VIRGINIA ELECTRIC AND POWER COMPANY
RICHMOND, VIRGINIA 23261

February 18, 2002

U.S. Nuclear Regulatory Commission
Attention: Document Control Desk
Washington, D.C. 20555-0001

Serial No.:	01- 560B
CM/RAB	R0
Docket Nos.:	50-338
	50-339
License Nos.:	NPF-4
	NPF-7

Gentlemen:

VIRGINIA ELECTRIC AND POWER COMPANY (DOMINION)
NORTH ANNA POWER STATION UNITS 1 AND 2
PROPOSED IMPROVED TECHNICAL SPECIFICATIONS
REQUEST FOR ADDITIONAL INFORMATION
ITS 3.7.9 BEYOND SCOPE ISSUE (TAC NOS. MB1451 AND MB1452)

This letter transmits our response to the NRC's request for additional information (RAI) regarding the North Anna Power Station (NAPS) Units 1 and 2 proposed Improved Technical Specifications (ITS). The North Anna ITS license amendment request was submitted to the NRC in a December 11, 2000 letter (Serial No. 00-606). The NRC requested additional information regarding ITS 3.7.9, "Ultimate Heat Sink," in a letter dated September 6, 2001 (TAC Nos. MB1439, MB1440, MB1451, and MB1452). On November 19, 2001, Dominion submitted responses to the NRC's RAIs (Serial Number 01-560). In a subsequent telephone call with members of your staff, Dominion agreed to revise one response and to submit additional information to address certain questions in the September 6, 2001 letter. The revised response and the additional information were transmitted in a letter dated January 25, 2002 (Serial Number 01-560A). In a letter dated February 11, 2002, the NRC requested further information on the North Anna reservoir. This letter provides the requested information.

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

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SN: 01-560B
Docket Nos.: 50-338/339
Subject: RAI – Proposed ITS 3.7.9

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 February, 2002.

My Commission Expires: March 31, 2004.

Maggie McClure
Notary Public

(SEAL)

Attachment

Proposed Improved Technical Specifications
Revised Response to Request for Additional Information
ITS 3.7.9, "Ultimate Heat Sink"

Virginia Electric and Power Company
(Dominion)

North Anna Power Station Units 1 and 2

North Anna Improved Technical Specifications (ITS) Review Comments
Ultimate Heat Sink (UHS)
(TAC Nos. MB1451 AND MB1452)
NRC Letter dated February 11, 2002

RAI 1, QUESTION 1:

When "steam dump" is referred to in the submittal, does this refer to the use of the turbine by-pass valve to route steam directly into the condenser?

RESPONSE:

Yes. The steam dumps are turbine bypass valves, and provide a direct line from the steam generators to the condenser.

RAI 1, QUESTION 2:

Describe the system, sequence of events, success criteria, and automatic/manual operations required for short term decay heat removal using the Decay Heat Release Valve (DHRV).

RESPONSE:

Each unit has a single, normally isolated DHRV. Downstream of its manual isolation, it is fed by each of the three main steam lines through non-return valves from taps upstream of the trip valves. It provides an alternate means of releasing steam to the atmosphere without using the steamline PORV's.

During a steam generator tube rupture, the operators will enter 1(2)-E-3. This procedure requires the operators to identify and isolate the ruptured SG. Afterward, the operators are instructed to cool down the RCS by releasing steam from the two intact generators. The first choice for cooldown is the steam dump system, which sends all of its steam to the condenser. If the dumps are not available, the procedure directs cooldown via the main steam PORV's or the DHRV. The DHRV is placed in service by opening its single upstream isolation valve and the non-return valves on the lines from the non-ruptured loops. The action is successful when the two intact loops can vent through the DHRV.

RAI 1, QUESTION 3:

After short term heat removal is successful using the DHRV, is long term heat removal initiated in the same way and under the same plant conditions as following other short term heat removal scenarios (i.e., condenser cooling using circulating water)?

RESPONSE:

Yes. Steam relief from the main steam system provides cooling until the Reactor Coolant System is below 350 degrees and 450 psig, after which the Residual Heat

Removal System will be placed in service for long term cooling. This sequence is followed no matter which steam relief path was used.

RAI 1, QUESTION 4:

If DHRV cooling was incorporated into the PRA, how would the PRA need to be modified to accurately model the scenario of events, plant states, and required supporting equipment?

RESPONSE:

Currently, the PRA model includes the steam dumps and the PORVs as illustrated below. The model does not credit the DHRV for steam release. In order to incorporate the DHRV into the model, an additional gate in the secondary cooling fault tree would be added that reflects the failure probability of the DHRV and the manual action.

The DHRV would be assigned a failure rate of approximately 2E-2. The human error term for a simple, procedurally controlled operation, with reasonable allowance for time, would be approximately 1E-2 or less. (The human error term for use of the SG PORVs, HEP-1ES1:2-S2, is 8.5E-4.) The combined effect would be a DHRV unavailability of well below 1.0E-1.

RAI 1, QUESTION 5:

If the DHRV is not modeled in the PRA but a reduction in the Risk Achievement Worth (RAW) for the North Anna Reservoir is estimated, describe how the magnitude of the anticipated reduction in the RAW was estimated.

RESPONSE:

Table 1 lists the top cutsets for the case in which Lake Anna is unavailable. Nine of the top ten cutsets are initiated by a tube rupture, followed by a failure of the steam PORVs on the intact loops to release steam. The result is a release of steam from the ruptured loop, including any radionuclides from the primary-to-secondary leakage.

Table 1
Top Ten Cutsets with Lake Anna Unavailable
Number of cut sets in equation = 5781
Top event unavailability (rare event) = 5.245E-006
Reference Run N0AL304

Cutset	LERF	Basic Events		
1	4.08E-007	LERF-25	IE-T7B	1MSRV--23-101AC
2	4.08E-007	LERF-25	IE-T7C	1MSRV--23-101AB
3	4.08E-007	LERF-25	IE-TCA	1MSRV--23-101BC
4	3.66E-007	LERF-25	IE-T7A	1MSRV--C3-101ABC
5	3.66E-007	LERF-25	IE-T7B	1MSRV--C3-101ABC
6	3.66E-007	LERF-25	IE-T7C	1MSRV--C3-101ABC
7	2.39E-007	LERF-24	IE-VX	
8	1.99E-007	LERF-25	IE-T7B	1MSRV--FC-101A 1MSRV--FC-101C
9	1.99E-007	LERF-25	IE-T7A	1MSRV--FC-101B 1MSRV--FC-101C
10	1.99E-007	LERF-25	IE-T7C	1MSRV--FC-101A 1MSRV--FC-101B

If we credit the DHRV as an alternate means of secondary heat removal, it would add an extra basic event to every cutset except #7 in the table above. The additional basic event would reduce the LERF contribution of these cutsets by at least a factor of ten (reflecting the DHRV unavailability of <0.1). This reduction would decrease the top event unavailability by 50%, just due to the improved modeling for these nine cutsets alone. The Risk Achievement Worth for this scenario would also diminish by the same 50%, taking the RAW from 2.9 to below 1.5.

RAI 2:

How long can North Anna Power Station continue to operate at full power if the temperature of the North Anna reservoir exceeds 95 degrees or if the water level of the reservoir falls below 244 feet Mean Sea Level? If the plant cannot operate at full power under the above conditions, can it operate at reduced power and, if so, at what power level?

RESPONSE:

Generally, the ability to operate North Anna Power Station would be impacted if the temperature of the North Anna reservoir exceeded 95°F or if the water level fell below 244 feet Mean Sea Level, due to the effect these two parameters have on condenser performance. Both parameters could affect condenser pressure, and plant procedures require the unit to shut down if condenser pressure is unacceptable. Condenser pressure is not a nuclear safety issue, but it does affect the ability to operate the plant.

If the North Anna Reservoir temperature exceeded 95°F, the increase in main condenser pressure would be the critical parameter of concern. Condenser performance curves indicate that with a Circulating Water (CW) supply temperature of 95°F, pressure is predicted to be in the range of 3.5 to 3.8 inches mercury (Hg), which is below the turbine trip setpoint of 5.5 inches Hg. A Control Room annunciator alarm for low vacuum has a setpoint of approximately 5.0 inches Hg, which is expected to occur when the CW supply temperature increases above 105°F. Abnormal Procedure 1(2)-AP-14, "Low Condenser Vacuum," requires a plant trip when condenser pressure is unacceptable. Also, it should be noted that it is very unlikely that the North Anna Reservoir temperature would exceed 95°F.

If the level in the North Anna Reservoir decreased below 244 feet, the capability to maintain power operation would begin to be challenged. In particular, the lower water level would begin to adversely affect pump submergence and net positive suction head for the various types of pumps located at the CW Intake Structure. The screenwash pumps would be impacted first, as their submergence requirements would not be satisfied if level decreased a few inches below 244 feet. A loss of the screenwash function may ultimately lead to the shutdown of the CW pumps as the differential level increases across the screens. Therefore, it is not expected that the main condenser would be available indefinitely to support plant power operation with level below 244 feet. The time duration that power operation could continue would be dependent on the rate of fouling of the travelling screens. Abnormal Procedure 0-AP-40, "Abnormal Level in North Anna Reservoir (Lake)," would be entered if the level fell below 247 feet. Also, as stated above, 1(2)-AP-14 would require a plant trip when condenser pressure is unacceptable.

Based on the previous discussion, operation of North Anna Power Station would be limited by the impact that the North Anna reservoir temperature and level have on condenser pressure.