September 8, 1986

Docket Nos. 50-338
and 50-339

Mr. W. L. Stewart
Vice President - Nuclear Operations
Virginia Electric and Power Company
Post Office Box 26666
Richmond, Virginia 23261

Dear Mr. Stewart:

DISTRIBUTION

Docket File	T. Barnhart (8)
NRC PDR	W. Jones
Local PDR	E. Butcher
PAD#2 Rdg	N. Thompson
T. Novak	V. Benaroya
D. Miller	Tech Branch
L. Engle	ACRS (10)
OGC-Bethesda	C. Miles, OPA
L. Harmon	L. Tremper, LFMB
E. Jordan	Gray File
B. Grimes	
J. Partlow	

The Commission has issued the enclosed Amendment Nos. 85 and 72 to Facility Operating License Nos. NPF-4 and NPF-7 for the North Anna Power Station, Units No. 1 and No. 2 (NA-1&2). The amendments revise the Technical Specifications (TS) in response to your letter dated January 3, 1986.

The amendments revise the negative end-of-cycle (EOC) moderator temperature coefficient (MTC) limit from the current value of -4.0×10^{-4} delta k/k/°F to -4.4×10^{-4} delta k/k/°F. In addition, the amendments revise the corresponding 300 ppm equilibrium boron concentration value from -3.1×10^{-4} delta k/k/°F to -3.3×10^{-4} delta k/k/°F. Finally, because of the difficulty of performing MTC measurements near the end of hot full power reactivity, the amendments eliminate MTC testing at EOC provided the 60 ppm measurement is greater than -4.0×10^{-4} delta k/k/°F.

A copy of the Safety Evaluation is also enclosed. The notice of issuance will be included in the Commission's next monthly Federal Register notice.

Sincerely,

Leon B. Engle, Project Manager
PWR Project Directorate #2
Division of PWR Licensing-A
Office of Nuclear Reactor Regulation

Enclosure:
1. Amendment No. 85 to NPF-4
2. Amendment No. 72 to NPF-7
3. Safety Evaluation

cc w/enclosures:
See next page

*See previous concurrence

*LA:PAD#2	*PM:PAD#2	*PD:PAD#2	*OGC
DMiller	LEngle:hc	LRubenstein	
8/ /86	8/ /86	8/ /86	8/ /86

Docket Nos. 50-338
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Mr. W. L. Stewart
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Virginia Electric and Power Company
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Dear Mr. Stewart:

The Commission has issued the enclosed Amendment Nos. and to Facility Operating License Nos. NPF-4 and NPF-7 for the North Anna Power Station, Units No. 1 and No. 2 (NA-1&2). The amendments revise the Technical Specifications (TS) in response to your letter dated January 3, 1986.

The amendments revise the negative end-of-cycle (EOC) moderator temperature coefficient (MTC) limit from the current value of -4.0×10^{-4} delta k/k/°F to -4.4×10^{-4} delta k/k/°F. In addition, the amendments revise the corresponding 300 ppm equilibrium boron concentration value from -3.1×10^{-4} delta k/k/°F to -3.3×10^{-4} delta k/k/°F. Finally, because of the difficulty of performing MTC measurements near the end of hot full power reactivity, the amendments eliminate MTC testing at EOC provided ~~a measurement of less than or equal to 60 ppm is less negative than -4.0×10^{-4} delta k/k/°F.~~ the 60ppm measurement is greater than -4.0×10^{-4} delta k/k °F.

A copy of the Safety Evaluation is also enclosed. The notice of issuance will be included in the Commission's next monthly Federal Register notice.

Sincerely,

Leon B. Engle, Project Manager
PWR Project Directorate #2
Division of PWR Licensing-A
Office of Nuclear Reactor Regulation

Enclosure:
1. Amendment No. to NPF-4
2. Amendment No. to NPF-7
3. Safety Evaluation

cc w/enclosures:
See next page

LA:PAD#2	PM:PAD#2	PD:PAD#2	OGC
DMiller	LEngle:hc	for LRubenstein	No legal objection with this change and change to "Rejection Publication" McCuskey
8/21/86	8/21/86	8/22/86	8/28/86

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

VIRGINIA ELECTRIC AND POWER COMPANY

OLD DOMINION ELECTRIC COOPERATIVE

DOCKET NO. 50-338

NORTH ANNA POWER STATION, UNIT NO. 1

AMENDMENT TO FACILITY OPERATING LICENSE

Amendment No. 85
License No. NPF-4

1. The Nuclear Regulatory Commission (the Commission) has found that:

   A. The application for amendment by Virginia Electric and Power Company, et al., (the licensee) dated January 3, 1986, 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.D.(2) of Facility Operating License No. NPF-4 is hereby amended to read as follows:

   (2) Technical Specifications

   The Technical Specifications contained in Appendices A and B, as revised through Amendment No. 85 , are hereby incorporated in the license. The licensee shall operate the facility in accordance with the Technical Specifications.

3. This license amendment is effective as of the date of its issuance.

FOR THE NUCLEAR REGULATORY COMMISSION

L.S. Rubenstein

Lester S. Rubenstein, Director
PWR Project Directorate #2
Division of PWR Licensing-A

Attachment:
Changes to the Technical
Specifications

Date of Issuance: September 8, 1986

ATTACHMENT TO LICENSE AMENDMENT NO. 85

TO FACILITY OPERATING LICENSE NO. NPF-4

DOCKET NO. 50-338

Replace the following pages of the Appendix "A" Technical Specifications with the enclosed pages as indicated. The revised pages are identified by amendment number and contain vertical lines indicating the area of change. The corresponding overleaf pages are also provided to maintain document completeness.

Page
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3/4 1-6a
B3/4 1-2

BORON DILUTION

VALVE POSITION

LIMITING CONDITION FOR OPERATION

3.1.1.3.2 The following valves shall be locked, sealed or otherwise secured in the closed position except during planned boron dilution or makeup activities

a. 1-CH-217 or

b. 1-CH-220, 1-CH-241, FCV-1114B and FCV-1113B.

APPLICABILITY: MODES 3, 4, 5, and 6

ACTION:

With the above valves not locked, sealed or otherwise secured in the closed position:

a. In MODES 3 and 4 be in COLD SHUTDOWN within 30 hours

b. In MODES 5 and 6 suspend all operations involving positive reactivity changes or CORE ALTERATIONS and lock, seal or otherwise secure the valves in the closed position within 15 minutes.

SURVEILLANCE REQUIREMENTS

4.1.1.3.2 The above listed valves shall be verified to be locked, sealed or otherwise secured in the closed position within 15 minutes after a planned boron dilution or makeup activity.

REACTIVITY CONTROL SYSTEMS

MODERATOR TEMPERATURE COEFFICIENT

LIMITING CONDITION FOR OPERATION

3.1.1.4 The moderator temperature coefficient (MTC) shall be:

a. For the all rods withdrawn, beginning of core life condition
$\leq 0.6 \times 10^{-4}$ $\Delta k/k/°F$ below 70 percent RATED THERMAL POWER

$\leq 0.0 \times 10^{-4}$ $\Delta k/k/°F$ at or above 70 percent RATED THERMAL POWER

b. Less negative than -4.4×10^{-4} $\Delta k/k/°F$ for the all rods withdrawn, end of core life at RATED THERMAL POWER.

APPLICABILITY: Specification 3.1.1.4.a - MODES 1 and 2* only#
Specification 3.1.1.4.b - MODES 1, 2 and 3 only#

ACTION:

a. With the MTC more positive than the limit of 3.1.1.4.a above:

1. Establish and maintain control rod withdrawal limits sufficient to restore the MTC to within its limit within 24 hours or be in HOT STANDBY within the next 6 hours. These withdrawal limits shall be in addition to the insertion limits of Specification 3.1.3.6.

2. Maintain the control rods within the withdrawal limits established above until subsequent measurement verifies that the MTC has been restored to within its limit for the all rods withdrawn condition.

3. Prepare and submit a Special Report to the Commission pursuant to Specification 6.9.2 within 10 days, describing the value of the measured MTC, the interim control rod withdrawal limits and the predicted average core burnup necessary for restoring the positive MTC to within its limit for the all rods withdrawn condition.

4. With the MTC more negative than the limit of 3.1.1.4b above, be in HOT SHUTDOWN within 12 hours.

*With $K_{eff} \geq 1.0$

#See Special Test Exception 3.10.3

SURVEILLANCE REQUIREMENTS

4.1.1.4 The MTC shall be determined to be within its limits during each fuel cycle as follows:

a. The MTC shall be measured and compared to the BOL Limit of Specification 3.1.1.4a, above, prior to initial operation above 5% of RATED THERMAL POWER, after each fuel loading.

b. The MTC shall be measured at any THERMAL POWER and compared to -3.3×10^{-4} $\Delta k/k/°F$ (all rods withdrawn, RATED THERMAL POWER condition) within 7 EFPD after reaching an equilibrium boron concentration of 300 ppm. In the event this comparison indicated the MTC is more negative than -3.3×10^{-4} $\Delta k/k/°F$, the MTC shall be remeasured, and compared to the EOL MTC limit of specification 3.1.1.4.b, at least once per 14 EFPD during the remainder of the fuel cycle.(1)

(1) Once the equilibrium boron concentration (all rods withdrawn, RATED THERMAL POWER condition) is 60 ppm or less, further measurement of the MTC in accordance with 4.1.1.4.b may be suspended providing that the measured MTC at an equilibrium boron concentration of $\leq$ 60 ppm is less negative than -4.0×10^{-4} $\Delta k/k/°F$.

3/4.1 REACTIVITY CONTROL SYSTEMS

BASES

3/4.1.1 BORATION CONTROL

3/4.1.1.1 and 3/4.1.1.2 SHUTDOWN MARGIN

A sufficient SHUTDOWN MARGIN ensures that 1) the reactor can be made subcritical from all operating conditions, 2) the reactivity transients associated with postulated accident conditions are controllable within acceptable limits, and 3) the reactor will be maintained sufficiently subcritical to preclude inadvertent criticality in the shutdown condition.

SHUTDOWN MARGIN requirements vary throughout core life as a function of fuel depletion, RCS boron concentration, and RCS T_{avg}. The most restrictive condition occurs at EOL, with T_{avg} at no load operating temperature, and is associated with a postulated steam line break accident and resulting uncontrolled RCS cooldown. In the analysis of this accident, a minimum SHUTDOWN MARGIN of 1.77% $\Delta k/k$ is initially required to control the reactivity transient. Accordingly, the SHUTDOWN MARGIN requirement is based upon this limiting condition and is consistent with FSAR safety analysis assumptions. With T_{avg} <200°F, the reactivity transients resulting from a postulated steam line break cooldown are minimal. A 1.77% $\Delta k/k$ shutdown margin provides adequate protection for the boron dilution accident.

3/4.1.1.3 BORON DILUTION

A minimum flow rate of at least 3000 GPM provides adequate mixing, prevents stratification and ensures that reactivity changes will be gradual during boron concentration reductions in the Reactor Coolant System. A flow rate of at least 3000 GPM will circulate an equivalent Reactor Coolant System volume of 9957 cubic feet in approximately 30 minutes. The reactivity change rate associated with boron reductions will therefore be within the capability for operator recognition and control.

3/4.1.1.4 MODERATOR TEMPERATURE COEFFICIENT (MTC)

The limitations on MTC are provided to ensure that the value of this coefficient remains within the limiting conditions assumed for this parameter in the FSAR accident and transient analyses.

The MTC values of this specification are applicable to a specific set of plant conditions; accordingly, verification of MTC values at

3/4.1.1.4 MODERATOR TEMPERATURE COEFFICIENT (MTC) (Continued)

conditions other than those explicitly stated will require extrapolation to those conditions in order to permit an accurate comparison.

The most negative MTC value equivalent to the most positive moderator density coefficient (MDC), was obtained by incrementally correcting the MDC used in the FSAR analyses to nominal operating conditions. These corrections involved subtracting the incremental change in the MDC associated with a core condition of all rods inserted (most positive MDC) to an all rods withdrawn condition and, a conversion for the rate of change of moderator density with temperature at RATED THERMAL POWER conditions. This value of the MDC was then transformed into the limiting MTC value -4.4×10^{-4} $\Delta k/k/°F$. The MTC value of -3.3×10^{-4} $\Delta k/k/°F$ represents a conservative value (with corrections for burnup and soluble boron) at a core condition of 300 ppm equilibrium boron concentration and is obtained by making these corrections to the limiting MTC value -4.4×10^{-4} $\Delta k/k/°F$.

Once the equilibrium boron concentration falls below about 60 ppm, dilution operations take an extended amount of time and reliable MTC measurements become more difficult to obtain due to the potential for fluctuating core conditions over the test interval. For this reason, MTC measurements may be suspended provided the measured MTC value at an equilibrium full power boron concentration $\leq$ 60 ppm is less negative than -4.0×10^{-4} delta k/k/°F. The difference between this value and the limiting MTC value of -4.4×10^{-4} delta k/k/°F conservatively bounds the maximum credible change in MTC between the 60 ppm equilibrium boron concentration (all rods withdrawn, RATED THERMAL POWER conditions) and the licensed end-of-cycle, including the effect of rods, boron concentration, burnup, and end-of-cycle coastdown.

The surveillance requirements for measurement of the MTC at the beginning and near the end of each fuel cycle are adequate to confirm that the MTC remains within its limits since this coefficient changes slowly due principally to the reduction in RCS boron concentration associated with fuel burnup.

3/4.1.1.5 MINIMUM TEMPERATURE FOR CRITICALITY

This specification ensures that the reactor will not be made critical with the Reactor Coolant System average temperature less than 541°F. This limitation is required to ensure 1) the moderator temperature coefficient is within its analyzed temperature range, 2) the protective instrumentation is within its normal operating range, and 3) the P-12 interlock is above its setpoint.

3/4.1.2 BORATION SYSTEMS

The boron injection system ensures that negative reactivity control is available during each mode of facility operation. The components required to perform this function include 1) borated water sources, 2) charging pumps, 3) separate flow paths, 4) boric acid transfer pumps, 5) associated heat tracing systems, and 6) an emergency power supply from OPERABLE diesel generators.

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

VIRGINIA ELECTRIC AND POWER COMPANY

OLD DOMINION ELECTRIC COOPERATIVE

DOCKET NO. 50-339

NORTH ANNA POWER STATION, UNIT NO. 2

AMENDMENT TO FACILITY OPERATING LICENSE

Amendment No. 72
License No. NPF-7

1. The Nuclear Regulatory Commission (the Commission) has found that:

   A. The application for amendment by Virginia Electric and Power Company, et al., (the licensee) dated January 3, 1986, 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. NPF-7 is hereby amended to read as follows:

(2) Technical Specifications

The Technical Specifications contained in Appendices A and B, as revised through Amendment No. 72 , are hereby incorporated in the license. The licensee shall operate the facility in accordance with the Technical Specifications.

3. This license amendment is effective as of the date of its issuance.

FOR THE NUCLEAR REGULATORY COMMISSION

Lester S. Rubenstein, Director
PWR Project Directorate #2
Division of PWR Licensing-A

Attachment:
Changes to the Technical
Specifications

Date of Issuance: September 8, 1986

ATTACHMENT TO LICENSE AMENDMENT NO. 72

TO FACILITY OPERATING LICENSE NO. NPF-7

DOCKET NO. 50-339

Replace the following pages of the Appendix "A" Technical Specifications with the enclosed pages as indicated. The revised pages are identified by amendment number and contain vertical lines indicating the area of change. The corresponding overleaf pages are also provided to maintain document completeness.

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3/4 1-6
B3/4 1-2

MODERATOR TEMPERATURE COEFFICIENT

LIMITING CONDITION FOR OPERATION

3.1.1.4 The moderator temperature coefficient (MTC) shall be:

a. For the all rods withdrawn, beginning of core life condition
$\leq 0.6 \times 10^{-4}$ $\Delta k/k/°F$ below 70 percent RATED THERMAL POWER
$\leq 0.0 \times 10^{-4}$ $\Delta k/k/°F$ at or above 70 percent RATED THERMAL POWER.

b. Less negative than -4.4×10^{-4} $\Delta k/k/°F$ for all the rods withdrawn, end of core life at RATED THERMAL POWER.

APPLICABILITY: Specification 3.1.1.4.a - MODES 1 and 2* only#
Specification 3.1.1.4.b - MODES 1, 2 and 3 only#

ACTION:

a. With the MTC more positive than the limit of 3.1.1.4.a above, operations in MODES 1 and 2 may proceed provided:

1. Control rod withdrawal limits are established and maintained sufficient to restore the MTC to less positive than 0 delta k/k/°F within 24 hours or be in HOT STANDBY within the next 6 hours. These withdrawal limits shall be in addition to the insertion limits of Specification 3.1.3.6.

2. The control rods are maintained within the withdrawal limits established above until subsequent measurement verifies that the MTC has been restored to within its limit for the all rods withdrawn condition.

3. Prepare and submit a Special Report to the Commission pursuant to Specification 6.9.2 within 10 days, describing the value of the measured MTC, the interim control rod withdrawal limits and the predicted average core burnup necessary for restoring the positive MTC to within its limit for the all rods withdrawn condition.

b. With the MTC more negative than the limit of 3.1.1.4.b above, be in HOT SHUTDOWN within 12 hours.

*With $K_{eff} \geq 1.0$
#See Special Test Exception 3.10.3

SURVEILLANCE REQUIREMENTS

4.1.1.4 The MTC shall be determined to be within its limits during each fuel cycle as follows:

a. The MTC shall be measured and compared to the BOL Limit of Specification 3.1.1.4.a above, prior to initial operation above 5% of RATER THERMAL POWER, after each fuel loading.

b. The MTC shall be measured at any THERMAL POWER and compared to -3.3×10^{-4} delta k/k/°F (all rods withdrawn, RATED THERMAL POWER condition) within 7 EFPD after reaching an equilibrium boron concentration of 300 ppm. In the event this comparison indicated the MTC is more negative than -3.3×10^{-4} delta k/k/°F, the MTC shall be remeasured, and compared to the EOL MTC limit of specification 3.1.1.4.b, at least once per 14 EFPD during the remainder of the fuel cycle.(1)

(1) Once the equilibrium boron concentration (all rods withdrawn, RATED THERMAL POWER condition) is 60 ppm or less, further measurement of the MTC in accordance with 4.1.1.4.b may be suspended providing that the measured MTC at an equilibrium boron concentration of $\leq$60 ppm is less negative than -4.0×10^{-4} Δk/k/°F.

3/4.1 REACTIVITY CONTROL SYSTEMS

BASES

3/4.1.1 BORATION CONTROL

3/4.1.1.1 and 3/4.1.1.2 SHUTDOWN MARGIN

A sufficient SHUTDOWN MARGIN ensures that 1) the reactor can be made subcritical from all operating conditions, 2) the reactivity transients associated with postulated accident conditions are controllable within acceptable limits, and 3) the reactor will be maintained sufficiently subcritical to preclude inadvertent criticality in the shutdown condition.

SHUTDOWN MARGIN requirements vary throughout core life as a function of fuel depletion, RCS boron concentration, and RCS T_{avg}. The most restrictive condition occurs at EOL, with T_{avg} at no load operating temperature, and is associated with a postulated steam line break accident and resulting uncontrolled RCS cooldown. In the analysis of this accident, a minimum SHUTDOWN MARGIN of 1.77% delta k/k is required to control the reactivity transient. Accordingly, the SHUTDOWN MARGIN requirement is based upon this limiting condition and is consistent with FSAR safety analysis assumptions. With T_{avg} less than 200°F, the reactivity transients resulting from a postulated steam line break cooldown are minimal.

3/4.1.1.3 BORON DILUTION

A minimum flow rate of at least 3000 GPM, as provided by either one RCP or one RHR pump as required by Specification 3.4.1.1, provides adequate mixing, prevents stratification and ensures that reactivity changes will be gradual during boron concentration reductions in the Reactor Coolant System. A flow rate of at least 3000 GPM will circulate an equivalent Reactor Coolant System volume of 9957 cubic feet in approximately 30 minutes. The reactivity change rate associated with boron reductions will therefore be within the capability for operator recognition and control. The requirement that certain valves remain closed at all times except during planned boron dilution or makeup, activities provides assurance that an inadvertent boron dilution will not occur.

3/4.1.1.4 MODERATOR TEMPERATURE COEFFICIENT (MTC)

The limitations on MTC are provided to ensure that the value of this coefficient remains within the limiting conditions assumed for this parameter in the FSAR accident and transient analyses.

The MTC values of this specification are applicable to a specific set of plant conditions; accordingly, verification of MTC values at conditions other than those explicitly stated will require extrapolation to those conditions in order to permit an accurate comparison..

The most negative MTC value equivalent to the most positive moderator density coefficient (MDC), was obtained by incrementally correcting the MDC used in the FSAR analyses to nominal operating conditions. These corrections involved subtracting the incremental change in the MDC associated with a core condition of all rods inserted (most positive MDC) to an all rods withdrawn condition and, a conversion for the rate of change of moderator density with temperature at RATED THERMAL POWER conditions. This value of the MDC was then transformed into the limiting MTC value -4.4×10^{-4} delta k/k/°F. The MTC value of -3.3×10^{-4} delta k/k/°F represents a conservative value (with corrections for burnup and soluble boron) at a core condition of 300 ppm equilibrium boron concentration and is obtained by making these corrections to the limiting MTC value -4.4×10^{-4} delta k/k/°F.

Once the equilibrium boron concentration falls below about 60 ppm, dilution operations take an extended amount of time and reliable MTC measurements become more difficult to obtain due to the potential for fluctuating core conditions over the test interval. For this reason, MTC measurements may be suspended provided the measured MTC value at an equilibrium full power boron concentration $\leq$60 ppm is less negative than -4.0×10^{-4} delta k/k/°F. The difference between this value and the limiting MTC value of 4.4×10^{-4} delta k/k/°F conservatively bounds the maximum credible change in MTC between the 60 ppm equilibrium boron concentration (all rods withdrawn, RATED THERMAL POWER conditions) and the licensed end of cycle, including the effect of rods, boron concentration, burnup, and end-of-cycle coastdown.

The surveillance requirements for measurement of the MTC at the beginning and near the end of each fuel cycle are adequate to confirm that the MTC remains within its limits since this coefficient changes slowly due principally to the reduction in RCS boron concentration associated with fuel burnup.

3/4.1.1.5 MINIMUM TEMPERATURE FOR CRITICALITY

This specification ensures that the reactor will not be made critical with the Reactor Coolant System average temperature less than 541°F. This limitation is required to ensure 1) the moderator temperature coefficient is within its analyzed temperature range, 2) the protective instrumentation is within its normal operating range, and 3) the P-12 interlock is above its setpoint, 4) the pressurizer is capable of being in an OPERABLE status with a steam bubble, and 5) the reactor pressure vessel is above its minimum RT_{NDT} temperature.

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

SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION

RELATED TO AMENDMENT NOS. 85 AND 72 TO

FACILITY OPERATING LICENSE NOS. NPF-4 AND NPF-7

VIRGINIA ELECTRIC AND POWER COMPANY

OLD DOMINION ELECTRIC COOPERATIVE

NORTH ANNA POWER STATION, UNITS NO. 1 AND NO. 2

DOCKET NOS. 50-338 AND 50-339

Introduction:

By letter dated January 3, 1986, the Virginia Electric and Power Company (the licensee), requested a change to the Technical Specifications (TS) for the North Anna Power Station, Units No. 1 and No. 2 (NA-1&2). Specifically, the proposed changes would revise the negative end-of-cycle (EOC) moderator temperature coefficient (MTC) limit from a current value of -4.0×10^{-4} delta k/k/°F to -4.4×10^{-4} delta k/k/°F, and would also revise the corresponding 300 part per million (ppm) equilibrium boron concentration value from -3.1×10^{-4} delta k/k/°F to -3.3×10^{-4} delta k/k/°F. In addition, the proposed changes would update the EOC MTC limits to reflect current plant operating conditions. The above changes have been proposed in order to provide greater flexibility during the reload design process. The staff's discussion and evaluation of the proposed changes are provided below.

Discussion:

The current NA-1&2 TS require that the MTC be confirmed as the fuel cycle approaches the 0 ppm boron concentration end point of EOC conditions. The negative EOC MTC limit is currently -4.0×10^{-4} delta k/k/°F in the NA-1&2 TS (Section 3.1.1.4.b). The value of the EOC MTC is measured upon reaching an equilibrium boron concentration of 300 ppm. The current TS value for this measurement point is -3.1×10^{-4} delta k/k/°F (Section 4.1.1.4.b). If the measured MTC is within this value, no further checks of MTC against the EOC negative MTC limit are necessary. If the measured MTC at the 300 ppm boron check point violates the NA-1&2 TS value, operation of the unit may continue if MTC measurements are taken at least every 14 effective full power days and found to be within the -4.0×10^{-4} delta k/k/°F EOC limit.

Bases Section 3/4.1.1.4 of the TS identifies the source for the MTC limit and the conversions used to derive the value for measurement comparison at the 300 ppm equilibrium boron concentration point. The most negative MTC value is based on the limiting moderator density coefficient, (MDC), used in the Chapter 15 of the Final Safety Analysis Report (FSAR) analyses:

- This MDC value is first incrementally adjusted to allow for changing the core from the all-rods-inserted condition, upon which the safety analysis is based, to an all-rods-withdrawn condition consistent with actual measurement conditions.

- The second conversion translates the MDC value in delta k/k/(g/cm^3) to MTC in delta k/k/°F. A derivative of water density with respect to temperature at core operating conditions is used to make this conversion. The result is the Technical Specification EOC negative MTC limit.

- The final conversion translates the EOC negative MTC limit into a TS value at the 300 ppm equilibrium boron concentration measurement point. Conservative corrections for MTC change due to burnup and soluble boron concentration are used.

The resulting EOC negative MTC limit and negative MTC value at the 300 ppm equilibrium boron concentration measurement point are -4.4×10^{-4} delta k/k/°F and -3.3×10^{-4} delta k/k/°F, respectively. The differences between these values and the current NA-1&2 TS limits are primarily due to a difference in the derivative of water density with respect to temperature at the current core operating conditions.

Once the equilibrium boron concentration falls below about 60 ppm, dilution operations take an extended amount of time due to the large required volume of dilution water. For example, dilution of the RCS from 50 ppm to 40 ppm requires charging of about 17,000 gallons of primary grade water and would require over 2 hours. These extended dilution times make reliable MTC measurements difficult to obtain due to any of a variety of fluctuations in the system conditions which could take place over this time interval.

As a result of this difficulty, the licensee has proposed a change to TS 4.1.1.4.b to eliminate further MTC measurements provided a measurement of 60 ppm equilibrium boron (all rods withdrawn, rated thermal power conditions) is less negative than -4.0×10^{-4} delta k/k/°F. Calculations have shown that for this condition the -4.4×10^{-4} delta k/k/°F limit will always be met at the licensed end of cycle, conservatively accounting for the effects of control rods, burnup, boron concentration and end of cycle coastdown.

The proposed TS continue to ensure that the acceptance criteria for the NA UFSAR accident analyses are met. The limiting value used in the UFSAR safety analysis is the positive MDC limit value, and this value is not changed by the proposed Technical Specifications. Thus, the current analyses remain bounding.

Evaluation:

The changes in EOC negative MTC limit and the value at 300 ppm are primarily the result of an increase of 7.5°F in Tave which was approved by the Commission in March 1984. This temperature change results in a difference in the derative of the water density with respect to temperature and thus allows a slightly more negative MTC both at EOC (-4.4×10^{-4} delta k/k/°F vs. -4.0×10^{-4} delta k/k/°F) and at 300 ppm (-3.3×10^{-4} delta k/k/°F vs. -3.1×10^{-4} delta k/k/°F).

To support elimination of measurements below 60 ppm, the licensee has shown by calculation that the maximum change in MTC from 60 ppm to EOC is less than 0.4×10^{-4} delta k/k/°F. Thus a measurement of greater than -4.0×10^{-4} delta k/k/°F at 60 ppm will insure that the MTC will not be less than -4.4×10^{-4} delta k/k/°F at EOC.

Thus the changes to the MTC limit at EOC and at 300 ppm are acceptable. Also if the 60 ppm measurement is greater than -4.0×10^{-4} delta k/k/°F further measurements are not necessary.

Environmental Consideration

These amendments involve a change in the installation or use of a facility component located within the restricted area as defined in 10 CFR Part 20. The staff has determined that the amendments involve no significant increase in the amounts, and no significant change in the types, of any effluents that may be released offsite, and that there is no significant increase in individual or cumulative occupational radiation exposure. The Commission has previously published a proposed finding that these amendments involve no significant hazards consideration and there has been no public comment on such finding. Accordingly, these 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 these amendments.

Conclusion

We have concluded, based on the considerations discussed above, that (1) there is reasonable assurance that the health and safety of the public will not be endangered by operation in the proposed manner, and (2) such activities will be conducted in compliance with the Commission's regulations, and the issuance of the amendments will not be inimical to the common defense and security or to the health and safety of the public.

Date: September 8, 1986

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