TENNESSEE VALLEY AUTHORITY

1101 Market Street, Chattanooga, Tennessee 37402

CNL-22-080

July 22, 2022

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

Sequoyah Nuclear Plant, Unit 1
Renewed Facility Operating License No. DPR-77
NRC Docket No. 50-327

Subject: Request for Enforcement Discretion from the Requirements of Technical Specification 3.5.2, "ECCS – Operating"

This letter documents the Tennessee Valley Authority (TVA) request for discretionary enforcement for Sequoyah Nuclear Plant (SQN), Unit 1 Technical Specification (TS) Limiting Condition for Operation (LCO) 3.5.2 to support completion of repairs and testing for the 1B-B centrifugal charging pump (CCP). This relief is needed as a result of the 1B-B CCP failure that occurred on July 18, 2022.

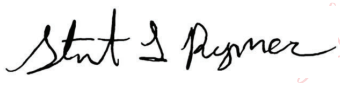
SQN Unit 1 entered TS LCO 3.5.2 at 2230 Eastern Daylight Time (EDT) on July 18 as a result of the inoperable 1B-B CCP and subsequent disassembly of the pump casing. As discussed with the Nuclear Regulatory Commission (NRC) staff on July 21, 2022, TVA requested discretionary enforcement for an additional 69 hours to allow completion of CCP repairs and testing to restore operability. With the additional 69 hours applied to TS LCO 3.5.2 Condition A completion time of 72 hours, expiration occurs on July 24 at 1930 EDT if the 1B-B pump has not been repaired. At which time, a unit shutdown will be accomplished in accordance with the LCO required action statement. Detailed justification for the discretionary enforcement is provided in the enclosure.

This request for discretionary enforcement was verbally requested and subsequently approved by the NRC on July 21, 2022. The NRC granted TVA's verbal request for enforcement discretion and agreed that a follow-up license amendment was not needed. This letter documents the verbal request TVA made on July 21, 2022.

NRC approval of this request will permit SQN to avoid an undesirable plant shutdown by allowing temporary noncompliance with TS 3.5.2 and will not have an adverse effect on safety as described within the enclosure.

There are no new regulatory commitments associated with this submittal. Please address any comments or questions regarding this matter to Jeff Sowa, SQN Licensing Manager, at 423-843-8129.

Respectfully,



Stuart Rymer
Director (Acting), Nuclear Regulatory Affairs

Enclosure:

Request for Enforcement Discretion from Technical Specification 3.5.2

cc (Enclosure):

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

Tennessee Valley Authority
Sequoyah Nuclear Plant, Unit 1
NRC Docket No. 50-327

Request for Enforcement Discretion from Technical Specification 3.5.2

INTRODUCTION

The Tennessee Valley Authority (TVA) requested enforcement discretion for Sequoyah Nuclear Plant (SQN) Technical Specification (TS) 3.5.2, "ECCS [Emergency Core Cooling System] - Operating" for Unit 1 on July 21, 2022.

DISCUSSION OF THE REQUIREMENTS FOR WHICH ENFORCEMENT DISCRETION IS REQUESTED

Consistent with Nuclear Regulatory Commission (NRC) Enforcement Manual, Part III, Appendix F, "Notices of Enforcement Discretion," TVA herein provides a supporting description and justification for issuance of the requested notice of enforcement discretion (NOED).

REQUIRED INFORMATION

1. ***Explain why a licensing process is not appropriate to address the issue and why the need for a NOED could not reasonably been avoided. If applicable, this explanation shall address previous instances of the issue and decisions to pursue licensing solutions in the past.***

RESPONSE:

On July 18, 2022, operators in the main control room (MCR) noticed that the pressurizer level was slowly declining with the downstream flow control valve near 100 percent open. Thereafter, operators received an unexpected alarm for low flow to the number 1 reactor coolant pump (RCP) seal. Operators dispatched auxiliary unit operators (AUO) to the field to validate MCR indications. Subsequently, operators received an alarm indicating a lowering pressurizer level with level indicating 54 percent and declining. Operators placed the 1A-A centrifugal charging pump (CCP) in service and pressurizer level began to recover. Operators declared the 1B-B CCP inoperable and entered into Condition A of the TS Limiting Condition for Operation (LCO) 3.5.2 for one or more trains of ECCS inoperable.

TS 3.5.2 Condition A has a 72-hour Completion Time (CT) to restore a train(s) to OPERABLE status. If the train is not restored to OPERABLE within 72 hours, the unit is required to be in MODE 3 within 6 hours and MODE 4 within 12 hours.

TVA reviewed NRC Enforcement Manual, Appendix F, "Notices of Enforcement Discretion" and determined that this request satisfies Section 1.3 – Applicability, as the time to process an exigent or emergency license amendment request (LAR) is not feasible due to the 72-hour CT.

TVA has concluded a LAR is not warranted for the following reasons.

1. The NOED will be in effect for a relatively short duration.
2. This action represents a one-time deferral.
3. Prior to the discovery of the pressurizer level decline and subsequent MCR alarms, there has been no maintenance history, within the last 10 years, that caused similar entry into these TS LCO Conditions that challenged the 72-hour CT.

2. Provide a description of the TSs or other license conditions that will be violated. This description shall include the time the condition was entered and when the completion time will expire.

RESPONSE:

SQN Unit 1 TS 3.5.2 requires two ECCS trains to be OPERABLE in Modes 1, 2, and 3. The ECCS consists of three separate subsystems: centrifugal charging (high head), safety injection (SI) (intermediate head), and residual heat removal (RHR) (low head). The ECCS accumulators and the refueling water storage tank (RWST) are also part of the ECCS but are not considered part of an ECCS flow path as described by this LCO. The ECCS flow paths consist of piping, valves, heat exchangers, and pumps such that water from the RWST can be injected into the reactor coolant system (RCS) following the accidents described in this LCO. The major components of each subsystem are the CCPs, the RHR pumps, the RHR heat exchangers, and the SI pumps. Each of the three subsystems consists of two 100% capacity trains that are interconnected and redundant such that either train is capable of supplying 100% of the flow required to mitigate the consequences of an accident.

LCO 3.5.2 Condition A stipulates with one or more trains inoperable, 72 hours is allowed to restore the train(s). If restoration of the ECCS trains is not met, Condition B requires the unit be brought to Mode 3 within 6 hours and Mode 4 within 12 hours.

On July 18, 2022 at 2230 Eastern Daylight Time (EDT), operators determined reasonable assurance no longer existed for 1B-B CCP to perform its specified safety functions and the above LCO 3.5.2 Condition A was entered. If the CCP could not be repaired and restored to operable, Unit 1 would be placed in Mode 3 by 0430 EDT on July 22 and Mode 4 by 1030 EDT on July 22, 2022.

3. Provide sufficient information to demonstrate that the cause of the situation is well understood including extent of condition on other related SSCs (e.g., common cause).

RESPONSE:

To obtain additional troubleshooting information about the condition of the 1B-B CCP, the pump was placed back into service on July 19 at 1304 EDT. The pump experienced excessive recirculation flow at 70 gallons per minute (gpm) versus the normal 25 gpm. Vibration measurement of the inboard bearing was high at 0.89 inches per second (in/s) which is above the action required range of greater than 0.70 in/s.

As part of this troubleshooting, a Current Signature Analysis test (CSA - commonly known as 'Baker test') was performed. The Baker test indicated performance as expected for the additional recirculation flow. Phases were balanced and no anomalies were identified. The operating current of the motor reported at the time of the event is consistent with the values that were recorded during the Baker test. The data obtained during this test confirmed that the operating current of the motor was well below the nameplate rating and that all phases were well balanced. The winding temperatures recorded during the event were also well below the thermal rating of the motor's insulation system and consistent with the expected small increase in current. Because the motor's torque is directly related to the operating current and the operating current is expected to have remained below the nameplate rating, no rotor or shaft degradation is expected to have occurred during the event. There was no noticeable change in motor bearing temperatures during the event and they were well below alert limits.

SQN experienced several shaft failures in the 1990s as a result of cyclic fatigue. To address this condition, the CCP shafts were replaced with Custom Age (Inconel) material, better machining tolerances, and different rotating element locking mechanisms. This upgrade provided better resistance to cyclic fatigue, increasing the service life on the order of five to ten times the original material service life. SQN has not experienced a failure since these upgrades began in 1999 and completed in 2003. 1B-B CCP rotating shaft was replaced in November 2001 with upgraded shaft material and flow elements. With this CCP component upgraded to Custom Age 625 (CA-625) alloy material, periodic shaft replacements were no longer required as they were previously.

Though the upgraded material provides more resistance to fatigue, it does not eliminate the failure mechanism. 1B-B CCP had approximately 100,000 hours of runtime when degradation was identified. This is less than the five to ten times service life expectancy. In comparison, 1A-A CCP has upgraded CA-625 shaft material and has approximately 11,000 hours of run time due to recent maintenance for shaft replacement.

In alignment with industry operating experience and Westinghouse WCAPs, the direct cause of the 1B-B CCP degradation is most likely pump element wear associated with cyclic fatigue. Other potential causes have been refuted through the troubleshooting process and a support/refute matrix.

During corrective maintenance on the 1B-B CCP, visual inspection revealed no abnormal conditions or foreign material. The rotating element has not been examined onsite. Instead, the element is being sent to the vendor for failure analysis.

As described in the following paragraph, transitioning from a time-based maintenance strategy to a condition-based maintenance strategy, after shaft upgrades, failed to ensure all failure mechanisms were addressed by condition monitoring and likely contributed to the degradation of the 1B-B CCP. A TVA internal procedure was later developed in 2017 to provide guidance for this transition.

Previous Maintenance History and Extent of Condition

In response to the shaft failures in the 1990s, SQN took action to upgrade shaft material as well as developing piping modifications and venting strategies to reduce air intrusion into ECCS piping. However, SQN did not continue a time-based replacement strategy. The material improvement was seen as a permanent solution, and condition-based monitoring was adopted

at SQN in accordance with the fleet maintenance strategy. This is also in alignment with other facilities in the nuclear power generation industry.

The remaining CCPs have had shaft upgrades, and their run times have been evaluated. The 2A-A CCP has approximately 75,000 hours of runtime, and 2B-B has approximately 100,000 hours of runtime. Based on the increased service life five to ten times the original material service life, the remaining CCPs are not within the shaft failure window.

4. ***Provide an evaluation of all safety and security concerns associated with operating outside of the TS or license conditions that demonstrates that the noncompliance will not create undue risk to the public health and safety or involve adverse consequences to the environment. This should include, as appropriate, a description of the condition and operational status of the plant, equipment that is out of service, inoperable, or degraded that may have risk significance, may increase the probability of a plant transient, may complicate the recovery from a transient, or may be used to mitigate the condition. This evaluation shall include potential challenges to offsite and onsite power sources and forecasted weather conditions.***

RESPONSE:

System Design and Operation

Final Safety Analysis Report (FSAR) Chapter 6, Section 6.3, "Emergency Core Cooling System," discusses the ECCS. FSAR Section 6.3.1.1, "Range of Coolant Ruptures and Leaks," describes the various range of reactor coolant system ruptures and leaks that ECCS is designed for cooling the reactor core as well as to provide additional shutdown capability following initiation of the following accident conditions.

1. A pipe break or spurious valve lifting in the RCS which cause a discharge larger than that which can be made up by the normal makeup system, up to and including the instantaneous circumferential rupture of the largest pipe in the RCS.

2. Rupture of a control rod drive mechanism causing a rod cluster control assembly ejection accident.

3. A pipe break or spurious valve lifting in the secondary system, up to and including the instantaneous circumferential rupture of the largest pipe in the secondary system.

4. A steam generator tube rupture.

Per FSAR Section 6.3.1.2, "Fission Product Decay Heat," the primary function of the ECCS following a loss of coolant accident is to remove the stored and fission product decay heat from the reactor core such that fuel rod damage, to the extent that it would impair effective cooling of the core, is prevented.

Per FSAR Section 6.3.1.3, "Reactivity Required for Cold Shutdown," the ECCS also provides shutdown capability for the accidents listed above by means of chemical poison (boron) injection. The most critical accident for shutdown capability is the steam line break.

To ensure that the ECCS will perform its desired function during these accidents, the system is designed to tolerate a single active failure during the short term immediately following an

accident, or to tolerate a single active or passive failure during the long term following an accident.

Centrifugal Charging Pump

These pumps, as a function of ECCS, deliver water from the RWST through an injection tank to the RCS at the prevailing RCS pressure during accident conditions. As a normal operating function of the Chemical and Volume Control System (CVCS), these pumps are normally aligned for reactor coolant pump (RCP) seal injection and charging service to the RCS.

During normal plant operations the charging pumps take suction from the volume control tank and return the cooled, purified reactor coolant to the RCS through the charging line. Normal charging flow is handled by one of the two charging pumps. The bulk of the charging flow is pumped back to the RCS through the tube side of the regenerative heat exchanger. The flow is then injected into a cold leg of the RCS. A portion of the charging flow is directed to the RCPs (normally 8 gpm per pump) through a seal water injection filter.

Weather Considerations

The National Weather Service indicates that temperature ranges from Thursday, July 21, 2022, until Sunday, July 24, 2022, will be lows near 70 degree Fahrenheit (°F) and highs in the mid-90s °F. Wind velocity will be calm during this period. Thursday night there is a 20 percent chance of thunderstorms before 2200 on Thursday July 21st, then clearing to partly cloudy sky to clear sky through Sunday.

This weather is expected to challenge the Tennessee Valley bulk electric system. TVA will be challenged from a reliability perspective if it loses a unit, or any portion of a unit, at SQN, anytime within the next eight days. TVA entered into a Conservative Operations Alert (COA) earlier this week, and a Power Supply Alert (PSA) in preparation for high temperatures and record-setting load forecasts that are expected to continue for at least the next eight days and potentially longer. TVA will need to make use of all available generation to meet the peak during this time, and even with all available generation in service, TVA anticipates that it will need to make non-firm spot market energy purchases to meet its forecast system load. Given the high loads forecast in TVA and neighboring systems alike, it is likely that TVA will be challenged in its ability to make these purchases and, if they are not available, TVA will be at risk of shedding firm load. Thus, it is critical that TVA maintain its native generation resources throughout the duration of the system challenges it is currently facing.

Safety Margins

The proposed period of enforcement discretion does not alter the design and operation of the ECCS, will not result in plant operation in a configuration outside the design basis, and will not impact any assumptions or consequences specified in any applicable safety analyses. Safety margins will be maintained in accordance with SQN safety analyses acceptance criteria, and no changes are proposed that affect any assumptions or inputs to applicable safety analyses. Because the 1A-A CCP is still operable, the ECCS safety function will be maintained during the proposed period of enforcement discretion. Therefore, safety margins will be maintained.

Other Defense-in-Depth Considerations

While the 1B-B CCP is inoperable, the 1A-A CCP remains in service to provide normal charging flow for the CVCS. The 1A-A CCP is currently the only train of high head ECCS injection that would be available during a design basis accident. The redundant 1A-A CCP's room cooler, which is support equipment that is required to be functional to maintain operability of the supported pump, is functional but degraded due to a known and previously evaluated essential raw cooling water (ERCW) leak on a cooler coil. This room cooler remains functional as determined by an engineering functionality evaluation. The 1A-A, 1B-B, 2A-A, and 2B-B Diesel Generators are operable. There are no challenges to operability of offsite power sources; however, the TVA grid is currently in a COA and PSA in preparation for high temperatures and record-setting load forecasts that are expected to continue for 8 days and potentially longer. Site scheduled and emergent activities are being controlled to minimize risk to generation and offsite power in accordance with TVA procedures.

A risk assessment has determined there is no net increase in radiological risk to the public as discussed in Section 7. During the requested 69-hour extension, safety related equipment will not be removed from service for elective reasons and will remain operable, and there is no non-safety related equipment out of service that may increase the probability of a plant transient, complicate the recovery from a plant transient, or be used to mitigate this condition.

Plant Status:

As of the time of the verbal request for enforcement discretion (i.e., July 21, 2022 at 1730 EDT) operating conditions of Unit 1 at SQN were as listed below.

- MODE 1, 100% Power
- Switchyards are available and stable

As of the time of the verbal request for enforcement discretion (i.e., July 21, 2022 at 1730 EDT) operating conditions of Unit 2 at SQN were as listed below.

- MODE 1 at 100% Power
- Switchyards are available and stable

No other operational challenges are currently being experienced at SQN. Maintenance activities on off-site power lines do not pose a challenge to the availability of off-site power sources.

Conclusion

Based on the justification above, the requested extension will not create undue risk to the public health and safety or involve adverse consequences to the environment.

5. Provide a description and timeline of the proposed course of action to resolve the situation (e.g., likely success of the repairs) and explain how the resolution will not result in a different or unnecessary transient. This shall include the time period for the requested discretion and demonstrate a high likelihood of completion within the requested period of enforcement discretion. If the proposed course of action necessitates enforcement discretion greater than 5 days, the licensee shall justify

why a longer-term solution (e.g., emergency amendment) should not be processed within the duration of a 5 days NOED.

RESPONSE:

The request is for 69 hours (best estimation as of July 21, 2022, at 1800 EDT), in addition to the 72 hours allowed by TS 3.5.2 Condition A, in order to complete work to restore 1B-B CCP to OPERABLE status. The action to place Unit 1 in MODE 3 within 6 hours and MODE 4 within 12 hours in accordance with TS 3.5.2 Condition B would then begin at 1930 EDT on July 24, 2022.

The 1B-B CCP work scope will involve the replacement of the pump element and associated parts for a standard refurbishment. This work requires uncoupling the pump shaft from the motor, removing the inboard and outboard bearings, removing the mechanical seals, and then pulling the rotating element out. For reassembly, a refurbished and modified rotating element will be installed that is made of the CA-625 alloy material. New inboard and outboard bearings will be installed, and the mechanical seals will be rebuilt.

Subsequent to maintenance, the pump will be returned to OPERABLE status in accordance with Technical Specifications and implementing procedures.

Based on discussions with SQN maintenance, engineering, and operations, the following timeline is provided for the repair and return to operable status of the 1B-B CCP within 104 hours.

Work Completed:
29 hours to disassemble the pump
16 hours to repair the pump

Work to perform:
56 hours to reassemble the pump
3 hours to perform post maintenance testing

There are no additional impacts to other systems during the replacement activity. SQN will ensure no other work will be performed on the 1A-A CCP during this time. As no other components will be affected to perform this maintenance, there is no additional anticipated transient.

An emergency LAR is not required because the 1B-B CCP will be restored to OPERABLE status within 72 hours after the NOED is granted, thus the period of enforcement discretion is less than 5 days.

6. Detail and explain compensatory actions the plant has both taken and will take to reduce risk(s), focusing on both event mitigation and initiating event likelihood. Describe how each compensatory measure achieves one or more of the following:

a. Reduces the likelihood of initiating events;
b. Reduces the likelihood of the unavailability of redundant trains, during the period of enforcement discretion; and

c. Increases the likelihood of successful operator actions in response to initiating events.

RESPONSE:

In order to minimize the risk associated with this enforcement discretion request, TVA has reviewed the previously planned work activities to ensure activities with the potential to cause a plant transient are not performed during the time frame of this enforcement discretion.

To provide for defense-in-depth during this condition, the redundant train of ECCS pumps and their safety-related power supply have been administratively protected in accordance with TVA procedures. This equipment protection includes either signage or barriers to prevent any inadvertent operation or unnecessary personnel access to these components. Specifically, this signage or barriers include the MCR component hand switches, equipment rooms, and power supplies. The specific components protected include the A train ECCS pumps listed below.

The following compensatory measures will be implemented during the requested enforcement discretion extension.

- No work that jeopardizes plant operation, such as alignment changes, balance-of-plant function testing, or switchyard work will be allowed except as needed in response to emergent failures or conditions that develop.
- The following equipment is protected:
  - 1A-A CCP
  - 1A-A RHR pump
  - 1A-A SI pump
  - 1A-A emergency diesel generator
  - 1A-A 6.9kV shutdown board
- Continuous fire watches, beyond recommended roving watches, and no hot work in areas as discussed in Section 7.E.
- AUO walkdowns of flood significant areas three times per shift as discussed in Section 7.C.

7. Demonstrate that the NOED condition, including compensatory measures will not result in more than a minimal increase in radiological risk, either in quantitative assessment that the risk will be within the normal work control levels (ICCDP less than or equal to 5E-7 and/or ICLERP less than or equal to 5E-8) or in a defensible qualitative manner.

RESPONSE:

The incremental conditional core damage probability (ICCDP) for SQN Unit 1 associated with 120 hours of unavailability is 2.15E-07. The incremental conditional large early release probability (ICLERP) for SQN Unit 1 is 3.05E-09. These values are below acceptable thresholds and indicate that the requested extension of up to 120 hours will be acceptable from a risk perspective.

Risk Insights

The numerical guidance for acceptance was established to augment qualitative arguments that continued operation of the plant during the period of enforcement discretion will not cause risk to exceed the level determined acceptable during normal work controls and, therefore, there is no net increase in radiological risk to the public. For licensee provided quantitative risk analysis, the licensee shall provide the effects on large early release frequency (LERF). The following information should be provided to support this evaluation:

A. Use the zero maintenance probabilistic risk assessment (PRA) model to establish the plant's baseline risk and the estimated risk increase associated with the period of enforcement discretion. For the plant-specific configuration the plant intends to operate in during the period of enforcement discretion, the ICCDP and ICLERP should be quantified and compared with guidance thresholds of less than or equal to an ICCDP of 5E-7 and an ICLERP of 5E-8. These numerical guidance values are not pass-fail criteria. For the degraded case with the subject equipment out of service, the model should reflect, as best as possible, current equipment unavailability states (i.e., if other equipment is unavailable because of test and maintenance, this should also be reflected in the analysis). This risk calculation should not be limited to the specific TS relief in question, but rather, the total risk of continued operation for the specific configuration of the plant.

RESPONSE:

Information was extracted from the current SQN Control Room equipment out of service (EOOS) model:

Equipment Considered to be Out of Service for this Evaluation		
Item	Type	Description
PCCFD1PMP_0620104	NOED	1B-B CCP
PCCFR1PMP_0620104	NOED	1B-B CCP
CMPSD0CMP_0320136	EOOS	Station Air Compressor D
CMPSR0CMP_0320136	EOOS	Station Air Compressor D
POBFD2PMP_0620232B	EOOS	Boric Acid Pump 2B
POBFR2PMP_0620232B	EOOS	Boric Acid Pump 2B
U1_XPORV1	EOOS	Block Valve 1-FCV-068-0332-B Closed

The zero test and maintenance SQN Probabilistic Risk Assessment (PRA) Internal Events Model was utilized during this evaluation. The fire quantitative results are not used in the evaluation because it is considered overly conservative. Combining the quantitative fire results with the internal events and comparing that to the guidance thresholds (less than or equal to an ICCDP of 5E-7 and an ICLERP of 5E-8) is overly conservative because the SQN Fire PRA model is relatively new and TVA has not had the opportunity to evaluate and refine all overly conservative assumptions. Given the short duration of the LCO, it is not possible to quickly adjust the fire modeling parameters within the Fire PRA model to include impacts of the compensatory measures established for fire watches and no hot work.

For 120 hours, the following results are obtained:

	NOED	Base	Delta	ICCDP/ICLERP
U1 CDF	2.03E-05	4.60E-06	1.57E-05	2.15E-07
U1 LERF	8.39E-07	6.16E-07	2.23E-07	3.05E-09
Note: Delta/ICCDP/ICLERP values are calculated using full precision and can differ slightly from what would be obtained if using the NOED and Base values shown in the table.				

ICCDP = (NOED CDF – Base CDF) * (Duration/8760)
ICLERP = (NOED LERF – Base LERF) * (Duration/8760)

The maximum duration before exceeding the ICCDP/ICLERP thresholds is 279 hours:

	NOED	Base	Delta	ICCDP/ICLERP
U1 CDF	2.03E-05	4.60E-06	1.57E-05	5.00E-07
U1 LERF	8.39E-07	6.16E-07	2.23E-07	7.10E-09
Note: Delta/ICCDP/ICLERP values are calculated using full precision and can differ slightly from what would be obtained if using the NOED and Base values shown in the table.				

ICCDP = (NOED CDF – Base CDF) * (Duration/8760)
ICLERP = (NOED LERF – Base LERF) * (Duration/8760)

B. ***Discuss the dominant risk contributors (cut sets or sequences or both) and summarize the risk insights for the plant-specific configuration the plant intends to operate in during the period of enforcement discretion. This discussion should focus primarily on risk contributors that have changed (increased or decreased) from the baseline model because of the degraded condition and resultant compensatory measures, if any.***

RESPONSE:

The top cutsets include the following.

- Various floods with loss of 1A-A CCP lost from random failure
- Floods that cause loss of power resulting in seal loss of coolant accident (also in baseline model)

C. Discuss how the compensatory measures are accounted for in the PRA. These modeled compensatory measures should be correlated, as applicable, to the dominant PRA sequences identified in items 1 and 2 above. In addition, other measures not directly related to the out-of-service equipment may also be implemented to reduce overall plant risk and, as such, should be explained. Compensatory measures that cannot be modeled in the PRA shall be assessed qualitatively.

RESPONSE:

The enforcement discretion request meets NRC guidance. This criterion applies to plants in operation where shutdown may result in unnecessary risk to the plant and public. The safety consequences and operational risks for SQN Unit 1 were reviewed as part of this NOED request and are documented within this submittal.

In order to minimize the risk associated with this enforcement discretion request, TVA has reviewed the previously planned work activities to ensure activities with the potential to unnecessarily increase risk are not performed during the time frame of this enforcement discretion.

The following, though not modeled in the PRA, will be implemented during the requested enforcement discretion extension.

- No work will be performed that jeopardizes availability of 1A-A Charging System and supporting systems, structures, and components.
- Fire watches and no hot work in areas as discussed in Section 7.E.
- Flood walkdowns established in flood significant areas (706.0-T01, 653.0-A08, 653.0-A13, 653.0-A15, 669.0-A01, 669.0-A07, 669.0-A25, 690.0-A01, 714.0-A01, 714.0-A05, 734.0-A02, 734.0-A04, 734.0-A21, 734.0-A22, 734.0-A24, 749.0-A01, 749.0-A08A, 749.0-A09A, 749.0-A16).

D. Discuss the "extent of condition" of the failed or unavailable component(s) to other trains or divisions of equipment and the adjustments, if any, which were made to the related PRA common cause factors to account for potential increases in their failure probabilities. The method used to determine the extent of condition shall be discussed. It is recognized that a formal root cause or apparent cause is not required because of the limited time available in determining the acceptability of a requested NOED. However, a discussion of the likely cause shall be provided with an associated discussion of the potential for common cause failure.

RESPONSE:

Regulatory Guide (RG) 1.177, Revision 2, indicates that it may be important to consider and potentially adjust the likelihood of common cause failure of similar components, given a failure of a particular component.

> Contributions from common-cause failures (CCFs) need special attention when calculating the increased risk level R1. If the component is down because of a failure, the common-cause contributions involving the component should be divided by the probability of the component being down because of failure since the component is given to be down. If the component is down because it is being brought down for maintenance (but not failed), the CCF contributions involving the component should be modified to remove the component and to only include failures of the remaining components (also see Section C.2.3.3 of this RG).

Given that the 1A-A and 1B-B CCPs are the same type of pump, they are maintained in the same manner, and the 1B-B CCP is inoperable due to a degraded condition, there is an increased potential for failure of the 1A-A CCP due to common cause. The probability of the

common cause of the 1A-A CCP and the 1B-B CCP is calculated by dividing the probability of the common cause of the 1A-A CCP and the 1B-B CCP with both pumps in service by the failure probability of the 1B-B CCP. This method was used to calculate the common cause failure probabilities of the 1A-A CCP and the 1B-B CCP for both failure to start on demand and failure to run.

E. Discuss "external event risk" for the specified plant configuration. External events include fire (internal and external), external flooding, seismic, high winds, tornado, transportation, other nearby facility accidents. An example of external event risk is a situation in which a reactor core isolation cooling (RCIC) pump has failed and a review of the licensee's Individual Plant Examination of External Events or full-scope PRA model identifies that the RCIC pump is used to mitigate core damage frequency (CDF) and LERF in certain fire scenarios. Action may be taken to reduce fire ignition frequency in the affected areas and to reduce human error associated with time-critical operator actions in response to such scenarios, and to ensure fire protective and corrective measures have been taken.

RESPONSE:

The 1B-B CCP extended outage window results in reliance on the A Train ECCS to avoid core damage in some accident scenarios. The SQN Fire PRA model was quantified in the current plant configuration with the identified components out of service. The top 100 cutsets of the fire risk quantification results (for CDF and LERF) were reviewed in order to establish areas in the plant that were important to fire risk. Based on this review, it is recognized that postulated fire scenarios in the following five areas would increase the risk of core damage due to fire: Auxiliary Building 714 elevation General Area (714-A01), the Auxiliary Building 690 Elevation General Area (690-A01), the 6.9KV Shutdown Board Room A (734-A02), the 480V Shutdown Board Room 1B2 (734-A05), and the 480V Board Room 1A (749-A01). Risk management actions, including roving fire watches, and no hot work in these fire areas, have been established to protect the availability of the A Train ECCS and other systems in order to reduce the risk of core damage due to fire.

It is also recognized that postulated seismic events that result in the failure of certain electrical systems could result in an increased chance of core damage. However, the total frequency of such scenarios is very small given the seismic qualification of safety-related systems, structures, and equipment. The compensatory measures being taken by operations and maintenance have been established to protect the availability of these systems.

The SQN plant Category I structures are designed for a 95 miles per hour (mph) wind (including a 1.1 gust factor) 30 feet above grade with a 100-year period of recurrence. The basis was determined from American Society of Civil Engineers (ASCE) Paper 3269, "Wind Forces on Structures." The SQN plant is designed for tornados having a maximum rotational velocity of 300 mph, and up to a translational speed of 60 mph. SQN has been designed to resist tornado wind and missile effects equivalent to the Design Basis Tornado and meets the intent of RG 1.76 and 1.117. SQN was designed prior to the 1975 Standard Review Plan (SRP). The approach taken in the Individual Plant Evaluation of External Events (IPEEE) was to review the design bases and compare them to the SRP requirements (screening criteria). Any changes that were made to the plant subsequent to the design analysis were reviewed to verify compliance with SRP criteria. As such, the SQN

design meets the intent of the 1975 SRP for high winds and tornadoes, and risk due to extreme winds or tornados is not significantly increased with 1B-B CCP out of service.

There are no weather events forecasted during the duration of the enforcement discretion that should produce high winds or heavy rains. Therefore, the chance of a tornado or flooding external events can be deemed negligible.

Transportation Accidents

An examination of the impact from potential accidents on the transportation routes (i.e., railroad, aircraft, highways, and barge traffic) concluded that their contribution to plant risk is negligible. Therefore, the risk due to transportation accidents cannot be significantly increased with 1B-B CCP out of service. The individual transportation accidents are discussed below.

Railroads:

As noted in the staff evaluation report for the SQN IPEEE Section 2.3.3.2, "The nearest mainline railroad is 5.5 miles away, which is greater than the RG 1.91 safe distance." There is a spur that leads into the plant; however, the track has been removed such that it is not used.

Aircraft:

The Dallas Bay Sky Park is located beyond five miles of the plant but has been closed. Also, Federal Airway V333 passes directly over the site. The Chattanooga Airport is located approximately 14.5 miles from the plant site. These are the only facilities of potential significance to the safe operation of the plant and based on evaluations these activities will pose no hazard. Therefore, there is no risk of airway accidents on the basis of lack of proximity.

Highways:

As noted in the IPEEE Section 2.3.3.2, "The nearest highway is two miles away, which is greater than the RG 1.91 safe distance."

Barge Traffic:

The potential for damage to the SQN plant from a barge explosion is negligible. Materials considered include trinitrotoluene (TNT), gasoline, liquid natural gas, and fertilizers. The frequency of barge impacts on plant structures are very low and the risk associated with such traffic is negligible.

8. Confirm that the facility organization that normally reviews safety issues has reviewed and approved this request and that a written NOED request will be submitted within 2 days of the NRC staff's decision regarding the NOED.

RESPONSE:

TVA confirms that the Plant Operations Review Committee reviewed and approved this request. TVA will provide a written NOED request within two business days of the NRC staff's decision regarding the NOED.