March 23, 1990

Docket Nos. 50-327
and 50-328

Mr. Oliver D. Kingsley, Jr.
Senior Vice President, Nuclear Power
Tennessee Valley Authority
6N 38A Lookout Place
1101 Market Street
Chattanooga, Tennessee 37402-2801

Dear Mr. Kingsley:

SUBJECT: AUXILIARY AIR SUPPLY TO AUXILIARY FEEDWATER SYSTEM (TAC 76080/76081) (TS 90-10) - SEQUOYAH NUCLEAR PLANT, UNITS 1 AND 2

Enclosed are changes to the Bases pages for Section 3/4.7.1.2, Auxiliary Feedwater System, of the Sequoyah Nuclear Plant, Units 1 and 2, Technical Specifications (TSs). The change for each unit adds text to the TS Bases explaining that the loss of a single train of the auxiliary air supply to the auxiliary feedwater (AFW) system is the same as the loss of a single AFW pump and, therefore, has the same action statement in TS 3/4.7.1.2 as that for a single inoperable AFW pump. The revised TS Bases clarify the requirements in TS 3/4.7.1.2 and in the definition of operable for the AFW system. This is based on the enclosed Safety Evaluation.

These changes are not amendments to the licenses for Units 1 and 2. In accordance with 10 CFR 50.36(a), the TS Bases include statements on the bases or reasons for specifications in the TSs, but they are not part of the TSs or the license.

Sincerely,

Original signed by:

Suzanne Black, Assistant Director
for Projects
TVA Projects Division
Office of Nuclear Reactor Regulation

Enclosures:
1. Bases Change for Sequoyah Unit 1
2. Bases Change for Sequoyah Unit 2
3. Safety Evaluation

cc w/enclosures:
See next page

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111

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REVISED BASES PAGES

FACILITY OPERATING LICENSE NO. DPR-77

DOCKET NO. 50-327

Revise the Appendix A Technical Specifications by removing the pages identified below and inserting the enclosed pages. The revised pages are identified by the captioned amendment number and contain marginal lines indicating the area of change.

REMOVE	INSERT
B 3/4 7-1	B 3/4 7-1
B 3/4 7-2	B 3/4 7-2

3/4.7.1 TURBINE CYCLE

3/4.7.1.1 SAFETY VALVES

The OPERABILITY of the main steam line code safety valves ensures that the secondary system pressure will be limited to within 110% (1194 psig) of the system design pressure during the most severe anticipated system operational transient. The maximum relieving capacity is associated with a turbine trip from 100% RATED THERMAL POWER coincident with an assumed loss of condenser heat sink (i.e., no steam bypass to the condenser).

The specified valve lift settings and relieving capacities are in accordance with the requirements of Section III of the ASME Boiler and Pressure Code, 1971 Edition. The total relieving capacity for all valves on all of the steam lines is 1.9×10^7 lbs/hr at 1170 psig which is 127 percent of the total secondary steam flow of 1.493×10^7 lbs/hr at 100% RATED THERMAL POWER. A minimum of 2 OPERABLE safety valves per steam generator ensures that sufficient relieving capacity is available for the allowable THERMAL POWER restriction in Table 3.7-2.

STARTUP and/or POWER OPERATION is allowable with safety valves inoperable within the limitations of the ACTION requirements on the basis of the reduction in secondary system steam flow and THERMAL POWER required by the reduced reactor trip settings of the Power Range Neutron Flux channels. The reactor trip setpoint reductions are derived on the following bases:

For 4 loop operation

$$SP = \frac{(X) - (Y)(V)}{X} \times (109)$$

For 3 loop operation

$$SP = \frac{(X) - (Y)(U)}{X} \times (76)$$

Where:

SP = reduced reactor trip setpoint in percent of RATED THERMAL POWER

V = maximum number of inoperable safety valves per steam line

U = maximum number of inoperable safety valves per operating steam line.

109 = Power Range Neutron Flux-High Trip Setpoint for 4 loop operation.

76 = Maximum percent of RATED THERMAL POWER permissible by P-8 Setpoint for 3 loop operation.

X = Total relieving capacity of all safety valves per steam line in lbs/hour, 4.75×10^6 lbs/hour at 1170 psig.

Y = Maximum relieving capacity of any one safety valve in lbs/hour, 950,000 lbs/hour at 1170 psig.

3/4.7.1.2 AUXILIARY FEEDWATER SYSTEM

The OPERABILITY of the auxiliary feedwater system ensures that the Reactor Coolant System can be cooled down to less than 350°F from normal operating conditions in the event of a total loss of off-site power.

The steam driven auxiliary feedwater pump is capable of delivering 880 gpm (total feedwater flow) and each of the electric driven auxiliary feedwater pumps are capable of delivering 440 gpm (total feedwater flow) to the entrance of the steam generators at steam generator pressures of 1100 psia. At 1100 psia the open steam generator safety valve(s) are capable of relieving at least 11% of nominal steam flow. A total feedwater flow of 440 gpm at pressures of 1100 psia is sufficient to ensure that adequate feedwater flow is available to remove decay heat and reduce the Reactor Coolant System temperature to less than 350°F where the Residual Heat Removal System may be placed into operation. The surveillance test values ensure that each pump will provide at least 440 gpm plus pump recirculation flow against a steam generator pressure of 1100 psia.

Each motor-driven auxiliary feedwater pump (one Train A and one Train B) supplies flow paths to two steam generators. Each flow path contains an automatic air-operated level control valve (LCV). The LCVs have the same train designation as the associated pump and are provided trained air. The turbine-driven auxiliary feedwater pump supplies flow paths to all four steam generators. Each of these flow paths contains an automatic air-operated LCV, two of which are designated as Train A, receive A-train air, and provide flow to the same steam generators that are supplied by the B-train motor-driven auxiliary feedwater pump. The remaining two LCVs are designated as Train B, receive B-train air, and provide flow to the same steam generators that are supplied by the A-train motor-driven pump. This design provides the required redundancy to ensure that at least two steam generators receive the necessary flow assuming any single failure. It can be seen from the description provided above that the loss of a single train of air (A or B) will not prevent the auxiliary feedwater system from performing its intended safety function and is no more severe than the loss of a single auxiliary feedwater pump. Therefore, the loss of a single train of auxiliary air only affects the capability of a single motor-driven auxiliary feedwater pump because the turbine-driven pump is still capable of providing flow to two steam generators that are separate from the other motor-driven pump.

3/4.7.1.3 CONDENSATE STORAGE TANK

The OPERABILITY of the condensate storage tank with the minimum water volume ensures that sufficient water is available to maintain the RCS at HOT STANDBY conditions for 2 hours with steam discharge to the atmosphere concurrent with total loss of off-site power. The contained water volume limit includes an allowance for water not useable because of tank discharge line location or other physical characteristics.

REVISED BASES PAGES

FACILITY OPERATING LICENSE NO. DPR-79

DOCKET NO. 50-328

Revise the Appendix A Technical Specifications by removing the pages identified below and inserting the enclosed pages. The revised pages are identified by the captioned amendment number and contain marginal lines indicating the area of change. Overleaf pages* are provided to maintain document completeness.

REMOVE	INSERT
B 3/4 7-1	B 3/4 7-1
B 3/4 7-2	B 3/4 7-2
B 3/4 7-3	B 3/4 7-3
B 3/4 7-4	B 3/4 7-4*

BASES

3/4.7.1 TURBINE CYCLE

3/4.7.1.1 SAFETY VALVES

The OPERABILITY of the main steam line code safety valves ensures that the secondary system pressure will be limited to within 110% (1194 psig) of the system design pressure during the most severe anticipated system operational transient. The maximum relieving capacity is associated with a turbine trip from 100% RATED THERMAL POWER coincident with an assumed loss of condenser heat sink (i.e., no steam bypass to the condenser).

The specified valve lift settings and relieving capacities are in accordance with the requirements of Section III of the ASME Boiler and Pressure Code, 1971 Edition. The total relieving capacity for all valves on all of the steam lines is 1.9×10^7 lbs/hr at 1170 psig which is 127 percent of the total secondary steam flow of 1.493×10^7 lbs/hr at 100% RATED THERMAL POWER. A minimum of 2 OPERABLE safety valves per steam generator ensures that sufficient relieving capacity is available for the allowable THERMAL POWER restriction in Table 3.7-2.

STARTUP and/or POWER OPERATION is allowable with safety valves inoperable within the limitations of the ACTION requirements on the basis of the reduction in secondary system steam flow and THERMAL POWER required by the reduced reactor trip settings of the Power Range Neutron Flux channels. The reactor trip setpoint reductions are derived on the following bases:

For 4 loop operation

$$SP = \frac{(X) - (Y)(V)}{X} \times 109$$

For 3 loop operation

$$SP = \frac{(X) - (Y)(U)}{X} \times 76$$

Where:

SP = Reduced reactor trip setpoint in percent of RATED THERMAL POWER

V = Maximum number of inoperable safety valves per steam line

U = Maximum number of inoperable safety valves per operating steam line

109 = Power Range Neutron Flux-High Trip Setpoint for 4 loop operation

76 = Maximum percent of RATED THERMAL POWER permissible by P-8 Setpoint for 3 loop operation.

SAFETY VALUES (Continued)

X = Total relieving capacity of all safety valves per steam line in lbs/hour, 4.75×10^6 lbs/hr at 1170 psig

Y = Maximum relieving capacity of any one safety valve in lbs/hour, 9.5×10^5 lbs/hr at 1170 psig.

3/4.7.1.2 AUXILIARY FEEDWATER SYSTEM

The OPERABILITY of the auxiliary feedwater system ensures that the Reactor Coolant System can be cooled down to less than 350°F from normal operating conditions in the event of a total loss of off-site power.

The steam driven auxiliary feedwater pump is capable of delivering 880 gpm (total feedwater flow) and each of the electric driven auxiliary feedwater pumps are capable of delivering 440 gpm (total feedwater flow) to the entrance of the steam generators at steam generator pressures of 1100 psia. At 1100 psia the open steam generator safety valve(s) are capable of relieving at least 11% of nominal steam flow. A total feedwater flow of 440 gpm at pressures of 1100 psia is sufficient to ensure that adequate feedwater flow is available to remove decay heat and reduce the Reactor Coolant System temperature to less than 350°F where the Residual Heat Removal System may be placed into operation. The surveillance test values ensure that each pump will provide at least 440 gpm plus pump recirculation flow against a steam generator pressure of 1100 psia.

Each motor-driven auxiliary feedwater pump (one Train A and one Train B) supplies flow paths to two steam generators. Each flow path contains an automatic air-operated level control valve (LCV). The LCVs have the same train designation as the associated pump and are provided trained air. The turbine-driven auxiliary feedwater pump supplies flow paths to all four steam generators. Each of these flow paths contains an automatic air-operated LCV, two of which are designated as Train A, receive A-train air, and provide flow to the same steam generators that are supplied by the B-train motor-driven auxiliary feedwater pump. The remaining two LCVs are designated as Train B, receive B-train air, and provide flow to the same steam generators that are supplied by the A-train motor-driven pump. This design provides the required redundancy to ensure that at least two steam generators receive the necessary flow assuming any single failure. It can be seen from the description provided above that the loss of a single train of air (A or B) will not prevent the auxiliary feedwater system from performing its intended safety function and is no more severe than the loss of a single auxiliary feedwater pump. Therefore, the loss of a single train of auxiliary air only affects the capability of a single motor-driven auxiliary feedwater pump because the turbine-driven pump is still capable of providing flow to two steam generators that are separate from the other motor-driven pump.

3/4.7.1.3 CONDENSATE STORAGE TANK

The OPERABILITY of the condensate storage tank with the minimum water volume ensures that sufficient water is available to maintain the RCS at HOT STANDBY conditions for 2 hours with steam discharge to the atmosphere concurrent with total loss of off-site power. The contained water volume limit includes an allowance for water not usable because of tank discharge line location or other physical characteristics.

3/4.7.1.4 ACTIVITY

The limitations on secondary system specific activity ensure that the resultant off-site radiation dose will be limited to a small fraction of 10 CFR Part 100 limits in the event of a steam line rupture. This dose also includes the effects of a coincident 1.0 GPM primary to secondary tube leak in the steam generator of the affected steam line. These values are consistent with the assumptions used in the accident analyses.

3/4.7.1.5 MAIN STEAM LINE ISOLATION VALVES

The OPERABILITY of the main steam line isolation valves ensures that no more than one steam generator will blowdown in the event of a steam line rupture. This restriction is required to 1) minimize the positive reactivity effects of the Reactor Coolant System cooldown associated with the blowdown, and 2) limit the pressure rise within containment in the event the steam line rupture occurs within containment. The OPERABILITY of the main steam isolation valves within the closure times of the surveillance requirements are consistent with the assumptions used in the accident analyses.

3/4.7.2 STEAM GENERATOR PRESSURE/TEMPERATURE LIMITATION

The limitation on steam generator pressure and temperature ensures that the pressure induced stresses in the steam generators do not exceed the maximum allowable fracture toughness stress limits. The limitations of 70°F and 200 psig are based on a steam generator RT_{NDT} of 25°F and are sufficient to prevent brittle fracture.

3/4.7.3 COMPONENT COOLING WATER SYSTEM

The OPERABILITY of the component cooling water system ensures that sufficient cooling capacity is available for continued operation of safety related equipment during normal and accident conditions. The redundant cooling capacity of this system, assuming a single failure, is consistent with the assumptions used in the accident analyses.

3/4.7.4 ESSENTIAL RAW COOLING WATER SYSTEM

The OPERABILITY of the essential raw cooling water system ensures that sufficient cooling capacity is available for continued operation of safety related equipment during normal and accident conditions. The redundant cooling capacity of this system, assuming a single failure, is consistent with the assumptions used in the accident conditions within acceptable limits.

3/4.7.5 ULTIMATE HEAT SINK

The limitations on the ultimate heat sink water level and temperature ensure 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 limitation on maximum temperature is based on providing a 30 day cooling water supply to safety related equipment without exceeding their design basis temperature and is consistent with the recommendations of Regulatory Guide 1.27, "Ultimate Heat Sink for Nuclear Plants", March 1974.

The limitations on minimum water level are based on providing sufficient flow to the ERCW serviced heat loads after a postulated event assuming a time dependent drawdown of reservoir level. Flow to the major transient heat loads (CCS and CS heat exchangers) is balanced assuming a reservoir level of el. 670. The time independent heat loads (ESF room coolers, etc.) are balanced assuming a reservoir level of el. 636.

3/4.7.6 FLOOD PROTECTION

The requirements for flood protection ensures that facility protective actions will be taken and operation will be terminated in the event of flood conditions. A Stage 1 flood warning is issued when the water in the forebay is predicted to exceed 697 feet Mean Sea Level USGS datum during October 1 through April 15, or 703 Feet Mean Sea Level USGS datum during April 15 through September 30. A Stage II flood warning is issued when the water in the forebay is predicted to exceed 703 feet Mean Sea Level USGS datum. A maximum allowed water level of 703 Mean Sea Level USGS datum provides sufficient margin to ensure waves due to high winds cannot disrupt the flood mode preparation. A Stage I or Stage II flood warning requires the implementation of procedures which include plant shutdown. Further, in the event of a loss of communications simultaneous with a critical combination flood, headwaters, and/or seismically induced dam failure the plant will be shutdown and flood protection measures implemented.

3/4.7.7 CONTROL ROOM EMERGENCY VENTILATION SYSTEM

The OPERABILITY of the control room ventilation system ensures that 1) the ambient air temperature does not exceed the allowable temperature for continuous duty rating for the equipment and instrumentation cooled by this system and 2) the control room will remain habitable for operations personnel during and following all credible accident conditions. The OPERABILITY of this system in conjunction with control room design provisions is based on limiting the radiation exposure to personnel occupying the control room to 5 rem or less whole body, or its equivalent. This limitation is consistent with the requirements of General Design Criteria 19 of Appendix "A", 10 CFR 50. ANSI N510-1975 will be used as a procedural guide for surveillance testing.

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

ENCLOSURE 3

SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION

BASES CHANGE FOR AUXILIARY AIR SUPPLY TO AUXILIARY FEEDWATER SYSTEM

TENNESSEE VALLEY AUTHORITY

SEQUOYAH NUCLEAR PLANT, UNITS 1 AND 2

DOCKET NOS. 50-327 AND 50-328

1.0 INTRODUCTION

By letter dated February 22, 1990, the Tennessee Valley Authority (TVA) proposed to add text to Section 3/4.7.1.2, Auxiliary Feedwater System, of the Bases of the Sequoyah Nuclear Plant, Units 1 and 2, Technical Specifications (TSs). The text would explain that the loss of a single train of the auxiliary air system which supplies air to the auxiliary feedwater (AFW) system is the same as the loss of a single AFW pump and should have the same action statement in TS 3/4.7.1.2 as that for a single inoperable AFW pump.

2.0 EVALUATION

The auxiliary air system is common equipment to both units. It supplies backup or emergency air to equipment which is required for operation of each unit. The system has two separate trains to supply the separate trains of required equipment, as the AFW system for both units. With the definition of operable in TS Definition 1.18, the operability of the AFW system is dependent on the operability of the auxiliary air system because the latter system is needed for the AFW system to performed its intended function. The auxiliary air system provides backup air to the AFW air-operated level control valves (LCVs). The AFW system cannot perform its intended function if the LCVs can not operate.

Each motor-driven AFW pump (one Train A and one Train B) supplies two steam generators through its associated flow paths and LCVs. The turbine-driven AFW pump can supply each of the four steam generators through four flow paths and LCVs. Two of the flow paths and associated LCVs for the turbine-driven AFW pump are Train A and the remaining two are Train B. The loss of a single train of auxiliary air would result in the loss of the flow paths of the same train of the motor-driven and turbine-driven AFW pumps. The flow paths associated with the opposite train of auxiliary air (two from the motor-driven and two from the turbine-driven pumps) would be unaffected.

The loss of auxiliary air does not affect the operability of either the motor-driven pumps or the turbine-driven pump but only the associated LCVs. The loss of a single train of auxiliary air only affects the capability of a single motor-driven auxiliary feedwater pump because the turbine-driven pump is still capable of providing flow to two steam generators that are separate from the other motor-driven pump. Although the FCVs would be assumed to fail on two of the flow paths from the turbine driven AFW, the FCVs on the remaining two paths would be operable. The A-train LCVs associated with the turbine-driven AFW pump supply flow to the same two steam generators as the B-train motor-driven AFW pump, and the B-train paths supplied by the turbine-driven pump supply the same two generators as the A-train motor-driven pump. Therefore, the AFW system would be able to supply the required flow to the steam generators assuming any single failure of a train of auxiliary air supply.

Based on the above, the staff concludes that the loss of a single train of the auxiliary air system to the LCVs of AFW system is the same as loss of a single AFW pump and, therefore, should have the same action statement as that for an inoperable AFW pump. The text that TVA proposes to add to the Bases for TS 3/4.7.1.2 states the same, for a loss of one train of the auxiliary air system. Therefore, the staff concludes that the proposed change to the Bases of TS 3/4.7.1.2 is acceptable.

Principal Contributor: J. Donohew

Dated: March 23, 1990