



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

October 14, 1988

Docket No. 50-327/328

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

Dear Mr. White:

SUBJECT: UPPER HEAD INJECTION LEVEL SWITCH SETPOINT (TAC R00422, 62192, 62197)
(TS 88-20) - SEQUOYAH NUCLEAR PLANT, UNITS 1 AND 2

The Commission has issued the enclosed Amendment No. 86 to Facility Operating License No. DPR-77 for the Sequoyah Nuclear Plant, Unit 1. This amendment is in response to your application dated August 15, 1988, as supplemented by letter dated September 21, 1988. Your submittal dated August 17, 1988 is a duplicate of your application dated August 15, 1988.

This amendment revises the surveillance requirements (SR) on the upper head injection (UHI) accumulators in the Sequoyah Unit 1 Technical Specification (TS). The UHI accumulator level switch setpoint and tolerances in SR 4.5.1.2.c.1 are changed from 87.1 ± 5.6 inches above the tank vendor working line to $92.0 + 2.6/-5.8$ inches above this line, when corrected for the mass of cover gas.

A copy of the Safety Evaluation (SE) is also enclosed. Notice of Issuance will be included in the Commission's Bi-Weekly Federal Register Notice.

In your application dated August 15, 1988, you withdrew Technical Specification 74, for both Unit 1 and Unit 2, which was submitted by your letter dated August 8, 1986.

In your letter dated September 19, 1988, you requested a temporary exemption to 10 CFR 50.46(a)(1) for Unit 1. This exemption is needed because the approved Emergency Core Cooling System (ECCS) cooling performance calculations for Unit 1 in the Sequoyah Final Safety Analysis Report are not based on plant operating conditions for the upcoming Cycle 4 operation and there are corrections needed to the UHI calculation model. The evaluation by the Tennessee Valley Authority for Unit 1 is based on sensitivity studies and the approved ECCS cooling performance and demonstrates that the fuel peak cladding temperature is below the acceptance criterion (2200°F) in 10 CFR 50.46. This includes operational restrictions for Unit 1. These operational restrictions are discussed in

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Mr. S. A. White

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the enclosed SE which provide a margin of at least 100°F below the acceptance criterion in 10 CFR 50.46. The requested exemption is a separate issue from the above amendment to the Unit 1 TS and will be the subject of a separate letter to you.

Sincerely,

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Suzanne Black, Assistant Director
for Projects
TVA Projects Division
Office of Special Projects

Enclosures:

- 1. Amendment No. to License No. DPR-77
- 2. Safety Evaluation

cc w/enclosures:
See next page

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Mr. S. A. White

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Sequoyah Nuclear Plant

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

TENNESSEE VALLEY AUTHORITY

DOCKET NO. 50-327

SEQUOYAH NUCLEAR PLANT, UNIT 1

AMENDMENT TO FACILITY OPERATING LICENSE

Amendment No. 86
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 15, 1988, as supplemented by letter dated September 21, 1988, 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.

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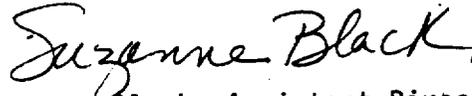
2. Accordingly, the license is amended by changes to the Technical Specifications as indicated in the attachment to this license amendment and paragraph 2.C.(2) of Facility Operating License No. DPR-77 is hereby amended to read as follows:

(2) Technical Specifications

The Technical Specifications contained in Appendices A and B, as revised through Amendment No. 86, 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.

FOR THE NUCLEAR REGULATORY COMMISSION



Suzanne Black, Assistant Director
for Projects
TVA Projects Division
Office of Special Projects

Attachment:
Changes to the Technical
Specifications

Date of Issuance: October 14, 1988

ATTACHMENT TO LICENSE AMENDMENT NO. 86

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. Asterisked pages* are provided to maintain document completeness.

REMOVE

3/4 5-3

3/4 5-4

INSERT

3/4 5-3*

3/4 5-4

EMERGENCY CORE COOLING SYSTEMS (ECCS)

UPPER HEAD INJECTION ACCUMULATORS

LIMITING CONDITION FOR OPERATION

3.5.1.2 Each upper head injection accumulator system shall be OPERABLE with:

- a. The isolation valves open,
- b. The water-filled accumulator containing between 1805 and 1851 cubic feet of borated water having a concentration of between 1900 and 2100 ppm of boron, and
- c. The nitrogen bearing accumulator pressurized to between 1185 and 1285 psig.

APPLICABILITY: MODES 1, 2 and 3.*

ACTION:

- a. With the upper head injection accumulator system inoperable, except as a result of a closed isolation valve(s), restore the upper head injection accumulator system to OPERABLE status within one hour or be in at least HOT STANDBY within the next 6 hours and in HOT SHUTDOWN within the following 6 hours.
- b. With the upper head injection accumulator system inoperable due to the isolation valve(s) being closed, either immediately open the isolation valve(s) or be in HOT STANDBY within one hour and be in HOT SHUTDOWN within the next 12 hours.

SURVEILLANCE REQUIREMENTS

4.5.1.2 Each upper head injection accumulator system shall be demonstrated OPERABLE:

- a. At least once per 12 hours by:
 1. Verifying the contained borated water volume and nitrogen pressure in the accumulators, and
 2. Verifying that each accumulator isolation valve is open.

*Pressurizer Pressure above 1900 psig.

EMERGENCY CORE COOLING SYSTEMS (ECCS)

SURVEILLANCE REQUIREMENTS (Continued)

- b. At least once per 31 days and within 6 hours after each solution volume increase of greater than or equal to 1% of tank volume by verifying the boron concentration of the solution in the water-filled accumulator.
- c. At least once per 18 months by:
 - 1. Verifying that each accumulator isolation valve closes automatically when the water level in the water-filled accumulator is $92.0 + 2.6/-5.8$ inches above the tank vendor working line when corrected for the mass of cover gas.
 - 2. Verifying that the total dissolved nitrogen and air in the water-filled accumulator is less than 80 SCF per 1800 cubic feet of water (equivalent to 5×10^5 pounds nitrogen per pounds water).
- d. At least once per 5 years by removing the membrane installed between the water-filled and nitrogen bearing accumulators and verifying that the removed membrane bursts at a differential pressure of 40 ± 10 psi.



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

ENCLOSURE

SAFETY EVALUATION BY THE OFFICE OF SPECIAL PROJECTS

SUPPORTING AMENDMENT NO. 86 TO FACILITY OPERATING LICENSE NO. DPR-77

TENNESSEE VALLEY AUTHORITY

SEQUOYAH NUCLEAR PLANT, UNIT 1

DOCKET NO. 50-327

1.0 INTRODUCTION

The Tennessee Valley Authority (TVA), by submittal dated August 15, 1988, proposes to modify the Sequoyah Nuclear Plant (SQN) Unit 1 Technical Specifications (TS) to revise the upper head injection (UHI) accumulator level switch setpoint and tolerance band of Surveillance Requirement (SR) 4.5.1.2.c.1. TVA provided supplemental information in its letter dated September 21, 1988. The TVA submittal dated August 17, 1988 is a duplicate of the application dated August 15, 1988.

The proposed changes are being requested to implement corrective actions documented in a TVA Condition Adverse to Quality Report (CAQR). The CAQR identifies that the current level switches used in the UHI potentially may allow more water to be injected during a postulated accident than the analytical limit of 1,130.5 cubic feet (ft³). The over injection of water can result in the accidental injection of nitrogen into the reactor coolant system. Nitrogen in the reactor coolant could result in the restriction of heat removal from the fuel cladding. The UHI system is described in the Sequoyah Final Safety Analysis Report (FSAR) Section 6.3.2 and its functional analytical performance in response to various accident analyses is described in FSAR Section 15.4.1.1.4.

Section 50.46(a)(1) of 10 CFR Part 50 requires an acceptable analysis calculating the peak cladding temperature based on plant operating conditions prior to restarting the Sequoyah, Unit 1. Changing the amount of water injected from the UHI tank impacts the Appendix K Peak Cladding Temperature Analysis; therefore, a re-analysis of the peak cladding temperature is required prior to restart of Unit 1. Also, corrections to the UHI calculation model are needed. Since Westinghouse, the reactor supplier, is presently modifying the reactor code used to perform the Appendix K analysis, the revised Appendix K analysis will not be developed before Unit 1 plans to restart from the current outage. Because of this delay TVA has requested a temporary exemption to 10 CFR 50.46(a)(1), in its letter dated September 19, 1988, in order to perform and submit to NRC the revised Appendix K analysis after restart of Unit 1.

The supplemental information in TVA's letter dated September 21, 1988 clarified information provided in TVA's application for this proposed amendment. It did not change the substance of the proposed action in the Federal Register Notice for the proposed amendment or affect the staff's initial determination.

2.0 EVALUATION

TVA implemented two corrective actions to resolve the above mentioned CAQR. Specifically, the first change is a proposed actual reduction in the total amount of water injected by the UHI system from the current requirement of 900 ft³ to 850 ft³; thereby, decreasing the probability of over injecting water from the UHI tank. Supporting Westinghouse Electric Corporation (WEC) evaluations were provided by TVA in Attachment 1 of the August 15, 1988 submittal. TVA has also provided additional clarifying information by the submittal dated September 21, 1988. The second CAQR corrective action is the replacement of the level switches with a new model. The new level switches are different only in the span of response. The switch accuracy calculations, therefore, are different. TVA has provided new calculations supporting the proposed TS setpoint and setpoint tolerances.

2.1 UHI Injected Water Volume

As documented in FSAR Section 6.3.2, the UHI System is designed to passively provide additional water inventory to the reactor core during the blowdown phase of a postulated Loss of Coolant Accident (LOCA). The limiting case break, as documented in Emergency Core Cooling System (ECCS) Analysis, (FSAR, Section 15.4.1.1.4), is the double-ended, cold-leg guillotine (DECLG) break using a discharge coefficient, $C_D = 0.6$ with the imperfect mixing of UHI water assumed in the vessel upper head. This analysis established the lower bound value of injected water volume at 900 ft³. TVA proposed to lower this value to 850 ft³ and has provided a WEC analysis to support the conclusion that the increase in calculated fuel peak clad temperature (PCT) remains below the 10 CFR 50.46 regulatory requirement of 2200°F. The reduction in the UHI water volume increased the PCT by 53°F and when PCT penalties for potential guide tube flexure failure and instrument guide tube filling during reflood are added, the limiting PCT reached 2198°F. This is less than the maximum acceptance criterion (2200°F) in 10 CFR 50.46.

2.2 Level Switch Setpoint Calculation

Level switches are used to automatically isolate the UHI System accumulators from the reactor coolant system (RCS) after the UHI System has injected the borated water. The level switch setpoints are selected to ensure that the quantity of UHI water delivered is within the limits calculated for the large break LOCA analysis.

TVA has performed an accuracy calculation (1-LS-87-21) to demonstrate that level switch setpoint and tolerances will be within the bounds of accident analysis. The TVA calculation is based on Static-O-Ring test report, 8601-042, using the sum of the squares method for all independent variables that affect accuracy. The bi-directional and uni-directional errors are combined in such a manner that the negative uni-directional error is added to the negative portion of the bi-directional error and the positive uni-directional error is added to the positive portion of the bi-directional error. The result is a corrective number for the instrument accuracy. The staff has reviewed the subject calculation and finds that the accuracy calculation has been conducted in a

manner which predicts the worse-case accuracy. TVA has established the level switch set point based on this calculation. However, the calculation is based on the assumption that the UHI system accumulator room temperature will be between 70 and 85° F. UHI room temperature is monitored via SI606 which requires that UHI room temperature be maintained between 75 and 85°F. Since the margin between the safety limit and the instrument operating band is very small (.01" of water column (WC)), the staff concludes that, anytime the temperature of the UHI room is not between 70 and 85°F, the level switches should be declared inoperable. TVA committed in its letter dated September 21, 1988 to revise the balance-of-plant temperature monitoring procedure to indicate that the UHI level switches are inoperable if the ambient temperature in the area of the switches exceeds the values used in Demonstrated Accuracy Calculation 1-LS-87-21 to determine temperature-induced reference water-leg error. These values are the temperature values discussed above. TVA stated that this procedure revision will be completed before Unit 1 entry into mode 2. This should be included in the next scheduled update of the FSAR.

2.3 10 CFR Part 50.46 Appendix K Calculations

To provide additional assurance that the PCT is below the 2200°F acceptance criterion, the following operational restrictions are imposed by TVA on Sequoyah, Unit 1:

- 1) The steam generator tube plugging limit will be administratively lowered from 10 percent to 5 percent. Westinghouse has performed an analysis which demonstrates that this restriction reduces the calculated PCT by 22°F.
- 2) The heat flux hot channel factor ($F_0(2)$) limit will be lowered from 2.37 to 2.15 by rearranging the control rod positions during power operation. This reduces the calculated PCT an additional 87°F for the limiting imperfect mixing case.

These two procedural changes reduce the calculated PCT from 2198°F to 2089°F for the postulated DECLG break with a discharge coefficient (C_D) of 0.6 and imperfect mixing. These procedural changes provide over 100°F of margin between the calculated PCT and the acceptance criterion in 10 CFR 50.46. This margin is sufficient to offset any uncertainties in the ECCS cooling performance calculations for Unit 1 and sufficient for the staff to conclude that the PCT are less than the acceptance criterion (2200°F) in 10 CFR 50.46.

Section 50.46(a)(1) of 10 CFR Part 50 requires that the ECCS cooling performance be calculated on a plant specific basis using an approved ECCS calculation model. The current approved calculated ECCS cooling performance, including the approved UHI calculation model, as referenced in Section 15.4 of the FSAR, is not based on the plant operating conditions for Unit 1 for the upcoming Cycle 4 operation and there are corrections needed to the UHI calculation model. TVA has made an evaluation based on sensitivity studies and the current approved ECCS cooling performance in the FSAR to demonstrate that the calculated PCTs remain below the acceptance criterion in 10 CFR 50.46.

These include the operational restrictions discussed above. TVA has requested a temporary exemption from 10 CFR 50.46(a)(1) in its letter dated September 19, 1988. This relief is until a revised calculated ECCS cooling performance has been completed using an approved ECCS model and Unit 1 operating conditions and is submitted to NRC, but not later than May 31, 1989. This requested exemption is being evaluated by the staff and will be the subject of a separate letter. It is a separate issue from the proposed changes to the Unit 1 TS. Approval of the proposed amendment is necessary for Unit 1 to enter Mode 3 with the reactor coolant system pressure greater than 1900 psi. Approval of the exemption is needed for Unit 1 to enter Mode 2 and restart from the current outage.

2.4 Staff Conclusions

Based on the above, the staff concludes that the proposed changes to the Unit 1 TS in TVA's application dated August 15, 1988 are acceptable. The staff also concludes that the Static-0-Ring level switches for the UHI System are inoperable if the room temperature is not between 70 and 85°F. The requested temporary exemption to 10 CFR 50.46(a)(1) is a separate issue to TVA's application dated August 15, 1988 and will be addressed separately.

3.0 ENVIRONMENTAL CONSIDERATION

This amendment involves a change to a requirement with respect to the installation or use of a facility component located within the restricted area as defined in 10 CFR Part 20 and changes to the surveillance requirements. The 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 previously issued a proposed finding that this amendment involves no significant hazards consideration and there has been no public comment on such finding. 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 nor environmental assessment need be prepared in connection with the issuance of the amendment.

4.0 CONCLUSION

The Commission made a proposed determination that the amendment involves no significant hazards consideration which was published in the Federal Register (53 FR 32960) on August 29, 1988 and consulted with the State of Tennessee on October 12, 1988. No public comments were received and the State of Tennessee did not have any comments.

The staff 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, and (2) such activities will be conducted in compliance with the Commission's regulations, and the issuance of the amendments will not be inimical to the common defense and security nor to the health and safety of the public.

Principal Contributors: H. Garg, P. Hearn and T. Rotella

Dated: October 14, 1988