VIRGINIA ELECTRIC AND POWER COMPANY
RICHMOND, VIRGINIA 23261

July 25, 2002

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

Serial No. 02-312A
NL&OS/ETS R1
Docket Nos. 50-280
50-338
License Nos. DPR-32
NPF-4

Gentlemen:

VIRGINIA ELECTRIC AND POWER COMPANY
SURRY POWER STATION UNIT 1
NORTH ANNA POWER STATION UNIT 1
REQUEST FOR ADDITIONAL INFORMATION ON
PROPOSED RISK-INFORMED TECHNICAL SPECIFICATIONS CHANGE
FIVE YEAR EXTENSION OF TYPE A TEST INTERVAL

In letters dated October 15, 2001 and December 7, 2001 (Serial Nos. 01-634 and 01-736), Virginia Electric and Power Company (Dominion) requested amendments to Facility Operating License Numbers DPR-32 and NPF-4 in the form of a change to the Technical Specifications for Surry Power Station Unit 1 and North Anna Power Station Unit 1, respectively. The proposed changes will permit a one-time, five-year extension of the ten-year performance-based Type A test interval established in NEI 94-01, "Nuclear Energy Institute Industry Guideline For Implementing Performance-Based Option of 10 CFR Part 50, Appendix J," Revision 0, July 26, 1995. In telephone conference calls on April 26, 2002 and May 28, 2002, the NRC requested additional information to complete the review of the proposed license amendment requests for Surry and North Anna. Responses to the requested information were provided in a letter dated June 28, 2002 (Serial Number 02-312).

In a subsequent telephone conference call on July 19, 2002 regarding the supplemental information provided in the June 28, 2002 letter, the NRC requested information regarding the visual inspections for the containment liner and the containment liner sensitivity analysis. The attachment to this letter provides the requested information to support both Surry and North Anna license amendment requests in the form of revisions to the responses to Questions Four and Five. The additional information is identified with revision bars for your convenience.

A017

Should you have any questions or require additional information, please contact Thomas Shaub at (804) 273-2763.

Very truly yours,

Leslie N. Hartz
Vice President – Nuclear Engineering

Commitments made in this letter: None

Attachment

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

Mr. R. A. Musser
NRC Senior Resident Inspector
Surry Power Station

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

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

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

SN: 02-312A
Docket Nos.: 50-280/338
Subject: RAI – Proposed TS Change
Five Year Extension of Type A Test Interval

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 25th day of July, 2002.

My Commission Expires: March 31, 2004.

Maggie McClure
Notary Public

(SEAL)

Attachment

Request for Additional Information
Proposed Risk-Informed Technical Specifications Change
Five-Year Extension of Type A Test Interval

North Anna Power Station Unit 1
Surry Power Station Unit 1
Virginia Electric and Power Company
(Dominion)

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

Question 4 -
North Anna Liner Corrosion Sensitivity Analysis

Step	Description	Containment Cylinder and Dome 85%	Containment Basemat 15%
1	**Historical Liner Flaw Likelihood** Failure Data: Containment location specific. Success Data: Based on 70 steel-lined Containments and 5.5 years since the 10 CFR 50.55a requirement for periodic visual inspections of containment surfaces.	Events: 2 (Brunswick 2 and North Anna 2) 2/(70 x 5.5) = **5.2E-3**	Events: 0 Assume half a failure 0.5/(70 x 5.5) = **1.3E-3**
2	**Aged Adjusted Liner Flaw Likelihood** During 15-year interval, assumed failure rate doubles every five years (14.9% increase per year). The average for 5th to 10th years was set to the historical failure rate.	Year / Failure Rate 1 / 2.1E-3 avg. 5-10 / 5.2E-3 15 / 1.4E-2 **15 year avg. = 6.27E-3**	Year / Failure Rate 1 / 5.0E-4 avg. 5-10 / 1.3E-3 15 / 3.5E-3 **15 year avg. = 1.57E-3**
3	**Increase in Flaw Likelihood Between 3 and 15 years** Uses age adjusted liner flaw likelihood (Step 2), assuming failure rate doubles every five years.	**8.7%**	**2.2%**
4	**Likelihood of Breach in Containment Given Liner Flaw** The upper end pressure is consistent with the Calvert Cliffs Probabilistic Risk Assessment (PRA) Level 2 analysis. 0.1% is assumed for the lower end. Intermediate failure likelihood is determined through logarithmic interpolation. The basemat is assumed to be 1/10 of the cylinder/dome analysis. The same value will be used for NAPS as was used for CCNP since it is considered to be conservative based on SPS fragility curves.	Pressure (psia) / Likelihood of Breach 20 / 0.1% 64.7 (ILRT) / 1.1% 100 / 7.02% 120 / 20.3% 150 / 100.0%	Pressure (psia) / Likelihood of Breach 20 / 0.01% 64.7 (ILRT) / 0.11% 100 / 0.7% 120 / 2.0% 150 / 10.0%
5	**Visual Inspection Detection Failure Likelihood**	**10%**[1]	**100%** Cannot be visually inspected
6	**Likelihood of Non-Detected Containment Leakage (Steps 3*4*5)**	8.7% x 1.1% x 10% =**.0096%**	2.2% x 0.11% x 100% =**.0024%**
7	The total likelihood of the corrosion-induced, non-detected containment leakage is the sum of Step 6 for the containment cylinder and dome and the containment basemat.	0.0096%+ 0.0024% =**0.012%**	
8	**The Non-Large Early Release Frequency (non-LERF)**[2]	**3.50E-5/yr**	
9	**Increase in LERF (ILRT 3/10 to 1/15 years)**	0.00012 x 3.50E-5 = **4.20E-9/yr**	

[1]5% failure to identity visual flaws plus 5% likelihood that the flaw is not visible (not through-cylinder but could be detected by ILRT). To date all events have been detected through visual inspection. 5% visible failure detection is a conservative assumption.

[2]For this sensitivity analysis, it is conservatively assumed that the non-LERF frequency is equal to the total CDF (3.78E-5/yr). Typically, the release category binning process would be used to calculate the non-LERF frequency by subtracting the frequency of all the core damage events that result in LERF from the core damage frequency to avoid double counting. But, it is conservative and efficient to simply use the total CDF here.

NRC Question 5:

An alternate method to assess the change in risk in terms of Large Early Release Frequency (LERF) is to consider the total change in LERF from the baseline case to the proposed case. Please provide this assessment for North Anna.

Response:

As requested, the alternative approach is presented. The baseline LERF is 7.35E-7/yr and for the proposed test extension to 1-in-15 year the LERF is 8.45E-7/yr. The change in LERF is:

$$\Delta LERF = 8.45E\text{-}7 - 7.35E\text{-}7 = 1.10E\text{-}7/yr.$$

The North Anna containment integrity is inspected regularly. As discussed in the response to RAI number 4, the liner is inspected (IWE) and the exterior concrete is inspected (IWL) at about three year intervals. A coatings inspection is performed during each refueling outage. As a result, visual inspections insure containment integrity with a greater frequency than the baseline Type A test interval. Assuming these visual inspections in sum provide the same assurance of containment integrity as the Type A test there should be no increase in the LERF frequency due to the extended interval. However, a section of the liner is below the basemat and there are areas above the basemat that are obstructed. As a result, a percentage of the containment area could be subject to increased leakage due to the longer interval between Type A tests.

The area of the interior surface of the containment liner has been calculated using dimensions from plant drawings. Approximately 85% of the interior surface area of the containment liner is visible. The accessible portions of the interior surface of the containment liner are inspected regularly as discussed in the above paragraph. The next scheduled IWE containment liner inspection for Unit 1 is during the Spring 2003 refueling outage. Thus, the effective change in LERF in going from the ILRT to a visual inspection is calculated based on the fraction of the interior surface area not visible:

$$\Delta LERF = 0.15 \times (1.10E\text{-}7) = 1.65E\text{-}8/yr.$$

The change in LERF from the 3-in-10 year interval to the 1-in-15 year interval is small and is below the Regulatory Guide 1.174 limit of 1E-7/yr. Therefore, the change is acceptable.

Surry Power Station Unit 1
Virginia Electric and Power Company
(Dominion)

Question 4 -
Surry Liner Corrosion Sensitivity Analysis

Step	Description	Containment Cylinder and Dome 85%	Containment Basemat 15%
1	**Historical Liner Flaw Likelihood** Failure Data: Containment location specific. Success Data: Based on 70 steel-lined Containments and 5.5 years since the 10 CFR 50.55a requirement for periodic visual inspections of containment surfaces.	Events: 2 (Brunswick 2 and North Anna 2) 2/(70 x 5.5) = **5.2E-3**	Events: 0 Assume half a failure 0.5/(70 x 5.5) = **1.3E-3**
2	**Aged Adjusted Liner Flaw Likelihood** During 15-year interval, assumed failure rate doubles every five years (14.9% increase per year). The average for 5th to 10th years was set to the historical failure rate.	<u>Year</u> <u>Failure Rate</u> 1 2.1E-3 avg. 5-10 5.2E-3 15 1.4E-2 **15 year avg. = 6.27E-3**	<u>Year</u> <u>Failure Rate</u> 1 5.0E-4 avg. 5-10 1.3E-3 15 3.5E-3 **15 year avg. = 1.57E-3**
3	**Increase in Flaw Likelihood Between 3 and 15 years** Uses aged adjusted liner flaw likelihood (Step 2), assuming failure rate doubles every five years.	**8.7%**	**2.2%**
4	**Likelihood of Breach in Containment Given Liner Flaw** The upper end pressure is consistent with the Calvert Cliffs Probabilistic Risk Assessment (PRA) Level 2 analysis. 0.1% is assumed for the lower end. Intermediate failure likelihood is determined through logarithmic interpolation. The basemat is assumed to be 1/10 of the cylinder/dome analysis. The same value will be used for SPS as was used for CCNP since it was considered to be conservative based on Surry fragility curves.	Pressure (psia) — Likelihood of Breach 20 — 0.1% 64.7 (ILRT) — 1.1% 100 — 7.02% 120 — 20.3% 150 — 100%	Pressure (psia) — Likelihood of Breach 20 — 0.01% 64.7 (ILRT) — 0.11% 100 — 0.7% 120 — 2.0% 150 — 10.0%
5	**Visual Inspection Detection Failure Likelihood**	**10%**[1]	**100%** Cannot be visually inspected
6	**Likelihood of Non-Detected Containment Leakage (Steps 3*4*5)**	8.7% x 1.1% x 10%=**.0096%**	2.2% x 0.11% x 100%=**.0024%**
7	The total likelihood of the corrosion-induced, non-detected containment leakage is the sum of Step 6 for the containment cylinder and dome and the containment basemat.	0.0096% + 0.0024% =**0.012%**	
8	**The Non-Large Early Release Frequency (non-LERF)**[2]	**3.78E-5/yr**	
9	**Increase in LERF (ILRT 3/10 to 1/15 years)**	0.00012 x 3.78E-5 = **4.54E-9/yr**	

[1]5% failure to identify visual flaws plus 5% likelihood that the flaw is not visible (not through-cylinder but could be detected by ILRT). To date all events have been detected through visual inspection. 5% visible failure detection is a conservative assumption.

[2]For this sensitivity analysis, it is conservatively assumed that the non-LERF frequency is equal to the total CDF (3.78E-5/yr). Typically, the release category binning process would be used to calculate the non-LERF frequency by subtracting the frequency of all the core damage events that result in LERF from the core damage frequency to avoid double counting. But, it is conservative and efficient to simply use the total CDF here.

NRC Question 5

An alternate method to assess the change in risk in terms of Large Early Release Frequency (LERF) is to consider the total change in LERF from the baseline case to the proposed case. Please provide this assessment for Surry.

Response:

As requested, the alternative approach is presented. The baseline LERF is 7.94E-7/yr and for the proposed test extension to 1-in-15 year the LERF is 9.13E-7/yr. The change in LERF is:

ΔLERF = 9.13E-7 – 7.94E-7 = 1.19E-7/yr.

The Surry containment integrity is inspected regularly. As discussed in the response to RAI number 4, the liner is inspected (IWE) and the exterior concrete is inspected (IWL) at about three year intervals. A coatings inspection is performed during each refueling outage. As a result, visual inspections insure containment integrity with a greater frequency than the baseline Type A test interval. Assuming these visual inspections in sum provide the same assurance of containment integrity as the Type A test there should be no increase in the LERF frequency due to the extended interval. However, a section of the liner is below the basemat and there are areas above the basemat that are obstructed. As a result, a percentage of the containment area could be subject to increased leakage due to the longer interval between Type A tests.

The area of the interior surface of the containment liner has been calculated using dimensions from plant drawings. Approximately 85% of the interior surface area of the containment liner is visible. The accessible portions of the interior surface of the containment liner are inspected regularly as discussed in the above paragraph. The next scheduled IWE containment liner inspection for Unit 1 is during the Spring 2003 refueling outage. Thus, the effective change in LERF in going from the ILRT to a visual inspection is calculated based on the fraction of the interior surface area not visible:

ΔLERF = 0.15 x (1.19E-7) = 1.79E-8/yr.

The change in LERF from the 3-in-10 year interval to the 1-in-15 year interval is small and is below the Regulatory Guide 1.174 limit of 1E-7/yr. Therefore, the change is acceptable.