

August 29, 2008

Mr. William R. Campbell, Jr.
Chief Nuclear Officer and
Executive Vice President
Tennessee Valley Authority
6A Lookout Place
1101 Market Street
Chattanooga, TN 37402-2801

SUBJECT: SEQUOYAH NUCLEAR PLANT, UNITS 1 AND 2 – ISSUANCE OF AMENDMENT
REGARDING AUXILIARY FEEDWATER START UPON TRIP OF MAIN
FEEDWATER PUMPS (TAC NOS. MD9525 AND MD9501)

Dear Mr. Campbell:

The Nuclear Regulatory Commission (Commission) has issued the enclosed Amendment No. 312 to Facility Operating License No. DPR-77 and Amendment No. 319 to Facility Operating License No. DPR-79 for the Sequoyah Nuclear Plant (SQN), Units 1 and 2, respectively. These amendments are in response to your application dated August 26, 2008, as supplemented on August 28, 2008, and revise the technical specifications. Your application requested that the proposed changes be processed on an emergency basis due to the near-term shutdown of SQN Unit 2.

The amendments revise requirements for the auxiliary feedwater system auto-start function associated with the trip of main feedwater pumps.

A copy of the Safety Evaluation is also enclosed. Notice of Issuance will be included in the Commission's biweekly *Federal Register* notice.

Sincerely,

/RA by TBoyce/

Brendan T. Moroney, Project Manager
Plant Licensing Branch II-2
Division of Operating Reactor Licensing
Office of Nuclear Reactor Regulation

Docket Nos. 50-327 and 50-328

Enclosures: 1. Amendment No. 319 to
License No. DPR-77
2. Amendment No. 312 to
License No. DPR-79
3. Safety Evaluation

cc w/enclosures: See next page

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TENNESSEE VALLEY AUTHORITY
DOCKET NO. 50-327
SEQUOYAH NUCLEAR PLANT, UNIT 1
AMENDMENT TO FACILITY OPERATING LICENSE

Amendment No.319
License No.DPR-77

1. The Nuclear Regulatory Commission (the Commission) has found that:
 - A. The application for amendment by Tennessee Valley Authority (the licensee) dated August 26, 2008, as supplemented on August 28, 2008, complies with the standards and requirements of the Atomic Energy Act of 1954, as amended (the Act), and the Commission's rules and regulations set forth in Title 10 of the *Code of Federal Regulations* (10 CFR) Chapter I;
 - B. The facility will operate in conformity with the application, the provisions of the Act, and the rules and regulations of the Commission;
 - C. There is reasonable assurance (i) that the activities authorized by this amendment can be conducted without endangering the health and safety of the public, and (ii) that such activities will be conducted in compliance with the Commission's regulations;
 - D. The issuance of this amendment will not be inimical to the common defense and security or to the health and safety of the public; and
 - E. The issuance of this amendment is in accordance with 10 CFR Part 51 of the Commission's regulations and all applicable requirements have been satisfied.
2. Accordingly, the license is amended by changes to the Technical Specifications as indicated in the attachment to this license amendment and paragraph 2.C.(2) of Facility Operating License No. DPR-77 is hereby amended to read as follows:

(2) Technical Specifications

The Technical Specifications contained in Appendices A and B, as revised through Amendment No. 319, are hereby incorporated in the license. The licensee shall operate the facility in accordance with the Technical Specifications.

3. This license amendment is effective as of its date of issuance, to be implemented no later than 45 days after issuance.

FOR THE NUCLEAR REGULATORY COMMISSION

/RA/

Thomas H. Boyce., Chief
Plant Licensing Branch II-2
Division of Licensing Project Management
Office of Nuclear Reactor Regulation

Attachment: Changes to License No. DPR-77
and the Technical Specifications

Date of Issuance: August 29, 2008

ATTACHMENT TO LICENSE AMENDMENT NO. 319

FACILITY OPERATING LICENSE NO. DPR-77

DOCKET NO. 50-327

Replace Page 3 of Operating License DPR-77 with the attached page.

Replace the following page of Appendix A Technical Specifications with the attached page. The revised page is identified by amendment number and contains marginal lines indicating the areas of change.

REMOVE

3/4 3-20

INSERT

3/4 3-20

TENNESSEE VALLEY AUTHORITY

DOCKET NO. 50-328

SEQUOYAH NUCLEAR PLANT, UNIT 2

AMENDMENT TO FACILITY OPERATING LICENSE

Amendment No. 312
License No. DPR-79

1. The Nuclear Regulatory Commission (the Commission) has found that:
 - A. The application for amendment by Tennessee Valley Authority (the licensee) dated August 26, 2008, as supplemented on August 28, 2008, complies with the standards and requirements of the Atomic Energy Act of 1954, as amended (the Act), and the Commission's rules and regulations set forth in 10 CFR Chapter I;
 - B. The facility will operate in conformity with the application, the provisions of the Act, and the rules and regulations of the Commission;
 - C. There is reasonable assurance (i) that the activities authorized by this amendment can be conducted without endangering the health and safety of the public, and (ii) that such activities will be conducted in compliance with the Commission's regulations;
 - D. The issuance of this amendment will not be inimical to the common defense and security or to the health and safety of the public; and
 - E. The issuance of this amendment is in accordance with 10 CFR Part 51 of the Commission's regulations and all applicable requirements have been satisfied.
2. Accordingly, the license is amended by changes to the Technical Specifications as indicated in the attachment to this license amendment and paragraph 2.C.(2) of Facility Operating License No. DPR-79 is hereby amended to read as follows:

(2) Technical Specifications

The Technical Specifications contained in Appendices A and B, as revised through Amendment No. 312, are hereby incorporated in the license. The licensee shall operate the facility in accordance with the Technical Specifications.

3. This license amendment is effective as of its date of issuance, to be implemented no later than 45 days after issuance.

FOR THE NUCLEAR REGULATORY COMMISSION

/RA/

Thomas H. Boyce., Chief
Plant Licensing Branch II-2
Division of Licensing Project Management
Office of Nuclear Reactor Regulation

Attachment: Changes to License No. DPR-79
and the Technical Specifications

Date of Issuance: August 29, 2008

ATTACHMENT TO LICENSE AMENDMENT NO. 312

FACILITY OPERATING LICENSE NO. DPR-79

DOCKET NO. 50-328

Replace Page 3 of Operating License DPR-79 with the attached page.

Replace the following page of Appendix A Technical Specifications with the attached page. The revised page is identified by amendment number and contains marginal lines indicating the areas of change.

REMOVE

3/4 3-20

INSERT

3/4 3-20

SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION
RELATED TO AMENDMENT NO. 319 TO FACILITY OPERATING LICENSE NO. DPR-77
AND AMENDMENT NO. 312 TO FACILITY OPERATING LICENSE NO. DPR-79
TENNESSEE VALLEY AUTHORITY
SEQUOYAH NUCLEAR PLANT, UNITS 1 AND 2
DOCKET NOS. 50-327 AND 50-328

1.0 INTRODUCTION

By application dated August 26, 2008, as supplemented on August 28, 2008, the Tennessee Valley Authority (the licensee) proposed amendments to the Technical Specifications (TSs) for Sequoyah Nuclear Plant (SQN) Units 1 and 2. The requested changes would modify the action statement for less than the minimum number of channels operable and the mode of applicability for Engineered Safety Feature Actuation System (ESFAS) Functional Unit 6.f of Table 3.3-3 regarding the auxiliary feedwater (AFW) system start upon trip of the main feedwater (MFW) pumps. The proposed change will add a footnote to indicate that Mode 2 applicability is limited to operation when one or more MFW pumps are supplying feedwater to the steam generators (SGs), and a second footnote delaying the entry into the action statement when starting or stopping MFW pumps in Mode 1.

The proposed change is needed to address a Nuclear Regulatory Commission (NRC, Commission)-identified noncompliance with TSs due to a conflict in the Mode 2 applicability and plant design, and a similar conflict while starting or stopping MFW pumps in Mode 1.

2.0 REGULATORY EVALUATION

Section 182a of the Atomic Energy Act requires applicants for nuclear power plant operating licenses to include TSs as part of the license. The Commission's regulatory requirements related to the content of the TSs are contained in Title 10, *Code of Federal Regulations* (10 CFR), Part 50, Section 50.36, "Technical Specifications." The TS requirements in 10 CFR 50.36 include the following categories: (1) safety limits, limiting safety systems settings and control settings, (2) limiting conditions for operation, (3) surveillance requirements (SRs), (4) design features, and (5) administrative controls. The requirements for the auto-start of AFW resulting from a MFW pump trip are included in the TSs in accordance with 10 CFR 50.36(c)(2), "Limiting Conditions for Operation."

As stated in 10 CFR 50.59(c)(1)(i), a licensee is required to submit a license amendment pursuant to 10 CFR 50.90 if a change to the TS is required. Furthermore, the requirements of 10 CFR 50.59 necessitate that the NRC approve the TS changes before the changes are

implemented. TVA's submittal meets the requirements of 10 CFR 50.59(c)(1)(i) and 10 CFR 50.90.

General Design Criterion (GDC) 13 "Instrumentation and Control," of Appendix A "General Design Criteria for Nuclear Power Plants," to 10 CFR Part 50 requires, among other things, that instrumentation be provided to monitor variables and systems and that controls be provided to maintain these variables and systems within prescribed operating ranges. The proposed operational change continues to provide system monitoring and proper actuation to satisfy the anticipatory trip function. No changes are proposed to the safety-related instrumentation.

GDC 20 through 29, "Protection and Reactivity Control Systems," of Appendix A, "General Design Criteria," to 10 CFR Part 50, provides the expectations for protection systems associated with reactor operation. The proposed change does not alter the ability for the reactor trip functions to actuate. The proposed operational allowance is consistent with the SQN design and analysis and ensures proper actuation to satisfy the anticipatory trip function. Therefore, the recommendations of these GDCs continue to be met with the proposed change.

3.0 TECHNICAL EVALUATION

The condensate and feedwater system is designed to supply a sufficient quantity of feedwater to the SG secondary side inlet during normal operating conditions and to guarantee that feedwater will not be delivered to the SGs when feedwater isolation is required. The condensate and feedwater system includes two turbine-driven MFW pumps per unit.

The AFW system includes two motor-driven pumps and one turbine-driven pump per unit. During low-power operation, the motor-driven pumps are used to maintain SG level. The turbine-driven AFW pump is not used because its level control valves are non-modulating (i.e., either open or closed) valves and operation of this pump would challenge the operating crew to control excessive AFW supply.

Each MFW pump is equipped with one oil pressure switch located on the pump's control oil system. A low pressure signal from this pressure switch indicates a trip of that pump. The ESFAS instrumentation (functional unit 6.f), upon a loss of both MFW pumps, automatically starts the motor-driven and turbine-driven AFW pumps, which lessens the effects of a feedwater transient. The AFW system supplies, in the event of a loss of the MFW supply, sufficient feedwater to the SGs to remove primary system stored and residual core energy.

The TSs require that the auto-start function be operable prior to entry into Mode 2, which is a plant condition with rated thermal power less than or equal to 5 percent and average reactor coolant temperature greater than or equal to 350 degrees Fahrenheit. The auto-start logic would be operable if the MFW pumps were operating or one channel is in the trip condition. Thus, for SQN to comply with the current TS applicability statement and enter into Mode 2, each MFW pump would need to be operating or a sufficient number of channels would need to be in a tripped condition. Since plant conditions at the time of entry into Mode 2 do not allow the MFW pumps to operate, the channels would need to be tripped. This configuration would result in an AFW start signal, starting the turbine-driven pump in addition to the motor-driven AFW pumps, which is an undesirable situation as described above. Also, closure of the Turbine-driven AFW pump

discharge valves to control SG level would impact operability of the pump and preclude Mode 2 entry.

The first proposed change would not require the auto-start logic to be operable until at least one MFW pump is in service supplying feedwater to the SGs. The licensee states that the need for the auto-start of the AFW pumps in Mode 2 without a MFW pump running does not serve any function since the motor-driven AFW pumps are already operating and supplying feedwater to the SGs to provide the heat sink. The licensee states that SQN's design does not provide any other method for complying with the current TS requirement.

During plant startup, when sufficient steam pressure is established, one MFW pump is reset and placed into service. The MFW pump is reset when electrical power is applied to the MFW pump trip circuit and the pressure switch located on the oil control system senses that the oil system is pressurized. A MFW pump is in service when the MFW pump's stop valves are open, the governor control valves are either in manual or automatic control and feedwater is being supplied to the SGs. Once a MFW pump is in service, the AFW pumps are secured.

At approximately two percent reactor thermal power and prior to securing AFW, the non-operating MFW pump is placed in the trip condition. Placing the MFW pump in the trip condition means electrical power is applied to the MFW pump trip bus and the pressure switch senses no control oil pressure, and that the MFW turbine stop valves and governor control valves are closed. During startup when one MFW pump is in service and the second pump is in trip, half the AFW auto-start logic will exist. If the operating MFW pump was to trip, an AFW auto-start signal will cause all three AFW pumps to start.

With one MFW pump in service and operating in Mode 1, the second MFW pump is placed into service, when required for continued plant power ascension. To place the second MFW pump in service, the MFW pump must be reset. The second pump is then started and brought up to speed to supply feedwater to the SGs.

While in Mode 1 and reducing power to a level where only one MFW pump is needed to supply feedwater flow, one of the two MFW pumps is removed from service. In this process, the MFW pump is brought to near minimum speed and tripped. For a brief period of time when the pump is at reduced speed, the MFW pump would be in the reset condition and not supplying feedwater to the SGs.

During the time of starting and stopping a second MFW pump, when the pump is in reset, the auto-start function is inoperable. The second proposed change would add a footnote to delay entry into the action statement for less than minimum channels operable for up to 4 hours.

The auto-start of AFW on loss of main feedwater is an anticipatory safety function needed to mitigate the operational impact of loss of feedwater events. The AFW start on loss of MFW is not required to address design basis events. In addition to the start of the AFW system on MFW pump trip, the system is designed to start automatically in the event of a loss of offsite electrical power (LOOP), a safety injection (SI) signal, or low-low SG water level. The design basis events that impose AFW safety function requirements are loss of normal feedwater, main feed line or main steam line break, LOOP, and small break loss of coolant accident. These design basis events assume auto-start of the AFW system on a blackout signal, low-low SG level, or a SI signal.

These ESFAS signals are Class 1E which means all requirements for reliable power supplies, separation, redundancy, testability, and seismic and environmental qualifications as specified in 10 CFR 50.55a(h)(2), "Protection Systems" are met, and are unaffected by the proposed change.

The first proposed change will modify the applicability requirement of TS Table 3.3-3 Functional Unit 6.f during Mode 2 to apply only when the MFW pumps are supplying feedwater to the SGs. This will resolve a conflict between the mode applicability and plant design, which does not support MFW pump operation at the time of entry into Mode 2. Also, modifying the requirement for auto-start of the AFW pumps to be only required when the MFW pumps are in service limits the potential for inadvertent AFW actuations during normal plant startups and shutdowns that could lead to reactivity control issues due to over cooling transients. The proposed change is consistent with NRC-approved TS changes at other Westinghouse-designed nuclear plants.

The second proposed change also addresses a conflict between the TS channel operability requirement and the design of the MFW pump control circuitry, which requires the pump to be reset before being placed into operation. Starting and stopping MFW pumps during plant startup and shutdown is a normal evolution, which will normally be accomplished within a short time. It was not intended to result in unnecessary entries into the action statement, which provides a timeframe to correct unplanned equipment failures. For the normal operating evolution of starting and stopping pumps, the proposed change would allow a delay of up to 4 hours before entering the action statement. The evolution should be completed in less time, but the 4 hours provides a reasonable allowance for operating contingencies. If the evolution takes longer than 4 hours, it is probably indicative of an equipment problem and entering the action statement would be appropriate. The 4 hours is consistent with similar allowances in other SQN TSs, such as the emergency core cooling system and low-temperature overpressure protection.

Lastly, the AFW auto-start function provides an anticipatory trip to reduce the effect of a feedwater transient, and is not credited in any transient analyses. Additional protection for loss of normal feedwater for all modes of operation is provided by the safety-related signals discussed above, and these are not affected by the proposed change.

Based on the above discussion, the NRC staff finds the proposed changes to be acceptable.

4.0 EMERGENCY CIRCUMSTANCES

In its August 26, 2008, letter, the licensee requested that this amendment be treated as an emergency amendment. In accordance with 10 CFR 50.91(a)(5), the licensee provided information regarding why this emergency situation occurred and how it could not be avoided.

On August 7, 2008, the NRC issued a violation at another licensee facility (Watts Bar) for failure to comply with the mode applicability requirements of the AFW auto-start function in Mode 2. Since SQN is a nuclear plant with essentially the same design, the licensee identified the need for a change to the SQN TSs. Without the change, SQN would not be in compliance with the TS requirements for proceeding into Mode 2 during plant startup. Although both units were operating at the time, the licensee had identified potential oil leaks on reactor coolant pump motors at SQN Unit 2 and had planned to shut down for inspection and repair on August 29. The return to power operation will require implementation of this proposed TS change. No operational options such as starting a MFW pump in Mode 3 or placing both MFW pumps in tripped condition exists for

SQN because of plant design or operational constraints. Also, the maintenance activities are scheduled for a short duration that will not allow for the normal amendment processing timeframes. The second design conflict was identified during NRC staff review of the original submittal and needs to be resolved within the same timeframe.

Failure to issue the proposed amendments would impact startup from a planned outage. Thus, in accordance with 10 CFR 50.91(a)(5), emergency circumstances exist. The NRC staff also evaluated whether the licensee took reasonable action to avoid the emergency situation. While the licensee was probably aware of discussions at its other facility regarding the TS issue, it is reasonable to have waited until the NRC's position was fully clarified in the inspection report before finalizing the amendment request, to ensure that all NRC concerns were addressed. The amendment request would probably have been submitted as a routine request, based on outage plans at the time. However, within a short time following the issuance of the inspection report, emerging problems with plant equipment with an impact on safety made a near-term shutdown necessary. The staff concludes that the licensee's actions were reasonable and that the emergency situation could not have been avoided.

The licensee only requested approval of this TS change on an emergency basis for Unit 2 because it did not have plans to shut down Unit 1 until the next refueling outage, which is scheduled for late March 2009. However, since an unplanned shutdown could occur at any time, the NRC is also issuing the proposed change for Unit 1 at this time to avoid an additional need for emergency approval.

5.0 FINAL NO SIGNIFICANT HAZARDS CONSIDERATION

The Commission may issue license amendments before the expiration of the 60-day period provided that its final determination is that the amendments involve no significant hazards consideration. These amendments are being issued prior to the expiration of the 60-day period. Therefore, a final finding of no significant hazards consideration follows.

The Commission has made a final determination that the amendment request involves no significant hazards consideration. Under the Commission's regulations in 10 CFR 50.92, this means that operation of the facility in accordance with the proposed amendment(s) does (do) not (1) involve a significant increase in the probability or consequences of an accident previously evaluated; or (2) create the possibility of a new or different kind of accident from any accident previously evaluated; or (3) involve a significant reduction in a margin of safety. As required by 10 CFR 50.91(a), the licensee has provided in its letter of August 26, 2008, its analysis of the issue of no significant hazards consideration which is presented below:

1. Does the proposed amendment involve a significant increase in the probability or consequences of an accident previously evaluated?

Response: No.

The design basis events which impose AFW safety function requirements are loss of normal MFV, main feedline or main steam line break, loss of offsite power, and small break loss of coolant accident. These design basis event evaluations assume actuation of the AFW due to a blackout signal,

low-low SG level, or a safety injection (SI) signal. The automatic start of the AFW pumps, because of a trip of both MFW pumps, is an anticipatory trip function. Requiring this function in Mode 2 only when one or more MFW pumps are running or the temporary placement of one channel in an inoperable condition to start or shutdown a MFW pump while in Mode 1 will not impact any previously evaluated design basis events. Therefore, the proposed change does not involve a significant increase in the probability or consequences of an accident previously evaluated.

2. Does the proposed amendment create the possibility of a new or different kind of accident from any accident previously evaluated?

Response: No.

The proposed change allows for an operational allowance during Modes 1 and 2 for placing MFW pumps in service or securing MFW pumps. This change involves a function that is anticipatory for loss of normal heat sink and is not credited in the accident analysis. This change does not affect the function that actuates AFW due to a blackout signal, low-low SG level, or a SI signal, and therefore will not be an initiator of a new or different kind of accident from any accident previously evaluated. Therefore, the proposed change does not create the possibility of a new or different kind of accident from any previously evaluated.

3. Does the proposed amendment involve a significant reduction in a margin of safety?

Response: No.

This TS change involves the automatic start of the AFW pumps when both MFW pumps trip, which is not an assumed start signal for design basis events. This change does not change any values or limits involved in a safety-related function or accident analysis. Therefore, the proposed change does not involve a significant reduction in a margin of safety.

The NRC staff has reviewed the licensee's analysis and based on this review, determined that the three standards of 10 CFR 50.92 are satisfied. Therefore, the NRC staff has determined that the amendment(s) involves (involve) no significant hazards consideration.

7.0 STATE CONSULTATION

In accordance with the Commission's regulations, the Tennessee State official was notified of the proposed issuance of the amendment. The State official had no comments.

8.0 ENVIRONMENTAL CONSIDERATION

The amendment changes a requirement with respect to installation or use of a facility component located within the restricted area as defined in 10 CFR Part 20. The NRC staff has determined

that the amendment involves no significant increase in the amounts, and no significant change in the types, of any effluents that may be released offsite, and that there is no significant increase in individual or cumulative occupational radiation exposure. The Commission has made a final no significant hazards finding with respect to this amendment. Accordingly, the amendment meets the eligibility criteria for categorical exclusion set forth in 10 CFR 51.22(c)(9). Pursuant to 10 CFR 51.22(b) no environmental impact statement or environmental assessment need be prepared in connection with the issuance of the amendment.

9.0 CONCLUSION

The Commission has concluded, based on the considerations discussed above, that (1) the amendment does not: (a) involve a significant increase in the probability or consequences of an accident previously evaluated; or, (b) create the possibility of a new or different kind of accident from any previously evaluated; or, (c) involve a significant reduction in a margin of safety and therefore, the amendment does not involve a significant hazards consideration; (2) there is reasonable assurance that the health and safety of the public will not be endangered by operation in the proposed manner, (3) such activities will be conducted in compliance with the Commission's regulations, and (4) the issuance of the amendment will not be inimical to the common defense and security or to the health and safety of the public.

Principal Contributors: Edward Smith
Brendan Moroney

Dated: August 29, 2008