ENCLOSURE 1

PROPOSED TECHNICAL SPECIFICATION CHANGE

SEQUOYAH NUCLEAR PLANT UNIT 2

DOCKET NO. 50-328

(TVA-SQN-TS-91-01)

LIST OF AFFECTED PAGES

Unit 2

3/4 5-1

3/4.5 EMERGENCY CORE COOLING SYSTEMS

3/4.5.1 ACCUMULATORS

COLD LEG INJECTION ACCUMULATORS

LIMITING CONDITION FOR OPERATION

3.5.1.1 Each cold leg injection accumulator shall be OPERABLE with:

a. The isolation valve open,

b. A contained borated water volume of between 7615 and 8094 gallons of borated water,

c. Between 2400 and 2700 ppm of boron,# and R131

d. A nitrogen cover-pressure of between 600 and 683 psig.

APPLICABILITY: MODES 1, 2 and 3.*

ACTION:

a. With one cold leg injection accumulator inoperable, except as a result of a closed isolation valve, restore the inoperable accumulator to OPERABLE status within one hour or be in at least HOT STANDBY within the next 6 hours and in HOT SHUTDOWN within the following 6 hours.

b. With one cold leg injection accumulator inoperable due to the isolation valve being closed, either immediately open the isolation valve or be in HOT STANDBY within one hour and be in HOT SHUTDOWN within the next 12 hours.

THE REQUIREMENT TO MAINTAIN BETWEEN 2400 AND 2700 PPM OF BORON FOR EACH COLD LEG INJECTION ACCUMULATOR IS MODIFIED TO REQUIRE ONLY THREE OF FOUR ACCUMULATORS TO BE MAINTAINED BETWEEN 2400 AND 2700 PPM OF BORON AND ONE ACCUMULATOR TO BE MAINTAINED BETWEEN 1900 AND 2700 PPM OF BORON DURING UNIT 2 CYCLE 5 OPERATION. THIS ALLOWANCE IS IN EFFECT UNTIL THE RESTART OF UNIT 2 FROM THE UNIT 2 CYCLE 5 REFUELING OUTAGE. R133

*Pressurizer pressure above 1000 psig.

R133

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ENCLOSURE 2

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DESCRIPTION AND JUSTIFICATION FOR
COLD LEG INJECTION ACCUMULATOR BORON CONCENTRATION CHANGE

ENCLOSURE 2

Description of Change

Tennessee Valley Authority proposes to modify the Sequoyah Nuclear Plant (SQN) Unit 2 Technical Specifications (TSs) to revise the required boron concentration for one of the four cold leg injection accumulators in TS 3.5.1.1 from between 2,400 and 2,700 parts per million (ppm) boron to between 1,900 and 2,700 ppm boron for Unit 2 Cycle 5 operation only.

Reason for Change

Sequoyah Unit 2 has been experiencing a small reactor coolant system (RCS) inleakage to the No. 3 cold leg accumulator (CLA) on the order of 0.1 to 0.2 gallon per minute (gpm) through the primary and secondary check valves (TS 3.4.6.2 leakage limit for these valves is 1 gpm). The leakage source has been confirmed by troubleshooting activities, which included monitoring with a contact pyrometer. At this time, the RCS is borated at approximately 1,000-ppm boron and the concentration will be decreased throughout the fuel cycle. With the current condition, SQN is required to drain approximately 3,000 gallons from the No. 3 CLA and then refill with borated water from the refueling water storage tank (RWST) every two or three days. This operation is initiated when the CLA boron concentration decreases to 2,450 ppm (as a result of dilution from the RCS inleakage) to ensure the minimum TS limit of 2,400 ppm is not violated.

During this drain and fill operation, which takes approximately four hours, the CLA is inoperable because of TS level and pressure requirements not being satisfied. As the RCS boron concentration decreases over core life, these drain and fill evolutions will become more frequent with one being required approximately every 26 hours (at assumed 0.2-gpm inleakage) when end of core life is reached. Accumulator availability is accordingly decreased as a result of these drain and refill evolutions. Additionally, the more frequent evolutions present an increased burden on operational personnel.

Options considered for resolution included shutdown and repair of the check valves, development of an online method to vent off the check valve leakage, or reduction of the CLA boron concentration requirements to decrease the frequency of necessary drain and refill evolutions. Shutdown and repair of the check valves at this point in the fuel cycle would result in accumulation of large radiation dose at the valves in conjunction with a high temperature work environment, which would further exacerbate task dose. Additionally, RCS draindown to a reduced inventory condition for a nonrefueling outage activity would create potential for a loss of residual heat removal (RHR) event coincident with a loaded "hot" core. Accordingly, delay of this activity to a refueling outage could result in reduced task dose, elimination of an additional reduced inventory evolution by conducting this activity during another scheduled reduced inventory condition and minimization of consequences of a loss of RHR event. The online vent approach does not appear feasible at this time because of the large amount of vent piping upgrade to American Society of Mechanical Engineers, Section III, Class 3, that would be required.

For these reasons, this temporary reduction of CLA boron concentration requirements is considered the best option for near-term resolution, which will decrease the drain and fill evolution frequency and increase overall CLA availability. This decision is made after weighing the safety significance of retaining the current small inleakage condition relative to the previously noted concerns and generation costs for incurring an additional outage for repair.

The proposed TS change would allow one of the four accumulators to be considered operable with concentration between 1,900- and 2,700-ppm boron. This would significantly decrease the frequency of projected drain and fill evolutions to approximately once every 19 days based on approximately 1,000-ppm RCS boron concentration and an inleakage of 0.2 gpm or less. This frequency will increase throughout the fuel cycle as RCS boron concentration decreases (to approximately once every six days), but will not be as limiting as it is with the current 2,400- to 2,700-ppm boron TS requirement. This change will improve CLA availability, reduce operational burden, and decrease potential for a forced shutdown because of problems encountered during drain and fill evolutions.

Justification for Change

The TS boron requirements for CLAs were increased from a range of between 1,900 and 2,100 ppm to between 2,400 and 2,700 ppm, before Cycle 5 operation, to account for changes at SQN, such as deactivation of the boron injection tank, removal of upper head injection system, use of Vantage 5 Hybrid fuel assemblies, and increase of fuel cycle length along with other considerations. In performing the evaluation to account for these changes, the strategy employed was to select the highest boron concentration possible so that it would bound the deactivation of the boron injection tank (approximately 55-ppm penalty), to remove the upper head injection (approximately 45-ppm penalty), meet the loss of coolant accident (LOCA) postaccident recirculation subcriticality sump boron requirements specified in the Final Safety Analysis Report and TS, and to be acceptable to the NRC. This would also provide a reasonable margin to the minimum boron concentration for future fuel reloads. For Cycle 5 of SQN Unit 2, this increase in the TS boron requirement is very conservative primarily because of overall core reactivity being well below the level considered for this new minimum CLA boron concentration.

Westinghouse Electric Corporation has issued Safety Evaluation Check List (SECL) 90-631 to address the acceptability of reducing the CLA boron concentration from between 2,400 and 2,700 ppm to between 1,900 and 2,700 ppm for one CLA. This evaluation applies only to SQN Unit 2 during Cycle 5 operation. The SECL considers LOCA and non-LOCA accidents and addresses radiological consequences and piping thermal loading concerns. The accidents evaluated are large break LOCA; small break LOCA; post-LOCA, long-term core cooling; steamline break core response; and steamline break mass and energy release inside containment. All other SQN licensing basis accidents do not decrease RCS pressure below the CLA injection pressure of 615 pounds per square inch absolute (psia) and therefore would not be affected by the change in boron concentration. In addition, LOCA hydraulic forcing functions and hot leg switchover to prevent potential boron precipitation were considered in the SECL.

The conclusions of SECL 90-631 are that the CLA boron concentration reduction to 1,900 ppm for one CLA is acceptable for Unit 2 Cycle 5 with respect to the safety analysis for the accidents and functions considered above. These conclusions are based upon the following:

1. For non-LOCA safety analysis, all four of the accumulators were conservatively assumed to remain at 1,900 ppm. Thus, there is no impact of allowing one accumulator to decrease back to 1,900 ppm for the remainder of the Unit 2 Cycle 5 outage.

2. Radiological consequences were evaluated, and it was determined that the affect of having one of the accumulators with a boron concentration of 1,900 as opposed to 2,400 ppm with respect to post-LOCA sump equilibrium solution boron concentration is so small that a quantitative change could not be determined.

3. For LOCA safety analysis, the proposed change in boron concentration has no impact on either the large or small break LOCA's margin calculated to exist to the regulatory limits of 10 CFR 50.46 (the accumulator boron concentration does not affect the peak clad temperature estimates made in large or small break LOCA analysis). The post-LOCA, long-term core cooling requirements of 10 CFR 50.46, paragraph (b), item (5), "Long Term Cooling," were also evaluated. The intent of the analysis is to ensure the core remains subcritical following a LOCA. The Westinghouse commitment is that the reactor will remain shut down by borated emergency core cooling system water residing in the sump post-LOCA. The conservative direction (less margin direction) for this calculation is to reduce the mixed mean sump boron concentration (reference WCAP-8339). The decrease in boron concentration in one accumulator will lower the mixed mean sump boron concentration. Westinghouse indicates that a conservative estimate of the mean sump mixture boron concentration, given one accumulator at 1,900 ppm, is approximately 1,980 ppm (at the most limiting point in core life). For the core to remain subcritical with Unit 2's current Cycle 5 reload, a mean sump mixture of approximately 1,800 ppm (at the most limiting point in core life) would be required. Thus, a margin of 180 ppm currently exists to maintain the core subcritical. The decrease of one CLA from 2,400- to 1,900-ppm boron reduces the mixed mean sump boron concentration by approximately 5 ppm.

   The above discussions serve to show that more than sufficient margin exists for Unit 2 to continue to operate with one CLA at 1,900 ppm during its Cycle 5 operation.

Additional Information

Recent industry experience regarding loadings that are the same type as NRC Bulletin 88-08 (i.e., thermal cycling and stratification) indicates that leakage of the magnitude currently experienced could lead to stratification. Stratification may cause higher pipe loads and displacements, and support loads, than determined in the design calculations.

A leakage of 0.2 gpm from the reactor coolant system to the No. 3 cold leg accumulator tank on the structural integrity of the piping and associated components for one 18-month fuel cycle of operation was evaluated. This evaluation considered both uniform thermal loading across the piping cross section and stratified thermal loading. The leakage is assumed to pass through two check valves and one open motor operated block valve and into the tank. This leakage is periodically removed from the accumulator tank using the fill and drain lines.

Based on this scenario, cyclic loading of the accumulator piping will occur only when the cold leg temperature cycles because of any shutdown that may occur during this fuel cycle. In one fuel cycle, this will produce only a few cycles of stress loading and, therefore, fatigue has been determined not to be a significant issue. As a conservative measure, visual inspections of the accumulator line piping and supports are planned for the next refueling outage to determine if excessive displacements or loadings have occurred because of stratified thermal loading caused by the RCS inleakage.

Environmental Impact Evaluation

The proposed change request does not involve an unreviewed environmental question because operation of SQN Unit 2 in accordance with this change would not:

1. Result in a significant increase in any adverse environmental impact previously evaluated in the Final Environmental Statement (FES) as modified by the staff's testimony to the Atomic Safety and Licensing Board, supplements to the FES, environmental impact appraisals, or decisions of the Atomic Safety and Licensing Board.

2. Result in a significant change in effluent or power levels.

3. Result in matters not previously reviewed in the licensing basis for SQN that may have a significant environmental impact.

ENCLOSURE 3

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SEQUOYAH NUCLEAR PLANT UNIT 2

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DETERMINATION OF NO SIGNIFICANT HAZARDS CONSIDERATION

ENCLOSURE 3

Significant Hazards Evaluation

TVA has evaluated the proposed technical specification (TS) change and has determined that it does not represent a significant hazards consideration based on criteria established in 10 CFR 50.92(c). Operation of Sequoyah Nuclear Plant (SQN) in accordance with the proposed amendment will not:

1. Involve a significant increase in the probability or consequences of an accident previously evaluated.

   The change of boron concentration requirements for a cold leg injection accumulator (CLA) cannot increase the probability of an accident because the CLA only provides accident mitigation functions and the boron concentration of a CLA cannot initiate any design basis accident. The consequences of an accident will not be increased as demonstrated in Westinghouse Electric Corporation's Safety Evaluation Check List (SECL) 90-631. This SECL evaluates all affected design basis accidents and verifies the acceptability of having one CLA at 1,900 parts per million (ppm) boron concentration with respect to the safety analysis. Additionally, if no changes were implemented, the CLA availability for accident mitigation would be reduced and thereby increase the possibility that the consequences of an accident could be increased. Therefore, this change will reduce the possibility that the consequences of an accident will be increased.

2. Create the possibility of a new or different kind of accident from any previously analyzed.

   CLA boron concentration changes cannot create any accident. The CLA boron concentration requirements in the TS are for accident mitigation purposes only and therefore would not contribute to the creation of any accident previously analyzed or not.

3. Involve a significant reduction in a margin of safety.

   The decrease from 2,400- to 1,900-ppm boron concentration for one CLA does not impact any margin of safety. This boron reduction is acceptable because extra conservatism exists in the present CLA boron concentration TS requirements. The changes to increase the minimum CLA boron concentration to 2,400 ppm employed the strategy to select the highest possible boron concentration to bound SQN Cycle 5 design changes and accommodate future fuel reloads. This provides CLA boron concentrations well above that required for the margin of safety. This decrease in CLA boron concentration reduces the available mar of the 180-ppm, mixed mean sump boron concentration to maintain th core subcritical by approximately 5 ppm. Therefore, additional conservatism exists in CLA boron concentration that will allow th reduction to 1,900-ppm boron without affecting the required margin safety.