ENCLOSURE 1

PROPOSED TECHNICAL SPECIFICATION CHANGE

SEQUOYAH NUCLEAR PLANT UNITS 1 AND 2

DOCKET NOS. 50-327 AND 50-328

(TVA-SQN-TS-90-12)

LIST OF AFFECTED PAGES

Unit 1

3/4 5-4
3/4 5-5
3/4 9-1
3/4 9-1a

Unit 2

3/4 5-4
3/4 5-5
3/4 9-2

3/4.9.1 BORON CONCENTRATION

LIMITING CONDITION FOR OPERATION

3.9.1 With the reactor vessel head closure bolts less than fully tensioned or with the head removed, the boron concentration of all filled portions of the Reactor Coolant System and the refueling canal shall be maintained uniform and sufficient to ensure that the more restrictive of the following reactivity conditions is met:

a. Either a K_{eff} of 0.95 or less, which includes a 1% delta k/k conservative allowance for uncertainties, or
b. A boron concentration of greater than or equal to 2000 ppm, which includes a 50 ppm conservative allowance for uncertainties.

APPLICABILITY: MODE 6*

ACTION:

With the requirements of the above specification not satisfied, immediately suspend all operations involving CORE ALTERATIONS or positive reactivity changes and initiate and continue boration at greater than or equal to 10 gpm of a solution containing greater than or equal to 20,000 ppm boron or its equivalent until K_{eff} is reduced to less than or equal to 0.95 or the boron concentration is restored to greater than or equal to 2000 ppm, whichever is the more restrictive. The provisions of Specification 3.0.3 are not applicable.

SURVEILLANCE REQUIREMENTS

4.9.1.1 The more restrictive of the above two reactivity conditions shall be determined prior to:

a. Removing or unbolting the reactor vessel head, and
b. Withdrawal of any full length control rod in excess of 3 feet from its fully inserted position within the reactor pressure vessel.

4.9.1.2 The boron concentration of the reactor coolant system and the refueling canal shall be determined by chemical analysis at least once per 72 hours.

4.9.1.3 One of the following valve combinations shall be verified closed under administrative control at least once per 72 hours: R16

Combination A	Combination B	Combination C	Combination D
a. 1-81-536	a. 1-81-536	a. 1-81-536	a. 1-81-536
b. 1-62-922	b. 1-62-922	b. 1-62-907	b. 1-62-907
c. 1-62-916	c. 1-62-916	c. 1-62-914	c. 1-62-914
d. 1-62-933	d. 1-62-940	d. 1-62-921	d. 1-62-921
	e. 1-62-696	e. 1-62-933	e. 1-62-940
	f. 1-62-929		f. 1-62-929
	g. 1-62-932		g. 1-62-932
	h. 1-FCV-62-128		h. 1-62-696
			i. 1-FCV-62-128

INSERT 4.9.1.4 AS PAGE 3/4 9.1a →

*The reactor shall be maintained in MODE 6 whenever fuel is in the reactor vessel with the vessel head closure bolts less than fully tensioned or with the head removed.

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SQN Unit 1 TS - Page 3/4 9-1a

4.9.1.4 The boron concentration in the spent fuel pool shall be determined by chemical analysis to be greater than or equal to 2,000 parts per million (ppm) at least once per 72 hours during fuel movement and until the configuration of the assemblies in the storage racks is verified to comply with the criticality loading criteria specified in Design Feature 5.6.1.1.c.

5.3 REACTOR CORE

FUEL ASSEMBLIES

5.3.1 The reactor core shall contain 193 fuel assemblies with each fuel assembly containing 264 fuel rods clad with Zircaloy-4. Each fuel rod shall have a nominal active fuel length of 144 inches. The initial core loading shall have a maximum enrichment of 3.15 weight percent U-235. Reload fuel shall be similar in physical design to the initial core loading and shall have a maximum enrichment of ~~4.0~~ 5.0 weight percent U-235. R49

INSERT: , EXCEPT THAT SUBSTITUTION OF ZIRCALOY-4 OR STAINLESS STEEL FILLER RODS OR OPEN WATER CHANNELS FOR FUEL RODS MAY BE MADE IN FUEL ASSEMBLIES IF JUSTIFIED BY CYCLE-SPECIFIC RELOAD ANALYSES USING NRC-APPROVED METHODOLOGY. SHOULD MORE THAN 30 RODS IN A CORE, OR 10 RODS IN ANY ASSEMBLY, BE REPLACED PER REFUELING, A SPECIAL REPORT DESCRIBING THE NUMBER OF RODS REPLACED SHALL BE SUBMITTED TO THE COMMISSION PURSUANT TO SPECIFICATION 6.9.2.1 WITHIN 30 DAYS AFTER CYCLE START UP.

CONTROL ROD ASSEMBLIES

5.3.2 The reactor core shall contain 53 full length and no part length control rod assemblies. The full length control rod assemblies shall contain a nominal 142 inches of absorber material. The nominal values of absorber material shall be 80 percent silver, 15 percent indium and 5 percent cadmium. All control rods shall be clad with stainless steel tubing.

5.4 REACTOR COOLANT SYSTEM

DESIGN PRESSURE AND TEMPERATURE

5.4.1 The reactor coolant system is designed and shall be maintained:

a. In accordance with the code requirements specified in Section 5.2 of the FSAR, with allowance for normal degradation pursuant to the applicable Surveillance Requirements,

b. For a pressure of 2485 psig, and

c. For a temperature of 650°F, except for the pressurizer which is 680°F.

VOLUME

5.4.2 The total water and steam volume of the reactor coolant system is 12,612 ± 100 cubic feet at a nominal T_{avg} of 525°F.

5.5 METEOROLOGICAL TOWER LOCATION

5.5.1 The meteorological tower shall be located as shown on Figure 5.1-1.

5.6 FUEL STORAGE

CRITICALITY - SPENT FUEL

5.6.1.1 The spent fuel storage racks are designed for fuel enriched to ~~4.0~~ 5.0 weight percent U-235 and shall be maintained with: R64

a. A k_{eff} equivalent to less than 0.95 when flooded with unborated water, which includes a conservative allowance of ~~1.42%~~ 3.06% delta k/k for uncertainties.* R17

b. A nominal 10.375 inch center-to-center distance between fuel assemblies placed in the storage racks.

INSERT ITEM C. →

CRITICALITY - NEW FUEL

5.6.1.2 The new fuel pit storage racks are designed and shall be maintained with a nominal 21.0 inch center-to-center distance between new fuel assemblies R118 such that k_{eff} will not exceed 0.98 when fuel having an enrichment of 4.5 weight percent U-235 is in place and optimum achievable moderation is assumed. ~~New fuel enrichment is limited to 4.0 weight percent as noted in 5.3.1 and 5.6.1.1.~~ R64

DRAINAGE

5.6.2 The spent fuel pit is designed and shall be maintained to prevent inadvertent draining of the pool below elevation 722 ft.

CAPACITY

5.6.3 The spent fuel storage pool is designed and shall be maintained with a storage capacity limited to no more than 1386 fuel assemblies.

5.7 COMPONENT CYCLIC OR TRANSIENT LIMIT

5.7.1 The components identified in Table 5.7-1 are designed and shall be maintained within the cyclic or transient limits of Table 5.7-1.

*For some accident conditions, the presence of dissolved boron in the pool water may be taken into account by applying the double contingency principle which requires two unlikely, independent, concurrent events to produce a criticality accident. R17

SURVEILLANCE REQUIREMENTS (Continued)

4.9.1.2 The boron concentration of the reactor coolant system and the refueling canal shall be determined by chemical analysis at least once per 72 hours.

4.9.1.3 One of the following valve combinations shall be verified closed under administrative control at least once per 72 hours:

Combination A

a. 2-81-536
b. 2-62-922
c. 2-62-916
d. 2-62-933

Combination B

a. 2-81-536
b. 2-62-922
c. 2-62-916
d. 2-62-940
e. 2-62-696
f. 2-62-929
g. 2-62-932
h. 2-FCV-62-128

Combination C

a. 2-81-536
b. 2-62-907
c. 2-62-914
d. 2-62-921
e. 2-62-933

Combination D

a. 2-81-536
b. 2-62-907
c. 2-62-914
d. 2-62-921
e. 2-62-940
f. 2-62-929
g. 2-62-932
h. 2-62-696
i. 2-FCV-62-128

4.9.1.4 THE BORON CONCENTRATION IN THE SPENT FUEL POOL SHALL BE DETERMINED BY CHEMICAL ANALYSIS TO BE GREATER THAN OR EQUAL TO 2000 ppm AT LEAST ONCE PER 72 HOURS DURING FUEL MOVEMENT AND UNTIL THE CONFIGURATION OF THE ASSEMBLIES IN THE STORAGE RACKS IS VERIFIED TO COMPLY WITH THE CRITICALITY LOADING CRITERIA SPECIFIED IN DESIGN FEATURE 5.6.1.1.C.

5.3 REACTOR CORE

FUEL ASSEMBLIES

5.3.1 The reactor core shall contain 193 fuel assemblies with each fuel assembly containing 264 fuel rods clad with Zircaloy -4. Each fuel rod shall have a nominal active fuel length of 144 inches. The initial core loading shall have a maximum enrichment of 3.15 weight percent U-235. Reload fuel shall be similar in physical design to the initial core loading and shall have a maximum enrichment of ~~4.0~~ 5.0 weight percent U-235. R37

CONTROL ROD ASSEMBLIES

5.3.2 The reactor core shall contain 53 full length and no part length control rod assemblies. The full length control rod assemblies shall contain a nominal 142 inches of absorber material. The nominal values of absorber material shall be 80 percent silver, 15 percent indium and 5 percent cadmium. All control rods shall be clad with stainless steel tubing.

5.4 REACTOR COOLANT SYSTEM

DESIGN PRESSURE AND TEMPERATURE

5.4.1 The reactor coolant system is designed and shall be maintained:

a. In accordance with the code requirements specified in Section 5.2 of the FSAR, with allowance for normal degradation pursuant to the applicable Surveillance Requirements,

b. For a pressure of 2485 psig, and

c. For a temperature of 650°F, except for the pressurizer which is 680°F.

VOLUME

5.4.2 The total water and steam volume of the reactor coolant system is 12,612 ± 100 cubic feet at a nominal T_{avg} of 525°F.

5.5 METEOROLOGICAL TOWER LOCATION

5.5.1 The meteorological tower shall be located as shown on Figure 5.1-1.

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5.6 FUEL STORAGE

CRITICALITY - SPENT FUEL

5.6.1.1 The spent fuel storage racks are designed for fuel enriched to ~~4.0~~ 5.0 weight percent U-235 and shall be maintained with: R52

a. A k_{eff} equivalent to less than 0.95 when flooded with unborated water, which includes a conservative allowance of ~~1.42%~~ 3.06% delta k/k for uncertainties.* R4

b. A nominal 10.375 inch center-to-center distance between fuel assemblies placed in the storage racks.

INSERT ITEM C. →

CRITICALITY - NEW FUEL

5.6.1.2 The new fuel pit storage racks are designed and shall be maintained with a nominal 21.0 inch center-to-center distance between new fuel assemblies such that k_{eff} will not exceed 0.98 when fuel having an enrichment of 4.5 weight percent U-235 is in place and optimum achievable moderation is assumed. ~~New fuel enrichment is limited to 4.0 weight percent, as noted in 5.3.1 and 5.6.1.1.~~ R52

DRAINAGE

5.6.2 The spent fuel storage pool is designed and shall be maintained to prevent inadvertent draining of the pool below elevation 722 ft.

CAPACITY

5.6.3 The spent fuel storage pool is designed and shall be maintained with a storage capacity limited to no more than 1386 fuel assemblies.

5.7 COMPONENT CYCLIC OR TRANSIENT LIMIT

5.7.1 The components identified in Table 5.7-1 are designed and shall be maintained within the cyclic or transient limits of Table 5.7-1.

*For some accident conditions, the presence of dissolved boron in the pool water may be taken into account by applying the double contingency principle which requires two unlikely, independent, concurrent events to produce a criticality accident. R4

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SQN Units 1 and 2 TS Page 5-5

c. Fuel assemblies with enrichment greater than 4.0 weight-percent U-235 and burnup less than 7,500 megawattday/metric ton (MWd/mtu) shall be placed in cells in the spent fuel storage racks that face adjacent cells containing either:

1. Fuel assemblies with accumulated burnup of at least 22,000 MWd/mtu, or

2. Water

ENCLOSURE 2

PROPOSED TECHNICAL SPECIFICATION CHANGE

SEQUOYAH NUCLEAR PLANT UNITS 1 AND 2

DOCKET NOS. 50-327 AND 50-328

(TVA-SQN-TS-90-12)

DESCRIPTION AND JUSTIFICATION FOR
INCREASING THE MAXIMUM FUEL ENRICHMENT
TO 5.0 WEIGHT-PERCENT URANIUM-235

ENCLOSURE 2

Description of Change

Tennessee Valley Authority proposes to modify the Sequoyah Nuclear Plant (SQN) Units 1 and 2 Technical Specifications (TSs) to revise Section 5.0, "Design Features," and add Surveillance Requirement 4.9.1.4 to increase the maximum fuel enrichment from the current 4.0 weight-percent to 5.0 weight-percent uranium (U)-235. This change will also permit the substitution of Zircaloy-4 or stainless steel filler rods or open water channels for fuel rods in fuel assemblies.

Reason for Change

The change to increase the allowable fuel enrichment is necessary to allow the use of higher discharge burnup fuel. Higher discharge burnups are achieved by reloading with smaller fresh batch fractions with higher enrichment. The change to allow the substitution of filler rods or water channels is desirable to permit timely removal of fuel rods that are found to be leaking or are determined to be probable sources of future leakage.

Justification for Change

Each core reload design used at SQN is confirmed to meet all design criteria and to be within the bounds of the accident analysis presented in Chapter 15 of the Final Safety Analysis Report (FSAR) by performance of a reload safety analysis. This analysis considers modifications to the plant design and any changes to fuel design including increases in fuel enrichment. The performance of the reload safety analysis ensures the unit, with its specific core design and fuel enrichment, will operate within the prescribed safety limits. Any restriction on core operation identified through the reload safety analysis process is documented and any changes to the plant license are made at that time. Therefore, operation with revised Design Feature 5.3.1 allowing the use of fuel assemblies with a maximum enrichment of 5.0 weight-percent will be justified for each fuel cycle.

TVA has performed a criticality analysis to justify the storage of fuel assemblies with a maximum enrichment of 5.0 weight-percent U-235. This analysis was sent to NRC for review as an enclosure in TVA letter to NRC dated February 14, 1990, "Sequoyah Nuclear Plant (SQN) Units 1 and 2 - Spent Fuel Rack Criticality Analysis for 5.0 Weight-Percent Fuel." This analysis concluded that by administratively controlling the placement of high reactivity fuel in the spent fuel storage racks at SQN, the enrichment limit can be increased from 4.0 weight-percent to 5.0 weight-percent while maintaining required criticality safety margins. Therefore, fuel enriched to greater than 4.0 weight-percent with burnup less than 7,500 megawattdays/metric ton uranium (MWd/mtu) shall be placed only in spent fuel rack locations with face adjacent cells that contain either fuel assemblies with at least 22,000 MWd/mtu of burnup or water. This requirement is being included in Design Feature 5.6.1.1 of the SQN TSs. The analysis discussed above was performed with a conservative allowance of 3.06 percent delta k/k for uncertainties. This change to the allowance for uncertainties has been included in Design Feature 5.6.1.1.a.

An additional requirement identified in the criticality analysis is that during fuel movement and until the configuration of the assemblies in the spent-fuel storage rack is verified to comply with the criticality loading criteria, the spent fuel pool must be borated with greater than 2,000 parts per million of boron in order to ensure that a dropped or misplaced assembly will not be a criticality concern. This requirement is being added as a surveillance requirement of TS 3/4.9.1.

Design Feature 5.6.1.2 has been revised to remove the limit of 4.0 weight-percent for new fuel based on the justification provided above for changes to Design Features 5.3.1 and 5.6.1.1. The maximum enrichment for fuel assemblies in the new fuel storage rack will remain 4.5 weight-percent U-235.

The requirements for fuel assemblies specify the quantity of fuel assemblies and the number of fuel rods per assembly. Flexibility to deviate from the number of fuel rods per assembly is desirable to permit timely removal of fuel rods that are found to be leaking during a refueling outage or are determined to be probable sources for future leakage. This improvement in SQN's fuel performance program will provide for reductions in future occupational radiation exposure and plant radiological releases.

As stated in Generic Letter 90-02, the substitution of filler rods or open water channels for fuel rods is acceptable when justified by cycle-specific reload analyses using an NRC-approved methodology. These reload analyses will demonstrate that existing design limits and safety analyses criteria are met in advance of the next operating cycle. An NRC-approved methodology includes those methodologies acknowledged in the FSAR and applied in support of the issuance of the original operating license. It also includes those subsequent methodologies that have been submitted to and accepted by NRC's staff as amendments to the operating license.

If the reconstitution of fuel assemblies through the use of filler rods or open water channels is extensive, this information should be reported to NRC. Therefore, if more than 30 rods in the core, or 10 rods in any assembly, are replaced during a refueling, a special report describing the number of rods replaced will be submitted to NRC in accordance with the provisions of the requested TS change.

Environmental Impact Evaluation

As stated in the Federal Register, Volume 53, Number 39, dated February 29, 1988, the NRC staff has concluded that the environmental impact summarized in Tables S-3 of 10 CFR 51.51 and in Table S-4 of 10 CFR 51.52 for a burnup level of 33 gigawattdays/metric ton uranium (GWd/mtu) are conservative and bound the corresponding impacts for burnup levels up to 60 GWd/mtu and fuel enrichments up to 5.0 weight-percent U-235. NRC based this conclusion on the results of a study performed by Northwest Laboratories and documented in the report entitled, "Assessment of the Use of Extended Burnup Fuels in Light Water Power Reactors," (NUREG/CR-5009, PNL-6258) and the report entitled, "The Environmental Consequences of Higher Fuel Burn-up," (AIF/NESP-032).

The proposed change request does not involve an unreviewed environmental question because operation of SQN Units 1 and 2 in accordance with this change would not:

1. Result in a significant increase in any adverse environmental impact previously evaluated in the Final Environmental Statement (FES) as modified by the Staff's testimony to the Atomic Safety and Licensing Board, supplements to the FES, environmental impact appraisals, or decisions of the Atomic Safety and Licensing Board.

2. Result in a significant change in effluents or power levels.

3. Result in matters not previously reviewed in the licensing basis for SQN that may have a significant environmental impact.

ENCLOSURE 3

PROPOSED TECHNICAL SPECIFICATION CHANGE

SEQUOYAH NUCLEAR PLANT UNITS 1 AND 2

DOCKET NOS. 50-327 AND 50-328

(TVA-SQN-TS-90-12)

DETERMINATION OF NO SIGNIFICANT HAZARDS CONSIDERATIONS

ENCLOSURE 3

Significant Hazards Evaluation

TVA has evaluated the proposed technical specification (TS) change and has determined that it does not represent a significant hazards consideration based on criteria established in 10 CFR 50.92(c). Operation of Sequoyah Nuclear Plant (SQN) in accordance with the proposed amendment will not:

(1) Involve a significant increase in the probability or consequences of an accident previously evaluated.

The safety considerations associated with reactor operation with higher enrichment and extended burnup have been evaluated. The proposed changes have no adverse affect on the probability of any accident. The increased burnup may slightly change the mix of fission products that might be released in the event of a serious accident but such small changes would not significantly affect the consequences of serious accidents. The substitution of filler rods or open water channels for fuel rods will be justified by cycle-specific analysis using an NRC-approved methodology. This reload analysis will demonstrate that existing design limits and safety analyses criteria are met. Therefore, the proposed change does not involve a significant increase in the probability of consequences of an accident previously evaluated.

(2) Create the possibility of a new or different kind of accident from any previously analyzed.

The proposed change to increase the maximum allowable fuel enrichment or the substitution of filler rods or open water channels for filler rods does not create any new or different kind of accident from any previously analyzed.

(3) Involve a significant reduction in a margin of safety.

Based on the discussion provided in Item 1 above and the fact that no changes are being made in the types or amounts of any radiological effluents that may be released offsite, there is no significant reduction in a margin of safety.