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

July 13, 2000

TVA-SQN-TS-00-17 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 - EXIGENT TECHNICAL SPECIFICATION (TS) CHANGE NO. 00-17, "ULTIMATE HEAT SINK (UHS)"

References:
1. TVA letter to NRC dated August 21, 1995, "Sequoyah Nuclear Plant (SQN) - Exigent Technical Specification (TS) Change 95-21, "Ultimate Heat Sink UHS"
2. NRC letter to TVA dated September 13, 1995, "Issuance of Amendments (TAC NOS. M93316 and M93317)(TS 95-21)"

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 revises TS Limiting Condition of Operation (LCO) 3.7.5.c to allow for an increase in SQN's UHS temperature to 87 °F until September 30, 2000.

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 Tennessee State Department of Public Health.

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The failure to satisfy TS LCO 3.7.5.c will require a forced shutdown of both units. If the forecast conditions occur, the temporary increase in UHS temperature will alleviate this requirement at a time when electrical demand is at a premium. Therefore, TVA requests that this proposed change be processed on an exigent basis.

The need for this change was only recently identified and TVA has pursued it on a priority basis since that time. Please note that current conditions are subject to change based on the amounts of rainfall and climate changes within the Tennessee Valley region.

The above referenced letters are associated with a 1995 TS amendment that was approved for SQN on an exigent basis. TVA is evaluating a permanent increase to SQN's analyses for UHS temperature in conjunction with a permanent TS change that would alleviate the need for interim measures during the summer months when river temperatures increase.

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. A TVA commitment is listed on Enclosure 3.

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 13th day of July

Peggy M. Billingsley
Notary Public

My Commission Expires October 9, 2002

Enclosures
cc: See page 3

Enclosures
cc (Enclosures):

Mr. R. W. Hernan, Project Manager
Nuclear Regulatory Commission
One White Flint, North
11555 Rockville Pike
Rockville, Maryland 20852-2739

Mr. Lawrence E. Nanny, Director (w/o Enclosures)
Division of Radiological Health
Third Floor
L&C Annex
401 Church Street
Nashville, Tennessee 37243-1532

NRC Resident
Sequoyah Nuclear Plant
2600 Igou Ferry Road
Soddy-Daisy, Tennessee 37384-2000

Regional Administrator
U.S. Nuclear Regulatory Commission
Region II
Atlanta Federal Center
61 Forsyth St., SW, Suite 23T85
Atlanta, Georgia 30303-3415

ENCLOSURE 1

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

PROPOSED TECHNICAL SPECIFICATION (TS) CHANGE 00-17
"ULTIMATE HEAT SINK (UHS)"

DESCRIPTION AND EVALUATION OF THE PROPOSED CHANGE

I. DESCRIPTION OF THE PROPOSED CHANGE

TVA proposes to modify the SQN Units 1 and 2 TSs to revise TS Limiting Condition of Operation (LCO) 3.7.5.c to allow for an increase in the UHS temperature from 84.5°F (°F) to 87.0°F.

SQN TS LCO 3.7.5.c currently states: "When the water level is above 680 feet mean sea level USGS datum, the average ERCW supply header water temperature may be less than or equal to 84.5°F." TVA's proposed change provides an asterisk after 84.5°F with a footnote that reads, "87.0°F is allowed until September 30, 2000."

II. REASON FOR THE PROPOSED CHANGE

The Tennessee River (Chickamauga reservoir) serves as the UHS for both units at TVA's SQN. SQN TS 3.7.5.c currently limits this UHS temperature to less than or equal to 84.5°F when the water level is above 680 feet. This maximum temperature limit ensures that sufficient cooling capacity is available to either: (1) provide normal cooldown of the facility or (2) to mitigate the effects of accident conditions within acceptable limits. The maximum temperature limitation is based on providing a 30-day (reference Regulatory Guide 1.27) cooling water supply to safety-related equipment without exceeding their design basis temperature. A reservoir elevation of 680 feet is established in TS 3.7.5.c to ensure that sufficient margin exists to remove plant heat loads by way of the essential raw cooling water (ERCW) system concurrent with a design basis accident.

The average water temperature of the Chickamauga reservoir (as measured at SQN's ERCW headers) on July 12, 2000, was 81.4°F. This high temperature is the result of drought induced low flow conditions in the Tennessee River System. The Chickamauga reservoir water level is above the

680-foot elevation and is expected to remain above 680-foot elevation. Continuing reservoir conditions could cause the average ERCW temperature to increase. This increase could cause the average temperature to reach the TS limit of 84.5°F as early as July 22, 2000.

In the event the 84.5°F limit is reached, the TS action would require that both units be placed in hot standby within 6 hours and in cold shutdown within the following 30 hours. TVA is requesting an exigent TS change to allow increasing the maximum UHS temperature to 87°F until September 30, 2000. This exigent TS change proposes to use existing margins in SQN's safety analysis for increasing SQN's UHS temperature limit from 84.5°F to 87°F.

III. SAFETY ANALYSIS

Due to the potential for increased river water temperatures on the Chickamauga Reservoir during the next 60 days, evaluations were performed to determine the effects of exceeding the present TS UHS limit of 84.5 °F at a river level of 680 feet. TVA's Engineering staff has identified existing margins in the UHS safety analysis that would justify increasing the limit from 84.5°F to 87°F. In addition, the following compensatory action will be put in place when SQN's UHS temperature is equal to or greater than 84.5°F:

SQN will control actions that would impact ERCW flow rates or availability of ERCW pumps to only those needed to maintain operability.

The following analysis has been identified as being directly affected by the increased UHS temperature:

<u>Containment Pressure Analysis (SQN Final Safety Analysis Report [FSAR] Chapter 6)</u>

The containment pressure analysis (WCAP-12455 Supplement 1) was reviewed to determine the effects on the overall containment peak accident pressure relative to the ERCW temperature. This analysis is based on a double-ended pump suction guillotine loss-of-coolant accident (LOCA) with a minimum ice condenser ice weight of 1.79 million pounds of ice with minimum safety injection capability. The UHS temperature used in this analysis is 85°F which is 0.5° above the TS UHS limit of 84.5°F. Since the containment spray system heat exchanger is served by the ERCW system, the effects of increased ERCW temperature will ultimately affect the amount of energy transferred between containment spray and the heat sink

(i.e., the heat out of containment) after the plant switches over to containment sump recirculation (i.e., after the contents of the refueling water storage tank are emptied via containment spray and emergency core cooling system [ECCS]). The analysis was reviewed and computer model sensitivities were performed by Westinghouse Electric Company at varying ERCW temperatures above the TS limit. By allowing this parameter to be the only condition varied, then no other licensing or design basis assumption for the containment analysis will be challenged. These sensitivity analyses have shown that with an increase in ERCW temperature of 4°F, the corresponding increase in peak containment pressure is 0.44 pounds per square inch (psi) with no adverse affect on the margin to ice bed meltout time relative to containment sump inventory swapover. Therefore, based on the present calculated maximum containment pressure of 11.45 pounds per square inch gauge (psig) (due to a large break LOCA), the maximum peak containment pressure expected with an ERCW temperature of 89°F is 11.89 psig. This 11.89 psig containment peak pressure is still below the TS integrated leak rate test (ILRT) pressure and containment design pressure of 12.0 psig. It should also be noted that with an ERCW temperature of 87°F, the peak pressure is calculated to be 11.49 psig. This analysis is based on our current licensed containment analysis.

TVA has recently been notified of two potential containment model issues by Westinghouse which are independent of the ultimate heat sink temperature. These issues are: (1) modeling of the ice condenser drain as a two phase mixture instead of a single phase as currently modeled under the LOTIC-1 code, and (2) a long-term pressure penalty of 0.1 psi for the generation of hydrogen post-LOCA. The effect of the ice condenser drain modeling will be an increased peak containment pressure after ice bed meltout since energy which was previously transferred solely to the containment sump must be apportioned to the containment atmosphere based on a two-phase mixture. Both of these issues are currently being evaluated by Westinghouse as to their validity but TVA has chosen to include these potential issues in an additional set of sensitivity studies for this change request. Based on these issues and the resultant effect on peak containment pressure, it is necessary to increase the amount of ice available for steam condensation in the analysis.

SQN currently has a TS minimum limit of 2,082,024 pounds of ice which must be available at the start of a fuel cycle to ensure that at least 1,790,000 pounds are available at the end of the fuel cycle taking sublimation (at a 15 percent rate) and measurement errors of 1 percent

into account. SQNs historical sublimation rate (as verifed under our surveillance program) for the past several cycles has been less than 8 percent based on a 95 percent level of confidence for both units. In addition, the amount of ice available at the start of Units 1 and Unit 2 most recent fuel cycle was 2,671,909 pounds and 2,631,401 pounds, respectively. Based on that information, two additional analyses were performed to ascertain the effects of crediting an increased ice mass for an increased UHS temperature of 87 °F and the two potential LOTIC-1 modeling errors. The first analysis utilized an 8 percent sublimation and the minimum TS beginning fuel cycle ice weight of 2,082,0243 pounds. Based on an 8 percent historical sublimination rate, this leaves an end of fuel cycle weight of 1,915,462 pounds of ice, however a value of 1,910,000 pounds was utilized for additional conservatism. This analysis resulted in a peak containment pressure of 11.56 psi and a negligible effect on ice bed meltout time relative to containment sump swapover. The second analysis utilized a weight more representative of the actual ice mass loaded. A weight or 2,631,401 pounds of ice was utilized (which is the Unit 2 value and is the lowest as installed ice weight between the units) and was reduced by 8 percent. A value of 2,400,000 pounds was then selected and the results indicate that for crediting the actual ice mass loaded, an increased UHS temperature of 87 °F and the two potential LOTIC-1 modeling errors, the containment peak pressure is 10.3 psig with an ice bed meltout time almost 2 times greater than the current licensing basis. As can be seen from the various sensitivity evaluations performed, the increase in the UHS by 2.5°F does not challenge the design of containment.

The Containment Subcompartment Pressure analysis is not affected by this increase in the ultimate heat sink temperature. This analysis is for the immediate (first few seconds) response to the double-ended break and does not utilize the UHS as a heat removal source. Likewise, the peak containment temperature analysis is unaffected by the ERCW temperature increase. The peak containment temperature results from a main steam line break and occurs very early in the transient during blowdown from the faulted steam generator and is not governed by ERCW temperature at the time when swapover to the containment sump is initiated, the containment temperature is well below the calculated maximum.

As for long-term containment cooling capability, it has been previously shown in analyses supporting TS Change 88-21 that any increase in the UHS temperature will decrease the rate of cooldown. The analysis that was

utilized to support the TS 88-21 change showed that the correlation between the UHS temperature and the long-term containment temperature was basically one-to-one. Therefore, it is justifiable that the long-term cooling effect of the lower compartment coolers (cooled by ERCW) would increase the long-term containment temperature by 2°F. This is an analytical result and does not take into account the actual performance of the ERCW (flowrates higher than assumed in the analyses, but proven by TS testing). Extending the long-term cooldown rate of containment does not affect the results of this analysis to the point of equipment degradation (i.e., environmental qualification limits). It should also be noted that the long-term definition for these events is 100 days and it is not justifiable to assume that the UHS will be at elevated temperatures during this 100 day period (this temporary increase in river water temperature is not expected to last into the fall season). Therefore, the long-term containment temperature analysis, the long-term cooling analysis for pipe breaks outside of containment and the environmental qualification analysis would not be affected by this short-term variance.

The increased river water temperatures may also result in excess heatup of the containment sump water temperatures following a postulated large break LOCA. Subsequently, the net positive suction head (NPSH) requirements on the containment spray pumps and residual heat removal pumps are not challenged. The current analysis (SQN-SQS2-0082) for both pumps assumes a containment sump water temperature of 190°F and a minimum sump water elevation. The peak post LOCA long-term sump water temperature is presently analyzed as 160°F. Sensitivity analyses have shown that the long-term sump temperature will increase less than 5°F for every corresponding 1°F increase in river water temperature. Therefore, based on the above assumed maximum of 87°F river water temperature, sufficient margin to NPSH requirements for the residual heat removal (RHR) and containment spray pumps is not challenged.

It should also be noted that other analytical variables outside of heat sink temperature (i.e., core decay heat, ECCS flow capability, and containment spray heat exchanger tube plugging criteria) are also within conservative margins with respect to actual plant conditions. Although no changes to these parameters were made to the above analyses and sensitivity studies, it is prudent to mention them to further show that the proposed variance is conservative with respect to the safety analyses.

The following analyses have been identified as not being affected by the increased ERCW temperatures since they do not depend upon heat removal via the UHS for mitigation of the consequences of the event:

- Major or minor secondary system ruptures
- Complete loss of forced reactor coolant system (RCS) flow or single reactor coolant pump locked rotor
- Rod cluster withdrawal at full power
- Rod cluster control assembly ejection
- Fuel handling accident
- Waste gas decay tank rupture
- Inadvertent loading of a fuel assembly into an improper location

The consequences of a steam generator tube rupture will not be altered by the proposed change. However, the last mitigative action item listed for the operator in the FSAR analysis for this event is initiation of RHR for cooldown. The RHR heat exchanger does transfer its heat load to the UHS via the component cooling system (CCS). Therefore, cooldown of the RCS may be minimally extended. The extended cooldown does not represent any unacceptable consequences.

The ECCS analysis is unaffected since the 10 CFR 50.46 limits and Appendix K requirements are met in the short-term accident mitigation period. As previously discussed, the swapover to containment inventory occurs after these analyzed peaks.

An evaluation of the latest ERCW flow balance data taken in June 1997 was performed to determine impacts on safety-related equipment and components served by ERCW. This evaluation concluded that for major safety-related heat exchangers the limiting component is Unit 2 CSS Heat Exchanger 2B with a 10 percent flow margin. The CSS heat exchanger is modeled directly in the containment peak pressure analysis in which the UHS data point (ERCW temperature) input was changed to 87°F. As previously discussed, this analysis met the established acceptance criteria with an 87°F UHS temperature.

Other large heat exchangers were found to have higher flow margin than the CSS heat exchangers, which will more than offset the increase in UHS maximum temperature to 87°F. Other ERCW served components were also evaluated, such as safety-related (attendant) room and oil coolers. These components were determined to have sufficient flow margin to more than offset any performance degradation caused by an increase in the UHS temperature. Operational and

accident performance capabilities of safety-related components will not be decreased.

From the evaluations performed, the increase to 87°F for SQN's UHS will not challenge any safety-related equipment served by ERCW due to the flow margins, which currently exist in the ERCW system.

An evaluation was performed for the affected ERCW piping and CCS piping. Engineering calculations show that the analyzed temperature ranges for the affected piping envelopes the 2.5°F temperature increase. Accordingly, the piping, supports and components remain qualified to the design basis and continues to meet code allowables with the proposed temperature increase to 87°F.

In general, TVA used "Design by Rule" methodology (ASME Section III, Class 2 & 3; MSS-SP-66, or ANSI B16.5) for ERCW components. The 87°F temperature is well within the pressure-temperature limits established by "Design by Rule."

In conclusion, ERCW piping, pipe supports, and components will remain operable for the increase in river temperature to 87°F.

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 [or operating license(s)], 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. The proposed amendment does not involve a significant increase in the probability or consequences of an accident previously evaluated.

The probability of occurrence or the consequences of an accident are not increased as presently analyzed in the safety analyses since the objective of the event mitigation is not changed. No changes in event classification as discussed in Final Safety Analysis Report Chapter 15 will occur due to the increased river water temperature (with respect to both containment integrity and safety-system heat removal). Therefore, the probability of an accident or malfunction of equipment presently evaluated in the safety analyses will not be increased. The containment design pressure is not challenged by allowing an increase in the river water temperature above that allowed by the TSs, thereby

ensuring that the potential for increasing offsite dose limits above those presently analyzed at the containment design pressure of 12.0 pounds per square inch is not a concern. In addition, SQN's essential raw cooling water (ERCW) and component cooling system (CCS) piping, pipe supports remain qualified to the design basis and code allowables. Therefore, the proposed variance to TS 3.7.5.c will not significantly increase the probability or consequences of an accident previously evaluated.

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

The possibility of a new or different accident situation occurring as a result of this condition is not created. The ERCW system is not an initiator of any accident and only serves as a heat sink for normal and upset plant conditions. By allowing this change in operating temperatures, only the assumptions in the containment pressure analysis are changed. The variance in the ERCW temperature results in minimal increase in peak containment accident pressure. As for the net positive suction head requirements relative to the essential core cooling system and containment spray system, it has been demonstrated that this operational variance will not challenge the present design requirements. In addition, increased river temperatures will not significantly affect the design basis analysis of ERCW or CCS piping, pipe supports, and components. Therefore, the potential for creating a new or unanalyzed condition is not created.

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

The margin of safety as reported in the basis for the TSs is also not reduced. The design pressure for the containment and all supporting equipment and components for worse-case accident condition is 12.0 pounds per square inch gauge (psig). This variance in river water temperature will not challenge the design condition of containment. Further, 12.0 psig design limit is not the failure point of containment, which would lead to the loss of containment integrity. In addition, analysis of the margins associated with ERCW and CCS piping, pipe supports, and components indicate these remain enveloped by the proposed increase in river temperature. Therefore, a significant reduction in the margin to safety is not created by this variance.

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.

ENCLOSURE 2

TENNESSEE VALLEY AUTHORITY
SEQUOYAH PLANT (SQN)
UNITS 1 AND 2

PROPOSED TECHNICAL SPECIFICATION (TS) CHANGE 00-17
MARKED PAGES

I. AFFECTED PAGE LIST

Unit 1

3/4 7-14

Unit 2

3/4 7-14

II. MARKED PAGES

See attached.

3/4.7.5 ULTIMATE HEAT SINK

LIMITING CONDITION FOR OPERATION

3.7.5 The ultimate heat sink shall be OPERABLE with:

a. A minimum water level at or above elevation 670 feet mean sea level USGS datum, and

b. An average ERCW supply header water temperature of less than or equal to 83°F, and

c. When the water level is above 680 feet mean sea level USGS datum, the average ERCW supply header water temperature may be less than or equal to 84.5°F.*

APPLICABILITY: MODES 1, 2, 3 and 4.

ACTION:

With the requirements of the above specification not satisfied, be in at least HOT STANDBY within 6 hours and in COLD SHUTDOWN within the following 30 hours.

SURVEILLANCE REQUIRMENTS

4.7.5.1 The ultimate heat sink shall be determined OPERABLE at least once per 24 hours by verifying the average ERCW supply header temperature and water level to be within their limits.

*87°F is allowed until September 30, ~~1995.~~ 2000

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ENCLOSURE 3

TENNESSEE VALLEY AUTHORITY
SEQUOYAH PLANT (SQN)
UNITS 1 AND 2

TVA COMMITMENT

The following compensatory action will be put in place when SQN's Ultimate Heat Sink (UHS) temperature is equal to or greater than 84.5 degrees F:

SQN will control any actions that would impact Essential Raw Cooling Water (ERCW) System flow rates or availability of ERCW pumps to only those needed to maintain operability.