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Docket Nos.: 50-280
and 50-281

Virginia Electric and Power Company
ATTN: Mr. W. L. Proffitt
Senior Vice President - Power

P. O. Box 26666
Richmond, Virginia 23261

Gentlemen:

The Commission has issued the enclosed Amendments No. 19 to Facility Operating Licenses Nos. DPR-32 and DPR-37 for the Surry Power Station Unit Nos. 1 and 2. These amendments consist of changes to the Technical Specifications in response to your application dated June 5, 1975, as supplemented January 29, 1976 and March 5, 1976.

These amendments relate to the operation of the Surry Unit Nos. 1 and 2 with a positive moderator coefficient in the power range.

Copies of the Safety Evaluation and the Federal Register Notice are also enclosed.

Sincerely,

Original signed by

V. Rooney
Robert W. Reid, Chief
Operating Reactors Branch #4
Division of Operating Reactors

Enclosures:

1. Amendment No. 19 to DPR-32
2. Amendment No. 19 to DPR-37
3. Safety Evaluation
4. Federal Register Notice

cc w/enclosures: See next page

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DATE →	5/11/76	5/11/76	5/12/76	5/13/76	5/13/76	5/11/76



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

May 13, 1976

Docket Nos.: 50-280
and 50-281

Virginia Electric and Power Company
ATTN: Mr. W. L. Proffitt
Senior Vice President - Power
P. O. Box 26666
Richmond, Virginia 23261

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These amendments relate to the operation of the Surry Unit Nos. 1 and 2 with a positive moderator coefficient in the power range.

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Sincerely,

A handwritten signature in cursive script, appearing to read "R. Reid", written in dark ink.

Robert W. Reid, Chief
Operating Reactors Branch #4
Division of Operating Reactors

Enclosures:

1. Amendment No. 19 to DPR-32
2. Amendment No. 19 to DPR-37
3. Safety Evaluation
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cc w/enclosures: See next page

May 13, 1976

cc w/enclosures:

Michael W. Maupin, Esquire
Hunton, Williams, Gay & Gibson
P. O. Box 1535
Richmond, Virginia 23213

Swem Library
College of William & Mary
Williamsburg, Virginia 23185

Mr. Sherlock Holmes, Chairman
Board of Supervisors of Surry County
Surry County Courthouse
Surry, Virginia 23683

cc w/enclosures & incoming:

dated: 6/5/75, 1/29/76, 3/5/76

Ms. Susan T. Wilburn
Commonwealth of Virginia
Council on the Environment
P. O. Box 790
Richmond, Virginia 23206



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

VIRGINIA ELECTRIC AND POWER COMPANY

DOCKET NO. 50-280

SURRY POWER STATION UNIT NO. 1

AMENDMENT TO FACILITY OPERATING LICENSE

Amendment No. 19
License No. DPR-32

1. The Nuclear Regulatory Commission (the Commission) has found that:
 - A. The application for amendment by Virginia Electric and Power Company (the licensee) dated June 5, 1975, as supplemented January 29 and March 5, 1976, 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. After weighing the environmental aspects involved, 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 a change to the Technical Specifications as indicated in the attachment to this license amendment.

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

FOR THE NUCLEAR REGULATORY COMMISSION

Karl R. Goller

Karl R. Goller, Assistant Director
for Operating Reactors
Division of Operating Reactors

Attachment:
Changes to the
Technical Specifications

Date of Issuance:
May 13, 1976

ATTACHMENT TO LICENSE AMENDMENT NO. 19

FACILITY OPERATING LICENSE NO. DPR-32

DOCKET NO. 50-280

Replace pages 3.1-18 and 3.1-19 of the Technical Specifications with the attached revised pages bearing the same numbers. The changed areas on the pages are shown by a marginal line.

1. Except during low power physics tests, the reactor shall not be made critical at any temperature above which the moderator temperature coefficient is more positive than:
 - a) +3 pcm/°F at less than 50% of rated power, or
 - b) +3 pcm/°F at 50% of rated power and linearly decreasing to 0 pcm/°F at rated power.
2. In no case shall the reactor be made critical with the reactor coolant temperature below DTT +10°F, where the value of DTT + 10°F is as determined in Part B of this specification.
3. When the reactor coolant temperature is below the minimum temperature as specified in E-1 above, the reactor shall be subcritical by an amount equal to or greater than the potential reactivity insertion due to primary coolant depressurization.

Basis

During the early part of a fuel cycle, the moderator temperature coefficient may be calculated to be slightly positive at coolant temperatures in the power operating range. The moderator coefficient will be most positive at the beginning of cycle life, when the boron concentration in the coolant is the greatest. Later in the cycle, the boron concentration in the coolant will be lower and the moderator coefficient will be less positive or will be negative in the power operating range. At the beginning of cycle life, during pre-operational physics tests, measurements are made to determine that the moderator coefficient is less than +3 pcm/°F in the power operating range.

The requirement that the reactor is not to be made critical when the moderator coefficient is greater than +3 pcm/°F has been imposed to prevent any unexpected power excursion during normal operations as a result of either an increase of moderator temperature or decrease of coolant pressure. This requirement is waived during low power physics tests to permit measurement of reactor moderator coefficient and other physics design parameters of interest. During physics tests, special operating precautions will be taken. In addition, the strong negative Doppler coefficient^{(2) (3)} and the small integrated $\Delta k/k$ would limit the magnitude of a power excursion resulting from a reduction of moderator density.

The requirement that the reactor is not to be made critical with a reactor coolant temperature below DTT + 10°F provides increased assurance that the proper relationship between reactor coolant pressure and temperature will be maintained during system heatup and pressurization whenever the reactor vessel is in the nil ductility transition temperature range. Heatup to this temperature is accomplished by operating the reactor coolant pumps.

If a specified shutdown reactivity margin is maintained (TS Section 3.12), there is no possibility of an accidental criticality as a result of an increase of moderator temperature or a decrease of coolant pressure.

(1) FSAR Figure 3.3-8

(2) FSAR Table 3.3-1

(3) FSAR Figure 3.3-9



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

VIRGINIA ELECTRIC AND POWER COMPANY

DOCKET NO. 50-281

SURRY POWER STATION UNIT NO. 2

AMENDMENT TO FACILITY OPERATING LICENSE

Amendment No. 19
License No. DPR-37

1. The Nuclear Regulatory Commission (the Commission) has found that:
 - A. The application for amendment by Virginia Electric and Power Company (the licensee) dated June 5, 1975, as supplemented January 29 and March 5, 1976, 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. After weighing the environmental aspects involved, 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 a change to the Technical Specifications as indicated in the attachment to this license amendment.

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

FOR THE NUCLEAR REGULATORY COMMISSION

Karl R. Goller

Karl R. Goller, Assistant Director
for Operating Reactors
Division of Operating Reactors

Attachment:
Changes to the
Technical Specifications

Date of Issuance:
May 13, 1976

ATTACHMENT TO LICENSE AMENDMENT NO. 19

FACILITY OPERATING LICENSE NO. DPR-37

DOCKET NO. 50-281

Replace pages 3.1-18 and 3.1-19 of the Technical Specifications with the attached revised pages bearing the same numbers. The changed areas on the pages are shown by a marginal line.

1. Except during low power physics tests, the reactor shall not be made critical at any temperature above which the moderator temperature coefficient is more positive than:
 - a) +3 pcm/°F at less than 50% of rated power, or
 - b) +3 pcm/°F at 50% of rated power and linearly decreasing to 0 pcm/°F at rated power.
2. In no case shall the reactor be made critical with the reactor coolant temperature below DTT +10°F, where the value of DTT + 10°F is as determined in Part B of this specification.
3. When the reactor coolant temperature is below the minimum temperature as specified in E-1 above, the reactor shall be subcritical by an amount equal to or greater than the potential reactivity insertion due to primary coolant depressurization.

Basis

During the early part of a fuel cycle, the moderator temperature coefficient may be calculated to be slightly positive at coolant temperatures in the power operating range. The moderator coefficient will be most positive at the beginning of cycle life, when the boron concentration in the coolant is the greatest. Later in the cycle, the boron concentration in the coolant will be lower and the moderator coefficient will be less positive or will be negative in the power operating range. At the beginning of cycle life, during pre-operational physics tests, measurements are made to determine that the moderator coefficient is less than +3 pcm/°F in the power operating range.

The requirement that the reactor is not to be made critical when the moderator coefficient is greater than +3 pcm/°F has been imposed to prevent any unexpected power excursion during normal operations as a result of either an increase of moderator temperature or decrease of coolant pressure. This requirement is waived during low power physics tests to permit measurement of reactor moderator coefficient and other physics design parameters of interest. During physics tests, special operating precautions will be taken. In addition, the strong negative Doppler coefficient⁽²⁾ ⁽³⁾ and the small integrated Delta k/k would limit the magnitude of a power excursion resulting from a reduction of moderator density.

The requirement that the reactor is not to be made critical with a reactor coolant temperature below DTT + 10°F provides increased assurance that the proper relationship between reactor coolant pressure and temperature will be maintained during system heatup and pressurization whenever the reactor vessel is in the nil ductility transition temperature range. Heatup to this temperature is accomplished by operating the reactor coolant pumps.

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- (1) FSAR Figure 3.3-8
- (2) FSAR Table 3.3-1
- (3) FSAR Figure 3.3-9



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

SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION
SUPPORTING AMENDMENTS NO. 19 TO LICENSES NOS. DPR-32 AND DPR-37

VIRGINIA ELECTRIC AND POWER COMPANY

SURRY POWER STATION UNITS 1 AND 2

DOCKETS NOS. 50-280 and 50-281

INTRODUCTION

By letter dated June 5, 1975, as supplemented January 29, 1976 and March 5, 1976, Virginia Electric and Power Company (the licensee) proposed to change the Technical Specifications for the Surry Power Station Units 1 and 2. The proposed change would permit the licensee to operate the reactors with a slightly positive moderator coefficient in the power range early in the core cycle life. Operation of the reactors would benefit in that initial escalation to power would be more rapid and the licensee would have more flexibility in core design for future reload cycles. VEPCO submitted a safety analysis with the proposed change. The analysis considered the effects of the positive moderator coefficient on previously analyzed accidents and transients.

EVALUATION

The Virginia Electric and Power Company has reexamined the accidents and transients presented in the Final Safety Analysis Report (FSAR) for sensitivity to a positive moderator coefficient. With the exception of the rod withdrawal from subcritical and rod ejection accidents all transients reanalyzed used a constant moderator coefficient of $+3 \text{ pcm}/^\circ\text{F}$ ($+0.3 \times 10^{-4} \Delta\text{K}/^\circ\text{F}$). This is conservative since, as shown in Figure 1, the coefficient is constant to 50% power and then decreases linearly to zero at 100% power.

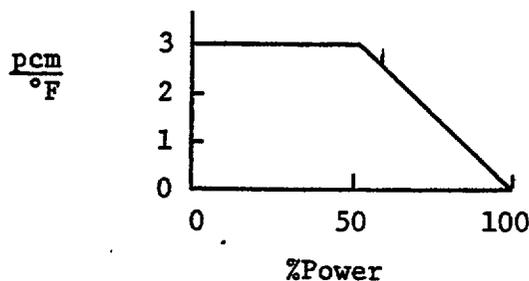


Figure 1

The rod ejection accident was analyzed with a moderator coefficient which approaches zero (becomes less positive) with increasing power. The rod withdrawal from subcritical was analyzed in the FSAR with a moderator coefficient of +10 pcm/°F and therefore bounds the requested Technical Specification change.

The reanalyses indicate that the minimum departure from nucleate boiling ratio (DNBR) occurs for the rod withdrawal at power accident. A range of possible reactivity insertion rates was analyzed. The most limiting rate was found to be 2.3×10^{-5} ΔK/sec, which corresponds to the point of intersection of the overtemperature ΔT and high neutron flux trip curves. This value of reactivity insertion rate yields a minimum DNBR of 1.32. Thus, the DNBR for all transients remains above the limiting value of 1.30.

The overpressure protection calculations for those transients sensitive to positive moderator coefficient, the loss of external electrical load, the uncontrolled rod withdrawal at power and the loss of reactor coolant flow, were redone. The reanalyses of these transients identified the rod withdrawal from 10% power as producing the worst pressure transient. The peak pressurizer pressure for this case was 2579 psia. Thus the pressurization transients remained well below the 2750 psia limit for the primary system.

In a pressurized water reactor (PWR), the coefficient becomes about 4 pcm/°F more negative in about four (4) days at full power, with the build-in of equilibrium xenon and consequent reduction in boron concentration. A shutdown of about four (4) days allows the xenon to decay, returning the coefficient to its initial value. As the core is burned up, however, the boron concentration is also reduced, and the coefficient becomes more negative. Several weeks of operation at full power are required to reduce the coefficient 3 pcm/°F by burnup.

The proposed Surry positive moderator coefficient at less than full power would therefore normally be zero or negative in a few days after operation commences, and would remain zero or negative even with a prolonged shutdown after a few weeks of operation. Positive moderator coefficients larger than proposed by Surry have been accepted for various Babcock and Wilcox and Combustion Engineering reactors. Several Westinghouse reactors have had slightly positive moderator coefficients at beginning of life (BOL) in the all rods out hot zero power configuration. These have been taken to power with rods in the core because of the zero coefficient Technical Specification.

Because the positive moderator coefficient of +3 pcm/°F will exist for only a short time at beginning of cycle, because the Specification requires the coefficient to be zero at full power, because measurements are made in the startup tests for each cycle to verify the coefficient will meet the Specification, and because the accident analysis shows acceptable results, we find the operation of Surry Units 1 and 2 with a positive moderator coefficient to be acceptable.

We have determined that the amendments do not authorize a change in effluent types or total amounts nor an increase in power level and will not result in any significant environmental impact. Having made this determination, we have further concluded that the amendments involve an action which is insignificant from the standpoint of environmental impact and, pursuant to 10 CFR §51.5(d)(4), that an environmental statement, negative declaration, or environmental impact appraisal need not 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 these amendments will not be inimical to the common defense and security or to the health and safety of the public.

Dated:
May 13, 1976

UNITED STATES NUCLEAR REGULATORY COMMISSION

DOCKETS NOS. 50-280 AND 50-281

VIRGINIA ELECTRIC AND POWER COMPANY

NOTICE OF ISSUANCE OF AMENDMENTS TO FACILITY
OPERATING LICENSES

Notice is hereby given that the U.S. Nuclear Regulatory Commission (the Commission) has issued Amendments No. 19 to Facility Operating Licenses Nos. DPR-32 and DPR-37 issued to Virginia Electric and Power Company which revised Technical Specifications for operation of the Surry Power Station, Units Nos. 1 and 2, located in Surry County, Virginia. These amendments are effective as of the date of issuance.

These amendments relate to the operation of Surry Units Nos. 1 and 2 with a positive moderator coefficient in the power range.

The application for the amendments complies with the standards and requirements of the Atomic Energy Act of 1954, as amended (the Act), and the Commission's rules and regulations. The Commission has made appropriate findings as required by the Act and the Commission's rules and regulations in 10 CFR Chapter I, which are set forth in the license amendments. Notice of Proposed Issuance of Amendments to Facility Operating Licenses in connection with this action was published in the FEDERAL REGISTER on June 30, 1975 (40 F.R. 27509). No request for a hearing or petition for leave to intervene was filed following notice of the proposed action.

The Commission has determined that the issuance of these amendments will not result in any significant environmental impact and that pursuant to 10 CFR §51.5(d)(4) an environmental statement, negative declaration or environmental impact appraisal need not be prepared in connection with issuance of these amendments.

For further details with respect to this action, see (1) the application for amendments dated June 5, 1975, as supplemented January 29, and March 5, 1976, (2) Amendments No. 19 to Licenses Nos. DPR-32 and DPR-37, and (3) the Commission's related Safety Evaluation. All of these items are available for public inspection at the Commission's Public Document Room, 1717 H Street, N.W. Washington, D. C. and at the Swem Library, College of William and Mary, Williamsburg, Virginia.

A copy of items (2) and (3) may be obtained upon request addressed to the U. S. Nuclear Regulatory Commission, Washington, D. C. 20555, Attention: Director, Division of Operating Reactors.

Dated at Bethesda, Maryland, this 13th day of May, 1976.

FOR THE NUCLEAR REGULATORY COMMISSION



Vernon L. Rooney, Acting Chief
Operating Reactors Branch #4
Division of Operating Reactors