VIRGINIA ELECTRIC AND POWER COMPANY
RICHMOND, VIRGINIA 23261

December 20, 2001

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

Serial No. 01-037C
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, July 31 and November 19, 2001.

Conference calls were held with the NRC staff on October 24, November 6 and November 21, 2001 to address additional questions that had been provided by the Surry NRC Project Manager, Gordon Edison. These questions were addressed in our earlier submittal dated November 19, 2001 (Serial No. 01-037B) with the exception of one outstanding question associated with the postulated effluent release pathways into the Turbine Building. During the November 21, 2001 conference call, Dominion responded to this remaining question and agreed to provide the NRC a written response as well. We also agreed to address an additional question the NRC raised during the conference call in this supplemental letter. This information is provided in the enclosure to this letter to facilitate the NRC staff's continued review of Dominion's AST license amendment request.

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

Very truly yours,

Leslie N. Hartz
Vice President – Nuclear Engineering

Enclosure

A001

Commitments made in this letter: None

cc: U.S. Nuclear Regulatory Commission
Region II
Sam Nunn Atlanta Federal Center
61 Forsyth Street, S.W.
Suite 23 T85
Atlanta, Georgia 30303-8931

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

SN: 01-037C
Docket Nos.: 50-280/281
Subject: RAI – Alternate Source Term – 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 20th day of December, 2001.

My Commission Expires: March 31, 2004.

Notary Public

(SEAL)

ENCLOSURE

Supplemental Information Discussed in 11/21/01 Teleconference Between Dominion and NRC Staff

Surry Power Station Units 1 and 2

Dominion

Supplemental Information Discussed in 11/21/01 Teleconference Between Dominion and NRC Staff

In teleconferences conducted on October 24, November 6 and November 21, 2001, Virginia Electric and Power Company (Dominion) and NRC Staff held detailed discussions concerning the modeling of pathways for effluents to enter the Turbine Building and the Main Control Room emergency air intakes following a LOCA. The discussions involved the potential for isolated pathways to allow some effluent into the Turbine Building and the impact of these potential pathway leaks upon the calculated Main Control Room dose. In the November 21 teleconference, Dominion presented an approach that involves modeling the contribution of all identified pathways into the Turbine Building (ten locations) on an equivalent basis, dependent only upon the relative flow area of each pathway. The equivalent weighting approach conservatively accounts for the contribution from "closed" pathways by exaggerating their relative contribution to effluents drawn into the Turbine Building. The results of this evaluation demonstrated that the dose as modeled and reported in Dominion's July 31, 2001 submittal bounds the dose associated with the equivalent weighting approach. The following discussion documents the evaluation Dominion has performed to investigate the impact of these potential pathways.

The control room emergency air intakes are within the Turbine Building air volume and are not exposed directly to the outside air or wind. All air entering the control room via the emergency air intakes is drawn from the Turbine Building air volume. All major openings in the Turbine Building were initially considered in the calculation of the atmospheric dispersion factors with ARCON96. The recent implementation of a station modification now terminates the operation of the Turbine Building non-safety related fans upon automatic or manual isolation of the control room. Securing the Turbine Building supply fans closes the fresh air louvers on the north face of the Turbine Building that were previously used as receptors for control room dose calculations. The closure of the fresh air louvers is accomplished mechanically by the action of a spring, which then holds the louvers closed. Wind pressure on the face of the louvers will also tend to press the louvers closed.

Based upon the closure of the fresh air louvers, the Unit 1 and Unit 2 rollup doors and fresh air intakes from the south and west faces of the Turbine Building were considered as receptors for the control room. This was deemed to remain conservative for the following reasons: 1) closure of the fresh air louvers would reduce flow through the louvers to negligible quantities, 2) the calculation of the atmospheric dispersion factors for the Unit 1 and Unit 2 rollup doors and fresh air intakes used a straight line distance from the source to the receptor through the Turbine Building and did not consider that the effluent plume would have to travel either over or around the Turbine Building, and 3) the dose consequences did not take credit for the dilution effect of the Turbine Building volume (8.0E6 ft^3). NRC staff questions indicated that a more detailed assessment of the impact of potential leakage into the Turbine Building through the fresh air louvers was desired to demonstrate that the control room dose consequences

reported in the revised Alternate Source Term (AST) Analysis Report (Attachment 1 to Reference 1) remain bounding.

Attachment 1 to this enclosure is a simplified site plan of Surry Power Station that indicates the sources and receptors considered in the calculation of control room atmospheric dispersion factors. The Unit 1 Containment (S1) and Ventilation Vent No. 2 (V2) are the limiting sources for the Loss of Coolant Accident (LOCA). The Auxiliary Building 45-foot elevation east (S4) and west (S3) louvers are the limiting sources for the Fuel Handling Accident (FHA). Using the aforementioned sources, this detailed assessment involved the following:

1) Use of the existing ARCON96 X/Q values for the fresh air louvers designated as receptors L1, L2, and L3.

2) Calculation of ARCON96 X/Q values for three new receptors, fresh air louvers designated as L4, L5, and L6, which were previously deemed to be less limiting than L1 through L3.

3) Recalculation of ARCON96 X/Q values including the minimum extra distance required for effluent to travel either over or around the Turbine Building for the Unit 1 and Unit 2 rollup doors and fresh air intakes, designated as receptors D1, D2, R6 and R7, respectively.

The relative airflow into the Turbine Building is assumed to be proportional to the surface area of the modeled receptors. This approach allows the flow area of each receptor to be used as a weighting factor to determine the relative flow contribution of each receptor. This was applied numerically in the following steps:

1) Calculate the surface area of each receptor (neglecting louvers, grating, etc.).

2) Multiply the ARCON96 X/Q of each receptor by [receptor surface area / total receptor surface area].

3) Sum the separate adjusted X/Qs to obtain the Turbine Building surface area weighted average X/Q.

4) Repeat Steps 1 through 3 for each X/Q time step.

The results of these surface area weighted X/Q calculations are found in Tables 1 through 4, located in Attachment 2, for sources S1, V2, S3 and S4, respectively. Table 1 indicates a slight increase in the S1 X/Qs as compared to the values used in Attachment 1 to Reference 1 with the exception of the 2-8 hour time period. The control room dose consequences impact of the slight increase in the S1 X/Q was investigated and it was determined that the control room dose consequences as reported in Attachment 1 to Reference 1 remain bounding. Tables 2, 3 and 4 indicate slight decreases in the V2, S3 and S4 X/Qs as compared to the values used in Attachment 1 of Reference 1, which would result in a slight decrease to the control room dose consequences.

The NRC asked an additional question during the November 21, 2001 teleconference which is provided and responded to below:

The following is stated on p. 47 of the revised AST Analysis Report (Attachment 1 to Reference 1):

> *"Dominion will ensure that future Surry core designs continue to be bounded by the key parameter values used in determining these fission gas gap fraction results."*

Please define what the key parameter values are and specifically whether any reanalysis of the core inventory with ORIGEN2 is anticipated for reload cores.

Response:

Section 3.2.2.4 of the revised AST Analysis Report describes the time-average linear heat generation rate (LHGR) as the key fuel rod parameter affecting fission gas release for use in the Fuel Handling Accident analysis. The specific key parameter modeled is the time-average LHGR after 3 cycles of irradiation, calculated assuming assembly average rod powers. The stated commitment involves confirming that the cycle-specific LHGR values, defined in the above fashion, will result in fission gas gap fractions less than or equal to the following values used in the FHA analysis:

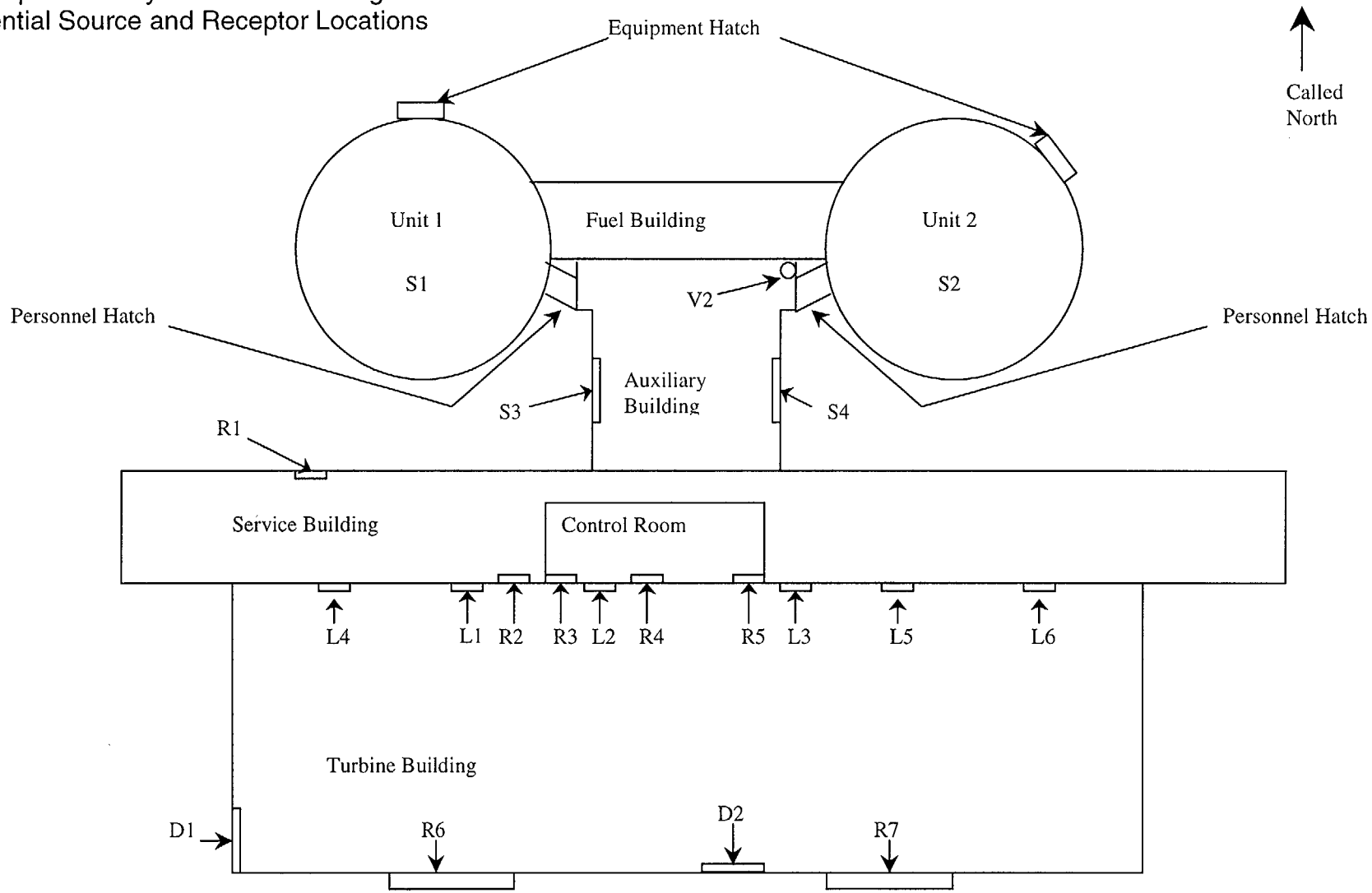
Once-Burned Gap Fraction =	3.0%
Twice-Burned Gap Fraction =	5.35%
Thrice-Burned Gap Fraction =	6.0%

Since various combinations of assembly rod power and burnup history can satisfy this condition, the constraint is specified in terms of LHGR and associated fission gas gap fractions. Dominion will confirm, during the course of performing reload design calculations for the Surry cores, that all fuel assembly locations satisfy this requirement. Reanalysis of the core inventory with ORIGEN2 is **not** anticipated for reload cores.

References:

1. 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 7/31/01.

A Simplified Surry Site Plan Including
Potential Source and Receptor Locations



Legend

Source		Receptor	
S1	Unit 1 Containment	D1, D2	Rollup Doors 1 and 2
S2	Unit 2 Containment	L1 through L6	Turbine Building Fresh Air Louvers 1 through 6
S3	Auxiliary Building West Louver	R1	Control Room Normal Intake
S4	Auxiliary Building East Louver	R2 through R5	Control Room Emergency Intakes
V2	Ventilation Vent No. 2	R6, R7	Turbine Building Fresh Air Intakes

Table 1: Unit 1 Containment (S1)

Turbine Building Inlet Points	Dimensions of Inlet Point (ft)	Area of Inlet Point (ft^2)	Fraction of Total Area	ARCON96 X/Q (seconds / m^3)					Surface Area weighted X/Q (seconds / m^3)				
				0 - 2 hr	2 - 8 hr	8 - 24 hr	1 - 4 days	4 -30 days	0 - 2 hr	2 - 8 hr	8 - 24 hr	1 - 4 days	4 - 30 days
Louver 1	20 X 12	240	0.053878	2.19E-03	1.69E-03	7.19E-04	5.62E-04	4.03E-04	1.18E-04	9.11E-05	3.87E-05	3.03E-05	2.17E-05
Louver 2	14.5 X 15.5	224.75	0.050455	1.72E-03	1.31E-03	5.56E-04	4.33E-04	3.13E-04	8.68E-05	6.61E-05	2.81E-05	2.18E-05	1.58E-05
Louver 3	14.5 X 15.5	224.75	0.050455	1.20E-03	8.71E-04	3.71E-04	2.88E-04	2.13E-04	6.05E-05	4.39E-05	1.87E-05	1.45E-05	1.07E-05
Louver 4	20 X 12	240	0.053878	1.74E-03	1.23E-03	5.65E-04	3.68E-04	2.91E-04	9.37E-05	6.63E-05	3.04E-05	1.98E-05	1.57E-05
Louver 5	20 X 12	240	0.053878	6.53E-04	4.49E-04	1.94E-04	1.41E-04	1.04E-04	3.52E-05	2.42E-05	1.05E-05	7.60E-06	5.60E-06
Louver 6	20 X 12	240	0.053878	4.49E-04	2.96E-04	1.29E-04	8.99E-05	6.57E-05	2.42E-05	1.59E-05	6.95E-06	4.84E-06	3.54E-06
Rollup Door 1	20 X 18	360	0.080817	5.30E-04	3.74E-04	1.71E-04	1.16E-04	8.93E-05	4.28E-05	2.72E-05	1.38E-05	9.37E-06	7.22E-06
Rollup Door 2	20 X 18	360	0.080817	4.15E-04	3.22E-04	1.35E-04	1.05E-04	7.53E-05	3.35E-05	2.60E-05	1.09E-05	8.49E-06	6.09E-06
Intake 1 (R6)	100 X 15	1500	0.336738	4.39E-04	3.36E-04	1.46E-04	1.08E-04	7.78E-05	1.48E-04	1.13E-04	4.92E-05	3.64E-05	2.62E-05
Intake 2 (R7)	55 X 15	825	0.185206	2.83E-04	2.14E-04	9.01E-05	7.01E-05	5.03E-05	5.24E-05	3.96E-05	1.67E-05	1.30E-05	9.32E-06
	Total	4454.5	1					Total	6.95E-04	5.13E-04	2.24E-04	1.66E-04	1.22E-04
								Reference 1 X/Q value	6.74E-04	5.18E-04	2.22E-04	1.66E-04	1.20E-04
								Percent Difference	3.1%	-0.9%	0.9%	0.1%	1.6%

The control room X/Q values from the Unit 1 Containment (source S1) were used to model the LOCA containment release. It should be noted that the LOCA containment release constitutes only a small fraction of the control room LOCA dose consequences. As can be seen in Table 1, there is overall a slight increase in the Total Surface Area weighted X/Q for S1 as compared to the values used in Attachment 1 to Reference 1 with the exception of the 2-8 hour time period.

Table 2: Ventilation Vent No. 2 (V2)

Turbine Building Inlet Points	Dimensions of Inlet Point (ft)	Area of Inlet Point (ft^2)	Fraction of Total Area	ARCON96 X/Q (seconds / m^3)					Surface Area weighted X/Q (seconds / m^3)				
				0 - 2 hr	2 - 8 hr	8 - 24 hr	1 - 4 days	4 -30 days	0 - 2 hr	2 - 8 hr	8 - 24 hr	1 - 4 days	4 - 30 days
Louver 1	20 X 12	240	0.053878	1.09E-03	8.03E-04	3.59E-04	2.25E-04	1.82E-04	5.87E-05	4.33E-05	1.93E-05	1.21E-05	9.81E-06
Louver 2	14.5 X 15.5	224.75	0.050455	1.51E-03	1.13E-03	5.17E-04	3.30E-04	2.54E-04	7.62E-05	5.70E-05	2.61E-05	1.67E-05	1.28E-05
Louver 3	14.5 X 15.5	224.75	0.050455	2.04E-03	1.60E-03	6.99E-04	5.07E-04	3.60E-04	1.03E-04	8.07E-05	3.53E-05	2.56E-05	1.82E-05
Louver 4	20 X 12	240	0.053878	6.36E-04	4.52E-04	1.98E-04	1.28E-04	9.76E-05	3.43E-05	2.44E-05	1.07E-05	6.90E-06	5.26E-06
Louver 5	20 X 12	240	0.053878	1.93E-03	1.51E-03	6.44E-04	5.00E-04	3.48E-04	1.04E-04	8.14E-05	3.47E-05	2.69E-05	1.87E-05
Louver 6	20 X 12	240	0.053878	1.32E-03	1.00E-03	4.24E-04	3.28E-04	2.35E-04	7.11E-05	5.39E-05	2.28E-05	1.77E-05	1.27E-05
Rollup Door 1	20 X 18	360	0.080817	2.84E-04	2.10E-04	9.33E-05	5.90E-05	4.71E-05	2.30E-05	1.85E-05	7.54E-06	4.77E-06	3.81E-06
Rollup Door 2	20 X 18	360	0.080817	4.44E-04	3.51E-04	1.51E-04	1.11E-04	7.96E-05	3.59E-05	2.84E-05	1.22E-05	8.97E-06	6.43E-06
Intake 1 (R6)	100 X 15	1500	0.336738	3.09E-04	2.29E-04	1.05E-04	6.69E-05	5.23E-05	1.04E-04	7.71E-05	3.54E-05	2.25E-05	1.76E-05
Intake 2 (R7)	55 X 15	825	0.185206	4.08E-04	3.29E-04	1.39E-04	1.05E-04	7.39E-05	7.56E-05	6.09E-05	2.57E-05	1.94E-05	1.37E-05
	Total	4454.5	1					Total	6.86E-04	5.26E-04	2.30E-04	1.62E-04	1.19E-04
								Reference 1 X/Q value	6.97E-04	5.43E-04	2.31E-04	1.71E-04	1.22E-04
								Percent Difference	-1.6%	-3.2%	-0.5%	-5.5%	-2.5%

The control room X/Q values from Ventilation Vent No. 2 (source V2) were used to model the LOCA ECCS and RWST and the FHA fuel building releases. As can be seen in Table 2, there is overall, a slight decrease in the Total Surface Area weighted X/Q for V2 as compared to the values used in Attachment 1 to Reference 1. This slight decrease in the V2 X/Q would result in a reduction in the control room dose consequences for the LOCA.

Table 3: Auxiliary Building West Louver (S3)

Turbine Building Inlet Points	Dimensions of Inlet Point (ft)	Area of Inlet Point (ft^2)	Fraction of Total Area	ARCON96 X/Q (seconds / m^3)					Surface Area weighted X/Q (seconds / m^3)				
				0 - 2 hr	2 - 8 hr	8 - 24 hr	1 - 4 days	4 -30 days	0 - 2 hr	2 - 8 hr	8 - 24 hr	1 - 4 days	4 - 30 days
Louver 1	20 X 12	240	0.053878	3.20E-03	2.55E-03	1.14E-03	7.16E-04	5.66E-04	1.72E-04	1.37E-04	6.14E-05	3.86E-05	3.05E-05
Louver 2	14.5 X 15.5	224.75	0.050455	3.95E-03	3.43E-03	1.44E-03	1.03E-03	7.00E-04	1.99E-04	1.73E-04	7.27E-05	5.20E-05	3.53E-05
Louver 3	14.5 X 15.5	224.75	0.050455	2.48E-03	2.04E-03	8.70E-04	6.36E-04	4.56E-04	1.25E-04	1.03E-04	4.39E-05	3.21E-05	2.30E-05
Louver 4	20 X 12	240	0.053878	1.35E-03	9.97E-04	4.45E-04	2.77E-04	2.10E-04	7.27E-05	5.37E-05	2.40E-05	1.49E-05	1.13E-05
Louver 5	20 X 12	240	0.053878	1.42E-03	1.08E-03	4.75E-04	3.43E-04	2.47E-04	7.65E-05	5.82E-05	2.56E-05	1.85E-05	1.33E-05
Louver 6	20 X 12	240	0.053878	8.12E-04	6.03E-04	2.66E-04	1.89E-04	1.38E-04	4.37E-05	3.25E-05	1.43E-05	1.02E-05	7.44E-06
Rollup Door 1	20 X 18	360	0.080817	4.56E-04	3.61E-04	1.58E-04	9.82E-05	8.00E-05	3.69E-05	2.76E-05	1.28E-05	7.94E-06	6.47E-06
Rollup Door 2	20 X 18	360	0.080817	5.14E-04	4.37E-04	1.86E-04	1.36E-04	9.52E-05	4.15E-05	3.53E-05	1.50E-05	1.10E-05	7.69E-06
Intake 1 (R6)	100 X 15	1500	0.336738	4.22E-04	3.42E-04	1.52E-04	1.01E-04	7.49E-05	1.42E-04	1.15E-04	5.12E-05	3.40E-05	2.52E-05
Intake 2 (R7)	55 X 15	825	0.185206	3.63E-04	3.12E-04	1.33E-04	9.82E-05	6.78E-05	6.72E-05	5.78E-05	2.46E-05	1.82E-05	1.26E-05
	Total	4454.5	1					Total	9.78E-04	7.94E-04	3.45E-04	2.37E-04	1.73E-04
								Reference 1 X/Q value	1.07E-03	9.04E-04	3.87E-04	2.73E-04	1.87E-04
								Percent Difference	-8.6%	-12.2%	-10.7%	-13.1%	-7.6%

The control room X/Q values from the Auxiliary Building West Louver (source S3) were used to model the FHA Containment personnel access hatch release. As can be seen in Table 3, there is overall, a slight decrease in the Total Surface Area weighted X/Q for S3 as compared to the values used in Attachment 1 to Reference 1. This slight decrease in the S3 X/Q would result in a reduction in the control room dose consequences for the FHA.

Table 4: Auxiliary Building East Louver (S4)

Turbine Building Inlet Points	Dimensions of Inlet Point (ft)	Area of Inlet Point (ft^2)	Fraction of Total Area	ARCON96 X/Q (seconds / m^3)					Surface Area weighted X/Q (seconds / m^3)				
				0 - 2 hr	2 - 8 hr	8 - 24 hr	1 - 4 days	4 -30 days	0 - 2 hr	2 - 8 hr	8 - 24 hr	1 - 4 days	4 - 30 days
Louver 1	20 X 12	240	0.053878	1.53E-03	1.16E-03	5.11E-04	3.17E-04	2.46E-04	8.24E-05	6.25E-05	2.75E-05	1.71E-05	1.33E-05
Louver 2	14.5 X 15.5	224.75	0.050455	2.86E-03	2.22E-03	9.89E-04	5.94E-04	4.91E-04	1.44E-04	1.12E-04	4.99E-05	3.00E-05	2.48E-05
Louver 3	14.5 X 15.5	224.75	0.050455	4.65E-03	3.87E-03	1.65E-03	1.14E-03	7.96E-04	2.35E-04	1.95E-04	8.33E-05	5.75E-05	4.02E-05
Louver 4	20 X 12	240	0.053878	6.87E-04	4.83E-04	2.21E-04	1.42E-04	1.04E-04	3.70E-05	2.60E-05	1.19E-05	7.65E-06	5.60E-06
Louver 5	20 X 12	240	0.053878	3.01E-03	2.54E-03	1.08E-03	7.77E-04	5.59E-04	1.62E-04	1.37E-04	5.82E-05	4.19E-05	3.01E-05
Louver 6	20 X 12	240	0.053878	1.59E-03	1.29E-03	5.49E-04	4.05E-04	2.94E-04	8.57E-05	6.95E-05	2.96E-05	2.18E-05	1.58E-05
Rollup Door 1	20 X 18	360	0.080817	2.97E-04	2.30E-04	1.01E-04	6.34E-05	4.95E-05	2.40E-05	2.12E-05	8.16E-06	5.12E-06	4.00E-06
Rollup Door 2	20 X 18	360	0.080817	5.11E-04	4.22E-04	1.84E-04	1.27E-04	8.90E-05	4.13E-05	3.41E-05	1.49E-05	1.03E-05	7.19E-06
Intake 1 (R6)	100 X 15	1500	0.336738	3.23E-04	2.62E-04	1.17E-04	7.11E-05	5.95E-05	1.09E-04	8.82E-05	3.94E-05	2.39E-05	2.00E-05
Intake 2 (R7)	55 X 15	825	0.185206	4.38E-04	3.88E-04	1.64E-04	1.17E-04	8.06E-05	8.11E-05	7.19E-05	3.04E-05	2.17E-05	1.49E-05
	Total	4454.5	1					Total	1.00E-03	8.18E-04	3.53E-04	2.37E-04	1.76E-04
								Reference 1 X/Q value	1.07E-03	9.04E-04	3.87E-04	2.73E-04	1.87E-04
								Percent Difference	-6.4%	-9.6%	-8.7%	-13.2%	-5.9%

The control room X/Q values from the Auxiliary Building East Louver (source S4) were used to model the FHA Containment personnel access hatch release. As can be seen in Table 4, there is overall, a slight decrease in the Total Surface Area weighted X/Q for S4 as compared to the values used in Attachment 1 to Reference 1. This slight decrease in the S4 X/Q would result in a reduction in the control room dose consequences for the FHA.