UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D.C. 20555-0001

July 18, 2019

Mr. Joseph W. Shea
Vice President, Nuclear Regulatory Affairs
and Support Services
Tennessee Valley Authority
Sequoyah Nuclear Plant
1101 Market Street, LP 4A
Chattanooga, TN 37402-2801

SUBJECT: SEQUOYAH NUCLEAR PLANT, UNIT 2 - ISSUANCE OF EXIGENT AMENDMENT NO. 338 RE: TECHNICAL SPECIFICATION CHANGE – REACTOR VESSEL LEVEL INSTRUMENT INOPERABLE (EPID L-2019-LLA-0149)

Dear Mr. Shea:

The U.S. Nuclear Regulatory Commission (the Commission) has issued the enclosed Amendment No. 338 to Renewed Facility Operating License No. DPR-79 for the Sequoyah Nuclear Plant (Sequoyah) Unit 2. The amendment consists of changes to the Renewed Facility Operating License and Technical Specifications in response to your application dated July 14, 2019.

The amendment allows a contingent change to Technical Specification Table 3.3.3-1, Function 15c, to permit the reactor vessel level instrumentation system upper range level channels to not be operable for the remainder of Operating Cycle 23 under certain compensatory actions. The amendment adds a new Note (g) to Technical Specification Table 3.3.3-1, Function 15c. This one-time change will cease to apply if Sequoyah Unit 2 enters Mode 5 prior to the Cycle 23 refueling outage. In that case, the instrument will be restored to operable status prior to plant startup.

A copy of the related Safety Evaluation is also enclosed. Notice of Issuance will be included in the Commission's biweekly *Federal Register* notice.

Sincerely,

/RA/

Andrew Hon, Project Manager
Plant Licensing Branch II-2
Division of Operating Reactor Licensing
Office of Nuclear Reactor Regulation

Docket No. 50-328

Enclosures:
1. Amendment No. 338 to DPR-79
2. Safety Evaluation

cc: Listserv

UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D.C. 20555-0001

TENNESSEE VALLEY AUTHORITY

DOCKET NO. 50-328

SEQUOYAH NUCLEAR PLANT, UNIT 2

AMENDMENT TO FACILITY OPERATING LICENSE

Amendment No. 338
Renewed License No. DPR-79

1. The Nuclear Regulatory Commission (the Commission) has found that:

   A. The application for amendment by the Tennessee Valley Authority (the licensee), dated July 14, 2019, complies with the standards and requirements of the Atomic Energy Act of 1954, as amended (the Act), and the Commission's rules and regulations set forth in 10 CFR Chapter I;

   B. The facility will operate in conformity with the application, as amended; the provisions of the Act; and the rules and regulations of the Commission;

   C. There is reasonable assurance (i) that the activities authorized by this amendment can be conducted without endangering the health and safety of the public, and (ii) that such activities will be conducted in compliance with the Commission's regulations;

   D. The issuance of this amendment will not be inimical to the common defense and security or to the health and safety of the public; and

   E. The issuance of this amendment is in accordance with 10 CFR Part 51 of the Commission's regulations and all applicable requirements have been satisfied.

2. Accordingly, the license is amended by changes as indicated in the attachment to this license amendment, and Renewed Facility Operating License No. DPR-79 is hereby amended to add paragraph (26) to read as follows:

   (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.

3. This license amendment is effective as of the date of its issuance and shall be implemented immediately.

FOR THE NUCLEAR REGULATORY COMMISSION

/RA/

Undine Shoop, Chief
Plant Licensing Branch II-2
Division of Operating Reactor Licensing
Office of Nuclear Reactor Regulation

Attachment:
Changes to the Renewed
Facility Operating License and
Technical Specifications

Date of Issuance: July 18, 2019

ATTACHMENT TO LICENSE AMENDMENT NO. 338

SEQUOYAH NUCLEAR PLANT, UNIT 2

RENEWED FACILITY OPERATING LICENSE NO. DPR-79

DOCKET NO. 50-328

Replace the following pages of the Renewed Facility Operating License with the attached revised pages. The revised pages are identified by amendment number and contain marginal lines indicating the areas of change.

Remove	Insert
3	3
13a	13a

Replace the following page of the Appendix A Technical Specifications with the attached revised page. The revised page is identified by amendment number and contains marginal line indicating the areas of change.

Remove	Insert
3.3.3-5	3.3.3-5

(3) Pursuant to the Act and 10 CFR Parts 30, 40 and 70, to receive, possess, and use at any time any byproduct, source and special nuclear material as sealed neutron sources for reactor startup, sealed sources for reactor instrumentation and radiation monitoring equipment calibration, and as fission detectors in amounts as required;

(4) Pursuant to the Act and 10 CFR Parts 30, 40 and 70, to receive, possess, and use in amounts as required any byproduct, source or special nuclear material without restriction to chemical or physical form, for sample analysis or instrument calibration or associated with radioactive apparatus or components; and

(5) Pursuant to the Act and 10 CFR Parts 30, 40 and 70, to possess, but not separate, such byproduct and special nuclear materials as may be produced by the operation of the Sequoyah and Watts Bar Unit 1 Nuclear Plants.

C. This renewed license shall be deemed to contain and is subject to the conditions specified in the Commission's regulations set forth in 10 CFR Chapter I and is subject to all applicable provisions of the Act and to the rules, regulations, and orders of the Commission now or hereafter in effect; and is subject to the additional conditions specified or incorporated below:

(1) Maximum Power Level

The Tennessee Valley Authority is authorized to operate the facility at reactor core power levels not in excess of 3455 megawatts thermal.

(2) Technical Specifications

The Technical Specifications contained in Appendices A and B, as revised through Amendment No. 338 are hereby incorporated into the renewed license. The licensee shall operate the facility in accordance with the Technical Specifications.

(3) Initial Test Program

The Tennessee Valley Authority shall conduct the post-fuel-loading initial test program (set forth in Section 14 of Tennessee Valley Authority's Final Safety Analysis Report, as amended), without making any major modifications of this program unless modifications have been identified and have received prior NRC approval. Major modifications are defined as:

a. Elimination of any test identified in Section 14 of TVA's Final Safety Analysis Report as amended as being essential;

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.

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.

UNITED STATES
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SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION

RELATED TO

AMENDMENT NO. 338 TO RENEWED FACILITY OPERATING LICENSE NO. DPR-79

TENNESSEE VALLEY AUTHORITY

SEQUOYAH NUCLEAR PLANT, UNIT 2

DOCKET NO. 50-328

1.0 INTRODUCTION

By letter dated July 14, 2019 (Agencywide Documents Access and Management System Accession No. ML19195A002), Tennessee Valley Authority (TVA or the licensee) requested exigent changes to the Technical Specifications (TSs) for Sequoyah Nuclear Plant (Sequoyah or SQN) Unit 2. Specifically, the licensee requested to add a new footnote to Item 15.c, Table 3.3.3-1 to temporarily eliminate operability requirements for both channels of the Upper Range Reactor Vessel Level Instrumentation System (RVLIS) from TS 3.3.3, "Post Accident Monitoring (PAM) Instrumentation." After TVA, Westinghouse, and an independent third party independently concluded there was likely blockage in the common sensing line coming off the reactor head and the repair would require a plant shutdown to Mode-5, TVA submitted this request under exigent circumstances to avoid unnecessary operational transients, consistent with the requirements in Title 10 of the *Code of Federal Regulations* (10 CFR) Section 50.91(a)(6), which states that exigent circumstances exist when a licensee and the U.S. Nuclear Regulatory Commission (NRC or the Commission) must act quickly, and time does not permit the NRC to publish a *Federal Register* notice allowing 30 days for prior public comment.

2.0 REGULATORY EVALUATION

2.1 System Description

The RVLIS is used to measure reactor vessel level or relative void content of the reactor coolant system (RCS). This instrument was installed to meet the Sequoyah Unit 2 License Condition 2.C.(16).m NUREG-0737,[1] "Instruments for Inadequate Core Cooling (Section 22.2. II.F.2) Conditions." Sequoyah Unit 2 has two channels of RVLIS that are required to be operable by TS 3.3.3. Each channel employs three differential pressure transmitters that measure the pressure drop from the bottom of the reactor vessel to the hot legs and from the

[1] NUREG-0737, Revision 1, "Clarification of TMI [Three Mile Island] Action Plan Requirements"

hot legs to the top of the vessel. These transmitters have three different ranges to cover differing level ranges and plant conditions:

1) The reactor vessel upper range channels provide reactor vessel level indication from 64 percent to 104 percent. 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 Emergency Operating Procedures (EOPs) when reactor coolant pumps (RCPs) are stopped. If the water level in the upper head cannot be determined via the RVLIS, the RCP will not be started by the operators due to the risk of circulating voids in the RCS. Natural circulation will provide the cooldown in this situation as designed.

2) The reactor vessel lower range channels provide reactor vessel level indication from 0 percent to 70 percent. 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.

3) The reactor vessel dynamic range channels provide reactor vessel level indication from 0 percent to 120 percent. 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. The dynamic range instrument monitors coolant conditions during forced flow conditions.

2.2 Current TS Requirements and Proposed TS Changes

The limiting condition for operation (LCO) for TS 3.3.3 requires the PAM instrumentation for each function in Table 3.3.3-1 to be operable in Modes 1, 2, and 3. Actions Table Condition C describes the situation when one or more functions with two required channels are inoperable. In this situation, one channel must be restored to operable status within 7 days. Condition G describes the situation when the required action and completion time of Conditions C, D, E, or F is not met. Required Action G.1 requires entering the condition referenced in Table 3.3.3-1 for the associated affected instrument. Table 3.3.3-1 contains a “Condition Reference from Required Action G.1” column that directs entry into Condition H for RVLIS. Condition H requires the plant to be in Mode 3 in 6 hours and Mode 4 within 12 hours.

On July 12, 2019, the licensee entered TS 3.3.3 Condition C for the vessel upper range instruments. According to TVA’s license amendment request (LAR), the 7-day completion time for Condition C 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 6 hours and Mode 4 in 12 hours.

Table 3.3.3-1 contains a “Required Channels” column that requires two channels for each range of RVLIS to be operable. The licensee proposed adding a new footnote indicator (g) to the number of required channels for the RVLIS upper range instrument for the remainder of Cycle 23. The new footnote (g) would be located at the bottom of the page and state:

> 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.

2.3 Proposed License Condition

The licensee also proposed adding the following new License Condition, 2.C.(26), to the Sequoyah Unit 2 operating license:

> 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.

2.4 Regulatory Requirements and Guidance

The regulation in 10 CFR 50.36(b) states that TSs will be derived from the analyses and evaluation included in the safety analysis report and amendments thereto, and the Commission may include such additional TSs as the Commission finds appropriate.

Pursuant to 10 CFR 50.36(c), TSs are required to include items in, among others, the following categories: (1) safety limits, limiting safety system settings, and limiting control settings; (2) LCOs; (3) surveillance requirements; (4) design features; and (5) administrative controls.

Per 10 CFR 50.36(c)(2), "Limiting conditions for operation":

> (i) Limiting conditions for operation are the lowest functional capability or performance levels of equipment required for safe operation of the facility. When a limiting condition for operation of a nuclear reactor is not met, the licensee shall shut down the reactor or follow any remedial action permitted by the technical specifications until the condition can be met.

Those actions must provide reasonable assurance of public health and safety.

The NRC's guidance for the format and content of licensee TSs can be found in NUREG-1431, "Standard Technical Specifications Westinghouse Plants."

The principal design criteria for a facility establish the necessary design, fabrication, construction, testing, and performance requirements for structures, systems, and components important to safety; that is, structures, systems, and components that provide reasonable assurance that the facility can be operated without undue risk to the health and safety of the public. The General Design Criteria (GDC) in Appendix A to 10 CFR Part 50 establish minimum requirements for the principal design criteria for water-cooled nuclear power plants similar in

design and location to plants for which construction permits have been issued by the Commission.

Sequoyah was designed to meet the intent of the proposed GDC for Nuclear Power Plant Construction Permits published in the *Federal Register* in July 1967 (32 FR 10213). The Sequoyah construction permit was issued in May 1970. In February 1971, a final rule that added Appendix A to 10 CFR Part 50, "General Design Criteria for Nuclear Power Plants," was published in the *Federal Register* (36 FR 3255), as amended in July 1971 (36 FR 12733). Differences between the proposed GDC and final GDC included a consolidation from 70 to 64 criteria. As discussed in the NRC Staff Requirements Memorandum, SECY-92-223, "Resolution of Deviations Identified During the Systematic Evaluation Program," dated September 18, 1992 (ADAMS Accession No. ML12256B290), the Commission decided not to apply the final GDC to plants with construction permits issued prior to May 21, 1971. However, Section 3.1.2 of the Sequoyah Updated Final Safety Analysis Report (UFSAR), states that the UFSAR addresses the final GDC published in July 1971. There are no significant differences between the proposed GDC to which Sequoyah is designed and the final GDC. The NRC staff identified the following GDC as being applicable in its review of this LAR:

- *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.*

- *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 15—Reactor coolant system design*. The reactor coolant system and associated auxiliary, control, and protection systems shall be designed with sufficient margin to assure that the design conditions of the reactor coolant pressure boundary are not exceeded during any condition of normal operation, including anticipated operational occurrences.

The regulation in 10 CFR 50.46 requires that the emergency core cooling system be designed with sufficient margin to assure that the design safety limits specified in 10 CFR 50.46(b) are met during loss-of-coolant accidents.

NUREG-0737 incorporated all TMI-related items approved for implementation by the NRC. Enclosures 1 and 2 in NUREG-0737 contain an itemized listing of requirements. The TMI action items applicable to this NRC review are as follows:

- Item I.C.1 addresses the preparation of the emergency operating procedures (EOPs) and specifies that EOPs instructions for operator actions should be technically correct for use to mitigate the consequences of the transients and accidents to cold shutdown or stable conditions.

- Item II.F.2 discusses the inadequate core cooling (ICC) phenomena and the need to have instrumentation that provides indication to detect the approach to ICC.

3.0 TECHNICAL EVALUATION

Evaluation of TS and Operating License Changes

The U.S. Nuclear Regulatory Commission (NRC or the Commission) staff determined that when the proposed note (g) is added to Table 3.3.3-1, the LCO for TS 3.3.3 would be met for the situation where both channels of the upper range RVLIS are inoperable. In this case, continued plant operation would be allowed until the end of Cycle 23 in Spring 2020, at the latest. The licensee stated that if Sequoyah Unit 2 enters Mode 5 before the end of Cycle 23 in Spring 2020, the upper range RVLIS would be required to be restored to operable status prior to plant startup. Therefore, the NRC staff's review focused on determining whether or not the TSs and operating license, as amended, would continue to provide reasonable assurance of adequate protection of public health and safety while the RVLIS upper range Instruments are inoperable. The NRC staff reviewed the upper range RVLIS function in the current licensing bases and the Standard Technical Specifications Standard NUREG-1431, as well as the proposed compensatory actions as follow:

In Section 3.1 of the LAR, the licensee stated:

> 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 [Updated Final Safety Analysis Report] 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.

In Section 3.6 of the LAR, the licensee stated that 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 initiate significant subcooling actions) prior to starting the RCPs, or to simply avoid the RCP restart altogether and continue natural circulation. When both channels of the RVLIS upper level instrument are inoperable, the licensee proposed a compensatory measure to assume head voids have formed during natural circulation and to avoid RCP restarts regardless of the instrument indication. This is consistent with Section 3.8 below.

In Section 3.7 of the LAR, the licensee stated that core exit temperatures, pressurizer level, and RCS subcooling indications are also used to provide diverse information for verifying the existence of adequate core cooling.

In Section 3.8 of the LAR, the licensee proposed the following set of compensatory measures to take while the RVLIS upper range instruments are inoperable. TVA proposed these compensatory measures as license conditions. TVA determined these compensatory measures are consistent with operations with the assumption that reactor vessel head voiding has occurred:

1. EOPs and AOPs [abnormal operating procedures] 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.

The NRC staff reviewed the proposed TS change and license condition and provided its evaluation in Sections 3.1, 3.2, and 3.3 below to address compliance with (1) GDC 10, 13, and 15 requirements; (2) NUREG-073, I.C.1 guidance; and (3) NUREG-0737, II.F.2 guidance, respectively.

3.1 <u>10 CFR 50, Appendix A, GDC 10, 13, and 15, and 10 CFR 50.46</u>

The RVLIS at Sequoyah Unit 2 consists of the reactor vessel upper range level channels, lower range level channels, and dynamic head channels. It performs the following functions: the upper range channels indicate the presence and measure the size of steam void or non-condensable gas bubble in the reactor vessel during natural circulation (NC) conditions in the RCS; the lower range channels detect the approach to ICC for beyond design-basis events to meet the guidance of NUREG-0737, II.F.2, Instrumentation for Detection of ICC; and dynamic head range channel indicate the formation of voiding in the RCS during forced flow conditions.

The licensee indicated in Section 3.1 of the LAR that RVLIS is a Type B, Category 1, Regulatory Guide (RG) 1.97, “Criteria for Accident Monitoring Instrumentation for Nuclear Power Plants,” post-accident monitoring function that provides indication only. This indication is not used by the main control room staff to perform manual actions required for safety systems to accomplish

their functions for the UFSAR Chapter 15 accident analysis. The licensee confirmed in Section 3.6 of the LAR that the RVLIS upper range channels were not credited in any of the Chapter 15 analysis for mitigating the consequences of the design-basis transients and accidents. Therefore, the NRC staff determined that for plant conditions with inoperable RVLIS upper range channels, the UFSAR Chapter 15 analysis remains valid, and thus, continues to meet the requirements of GDC 10 regarding the fuel integrity criterion, GDC 13 regarding the provision of instrumentation for monitoring reactor conditions, and GDC 15 regarding the reactor coolant pressure boundary limits, and 10 CFR 50.46 regarding adequate emergency core cooling system performance.

3.2 NUREG-0737, I.C.1, Guidance for Evaluation and Development of Procedures for Transients and Accidents

The licensee indicated in Section 3.1 of the LAR that the upper range indication is used to monitor reactor vessel head voiding for the following events considered in EOPs:

- Events involving a loss of forced RCS circulation and requiring a subsequent natural circulation (NC) cooldown. The potential for vessel head voiding during NC is addressed in EOPs. The RVLIS upper range indication is used in EOPs to monitor and limit steam void growth.

- Events involving a loss of forced RCS circulation and resulting in or requiring RCS pressure reduction, which would cause formation of a void in the reactor vessel head. The RVLIS upper range indication is used in the EOPs to detect the presence of steam voids, which could have an adverse impact when RCPs are started to restore forced circulation.

During a natural circulation cooldown for the above events considered in EOPs, if the operators start RCP(s), the RCS pressure increase from RCP startup could cause collapse of the steam voids and a decrease in pressurizer level, resulting in interruption of cooldown while the RCS level control was restored using the emergency core cooling system. In EOPs, detection of voids via RVLISs upper range indicator is used to alert the operators to take appropriate actions such as establishing a high pressurizer level and significant subcooling prior to starting the RCPs. To avoid cooldown interruption induced by voids collapse from inadvertent start of the RCP(s) with void in the upper head, the licensee proposed in Section 3.8 and clarified in Section 3.6 of the LAR compensatory measures as license conditions. The compensatory measures assumed that without operable RLVIS upper range instrument confirmation, voids in the reactor vessel head have formed during natural circulation, and the EOPs are revised for the operators to avoid RCP restart, regardless of the indication from the RVLIS upper range instrument.

The NRC staff reviewed the licensee's evaluation and justification of the proposed change to add new footnote (g) to the number of required channels for the Reactor Vessel upper range level measurement, as well as, the licensee's proposed compensatory measures as license conditions. The compensatory measures prohibit the licensee from starting an RCP when conditions exist that could inhibit natural circulation. Instead, the proposed compensatory measures will prevent the potential need to interrupt a natural circulation flow cooldown to restore a low pressurizer level that would occur if an RCP restart collapses a head void. The NRC staff determined that although the proposed compensatory measures may prolong the cooldown process, this is acceptable because the natural circulation cooldown is already analyzed and accepted as part of the station blackout analysis.

Therefore, the NRC staff concludes that the compensatory measures, as implemented by the proposed license condition, will provide an adequate cooldown method and meet the intent of guidance in NUREG-0737, I.C.1, during the time the RVLIS upper range channels are inoperable.

3.3 NUREG-0737, II.F.2, Instrumentation for Detection of the Approach to ICC

The licensee indicated in Section 3.1 of the LAR that RVLIS lower range channels provide level indication from the bottom of the reactor to the center of the RCS hot-leg and detect the approach to ICC in accordance with the NUREG-0737, II.F.2 guidance. In addition, the licensee indicated in Section 3.7 of the LAR that core exit temperatures, pressurizer level, and RCS subcooling indications are also used to provide diverse information for verifying existence of adequate core cooling.

Since RVLIS upper range channels at Sequoyah 2 are not part of the instrumentation used to detect the approach to ICC, the inoperability of both RVLIS upper range channels does not violate the requirements of the ICC instrumentation, assuring that guidance of NUREG-0737, II.F.2, regarding appropriate instrumentation requirement for detection of the approach to ICC continues to be met.

Moreover, the NRC staff also compared the guidance for TS format and content in NUREG-1431 to the Sequoyah Unit 2 TSs to inform this evaluation. The NRC staff noted that for a similar situation, NUREG-1431 would require immediate initiation of action in accordance with the plant's Post-Accident Monitoring Report but would allow continued plant operation.

The NRC staff determined that no additional reporting requirement is necessary because the licensee's operator training normally includes routine simulator exercises of the scenario related to this amendment implementation, and its effectiveness is part of the training evaluations. In addition, any plant conditions that would require the use of RVLIS (i.e., natural circulation cooldown or other off normal condition without RCPs in operation) are not expected and would be monitored by the NRC.

Given the compensatory measures proposed by the licensee, as well as, the license condition to implement the compensatory measures, the NRC staff concluded the TSs and operating license, as amended, are acceptable, because the proposed compensatory measures will prevent the potential loss of natural circulation cooldown.

In Section 3.5 of the LAR, "Risk Considerations," the licensee stated, in part, that:

> RVLIS is not currently credited in the SQN PRA [probabilistic risk assessment] 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.

The NRC staff determined this section was immaterial to the review. However, the staff did not identify any information in this section that would invalidate the NRC staff's conclusion above. The NRC staff also did not credit it in the technical evaluation.

4.0 EXIGENT CIRCUMSTANCES

The NRC's regulations contain provisions for issuance of amendments when the usual 30-day public comment period cannot be met. These provisions are applicable when both exigent circumstances exist, and the amendment involves no significant hazards consideration. Consistent with the requirements in 10 CFR 50.91(a)(6), exigent circumstances exist when a licensee and the NRC must act quickly, and time does not permit the NRC to publish a *Federal Register* notice allowing 30 days for prior public comment. As discussed in the licensee's application, the licensee requested that the proposed amendment be processed by the NRC on an exigent basis.

In the LAR, TVA provided the following timeline and justification related to the RVLIS:

- 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 percent. This was identified while trending data as part of troubleshooting the A channel upper RVLIS. The indicated level did not exceed the 64-67 percent 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 percent, which did not impact the range of operability.

- On July 11, 2019, at approximately 0900, the licensee's maintenance staff 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 [LAR] 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 [LAR] enclosure.

Consequently, the licensee and the NRC must act quickly because the TSs require a plant shutdown if both channels of the RVLIS are not operable for 7 days. TVA has acted quickly by diagnosing the issue and submitting an amendment request soon after the equipment was declared inoperable. However, processing a routine LAR by the NRC staff to change the TS requirement within 7 days does not allow sufficient time to publish a *Federal Register* notice providing 30 days for prior public comment.

Summary

The NRC staff confirmed the above circumstances onsite and finds that the licensee made a timely application for the proposed amendment following identification of the issue. In addition, the NRC staff finds that the licensee could not avoid the exigency because failure of the instrumentation could not be anticipated, and the licensee acted quickly upon discovery of the condition. Therefore, TVA has not failed to use its best efforts to make a timely application for an amendment in order to create an exigency and take advantage of the exigency procedure in 10 CFR 50.91(a)(6). Based on these findings and the determination that the amendment involves no significant hazards consideration as discussed in Section 5.0 below, the NRC staff has determined that a valid need exists for issuance of the license amendment using the exigent provisions of 10 CFR 50.91(a)(6).

5.0 NO SIGNIFICANT HAZARDS CONSIDERATION

Under the provisions in 10 CFR 50.91(a)(6), the NRC notifies the public in one of two ways: (1) by issuing a *Federal Register* notice providing notice of an opportunity for hearing and allowing at least 2 weeks from the date of the notice for prior public comment or (2) by using local media to provide reasonable notice to the public in the area surrounding the licensee's facility. In this case, a notice was published on July 17, 2019, in the *Chattanooga Times Free Press* requesting comment by July 19, 2019.

As required by 10 CFR 50.91(a)(1), when a licensee requests an amendment, it must provide to the Commission its analysis about the issue of no significant hazards consideration using the standards in 10 CFR 50.92. Under 10 CFR 50.92(c), a proposed amendment to an operating license involves no significant hazards consideration if operation of the facility in accordance with the proposed amendment would not: (1) involve a significant increase in the probability or consequences of an accident previously evaluated; or (2) create the possibility of a new or different kind of accident from any accident previously evaluated; or (3) involve a significant reduction in a margin of safety.

The licensee's determination of no significant hazards consideration is presented 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 utilized 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 [sic] 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 evaluation, the NRC staff concludes that the three standards of 10 CFR 50.92(c) are satisfied. Therefore, the NRC staff has determined that no significant hazards consideration is involved for the proposed amendment and that the amendment should be issued as allowed by the criteria contained in 10 CFR 50.91.

6.0 STATE CONSULTATION

In accordance with the Commission's regulations, the Tennessee State official was notified of the proposed issuance of the amendment on July 15, 2019. The State official suggested "consideration of a requirement that TVA report to NRC, on a frequency determined by NRC to more than adequate for safety, verifying the effectiveness of the alternate method/compensatory measures in determining that the reactor and its associated systems are performing as designed and in as safe in a manner as possible." The NRC staff considered the suggestion and determined no additional reporting requirement is necessary because the licensee's operator training normally included simulator exercises of the scenario related to this amendment, and its effectiveness is already part of the training evaluations. In addition, any plant conditions that would require the use of RVLIS (i.e., natural circulation cooldown or other off normal condition without RCPs in operation) are not expected, would be monitored by NRC if they did occur, and would require TVA to report the event to the NRC under existing regulations. The NRC staff discussed the above consideration with the State official who has no additional comments.

7.0 PUBLIC COMMENTS

On July 17, 2019, in the *Chattanooga Times Free Press*, the NRC staff published a public notice associated with the proposed amendment request. In accordance with the requirements in 10 CFR 50.91 for an exigent amendment, the notice provided until July 19, 2019, for public comment on the proposed no significant hazards consideration determination. No comments were received.

8.0 ENVIRONMENTAL CONSIDERATION

The amendment changes a requirement with respect to installation or use of a facility component located within the restricted area as defined in 10 CFR Part 20. The NRC staff has determined that the amendment involves no significant increase in the amounts, and no significant change in the types, or any effluents that may be released offsite, and that there is no significant increase in individual or cumulative occupational radiation exposure. The Commission has previously issued a proposed finding that the amendment involves no significant hazards consideration, published in the *Chattanooga Times Free Press* on July 17, 2019, and there has been no public comment on such finding. Accordingly, the amendment meets the eligibility criteria for categorical exclusion set forth in 10 CFR 51.22(c)(9). Pursuant to 10 CFR 51.22(b), no environmental impact statement or environmental assessment need be prepared in connection with the issuance of the amendment.

9.0 CONCLUSION

The Commission has concluded, based on the considerations discussed above, that: (1) there is reasonable assurance that the health and safety of the public will not be endangered by operation in the proposed manner, (2) there is reasonable assurance that such activities will be conducted in compliance with the Commission's regulations, and (3) the issuance of the

amendments will not be inimical to the common defense and security or to the health and safety of the public.

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Date: July 18, 2019

SUBJECT: SEQUOYAH NUCLEAR PLANT, UNIT 2 - ISSUANCE OF EXIGENT AMENDMENT NO. 338 RE: TECHNICAL SPECIFICATION CHANGE – REACTOR VESSEL LEVEL INSTRUMENT INOPERABLE (EPID L-2019-LLA-0149) DATED JULY 18, 2019

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