If the RVLIS upper range level channels are returned to operable status prior to the end of Cycle 23, then these compensatory measures will no longer be required. This is being proposed as RFOL Condition 2.C.(26).

TVA requests approval of the TS change by 0700 EDT on July 19, 2019, and that the implementation of the revised TS be effective immediately to avoid an unnecessary operational transient to initiate a plant shutdown.

The enclosure to this letter provides a description of the proposed changes, technical evaluation of the proposed changes, regulatory evaluation, and a discussion of risk and environmental considerations. Attachment 1 to the enclosure provides the existing SQN Unit 2 TS pages marked-up to show the proposed changes. Attachment 2 to the enclosure provides the proposed SQN Unit 2 TS pages retyped to show the changes incorporated. Attachment 3 to the enclosure provides a new license condition regarding implementation of the compensatory measures described in Section 3.8 of the enclosure. Attachment 4 to the enclosure provides the SQN Unit 2 RFOL page retyped to show the changes incorporated.

TVA determined that there are no significant hazards consideration 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). Additionally, 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.

There are no new regulatory commitments associated with this submittal. Please address any questions regarding this request to Kimberly D. Hulvey at (423) 751-3275.

I declare under penalty of perjury that the foregoing is true and correct. Executed on this 14th day of July 2019.

Respectfully,

James T. Polickoski
Interim Director, Nuclear Regulatory Affairs

Enclosure:

Evaluation of the Proposed Change

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

TENNESSEE VALLEY AUTHORITY
SEQUOYAH NUCLEAR PLANT, UNIT 2

EVALUATION OF PROPOSED CHANGE

Subject: **Sequoyah Nuclear Plant Unit 2 - Technical Specification Change - Reactor Vessel Level Indication System Inoperable - Exigent Amendment (SQN-TS-2019-03)**

Contents

ATTACHMENTS
1. Proposed TS Changes (Mark-Ups) for SQN Unit 2
2. Proposed TS Changes (Final Typed) for SQN Unit 2
3. Proposed License Condition (Mark-Ups) for SQN Unit 2
4. Proposed License Condition (Final Typed) for SQN Unit 2

1.0 SUMMARY DESCRIPTION

Pursuant to Title 10 of the *Code of Federal Regulations* (10 CFR) 50.90, "Application for amendment of license, construction permit, or early site permit," and 10 CFR 50.91(a)(6), "Notice for public comment; State consultation," Tennessee Valley Authority (TVA) is requesting an exigent license amendment to amend the Sequoyah Nuclear Plant (SQN) Unit 2 Technical Specifications (TS) and the Renewed Facility Operating License (RFOL). The proposed exigent license amendment request (LAR) submits a one-time change to SQN Unit 2 TS Table 3.3.3-1, Function 15c, "Reactor Vessel Level Instrumentation, Upper Range" for Nuclear Regulatory Commission (NRC) approval. The proposed exigent LAR permits the reactor vessel level indication system (RVLIS), upper range to not be operable for the remainder of the SQN Unit 2 Operating Cycle 23. SQN Unit 2 is scheduled to start the Cycle 23 refueling outage in Spring 2020. A new license condition is also proposed to reflect compensatory measures that will be followed during this period that the reactor vessel level indication system (RVLIS) upper range is not required to be operable.

SQN Unit 2 TS Table 3.3.3-1, Function 15c, requires two reactor vessel level instrumentation upper range channels to be operable in Modes 1, 2 and 3. At 0915 hours eastern daylight time (EDT) on July 1, 2019, while SQN Unit 2 was in Mode 1, the RVLIS upper range level channel A was declared inoperable due to the channel indication being outside of its allowable range. This placed the unit into the 30-day Completion Time of Condition A of SQN Unit 2 TS 3.3.3, "Post Accident Monitoring (PAM) Instrumentation."

During troubleshooting, TVA determined that the RVLIS upper range level channel B was also increasing similar to the A channel. After further investigation and troubleshooting, at 1436 hours EDT on July 12, 2019, the RVLIS upper range level channel B was also declared inoperable. This placed the unit into Condition C of SQN Unit 2 TS 3.3.3, which requires restoration of one channel to operable status within seven days. After that expiration, TS 3.3.3, Condition H will require the unit to be in Mode 3 within six hours and Mode 4 in 12 hours.

The inoperability of the RVLIS upper range level channels was entered into the TVA Corrective Action Program. TVA's troubleshooting and investigation determined that the most likely cause of the RVLIS upper range level inoperability is due to blockage in the RVLIS upper tap on the reactor head, which is a common sensing line shared between the two trains. Blockage in the common sensing line was also confirmed as the most likely cause by Westinghouse and an independent third party.

The location of the tap and associated piping and valves are inside the reactor cavity and would require lifting of the reactor vessel missile shield to access. Thus, either channel cannot be restored to operable status with SQN Unit 2 currently at power, and within the seven-day Completion Time of Condition C of SQN Unit 2 TS 3.3.3, which expires at 1436 hours EDT on July 19, 2019.

2.0 DETAILED DESCRIPTION

2.1 PROPOSED TECHNICAL SPECIFICATION CHANGE AND LICENSE CONDITION

The proposed change adds the following new Note (g) to the Required Channels column of SQN Unit 2 TS Table 3.3.3-1, Function 15c:

> "The Upper Range Reactor Vessel Level Instrumentation is not required to be operable for the remainder of Cycle 23. If SQN Unit 2 enters Mode 5 prior to the Unit 2 Cycle 23 refueling outage, TVA will further validate the cause of the inoperability of the Upper Range Reactor Vessel Level Instrumentation and the Upper Range Reactor Vessel Level Instrumentation will be restored to OPERABLE status prior to plant startup.
>
> Regardless of the above action, the Upper Range Reactor Vessel Level Instrumentation will be restored to OPERABLE status no later than the end of the Unit 2 Cycle 23 refueling outage."

TVA also proposes the addition of the following new license condition 2.C.(26) to the operating license of SQN Unit 2:

> "TVA will implement the compensatory measures described in Section 3.8, 'Additional Compensatory Measures,' of TVA letter CNL-19-072, dated July 14, 2019, during the timeframe the Upper Range Reactor Vessel Level Instrumentation is not required to be operable for the remainder of Cycle 23. If the Upper Range Reactor Vessel Level Instrumentation is returned to operable status prior to the end of Cycle 23, then these compensatory measures are no longer required."

Attachment 1 to this enclosure provides the existing SQN Unit 2 TS pages marked-up to show the proposed changes. Attachment 2 to this enclosure provides the proposed SQN Unit 2 TS pages retyped to show the changes incorporated. Attachment 3 to this enclosure provides the SQN Unit 2 RFOL page marked-up to show the proposed changes. Attachment 4 to this enclosure provides the SQN Unit 2 RFOL page retyped to show the changes incorporated.

There are no TS Bases changes associated with this proposed change.

2.2 CONDITION INTENDED TO RESOLVE

The inoperable devices (2-LI-68-369 for channel A and 2-LI-68-372 for channel B) provide the upper plenum range for RVLIS. In order to resolve the inoperable condition, Unit 2 will need to enter Mode 5 and restore these devices to operable status. The RVLIS upper tap and associated piping and valves is located inside the reactor cavity on the reactor head under the missile shields and is not accessible during plant operation.

The seven-day Completion Time for Condition C of SQN Unit 2 TS 3.3.3 expires at 1436 hours EDT on July 19, 2019. After that expiration, TS 3.3.3, Condition H requires the plant to be in Mode 3 within six hours and Mode 4 in 12 hours. Approval

of this LAR will avoid an unnecessary operational transient to initiate a plant shutdown.

2.3 JUSTIFICATION FOR THE CHANGE

As noted in Section 1.0 of this enclosure, on July 12, 2019, following complex troubleshooting, TVA determined that a common failure to both A and B channels of the RVLIS upper range level instrumentation existed resulting in both channels being inoperable. TVA's troubleshooting and investigation determined that the most likely cause of the inoperability of the A and B channels of the RVLIS upper range level is due to blockage in the RVLIS upper tap on the reactor head, which is a common sensing line shared between the two trains. The location of the tap and associated piping and valves are inside the reactor cavity and would require lifting of the reactor vessel missile shield to access. The dynamic and lower range indications take differential pressure measurements between independent hot leg taps and a common tap at the bottom of the vessel. Because the issue is associated with the connection to the reactor vessel head, it does not have the ability to affect the lower or dynamic RVLIS indications as discussed further in Section 3.1.

TVA has evaluated the plant conditions needed to perform the necessary repairs. While the plant is operating, as discussed in more detail in Section 3.3 of this enclosure, the radiological conditions and environmental conditions inside this area would impose a significant hazard on plant staff attempting to repair the components. TVA determined that the potential consequences to personnel safety and the radiological doses required to perform the repair outweigh the safety significance of operating with the RVLIS upper range level channels inoperable for the remainder of the current operating cycle. A unit shutdown to Mode 5 would be necessary to allow for repairs.

In addition, while the exigent LAR is being submitted as a deterministic LAR, risk insights using the SQN Probabilistic Risk Assessment (PRA) are discussed in Section 3.5.

3.0 TECHNICAL EVALUATION

As provided for in 10 CFR 50.91(a)(6)(vi), TVA is required to explain the exigency and why this cannot be avoided. Accordingly, TVA could not have reasonably anticipated the inoperability of 2-LI-68-369 and 2-LI-68-372. As shown below, while there have been some failures associated with these instruments, there has been no similar common mode failure of these instruments. A timeline and maintenance history are provided below (Note all times are in EDT).

1. During Unit 2 Refueling Outage 22 (U2R22), the B channel RVLIS upper range transmitter failed the static pressure test. It was postulated that some amount of air had become entrapped in the sensing lines. Corrective action was taken as described in item 4 below.
2. During U2R22, the A channel RVLIS upper range transmitter failed the static pressure test and experienced difficulties when calibrating to within as-left tolerance, but was able to be calibrated to within the the as-left tolerance.

3. During U2R22, legacy errors were discovered in RVLIS set point calculation and Set point and Scaling Documents (SSDs), which required a change to various set points.
4. A design change was implemented during U2R22 to increase the error allowance for the RVLIS upper range channels for SQN Units 1 and 2. The required accuracy of ten percent (%) of upper range (5.6% of full vessel height) used in determining emergency operating procedure (EOP)/Abnormal Operating Procedure (AOP) J01 and J99 set points was changed to 6% of full vessel height. EOP/AOP K04 set point of 71% of vessel height was changed to 69% of vessel height. Additionally, SQN Unit 1 and Unit 2 integrated computer system (ICS) points L2301A and L2302A were changed to reflect a span of 64% - 104% full vessel height.
5. The only online maintenance of RVLIS is quarterly stroking of the level transmitters magnetic isolation valves. The A channel preventive maintenance (PM) was last successfully completed on June 17, 2019 and B channel PM was successfully completed on May 13, 2019.
6. 2-LI-68-369 and 2-LI-68-372 successfully met the monthly channel check acceptance criteria in accordance with 2-SI-OPS-000-003.M, “Monthly Shift Log,” on December 22, 2018, January 26, 2019, February 23, 2019, March 23, 2019, April 27, 2019, May 25, 2019, and June 22, 2019.
7. On July 01, 2019 at 0915, the channel A RVLIS was declared inoperable due to 2-LI-68-369, upper range level indicator, indicating 71% during 2-SI-OPS-000-003.M monthly channel check. The surveillance instruction requires the upper range to be in the 64 - 67% range.
8. Review of plant computer data during complex troubleshooting, revealed the A channel uncompensated upper RVLIS indication first came on scale (above 64%) momentarily on June 20, 2019, at approximately 1600 and dropped back off scale on June 21, 2019, at approximately 0500. The A channel upper RVLIS indication came back on scale June 25, 2019, at approximately 1200.

The following timeline relates to the events that prompted the need for this exigent LAR:

- On July 3, 2019, 2-LT-68-369, the A channel RVLIS upper level transmitter output was verified by lifting an output and placing a digital multi-meter inline with the loop to measure output current to be consistent with the indication seen on the plant computer as well as 2-LI-68-369 in the main control room (MCR).
- On July 3, 2019 at approximately 0300, the B channel upper RVLIS uncompensated indication (computer point 2L302A, which does not provide indication in the MCR) first came on scale above 64%. This was identified while trending data as part of troubleshooting the A channel upper RVLIS. The indicated level did not exceed the 64-67% range. The B channel upper RVLIS compensated indication (computer point 2L2304A), which is the signal that provides indication in the MCR, was off scale below 64%, which did not impact the range of operability.

- On July 11, 2019, at approximately 0900, Maintenance performed 2-SI-ICC-068-002.A, “Online Channel Calibration of RVLIS” to verify the calibration of 2-LT-68-369, A channel RVLIS upper transmitter. During the adjustment of the hydraulic isolator for the A channel RVLIS upper transmitter, the B channel RVLIS upper indication experienced a step change. After approximately 20 minutes, the indication stepped back down to its previously indicated level before the step change. This is not an expected response. TVA, Westinghouse, and an independent third party independently concluded this indicates a likely blockage in the common sensing line coming off the reactor head.
- On July 12, 2019, at 1348, the C bank of pressurizer heaters was placed in service. Both A and B channel RVLIS Upper Indication were observed to be increasing as the reactor coolant system (RCS) pressure increased. This was the expected response for blockage in the common sensing line coming off the reactor head.
- On July 12, 2019 at 1436, following complex troubleshooting, B channel RVLIS was declared inoperable.

The configuration of the affected instrumentation precludes repair at power because the affected equipment is located inside the reactor cavity under the missile shields, which is in an elevated radiological and environmental condition and is not accessible during power operations.

Based on the information in Section 3.2 of this enclosure, a forced outage to restore operability of level indicators 2-LI-68-369 and 2-LI-68-372 would result in an unnecessary operational transient to initiate a plant shutdown. The shutdown of the plant to restore operability of level indicators 2-LI-68-369 and 2-LI-68-372 is not necessary because alternate actions are available as described in Section 3.7 of this enclosure.

3.1 SYSTEM DESCRIPTION

SQN has two channels per unit of RVLIS, which are required to be operable by TS 3.3.3. RVLIS uses differential pressure (d/p) transmitters to measure vessel level or relative void content of the RCS and includes automatic compensation for potential temperature variations of the sensing lines. Each channel is independent/redundant. Essential information is displayed in the MCR for use by Operations. Figure 1 shows a simplified diagram of RVLIS.

RVLIS uses two channels of three d/p transmitters, which measure the pressure drop from the bottom of the reactor vessel to the hot legs and from the hot legs to the top of the vessel. These transmitters have three different ranges to cover differing level ranges and plant conditions as follows:

- Reactor Vessel Upper Range: Provides indication from 64% to 104%. This range provides an indication of reactor vessel level from the center of the hot leg pipes to the top of the reactor vessel head. This indication is only used in EOPs when reactor coolant pumps (RCPs) are stopped.

- Reactor Vessel Lower Range: Provides indication from 0% to 70%. This range provides an indication of reactor vessel level from the bottom of the reactor to the center of the hot legs. This indication is only used in EOPs when RCPs are stopped.

- Reactor Vessel Dynamic Head: Provides indication from 0% to 120%. This range provides an indication of reactor core and internals pressure drop for any combination of operating RCPs. Comparison of the measured pressure drop with the normal, single-phase pressure drop provides an approximate indication of the relative void content or density of the circulating fluid. This instrument monitors coolant conditions during forced flow conditions.

The following safety functions are performed by RVLIS:

- Indicate the presence and measure the size of a steam void or non-condensable gas bubble in the reactor vessel during natural circulation conditions in the RCS. The upper range channels perform this function.
- Detect the approach to inadequate core cooling. This function, which is performed by the lower range channels, is only necessary during accident scenarios, which are outside the design basis [i.e., when the SQN Updated Final Safety Analysis Report (UFSAR)-described methods of core cooling are degraded or have failed].
- Indicate the formation of voiding in the RCS during forced flow conditions. The dynamic range channels perform this function.

RVLIS is a Type B, Category 1, Regulatory Guide (RG) 1.97 PAM function that provides indication only. The use of RVLIS indications is not described in the UFSAR Chapter 15 accident analyses. However, RVLIS upper range indication may be needed to monitor for reactor vessel head voiding during any of the following types of events/accidents described in the UFSAR:

- Events which involve (or potentially involve) a loss of forced RCS circulation and may require a subsequent natural circulation cooldown. The potential for head voiding during natural circulation cooldown is recognized and addressed in EOPs. RVLIS upper range is the prescribed method in these EOPs to monitor and limit steam void growth.
- Other accidents which involve (or potentially involve) loss of forced RCS circulation and could result in or require RCS pressure reduction which would cause formation of a void in the reactor vessel head. RVLIS upper range is generically used in the EOPs to detect the presence of steam voids, which could have adverse impact when RCPs are started to restore forced circulation.

3.2 REPAIR CONSIDERATIONS

Troubleshooting efforts have determined that the most likely cause for this issue is blockage in the RVLIS upper tap on the reactor head, which is shared between the two channels. The location of the tap and associated piping and valves are inside the reactor cavity and repairs would require lifting of the reactor vessel missile shield to access, which is not permissible during power operations.

Once SQN Unit 2 is in Mode 5 and access to this area is granted, the RCS will need to be breached and depressurized in order to further diagnose the issue.

3.3 PERSONNEL SAFETY - WORKING CONDITIONS

A team of various disciplines will be required to enter the reactor cavity to perform the necessary repairs. Based on operating experience and discussions with craft personnel the time needed to complete the repairs could range up to 20 days as shown below. The affected components are located in the reactor cavity under the missile shields. The time needed to complete the repairs includes consideration of a forced outage during summer-like conditions and other environmental considerations including elevated containment temperature and humidity. Therefore, the repairs would have to be performed shortly after shutdown when plant components and structures are still radiating heat, the lack of normal outage power supplies that allow enhanced lighting and ventilation, and higher dose rates because of inability to install reactor head shielding with reactor head ductwork installed.

- Shutdown to Mode 5 - eight hours
- Degass RCS and remove missile shield – four hours
- Trouble shooting - 36 hours
- RVLIS repair and backfill - 12 days
- RVLIS calibrations - 2.5 days
- Restore containment- 12 hours
- Start up and testing – three days

The temperatures in the reactor cavity will likely be between 100 and 110 degrees Fahrenheit (˚F) compared to normal outage conditions of around 80˚F. Additionally, heat stress and worker efficiency will be further negatively impacted by the radiological protective clothing that will be required for venting and repairs on RCS piping. Some aspects of the repair will likely require double protective clothing and face shields. Should RVLIS backfill be required, the temperature and dose rates for these activities are likewise expected to be elevated because of the summer conditions and reduced shielding that would be available during forced outage conditions in lower containment.

Section 3.4 discusses the radiological effects associated with performing such a repair.

3.4 EXPECTED RADIOLOGICAL DOSE FOR PERFORMING THE REPAIR

The radiological aspects of this specific repair activity will be similar to a typical refueling outage or forced outage conditions. However, the total dose accrual in the reactor cavity will be approximately two to three times higher than the refueling

outage dose because of the absence of reactor head shielding (general area dose rates increase from 20 to 45 mrem/hr - shielded to 45 to 200 mrem/hr - unshielded). The dose estimates for RVLIS repairs range from 217 mrem to 1,706 mrem depending on the scope of work required.

3.5 RISK CONSIDERATIONS

RVLIS is not currently credited in the SQN PRA model of record. Therefore, regardless of plant configuration, there is no quantifiable increase in plant risk associated with unavailability of RVLIS. TVA determined that the safety effect of continued plant operation without the RVLIS upper range level channels is qualitatively assessed to be very low compared to the incremental risks associated with an unnecessary operational transient to initiate a plant shutdown. Large power maneuvers increase the likelihood of a transient that could initiate or require a plant trip or shutdown. Plant trips and shutdowns have the potential to challenge important safety systems such as the reactor protection, auxiliary feedwater, and the residual heat removal systems. Each of those systems has a small probability of failure. Therefore, performing a significant plant downpower or shutdown to effect repairs results in a small negative safety impact, versus essentially no safety impact associated with continued operation with the RVLIS upper range level channels unavailable. Therefore, continuing to operate with the RVLIS upper range level channels unavailable until the upcoming refueling outage is not adverse to plant safety and is expected to have minimal risk impact.

3.6 SAFETY ASSESSMENT EVALUATION

As described earlier in Section 3.1 to this enclosure, RVLIS is a Category 1, Type B PAM variable. Unlike PAM Type A variables, Type B variables are not used by the MCR staff to perform manual actions required for safety systems to accomplish their functions for Chapter 15 design basis events. As such, RVLIS is not credited in any of the Chapter 15 safety analyses. However, since the RVLIS Upper Level Instrumentation is used to detect and quantify steam voids that may have formed in the reactor vessel head during natural circulation cooldowns, the RVLIS upper level instrumentation may be used in the subsequent cooldown and long-term recovery after the unit has achieved a safe and stable state after the design basis event.

During a natural circulation cooldown, if the RCP availability is restored, the operators may desire to use forced circulation to expedite the cooldown. If steam voids have formed at this time, the RCS pressure increase from RCP restart could collapse the steam voids and reduce pressurizer level such that the cooldown would have to be interrupted while the RCS level control was restored using the emergency core cooling system (ECCS). Detection of voids via the RVLIS upper level instrumentation is typically used to alert the operators to take compensating actions (namely, establishing a high pressurizer level and significant subcooling) prior to starting the RCPs, or to simply avoid the RCP restart altogether and continue natural circulation. With both channels of RVLIS upper level instrumentation inoperable, the proposed compensatory measure is to assume head voids have formed during natural circulation and avoid RCP restarts regardless of indication. Although this can delay cooldown as compared to forced circulation methods, using natural circulation, despite forced circulation being available, is no different from a typical natural

circulation cooldown that would be performed if offsite power and/or the RCPs remained unavailable.

RVLIS upper range instrumentation is also used in beyond design basis events to control primary coolant makeup or as a threshold to establish alternate makeup. For these functions, alternate indications and means of establishing flowrates are available. Therefore, the loss of RVLIS upper range indication does not compromise the ability to perform these functions.

3.7 ALTERNATE METHODS OF MONITORING

While the RVLIS upper range level channels are unavailable, the following alternate methods are available to provide for determination of core cooling:

- Even with both RVLIS upper range channels inoperable, operations personnel can monitor vessel level with the dynamic or lower range instrumentation. Dynamic range instrumentation provides values from zero percent (0%) to 120%, which provides an indication of reactor core and internals pressure drop for any combination of operating RCPs. This instrumentation is used to monitor coolant conditions during forced flow operations.
- Lower range instrumentation provides values from 0% to 70%, which provides an indication of vessel level from the bottom of the reactor to the center of the hot legs. This indication is utilized when EOPs are in effect and RCPs are not in-service.
- In addition to the above channels of reactor vessel level indication, core exit thermocouple temperatures, pressurizer level and RCS subcooling indications are being utilized to provide diverse information for verifying adequate core cooling exists.

3.8 ADDITIONAL COMPENSATORY MEASURES

SQN has taken or will take the following actions during the time the subject instruments are out of service.

1. EOPs and AOPs that mitigate design basis accidents affected by the inoperable instruments will be revised to:
   - provide steps to bypass restart of an RCP with the condition of voiding in reactor vessel head unknown.
   - provide clear guidance for selection of appropriate natural circulation cooldown procedure that accounts for RVLIS unavailability.
   - verify adequate RCS inventory exists prior to establishing residual heat removal cooling using alternate criteria of pressurizer level and RCS subcooling.
2. The inoperable instruments have been appropriately flagged per TVA Procedure OPDP-1, “Conduct of Operations.”
3. The inoperable instruments and procedure changes will be incorporated in requalification training and required reading (i.e., Standing Orders) for licensed operators.

As noted in Section 2.1 of this enclosure, TVA is proposing a new license condition regarding implementation of the above compensatory measures.

4.0 REGULATORY EVALUATION

4.1 APPLICABLE REGULATORY REQUIREMENTS/CRITERIA

NUREG-0737, II.F.2 – Instrumentation for detection of inadequate core cooling

a) Procedure development for use of existing instrumentation.
b) Install subcooling meter.
c) Submit analysis of capability to detect inadequate core cooling and vessel level indicator design, if new instrumentation desirable.
d) Install vessel level indicator, if required.

The Bases for TS 3.3.3 states that the primary purpose of the PAM instrumentation is to display unit variables that provide information required by the control room operators during accident situations. Furthermore, the Bases for TS 3.3.3 states that the Reactor Vessel Level indication is provided for determination of core cooling. It is considered a more direct and less ambiguous indication of core cooling.

4.1.1 General Design 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. Conformance with the GDC is described in Section 3.1.2 of the SQN dual-unit UFSAR.

The relevant GDC are described below.

Criterion 13 - Instrumentation and Control

Instrumentation shall be provided to monitor variables and systems over their anticipated ranges for normal operation, for anticipated operational occurrences, and for accident conditions as appropriate to assure adequate safety, including those variables and systems that can affect the fission process, the integrity of the reactor core, the reactor coolant pressure boundary, and the containment and its associated systems. Appropriate controls shall be provided to maintain these variables and systems within prescribed operating ranges.

Criterion 19 - Control Room

A control room shall be provided from which actions can be taken to operate the nuclear power unit safely under normal conditions and to maintain it in a safe condition under accident conditions including loss of coolant accidents (LOCAs). Adequate radiation protection shall be provided to permit access and occupancy of the control room under accident conditions without personnel receiving radiation exposures in excess of five rem whole body, or its equivalent to any part of the body, for the duration of the accident.

Equipment at appropriate locations outside the control room shall be provided (1) with a design capability for prompt hot shutdown of the reactor, including necessary instrumentation and controls to maintain the unit in a safe condition duringhot shutdown, and (2) with a potential capability for subsequent cold shutdown of the reactor through the use of suitable procedures.

The auxiliary control stations (ACS) are required to provide equipment at appropriate locations outside the main control room with the capability to promptly shut down and maintain the unit in a safe condition in Mode 3. The criteria governing the design and specific system requirements of the ACS are located in GDC 19. The instrumentation functions required for the auxiliary control room are discussed in Section 7.4, “Systems Required for Safe Shutdown,” of the UFSAR.

4.2 PRECEDENT

This exigent LAR is similar to the following exigent LARs approved by the NRC involving one-time extension of TS required components:

- In Reference 1, the NRC approved an exigent amendment for the Watts Bar Nuclear Plant (WBN) Unit 2, which authorized a one-time change to allow TS Table 3.3.4-1, Function 4a, RCS hot leg Temperature Indication for RCS Loop 3 to be inoperable for the remainder of the WBN Unit 2 Operating Cycle 2 for a period of approximately 15 months.
- In Reference 2, NRC approved an exigent amendment for the Catawba Nuclear Station, Units 1 and 2, which provided a one-time change to Function 3.b, “Decay Heat Removal via Steam Generators (SGs) - Reactor Coolant System (RCS) Cold Leg Temperature - Loop A and B,” of TS Table 3.3.4-1 to allow a Unit 2 resistance temperature detector (RTD) for RCS Loop B to remain inoperable for the remainder of Operating Cycle 20 (approximately a 13-month duration).

4.3 SIGNIFICANT HAZARDS CONSIDERATION

Tennessee Valley Authority (TVA) proposes to revise the Sequoyah Nuclear Plant (SQN) Technical Specifications (TS) 3.3.3, Table 3.3.3-1, Function 15c, "Reactor Vessel Level Instrumentation, Upper Range," as follows:

> "The Upper Range Reactor Vessel Level Instrumentation is not required to be operable for the remainder of Cycle 23. If SQN Unit 2 enters Mode 5 prior to the Unit 2 Cycle 23 refueling outage, TVA will further validate the cause of the inoperability of the Upper Range Reactor Vessel Level Instrumentation and the Upper Range Reactor Vessel Level Instrumentation will be restored to OPERABLE status prior to plant startup.
>
> Regardless of the above action, the Upper Range Reactor Vessel Level Instrumentation will be restored to OPERABLE status no later than the end of the Unit 2 Cycle 23 refueling outage."

TVA also proposes the addition of the following new license condition 2.C.(26) to the renewed facility operating license of SQN Unit 2:

> "TVA will implement the compensatory measures described in Section 3.8, 'Additional Compensatory Measures,' of TVA letter CNL-19-072, dated July 14, 2019, during the timeframe the Upper Range Reactor Vessel Level Instrumentation is not required to be operable for the remainder of Cycle 23. If the Upper Range Reactor Vessel Level Instrumentation is returned to operable status prior to the end of Cycle 23, then these compensatory measures are no longer required."

TVA has evaluated whether or not a significant hazards consideration is involved with the proposed amendment by focusing on the three standards set forth in 10 CFR 50.92, "Issuance of amendment," as discussed below.

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

   Response: No.

   The proposed TS change is to allow operation of SQN Unit 2 for the remainder of Cycle 23 or until the unit enters Mode 5 with both upper range channels of reactor vessel level instrumentation system (RVLIS) inoperable. The upper range channels of RVLIS provide indication only, are utlizied post-accident, and do not affect equipment operation. Its failure is also not an accident initiator. With the upper range channels of RVLIS inoperable, other means exist for determining if a void is forming in the vessel head exist. Operators are able to use these means to take appropriate action to mitigate the consequences of an accident. Additionally, in situations where there is a potential for a void to form and the reactor coolant pumps (RCPs) are not operating, procedures provide for the establishment of natural circulation if it is not already occurring. Therefore, the proposed change does not involve a significant increase in the probability or consequences of an accident previously evaluated.

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

   Response: No.

   The proposed TS change is to allow operation of SQN Unit 2 for the remainder of Cycle 23 or until the unit enters Mode 5 with both upper range channels of RVLIS inoperable. The upper range channels of RVLIS provide indication only and do not affect equipment operation. No new operating conditions or modes are created by this proposed change. 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 change involve a significant reduction in a margin of safety?*

   Response: No.

   The proposed TS change is to allow operation of SQN Unit 2 for the remainder of Cycle 23 or until the unit enters Mode 5 with both upper range channels of RVLIS inoperable. The upper range channels of RVLIS provide indication only and does not challenge safety systems' operations. The lower range channels remain available to provide indication of adequate core cooling and other indications remain available to identify void formations. 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 CONCLUSIONS

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.

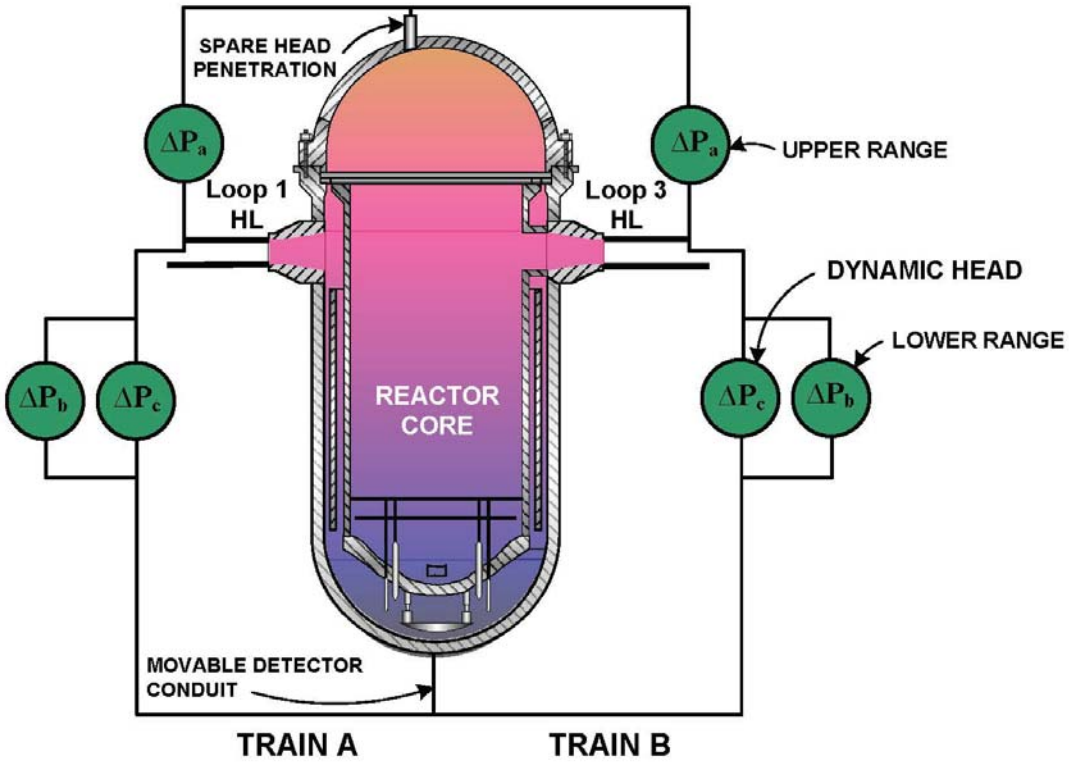
5.0 ENVIRONMENTAL CONSIDERATION

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. NRC letter to TVA, “Watts Bar Nuclear Plant, Unit 2- Issuance of Amendment Regarding Application to Allow Inoperable Reactor Coolant System Loop 3 Temperature Indication for Operating Cycle 2 (EPID L-2018-LLA-0003),” dated January 25, 2018 (ML180228106)
2. NRC letter to Duke Energy Carolinas, LLC, “Catawba Nuclear Station, Units 1 and 2 - Issuance of Amendments Regarding Exigent License Amendment Request to Revise Technical Specification 3.3.4, Remote Shutdown System (TAC Nos. MF3473 and MF3474),” dated February 27, 2014 (ML14056A217)

Figure 1 – SIMPLIFIED RVLIS SYSTEM LAYOUT (for information only)



Enclosure

ATTACHMENT 1

Proposed TS Changes (Mark-Ups) for SQN Unit 2

Table 3.3.3-1 (page 2 of 2)
Post Accident Monitoring Instrumentation

	FUNCTION	REQUIRED CHANNELS	CONDITION REFERENCED FROM REQUIRED ACTION G.1
15.	Reactor Vessel Level Instrumentation		
	a. Dynamic Range	2	H
	b. Lower Range	2	H
	c. Upper Range	2[(g)]	H
16.	Containment Area Radiation Monitors		
	a. Upper Compartment	1	I
	b. Lower Compartment	1	I
17.	Neutron Flux		
	a. Source Range	2[(c)]	H
	b. Intermediate Range	2	H
18.	ERCW to AFW Valve Position		
	a. Motor Driven Pumps	2[(d)]	H
	b. Turbine Driven Pump	2[(d)]	H
19.	Containment Isolation Valve Position	2 per penetration flowpath[(e)(f)]	H

(c) Source Range outputs may be disabled above the P-6 (Block of Source Range Reactor Trip) setpoint.

(d) A channel consists of two valve position indicators associated with the in-series valves in a single suction line.

(e) Not required for isolation valves whose associated penetration is isolated by at least one closed and deactivated automatic valve, closed manual valve, blind flange, or check valve with flow through the valve secured.

(f) Only one position indication channel is required for penetration flow paths with only one installed control room indication channel.

(g) The Upper Range Reactor Vessel Level Instrumentation is not required to be operable for the remainder of Cycle 23. If SQN Unit 2 enters Mode 5 prior to the Unit 2 Cycle 23 refueling outage, TVA will further validate the cause of the inoperability of the Upper Range Reactor Vessel Level Instrumentation and the Upper Range Reactor Vessel Level Instrumentation will be restored to OPERABLE status prior to plant startup.

Regardless of the above action, the Upper Range Reactor Vessel Level Instrumentation will be restored to OPERABLE status no later than the end of the Unit 2 Cycle 23 refueling outage.

Enclosure

ATTACHMENT 2

Proposed TS Changes (Final Typed) for SQN Unit 2

Table 3.3.3-1 (page 2 of 2)
Post Accident Monitoring Instrumentation

	FUNCTION	REQUIRED CHANNELS	CONDITION REFERENCED FROM REQUIRED ACTION G.1
15.	Reactor Vessel Level Instrumentation		
	a. Dynamic Range	2	H
	b. Lower Range	2	H
	c. Upper Range	2[(g)]	H
16.	Containment Area Radiation Monitors		
	a. Upper Compartment	1	I
	b. Lower Compartment	1	I
17.	Neutron Flux		
	a. Source Range	2[(c)]	H
	b. Intermediate Range	2	H
18.	ERCW to AFW Valve Position		
	a. Motor Driven Pumps	2[(d)]	H
	b. Turbine Driven Pump	2[(d)]	H
19.	Containment Isolation Valve Position	2 per penetration flowpath[(e)(f)]	H

(c) Source Range outputs may be disabled above the P-6 (Block of Source Range Reactor Trip) setpoint.

(d) A channel consists of two valve position indicators associated with the in-series valves in a single suction line.

(e) Not required for isolation valves whose associated penetration is isolated by at least one closed and deactivated automatic valve, closed manual valve, blind flange, or check valve with flow through the valve secured.

(f) Only one position indication channel is required for penetration flow paths with only one installed control room indication channel.

(g) The Upper Range Reactor Vessel Level Instrumentation is not required to be operable for the remainder of Cycle 23. If SQN Unit 2 enters Mode 5 prior to the Unit 2 Cycle 23 refueling outage, TVA will further validate the cause of the inoperability of the Upper Range Reactor Vessel Level Instrumentation and the Upper Range Reactor Vessel Level Instrumentation will be restored to OPERABLE status prior to plant startup.

Regardless of the above action, the Upper Range Reactor Vessel Level Instrumentation will be restored to OPERABLE status no later than the end of the Unit 2 Cycle 23 refueling outage.

Enclosure

ATTACHMENT 3

Proposed License Condition (Mark-Ups) for SQN Unit 2

relocation of the requirements to the specified documents, as described in Table R, Relocated Specifications and Removed Detail Changes, attached to the NRC staff's Safety Evaluation, which is enclosed in this amendment.

2. Schedule for New and Revised Surveillance Requirements (SRs) The schedule for performing SRs that are new or revised in License Amendment 327 shall be as follows:

   (a) For SRs that are new in this amendment, the first performance is due at the end of the first Surveillance interval, which begins on the date of implementation of this amendment.

   (b) For SRs that existed prior to this amendment, whose intervals of performance are being reduced, the first reduced Surveillance interval begins upon completion of the first Surveillance performed after implementation of this amendment.

   (c) For SRs that existed prior to this amendment, whose intervals of performance are being extended, the first extended Surveillance interval begins upon completion of the last Surveillance performed prior to implementation of this amendment.

   (d) For SRs that existed prior to this amendment that have modified acceptance criteria, the first performance subject to the modified acceptance criteria is due at the end of the first Surveillance interval that began on the date the Surveillance was last performed prior to the implementation of this amendment.

(26) TVA will implement the compensatory measures described in Section 3.8, "Additional Compensatory Measures," of TVA letter CNL-19-072, dated July 14, 2019, during the timeframe the Upper Range Reactor Vessel Level Instrumentation is not required to be operable for the remainder of Cycle 23. If the Upper Range Reactor Vessel Level Instrumentation is returned to operable status prior to the end of Cycle 23, then these compensatory measures are no longer required.

Enclosure

ATTACHMENT 4

Proposed License Condition (Final Typed) for SQN Unit 2

relocation of the requirements to the specified documents, as described in Table R, Relocated Specifications and Removed Detail Changes, attached to the NRC staff's Safety Evaluation, which is enclosed in this amendment.

2. Schedule for New and Revised Surveillance Requirements (SRs) The schedule for performing SRs that are new or revised in License Amendment 327 shall be as follows:

   (a) For SRs that are new in this amendment, the first performance is due at the end of the first Surveillance interval, which begins on the date of implementation of this amendment.

   (b) For SRs that existed prior to this amendment, whose intervals of performance are being reduced, the first reduced Surveillance interval begins upon completion of the first Surveillance performed after implementation of this amendment.

   (c) For SRs that existed prior to this amendment, whose intervals of performance are being extended, the first extended Surveillance interval begins upon completion of the last Surveillance performed prior to implementation of this amendment.

   (d) For SRs that existed prior to this amendment that have modified acceptance criteria, the first performance subject to the modified acceptance criteria is due at the end of the first Surveillance interval that began on the date the Surveillance was last performed prior to the implementation of this amendment.

(26) TVA will implement the compensatory measures described in Section 3.8, "Additional Compensatory Measures," of TVA letter CNL-19-072, dated July 14, 2019, during the timeframe the Upper Range Reactor Vessel Level Instrumentation is not required to be operable for the remainder of Cycle 23. If the Upper Range Reactor Vessel Level Instrumentation is returned to operable status prior to the end of Cycle 23, then these compensatory measures are no longer required.