Tennessee Valley Authority, Post Office Box 2000, Soddy-Daisy, Tennessee 37379

January 15, 1999

TVA-SQN-TS-98-07 10 CFR 50.90

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

Gentlemen:

In the Matter of) Docket Nos. 50-327
Tennessee Valley Authority) 50-328

SEQUOYAH NUCLEAR PLANT (SQN) - UNITS 1 AND 2 - TECHNICAL SPECIFICATION (TS) CHANGE NO. 98-07 - "NEW ROD POSITION INDICATION (RPI) ACTION STATEMENT"

In accordance with the provisions of 10 CFR 50.4 and 50.90, TVA is submitting a request for an amendment to SQN's licenses DPR-77 and 79 to change the TSs for Units 1 and 2. The proposed change adds a new action statement to TS 3.1.3.2, "Position Indicating Systems - Operating," that eliminates the need to enter TS 3.0.3 whenever two or more individual RPIs per bank may be inoperable, while maintaining the appropriate overall level of protection. It also allows additional time to determine the position of the non-indicating rod(s).

TVA has determined that there are no significant hazards considerations associated with the proposed change and that the change is exempt from environmental review pursuant to the provisions of 10 CFR 51.22(c)(9). The SQN Plant Operations Review Committee and the SQN Nuclear Safety Review Board have reviewed this proposed change and determined that operation of SQN Units 1 and 2, in accordance with the proposed change, will not endanger the health and safety of the public. Additionally, in accordance with 10 CFR 50.91(b)(1), TVA is sending a copy of this letter to the

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Tennessee State Department of Public Health. Enclosure 1 to this letter provides the description and evaluation of the proposed change. This includes TVA's determination that the proposed change does not involve a significant hazards consideration, and is exempt from environmental review. Enclosure 2 contains copies of the appropriate TS pages from Units 1 and 2 marked-up to show the proposed change. Enclosure 3 forwards the revised TS pages for Units 1 and 2 which incorporate the proposed change.

TVA requests that the revised TS be made effective within 45 days of NRC approval. If you have any questions about this change, please telephone me at (423) 843-7170 or J. D. Smith at (423) 843-6672.

Sincerely,

Pedro Salas
Licensing and Industry Affairs Manager

Subscribed and sworn to before me
on this 15th day of January

Peggy M. Billingsley
Notary Public

My Commission Expires October 9, 2002

Enclosures
cc: See page 3

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ENCLOSURE 1

TENNESSEE VALLEY AUTHORITY
SEQUOYAH NUCLEAR PLANT (SQN)
UNITS 1 AND 2
DOCKET NOS. 327 AND 328

PROPOSED TECHNICAL SPECIFICATION (TS) CHANGE TS 98-07
DESCRIPTION AND EVALUATION OF THE PROPOSED CHANGE

I. DESCRIPTION OF THE PROPOSED CHANGE

TVA proposes to modify the Sequoyah Nuclear Plant (SQN) Units 1 and 2 TSs by adding a new action statement to TS 3.1.3.2, "Position Indicating Systems - Operating," that eliminates the need to enter TS 3.0.3 whenever two or more individual rod position indicators (RPIs) may be inoperable per bank, while maintaining the appropriate overall level of protection and adding flexibility to the initial determination of the position of the non-indicating rod(s). This change is similar to one approved by NRC for Wolf Creek (TAC NO 80054) on June 27, 1991, and is similar to that being proposed as a change to Standard TSs (NUREG-1431).

The changes to TS 3.1.3.2 are described as follows:

- Revise original action statements (a) and (b) that require the initial determination of position of the non-indicating rod(s) indirectly by the movable incore detectors from "at least once per 8 hours" to "at least once per 12 hours."

- Add a new action (b) that reads:

  With more than one rod position indicator per bank inoperable either:

  Determine the position of the non-indicating rod(s) indirectly by the movable incore detectors at least once per 12 hours, and immediately after any motion of the non-indicating rod which exceeds 24 steps in one direction since the last determination of the rod's position, and

  Place the control rods under manual control, and monitor and record Reactor Coolant System average temperature (Tavg) at least once per hour, and

Restore the rod position indicators to OPERABLE status within 24 hours such that a maximum of one rod position indicator per bank is inoperable, or

Be in HOT STANDBY within the next 6 hours.

- As a result of the above proposed change, the current existing action statement (b) becomes (c).

II. REASON FOR THE PROPOSED CHANGE

TVA is proposing to change TS 3.1.3.2, "Position Indicating Systems - Operating" by adding: Flexibility to the initial determination of the position of the non-indicating rod(s), and a new action statement in order to address the situation where more than one RPI is inoperable per control bank. The flexibility is added by allowing four additional hours to obtain the position of the non-indicating rod(s) indirectly by the movable incore detectors, which is still within the period of one shift and consistent with SR 4.1.3.1.1 frequency of 12 hours. The new action would avoid unnecessary plant shutdowns per TS 3.0.3 when operators would be challenged to use the rod control system with degraded RPI capabilities. This request addresses the condition wherein the RPI system is inoperable with several compensatory actions being taken during a 24-hour allowed outage time (AOT). However, during this time there are no known misalignments or rod control operability concerns or additional limiting condition of operations (LCO's) apply (e.g., LCO 3.1.3.1.b or c). The additional time to determine the position of the non-indicating rod(s) is requested to remove the interference between reducing power and determination of rod position while trying to troubleshoot the problem.

III. SAFETY ANALYSIS

SQN has 53 full-length rod control cluster assemblies (RCCAs or control rod assemblies). The RCCAs are designed by function as the control banks and shutdown banks. The shutdown RCCAs provide a large negative shutdown reactivity insertion on a reactor trip. They ensure the reactor remains subcritical and that shutdown margin is maintained immediately following the trip. The control RCCAs are used to change reactivity in the core, thereby changing fuel temperature and subsequently moderator temperature to maintain Tavg on program during power operation. There are four control and four shutdown banks. Each set of banks are labeled A, B, C, and D. With the exception of Shutdown Banks C and D, each bank is comprised of two groups, although the banks are normally operated and controlled as a unit. The axial position of the RCCAs may be controlled

manually or automatically. The RCCAs drop into the core following actuation of reactor trip signals.

The shutdown banks are always in the fully withdrawn position during normal operation, and are moved to this position at a constant speed by manual control prior to criticality. A reactor trip signal causes them to fall by gravity into the core. The control banks are the only RCCAs that can be manipulated under automatic control. Each control bank is divided into two groups to obtain smaller incremental reactivity changes per step. All RCCAs in a group are electrically paralleled to move simultaneously. The two groups within the same bank are stepped so that the relative position of the groups will not differ by more than one step. The control banks are programmed so that withdrawal of the banks is sequenced and overlapped in the following order: Control Banks A, B, C, then D. The programmed insertion sequence is the opposite of the withdrawal sequence, i.e., the last control bank withdrawn (Bank D) is the first control bank inserted.

The indication of RCCA position is a Regulatory Guide 1.97 Category 3 variable (i.e., non-Class 1E performance grade). Two separate systems are provided to sense and display control RCCA positions as described below.

- Demand Position Indicating System (DPIS)

  The bank DPIS counts the pulses from the rod control system that moves the RCCAs. There is one step counter for each group of RCCAs. Individual rods in a group receive the same signal to move; therefore, they should all be at the same position indicated by the group step counter for that group. The DPIS is considered highly precise (± 1 step or ± 5/8 inch). If a RCCA does not move one step for each demand pulse, the step counter will still count the pulse and incorrectly reflect the position of the RCCA.

- Rod Position Indication System (RPIS)

  The RPIS provides an indication of actual control rod position, but at a lower precision than the step counters. This system is based on inductive analog signals from a series of primary and secondary coil stacks spaced along the rod drive pressure housing in which the rod drive shaft acts as the core. The higher the shaft (and RCCA) is out of the reactor, the stronger the coupling between the transformer coil stacks. This produces an analog secondary voltage, which is directly proportional to the position of the drive rod. The maximum uncertainty is ± 12 steps.

The DPIS and the RPIS are separate and independent systems as a result of operational requirements. Operating procedures require the reactor operator to compare the demand and indicated (actual) readings from the RPIS so as to verify the operation of the rod control system. In addition, the RPIS system provides an input to the control rod deviation alarm circuit. A rod position deviation alarm would be generated if an individual rod position deviated by more than 12 steps from its RCCA bank position. Also, RPIS provides warning of misalignment of any two RCCAs within the same bank by ≥ 12 steps, and "rod-at-bottom" (rod drop).

TS Bases Section 3/4.1.3 states that the specifications of this section ensure that:

a. Acceptable power distribution limits are maintained,
b. the minimum shutdown margin is maintained, and
c. the potential effects of rod alignment on associated accident analyses are limited.

The proposed TS changes provide compensatory measures to assure that the Bases are maintained. The compensatory actions require that rod position be determined indirectly via the movable incore flux detectors and that the Reactor Coolant System (RCS) temperature be monitored and recorded. This addresses Items a and b above. Also, rod control is placed in manual, which limits automatic rod motion. This addresses Item c above.

The new action statement has an AOT of 24 hours, as well as compensatory measures, to use the movable incore detectors to ascertain rod position; to monitor and record RCS temperature; to place rod control in the manual mode, which limits automatic rod motion; and allow the use of other reactivity control mechanisms such as boration and dilution. The 24-hour AOT provides sufficient time to troubleshoot and restore the RPIS to operation while avoiding plant challenges associated with an unnecessary shutdown. Monitoring and recording the RCS temperature would allow early detection of mispositioned or dropped rods. Overall plant safety would be enhanced by maintaining steady-state operation, as compared with the large rod movements and potential challenges required during an unnecessary shutdown in conjunction with the loss of RPI. The new action would avoid unnecessary plant shutdowns per TS 3.0.3 when operators would be challenged to use the rod control system with degraded rod indication capabilities.

Because no design changes are involved with this amendment request, the impact on the plant safety analysis design basis would be one involving a reactivity transient induced by operator error associated with the loss of position indication. The analysis results for these events in Final Safety Analysis Report (FSAR) Sections 15.2.1 through 15.2.3 are not dependent upon operator action. The assumed reactivity insertion rates are based on conservative, worst-case scenarios independent of whether they are due to equipment malfunction or human error. Loss of RCCA position indication would not affect the assumed reactivity insertion rates. Further, the protection systems assumed in the analysis of these events (power range neutron flux-high and low settings and Overtemperature-Delta T) are unaffected since no design changes are involved.

The worst-case reactivity transient of this nature, the withdrawal of a single RCCA, has been analyzed in FSAR Section 15.3.6 assuming that operators ignore RCCA position indication. Whether indication is lost, as is the case covered by this new action statement, or disregarded, does not change the method of analysis or the outcome of this event. Warning of rod bank insertion limits would be available to the operator from the rod bank demand position system.

There is a 5 percent uncertainty margin between the power peaking factor measured by the incore detector system and the design power peaking factor assumed in the analysis of American Nuclear Society (ANS) Condition I and II transients. The movable incore detectors are capable of revealing any situation, which causes power shapes to be peaked in excess of the design value. Asymmetric power distributions can also be detected by the excore neutron flux detectors and core exit thermocouples. FSAR Sections 7.7.1.9 and 7.7.2 provide further discussions on the capabilities of these systems.

TS Bases Section 3/4.1.3 states that control rod positions and operability of the rod position indicators are required to be verified on a nominal basis of once per 12 hours with more frequent verification if an automatic monitoring channel is inoperable. Standard TS (NUREG-1431) Bases Section B 3.1.8 (equivalent to Section 3/4.1.3) states the period of 8 hours for verification of RCCA position is reasonable based on: experience, normal power operation not requiring excessive movement of banks,

and the probability of simultaneously having a rod significantly out of position and an event sensitive to rod position being small. The 12-hour period for verification (not applicable to the rod position deviation monitor being inoperable) is reasonable in that:

- It is consistent with shift frequency (shift durations are now 12 hours), a period typically used as the basis of the 8 hours, and

- It is consistent with the rod position surveillance frequency currently in the TS.

- It removes the interference between TS 3.1.3.2 Actions a.1 and a.2 or b.1 and b.2. If power is going to be reduced, control rod position determination cannot be made during the power reduction. This change would provide more time for troubleshooting the problem and/or, allow the determination to be made after the power is reduced, and

- It is consistent with the 12-hour timeframe allowed to verify shutdown margin when a rod is misaligned from its group step counter height by more than ± 12 steps in TS 3.1.3.1.

- SQN's operating experience has been that RCCAs have not actually been found misaligned when movable flux detectors have been utilized to indirectly determine their position. Rather, the RPI system itself has had problems due to signal variations as a result of resistance in the loop or the rod bow phenomenon.

IV. NO SIGNIFICANT HAZARDS CONSIDERATION DETERMINATION

TVA has concluded that operation of SQN Units 1 and 2, in accordance with the proposed change to the TSs, does not involve a significant hazards consideration. TVA's conclusion is based on its evaluation, in accordance with 10 CFR 50.91(a)(1), of the three standards set forth in 10 CFR 50.92(c).

A. <u>The proposed amendment does not involve a significant increase in the probability or consequences of an accident previously evaluated.</u>

The proposed change to TS 3.1.3.2 does not involve a significant increase in the probability or consequences of an accident previously evaluated. The

potential for the new action statement to impact the probability or consequences of the safety analyses for the plant lies only in the area of operator-exacerbated reactivity events due to a loss of RCCA position indication.

RCCA events such as: One or more dropped RCCAs, a dropped RCCA bank or a RCCA ejection (FSAR Sections 15.2.3 and 15.4.6, respectively) are not impacted since the new action statement does not involve a design change. Events such as: Uncontrolled RCCA bank withdrawal at power, statically misaligned RCCA or withdrawal of a single RCCA (FSAR Sections 15.2.2, 15.2.3, and 15.3.6, respectively) involve, or potentially involve, operator action and are of interest. The uncontrolled RCCA bank withdrawal at power is an ANS Condition II transient that has been analyzed using a positive reactivity insertion rate greater than that for the simultaneous withdrawal of the two control banks having the maximum combined worth at maximum speed. Whether the event is caused by a failure in the rod control system or by operator error has no effect on the positive reactivity insertion rate assumed in the analysis. The protection systems assumed in the analysis are unaffected since there is no change to the design. Loss of the RPIS would not result in more frequent control rod movement by plant operators. Therefore, the new action statement would not affect the analysis of this event and departure from nucleate boiling ratio (DNBR) design basis would still be met.

The most severe misalignment situation, with respect to DNBR, arises from cases in which one RCCA is fully inserted or where Bank D is fully inserted to its insertion limits with one RCCA fully withdrawn. For these cases, as discussed in FSAR Section 15.2.3.2, the DNBR remains above the safety analysis limit values. Also, the control bank insertion limit alarms remain available to warn operators that bank insertion limits have been reached.

A compensatory action associated with this new action statement, placing the control rods under manual control, addresses concerns associated with automatic rod motion due to the rod control system and inadvertent operator contribution to these events.

The worst-case event of those described above, the withdrawal of a single RCCA, is an ANS Condition III event. It has been analyzed in FSAR Section 15.3.6, assuming that operators ignore RCCA position

indication or that multiple rod control system failures occur. No single electrical or mechanical failure in the rod control system could cause the accidental withdrawal of a single RCCA from an inserted bank at full power operation. The operator could deliberately withdraw a single RCCA in the control bank. This feature is necessary in order to retrieve an accidentally dropped rod. This new action statement does not change the plant design; therefore, there would be no change in the probability of the event being induced by the unlikely, simultaneous electrical failures (FSAR Section 7.7.2.2).

The change in the time to determine the position of the non-indicating rods, indirectly with the movable incore detectors, does not involve a design change nor does it affect the immediate response of the operator to the event, therefore, it does not affect the results of the analyses described above.

B. **The proposed amendment does not create the possibility of a new or different kind of accident from any accident previously evaluated.**

Since there is no change to the design associated with the proposed change, it does not create the possibility of a new or different kind of accident from any accident previously evaluated. The proposed change involves a loss of the RPIS and establishes compensatory measures to maintain control rod position consistent with the assumptions used in the existing accident and transient analyses. The new action statement provides sufficient time for troubleshooting while avoiding unnecessary plant shutdowns per TS 3.0.3.

C. **The proposed amendment does not involve a significant reduction in a margin of safety.**

The proposed change to TS 3.1.3.2 does not involve a significant reduction in a margin of safety. As discussed in Section IV.A above, the results of the FSAR Chapter 15 safety analyses for the applicable events, are not affected by the proposed changes. Therefore, the safety margins demonstrated by these analyses remain unchanged. The additional time to obtain the flux maps is consistent with the 12-hour timeframe allowed to verify shutdown margin when a rod is misaligned from its group step counter height by more than ± 12 steps in TS 3.1.3.1 and remains within a shiftly basis. Therefore, it does not reduce the margin of safety.

V. ENVIRONMENTAL IMPACT CONSIDERATION

The proposed change does not involve a significant hazards consideration, a significant change in the types of or significant increase in the amounts of any effluents that may be released offsite, or a significant increase in individual or cumulative occupational radiation exposure. Therefore, the proposed change meets the eligibility criteria for categorical exclusion set forth in 10 CFR 51.22(c)(9). Therefore, pursuant to 10 CFR 51.22(b), an environmental assessment of the proposed change is not required.