VIRGINIA ELECTRIC AND POWER COMPANY
RICHMOND, VIRGINIA 23261

March 10, 1993

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

Serial No. 93-082
NL&P/MAE: 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 CHANGES
HIGH HEAD SAFETY INJECTION FLOW BALANCING

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 Nos. NPF-4 and NPF-7 for North Anna Power Station Units 1 and 2, respectively. The proposed changes will revise the current Technical Specification requirements pertaining to the High Head Safety Injection System flow balance tests.

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 these 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,

W. L. Stewart
Senior Vice President - Nuclear

Attachments

A001

cc: U.S. Nuclear Regulatory Commission
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Mr. M. S. Lesser
NRC Senior Resident Inspector
North Anna Power Station

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 W. L. Stewart 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 10TH day of March, 1993.

My Commission Expires: May 31, 1994.

Vicki L. Hull
Notary Public

(SEAL)

ATTACHMENT 1
DISCUSSION OF CHANGES

Discussion of Changes

Introduction

Technical Specification (TS) 4.5.2.h requires that high head safety injection (HHSI) flow balance tests be performed following the completion of modifications to the ECCS subsystems that alter the subsystem flow characteristics. The successful completion of the HHSI flow balance testing is ensured by two surveillance requirements. These surveillance requirements are for the sum of the flows through the two lowest flow branch lines, and a total HHSI pump flow requirement. These requirements provide a specified acceptance range for HHSI flow balancing of only 4%, which is too narrow to consistently be met during the tests. This is due to the sensitivity of throttle valve positioning and the uncertainty of flow measurements caused by instrument inaccuracies.

The flow rates currently specified for the sum of the flows through the two lowest flow branch lines and the total HHSI pump flow are conservative with respect to the existing safety analysis values. The flow rates will be revised to remove any instrument inaccuracies. Normal instrument inaccuracies will be factored into the acceptance criteria of the periodic surveillance tests which perform the flow balance testing.

The proposed changes will decrease the sum of the flows through the two lowest flow branch lines from $\geq$ 384 gpm to $\geq$ 359 gpm, and increase the total HHSI pump flow from $\leq$ 650 gpm to $\leq$ 660 gpm. This expanded acceptance range will ensure the system performance remains bounded by the existing safety analysis and will make test failures due to instrument inaccuracies less likely.

In addition, a surveillance requirement will be added to define a value of $\geq$ 48.3 gpm to be used for simulated reactor coolant pump (RCP) seal injection flow during cold leg injection balancing. A simulated RCP seal injection flow has been taken into account during actual surveillance tests. It is added for completeness of the surveillance requirements, but does not change the way the surveillance test is currently being performed.

Background

The function of the Emergency Core Cooling System (ECCS) is to provide core cooling and negative reactivity to ensure that the reactor core is protected after any of the following accidents: Loss of Coolant Accident (LOCA), Rod Ejection Accident, Loss of Secondary Coolant Accident, and Steam Generator Tube Rupture (SGTR). During the initial phase of these accidents, HHSI flow enters the Reactor Coolant System (RCS) via the cold leg injection to the three RCS loops and the reactor coolant pump seal supply. The following existing TS ensure that HHSI flow is available as required by the current safety analysis:

- TS 4.5.2.h.1.a requires the sum of the two lowest branch line flows to be $\geq$ 384 gpm with the RCS depressurized (this means the third branch line flow must be $\geq$ 192 gpm and total flow of the three branch lines must be $\geq$ 576 gpm).

- TS 4.5.2.h.1.b requires total HHSI pump flow rate to be $\leq$ 650 gpm with the RCS depressurized.

- TS 3.4.6.2.e and TS 4.4.6.2.1 require RCP seal injection to be throttled to $\leq$ 30 gpm and controlled leakage measured once every 31 days with the RCS at 2235 $\pm$ 20 psig (this

ensures that seal injection will be less than or equal to the 48.3 gpm value assumed in the safety analysis if the RCS suddenly depressurizes).

Based on the TS requirements above, total HHSI pump flow must be $\geq$ 624.3 gpm (576 gpm + 48.3 gpm) and $\leq$ 650 gpm during cold leg injection. These requirements provide a specified acceptance range of only 4%, which is too narrow to consistently be met during the tests. This is due to the sensitivity of throttle valve positioning and the uncertainty of flow measurements caused by instrument inaccuracies. These instances have been reported in Licensee Event Reports (LERs). LER 90-008-00, for Unit 2, and 91-001-00, for Unit 1, documented that the flows obtained during recent surveillance testing were outside the TS limits. Part of the "Actions To Prevent Reoccurrence" in LER 91-001-00 was to determine if the safety analysis would support TS changes.

A review of the existing safety analysis has determined that the HHSI system performance will remain bounded if the summation of the indicated flows of the two lowest flow branch lines is $\geq$ 359 gpm with no measurement uncertainty. This allows the adjustment of test values depending on the accuracy of the test equipment used.

The manufacturer for the HHSI pumps was contacted to obtain the maximum flow rate allowed for these pumps. The manufacturer stated that the maximum flow rate for these pumps was 675 gpm. An engineering study was performed to determine the required NPSH for the HHSI pumps at the manufacturer's maximum flow rate. The study has determined that under all circumstances the NPSH available exceeds the NPSH required. However, to prevent HHSI flow from exceeding 675 gpm during the safety injection recirculation mode of operation, the engineering study recommended the maximum flow of the HHSI pump be $\leq$ 660 gpm when flowing from the refueling water storage tank to the RCS. The effect of this change on LHSI flow and NPSH during the safety injection recirculation mode was also evaluated and found to be acceptable.

Although not specifically delineated in TS 4.5.2.h.1, during the HHSI cold leg injection flow balancing performed to meet this specification, a simulated RCP seal injection flow has been accounted for to support the basis of TS 3.4.6.2.e. This is part of the original design basis and has been taken into account during actual surveillance tests. It is added for completeness of the surveillance requirements. A simulated RCP seal injection flow is not required for hot leg injection flow balancing due to the system configuration at the time of switchover to hot leg injection.

The flow rates currently specified in TS 4.5.2.h.1.a and b are conservative with respect to the existing safety analysis values. The revised flow rates will not incorporate any instrument inaccuracies. Normal instrument inaccuracies will be factored into the acceptance criteria of the periodic surveillance tests which perform the flow balance testing. This expanded acceptance range will ensure the system performance remains bounded by the existing safety analysis and will make test failures due to instrument inaccuracies less likely.

The proposed TS changes will continue to ensure that the three RCS loops and the reactor coolant pump seal supply are throttled to meet the following constraints:

- When one RCS loop is faulted (i.e., doubled ended cold leg break), sufficient flow is delivered to the two intact RCS loops.

- The HHSI pump flow does not exceed run out flow with the RCS completely depressurized.

•With the low head safety injection (LHSI) pump supplying the HHSI pump, total LHSI flow does not decrease HHSI Net Positive Suction Head (NPSH) available below the NPSH required.

Technical Specification Changes

General

The TS changes described herein apply to North Anna Units 1 and 2.

TS 4.5.2.h.1.a

TS 4.5.2.h.1.a will be modified by decreasing the allowable sum of the flows through the two lowest flow branch lines, with a single HHSI pump running, from ≥ 384 gpm to ≥359 gpm.

TS 4.5.2.h.1.b

TS 4.5.2.h.1.b will be modified by increasing the allowable total flow of the HHSI pump, with a single HHSI pump running, from ≤ 650 gpm to ≤ 660 gpm.

TS 4.5.2.h.1.c

TS 4.5.2.h.1.c will be added to define the value of ≥ 48.3 gpm used for simulated RCP seal injection flow during HHSI cold leg injection flow balance measurements.

In addition, minor editorial changes have been made to these TS sections to improve the readability.

Safety Significance

A safety evaluation has been performed for the proposed TS changes. The criteria for performing HHSI flow balance testing is established to ensure that the minimum required ECCS flow rates are obtainable and maximum flow rates, based on NPSH considerations, are not exceeded. These changes will not affect the capability of the ECCS to perform its design function. The system performance will remain bounded by the existing safety analysis. The probability or consequences of HHSI pump runout is not increased because by limiting the HHSI pump flow to 660 gpm, the maximum flow allowed by the manufacturer (675 gpm) will not be exceeded during worse case conditions.