

April 27, 1990

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: INTERMEDIATE AND SOURCE RANGE NUCLEAR FLUX DETECTORS (TAC R00506)  
(TS 88-42) - SEQUOYAH NUCLEAR PLANT, UNIT 1

The Commission has issued the enclosed Amendment No.136 to Facility Operating License No. DPR-77. This amendment is in response to your application dated January 12, 1990.

This amendment modifies the Sequoyah Nuclear Plant, Unit 1, Technical Specifications (TSs). The changes revise the trip setpoint and allowable value units for the intermediate range (IR) nuclear flux detectors and revise the applicability requirements for the source range (SR) nuclear flux detectors. These changes account for the fact that this equipment was replaced at Unit 1 during the current Cycle 4 refueling outage. This is part of the equipment upgrade at Sequoyah to comply with Regulatory Guide 1.97.

The application dated January 12, 1990 superceded the previous application for TS Change Request 88-42, dated December 2, 1988. The proposed changes for Sequoyah Unit 2 will be issued during the Unit 2 Cycle 4 refueling outage after this equipment is replaced in the outage.

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

Sincerely,

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

Enclosures:

- 1. Amendment No.136 to License No. DPR-77
- 2. Safety Evaluation

cc w/enclosures:  
See next page

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Mr. Oliver D. Kingsley, Jr.

- 2 -

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AMENDMENT NO. 136 FOR SEQUOYAH UNIT NO. 1 - DOCKET NO. 50-327  
DATED: April 27, 1990

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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. 136  
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 January 12, 1990, 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. 136, 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 Nuclear Reactor Regulation

Attachment:  
Changes to the Technical  
Specifications

Date of Issuance: April 27, 1990

ATTACHMENT TO LICENSE AMENDMENT NO.136

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. Overleaf pages\* are provided to maintain document completeness.

REMOVE

2-6

B 2-3

B 2-4

3/4 3-5

INSERT

2-6

B 2-3\*

B 2-4

3/4 3-5

TABLE 2.2-1 (Continued)

REACTOR TRIP SYSTEM INSTRUMENTATION TRIP SETPOINTS

SEQUOYAH - UNIT 1

2-6

Amendment No. 16, 85, 136

<u>FUNCTIONAL UNIT</u>	<u>TRIP SETPOINT</u>	<u>ALLOWABLE VALUES</u>
13. Steam Generator Water Level--Low-Low	$\geq$ 18% of narrow range instrument span--each steam generator	$\geq$ 17% of narrow range instrument span--each steam generator
14. Steam/Feedwater Flow Mismatch and Low Steam Generator Water Level	$<$ 40% of full steam flow at RATED THERMAL POWER coincident with steam generator water level $\geq$ 25% of narrow range instrument span--each steam generator	$<$ 42.5% of full steam flow at RATED THERMAL POWER coincident with steam generator water level $\geq$ 24.0% of narrow range instrument span--each steam generator
15. Undervoltage-Reactor Coolant Pumps	$\geq$ 5022 volts--each bus	$\geq$ 4739 volts--each bus
16. Underfrequency-Reactor Coolant Pumps	$\geq$ 56.0 Hz - each bus	$\geq$ 55.9 Hz - each bus
17. Turbine Trip A. Low Trip System Pressure B. Turbine Stop Valve Closure	$\geq$ 45 psig $\geq$ 1% open	$\geq$ 43 psig $\geq$ 1% open
18. Safety Injection Input from ESF	Not Applicable	Not Applicable
19. Intermediate Range Neutron Flux - (P-6) Enable Block Source Range Reactor Trip	$>$ $1 \times 10^{-5}\%$ of RATED THERMAL POWER	$>$ $6 \times 10^{-6}\%$ of RATED THERMAL POWER
20. Power Range Neutron Flux (not P-10) Input to Low Power Reactor Trips Block P-7	$<$ 10% of RATED THERMAL POWER	$<$ 11% of RATED THERMAL POWER

## SAFETY LIMITS

### BASES

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#### Manual Reactor Trip

The Manual Reactor Trip is a redundant channel to the automatic protective instrumentation channels and provides manual reactor trip capability.

#### Power Range, Neutron Flux

The Power Range, Neutron Flux channel high setpoint provides reactor core protection against reactivity excursions which are too rapid to be protected by temperature and pressure protective circuitry. The low set point provides redundant protection in the power range for a power excursion beginning from low power. The trip associated with the low setpoint may be manually bypassed when P-10 is active (two of the four power range channels indicate a power level of above approximately 10 percent of RATED THERMAL POWER) and is automatically reinstated when P-10 becomes inactive (three of the four channels indicate a power level below approximately 9 percent of RATED THERMAL POWER).

#### Power Range, Neutron Flux, High Rates

The Power Range Positive Rate trip provides protection against rapid flux increases which are characteristic of rod ejection events from any power level. Specifically, this trip complements the Power Range Neutron Flux High and Low trips to ensure that the criteria are met for rod ejection from partial power.

The Power Range Negative Rate trip provides protection to ensure that the minimum DNBR is maintained above 1.30 for control rod drop accidents. At high power a single or multiple rod drop accident could cause local flux peaking which, when in conjunction with nuclear power being maintained equivalent to turbine power by action of the automatic rod control system, could cause an unconservative local DNBR to exist. The Power Range Negative Rate trip will prevent this from occurring by tripping the reactor for all single or multiple dropped rods.

#### Intermediate and Source Range, Nuclear Flux

The Intermediate and Source Range, Nuclear Flux trips provide reactor core protection during reactor startup. These trips provide redundant protection to the low setpoint trip of the Power Range, Neutron Flux channels. The Source Range Channels will initiate a reactor trip at about  $10^{+5}$  counts per second unless manually blocked when P-6 becomes active. The Intermediate



## SAFETY LIMITS

### BASES

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Range Channels will initiate a reactor trip at approximately 25 percent of RATED THERMAL POWER unless manually blocked when P-10 becomes active. No credit was taken for operation of the trips associated with either the Intermediate or Source Range Channels in the accident analyses; however, their functional capability at the specified trip settings is required by this specification to enhance the overall reliability of the Reactor Protection System.

#### Overtemperature Delta T

The Overtemperature Delta T trip provides core protection to prevent DNB for all combinations of pressure, power, coolant temperature, and axial power distribution, provided that the transient is slow with respect to piping transit delays from the core to the temperature detectors (about 4 seconds), and pressure is within the range between the High and Low Pressure reactor trips. This setpoint includes corrections for axial power distribution, changes in density and heat capacity of water with temperature and dynamic compensation for piping delays from the core to the loop temperature detectors. With normal axial power distribution, this reactor trip limit is always below the core safety limit as shown in Figure 2.1-1. If axial peaks are greater than design, as indicated by the difference between top and bottom power range nuclear detectors, the reactor trip is automatically reduced according to the notations in Table 2.2-1.

Operation with a reactor coolant loop out of service below the 4 loop P-8 setpoint does not require reactor protection system setpoint modification because the P-8 setpoint and associated trip will prevent DNB during 3 loop operation exclusive of the Overtemperature Delta T setpoint. Three loop operation above the 4 loop P-8 setpoint is permissible after resetting the K1, K2 and K3 inputs to the Overtemperature Delta T channels and raising the P-8 setpoint to its 3 loop value. In this mode of operation, the P-8 interlock and trip functions as a High Neutron Flux trip at the reduced power level.

#### Overpower Delta T

The Overpower Delta T reactor trip provides assurance of fuel integrity, e.g., no melting, under all possible overpower conditions, limits the required range for Overtemperature Delta T protection, and provides a backup to the High Neutron Flux trip. The setpoint includes corrections for changes in density and heat capacity of water with temperature, and dynamic compensation for piping delays from the core to the loop temperature detectors. No credit was taken for operation of this trip in the accident

TABLE 3.3-1 (Continued)

TABLE NOTATION

- \* With the reactor trip system breakers in the closed position and the control rod drive system capable of rod withdrawal, and fuel in the reactor vessel.
- \*\* The channel(s) associated with the protective functions derived from the out of service Reactor Coolant Loop shall be placed in the tripped condition.
- # The provisions of Specification 3.0.4 are not applicable.
- ## Source Range outputs may be disabled above the P-6 (Block of Source Range Reactor Trip) setpoint.

ACTION STATEMENTS

- ACTION 1 - With the number of channels OPERABLE one less than required by the Minimum Channels OPERABLE requirement, restore the inoperable channel to OPERABLE status within 48 hours or be in HOT STANDBY within the next 6 hours and/or open the reactor trip breakers.
- ACTION 2 - With the number of OPERABLE channels one less than the Total Number of Channels, STARTUP and POWER OPERATION may proceed provided the following conditions are satisfied:
- a. The inoperable channel is placed in the tripped condition within 6 hours.
  - b. The Minimum Channels OPERABLE requirement is met; however, one additional channel may be bypassed for up to 4 hours for surveillance testing per Specification 4.3.1.1.1.
  - c. The QUADRANT POWER TILT RATIO is monitored in accordance with Technical Specification 3.2.4.



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

ENCLOSURE 3

SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION  
AND AMENDMENT NO. 136 TO FACILITY OPERATING LICENSE NO. DPR-79

TENNESSEE VALLEY AUTHORITY

SEQUOYAH NUCLEAR PLANT, UNIT 1

DOCKET NO. 50-327

1.0 INTRODUCTION

By letter dated January 12, 1990, the Tennessee Valley Authority (TVA) proposed to modify the Sequoyah Nuclear Plant (SQN), Unit 1, Technical Specifications (TSs). The proposed changes are to revise the trip setpoint and allowable value units for the intermediate range (IR) nuclear flux detectors and to revise the applicability requirements for the source range (SR) nuclear flux detectors. This is TVA's TS Change Request 88-42. This application dated January 12, 1990 superceded TVA's application dated December 2, 1989 and its letter dated January 24, 1989, on the same TS change request,

In order to meet License Conditions 2.C.14 (Unit 2) and 2.C.24 (Unit 1), TVA has elected to replace the SR and IR neutron detectors. These license conditions were required because the present SR and IR neutron detectors did not meet the requirements of NRC Regulatory Guide 1.97. The new detectors are Class 1E equipment, and are seismically and environmentally qualified. Because of design differences between the old and new detectors, TVA has proposed changes to the present TS requirements on this equipment.

2.0 EVALUATION

The new SR/IR detectors are a fission chamber design, manufactured by Gamma Metrics. The new detectors are compatible with the current system except for certain features which necessitate the following TS changes:

- (a) TVA has proposed to change the footnote (symbol ##) in TS Table 3.3-1 to state that source range outputs may be disabled above the P-6 setpoint instead of the statement that high voltage to detector may be de-energized above the P-6 setpoint. This change is required because in the new design for the SR detectors, the output signal is automatically blocked from the reactor trip logic for a reactor power level above the P-6 setpoint and the detector is not required to be de-energized above the P-6 setpoint. Based on this, the staff finds the proposed change to the TS Table 3.3-1 acceptable.
- (b) TVA has proposed to change the units of the P-6 setpoint and allowable value listed in TS Table 2.2-1 from "amps" to "power." This change is required because the new IR detector output signals are in units of power

rather than amperes. TVA has performed a calculation to determine the relationship between reactor power and detector current. This relationship was used to convert the trip setpoint and allowable value to a relative power value. The staff has reviewed the calculation and finds it acceptable. Since the actual setpoint has not been changed, it does not affect the accident analysis previously approved by the staff. TVA has also proposed to revise the bases in Section 2.2 of the TSs to delete the reference to IR detector current signals that are proportional to power levels. Based on this, the staff finds the proposed change to TS Table 2.2-1 and the associated bases acceptable.

Therefore, based on the above, the staff concludes that the proposed changes to the TSs in the application dated January 12, 1990 are acceptable. These changes are administrative in nature and do not invalidate any previous analysis on Sequoyah.

### 3.0 ENVIRONMENTAL CONSIDERATION

These amendments involve 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. The 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 these amendments involve no significant hazards consideration and there has been no public comment on such finding. Accordingly, the amendments meet 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 these amendments.

### 4.0 CONCLUSION

The Commission made a proposed determination that the amendment involves no significant hazards consideration which was published in the Federal Register (55 FR 4278) on February 7, 1990 and consulted with the State of Tennessee. 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 Contributor: H. Garg

Dated: April 27, 1990