

December 16, 1998

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: ISSUANCE OF TECHNICAL SPECIFICATION AMENDMENTS FOR THE  
SEQUOYAH NUCLEAR PLANT, UNITS 1 AND 2 (TAC NOS. M96600 AND  
M96601)(TS 96-08)

Dear Mr. Scalice:

The Commission has issued the enclosed Amendment No. 241 to Facility Operating License No. DPR-77 and Amendment No. 231 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 22, 1996, as supplemented on August 27 and October 8, 1998. The amendments revise the SQN Technical Specifications by extending the allowed outage time for the SQN emergency diesel generators from 72 hours to 7 days.

A copy of the Safety Evaluation is also enclosed. Notice of Issuance will be included in the Commission's biweekly Federal Register notice. Please direct any questions you or your staff should have to me at 301-415-2010.

Sincerely,

Original signed by:

Ronald W. Hernan, Senior Project Manager  
Project Directorate II-3  
Division of Reactor Projects - I/II  
Office of Nuclear Reactor Regulation

Docket Nos. 50-327 and 50-328

- Enclosures: 1. Amendment No. 241 to License No. DPR-77  
2. Amendment No. 231 to License No. DPR-79  
3. Safety Evaluation

10134

cc w/enclosures: See next page

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NAME	RHernan <i>RWH</i>	BClayton <i>BC</i>	JCalvo <i>JAC</i>	RBarrett		<i>CB at</i>	FHebdon <i>FH</i>	
DATE	11/23/98	11/24/98	11/30/98	12/2/98		12/8/98	12/16/98	

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UNITED STATES  
NUCLEAR REGULATORY COMMISSION

WASHINGTON, D.C. 20555-0001

December 16, 1998

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Executive Vice President  
Tennessee Valley Authority  
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Sincerely,

A handwritten signature in black ink that reads "Ronald W. Hernan".

Ronald W. Hernan, Senior Project Manager  
Project Directorate II-3  
Division of Reactor Projects - I/II  
Office of Nuclear Reactor Regulation

Docket Nos. 50-327 and 50-328

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cc w/enclosures: See next page

Mr. J. A. Scalice  
Tennessee Valley Authority

cc:

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UNITED STATES  
NUCLEAR REGULATORY COMMISSION  
WASHINGTON, D.C. 20555-0001

TENNESSEE VALLEY AUTHORITY

DOCKET NO. 50-327

SEQUOYAH NUCLEAR PLANT, UNIT 1

AMENDMENT TO FACILITY OPERATING LICENSE

Amendment No. 241  
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 22, 1996, as supplemented on August 27 and October 8, 1998, 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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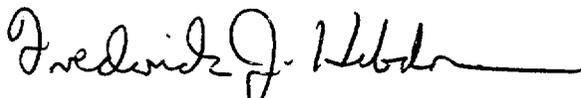
2. Accordingly, the license is amended by changes to the Technical Specifications as indicated in the attachment to this license amendment and paragraph 2.C.(2) of Facility Operating License No. DPR-77 is hereby amended to read as follows:

(2) Technical Specifications

The Technical Specifications contained in Appendices A and B, as revised through Amendment No. <sup>241</sup> are hereby incorporated in the license. The licensee shall operate the facility in accordance with the Technical Specifications.

3. Also, the license is amended by deleting Paragraph 2.C.(15) of page 6 of the Facility Operating License DPR-77.\*
4. 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



Frederick J. Hebdon, Director  
Project Directorate II-3  
Division of Reactor Projects - I/II  
Office of Nuclear Reactor Regulation

Attachment : 1. Page 6 of License DPR-77  
2. Changes to the Technical  
Specifications

Date of Issuance: December 16, 1998

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\*Page 6 is attached, for the composite license to reflect this change.

(c) By no later than June 30, 1982, all safety-related electrical equipment in the facility shall be qualified in accordance with the provisions of: Division of Operating Reactors "Guidelines for Evaluating Environmental Qualification of Class IE Electrical Equipment in Operating Reactors" (DOR Guidelines); or, NUREG-0588, "Interim Staff Position on Environmental Qualification of Safety-Related Electrical Equipment," December 1979. Copies of these documents are attached to the Order for Modification of Licence DPR-77 dated November 6, 1980.

(13) Loss of Non-Class IE Instrumentation and Control Room System Bus During Operation (Section 7.10)

Prior to exceeding five percent power, TVA must complete revisions to plant emergency procedures to the satisfaction of the NRC.

(14) Engineering Safety Feature (ESF) Reset Controls (Section 7.11)

In conformance with IE Bulletin 80-06, TVA shall test the system to identify any further areas of concern, and TVA shall review the control schemes to determine that they are the best in terms of equipment control and plant safety. The results of these test and review efforts shall be provided to the NRC in accordance with the bulletin.

(15) This specification has been deleted

(16) Fire Protection

TVA shall implement and maintain in affect all provisions of the approved fire protection program referenced in Sequoyah Nuclear Plant's Final Safety Analysis Report and as approved in NRC Safety Evaluation Reports contained in NUREG-0011, Supplements 1, 2, and 5, NUREG-1232, Volume 2, NRC letters dated May 29 and October 6, 1986, and the Safety Evaluation issued on August 12, 1997, for License Amendment No. 227, subject to the following provision:

TVA may make changes to the approved fire protection program without prior approval of the Commission only if those changes would not adversely affect the ability to achieve and maintain safe shutdown in the event of a fire.

R231

ATTACHMENT TO LICENSE AMENDMENT NO. 241

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 areas of change.

REMOVE

3/4 8-1  
3/4 8-6  
3/4 8-8  
B 3/4 0-2  
B 3/4 8-1  
B 3/4 8-1a  
6-10a  
6-13a  
6-14

INSERT

3/4 8-1  
3/4 8-6  
3/4 8-8  
B 3/4 0-2  
B 3/4 8-1  
B 3/4 8-1a  
6-10a  
6-13a  
6-14

### 3/4.8 ELECTRICAL POWER SYSTEMS

#### 3/4.8.1 A.C. SOURCES

##### OPERATING

##### LIMITING CONDITION FOR OPERATION

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- 3.8.1.1 As a minimum, the following A.C. electrical power sources shall be OPERABLE:
- a. Two physically independent circuits between the offsite transmission network and the onsite Class 1E distribution system, and
  - b. Four separate and independent diesel generator sets each with:
    1. Two diesels driving a common generator
    2. Two engine-mounted fuel tanks containing a minimum volume of 250 gallons of fuel, per tank
    3. A separate fuel storage system containing a minimum volume of 62,000 gallons of fuel,
    4. A separate fuel transfer pump, and
    5. A separate 125-volt D.C. distribution panel, 125-volt D.C. battery bank and associated charger.

APPLICABILITY: MODES 1, 2, 3 and 4.

##### ACTION:

- a. With one offsite A.C. circuit of the above required A.C. electrical power source inoperable, demonstrate the OPERABILITY of the remaining offsite A.C. circuit by performing Surveillance Requirement 4.8.1.1.1.a within one hour and at least once per 8 hours thereafter. Restore at least two offsite circuits to OPERABLE status within 72 hours or be in at least HOT STANDBY within the next 6 hours and in COLD SHUTDOWN within the following 30 hours.
- b.# With diesel generator set(s) IA-A and/or 2A-A or 1B-B and/or 2B-B of the above required A.C. electrical power sources inoperable,\* demonstrate the OPERABILITY of the remaining A.C. sources by performing Surveillance Requirement 4.8.1.1.1.a within one hour and at least once per 8 hours thereafter, and determining OPERABLE diesel generator sets are not inoperable due to common cause failure or performing Surveillance Requirement 4.8.1.1.2.a.4 within 24 hours; restore at least four diesel generator sets to OPERABLE status within 7 days or be in at least HOT STANDBY within the next 6 hours and in COLD SHUTDOWN within the following 30 hours.

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# Required actions, to verify OPERABLE diesel generator sets are not inoperable due to common cause failure or perform SR 4.8.1.1.2.a.4, shall be completed if this action is entered.

\* No more than one diesel generator may be made simultaneously inoperable on a pre-planned basis for maintenance, modification, or surveillance testing.

ELECTRICAL POWER SYSTEMS

SURVEILLANCE REQUIREMENTS (Continued)

3. Verifying the diesel generator operates for at least 24 hours. During the first 2 hours to 2.25 hours of this test, the diesel generator shall be loaded between 4620 kw and 4840 kw and between 2380 kvar and 2600 kvar and during the remaining hours of this test, the diesel generator shall be loaded between 3960 kw and 4400 kw and between 2140 kvar and 2370 kvar.

R177

The generator voltage and frequency shall be  $\geq 6800$  volts and  $\geq 58.8$  Hz within 10 seconds after the start signal. After energization, the steady state generator voltage and frequency shall be maintained  $\geq 6800$  volts and  $\leq 7260$  volts and  $\geq 58.8$  Hz and  $\leq 61.2$  Hz during this test.

R238

4. Within 5 minutes of shutting down the diesel generator after it has operated  $\geq 2$  hours loaded between 3960 kw and 4400 kw and between 2140 kvar and 2370 kvar, verify that the diesel generator starts within 10 seconds after receipt of the start signal and operates for greater than or equal to 5 minutes. After energization, the steady state voltage and frequency shall be maintained  $\geq 6800$  volts and  $\leq 7260$  volts and  $\geq 58.8$  Hz and  $\leq 61.2$  Hz during this test.

R238

4.8.1.1.3 The 125-volt D.C. distribution panel, 125-volt D.C. battery bank and associated charger for each diesel generator shall be demonstrated OPERABLE:

a. At least once per 7 days by verifying:

1. That the parameters in Table 4.8-1a meet the Category A limits.
2. That the total battery terminal voltage is greater than or equal to 124-volts on float charge.

b. At least once per 92 days by:

1. Verifying that the parameters in Table 4.8-1a meet the Category B limits,
2. Verifying there is no visible corrosion at either terminals or connectors, or the cell to terminal connection resistance of these items is less than  $150 \times 10^{-6}$  ohms, and
3. Verifying that the average electrolyte temperature of 6 connected cells is above 60°F.

R217

c. At least once per 18 months by verifying that:

1. The cells, cell plates and battery racks show no visual indication of physical damage or abnormal deterioration.
2. The battery to battery and terminal connections are clean, tight and coated with anti-corrosion material.
3. The resistance of each cell to terminal connection is less than or equal to  $150 \times 10^{-6}$  ohms.

4.8.1.1.4 This surveillance has been deleted.

## ELECTRICAL POWER SYSTEMS

### SHUTDOWN

#### LIMITING CONDITION FOR OPERATION

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3.8.1.2 As a minimum, the following A.C. electrical power sources shall be OPERABLE:

- a. One circuit between the offsite transmission network and the onsite Class 1E distribution system, and
- b. Diesel generator sets 1A-A and 2A-A or 1B-B and 2B-B each with:
  1. Two diesels driving a common generator,
  2. Two engine-mounted fuel tanks containing a minimum volume of 250 gallons of fuel per tank,
  3. A fuel storage system containing a minimum volume of 62,000 gallons of fuel,
  4. A fuel transfer pump, and
  5. A separate 125-volt D.C. distribution panel, 125-volt D.C. battery bank and associated charger.

APPLICABILITY: MODES 5 and 6.

#### ACTION:

With less than the above minimum required A.C. electrical power sources OPERABLE, suspend all operations involving CORE ALTERATIONS or positive reactivity changes.

#### SURVEILLANCE REQUIREMENTS

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4.8.1.2 The above required A.C. electrical power sources shall be demonstrated OPERABLE by the performance of each of the Surveillance Requirements of 4.8.1.1.1 and 4.8.1.1.2 (except for requirement 4.8.1.1.2.a.5), and 4.8.1.1.3.

## APPLICABILITY

### BASES

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3.0.5 This specification delineates what additional conditions must be satisfied to permit operation to continue, consistent with the ACTION statements for power sources, when a normal or emergency power source is not OPERABLE. It specifically prohibits operation when one division is inoperable because its normal or emergency power source is inoperable and a system, subsystem, train, component or device in another division is inoperable for another reason.

The provisions of this specification permit the ACTION statements associated with individual systems, subsystems, trains, components, or devices to be consistent with the ACTION statements of the associated electrical power source. It allows operation to be governed by the time limits of the ACTION statement associated with the Limiting Condition for Operation for the normal or emergency power source, not the individual ACTION statements for each system, subsystem, train, component or device that is determined to be inoperable solely because of the inoperability of its normal or emergency power source.

For example, Specification 3.8.1.1 requires in part that four emergency diesel generators be OPERABLE. The ACTION statement provides for a 7-day out-of-service time when one emergency diesel generator is not OPERABLE. If the definition of OPERABLE were applied without consideration of Specification 3.0.5, all systems, subsystems, trains, components and devices supplied by the inoperable emergency power source would also be inoperable. This would dictate invoking the applicable ACTION statements for each of the applicable Limiting Conditions for Operation. However, the provisions of Specification 3.0.5 permit the time limits for continued operation to be consistent with the ACTION statement for the inoperable emergency diesel generator instead, provided the other specified conditions are satisfied. In this case, this would mean that the corresponding normal power source must be OPERABLE, and all redundant systems, subsystems, trains, components, and devices must be OPERABLE, or otherwise satisfy Specification 3.0.5 (i.e., be capable of performing their design function and have at least one normal or one emergency power source OPERABLE). If they are not satisfied, action is required in accordance with this specification.

As a further example, Specification 3.8.1.1 requires in part that two physically independent circuits between the offsite transmission network and the onsite Class IE distribution system be OPERABLE. The ACTION statement provides a 24-hour out-of-service time when both required offsite circuits are not OPERABLE. If the definition of OPERABLE were applied without consideration of Specification 3.0.5, all systems, subsystems, trains, components and devices supplied by the inoperable normal power sources, both of the offsite circuits, would also be inoperable. This would dictate invoking the applicable ACTION statements for each of the applicable LCOS. However, the provisions of Specification 3.0.5 permit the time limit for continued operation to be consistent with the ACTION statement for the inoperable normal power sources

### 3/4.8 ELECTRICAL POWER SYSTEMS

#### BASES

#### 3/4.8.1 and 3/4.8.2 A.C. SOURCES AND ONSITE POWER DISTRIBUTION SYSTEMS

The OPERABILITY of the A.C. and D.C power sources and associated distribution systems during operation ensures that sufficient power will be available to supply the safety related equipment required for 1) the safe shutdown of the facility and 2) the mitigation and control of accident conditions within the facility. The minimum specified independent and redundant A.C. and D.C. power sources and distribution systems satisfy the requirements of General Design Criteria 17 of Appendix "A" to 10 CFR 50.

The ACTION requirements specified for the levels of degradation of the power sources provide restriction upon continued facility operation commensurate with the level of degradation. The OPERABILITY of the power sources are consistent with the initial condition assumptions of the accident analyses and are based upon maintaining at least one redundant set of onsite A.C. and D.C. power sources and associated distribution systems OPERABLE during accident conditions coincident with an assumed loss of offsite power and single failure of the other onsite A.C. source. When applying Action b of LCO 3.8.1.1, the Configuration Risk Management Program described in Section 6.8.4.i is required to be implemented.

The footnote for Action b of LCO 3.8.1.1 requires completion of a determination that the OPERABLE diesel generators are not inoperable due to common cause failure or performance of Surveillance 4.8.1.1.2.a.4 if Action b is entered. The intent is that all diesel generator inoperabilities must be investigated for common cause failures regardless of how long the diesel generator inoperability persists.

The action to determine that the OPERABLE diesel generators are not inoperable due to common cause failure provides an allowance to avoid unnecessary testing of OPERABLE diesel generators. If it can be determined that the cause of the inoperable diesel generator does not exist on the OPERABLE diesel generators, Surveillance Requirement 4.8.1.1.2.a.4 does not have to be performed. If the cause of inoperability exists on other diesel generator(s), the other diesel generator(s) would be declared inoperable upon discovery and Action e of LCO 3.8.1.1 would be entered as applicable. Once the common failure is repaired, the common cause no longer exists, and the action to determine inoperability due to common cause failure is satisfied. If the cause of the initial inoperable diesel generator cannot be confirmed not to exist on the remaining diesel generators, performance of Surveillance 4.8.1.1.2.a.4 suffices to provide assurance to continued OPERABILITY of the other diesel generators.

According to Generic Letter 84-15, 24 hours is reasonable to confirm that the OPERABLE diesel generators are not affected by the same problem as the inoperable diesel generator.

### 3/4.8 ELECTRICAL POWER SYSTEMS

#### BASES

#### 3/4.8.1 and 3/4.8.2 A.C. SOURCES AND ONSITE POWER DISTRIBUTION SYSTEMS

The OPERABILITY of the minimum specified A.C. and D.C. power sources and associated distribution systems during shutdown and refueling ensures that 1) the facility can be maintained in the shutdown or refueling condition for extended time periods and 2) sufficient instrumentation and control capability is available for monitoring and maintaining the unit status.

The Surveillance Requirements for demonstrating the OPERABILITY of the diesel generators are in accordance with the recommendations of Regulatory Guides 1.9 "Selection of Diesel Generator Set Capacity for Standby Power Supplies," March 10, 1971, and 1.108 "Periodic Testing of Diesel Generator Units Used as Onsite Electric Power Systems at Nuclear Power Plants," Revision 1, August 1977, and 1.137 "Fuel-Oil Systems for Standby Diesel Generators," Revision 1, October 1979. The surveillance requirements for the diesel generator load-run test and the 24-hour endurance and margin test are in accordance with Regulatory Guide 1.9, Revision 3, July 1993, "Selection, Design, Qualification, and Testing of Emergency Diesel Generator Units Used as Class 1E Onsite Electric Power Systems at Nuclear Power Plants." During the diesel generator endurance and margin surveillance test, momentary transients outside the kw and kvar load ranges to not invalidate the test results. Similarly, during the diesel generator load-run test, momentary transients outside the kw load range do not invalidate the test results.

R177

Where the SRs discussed herein specify voltage and frequency tolerances, the following is applicable. 6800 volts is the minimum steady state output voltage and the 10 second transient value. 6800 volts is 98.6% of nominal bus voltage of 6900 volts and is based on the minimum voltage required for the diesel generator supply breaker to close on the 6.9 kV shutdown board. The specified maximum steady state output voltage of 7260 volts is based on the degraded over voltage relay setpoint and is equivalent to 110% of the nameplate rating of the 6600 volt motors. The specified minimum and maximum frequencies of the diesel generator are 58.8 Hz and 61.2 Hz, respectively. These values are equal to  $\pm 2\%$  of the 60 Hz nominal frequency and are derived from the recommendations given in regulatory Guide 1.9.

R238

The Surveillance Requirement for demonstrating the OPERABILITY of the Station batteries are based on the recommendations of Regulatory Guide 1.129 "Maintenance Testing and Replacement of Large Lead Storage Batteries for Nuclear Power Plants," February 1978, and IEEE Std 450-1980, "IEEE Recommended Practice for Maintenance, Testing, and Replacement of Large Lead Storage Batteries for Generating Stations and Substations."

#### h. Containment Leakage Rate Testing Program

A program shall be established to implement the leakage rate testing of the containment as required by 10 CFR 50.54(o) and 10 CFR 50 Appendix J, Option B, as modified by approved exemptions. Visual examination and testing, including test intervals and extensions, shall be in accordance with Regulatory Guide (RG) 1.163, "Performance-Based Containment Leak-Test Program," dated September 1995 with exceptions provided in the site implementing instructions.

The peak calculated containment internal pressure for the design basis loss of coolant accident,  $P_a$ , is 12.0 psig.

The maximum allowable containment leakage rate,  $L_a$ , at  $P_a$ , is 0.25% of the primary containment air weight per day.

Leakage rate acceptance criteria are:

- a. Containment overall leakage rate acceptance criteria is  $\leq 1.0 L_a$ . During the first unit startup following testing in accordance with this program, the leakage rate acceptance criteria are  $\leq 0.60 L_a$  for the combined Type B and Type C tests, and  $\leq 0.75 L_a$  for Type A tests;
- b. Air lock testing acceptance criteria are:
  - 1) Overall air lock leakage rate is  $\leq 0.05 L_a$  when tested at  $\geq P_a$ .
  - 2) For each door, leakage rate is  $\leq 0.01 L_a$  when pressurized to  $\geq 6$  psig for at least two minutes.

The provisions of SR 4.0.2 do not apply to the test frequencies specified in the Containment Leakage Rate Testing Program.

The provisions of SR 4.0.3 are applicable to the Containment Leakage Rate Testing Program.

#### i. Configuration Risk Management Program

The Configuration Risk Management Program (CRMP) provides a proceduralized risk-informed assessment to manage the risk associated with equipment inoperability. The program applies to Technical Specification structures, systems, or components for which a risk-informed allowed outage time has been granted. The program shall include the following elements:

- a. Provisions for the control and implementation of a Level 1 at-power internal events PRA-informed methodology. The assessment shall be capable of evaluating the applicable plant configuration.
- b. Provisions for performing an assessment prior to entering the Limiting Condition for Operation (LCO) Action for preplanned activities.
- c. Provisions for performing an assessment after entering the LCO Action for unplanned entry into the LCO Action.
- d. Provisions for assessing the need for additional actions after the discovery of additional equipment out of service conditions while in the LCO Action.
- e. Provisions for considering other applicable risk significant contributors such as Level 2 issues and external events, qualitatively or quantitatively.

ADMINISTRATIVE CONTROLS

CORE OPERATING LIMITS REPORT (continued)

- 6. WCAP-10054-P-A, Westinghouse Small Break ECCS Evaluation Model Using the NOTRUMP Code, August 1985, (W Proprietary)  
(Methodology for Specification 3/4.2.2 - Heat Flux Hot Channel Factor)
- 7. WCAP-10266-P-A, Rev. 2, "THE 1981 REVISION OF WESTINGHOUSE EVALUATION MODEL USING BASH CODE", March 1987, (W Proprietary).  
(Methodology for Specification 3.2.2 - Heat Flux Hot Channel Factor).

R227

6.9.1.14.b The core operating limits shall be determined so that all applicable limits (e.g., fuel thermal-mechanical limits, core thermal-hydraulic limits, ECCS limits, nuclear limits such as shutdown margin, and transient and accident analysis limits) of the safety analysis are met.

6.9.1.14.c THE CORE OPERATING LIMITS REPORT shall be provided within 30 days after cycle start-up (Mode 2) for each reload cycle or within 30 days of issuance of any midcycle revision of the NRC Document Control Desk with copies to the Regional Administrator and Resident Inspector.

R159

SPECIAL REPORTS

6.9.2.1 Special reports shall be submitted within the time period specified for each report, in accordance with 10 CFR 50.4.

R76

6.9.2.2 This specification has been deleted.

ADMINISTRATIVE CONTROLS

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6.10 RECORD RETENTION (DELETED)

R237



UNITED STATES  
NUCLEAR REGULATORY COMMISSION  
WASHINGTON, D.C. 20555-0001

TENNESSEE VALLEY AUTHORITY

DOCKET NO. 50-328

SEQUOYAH NUCLEAR PLANT, UNIT 2

AMENDMENT TO FACILITY OPERATING LICENSE

Amendment No. 231  
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 22, 1996, as supplemented on August 27 and October 8, 1998, 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.

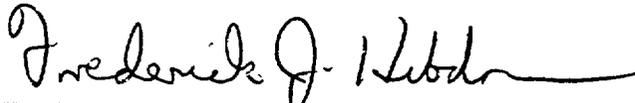
2. Accordingly, the license is amended by changes to the Technical Specifications as indicated in the attachment to this license amendment and paragraph 2.C.(2) of Facility Operating License No. DPR-79 is hereby amended to read as follows:

(2) Technical Specifications

The Technical Specifications contained in Appendices A and B, as revised through Amendment No. 231 are hereby incorporated in the license. The licensee shall operate the facility in accordance with the Technical Specifications.

3. Also, the license is amended by deleting Paragraph 2.C.(12) of page 5 of the Facility Operating License DPR-79.\*
4. 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



Frederick J. Hebdon, Director  
Project Directorate II-3  
Division of Reactor Projects - I/II  
Office of Nuclear Reactor Regulation

Attachment : 1. Page 5 of License DPR-79  
2. Changes to the Technical  
Specifications

Date of Issuance: December 16, 1998

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\*Page 5 is attached, for the composite license to reflect this change.

- b. Complete and auditable records must be available and maintained at a central location which describe the environmental qualification method used for all safety-related electrical equipment in sufficient detail to document the degree of compliance with the DOR Guidelines or NUREG-0588. Such records should be updated and maintained current as equipment is replaced, further tested, or otherwise further qualified to document complete compliance by June 30, 1982.
- c. Within 90 days of receipt of the equipment qualification safety evaluation, the licensee shall either (i) provide missing documentation identified in Sections 3 and 4 of the equipment qualification safety evaluation which will demonstrate compliance of the applicable equipment with NUREG-0588, or (ii) commit to corrective actions which will result in documentation of compliance of applicable equipment with NUREG-0588 no later than June 30, 1982.

(11) Requirements For Modification To Or Addition Of Instrumentation And Controls (Section 7.3.2)

- a. Prior to startup after first refueling, TVA shall have installed instrument downscale failure alarms for the effluent monitoring instrumentation channels for radioactive gaseous and radioactive liquid effluents. Modifications to procedures and Technical Specifications 3.3.3.9 and 3.3.3.10 shall have been completed.
- b. Prior to startup after the first refueling, TVA shall have received NRC approval of an additional operable level of over/undervoltage protection including associated Technical Specifications. The level of protection from the effects of power transients on safety-related equipment provided by Part I of the staff's "Degraded Grid Voltage Position", or equivalent, is required.

R2

(12) This specification has been deleted.

ATTACHMENT TO LICENSE AMENDMENT NO. 231

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 areas of change.

REMOVE

3/4 8-1  
3/4 8-7  
3/4 8-9  
B 3/4 0-2  
B 3/4 8-1  
B 3/4 8-1a  
6-10  
6-14  
6-15

INSERT

3/4 8-1  
3/4 8-7  
3/4 8-9  
B 3/4 0-2  
B 3/4 8-1  
B 3/4 8-1a  
6-10  
6-14  
6-15

### 3/4.8 ELECTRICAL POWER SYSTEMS

#### 3/4.8.1 A.C. SOURCES

##### OPERATING

##### LIMITING CONDITION FOR OPERATION

---

- 3.8.1.1 As a minimum, the following A.C. electrical power sources shall be OPERABLE:
- a. Two physically independent circuits between the offsite transmission network and the onsite Class 1E distribution system, and
  - b. Four separate and independent diesel generator sets each with:
    1. Two diesels driving a common generator
    2. Two engine-mounted fuel tanks containing a minimum volume of 250 gallons of fuel, per tank
    3. A separate fuel storage system containing a minimum volume of 62,000 gallons of fuel,
    4. A separate fuel transfer pump, and
    5. A separate 125-volt D.C. distribution panel, 125-volt D.C. battery bank and associated charger.

APPLICABILITY: MODES 1, 2, 3 and 4.

##### ACTION:

- a. With one offsite A.C. circuit of the above required A.C. electrical power source inoperable, demonstrate the OPERABILITY of the remaining offsite A.C. circuit by performing Surveillance Requirement 4.8.1.1.1.a within one hour and at least once per 8 hours thereafter. Restore at least two offsite circuits to OPERABLE status within 72 hours or be in at least HOT STANDBY within the next 6 hours and in COLD SHUTDOWN within the following 30 hours.
- b.# With diesel generator set(s) IA-A and/or 2A-A or 1B-B and/or 2B-B of the above required A.C. electrical power sources inoperable,\* demonstrate the OPERABILITY of the remaining A.C. sources by performing Surveillance Requirement 4.8.1.1.1.a within one hour and at least once per 8 hours thereafter, and determining OPERABLE diesel generator sets are not inoperable due to common cause failure or performing Surveillance Requirement 4.8.1.1.2.a.4 within 24 hours; restore at least four diesel generator sets to OPERABLE status within 7 days or be in at least HOT STANDBY within the next 6 hours and in COLD SHUTDOWN within the following 30 hours.

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# Required actions, to verify OPERABLE diesel generator sets are not inoperable due to common cause failure or perform SR 4.8.1.1.2.a.4, shall be completed if this action is entered.

\* No more than one diesel generator may be made simultaneously inoperable on a pre-planned basis for maintenance, modification, or surveillance testing.

ELECTRICAL POWER SYSTEMS

SURVEILLANCE REQUIREMENTS (Continued)

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4.8.1.1.4 This surveillance has been deleted.

## ELECTRICAL POWER SYSTEMS

### SHUTDOWN

#### LIMITING CONDITION FOR OPERATION

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3.8.1.2 As a minimum, the following A.C. electrical power sources shall be OPERABLE:

- a. One circuit between the offsite transmission network and the onsite Class 1E distribution system, and
- b. Diesel generator sets 1A-A and 2A-A or 1B-B and 2B-B each with:
  1. Two diesels driving a common generator,
  2. Two engine-mounted fuel tanks containing a minimum volume of 250 gallons of fuel per tank,
  3. A fuel storage system containing a minimum volume of 62,000 gallons of fuel,
  4. A fuel transfer pump, and
  5. A separate 125-volt D.C. distribution panel, 125-volt D.C. battery bank and associated charger.

APPLICABILITY: MODES 5 and 6.

#### ACTION:

With less than the above minimum required A.C. electrical power sources OPERABLE, suspend all operations involving CORE ALTERATIONS or positive reactivity changes.

#### SURVEILLANCE REQUIREMENTS

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4.8.1.2 The above required A.C. electrical power sources shall be demonstrated OPERABLE by the performance of each of the Surveillance Requirements of 4.8.1.1.1 and 4.8.1.1.2 (except for requirement 4.8.1.1.2.a.5), and 4.8.1.1.3.

## BASES

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3.0.5 This specification delineates what additional conditions must be satisfied to permit operation to continue, consistent with the ACTION statements for power sources, when a normal or emergency power source is not OPERABLE. It specifically prohibits operation when one division is inoperable because its normal or emergency power source is inoperable and a system, subsystem, train, component or device in another division is inoperable for another reason.

The provisions of this specification permit the ACTION statements associated with individual systems, subsystems, trains, components, or devices to be consistent with the ACTION statements of the associated electrical power source. It allows operation to be governed by the time limits of the ACTION statement associated with the Limiting Condition for Operation for the normal or emergency power source, not the individual ACTION statements for each system, subsystem, train, component or device that is determined to be inoperable solely because of the inoperability of its normal or emergency power source.

For example, Specification 3.8.1.1 requires in part that four emergency diesel generators be OPERABLE. The ACTION statement provides for a 7-day out-of-service time when one emergency diesel generator is not OPERABLE. If the definition of OPERABLE were applied without consideration of Specification 3.0.5, all systems, subsystems, trains, components and devices supplied by the inoperable emergency power source would also be inoperable. This would dictate invoking the applicable ACTION statements for each of the applicable Limiting Conditions for Operation. However, the provisions of Specification 3.0.5 permit the time limits for continued operation to be consistent with the ACTION statement for the inoperable emergency diesel generator instead, provided the other specified conditions are satisfied. In this case, this would mean that the corresponding normal power source must be OPERABLE, and all redundant systems, subsystems, trains, components, and devices must be OPERABLE, or otherwise satisfy Specification 3.0.5 (i.e., be capable of performing their design function and have at least one normal or one emergency power source OPERABLE). If they are not satisfied, action is required in accordance with this specification.

As a further example, Specification 3.8.1.1 requires in part that two physically independent circuits between the offsite transmission network and the onsite Class IE distribution system be OPERABLE. The ACTION statement provides a 24-hour out-of-service time when both required offsite circuits are not OPERABLE. If the definition of OPERABLE were applied without consideration of Specification 3.0.5, all systems, subsystems, trains, components and devices supplied by the inoperable normal power sources, both of the offsite circuits, would also be inoperable. This would dictate invoking the applicable ACTION statements for each of the applicable LCOs. However, the provisions of Specification 3.0.5 permit the time limit for continued operation to be consistent with the ACTION statement for the inoperable normal power sources instead, provided the other

### 3/4.8 ELECTRICAL POWER SYSTEMS

#### BASES

#### 3/4.8.1 AND 3/4.8.2 A.C. SOURCES AND ONSITE POWER DISTRIBUTION SYSTEMS

The OPERABILITY of the A.C. and D.C power sources and associated distribution systems during operation ensures that sufficient power will be available to supply the safety related equipment required for 1) the safe shutdown of the facility and 2) the mitigation and control of accident conditions within the facility. The minimum specified independent and redundant A.C. and D.C. power sources and distribution systems satisfy the requirements of General Design Criterion 17 of Appendix "A" to 10 CFR 50.

The ACTION requirements specified for the levels of degradation of the power sources provide restriction upon continued facility operation commensurate with the level of degradation. The OPERABILITY of the power sources are consistent with the initial condition assumptions of the safety analyses and are based upon maintaining at least one redundant set of onsite A.C. and D.C. power sources and associated distribution systems OPERABLE during accident conditions coincident with an assumed loss of offsite power and single failure of the other onsite A.C. source. When applying Action b of LCO 3.8.1.1, the Configuration Risk Management Program described in Section 6.8.4.i is required to be implemented.

The footnote for Action b of LCO 3.8.1.1 requires completion of a determination that the OPERABLE diesel generators are not inoperable due to common cause failure or performance of Surveillance 4.8.1.1.2.a.4 if Action b is entered. The intent is that all diesel generator inoperabilities must be investigated for common cause failures regardless of how long the diesel generator inoperability persists.

The action to determine that the OPERABLE diesel generators are not inoperable due to common cause failures provides an allowance to avoid unnecessary testing of OPERABLE diesel generators. If it can be determined that the cause of the inoperable diesel generator does not exist on the OPERABLE diesel generators, Surveillance Requirement 4.8.1.1.2.a.4 does not have to be performed. If the cause of inoperability exists on other diesel generator(s), the other diesel generator(s) would be declared inoperable upon discovery and Action e of LCO 3.8.1.1 would be entered as applicable. Once the common failure is repaired, the common cause no longer exists, and the action to determine inoperability due to common cause failure is satisfied. If the cause of the initial inoperable diesel generator cannot be confirmed not to exist on the remaining diesel generators, performance of Surveillance 4.8.1.1.2.a.4 suffices to provide assurance of continued OPERABILITY of the other diesel generators.

According to Generic Letter 84-15, 24 hours is reasonable to confirm that the OPERABLE diesel generators are not affected by the same problem as the inoperable diesel generator.

### 3/4.8 ELECTRICAL POWER SYSTEMS

#### BASES

#### 3/4.8.1 AND 3/4.8.2 A.C. SOURCES AND ONSITE POWER DISTRIBUTION SYSTEMS

The OPERABILITY of the minimum specified A.C. and D.C. power sources and associated distribution systems during shutdown and refueling ensures that 1) the facility can be maintained in the shutdown or refueling condition for extended time periods and 2) sufficient instrumentation and control capability is available for monitoring and maintaining the unit status.

The Surveillance Requirements for demonstrating the OPERABILITY of the diesel generators are in accordance with the recommendations of Regulatory Guides 1.9 "Selection of Diesel Generator Set Capacity for Standby Power Supplies", March 10, 1971, 1.108 "Periodic Testing of Diesel Generator Units Used as Onsite Electric Power Systems at Nuclear Power Plants," Revision 1, August 1977, and 1.137 "Fuel-Oil Systems for Standby Diesel Generators," Revision 1, October 1979. The surveillance requirements for the diesel generator load-run test and the 24-hour endurance and margin test are in accordance with Regulatory Guide 1.9, Revision 3, July 1993, "Selection, Design, Qualification, and Testing of Emergency Diesel Generator Units Used as Class 1E Onsite Electric Power Systems at Nuclear Power Plant." During the diesel generator endurance and margin surveillance test, momentary transients outside the kw and kvar load ranges do not invalidate the test results. Similarly, during the diesel generator load-run test, momentary transients outside the kw load range do not invalidate the test results.

R164

Where the SRs discussed herein specify voltage and frequency tolerances, the following is applicable. 6800 volts is the minimum steady state output voltage and the 10 second transient value. 6800 volts is 98.6% of nominal bus voltage of 6900 volts and is based on the minimum voltage required for the diesel generator supply breaker to close on the 6.9 kV shutdown board. The specified maximum steady state output voltage of 7260 volts is based on the degraded over voltage relay setpoint and is equivalent to 110% of the nameplate rating of the 6600 volt motors. The specified minimum and maximum frequencies of the diesel generator are 58.8 Hz and 61.2 Hz, respectively. These values are equal to  $\pm 2\%$  of the 60 Hz nominal frequency and are derived from the recommendations given in regulatory Guide 1.9.

R224

The Surveillance Requirement for demonstrating the OPERABILITY of the Station batteries are based on the recommendations of Regulatory Guide 1.129 "Maintenance Testing and Replacement of Large Lead Storage Batteries for Nuclear Power Plants," February 1978, and IEEE Std 450-1980, "IEEE Recommended Practice for Maintenance, Testing and Replacement of Large Lead Storage Batteries for Generating Stations and Substations."

ADMINISTRATIVE CONTROLS

b. Air lock testing acceptance criteria are:

- 1) Overall air lock leakage rate is  $\leq 0.05 L_2$  when tested at  $\geq P_2$ .
- 2) For each door, leakage rate is  $\leq 0.01 L_2$  when pressurized to  $\geq 6$  psig for at least two minutes.

R207

The provisions of SR 4.0.2 do not apply to the test frequencies specified in the Containment Leakage Rate Testing Program.

The provisions of SR 4.0.3 are applicable to the Containment Leakage Rate Testing Program.

i. Configuration Risk Management Program

The Configuration Risk Management Program (CRMP) provides a proceduralized risk-informed assessment to manage the risk associated with equipment inoperability. The program applies to Technical Specification structures, systems, or components for which a risk-informed allowed outage time has been granted. The program shall include the following elements:

- a. Provisions for the control and implementation of a Level 1 at-power internal events PRA-informed methodology. The assessment shall be capable of evaluating the applicable plant configuration.
- b. Provisions for performing an assessment prior to entering the Limiting Condition for Operation (LCO) Action for preplanned activities.
- c. Provisions for performing an assessment after entering the LCO Action for unplanned entry into the LCO Action.
- d. Provisions for assessing the need for additional actions after the discovery of additional equipment out of service conditions while in the LCO Action.
- e. Provisions for considering other applicable risk significant contributors such as Level 2 issues and external events, qualitatively or quantitatively.

6.9 REPORTING REQUIREMENTS

ROUTINE REPORTS

6.9.1 In addition to the applicable reporting requirements of Title 10, Code of Federal Regulations, the following reports shall be submitted in accordance with 10 CFR 50.4.

R64

STARTUP REPORT

6.9.1.1 DELETED

6.9.1.2 DELETED

6.9.1.3 DELETED

R223

ADMINISTRATIVE CONTROLS

CORE OPERATING LIMITS REPORT (continued)

- 6. WCAP-10054-P-A, Westinghouse Small Break ECCS Evaluation Model Using the NOTRUMP Code, August 1985, (W Proprietary)  
(Methodology for Specification 3/4.2.2 - Heat Flux Hot Channel Factor)
- 7. WCAP-10266-P-A, Rev. 2, "THE 1981 REVISION OF WESTINGHOUSE EVALUATION MODEL USING BASH CODE", March 1987, (W Proprietary).  
(Methodology for Specification 3.2.2 - Heat Flux Hot Channel Factor).

R214

6.9.1.14.b The core operating limits shall be determined so that all applicable limits (e.g., fuel thermal-mechanical limits, core thermal-hydraulic limits, ECCS limits, nuclear limits such as shutdown margin, and transient and accident analysis limits) of the safety analysis are met.

R146

6.9.1.14.c THE CORE OPERATING LIMITS REPORT shall be provided within 30 days after cycle start-up (Mode 2) for each reload cycle or within 30 days of issuance of any midcycle revision of the NRC Document Control Desk with copies to the Regional Administrator and Resident Inspector.

SPECIAL REPORTS

6.9.2.1 Special reports shall be submitted within the time period specified for each report, in accordance with 10 CFR 50.4.

R64

6.9.2.2 This specification has been deleted.

ADMINISTRATIVE CONTROLS

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6.10 RECORD RETENTION (DELETED)

| R223

SEQUOYAH - UNIT 2

6-15 Amendment No. 28, 44, 50, 66, 107,  
134, 153, 165, 169, 223, 231



UNITED STATES  
NUCLEAR REGULATORY COMMISSION  
WASHINGTON, D.C. 20555-0001

SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION  
RELATED TO AMENDMENT NO. 241 TO FACILITY OPERATING LICENSE NO. DPR-77  
AND AMENDMENT NO. 231 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

The Tennessee Valley Authority (TVA) requested amendments to Operating Licenses DPR-77 and DPR-79 for Sequoyah Nuclear Plant (SQN), Units 1 and 2, respectively, in a letter to the U.S. Nuclear Regulatory Commission (NRC) dated August 22, 1996, as supplemented on August 27 and October 8, 1998. The August 27, 1998, amendment request superseded the original (August 22, 1998) request in its entirety. The October 8, 1998, letter provided clarifying information that did not change the initial no significant hazards consideration determination. The amendments would modify the SQN Unit 1 and 2 Technical Specifications (TSs) by modifying TS 3.8.1.1, Action b, to extend the emergency diesel generator (EDG) allowed outage time (AOT) from 72 hours to 7 days. The original request proposed the AOT be changed to 7 days on a once per 18-month basis. Subsequently, by letter dated August 27, 1998, the licensee revised their request to replace the original request for a once per 18-month provision for a 7-day EDG AOT with a permanent 7-day AOT for the EDGs. The main purpose of this proposal is to allow on-line EDG major 6- and 12-year maintenance activities that would normally be performed during refueling outages. The licensee indicates that performing EDG maintenance at power using the proposed extended EDG AOT would result in a net risk decrease due to increased EDG availability during refueling outages. The licensee's risk analysis indicates that the increasing the AOT from the current 3 days to 7 days is not risk significant.

Additional changes have also been proposed which include eliminating the special reporting requirements for EDGs in TS 4.8.1.1.2.a in accordance with Generic Letter (GL) 94-01 and eliminating a license condition that no longer applies regarding implementation of EDG design and procedure modifications.

The NRC staff has reviewed the requested changes and finds them acceptable as discussed in the following evaluation.

2.0 BACKGROUND

SQN Units 1 and 2 are each equipped with two Class 1E EDGs to supply emergency power to the safety-related buses in the event of a loss of offsite power. The current SQN TS for both units requires that all four EDGs be operable for either or both units during power operation

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because many systems are shared between the Unit 1 and Unit 2. The systems that are shared between Unit 1 and Unit 2 are the emergency gas treatment system, the auxiliary building gas treatment system, the auxiliary control air system, and the component cooling water system. Since the inoperability of one EDG results in the degradation of one train of safety-related system functions for both units, a dual unit shutdown would be required if the repairs/maintenance of any one of the four EDGs is not completed within the current AOT of 72 hours. Since the licensee is required to perform the upcoming 6- and 12-year maintenance activities on SQN EDGs in early 1999 and the scope of this effort is substantially larger, the licensee is proposing a longer EDG AOT to complete this effort.

### 3.0 EVALUATION

In their submittal dated August 27, 1998, TVA proposed the following changes to TS 3.8.1, "AC Sources - Operating":

1. Extend the AOT in TS 3.8.1.1, Action b, for one EDG inoperable from the current 72- hours to 7-days.
2. Delete the current footnote that is associated with the above Required Action b that provides a 72-hour extension for cleaning activities of the fuel oil storage tank. This note will not be necessary because the proposed 7-day AOT provides adequate time for cleaning the fuel storage tank.
3. Delete the reporting requirements associated with EDG reliability report in TSs 4.8.1.1.4, 4.8.1.2, and 6.9.2.2.
4. Delete license condition, 2.C.(15) for Unit 1 and 2.C.(12) for Unit 2, associated with the implementation of EDG design and procedure modifications, that are no longer applicable.

Additionally, the pertinent TS Bases sections are revised to reflect the above TS changes. In particular, because of the proposed addition of TS 6.8.4.i, "Configuration Risk Management Program," the following statement is added to Bases Section 3/4.8.1 and 3/4.8.2, "AC Sources and Onsite Power Distribution Systems:"

"When applying Action b of LCO [limiting condition for operation] 3.8.1.1, the configuration risk management program described in Section 6.8.4.i is required to be implemented."

### 3.1 DETERMINISTIC EVALUATION

The purpose of the proposed change to TS 3.8.1.1, Action b, is to extend the EDG AOT from the current 72 hours to 7 days to allow the licensee to perform the major 6- and 12-year preventive maintenance overhauls on-line. Although the licensee has demonstrated, based on a probabilistic risk assessment (PRA) basis (see PRA evaluation below), that performing on-line

EDG maintenance at power using the proposed extended EDG AOT would result in no significant increase in risk, the staff also reviewed the submittal from a deterministic approach as follows.

The licensee originally proposed changes to TS 3.8.1.1, Action b, to provide AOT extension from 72 hours to 7 days for one EDG or one train of EDGs. This proposal could have allowed the licensee to take two EDGs simultaneously for up to 7 days. The staff informed the licensee that the proposed change to allow two EDGs to be inoperable for 7 days would be too risky and, therefore, is unacceptable. Subsequently, the licensee proposed a revised TS 3.8.1.1, Action b, to add a footnote that would read as follows:

\*No more than one diesel generator may be made simultaneously inoperable on a pre-planned basis for maintenance, modification or surveillance testing.

The staff finds that the note in the TS would restrict the licensee to declare only one EDG at a time to be inoperable on a preplanned basis for up to 7 days. The above change to the TS satisfies staff's concern.

In evaluating the licensee's request to extend the AOT for EDGs, the staff evaluated the request to ensure that the overall availability of the EDGs will not be reduced significantly as a result of increased on-line preventive maintenance activities. In order to determine the above, the NRC staff sent a request for additional information dated November 26, 1997. The licensee's responses were included in letters dated August 27, 1998 and October 8, 1998, and are summarized below:

1. In evaluating the licensee's request to extend the allowed EDG AOT from the current 72 hours to 7 days, the staff requested the licensee to state whether the EDG unavailability for a 7-day AOT would also be consistent with the objective and intent of 10 CFR 50.65, Appendix A, the maintenance rule.

The licensee stated that the maintenance rule unavailability performance criteria for the EDGs is 0.025 for a rolling 24-month average per EDG. This unavailability is bounded by the SQN probabilistic safety assessment. The expected unavailability for each EDG resulting from performing the 12 year and 6 year maintenance in a single 7-day AOT versus performing the maintenance over multiple periods within the current 72-hour AOT were compared. Utilizing multiple 72-hour AOTs to perform the 6- and 12-year maintenance will likely result in the 2A-A EDG exceeding the criteria. In contrast, performing the same maintenance with a single 7-day AOT will not cause any of the four EDGs to exceed the performance criteria and is consistent with the objective and intent of the maintenance rule. Since the unavailability of the EDGs with the 7-day LCO is within the unavailability established for maintenance rule, the staff finds the above response acceptable.

Additionally, the licensee stated that in order to perform the major maintenance with the current 3-day AOT, the duration of work could extend for over 215 hours with five LCO action statement entries and 19 EDG starts. A 7-day AOT will reduce entries into LCO action statement entries to one, reduce EDG unavailability to 113 hours, decrease the

number of required EDG starts to six, and reduce the risk associated with the activities necessary to complete. The above demonstrates that at SQN, the longer EDG AOT not only reduces the entries into the LCO but also the number of EDGs starts.

2. The staff also requested the licensee to provide a discussion of the loss of offsite power at its facility.

The licensee stated that there has been no complete loss of offsite power event at SQN through July 1998. This information is based on the data from Nuclear Safety Analysis (NSA) Center, specifically NSA-166, and plant records.

3. The staff requested the licensee to provide detailed discussion of the measures taken during EDG maintenance outages to minimize transients on the offsite power system.

The licensee stated that the plant specification requires verification of the proper breaker alignment of the offsite power sources within an hour of removing the an EDG , and every eight hours thereafter until that EDG is returned to service to assure that the offsite power is available during the EDG AOT period. Further, in order to minimize the risk of offsite power during the time the EDG is inoperable, the licensee would restrict access to the switchyard and to the relay room at all times and ensure that switchyard activities are controlled during an EDG outage. The staff finds that the above measures taken by the licensee will minimize the probability of loosing offsite power during the EDG outage

On September 30, 1998, a meeting was held between TVA representatives and the NRC staff to discuss the proposed amendment. The Electrical Engineering staff informed TVA that because of the potential safety impact of extended outage time for an EDG, the staff believes that certain compensatory measures are needed during the extended EDG AOT to ensure safe operation of the plant. This should include (1) verification that required systems, subsystems, trains, components, and devices that depend on the remaining EDG as a source of onsite power are verified to be operable before removing an EDG for an extended maintenance, (2) voluntary entry into an LCO action statement should not be scheduled when adverse weather is expected.

By letter dated October 8, 1998, the licensee provided the following responses to our concerns. In response to item (1), the licensee stated that in accordance with the SQN TS requirements in 3.0.5, redundant safety-related systems that depend on the remaining EDG are required to be operable when removing an EDG from service. If this provision cannot be satisfied, those components supplied by only an operable redundant component, are considered inoperable. This condition will result in reduced action times for continued operation before requiring a unit shutdown. In addition, the licensee proposed a Configuration Risk Management Program (CRMP) to support risk-informed TSs to ensure that a proceduralized PRA informed process is in place that assesses the overall impact of plant maintenance on plant risk. The CRMP will be implemented whenever an EDG is out-of-service. The CRMP is codified in SQN TS 6.8.4.i. The staff finds the response acceptable.

In response to item (2) above, the licensee stated that the procedural controls will ensure that the EDG LCO action will not be voluntarily entered when the severe weather is expected. Moreover, there have been no site specific severe weather events that have caused the loss of offsite power at the site. The staff finds the above response acceptable.

TVA proposed deleting the current footnote that is associated with TS 3.8.1.1, Required Action b, which provides a 72-hour extension for cleaning activities of the fuel oil storage tank. The note will no longer be necessary because the proposed 7-day AOT provides adequate time for cleaning the fuel storage tank. Therefore, the proposed change to delete the note is acceptable.

With regard to the proposed change for deleting the reporting requirements of EDG failure and reliability reporting requirements in TSs 4.8.1.1.4, 4.8.1.2, and 6.9.2.2, the licensee states that these provisions are not necessary based on the implementation of the maintenance rule at SQN. On July 14, 1997, the NRC staff approved the TS requirements to remove accelerated testing requirements of EDGs for SQN based on the implementation of the maintenance rule. The licensee states that the deletion of the reporting requirements should have been included in its original TS change request, but was overlooked at that time. The staff finds the deletion of EDG failure reporting requirements to be consistent with GL 94-01, "Removal of Accelerated Testing and Special Reporting Requirements for Emergency Diesel Generators," which allows the licensee to remove the special reporting requirements for EDGs based on the implementation of the maintenance program in accordance 10 CFR 50.65, "Requirements to for Monitoring the Effectiveness of Maintenance at Nuclear Power Plants," and is acceptable.

With regard to the proposed change to delete the license condition, 2.C.(15) for Unit 1 and 2.C.(12) for Unit 2, associated with the implementation of EDG design and procedure modifications, the licensee states that this modification is administrative in nature. This condition involved actions to be completed prior to unit operation following the first refueling outage on each unit. The licensee performed the necessary design and procedure activities to support completion of this condition in the early 1980s. This license condition provides no further benefit and currently has no associated open actions. Based on the above, the staff agrees with the licensee that this condition has already been satisfied for SQN and, therefore, the deletion of the above license condition for Unit 1 and Unit 2 is acceptable.

### 3.2 CONCLUSION OF DETERMINISTIC REVIEW

The staff evaluated the proposed change to extend the EDG AOT from the current 72-hours to 7-days to ensure that the overall availability of the EDGs will not be reduced unnecessarily due to preventive maintenance activities. The staff concludes that the licensee's request for 7-day EDG AOT to perform major maintenance is acceptable. Our conclusion is based on the following: (1) At SQN, the longer EDG AOT would reduce the entries into the LCO and reduce the number of EDG starts for major EDG maintenance activities, (2) no loss of offsite power event at SQN during the whole commercial operation, and (3) several improvements to the offsite power system. Further, we believe that precluding testing and maintenance of other electrical systems during the extended outage will reduce the probability of a station blackout at SQN.

The NRC staff also reviewed the other proposed changes to 3/4.8.1 and finds them to be acceptable.

The NRC staff evaluated the net contribution of the change to overall plant risk due to the extended EDG AOT in Section 3.3.

### 3.3 PRA REVIEW

The staff used a three-tiered approach to evaluate the risk associated with the proposed amendment. The first tier evaluated the PRA model and the impact of the change on plant operational risk. The second tier addressed the need to preclude potentially high risk configurations if additional equipment will be taken out of service simultaneously or other risk significant operational factors such as concurrent system or equipment testing are involved. The third tier evaluated the licensee's configuration risk management program, to ensure that equipment removed from service prior to or during the proposed AOT will be appropriately assessed from a risk perspective. Each tier and associated findings are discussed below.

#### 3.3.1 TIER 1: PRA EVALUATION OF AOT EXTENSION

The Tier 1 staff review of the licensee's PRA involved two aspects: (1) evaluation of the PRA model and its application to the proposed AOT extension, and (2) evaluation of PRA results and insights stemming from the application.

##### 1. Evaluation of PRA Model and its Application to the AOT Extension

The licensee's risk analysis used to support the proposed change is based on its revised Individual Plant Examination (IPE), Revision 1, in 1995, as compared to the original IPE, Revision 0, in 1992. IPE, Revision 1, was submitted to the staff for information in early 1998. It incorporated various changes made to the facility in terms of plant design, procedures, and training programs; updated initiating event frequencies based on additional operating experience; and additional changes in the PRA model to represent the current plant configuration.

The overall PRA methodology used in both revisions is essentially the same. TVA submitted the SQN IPE in 1992 for staff review. The staff review concluded that the submittal met the intent of GL 88-20. The IPE was developed by a combined effort of the licensee staff, Pickard, Lowe and Garrick, Inc., and EQE Engineering, Inc. The IPE capitalized on insights stemming from the NUREG-1150<sup>1</sup> for SQN and the IPE prepared for Watts Bar. For front-end analysis, the SQN IPE used a large event tree and small fault tree technique with linked event tree for quantification. The RISKMAN computer code was used for quantification. The type of initiating events considered are generally consistent with other PRAs. The staff noted that electrical support systems such as AC and DC power were analyzed in the PRA, and no major deficiencies were identified. For common cause failures, the Multiple Greek Letter method was used and the associated parameters were generally consistent with other PRAs. In general, the database for the IPE was based on both generic and plant-specific information. The review

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<sup>1</sup>NUREG-1150, "Sever Accident Risks: An Assessment of Five U.S. Nuclear Power Plants," U.S. NRC, December 1990

of the IPE found no significant problem or errors in the area of human reliability analysis. The original IPE reported the core damage frequency (CDF) for internal events, including internal flooding, to be  $1.7 \times 10^{-4}/\text{yr}$ , but the revised IPE in 1995 reported a new CDF of  $3.8 \times 10^{-5}/\text{yr}$ , with the sequence truncation value of  $1 \times 10^{-9}/\text{yr}$ . The loss of offsite power (LOOP) initiator contributed approximately 10% of the CDF, which amounts to about  $4 \times 10^{-6}/\text{yr}$ .

The Level 2 portion of the original IPE has not been revised. However, TVA performed calculations to estimate the large early release frequency (LERF) impact from the proposed extended EDG AOT. In the IPE, the transition from the front-end analysis to the back-end analysis was accomplished by binning the Level 1 core damage sequences into appropriate plant damage states. Information resulting from the NUREG-1150 study for SQN was used to develop the containment event trees. The staff review of the IPE found that the SQN back-end analysis used reasonable PRA techniques. The IPE indicated that the release group frequencies associated with large early release comprised less than 10% of the CDF.

The LOOP initiating frequency used,  $4.85 \times 10^{-2}/\text{yr}$ , is considered relatively low. However, the relatively low LOOP frequency is justified due to several reasons, which include: (1) no LOOP event at the site during the whole commercial operation; (2) relatively low vulnerability to severe weather, i.e., hurricanes, and (3) the switchyard design and redundant offsite power sources to the switchyard.

TVA provided to the staff the recent EDG performance data, associated with unavailability and reliability for each EDG. The staff finds that the actual performance data from 1995 to 1997 were generally better than those used in the PRA, and the reliability of EDGs was generally high. In addition, the EDG performance consistently exceeded the Maintenance Rule criteria.

The staff did not identify any significant deficiencies or shortcomings associated with the SQN risk analysis to support the proposed change. The licensee provided additional information to address several questions regarding the validity of the risk analysis, and the information was sufficient to resolve the issues. Therefore, the staff believes that the licensee's risk analysis to justify the proposed EDG AOT extension is of sufficient quality for the proposed application.

## 2. Evaluation of PRA Results and Insights

SQN indicated that the proposed extended AOT would result in an EDG unavailability decrease because the unavailability would be less with the 7-day AOT than with the current 3 days. With the current 3-day AOT, the licensee plans to enter and exit multiple outages to perform scheduled maintenance activities. In particular, the upcoming 6- and 12-year inspection would require five AOTs per EDG; in contrast, the licensee indicated that only one extended outage per EDG would be needed to perform the inspection. TVA determined the expected annual EDG unavailability for the 3-day and 7-day AOTs to be 434 and 332 hours, respectively, per EDG per year when those major inspections are included. The CDF impact for both expected unavailabilities were summarized as follows:

<u>Case</u>	<u>EDG Unavailability</u>	<u>CDF (/yr)</u>	<u>% Change</u>
Base	171 hours/yr	$4.06 \times 10^{-5}$	---
7-day AOT	332 hours/yr	$4.13 \times 10^{-5}$	1.8%
3-day AOT	434 hours/yr	$4.19 \times 10^{-5}$	3.1%

A sequence truncation value of  $1 \times 10^{-12}/\text{yr}$  was used to calculate the CDFs. The staff finds that the CDF risk increase from the base case to the proposed 7-day AOT case is very small, less than  $1 \times 10^{-7}/\text{yr}$ . In addition, compared with the 3-day case, the 7-day case would result in a smaller increase in CDF.

The incremental conditional core damage probabilities (ICCDPs) for a single outage have been provided for both cases, 3-day and 7-day, and are summarized as follows:

<u>Case</u>	<u>ICCDP for a single outage</u>
3-day AOT	$2.14 \times 10^{-7}$
7-day AOT	$4.98 \times 10^{-7}$

The ICCDPs were calculated based on an entire AOT duration.

The licensee performed a sensitivity study to determine the impact of changing the sequence truncation value on the CDF of the base case model. The result of the study is summarized as follows:

<u>Truncation Value</u>	<u>CDF (/yr)</u>
$1 \times 10^{-9}$	$3.77 \times 10^{-5}$ (Rev. 1 IPE)
$1 \times 10^{-10}$	$3.97 \times 10^{-5}$
$1 \times 10^{-11}$	$4.03 \times 10^{-5}$
$1 \times 10^{-12}$	$4.06 \times 10^{-5}$

The result indicates that the CDF results are generally robust against different truncation values. The increase in LERF resulting from the proposed change was estimated to be  $9 \times 10^{-8}/\text{yr}$ . The results of LERF calculations are summarized as follows:

<u>Case</u>	<u>LERF (/yr)</u>
Base	$4.45 \times 10^{-6}$
Proposed	$4.54 \times 10^{-6}$

Based on the information provided from TVA, the staff calculated the incremental conditional large early release probability for a single 7-day outage to be less than  $2 \times 10^{-8}$ .

The staff finds that the calculated risk impact of the proposed change in EDG AOT extension is small and below the guidelines in Regulatory Guides (RGs) 1.174<sup>2</sup> and 1.177<sup>3</sup>.

### 3.3.2 TIER 2: AVOIDANCE OF RISK SIGNIFICANT PLANT CONFIGURATIONS

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<sup>2</sup>RG 1.174, "An Approach for Using Probabilistic Risk Assessment in Risk-Informed Decisions on Plant-Specific Changes to the Licensing Basis," July 1998

<sup>3</sup>RG 1.177, "An Approach for Plant-Specific, Risk-Informed Decision making: Technical Specifications," September 1998

TVA did not identify additional TS restrictions or compensatory measures required to avoid potential risk significant configurations during an EDG outage. However, the licensee proposed additional procedural controls associated with severe weather conditions, switchyard activities, and the same-train activities as part of their CRMP for Tier 3.

### 3.3.3 TIER 3: RISK INFORMED PLANT CONFIGURATION MANAGEMENT

The staff believes that the licensee's risk-informed CRMP will allow an evaluation of the risk associated with both scheduled and unscheduled plant activities when performing the EDG maintenance at power. TVA uses multiple elements to incorporate the risk management concept into their maintenance planning, scheduling and activities at power. These elements include the 12-week scheduling process, the Work Week Manager, the computer program SENTINEL, and the Operations Risk Senior Reactor Operator. A risk matrix, developed using the plant-specific SQN PRA, and the SENTINEL computer program are tools to evaluate the risk level of scheduled activities. For equipment configurations of potential risk significance that are not covered by these tools, a PRA engineer is consulted. Emergent work is evaluated by the Work Week Manager against the risk matrix or SENTINEL. The staff finds that the licensee's program to control the risk associated with the activities regarding EDG outages is reasonable.

TVA proposed a supplemental change that adds a CRMP to the Administrative Controls section and bases of TSs. The proposed change is consistent with RG 1.177. The staff concludes that the licensee has met the intent of the Tier 3 guidance.

### 3.3.4 CONCLUSION OF THE PRA REVIEW

The staff did not identify any significant weaknesses or deficiencies associated with the licensee's risk analysis used to support the proposed change that could impact the overall quantitative conclusion. The PRA methodology and approach used to estimate the risk impact were reasonable, and the risk impact of the proposed change was found to be small. The licensee also has a CRMP that provides reasonable tools and processes for configurational risk control during EDG outages. Based on the review, the staff concludes there is a reasonable assurance that the licensee's risk analysis support the EDG AOT extension and the overall risk impact of the proposed change meets the intent of the criteria and guidelines used in the RGs 1.174 and 1.177.

Therefore, the NRC staff concludes that the results and insights of the PRA analysis support the proposed EDG AOT extension from 3 to 7 days.

### Implementation and Monitoring

The staff expects the licensee to implement these TS changes in accordance with the three-tiered approach described above. The licensee has also indicated that the maintenance scheduling practice and the tools used to implement a means of evaluating the impact of maintenance activities on plant configurations are consistent with the Maintenance Rule (10 CFR 50.65). The AOT extension will allow efficient scheduling of on-line maintenance within the boundaries established by implementing the Maintenance Rule. The licensee will monitor EDG performance in relation to the Maintenance Rule performance criteria. Therefore,

application of these implementation and monitoring strategies will help to ensure that an extension of TS EDG AOT does not degrade operational safety over time and that the risk expected when an EDG is taken out of service is minimized.

#### 4.0 STATE CONSULTATION

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

#### 5.0 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 previously issued a proposed finding that the amendment involves no significant hazards consideration, and there has been no public comment on such finding (63 FR 48270, dated September 9, 1998). 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 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.

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