VIRGINIA ELECTRIC AND POWER COMPANY
RICHMOND, VIRGINIA 23261

November 19, 2001

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

Serial No.	01-037B
NLOS/GDM	R1
Docket Nos.	50-280, 281
License Nos.	DPR-32, 37

Gentlemen:

VIRGINIA ELECTRIC AND POWER COMPANY
SURRY POWER STATION UNITS 1 AND 2
RESPONSE TO REQUEST FOR ADDITIONAL INFORMATION
ALTERNATE SOURCE TERM - PROPOSED TECHNICAL SPECIFICATION CHANGE

In a letter dated April 11, 2000 (Serial No. 00-123), Virginia Electric and Power Company (Dominion) submitted a license amendment request for implementation of the Alternate Source Term (AST) as the plant design and licensing bases for Surry Power Station Units 1 and 2. Supplemental responses to NRC requests for additional information were provided on August 28 and November 20, 2000 and April 11 and July 31, 2001.

A conference call was held with the NRC staff on October 24, 2001 to address additional questions that had been provided by the Surry NRC Project Manager, Gordon Edison, on October 19, 2001. At the conclusion of the conference call, Dominion agreed to provide additional information to the NRC to facilitate the staff's continued review of the AST license amendment request. This information is provided in the attachment. Also, as discussed during the conference call noted above and in a subsequent conference call held on November 6, 2001, it was agreed that further discussion of the postulated effluent release pathways in the Turbine Building would not be included in this response, but would be addressed separately if required.

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

Very truly yours,

Leslie N. Hartz
Vice President – Nuclear Engineering

Enclosure

Commitments made in this letter: None

A001

cc: U.S. Nuclear Regulatory Commission
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Mr. R. A. Musser
NRC Senior Resident Inspector
Surry Power Station

SN: 01-037B
Docket Nos.: 50-280;281
Subject: RAI - AST - Proposed TS Change

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 19th day of November, 2001.

My Commission Expires: March 31, 2004.

Maggie McClure
Notary Public

(SEAL)

ENCLOSURE

Response to NRC Request for Additional Information
Alternate Source Term

Surry Power Station Units 1 and 2

Dominion

RESPONSE TO REQUEST FOR ADDITIONAL INFORMATION
ALTERNATE SOURCE TERM TECHNICAL SPECIFICATION CHANGE
SURRY POWER STATION UNITS 1 AND 2

NRC Question 1
What are the specific release location/receptor pairings for each set of X/Q values used in the dose assessment now that it is assumed that the Turbine Building fresh air louvers will not be potential intake locations? What inputs and assumptions were used in making the estimates? What is the basis for their selection?

Response
The release location/receptor pairs used in the dose assessment are as follows:

RELEASE LOCATION	RECEPTOR LOCATION
Unit 1 Containment	Turbine Building Fresh Air Intake Pit #1
Ventilation Vent #2	Turbine Building Fresh Air Intake Pit #2
Ventilation Vent #2	Turbine Building Roll Up Door #2
Auxiliary Building East Louvers	Turbine Building Roll Up Door #2
Auxiliary Building East Louvers	Turbine Building Fresh Air Intake Pit #2

The assumptions used in the ARCON96 X/Q dose analysis are unchanged from those provided in Question No. 7 on Page 7 of the enclosure to Reference 1.

The basis for the selection of the X/Q values computed for the above release location/receptor pairs was that they were the largest values of all the release location/receptor pairs considered, after accounting for the completion of portions of a design change that terminates operation of Turbine Building non-safety related fans upon automatic (i.e., on a safety injection signal) or manual isolation of the control room. Securing the Turbine Building supply fans closes the louvers that were previously used as receptor points for control room dose calculations. Therefore, the Turbine Building fresh air louvers were no longer assumed to be entry points for outside air.

During the October 24, 2001 teleconference, the NRC also requested the distances assumed for the X/Q calculated between the Unit 1 Containment and the fresh air pits and roll up doors. The distances modeled are from the closest point on the containment to the receptor location. The specific distances were previously provided in Attachment 3 to Question No. 7 of the enclosure to Reference 1.

NRC Question 2
In Section 3 of Attachment 1 (page 19) *(of Reference 2),* you stated that the exclusion area boundary (EAB) doses are calculated for the worst 2 hour periods. State the worst 2-hour periods for the containment leak, ECCS leak and the RWST release pathways.

Response

The worst 2-hour period for each of the separate release pathways modeled is indicated below. Attachment 1 provides additional detail of the time dependence for calculated dose from each of these pathways from which the overall worst 2-hour period can be confirmed.

Emergency Core Cooling System (ECCS)	0.639 – 2.639 hours
Refueling Water Storage Tank (RWST)	2.5 – 4.5 hours
Containment	0.194 – 2.194 hours
Overall worst 2-hour dose	0.5 – 2.5 hours

NRC Question 3

State EAB X/Q values used for the dose calculations. Did you use the EAB X/Q values listed in Table 3.2-4 on page 56 in determining the worst 2-hour dose? (We could not match your calculated worst 2-hour EAB dose for the RWST release.)

Response

The 0 to 2-hour Exclusion Area Boundary (EAB) X/Q is 4.61E-3 sec/m^3 and can be found in Table 1.3-1 on page 12 of Attachment 1 to Reference 2. This value was used for all time-steps to determine the EAB worst 2-hour dose for the Containment, ECCS, and RWST contributions to the Loss of Coolant Accident (LOCA). The EAB X/Q values in Table 3.2-4 on page 56 of Attachment 1 to Reference 2 were only used in the Fuel Handling Accident (FHA) for time periods after 2 hours from the start of the accident. However, since no benefit is achieved from using the EAB X/Q values from Table 3.2-4 due to the release being completed within the first two hours after initiation of the FHA, Dominion proposes to delete the EAB X/Q values from Table 3.2-4 for clarity. A revised page 56 has been included in Attachment 2.

NRC Question 4

State the control room air intake X/Q values used for the RWST release pathway. They are not listed in Table 3.1-7 on page 37.

Response

The ECCS leakage X/Q's listed in Table 3.1-7 on page 37 of Attachment 1 to Reference 2 were used for both the RWST and ECCS release pathways of the LOCA. This use of a common X/Q is justified, but not explicitly stated, by the discussion on page 34 of Attachment 1 to Reference 2. Following a LOCA, the RWST free volume would be under suction from the safety related fans through the Safeguards Building and out Ventilation Vent No. 2, which is the same release point modeled for the ECCS pathway.

NRC Question 5
Table 3.2-4 on page 56 listed decontamination factors (DFs) for elemental and organic iodines for the FHA. What was the overall effective DF? The table also lists the control room X/Q values for the equipment hatch, personnel airlock, and fuel building purge. Which values did you use for the control room dose calculations?

Response
The DFs used in the FHA analysis are 500 for elemental iodine and 1 for organic iodine as indicated in Table 3.2-4. The overall effective DF is not utilized in the LOCADOSE code. Dominion has calculated the effective DF, using the iodine composition of 99.85% elemental and 0.15% organic, as follows:

Effective DF = 1 / (0.9985/500 + 0.0015) = 286

This results in 99.65% of the iodine retained in the pool and a release above the pool surface that is 57% elemental iodine and 43% organic iodine. The overall effective DF and the percentage of iodine retained in the pool are not consistent with the values provided in Appendix B of RG-1.183 (200 and 99.5%, respectively). However, the values used to determine the effective DF and the resulting composition of the iodine release above the pool are consistent with Appendix B of RG-1.183.

The X/Q values in Table 3.2-4 of Attachment 1 to Reference 2 were considered in sensitivity studies to determine the maximum control room dose consequences. The limiting FHA control room dose consequences were obtained using the X/Qs associated with the personnel airlock, which correspond to a release through louvers on the 45-ft elevation of the Auxiliary Building.

NRC Question 6
An additional item discussed during the October 24, 2001 teleconference were the assumptions associated with the filtration of the auxiliary ventilation system as discussed on page 35 of Attachment 1 to Reference 2.

Response
The auxiliary ventilation system filters were assumed to be 0% efficient as stated on page 35 and in Table 3.1-7 of Attachment 1 to Reference 2. The text on page 35 also refers to Revision 0 of the alternate source term analysis report in which the auxiliary building ventilation system's ventilation and filtration functions were credited (without stipulating filter efficiency) to preclude including the effects of a passive failure in the design basis. This statement appeared to take credit for filtration and created some confusion concerning whether any filtration was actually assumed in the Revision 1 analysis. However, no credit is assumed for filtration, since RG 1.183 does not require consideration of a passive failure. Pages 35 and 36 of Attachment 1 to Reference 2 have been revised to clarify this point and are included in Attachment 2.

References:

1. Letter, W. R. Matthews to USNRC, "Surry Power Station Units 1 and 2, Request for Additional Information, Alternate Source Term-Proposed Technical Specification Change," Serial No. 00-123B, dated November 20, 2000.

2. Letter, Eugene S. Grecheck to USNRC, "Surry Power Station Units 1 and 2, Response to Request for Additional Information, Alternate Source Term-Proposed Technical Specification Change," Serial No. 01-037A, dated July 31, 2001.

ATTACHMENT 1

Worst Case 2 Hour EAB Doses With 0-2 Hour X/Q for All Time Steps for RWST, Containment and ECCS Releases

Surry Power Station Units 1 and 2

Dominion

RWST worst case 2 hour EAB doses with 1000 cfm RWST exhaust, RWST holdup, release from ventilation vent #2, & 0-2 hour X/Q for all time steps.

Time Interval (hr)		Effective Inhalation	Effective Immersion	Total	dose rate for period
From	to	Rem CEDE	Rem DDE	Rem TEDE	Rem / hr
0	0.5	0.00E+00	0.00E+00	0	0.00
0.5	0.639	0.00E+00	0.00E+00	0	0.00
0.639	1	9.44E-02	1.03E-02	0.10467	0.29
1	2	8.69E-01	7.79E-02	0.94661	0.95
2	2.5	5.97E-01	4.49E-02	0.64144	1.28
2.5	8	7.36E+00	3.63E-01	7.7197	1.40
8	24	9.91E+00	4.70E-01	10.3785	0.65
24	96	4.22E+01	6.36E-01	42.856	0.60
96	720	1.19E+02	1.08E+00	119.779	0.19

Time Interval (hr)	Rem TEDE
0.194-2.194	1.30
0.5-2.5	1.69
0.639 - 2.639	1.89
2.5-4.5	2.81

Containment worst case 2 hour EAB doses with 0-2 hour X/Q for all time steps.

Time Interval (hr)		Effective Inhalation	Effective Immersion	Total	dose rate for period
From	to	Rem CEDE	Rem DDE	Rem TEDE	Rem / hr
0	2.78E-02	1.08E-02	2.31E-03	0.013097	0.47
2.78E-02	6.00E-02	3.83E-02	8.12E-03	0.046414	1.44
6.00E-02	0.115	1.17E-01	2.48E-02	0.14145	2.57
0.115	0.194	2.41E-01	5.17E-02	0.29226	3.70
0.194	0.5	1.46E+00	3.17E-01	1.7728	5.79
0.5	1	7.91E+00	1.85E+00	9.758	19.52
1	1.14	6.79E-01	1.69E-01	0.8473	6.05
1.14	1.8	4.09E+00	1.05E+00	5.132	7.78
1.8	1.9	6.26E-01	1.69E-01	0.7955	7.96
1.9	2	5.40E-01	1.49E-01	0.6892	6.89
2	2.33	1.47E+00	4.08E-01	1.8795	5.70
2.33	2.51	6.41E-01	1.84E-01	0.8252	4.58
2.51	4	3.28E+00	1.07E+00	4.35	2.92
4	4.38	0.00E+00	0.00E+00	0	0.00
4.38	6	0.00E+00	0.00E+00	0	0.00
6	6.48	0.00E+00	0.00E+00	0	0.00
6.48	8	0.00E+00	0.00E+00	0	0.00
8	24	0.00E+00	0.00E+00	0	0.00
24	96	0.00E+00	0.00E+00	0	0.00
96	720	0.00E+00	0.00E+00	0	0.00

Time Interval (hr)	Rem TEDE
0.194-2.194	20.10
0.5-2.5	19.93
0.639 - 2.639	17.59
2.5-4.5	4.35

ECCS worst case 2 hour EAB doses with 0-2 hour X/Q for all time steps.

Time Interval (hr)		Effective Inhalation	Effective Immersion	Total	dose rate for period
From	to	Rem CEDE	Rem DDE	Rem TEDE	Rem / hr
0	0.115	0.00E+00	0.00E+00	0.00	0.00
0.115	0.333	5.24E-02	7.22E-03	0.06	0.27
0.333	0.5	4.00E-02	5.12E-03	0.05	0.27
0.5	0.639	3.31E-02	4.02E-03	0.04	0.27
0.639	1	4.24E-01	4.73E-02	0.47	1.31
1	2	1.16E+00	1.06E-01	1.27	1.27
2	2.5	5.72E-01	4.31E-02	0.62	1.23
2.5	8	6.01E+00	2.98E-01	6.31	1.15
8	24	7.93E+00	3.76E-01	8.30	0.52
24	96	3.38E+01	5.09E-01	34.29	0.48
96	720	9.50E+01	8.63E-01	95.88	0.15

Time Interval (hr)	ECCS Rem TEDE	Containment Rem TEDE	RWST Rem TEDE	Total Rem TEDE
0.194-2.194	2.10	20.10	1.30	23.50
0.5-2.5	2.39	19.93	1.69	24.01
0.639 - 2.639	2.51	17.59	1.89	21.99
2.5-4.5	2.29	4.35	2.81	9.45

ATTACHMENT 2

Revised Replacement Pages 35, 36 and 56
for Inclusion in Attachment 1 to the Virginia Electric and Power Company Letter
dated 7/31/01 (Serial No. 01-037A)

Surry Power Station Units 1 and 2

Dominion

auxiliary nuclear equipment for both units. Equipment handling potentially radioactive fluids is located on the lower three levels, isolated and shielded as required. The upper level is a ventilation equipment room.

Within the auxiliary building, three iodine filter assemblies, two safety-related and one non-safety-related, are provided. Each filter bank consists of roughing, HEPA and charcoal filters. Two safety-related, high-head fans, sized to draw 36,000 cfm each from emergency core cooling system (ECCS) equipment areas through the safety-related filters, are provided. The auxiliary ventilation system exhaust serving the following components is directed through the safety-related filters following a safety injection signal: charging pumps (in cubicles within the auxiliary building), recirculation spray system and low head safety injection pumps (in the safeguards area). Exhaust to the atmosphere is through a common, continuously monitored ventilation vent (Ventilation Vent no. 2) located on the roof of the auxiliary building.

The safety-related filters are designed to provide for removal of elemental and organic iodine that is assumed to evolve from ECCS leakage following a LOCA. The assumed ECCS leakage following a LOCA is provided on Table 3.1-7. As indicated on the table, the leakage that is modeled includes the backleakage into the RWST described in the previous section.

The LOCA analysis model for AST implementation assumes 0% efficiency for the safety-related filters in removing iodine assumed to evolve from the 9600 cc/hr analyzed ECCS leakage. The analysis does credit the general function of the auxiliary ventilation system for providing ventilation of the air in the vicinity of the charging pump cubicle and Safeguards Area. Filtration was previously assumed in Revision 0 of this report in order to maintain the current licensing basis of not including the leakage from a passive failure (e.g., pump seal). It is no longer necessary to accommodate the effects of a passive failure in radiological analyses, per the guidance in Appendix A of RG-1.183. Implementation of the AST allows the Surry licensing basis to be revised such that an ECCS passive failure is no longer postulated, and its direct or indirect effects need not be considered. The Technical Specifications LCOs for operability of the auxiliary ventilation safety-related filters are maintained for initial implementation of the AST, but may be considered for future deletion.

There are a number of additional assumptions and key input parameter values assumed in the analysis of the LOCA cases. Table 3.1-7 presents the most significant of these that are unique to the LOCA analysis for AST implementation.

Table 3.2-4
Analysis Assumptions & Key Parameter Values
Employed Only in Fuel Handling Accident Analysis

<u>Containment Parameters</u>	
Release Flowrate (0 – 720 hours)	2,000 – 36,000 cfm [1]
Free Volume (for holdup; 50% of total)	9.315E5 ft^3
<u>Core and Fuel Assembly Characteristics</u>	
Number of Fuel Assemblies in Core	157
Maximum Fuel Assembly Radial Peaking Factor	1.62, 1.62, 1.188 [2]
Assumed Iodine Physical Form In Gap	99.85% elemental 0.15% organic

<u>MCR Atmospheric Dispersion Factors</u>

	Equipment Hatch	Personnel Airlock	Fuel Building/Purge
0 –2 hour	6.74E-4 sec/m^3	1.07E-3 sec/m^3	6.97E-4 sec/m^3
2 – 8 hour	5.18E-4 sec/m^3	9.03E-4 sec/m^3	5.43E-4 sec/m^3
8 – 24 hours	2.22E-4 sec/m^3	3.87E-4 sec/m^3	2.31E-4 sec/m^3
24 – 96 hours	1.66E-4 sec/m^3	2.73E-4 sec/m^3	1.71E-4 sec/m^3
96 – 720 hours	1.20E-4 sec/m^3	1.87E-4 sec/m^3	1.22E-4 sec/m^3

<u>Miscellaneous</u>	
Decontamination Factor – Elemental Iodine	500
Decontamination Factor – Organic Iodine	1
Minimum Depth of Water Over Fuel	23 feet
Fuel Building Free Volume (for holdup)	1.11E5 ft^3
Fuel Building Release Flowrate (0 – 720 hours)	3,500 - 80,000 cfm[1]
<u>Key Operator Actions</u>	<u>Timing of Action</u>
Discharge Air Bottles/Isolate MCR Upon Indication of FHA	Prior to MCR Intake of Contaminated Air

[1] Release flowrates are assumed to be constant for the duration of the event. Dose consequences bound expected results from all credible flow combinations.
[2] Values are for once, twice and thrice-burned assemblies