VIRGINIA ELECTRIC AND POWER COMPANY
RICHMOND, VIRGINIA 23261

June 18, 2002

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

Serial No. 02-341
NL&OS/ETS R0
Docket Nos. 50-338/-339
License Nos. NPF-4/-7

Gentlemen:

VIRGINIA ELECTRIC AND POWER COMPANY
NORTH ANNA POWER STATION UNITS 1 AND 2
REQUEST FOR ADDITIONAL INFORMATION
PROPOSED TECHNICAL SPECIFICATION CHANGES
REVISED CONTAINMENT OPERATING LIMITS

In a letter dated November 29, 2001 (Serial No. 01-684), Virginia Electric and Power Company (Dominion) requested amendments, in the form of changes to the Technical Specifications to Facility Operating Licenses Numbers NPF-4 and NPF-7 for North Anna Power Station Units 1 and 2, respectively. The proposed changes will revise the containment air partial pressure versus service water temperature to establish a new operating domain for containment air partial pressure. In a May 28, 2002 telephone conference call with the NRC, additional information was requested to complete the review of the proposed amendments. The attachment to this letter provides the requested information to support the containment operating limits amendments.

As noted in our initial submittal, there are plant modifications inside containment necessary to implement the proposed Technical Specification changes. We plan to implement these changes during the North Anna Unit 1 Cycle 16/17 and Unit 2 Cycle 15/16 refueling outages. These outages are currently scheduled to begin in the Fall of 2002 for Unit 2 and the Spring of 2003 for Unit 1. To permit effective outage planning, it is requested that the NRC approve the proposed Technical Specification changes by August 2002. In addition, it is requested that the effective implementation date for the amendments be specified as the end of the Cycle 15/16 refueling outage for Unit 2 and end of the Cycle 16/17 refueling outage for Unit 1.

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

Very truly yours,

Leslie N. Hartz
Vice President – Nuclear Engineering

Attachment

Commitments made in this letter: None

A001

cc: U.S. Nuclear Regulatory Commission
Region II
Sam Nunn Atlanta Federal Center
61 Forsyth Street, SW
Suite 23T85
Atlanta, Georgia 30303

Mr. M. J. Morgan
NRC Senior Resident Inspector
North Anna Power Station

Commissioner
Bureau of Radiological Health
1500 East Main Street
Suite 240
Richmond, VA 23218

Mr. J. E. Reasor, Jr.
Old Dominion Electric Cooperative
Innsbrook Corporate Center
4201 Dominion Blvd.
Suite 300
Glen Allen, Virginia 23060

COMMONWEALTH OF VIRGINIA)
)
COUNTY OF HENRICO)

The foregoing document was acknowledged before me, in and for the County and Commonwealth aforesaid, today by Leslie N. Hartz, who is Vice President - Nuclear Engineering, of Virginia Electric and Power Company. She has affirmed before me that she 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 her knowledge and belief.

Acknowledged before me this 18th day of June, 2002.

My Commission Expires: March 31, 2004.

Maggie McClure
Notary Public

(SEAL)

Attachment 1

Request for Additional Information
Containment Reanalysis Technical Specification Change

North Anna Power Station
Units 1 and 2
Virginia Electric and Power Company
(Dominion)

Request for Additional Information
Containment Reanalysis Technical Specification Change

NRC Question #1

In Figure 3.6-1, Why is the new upper curve independent of service water to a much lower service water temperature than the current curve (38°F for the proposed curve vs. 52.5°F for the current curve)?

Response to Question #1

The peak pressure and the containment depressurization analyses establish the upper limit of the curve. The location where the analysis lines intersect is dependent on the maximum allowable initial air partial pressure and the selection of retained analysis margin in the depressurization analysis. The existing Technical Specifications (TS) limitation of 11.1 psia for SW temperature less than 52.5 °F (on Figure 3.6-1 in current Technical Specifications or Figure 3.6.4-1 in Improved Technical Specifications) is based upon analysis of the main steam line break (MSLB) event. The LOCA analyses for the existing TSs support air partial pressure greater than 11.1 psia. Thus, the existing TS is based upon the more restrictive MSLB analysis. However, the MSLB analysis results, for these initial conditions, contain margin to the containment design pressure limit. The North Anna Model 51F steam generators include steam outlet flow restrictors built into the steam domes that reduced the maximum steam line break size from 4.6 ft^2 to 1.4 ft^2. The MSLB assessment in Section 4.3.8 of the submittal describes how margin was used to better integrate the respective limitations imposed from the revised LOCA analyses and its initial containment air partial pressure. When integrated in this manner, there is a much smaller portion of the proposed containment operating domain (on Figure 3.6-1 in current Technical Specifications or Figure 3.6.4-1 in Improved Technical Specifications) that is limited by the peak pressure analysis.

NRC Question #2

Page 6 of Attachment 1: Page 6 states that to ensure adequate NPSH margin consistent with the proposed containment partial pressure operating limits, the inside recirculation spray (IRS) pump delay time is increased from 195 to 400 seconds. Please explain how the IRS pump delay time was determined.

Response to Question #2

The proposed revisions to the items indicated on page 6 (e.g., spray flow rate and instrumentation uncertainties) resulted in preliminary analysis results for which the IRS pump NPSH margin was less than desired. Using an iterative approach, the IRS pump delay time was increased, which increased calculated NPSH but extended containment depressurization time, until a more optimum balance was achieved between the results. The IRS pump delay time of 400 seconds provided the desired margin in analyses for IRS pump NPSH and containment depressurization.

NRC Question #3

Page 5 of Attachment 1: It is not clear which variables are now analyzed with uncertainties. Section 3.3 names RWST temperature, service water temperature, containment temperature, containment air partial pressure, and casing cooling tank temperature. Please provide a complete list with the values of the uncertainties.

Response to Question #3

Table 4.1 of the submittal includes the TS surveillance parameters that are input to the analysis and the total range of values in the analysis. Each TS parameter input to the analysis includes an instrument uncertainty that conservatively bounds the calculated indication uncertainty. The following table provides the TS allowable values and the associated instrument uncertainty used in the analysis.

TS Parameter Input to Analysis	TS Allowable	Instrument Uncertainty
Maximum Core Power	2893 MWt	2.0 %
RWST Temperature	40-50 °F	2.0 °F
Containment Air Temperature	86-120 °F	1.5 °F
Containment Air Partial Pressure	Note 1	0.3 psi
Service Water Temperature	35-95 °F	3.0 °F
Maximum Casing Cooling Temperature	50 °F	3.0 °F

1) Proposed containment air partial pressure operating domain is provided in Figure 4.1 of the submittal.

Dominion calculates the measurement indication uncertainty consistent with the methodology established in ANSI/ISA-S67.04-Part 1-1982, "Setpoints for Nuclear Safety Related Instrumentation" which was endorsed by Regulatory Guide 1.105, Rev. 2, "Instrument Setpoints for Safety-related Systems."

Section 3.3 of the submittal discusses planned RTD replacements that influence instrumentation uncertainties. The RTDs will be replaced or calibrated frequently to limit the RTD drift and create a smaller instrument measurement uncertainty. The proposed analysis is based on uncertainties associated with new RTDs that will be replaced during the next refueling outages for both North Anna units. The RTD replacement program is controlled through plant design change procedures and maintenance programs.

NRC Question #4

Page 8 of Attachment 1: For peak containment pressure calculations, the relative humidity and the initial temperature are usually minimized in order to increase the mass of air in the containment and to increase the effect of air on condensation. Section 4.3 seems to indicate that it is maximized. Is this correct?

Response to Question #4

Maximizing the relative humidity results in the largest initial containment pressure at a selected air partial pressure. The maximum total initial containment pressure requires a maximum vapor pressure, which corresponds to 100% humidity at the maximum containment air temperature. In addition, the passive heat sinks are initialized to the maximum initial temperature in order to minimize the amount of energy absorption. This combination of inputs creates the maximum post-LOCA containment pressure. LOCTIC sensitivity analyses support this conclusion for the peak pressure analysis. For the long-term depressurization analysis, LOCTIC analyses with 100% humidity and minimum containment air temperature result in the most conservative response. The humidity assumption maximizes the initial total containment pressure, while the minimum air temperature maximizes the air mass, which is important for the long-term analysis. The analyses for containment peak pressure and depressurization time establish a bounding envelope for containment operation between 86°F and 120°F and between 0% and 100% relative humidity.

NRC Question #5

Page 9: Why does the pump suction double ended rupture (PSDER) result in minimum available NPSH for the LHSI pump, while the hot leg double ended rupture (HLDER) provides the minimum available NPSH for the RS pumps? Both the low head safety injections (LHSI) and recirculation spray (RS) pumps take suction from the containment sump.

Response to Question #5

The time at which the RS and LHSI pumps take suction from the sump is significantly different. The RS pumps are actuated early in the event, approximately 200 and 400 seconds as shown in Table 4.1 of the submittal. In contrast, the LHSI pumps take suction on the sump only after depletion of the RWST (approximately 3000 seconds). The HLDER provides a combination of conditions (sump water temperature, containment pressure) that is more limiting early in the event, while the PSDER yields conditions that are more limiting in the longer time frame consistent with the time of LHSI switchover to sump recirculation.

NRC Question #6

Section 2.0 states that some design margin was consumed in the new analysis to provide operating margin. Please describe.

Response to Question #6

The statement was meant to convey the process in which some analytical margin in one parameter or area is being traded off to generate margin for another area or parameter, This is accomplished while still maintaining an overall conservative containment analysis relative to the plant design basis. Specifically, past containment analyses included some assumptions that were found to be very conservative compared to the actual design configuration. The new analysis takes advantage of these very conservative assumptions in individual parameters while maintaining the overall conservatism in the analysis. The example provided in the report is for casing cooling flow rate. Previous analyses had assumed 600 gpm per pump, while the minimum design flow rate is 765 gpm including instrument measurement uncertainties and assumed future flow degradation. The submitted analysis now assumes a flow rate of 700 gpm, which converts design margin into operating margin while maintaining a bounding input assumption.

NRC Question #7

What assurance is there that the UA value of the recirculation system heat exchangers used in the containment calculations reflects the actual UA for the recirculation system (RS) heat exchangers.

Response to Question #7

The RS heat exchanger design condition UA was verified with the Heat Transfer Research Institute (HTRI) model to provide assurance of accurate modeling at the design condition. HTRI model is a widely accepted heat exchanger design code used for calculating heat transfer coefficients. Transient UAs were selected for each analysis case to bound conservatively the RS and service water flow and temperature conditions throughout the transient simulation. In addition, some analysis cases applied UAs based on some tube plugging and a small amount of fouling to reduce the heat transfer capability, when that is the conservative approach. In accordance with plant procedures, the RS heat exchangers are maintained dry during normal plant operation to minimize corrosion and fouling. This control provides assurance that post-LOCA heat exchanger performance would be bounded by the assumptions in the safety analysis.

NRC Question #8

Figure 3.6-1: If it is more difficult to depressurize a subatmospheric containment when the service water temperature is high, why is the limiting case of containment depressurization not at a service water temperature higher than 38°F?

Response to Question #8

It is more difficult to depressurize the containment at high service water temperature. The TS containment air partial pressure limit must be reduced as service water temperature increases in order to satisfy the depressurization acceptance criterion. The upper limit in TS Figure 3.6-1 slopes down with increasing SW temperature because the recirculation spray heat exchanger duty decreases as SW temperature increases. Since the depressurization analyses in Table 4.2 of the submittal are initiated for a multitude of different initial containment pressures, it is difficult to identify a specific "limiting case." The engineering approach was to obtain roughly equivalent analysis results for depressurization time and subatmospheric peak pressure across the SW temperature range. Table 4.2 illustrates that the containment depressurization analyses provide a TS containment air partial pressure upper limit with consistent analysis margin to the acceptance criterion.