

September 30, 2002

Mr. J. A. Scalice
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
AMENDMENTS REGARDING ICE CONDENSER BASKET WEIGHT
(TAC NOS. MB3682 AND MB3683) (TS01-04)

Dear Mr. Scalice:

The Commission has issued the enclosed Amendment No. 279 to Facility Operating License No. DPR-77 and Amendment No. 270 to Facility Operating License No. DPR-79 for the Sequoyah Nuclear (SQN) Plant, Units 1 and 2, respectively. These amendments are in response to your application dated September 12, 2001, as supplemented in your letter dated September 17, 2002. The proposed amendments would change the SQN Units 1 and 2 Technical Specification 3/4 6.5.1 and associated Bases to reflect an increase in the ice condenser basket weight from 1071 pounds to 1145 pounds and the total ice condenser ice weight from 2,082,024 pounds to 2,225,880 pounds. This change is being made in response to a reanalysis by Westinghouse Electric Company that identified a modeling input error used in the original analysis.

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/

Ronald W. Hernan, Senior Project Manager, Section 2
Project Directorate II
Division of Licensing Project Management
Office of Nuclear Reactor Regulation

Docket Nos. 50-327 and 50-328

Enclosures: 1. Amendment No. 279 to
License No. DPR-77
2. Amendment No.270 to
License No. DPR-79
3. Safety Evaluation

cc w/enclosures: See next page

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Mr. J. A. Scalice
Tennessee Valley Authority

SEQUOYAH NUCLEAR PLANT

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

Amendment No. 279
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 September 12, 2001, as supplemented September 17, 2002, 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-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. 279, 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 30 days after issuance.

FOR THE NUCLEAR REGULATORY COMMISSION

/RA/

Allen G. Howe, Chief, Section 2
Project Directorate II
Division of Licensing Project Management
Office of Nuclear Reactor Regulation

Attachment: Changes to the Technical
Specifications

Date of Issuance: September 30, 2002

ATTACHMENT TO LICENSE AMENDMENT NO. 270

FACILITY OPERATING LICENSE NO. DPR-77

DOCKET NO. 50-327

Replace the following pages of the Appendix A Technical Specifications with the attached pages. The revised pages are identified by amendment number and contain marginal lines indicating the areas of change.

REMOVE

3/4 6-26

3/4 6-27

B 3/4 6-4

INSERT

3/4 6-26

3/4 6-27

B 3/4 6-4

TENNESSEE VALLEY AUTHORITY

DOCKET NO. 50-328

SEQUOYAH NUCLEAR PLANT, UNIT 2

AMENDMENT TO FACILITY OPERATING LICENSE

Amendment No. 270
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 September 12, 2001, as supplemented September 17, 2002, 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. 270, 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 30 days after issuance.

FOR THE NUCLEAR REGULATORY COMMISSION

/RA/

Allen G. Howe, Chief, Section 2
Project Directorate II
Division of Licensing Project Management
Office of Nuclear Reactor Regulation

Attachment: Changes to the Technical
Specifications

Date of Issuance: September 30, 2002

ATTACHMENT TO LICENSE AMENDMENT NO. 270

FACILITY OPERATING LICENSE NO. DPR-79

DOCKET NO. 50-328

Replace the following pages of the Appendix A Technical Specifications with the attached pages. The revised pages are identified by amendment number and contain marginal lines indicating the areas of change.

REMOVE

3/4 6-27
3/4 6-28
B 3/4 6-4

INSERT

3/4 6-27
3/4 6-28
B 3/4 6-4

SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION
RELATED TO AMENDMENT NO. 279 TO FACILITY OPERATING LICENSE NO. DPR-77
AND AMENDMENT NO. 270 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

In a submittal dated September 12, 2001, as supplemented by a letter dated September 17, 2002, Tennessee Valley Authority (TVA) proposed to revise the Sequoyah Nuclear Plant (SQN), Units 1 and 2, Ice Condenser Technical Specification (TS) 3.6.5.1 and Surveillance Requirement 4.6.5.1.d.2. The licensee's proposal would increase the minimum total ice weight in the TS from 2,082,024 pounds (lbs) to 2,225,880 lbs, and ice-basket weight from 1071 lbs to 1145 lbs. The associated TS Bases section is also revised to include these changes in ice weight values. The proposed changes are required to address a computer modeling input error that was identified by Westinghouse Electric Company LLC (Westinghouse) (Westinghouse Potential Issue Number PI-00-011) regarding the treatment of mass and energy inputs in SQN's long-term containment pressurization analysis. The licensee indicated that the analysis input error is being addressed within TVA's Corrective Action Program and is being administratively controlled in accordance with U.S. Nuclear Regulatory Commission (NRC) Administrative Letter 98-10.

The licensee also proposed including the contribution to containment pressure of accident-generated hydrogen in the containment pressure calculations, increasing the effectiveness of the containment spray heat exchangers, increasing the ultimate heat sink (UHS) temperature assumed in the analysis from 85 degrees Fahrenheit (degrees F) to 87 degrees F, and decreasing the nuclear service water flow to the containment spray heat exchanger.

The supplemental letter dated September 17, 2002, contained clarifying information only and did not change the initial no significant hazards consideration determination or expand the scope of the initial application.

2.0 REGULATORY EVALUATION

The licensee, in Section 2.5 of the Westinghouse reanalysis, identified the applicable regulatory requirements. The regulatory requirements on which the staff based on acceptance are discussed below.

Containment integrity analysis is performed during nuclear plant design to ensure that the pressure inside containment will remain below the containment building design pressure if a Loss-of-Coolant Accident (LOCA) inside containment should occur during plant operation. The analysis ensures that the containment heat removal capability is sufficient to remove the maximum possible discharge of mass and energy to containment from the Nuclear Steam Supply System without exceeding the acceptable criteria (design pressure and temperature). The analysis is performed in accordance with the criteria of NUREG-800, Standard Review Plan (SRP) for the Review of Safety Analysis Reports for Nuclear Power Plants LWR [light-water reactor] Edition section 6.2.1.1.b for ice condenser containments. Conformance to Title 10 of the *Code of Federal Regulations* (10 CFR) Part 50 Appendix A, General Design Criteria Nos. 16, 38, and 50 is demonstrated by showing that the containment design pressure is not exceeded at any time in the transient and containment heat removal systems function to rapidly reduce the containment pressure and temperature.

3.0 TECHNICAL EVALUATION

TVA is proposing a revision to SQN TS to ensure that TS ice mass values remain consistent with design values as contained in the SQN containment integrity analysis. Westinghouse has determined that the interface between the two computer models used in the analysis, the computer model for LOCA mass and energy release, and the computer model for long-term ice condenser containment response (LOTIC-1) contained an incorrect input assumption regarding the separation of steam and water from the two-phase mixture released downstream of a primary reactor coolant pipe break. This resulted in erroneous treatment of the two-phase mixture that causes the calculated peak pressure inside containment to be non-conservatively low. A containment integrity reanalysis was performed for SQN by Westinghouse to implement corrections to the LOTIC-1 computer code input assumptions that account for the mass and energy interface error. The reanalysis determined that an increase in ice mass is necessary to retain the current calculated peak pressure.

The licensee stated that the current containment integrity analysis for SQN Units 1 and 2 is documented in WCAP-12455, Revision 1 (September 1995) as discussed in Section 6.2.1.3 of the SQN Final Safety Analysis Report. The analysis utilizes a Westinghouse computer model (LOTIC-1) to calculate the peak containment pressure following a LOCA inside containment. The calculated pressure for SQN is 11.44 pounds per square inch gage (psig), which is below the containment design pressure of 12.0 psig. The assumption contained in the LOTIC-1 computer model for this analysis includes an initial ice mass in the ice condenser of 1.792×10^6 lbs of ice.

The licensee indicated that a reanalysis of SQN's containment integrity analysis was performed by Westinghouse to account for an incorrect input assumption regarding the separation of steam and water from the two-phase mixture released downstream of a primary reactor coolant pipe break. The licensee provided the reanalysis in Enclosure 4 of the above submittal as WCAP-12455, Revision 1, Supplement 1R, Tennessee Valley Authority Sequoyah Nuclear Plant Units 1 and 2 Containment Integrity Reanalyses Engineering Report. The reanalysis determined that the ice mass necessary to maintain the same containment peak pressure (11.44 psig) increases from 1.792×10^6 to 1.916×10^6 lbs. The staff notes that these are nominal values before any uncertainties are added.

As the licensee indicated in their submittal, additional analytical changes were included for completeness. These changes to the SQN plant-specific pressurization model include: (1) revision of SQN's UHS temperature from 85 degrees F to 87 degrees F, (2) enhancement of containment spray heat exchanger performance, and (3) a reduction in the nuclear service water system flow to the containment spray heat exchanger.

The ice inventory is contained in 1944 ice baskets throughout the ice condenser. Currently, SQN's TS minimum ice basket weight is 1071 lbs of ice per basket, which includes a 15 percent conservative allowance for ice loss through sublimation and an additional 1 percent conservative allowance to account for systematic error in weighing instruments. The current TS minimum for total ice weight is 2,082,024 lbs of ice in the ice condenser, including uncertainties. TVA's proposed TS change increases the TS minimum ice weight from 2,082,024 lbs to 2,225,880 lbs and the ice weight per basket from 1071 lbs to 1145 lbs.

The licensee indicated that, as a conservative measure, TVA adds additional ice to the ice condenser over and above the TS minimum. The addition of ice over the TS minimum is a TVA maintenance practice (servicing plan) that is based on historical ice weight data and visual inspection history of the ice baskets. This maintenance practice ensures that distribution of ice is uniform throughout the ice condenser. During the last refueling outage (Cycle 10), ice was added as part of TVA's servicing plan. The as-left ice weight for Unit 1 at the start of Cycle 11 operation was 2,672,000 lbs of ice for an average as-left weight per basket of 1374 lbs (95 percent level of confidence). The as-left ice weight for Unit 2 at the start of Cycle 11 operation was 2,582,761 lbs of ice for an average as-left weight per basket of 1346 lbs.

TVA's proposed TS change, which increases the TS minimum ice weight from 2,082,024 lbs to 2,225,880 lbs, reduces the margin between the TS-required minimum and the as-left ice weight; however, TVA's servicing plan and as-left ice weight values from Cycle 10 ensure that sufficient ice is present to support safe operation during Cycle 11. TVA's proposed change ensures that ice mass values retain the existing margin between the calculated peak containment accident pressure and SQN's containment design pressure.

The staff has reviewed the licensee's submittal as discussed above, including the revised SQN reanalysis report, WCAP-12455, Revision 1, Supplement 1R, dated September 1, 2001, which contains the revised containment analysis. The staff notes that the analysis was performed using acceptable analytical methods. Based on the above review, the staff finds the proposed change to SQN TS for increasing the total ice weight to be acceptable. The proposed change is conservative and retains the existing margin between the calculated peak containment pressure and the containment design pressure of 12.0 psig. The licensee included the LOCA generated hydrogen in the pressure calculations. Hydrogen is generated by several mechanisms during a LOCA, and including its effect on pressure is appropriate.

The UHS temperature was increased in the reanalysis to provide more margin for hot weather. The staff finds the increase in the margin acceptable for this calculation and recognizes that the operating UHS as defined in the TS is not affected nor modified by this evaluation. The flow of nuclear service water to the containment spray heat exchanger was decreased and the containment spray heat exchanger performance coefficient (UA) was increased. These changes are acceptable since they result in the peak containment pressure remaining below the design limit. The licensee periodically monitors these parameters to ensure that they are maintained within the analysis assumptions.

Based on the above evaluation, the staff finds the licensee's proposed changes to SQN's TS 3/4.6.5 for increasing the minimum TS total ice weight from 2,082,024 lbs to 2,225,880 lbs and each ice basket from 1071 lbs to 1145 lbs and associated Bases acceptable.

4.0 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.

5.0 ENVIRONMENTAL CONSIDERATION

The amendments change a requirement with respect to installation or use of a facility component located within the restricted area as defined in 10 CFR Part 20 and change a surveillance requirement. The NRC staff has determined that the amendments involve 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 previously issued a proposed finding that the amendments involve no significant hazards consideration, and there has been no public comment on such finding (67 FR 934). 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 amendments.

6.0 CONCLUSION

The Commission has concluded, based on the considerations discussed above, that: (1) there is reasonable assurance that the health and safety of the public will not be endangered by operation in the proposed manner, (2) such activities will be conducted in compliance with the Commission's regulations, and (3) 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 Contributor: Raj P. Goel, NRR

Date: September 30, 2002