VIRGINIA ELECTRIC AND POWER COMPANY

RICHMOND, VIRGINIA 23261

September 19, 1995

U.S. Nuclear Regulatory Commission
Attention: Document Control Desk
Washington, D.C. 20555

Serial No. 95-463
NL&OS/JDH R0
Docket Nos. 50-338
50-339
License Nos. NPF-4
NPF-7

Gentlemen:

VIRGINIA ELECTRIC AND POWER COMPANY
NORTH ANNA POWER STATION UNITS 1 AND 2
PROPOSED TECHNICAL SPECIFICATIONS CHANGE
REVISED NEUTRON FLUX HIGH TRIP SETPOINTS
WITH INOPERABLE MAIN STEAM SAFETY VALVES

Pursuant to 10 CFR 50.90, Virginia Electric and Power Company requests amendments, in the form of changes to the Technical Specifications, to Facility Operating License Numbers NPF-4 and NPF-7 for North Anna Power Station Units 1 and 2, respectively. The proposed changes will revise the maximum allowable power range neutron flux high setpoints for operation with inoperable main steam safety valves. The revised setpoints resolve the concern expressed in the Westinghouse Nuclear Safety Advisory Letter NSAL-94-001, "Operation at Reduced Power Levels with Inoperable Main Steam Safety Valves."

A discussion of the proposed Technical Specifications changes is provided in Attachment 1. The proposed Technical Specifications changes are provided in Attachment 2. It has been determined that the proposed Technical Specifications changes do not involve an unreviewed safety question as defined in 10 CFR 50.59 or a significant hazards consideration as defined in 10 CFR 50.92. The basis for our determination that the changes do not involve a significant hazards consideration is provided in Attachment 3.

The proposed Technical Specifications changes have been reviewed and approved by the Station Nuclear Safety and Operating Committee and the Management Safety Review Committee.

Should you have any questions or require additional information, please contact us.

Very truly yours,

James P. O'Hanlon

James P. O'Hanlon
Senior Vice President - Nuclear

Attachments

A001

cc: U.S. Nuclear Regulatory Commission
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Commissioner
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COMMONWEALTH OF VIRGINIA)
)
COUNTY OF HENRICO)

The foregoing document was acknowledged before me, in and for the County and Commonwealth aforesaid, today by J. P. O'Hanlon, who is Senior Vice President - Nuclear, of Virginia Electric and Power Company. He is duly authorized to execute and file the foregoing document in behalf of that Company, and the statements in the document are true to the best of his knowledge and belief.

Acknowledged before me this 19TH day of September, 1995.

My Commission Expires: May 31, 1998.

Vicki L. Hull
Notary Public

(SEAL)

ATTACHMENT 1

DISCUSSION OF CHANGES

VIRGINIA ELECTRIC AND POWER COMPANY

Discussion of Changes

Introduction

Virginia Electric and Power Company requests changes to Technical Specifications Limiting Condition for Operation 3.7.1.1 Action Statements, Technical Specifications Table 3.7-1, dually entitled "Maximum Allowable Power Range Neutron Flux High Setpoint With Inoperable Steam Line Safety Valves During 3 Loop Operation" and "Maximum Allowable Power Range Neutron Flux High Setpoint With Inoperable Steam Line Safety Valves During 2 Loop Operation," and the Technical Specifications Bases 3/4.7.1.1, "Safety Valves" for North Anna Power Station Units 1 and 2. Table 3.7-1 provides the maximum allowable power range neutron flux high setpoints with one or more main steam safety valves (MSSVs) inoperable during two loop and three loop operation. The proposed changes provide more conservative power range neutron flux high setpoints calculated utilizing the Westinghouse Electric Corporation (Westinghouse) recommended methodology and delete the information for setpoints for two loop operation. The proposed changes also revise the Technical Specifications Bases to reflect the methodology used to establish the new setpoints, and delete the Limiting Condition for Operation Action Statement and the Technical Specifications Bases for two loop operation.

The proposed changes do not affect the design, operation, or failure modes of the main steam system. The Loss of Load/Turbine Trip accident analysis is not revised as a result of these changes and remains bounding. The revised trip setpoints ensure that the heat addition rate to the secondary system remains below the heat removal capability of the remaining operable MSSVs, and thus the accident analysis consequences are unaffected. To ensure that the revised setpoints are used, if necessary, pending approval of this Technical Specifications change, North Anna has established additional administrative controls (i.e., Standing Order) directing that the revised setpoints be implemented in the event entry into the Action Statement is required. The current Technical Specifications provide this flexibility because the Technical Specifications are expressed in terms of the maximum permissible setpoints. Implementing setpoints less than the maximum does not conflict with the existing Technical Specification requirement. Finally, the proposed changes involve no unreviewed safety question or significant hazards consideration.

Background

Westinghouse issued Nuclear Safety Advisory Letter NSAL-94-001, "Operation at Reduced Power Levels with Inoperable MSSVs" dated January 20, 1994 which identified a potential concern for plant operations with the existing Technical Specifications setpoints with inoperable main steam safety valves. It was identified that the current Westinghouse methodology used for reducing the power range neutron flux high trip setpoints was potentially inadequate for protecting the main steam system from an overpressure condition. A deficiency was identified which involved the assumption that the maximum allowable initial power level was a linear function of the available Main Steam Safety Valve (MSSV) relief capacity. This assumption was determined invalid by Westinghouse.

An evaluation performed by Westinghouse concluded that this deficiency did not represent a substantial safety hazard. However, Westinghouse determined that it was a condition which required further review by each affected licensee for impact on its site specific licensing bases. Based upon the results of our review of the Westinghouse Nuclear Safety Advisory Letter with supporting recommendations, it was determined that additional calculations were required. By using the more conservative methodology recommended by Westinghouse, new setpoints have been calculated and are being submitted for NRC review and approval. In the interim, a Standing Order had been issued to ensure that conservative setpoints consistent with the accident analysis would be used in the event entry into the Action Statement of Technical Specifications 3.7.1.1 was required.

Current Licensing Basis

The existing Technical Specifications for the Main Steam Safety Valves were issued as part of the original operating licenses for North Anna Units 1 and 2 dated April 1, 1978 and August 21, 1980 respectively. The specified valve lift settings and relieving capacities are in accordance with the requirements of Section III of the ASME Boiler and Pressure Vessel Code, 1971 Edition.

The main steam safety valves are discussed in Section 10.3 of the North Anna Power Station Updated Final Safety Analysis Report. The Loss of Load/Turbine Trip is

discussed in Section 15.2.7 of the North Anna Power Station Updated Final Safety Analysis Report

Current Design Basis

One of the functions of the Main Steam System is to remove heat from the Reactor Coolant System steam generators via the decay heat release valve, the safety valves, atmospheric dump valves, and/or the steam dump valves. The five main steam safety valves provided for each steam generator are designed to protect the integrity of the main steam piping from overpressurization. In the event one or more MSSVs are inoperable, the Reactor Protection System power range neutron flux high trip setpoints are reduced to ensure that the Main Steam System is not overpressurized as a result of various transients.

Discussion

Westinghouse identified a potential concern in its Nuclear Safety Advisory Letter NSAL-94-001 regarding plant operation within the limits established in Technical Specifications. Table 3.7-1 allows the plant to operate at reduced power levels with a reduced number of operable main steam safety valves. Westinghouse identified that the current method used for reducing the neutron flux high trip setpoints was potentially inadequate for protecting the main steam system from an overpressure condition following certain design transients. The assumption that the maximum allowable initial power level is a linear function of the available MSSV relief capacity was determined invalid by Westinghouse. Although it has not been directly shown that the reduced neutron flux high trip setpoints generated by this assumption would result in an overpressure condition of the main steam system, the potential exists due to the non-conservative nature of the assumption.

A detailed analysis performed for a Loss of Load/Turbine Trip (LOL/TT), as part of the UFSAR Chapter 15 for a full power condition with all MSSVs operable, determined that no overpressure condition would occur. The LOL/TT event was analyzed in the UFSAR to show that core protection margins (e.g., DNBR) are maintained, the RCS will not overpressurize, and the main steam system will not overpressurize. Secondary side overpressure protection is provided by actuation of the MSSVs, which

are designed to relieve at least full power nominal steam flow. The analysis verifies that the MSSVs capacity is sufficient to prevent secondary side pressure from exceeding 110 percent of the design pressure.

However, the UFSAR only analyzes the LOL/TT transient from the full power initial condition, with cases examining the effects of assuming primary side pressure control and different reactivity feedback conditions. With fully operational MSSVs, it can be demonstrated that overpressure protection is provided for all initial power levels. Technical Specifications Table 3.7-1 allows operation with a reduced number of operable MSSVs at a reduced power level as determined by resetting the power range neutron flux high trip setpoints. This Technical Specifications requirement was not based upon a detailed analysis, but rather based upon the assumption that the maximum allowable initial power level is a linear function of the available MSSV relief capacity. Therefore, a subsequent detailed analysis for the LOL/TT event for individual cases of inoperable MSSVs was not performed at that time since the original full power analysis was determined to bound such an event. This was based upon the invalid assumption that a linearly reduced neutron flux high trip setpoint would limit the heat addition rate below the removal capacity of the remaining operable MSSVs.

Since Westinghouse has determined this assumption invalid, Virginia Electric and Power Company performed new calculations to support the proposed conservative setpoints. In lieu of a detailed analysis using Technical Specification Table 3.7-1 power range neutron flux setpoint trip values to determine whether a true overpressure condition would result with one or more MSSVs inoperable, calculations were performed such that the maximum power level allowed for operation with inoperable MSSVs is below the heat removing capability of the operable MSSVs. This is based upon Westinghouse's recommendation and represents the most conservative methodology by setting the power range neutron flux high setpoint to this level, thus ensuring that the actual power level cannot exceed this value. Additionally, the information in Table 3.7-1 and the Limiting Condition for Operation Action Statement associated with two loop operation have been deleted since Virginia Electric and Power Company is prohibited by the license from operating in this configuration.

In order to calculate these new setpoints, the governing equation is the relationship $q = m \Delta h$, where q is the heat input from the primary side, m is the steam flow rate, and

Δh is the heat of the vaporization at the steam relief pressure. Therefore, the equation used in defining the revised Technical Specifications Table 3.7-1 setpoint values is:

$$\text{Hi } \phi = \frac{(100)}{Q} \times \frac{(w_g h_{fg} N)}{K}$$

Where:

Hi ϕ = Safety analysis power range high neutron flux setpoint, percent

Q = Nominal NSSS power rating of the plant (including reactor coolant pump heat, MWt)

K = Conversion factor, 947.82 $\frac{\text{(Btu/sec)}}{\text{MWt}}$

w_g = Minimum total steam flow rate capability of the operable MSSVs on any one steam generator at the highest MSSV operating pressure including tolerance and accumulation, as appropriate, lbm/sec.

h_{fg} = Heat of vaporization for steam at the highest MSSV opening pressure including tolerance and accumulation, as appropriate, Btu/lbm.

N = Number of loops in plant

The resulting values calculated from this equation were reduced by 9% power to account for instrument and channel uncertainties. With the revised values, the maximum plant operating power level would be lower than the reactor protection system setpoint by an appropriate operating margin. These revised values, by the use of this equation, resolves the issue identified by the Westinghouse Nuclear Safety Advisory Letter by enabling us to re-calculate and establish more restrictive power range neutron flux high setpoints as listed in the proposed changes in Technical Specifications Table 3.7-1.

Specific Changes

The following specific Technical Specifications changes apply to both Units 1 and 2.

Change Section 3.7.1.1, "Limiting Condition for Operation" Action Item "a" by deleting "With 3 reactor coolant loops and associated steam generators in operation and" and begin the sentence by capitalizing "With".

Delete the following Section 3.7.1.1, "Limiting Condition for Operation" Action Item "b"

- "With 2 reactor coolant loops and associated steam generators in operation and with one or more main steam line code safety valves associated with an operating loop inoperable, operation in MODES 1, 2, and 3 may proceed provided, that within 4 hours, either the inoperable valve is restored to OPERABLE status or the Power Range Neutron Flux High Setpoint trip is reduced per Table 3.7-1; otherwise, be in at least HOT STANDBY within the next 6 hours and in COLD SHUTDOWN within the following 30 hours."

Change Section 3.7.1.1, "Limiting Condition for Operation" Action Item "c" to Action Item "b"

Make the following changes to Table 3.7-1:

- Delete "During 3 Loop Operation" from title of table

- Change the Maximum Allowable Power Range Neutron Flux High Setpoint (Percent of RATED THERMAL POWER) for one inoperable safety valve in Table 3.7-1 from "87" to "52"

- Change the Maximum Allowable Power Range Neutron Flux High Setpoint (Percent of RATED THERMAL POWER) for two inoperable safety valves in Table 3.7-1 from "65" to "37"

- Change the Maximum Allowable Power Range Neutron Flux High Setpoint (Percent of RATED THERMAL POWER) for three inoperable safety valves in Table 3.7-1 from "44" to "21"

- Delete all information which discusses two Loop Operation

Make the following changes to the Technical Specifications Bases 3/4.7.1.1:

- Delete the following reactor trip setpoint reduction calculations with supporting definitions:

For 3 loop operation with
stop valves closed

$$SP = \frac{(X) - (Y)(U)}{X} \times 109$$

For 2 loop operation with
stop valves closed

$$SP = \frac{(X) - (Y)(U)}{X} \times 71$$

For 2 loop operation with
stop valves open

$$SP = \frac{(X) - (Y)(U)}{X} \times 66$$

- Replace the last sentence in the third paragraph with the following information and add the supporting calculation with supporting information:

... The reactor trip setpoint reductions are derived from the following conservative calculation such that the maximum power level allowed for operation with inoperable MSSVs is below the heat removing capability of the operable MSSVs:

In order to calculate these setpoints, the governing equation is the relationship: $q = m \Delta h$, where q is the heat input from the primary side, m is the steam flow rate, and Δh is the heat of the vaporization at the steam relief pressure. Therefore, the equation used in defining the revised setpoint values is:

$$Hi\ \phi = \frac{(100)}{Q} \times \frac{(w_g h_{fg} N)}{K}$$

Where:

Hi ϕ = Safety analysis power range high neutron flux setpoint, percent

O = Nominal NSSS power rating of the plant (including reactor coolant pump heat, MWt)

K = Conversion factor, 947.82 $\frac{(Btu/sec)}{MWt}$

w_g = Minimum total steam flow rate capability of the operable MSSVs on any one steam generator at the highest MSSV operating pressure including tolerance and accumulation, as appropriate, lbm/sec.

h_{fg} = Heat of vaporization for steam at the highest MSSV opening pressure including tolerance and accumulation, as appropriate, Btu/lbm.

N = Number of loops in plant

The resulting values calculated from this equation are reduced by 9% power to account for instrument and channel uncertainties. With the revised values, the maximum plant operating power level would be lower than the reactor protection system setpoint by an appropriate operating margin.

Safety Significance

Virginia Electric and Power Company has reviewed these proposed Technical Specifications changes and determined that the changes do not involve an unreviewed safety question.

1. The proposed changes do not increase the probability of occurrence or the consequences of an accident or malfunction of equipment important to safety

previously evaluated in the safety analysis report. The proposed changes have no adverse impact upon probability or consequences of any accident previously evaluated. The proposed changes will provide conservative power range neutron flux high trip setpoints such that the maximum power level allowed for operation with inoperable MSSVs is below the heat removing capability of the remaining operable MSSVs. No new or unique accident precursors are introduced by this change.

2. The proposed changes do not create the possibility for an accident or malfunction of a different type than any evaluated previously in the safety analysis report. Since the implementation of the proposed change to setpoints would require no hardware modifications (i.e., alterations to plant configuration), operation of the facilities with these proposed Technical Specifications does not create the possibility for any new or different kind of accident which has not already been evaluated in the Updated Final Safety Analysis Report (UFSAR).

   The proposed revision to the Technical Specifications will not result in any physical alteration to any plant system, nor would there be a change in the method by which any safety-related system performs its function. The design and operation of the main steam system is not being changed. Therefore, the proposed change does not create the possibility of a new or different kind of accident from any accident previously evaluated.

3. The proposed changes do not reduce the margin of safety as defined in the basis for any Technical Specifications. The design and operation of the main steam system is not being changed. In addition, the results of the accident analyses which are documented in the UFSAR bound operation under the proposed changes, so that there is no safety margin reduction. Therefore, the proposed change does not involve a reduction in a margin of safety.

Based on the above evaluation, the proposed changes to the Technical Specifications will not adversely affect the safe operation of the plant. Therefore, the proposed change request for North Anna Units 1 and 2 does not result in an unreviewed safety question as defined in the criteria of 10 CFR 50.59.

ATTACHMENT 2

PROPOSED TECHNICAL SPECIFICATIONS CHANGES
NORTH ANNA UNITS 1 AND 2

VIRGINIA ELECTRIC AND POWER COMPANY