VIRGINIA ELECTRIC AND POWER COMPANY
RICHMOND, VIRGINIA 23261

August 4, 1999

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

Serial No. 99-394
NL&OS/GSS/ETS 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
CLARIFICATION OF THE ACTIVE VOLUME OF THE RCS USED TO RETURN A DRAINED RCS LOOP BACK TO SERVICE

Pursuant to 10 CFR 50.90, Virginia Electric and Power Company requests amendments, in the form of changes to the Technical Specifications and to Facility Operating License Numbers NPF-4 and NPF-7 for North Anna Power Station Units 1 and 2, respectively. The proposed changes will acknowledge the establishment of seal injection for the Reactor Coolant Pump in the isolated and drained loop as a prerequisite for the vacuum-assisted backfill technique and will extend the drained loop verification time from two hours to four hours prior to commencing backfill operation. A discussion of the proposed Technical Specifications changes is provided in Attachment 1.

The proposed Technical Specifications changes have been reviewed and approved by the Station Nuclear Safety and Operating Committee and the Management Safety Review Committee. 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 proposed Technical Specifications changes are provided as a mark-up in Attachment 2 and a typed version in Attachment 3. The basis for our determination that the changes do not involve a significant hazards consideration is provided in Attachment 4.

If you have any further questions, please contact us.

Very truly yours,

David A. Christian
Vice President – Nuclear Operations

Attachments

1. Discussion of Changes
2. Mark-up of Technical Specifications Changes
3. Proposed Technical Specifications Changes
4. Significant Hazards Consideration Determination

Commitments made in this letter:

1. There are no commitments in this letter

cc: U.S. Nuclear Regulatory Commission
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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 David A. Christian, who is Vice President - Nuclear Operations, of Virginia Electric and Power Company. He has affirmed before me that he is duly authorized to execute and file the foregoing document in behalf of that Company, and that the statements in the document are true to the best of his knowledge and belief.

Acknowledged before me this 4th day of August, 1999.

My Commission Expires: 3/31/2000.

Maggie McClure
Notary Public

(SEAL)

Attachment 1

Discussion of Changes

North Anna Power Station
Units 1 and 2
Virginia Electric and Power Company

Discussion of Changes

Introduction

Pursuant to 10 CFR 50.90, Virginia Electric and Power Company requests changes to Technical Specifications (TS) Bases Section 3/4.4.1, "Reactor Coolant System – Reactor Coolant Loops" and to Surveillance Requirement 4.4.1.6.1. The Bases section for TS 3/4.4.1 is being modified to accommodate a vacuum-assisted fill technique for backfilling isolated loops from the active volume of the Reactor Coolant System (RCS). The vacuum-assisted fill technique reduces the number of "pump jogs" required to fill and vent the isolated loop. However, the technique requires initiation of seal injection for the reactor coolant pump (RCP) in the isolated loop in order to allow the establishment of a partial vacuum. Surveillance Requirement 4.4.1.6.1 presently requires an isolated and drained loop to be verified as "drained" no more than two hours prior to opening a loop stop valve for backfilling the loop from the RCS. Because seal injection results in a small flow rate (i.e., approximately 5 gpm) of borated water to the isolated loop, it is not possible to perform the modified backfill evolution and remain in verbatim compliance with Surveillance Requirement 4.4.1.6.1 since the seal injection renders the loop no longer "drained." Therefore, the Bases change for TS 3/4.4.1 will acknowledge the establishment of seal injection for the RCP in the isolated and drained loop as a prerequisite for the vacuum-assisted backfill technique. Because establishment of a partial vacuum in the isolated and drained loop may require longer than two hours, the proposed Surveillance Requirement 4.4.1.6.1 is modified to extend the drained loop verification time from two hours to four hours prior to the backfill operations.

These changes do not create an unreviewed safety question. Changes provide clarification of the backfill evolution with vacuum assist, and permit additional time to establish a partial vacuum in the loop to optimize the backfill evolution and reduce pump jogs.

Licensing and Design Bases

The current Technical Specifications permit returning an isolated RCS loop to service by either of two methods. The first method, when the loop is isolated but not drained, requires the isolated loop to be operated on recirculation flow for a specified period of time prior to returning the loop to service. This activity serves to equalize reactor coolant temperature and boron concentration among the isolated and operating loops. The second method, when a loop is isolated and drained, permits returning the loop to service by backfilling the loop from the active portion of the RCS volume with specific controls in place to ensure reactivity control and to prevent loss of shutdown cooling.

Discussion

On November 6, 1996, Virginia Electric and Power Company proposed changes to the Technical Specifications to permit returning an isolated and drained RCS loop to service during Modes 5 and 6 by backfilling from the active portion of the RCS. On October 30, 1998, the NRC issued Technical Specification Amendment 215 for Unit 1 and 196 for Unit 2 to approve the proposed changes. The new method permits filling a drained isolated loop via backfill from the RCS through a partially opened loop stop valve. New controls were also imposed to ensure adequate reactivity and coolant inventory control during the loop backfill evolution.

To avoid numerous reactor coolant pump (RCP) starts to eliminate the entrapped air when filling a drained loop, a partial vacuum may be drawn on the loop prior to back filling. However, RCP seal injection is required to permit establishing a partial vacuum in the isolated loop. Seal injection involves a low flow-rate injection (approximately 5 gpm) of borated water from the charging system into the isolated loop during the time period required to establish a partial vacuum in that loop and during the backfill evolution. Therefore, to facilitate the use of the vacuum-assisted fill technique and to eliminate a potential verbatim compliance issue associated while filling the drained loop, Virginia Electric and Power Company proposed two changes to the Technical Specifications: First, the Bases for Technical Specifications 3/4.4.1 are being modified to acknowledge that RCP seal injection is initiated for the pump in the isolated and drained loop as a prerequisite for the vacuum assisted backfill technique. Second, because establishment of a partial vacuum in the isolated and drained loop may require longer than two hours, the proposed Surveillance Requirement 4.4.1.6 is modified to extend the drained loop verification time from two hours to four hours prior to the backfill operations.

Virginia Electric and Power Company has considered the implications of the proposed changes on the safe operation of the North Anna units. The considerations center on avoiding the possibility of an inadvertent and undetected introduction of under-borated water into an isolated loop prior to returning the isolated loop to service. The design and licensing basis focuses on restoring isolated and drained loops to service using borated water sources of known concentration to preclude the pre-condition for a Startup of an Inactive Loop (SUIL) accident.

Amendments 215 and 196 allow an initially isolated and drained loop to be returned to service by partially opening a loop stop valve and filling the loop in a controlled manner from the "active volume" of the RCS. Surveillance Requirement 4.4.1.6.1 requires the isolated loop to be verified as drained within two hours prior to opening a loop stop valve. This verification is procedurally controlled and performed to prevent potentially under-borated water that may exist in the isolated loop from diluting the borated water being transferred to the loop.

During the backfill evolution, make-up flow to the active RCS volume is provided from the reactor cavity, the Refueling Water Storage Tank (RWST), or from the Boric Acid Storage Tank (BAST), which is blended with unborated water from the primary grade (PG) water storage tank. During shutdown operations, the primary grade water valves are locked closed except during controlled dilution and/or RCS makeup activities. Make-up flow is introduced to the active RCS volume by normal charging into the Loop B cold leg, and by auxiliary spray into the pressurizer on the Loop C hot leg. As a result of establishing RCP seal injection to permit a partial vacuum to be drawn on the isolated and drained loop, a small flow rate (approximately 5 gpm) of makeup is also introduced directly into the isolated and drained loop. Compliance with Technical Specifications administratively precludes the possibility of an inadequate boron concentration in makeup flow derived from the reactor cavity or RWST. Prior to its introduction into the active RCS volume, blended makeup flow from the BAST and PG water storage tank is repeatedly sampled to ensure adequate boron concentration, and to eliminate the potential for inadvertent under-boration due to improper blending. Continuous mixing of the active RCS volume is provided by the Residual Heat Removal System. Therefore, secondary indication of mis-blending makeup flow from the BAST and PG water storage tank is provided by source range instrumentation, which is operable during the backfill evolution. These controls ensure that makeup flow to the active RCS volume and to the isolated loop (through RCP seal injection) will not result in an inadvertent and undetected boron concentration less than that required by Technical Specifications in a reactor coolant loop being brought back to service.

Surveillance Requirement 4.4.1.6.1 presently requires an isolated and drained loop to be verified as drained no more than two hours prior to opening a loop stop valve for back-filling the loop from the RCS. However, the establishment of a partial vacuum in the isolated and drained loop may require longer than two hours. Therefore, it is proposed that the drained loop verification time be extended from two hours to four hours prior to the backfill operations. The two hour interval was established in Technical Specifications to ensure that the drained loop is verified to be drained at a point in time sufficiently close to the initiation of the back-fill evolution that no intervening event could likely have occurred that would render the loop no longer drained. Extending the time between drained loop verification and the backfill operation from two hours to four hours does not significantly diminish confidence that the isolated and drained loop will, in fact, be drained at the time the back-fill evolution is initiated.

Specific Changes – Technical Specifications

Revise Surveillance Requirement 4.4.1.6.1 as noted below:

From:
The isolated loop shall be verified drained within 2 hours prior to opening the loop stop valve for backfilling the loop from the RCS.

To:

The isolated loop shall be verified drained within 4 hours prior to commencing the backfill operation.

TS Bases 3/4.4.1 Revise 9th paragraph as noted below:

From:
An initially isolated and drained reactor coolant loop may be returned to service by partially opening the loop stop valves and filling the loop in a controlled manner from the Reactor Coolant System. Prior to partially opening the loop stop valves, the following measures are required to ensure no sudden positive reactivity addition or loss of Reactor Coolant inventory occurs:

To:
An initially isolated and drained reactor coolant loop may be returned to service by partially opening a loop stop valve and filling the loop in a controlled manner from the Reactor Coolant System. Blended makeup flow from the Boric Acid Storage Tank and Primary Grade Water Storage Tank is periodically sampled during the backfill evolution to ensure its boron concentration meets the minimum refueling water boron concentration requirement established by Technical Specification 3.9.1. Makeup to the RCS solely through auxiliary spray during the backfill evolution is prohibited to ensure that a sufficient fraction of makeup flow is mixed with coolant in the active RCS volume and flows through the core, where the source range instrumentation is available to provide secondary indication of improperly blended makeup flow. The vacuum-assisted backfill evolution involves initiation of reactor coolant pump seal injection in the isolated and drained loop to allow establishment of a partial vacuum prior to partially opening the loop stop valve. The following measures are required to ensure no sudden positive reactivity addition or loss of reactor coolant inventory occurs during the backfill evolution:

Safety Significance

Virginia Electric and Power Company has reviewed the Technical Specification changes and has determined that the proposed changes would not pose an unreviewed

safety question. These changes modify the Bases for Technical Specifications 3/4.4.1 to acknowledge that seal injection is initiated for RCP in the isolated and drained loop as a prerequisite for the vacuum-assisted backfill technique. Because establishment of a partial vacuum in the isolated and drained loop may require longer than two hours, the proposed Surveillance Requirement 4.4.1.6.1 extends the time between drained-loop verification and the backfill operation from two hours to four hours. Operation of the North Anna Power Station in accordance with the proposed Technical Specification and Basis changes will not:

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

   Administrative procedures ensure that the initiation of seal injection in order to allow a partial vacuum to be established in an isolated and drained loop will not create the potential for an inadvertent and undetected introduction of under-borated water into an isolated loop prior to returning the isolated loop to service. Additionally, extending the drained loop verification time from two hours to four hours prior to backfill operations will not significantly diminish confidence that the isolated and drained loop will, in fact, be drained at the time the backfill evolution is initiated. Therefore, there is no measurable increase in the probability or consequences of any accident previously evaluated.

2. Create the possibility of a new or different kind of accident from any accident previously evaluated.

   There are no modifications to the plant as a result of the changes. No new accident or event initiators are created by the initiation of seal injection for the RCP in the isolated loop in order to establish a partial vacuum in that isolated and drained loop, and by the extension of the drained loop verification time from two hours to four hours prior to the backfill operations. Therefore, the proposed changes do not create the possibility of any accident or malfunction of a different type previously evaluated.

3. Involve a significant reduction in the margin of safety as defined in the bases on any Technical Specifications.

   The proposed changes have no effect on safety analyses assumptions. Rather, the proposed changes acknowledge the establishment of seal injection for the RCP in the isolated and drained loop as a prerequisite for the vacuum-assisted backfill technique and extends the drained loop verification time from two hours to four hours prior to the backfill operations. The two hour interval was established to ensure that the drained loop is verified to be drained at a point in time sufficiently close to the initiation of the backfill evolution such that no intervening event could occur that would render the loop no longer drained. Modification of the drained loop verification time from two hours to four hours

prior to the backfill operations will not significantly diminish confidence that the isolated and drained loop will be drained at the time the backfill evolution is initiated. Therefore, the proposed changes do not result in a reduction in a margin of safety.

Environmental Assessment

The proposed Technical Specifications changes clarify the method used when backfilling an isolated and drained Reactor Coolant System (RCS) loop, and extend the time to commence the loop backfill evolution after verifying that the RCS loop is drained. The proposed changes have no environmental impact or increase in the individual or cumulative occupational radiation exposure. Adequate controls exist to ensure that the RCS loop backfill evolution is performed safely. No new effluents or effluent release paths are created as a result of the proposed Technical Specifications changes to the RCS loop backfill process. The proposed changes will continue to ensure that core reactivity management is adequately addressed and therefore, there is no environmental impact as a result of the proposed Technical Specifications changes.

Attachment 2

Mark-up of Technical Specifications Changes

North Anna Power Station
Units 1 and 2
Virginia Electric and Power Company