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Dominion

December 3, 2008

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

Serial No. NA3-08-122R
Docket No. 52-017
COL/WDC

DOMINION VIRGINIA POWER
NORTH ANNA UNIT 3 COMBINED LICENSE APPLICATION
RESPONSE TO REQUEST FOR ADDITIONAL INFORMATION LETTER 030
(CHAPTERS 2, 6, 9, 11 AND 12)

On October 20, 2008, the NRC requested additional information to support the review of certain portions of the North Anna Unit 3 Combined License Application (COLA). The response to the following RAIs is provided in Enclosures 1 through 7:

- RAI Question 02.03.01-4 — Wet Bulb Value
- RAI Question 06.02.04-2 — Pipe Lengths
- RAI Question 09.05.04-6 — Corrosion Protection Systems
- RAI Question 11.03-2 — Cost Benefit for GWMS
- RAI Question 12.02-11 — Clarify Information In Section 12 Tables
- RAI Question 12.02-12 — Dose Contributions
- RAI Question 12.03-12.04-9 — Editorial Corrections

This information will be incorporated into a future submission of the North Anna Unit 3 COLA, as described in the enclosures.

Please contact Regina Borsh at (804) 273-2247 (regina.borsh@dom.com) if you have questions.

Very truly yours,

Eugene S. Grecheck

D089
NRO

Enclosures:

1. Response to RAI Letter Number 030, RAI Question 02.03.01-4
2. Response to RAI Letter Number 030, RAI Question 06.02.04-2
3. Response to RAI Letter Number 030, RAI Question 09.05.04-6
4. Response to RAI Letter Number 030, RAI Question 11.03-2
5. Response to RAI Letter Number 030, RAI Question 12.02-11
6. Response to RAI Letter Number 030, RAI Question 12.02-12
7. Response to RAI Letter Number 030, RAI Question 12.03-12.04-9

Commitments made by this letter:

1. Incorporate proposed changes in a future COLA submission.

COMMONWEALTH OF VIRGINIA

COUNTY OF HENRICO

The foregoing document was acknowledged before me, in and for the County and Commonwealth aforesaid, today by Eugene S. Grecheck, who is Vice President-Nuclear Development of Virginia Electric and Power Company (Dominion Virginia Power). He has affirmed before me that he is duly authorized to execute and file the foregoing document on behalf of the Company, and that the statements in the document are true to the best of his knowledge and belief.

Acknowledged before me this 3rd day of December 2008
My registration number is 7173057 and my
Commission expires: August 31, 2012

Wanda K. Marshall
Notary Public

WANDA K. MARSHALL
Notary Public
Commonwealth of Virginia
7173057
My Commission Expires Aug 31, 2012

cc: U. S. Nuclear Regulatory Commission, Region II
T. A. Kevern, NRC
J. T. Reece, NRC
J. J. Debiec, ODEC
G. A. Zinke, NuStart/Entergy
T. L. Williamson, Entergy
R. Kingston, GEH
K. Ainger, Exelon
P. Smith, DTE
J. Burford, Entergy

ENCLOSURE 1

Response to NRC RAI Letter 030

RAI Question 02.03.01-4

NRC RAI 02.03.01-4

The response to RAI 02.03.01-2 states that a 100-year coincident wet bulb temperature of 76 F was derived by plotting Richmond dry-bulb temperatures with their maximum observed coincident wet-bulb temperatures and extrapolating the resulting curve to 109 °F (the 100-year return period maximum dry bulb temperature). The resulting 76°F concurrent wet bulb value does not appear to be conservative. Justify why the concurrent wet bulb value should not be a higher value, such as 78°F.

The CD-ROM accompanying Chapter 28 to the 2005 ASHRAE Handbook – Fundamentals provides a joint frequency matrix of Richmond, VA dry bulb (DB) temperatures and mean coincident wet bulb (MCWB) temperatures for the period 1972-2001. A plot of the upper end for this joint frequency matrix is attached. A linear trend line through the last five data points in this joint frequency matrix extrapolated out to a DB temperature of 109°F projects a MCWB temperature of 77.8°F. A DB/MCWB combination of 109°F/76°F is also inconsistent with 0.4% and 0% exceedance DB/MCWB combinations of 95°F/77°F and 104.9°F/79°F presented in North Anna ESPA SSAR Table 2.3-18.

Dominion Response

The 100-year return maximum coincident wet bulb temperature is extrapolated from a second order polynomial approximation curve based on a wet bulb depression frequency from the International Station Meteorological Climate Summary (ISMCS). The data does not appear to support a linear trend and a second order polynomial curve is a more appropriate representation of the data. As dry bulb temperatures increase at the upper end of the temperature scale (~88°F and above), wet bulb depression increases. The dry bulb/wet bulb correlation begins to trend negatively as this occurs. Thus, using a second order polynomial curve for approximation better represents the increase, peak, and decrease of coincident wet bulb temperature as dry bulb temperature increases. The prediction of a decreasing coincident wet bulb temperature with increasing dry bulb temperature may be explained in that the only way for the dry bulb temperature to increase into such extreme temperatures is for the humidity, and therefore the wet bulb temperature, to decrease. Since this curve is of maximum wet bulb temperature as a function of dry bulb temperature, the trend results are considered conservative.

Additionally, the 100-year return of the maximum non-coincident wet bulb temperature conservatively approximates the maximum wet bulb temperature (through linear extrapolation). This non-coincident wet bulb temperature is bounded by the ESBWR DCD value.

Proposed COLA Revision

None

ENCLOSURE 2

Response to NRC RAI Letter 030

RAI Question 06.02.04-2

NRC RAI 06.02.04-2

In FSAR Section 6.2.4.2, the proposed COL Item 6.2-1-H states that the pipe lengths will be determined as part of completion of the piping design ITAAC identified in DCD Tier 1, Table 3.1-1 (Table 2.15.1-2, item 2.a.iii). Item 2.a.iii refers to an ASME Code Design Data Report. How does this ASME Design Data Report verify that the Containment Isolation Valves in FSAR Tables 6.2-15 through 6.2-45 have been located as close as practical to containment.

Dominion Response

GEH responded to DCD RAI 6.2-157 S02 on November 11, 2008. In its response, GEH stated that it plans to delete COL Item 6.2-1-H from DCD Tier 2, Subsection 6.2.8. COL Item 6.2-1-H was to provide the pipe lengths between the containment isolation valves and containment. GEH plans to add the design considerations for locating containment isolation valves as close to the containment as practical to DCD Tier 2, Subsection 6.2.4.2. Additionally, a new ITAAC (DCD Tier 1, Table 2.15.1-2, Item 22) will be added to specifically require verification that containment isolation valves have been located as close as practical to containment. These changes will address the concern stated in this RAI. The FSAR will be revised to be consistent with the DCD when the DCD is revised to incorporate the proposed revisions to DCD RAI 6.2-157 S02.

Proposed COLA Revision

None

ENCLOSURE 3

Response to NRC RAI Letter 030

RAI Question 09.05.04-6

NRC RAI 09.05.04-6

NAPS COL 9.5.4-2-A states that buried carbon steel piping for the diesel fuel oil transfer system will have a coating and impressed-current cathodic protection system for external corrosion control. However, it does not identify the corrosion control system for the internal surface of the piping or provide the industry standards that will be applied to these corrosion control methods. The ESBWR DCD and North Anna FSAR state that SRP Section 9.5.4 and RG 1.137 do not apply. However, RTNSS Criterion B and C apply to the system and availability of standby and ancillary diesel generators is required according to the Availability Controls Manual (ACLCO 3.8.1 and 3.8.2). In addition, the ESBWR DCD (p. 9.5-46) states underground piping portions of the standby DG system will be designed and constructed according to "the latest industry standards for buried pipe including provisions for corrosion protection," but it does not identify the standards to be used. Please modify the FSAR to clarify the internal and external corrosion protection methods for underground portions of the diesel generator fuel oil storage and transfer systems, and to identify the industry standards that will be applied to the corrosion protection systems.

Dominion Response

Corrosion protection for the internal surfaces of the buried carbon steel piping portion of the diesel fuel oil transfer system is neither recommended nor required. An allowance for internal corrosion of the diesel fuel oil piping is incorporated by applying extra pipe wall thickness. FSAR Section 9.5.4 will be revised to delete reference to a corrosion protection system for the internal surfaces of buried diesel fuel oil transfer system piping.

As stated in ESBWR DCD Rev 5, Table 3.2-1 for the Y52, Oil Storage and Transfer System, the safety class of the system is N. DCD Table 3.2-1 indicates that the Quality Group designation for Safety Class N is D. DCD Table 3.2-3 indicates that for the Quality Group D classification, ASME B31.1 is applicable for piping and valves. ASME B31.1, Power Piping Code, Nonmandatory Appendix IV, Corrosion Control for ASME B31.1 Power Piping Systems, is applicable for corrosion protection for the external surfaces of the underground portion of the diesel fuel oil transfer system piping. Also, American Petroleum Institute (API) Recommended Practice 1632 provides guidance for establishing corrosion protection. ASME B31.1, Appendix IV, and API 1632 will be followed as deemed applicable for corrosion protection of the underground portions of the diesel fuel oil transfer system.

Proposed COLA Revision

FSAR Section 9.5.4 will be revised as shown on the attached markup.

Markup of North Anna COLA

The attached markup represents Dominion's good faith effort to show how the COLA will be revised in a future COLA submittal in response to the subject RAI. However, the same COLA content may be impacted by revisions to the ESBWR DCD, responses to other COLA RAIs, other COLA changes, plant design changes, editorial or typographical corrections, etc. As a result, the final COLA content that appears in a future submittal may be somewhat different than as presented herein.

	Replace the third paragraph with the following.
NAPS COL 9.5.4-2-A	The only underground component of the SDGs fuel oil storage and transfer system is carbon steel piping. A corrosion protection system is provided for ~~internal and~~ external surfaces of buried piping systems. The buried sections of the piping are provided with waterproof protective coating and an impressed current type cathodic protection to control external corrosion.
STD COL 9.5.4-1-A	Delete the parenthetical "(COL 9.5.4-1-A)" at the end of the last paragraph.
	Ancillary Diesel Generators
	Replace the third to last sentence in the first paragraph with the following.
STD COL 9.5.4-1-A	Procedures require that the quantity of diesel fuel in the ancillary diesel generator (ADG) fuel oil storage tanks is monitored on a periodic basis. The diesel fuel oil usage is tracked against planned deliveries. Regular transport replenishes the fuel oil inventory during periods of high demand and ensures continued supply in the event of adverse weather conditions. These procedures ensure sufficient diesel fuel oil inventory is available on site so that the ADGs can operate continually for seven days with each operating at its calculated design load, with appropriate design margins. The procedures will be developed in accordance with the milestone and processes described in Section 13.5.
	Replace the third paragraph with the following.
NAPS COL 9.5.4-2-A	The only underground component of the ADGs fuel oil storage and transfer system is carbon steel piping. A corrosion protection system is provided for external surfaces of buried piping systems. The buried sections of the piping are provided with waterproof protective coating and an impressed current type cathodic protection to control external corrosion.
	System Operation
	Standby Diesel Generators
STD COL 9.5.4-1-A	Delete the parenthetical "(COL 9.5.4-1-A)" at the end of the paragraph.

ENCLOSURE 4

Response to NRC RAI Letter 030

RAI Question 11.03-2

NRC RAI 11.03-2

RAI 11.03-0 and Dominion's response address the conduct of a plant and site specific cost-benefit (CB) analyses for the Gaseous Waste Management System (GWMS). While the staff's evaluation generally concurs with the CB ratios of the analyses of the three system augments considered, the review identified four items as requiring further information and technical and regulatory clarifications. Specifically, the applicant is requested to address and resolve the following four items in the proposed revision of FSAR Section 11.3.1:

a. Given that the CB analyses are based on Regulatory Guide (RG) 1.110, provide the rationale for not presenting the information (cost parameters) following the format of Appendix C to RG 1.110. See regulatory position C.5 of RG 1.110.

b. The presentation of information and then discussions in excluding GWMS system design for PWR plants as being not applicable for BWRs is extraneous and should be removed from the proposed FSAR update; see FSAR p.11-7 and 11-8. The introduction of the CB analyses should state that all system augments considered in the analyses include only those that are compatible with BWR plant design features.

c. The discussion and rationale for excluding the 600 ft^3 gas decay tank, given a residence time of 19 minutes, is not consistent with the source term 'as there are noble gases with radioactive half-lives of less than 19 minutes. These include Kr-89, Xe-135m, Xe-137, and Xe-138, which make up a significant fraction of the noble gas source term for the turbine building. Accordingly, it is recommended that this augment be reconsidered on the basis of a CB analysis, rather than excluding it solely on the basis of radionuclide half-lives.

d. The discussion supporting the exclusion of system augments on the basis capacity or flow rates is incomplete as it is not clear if attempts were made to match or approximate system capacities as closely as is possible with that of DCD system design features. For example, the consideration of a 15,000 CFM HEPA filtration system augment for the CONAVS system with a capacity of about 42,300 CFM is not logical. The closest option in RG 1.110 for such augment is 30,000 CFM; see Table A-1. As a result, the discussion should provide qualitative and/or quantitative qualifiers addressing the impact of such differences in capacities and expected impacts (as direction and magnitude) of the resulting cost-benefit-ratio. This observation applies to all other CB cases dismissed in a similar manner in this response.

Dominion Response

a. The rationale for not presenting the information (cost parameters) following the format of Appendix C to RG 1.110 is that Appendix C requests detailed cost estimate sheets and the detailed cost estimates applicable to the Unit 3 cost-benefit analysis are without exception identical to those detailed cost estimates given in RG 1.110 Appendix B. The Appendix C cost estimate sheets are in the format of the information provided in Appendix B of RG 1.110. The Unit 3 cost-benefit analysis did not change the Appendix B

information that is summarized by NRC in Appendix A of RG 1.110. For the system augments compatible with BWR plant design features, the Unit 3 cost-benefit analysis uses the values in Appendix A without exception. The values in Table A-1 for equipment/material and labor total direct costs are used without exception. Also, the values in Table A-2 for total annual operating costs for a single unit and Table A-3 for total annual maintenance costs are used without exception. Because the Unit 3 cost-benefit analysis used the information in the Appendix A without changes, there is no new detailed cost estimate information beyond that provided in Appendices A and B of RG 1.110 to submit.

FSAR Section 11.2.1 will be revised to identify that the information used in the Unit 3 cost-benefit analysis was, without exception, the values provided in Tables A-1, A-2, and A-3 of RG 1.110 for the system augments compatible with BWR plant design features.

b. Both references to PWR augments will be removed from FSAR Section 11.3.1 and the first sentence of FSAR Section 11.2.1 will be revised as follows: "RG 1.110 methodology was applied to satisfy the cost-benefit analysis requirements of 10 CFR 50, Appendix I, Section II.D, for the system augments compatible with BWR plant design features." Where appropriate, FSAR Sections 11.2.1 and 11.3.1 will be revised consistent with this qualification.

c. The evaluation of the 600 ft^3 gas decay tank will be revised to address the cost-benefit analysis, rather than excluding it solely on the basis of radionuclide half-lives. The current evaluation will be replaced with the following:

> "It is assumed that the gas decay tank is an augment to the offgas system. The flow rate through the offgas system is 54 m^3/hr (31.8 cfm) per DCD Table 12.2-15. As a result, the average residence time in a 600 ft^3 gas decay tank is approximately 19 minutes. While this decay time will have a negligible effect on iodines, particulates, C-14, and H-3, it will mitigate the dose consequences of short-lived noble gases. Because the noble gases contribute 1.5 person-rem/year to the thyroid dose, even complete elimination of the noble gases represents a maximum improvement in the thyroid dose of only 1.5 person-rem/year. The $8,040/year cost of the 600 ft^3 gas decay tank augment divided by the annual dose reduction of 1.5 person-thyroid-rem/year results in an estimated cost of over $5,000/person-thyroid-rem saved. This augment exceeds the cost-benefit ratio of $1000/person-thyroid-rem prescribed in 10 CFR 50, Appendix I, and is eliminated from further consideration."

d. The evaluation of each radwaste system augment in RG 1.110 compatible with BWR plant design was based on a cost-benefit comparison with either the $1,000 per total body person-rem or the $1,000 per person-thyroid-rem criteria in 10 CFR 50, Appendix I. System augments with sufficient capacity to match that of DCD system design features were considered, but such augments have total annual costs above the values which would be cost-beneficial. As stated in Section 11.2.1, none of the liquid radwaste system augments provided in RG 1.110 is found to be cost-beneficial, so capacity of those augments need not be considered further in the FSAR for reducing total body or thyroid doses.

For gaseous radwaste system augments, the estimated 28 person-rem/year thyroid dose leads to the need for specific evaluation of those augments with a total annual cost below $28,000. The system augments in RG 1.110 were considered and therefore the capacities were considered. To clarify the FSAR, Section 11.3.1 will be revised to add a qualifier addressing the capacities of the gaseous radwaste system augments. The last paragraph preceding the discussion of specific augments will be supplemented with the following: "In some cases, the system augments less than $28,000 per year have insufficient capacity. System augments with greater capacities were considered but eliminated because they had TAC values greater than $28,000. The gaseous radwaste system augments in RG 1.110 were considered."

Proposed COLA Revision

The FSAR will be revised as stated in the above response. These changes are shown on the attached FSAR markups.

Markup of North Anna COLA

The attached markup represents Dominion's good faith effort to show how the COLA will be revised in a future COLA submittal in response to the subject RAI. However, the same COLA content may be impacted by revisions to the ESBWR DCD, responses to other COLA RAIs, other COLA changes, plant design changes, editorial or typographical corrections, etc. As a result, the final COLA content that appears in a future submittal may be somewhat different than as presented herein.

Chapter 11 Radioactive Waste Management

11.1 Source Terms

This section of the referenced DCD is incorporated by reference with no departures or supplements.

11.2 Liquid Waste Management System

This section of the referenced DCD is incorporated by reference with the following departures and/or supplements.

11.2.1 Design Basis

Safety Design Bases

Add the following at the end of this section.

NAPS SUP 11.2-1

RG 1.110 methodology was applied to satisfy the cost-benefit analysis requirements of 10 CFR 50, Appendix I, Section II.D, for the system augments compatible with BWR plant design features. ~~Fixed~~ Cost parameters used to calculate the Total Annual Cost (TAC) for each applicable radwaste treatment system augment listed in RG 1.110 are ~~given, including the~~ taken without exception from RG 1.110, Appendix A. These costs are Annual Operating Cost (AOC) (Table A-2), Annual Maintenance Cost (AMC) (Table A-3), Direct Cost of Equipment and Materials (DCEM) (Table A-1), and Direct Labor Cost (DLC) (Table A-1). ~~Variable~~ Other cost parameters~~, determined by the licensee,~~ used to determine TAC are as follows:

- Capital Recovery Factor (CRF) - Obtained from RG 1.110, Table A-6, this factor reflects the cost of money for capital expenditures. A cost-of-money value of 7 percent per year is assumed in this analysis, consistent with "Guidelines and Discount Rates for Benefit-Cost Analysis of Federal Programs" (OMB Circular A-94) (Reference 11.2-202). Based on a 30-year service life, Table A-6 gives a CRF of 0.0806.
- Indirect Cost Factor (ICF) - Obtained from RG 1.110, Table A-5, this factor takes into account whether the radwaste system is unitized or shared (in the case of a multi-unit site). Because this is a single ESBWR unit site, this analysis is for a single unit, which gives an ICF of 1.75.

11.3.1 Design Basis

Add the following at the end of this section.

NAPS ESP COL 11.1-1

The methodology for performing cost-benefit analysis for the radwaste system is presented in Section 11.2.1.

The annual costs for augments for the gaseous radwaste treatment system were determined and the lowest annual cost was considered a threshold value. The lowest-cost option for a gaseous radwaste treatment system augment that applies to BWRs is the 1000 cfm Charcoal/HEPA Filtration System at $7,960 per year, which yields a threshold value of 7.96 person-rem whole body or thyroid from gaseous effluents for BWRs.

As shown in Table 12.2-204, the Unit 3 annual whole body dose from gaseous effluents is 7.7 person-rem/yr, which is below the 7.96 person-rem/yr threshold value. Based on this comparison, no gaseous radwaste treatment system augment is cost-beneficial in reducing annual whole body dose and the cost-benefit analysis demonstrates compliance with 10 CFR 50, Appendix I, Section II.D, for this type of dose.

As shown in the table below, the Unit 3 thyroid dose from gaseous effluents is 28 person-rem/yr, which exceeds the 7.96 person-rem/yr threshold value for a BWR. Because the Unit 3 estimate exceeds this threshold value, further analysis is provided below.

Source	Thyroid Dose (person-rem/year)	% of Total
Iodines	20	72.9
Particulates	0.65	2.3
Noble gases	1.5	5.4
C-14	5.1	18.6
H-3	0.20	0.7
Total	28	100.0

The cost-benefit analysis described in Section 11.2.1 is based on RG 1.110, which provides the gaseous radwaste augments applicable to a BWR to be considered for Unit 3. Based on the estimated 28 person-rem/year thyroid dose, those augments with a ~~"Total Annual~~

~~Cost"~~ TAC less than $28,000 are considered below. In some cases, the system augments less than $28,000 per year have insufficient capacity. System augments with greater capacities were considered but eliminated because they had TAC values greater than $28,000. The gaseous radwaste system augments in RG 1.110 applicable to a BWR were considered.

15,000 and 30,000 cfm HEPA Filtration System (If in Auxiliary Building)

For Unit 3, the gaseous effluent releases "from the Auxiliary Building" were considered as follows because an ESBWR does not have an Auxiliary Building. Two ventilation systems that service contaminated air in the Reactor Building are combined: the Contaminated Area HVAC Subsystem (CONAVS) and the Refueling and Pool Area HVAC Subsystem (REPAVS). Per DCD Figure 9.4-10, the normal flow through the CONAVS exhaust fan is 19,950 l/sec (42,272 cfm). Per DCD Figure 9.4-11, the normal flow through the REPAVS exhaust fan is 32,050 l/sec (67,910 cfm). In both cases, the normal flow rates exceed the proposed 7079 l/sec (15,000 cfm) HEPA filtration system. Therefore, this augment is not effective for Unit 3 and is eliminated from further consideration. The 14,158 l/sec (30,000 cfm) Charcoal/HEPA Filtration System is also not effective and with a TAC of $56,330/yr, also exceeds the $28,000/yr TAC threshold.

15,000 and 30,000 cfm HEPA Filtration System (If in Turbine Building)

The Turbine Building HVAC System (TBVS) services the Turbine Building. DCD Figure 9.4-8 shows that the Turbine Building exhaust goes through the Turbine Building Air Exhaust Subsystem (TBE). Per DCD Table 9.4-15, the 100 percent capacity flow through TBE is 52,800 l/sec (111,877 cfm). Based on this design capacity, it is assumed that the normal flow exceeds 7079 l/sec (15,000 cfm), which is 13 percent of the design capacity. Therefore, this augment is not effective for Unit 3 and is eliminated from further consideration. The 14,158 l/sec (30,000 cfm) Charcoal/HEPA Filtration System is also not effective and with a TAC of $54,220/yr, also exceeds the $28,000/yr TAC threshold.

3-Ton Charcoal Adsorber

Per DCD Table 11.3-1, the total mass of charcoal in the offgas system is 237 metric tons (523,000 lb), or approximately 262 tons. Addition of a 2.7 metric ton (3-ton) charcoal adsorber only provides an additional

1.1 percent capacity to the existing offgas system. DCD Table 12.2-16 shows that the annual airborne releases from the offgas system represent only about 4 percent of the total annual airborne releases from Unit 3. Additional charcoal adsorbers would improve the holdup times of the noble gases and C-14, but those only contribute approximately 24 percent to the thyroid dose. Therefore, additional charcoal adsorber material could make a maximum improvement of 0.96 percent of the 28 person-rem/year thyroid dose, or 0.27 person-rem/year. The $9,450/year cost of the 3-ton charcoal adsorber augment divided by the annual dose reduction of 0.27 person-rem/year, results in an estimated cost of over $35,000/person-rem saved. This augment exceeds the cost-benefit ratio of $1000/person-rem prescribed in 10 CFR 50, Appendix I, and is eliminated from further consideration.

~~**PWR Air Ejector Charcoal/HEPA Filtration Unit**~~

~~This PWR option is not applicable for Unit 3, which is an ESBWR.~~

Main Condenser Vacuum Pump (MCVP) Charcoal/HEPA Filtration System

DCD Table 12.2-16 shows that the annual airborne iodine releases from the MCVP represent approximately 0.7 percent of the total annual airborne iodine releases from Unit 3. Because the iodines contribute about 73 percent to the 28 person-rem/year thyroid dose, this represents a maximum improvement of 0.5 percent to the thyroid dose, or 0.14 person-rem-year. The $8,170/year cost of the MCVP HEPA filtration system augment divided by the annual dose reduction of 0.14 person-rem/year, results in an estimated cost of over $58,000/person-rem saved. This augment exceeds the cost-benefit ratio of $1000/person-rem prescribed in 10 CFR 50, Appendix I, and is eliminated from further consideration.

600-ft^3 Gas Decay Tank

It is assumed that the gas decay tank is an augment to the offgas system. The flow rate through the offgas system is 54 m^3/hr (31.8 cfm) per DCD Table 12.2-15. As a result, the average residence time ~~of noble gases~~ in a 600 ft^3 gas decay tank is approximately 19 minutes. ~~This~~ While this decay time ~~is not sufficient even for short half-life noble gas decay and subsequent dose reduction.~~ will have a negligible effect on iodines, particulates, C-14, and H-3, it will mitigate the dose consequences of short-lived noble gases. ~~Therefore, this augment is not effective for Unit 3.~~ Because the noble gases contribute

1.5 person-rem/year to the thyroid dose, even complete elimination of the noble gases represents a maximum improvement in the thyroid dose of only 1.5 person-rem/year. The $8,040/year cost of the 600 ft^3 gas decay tank augment divided by the annual dose reduction of 1.5 person-thyroid-rem/year results in an estimated cost of over $5,000/person-thyroid-rem saved. This augment exceeds the cost-benefit ratio of $1000/person-thyroid-rem prescribed in 10 CFR 50, Appendix I, and is eliminated from further consideration.

1000 cfm Charcoal/HEPA Filtration System

As discussed above for 15,000 cfm HEPA filtration systems, the Unit 3 building exhaust system flow rates greatly exceed 472 l/sec (1000 cfm). Therefore, this augment is not effective for Unit 3 and is eliminated from further consideration.

~~**Steam Generator Flash Tank Vent to Main Condenser**~~

~~This PWR option is not applicable for Unit 3, which is an ESBWR.~~

Conclusion

None of the gaseous radwaste augments are cost-beneficial in reducing the annual thyroid dose from gaseous effluents for Unit 3.

11.4 Solid Waste Management System

This section of the referenced DCD is incorporated by reference with the following departures and/or supplements.

11.4.1 SWMS Design Bases

Add the following after the second paragraph.

STD SUP 11.4-1

The LWMS offsite dose calculations, which are described in Section 12.2.2.4, include the offsite doses from the SWMS liquid effluents, as they are processed by the LWMS. Similarly, the GWMS offsite dose calculations, which are described in Section 12.2.2.2, include the offsite doses from the SWMS gaseous effluents, as they are inputs processed by the GWMS. The cost-benefit analyses in Section 11.2.1 for the LWMS and in Section 11.3.1 for the GWMS address the liquid and gaseous effluents that are generated from solid waste processing by the SWMS. Because these two cost-benefit analyses include the liquid and gaseous effluents from the SWMS, the augments considered for the LWMS and GWMS apply to the SWMS, which provides inputs to those systems. As described in Sections 11.2.1 and 11.3.1, no augments are

ENCLOSURE 5

Response to NRC RAI Letter 030

RAI Question 12.02-11

NRC RAI 12.02-11

Dominion responded to RAI 12.02-1 by letter NA3-08-043 (dated 4/28/08). The staff requests further clarification in the presentation of FSAR information and results.

a. The citation of Appendix 12B in FSAR Table 12.2-15R (second column header) should be qualified as to its origin. As presented, it implies that the appendix is located in the North Anna FSAR but in fact Appendix 12B is located in Chapter 12 of the ESBWR DCD. A new footnote should be added stating that Appendix 12B is located in Chapter 12 of the ESBWR DCD.

b. Provide the technical basis and year of data in FSAR Table 12.2-17R for the incremental gaseous effluent concentrations for North Anna Units 1 and 2 in making up the total effluent concentration from all three units, listed as "Units 1, 2 & 3 Concentration" in the tabulation. This information is not included in this subsection, nor included as a footnote to the table.

c. A new footnote should be added to Table 12.2-18bR for the purpose of referring to Table 12.2-203 for the complementary limiting dose result for the child (bone) since this dose result is derived from the same set of assumptions and analysis.

d. The following observations were noted in reviewing FSAR Table 12.2-204: (i) a new footnote should be added referencing to ER Tables 5.4-1, 5.4-3, and 2.5-8 of the North Anna ESP (Rev. 9, Sept. 2006) as the source of data in deriving collective doses; (ii) a new entry or a footnote should be added to Table 12.2-204 for the purpose of listing collective dose results for the thyroid in support of the discussion presented on page 2 of 29 on the COLA markup; and (iii) a new footnote should be added to this table specifying the location (FSAR or ER tables) of the atmospheric dispersion and deposition parameters used in deriving collective doses from routine stack effluent releases within 50-miles of the plant.

Dominion Response

a. The citation in FSAR Table 12.2-15R will be revised to "DCD Appendix 12B" as shown in the attached markup.

b. RAI 12.02-3 requested the same clarification regarding the liquid effluent concentrations in FSAR Table 12.2-19bR. When addressing this RAI for the liquid effluents, the corresponding gaseous effluent table was also revised. Specifically, in Dominion's response to RAI 12.02-3, dated August 21, 2008 (Serial No. NA3-08-85R), Table 12.2-17R was revised to add a footnote stating, "Concentrations for Units 1 and 2 are based on the activity releases in NAPS UFSAR Table 11.3-2."

c. Footnote 5 will be added to FSAR Table 12.2-18bR, stating, "The maximum (child) bone dose for Unit 3 from all gaseous effluent pathways is shown in Table 12.2-203." A corresponding note will be added to ER Table 5.4-4.

d. i. Footnote 2 will be added to FSAR Table 12.2-204 and ER Table 5.4-7, stating, "ESP doses are based on data from ESP-ER Tables 2.5-8, 5.4-1, and 5.4-3."

ii. Footnote 3 will be added to FSAR Table 12.2-204 and ER Table 5.4-7, stating, "The corresponding collective thyroid doses for Unit 3 are 0.69 person-rem/yr from liquid effluents and 28 person-rem/yr from gaseous effluents."

iii. Footnote 4 will be added to FSAR Table 12.2-204, stating, "The long-term χ/Q and D/Q values used in deriving Unit 3 collective doses from routine gaseous effluent releases within 50 miles of the plant are shown in Tables 2.3-208 to 2.3-215." A corresponding note will be added to ER Table 5.4-7.

Proposed COLA Revision

The FSAR and ER will be revised as stated in the above response. These changes are shown on the attached FSAR and ER markups.

Markup of North Anna COLA

The attached markup represents Dominion's good faith effort to show how the COLA will be revised in a future COLA submittal in response to the subject RAI. However, the same COLA content may be impacted by revisions to the ESBWR DCD, responses to other COLA RAIs, other COLA changes, plant design changes, editorial or typographical corrections, etc. As a result, the final COLA content that appears in a future submittal may be somewhat different than as presented herein.

NAPS COL 12.2-2-A
NAPS ESP COL 11.1-1

Table 12.2-15R Airborne Sources Calculation

Calculation Bases

	Methodology	**DCD Appendix 12B**
	Noble Gas Source at t=30 min	740 MBq/sec (20,000 µCi/sec)
	I^{131} Release Rate	3.7 MBq/sec (100 µCi/sec)
~~NAPS COL 12.2-2-A~~	Directions and distances from site to receptor locations	See Table 2.3-16R
~~NAPS COL 12.2-2-A~~	Meteorology χ/Q	See Table 2.3-16R
~~NAPS COL 12.2-2-A~~	Meteorology D/Q	See Table 2.3-16R
	Plant Availability Factor	0.92
	Offgas System	
	Offgas stream temperature	100°F
	Flow rate at 100°F	54 m^3/hr
	K_d (Kr)	18.5 cm^3/g
	K_d (Xe)	330 cm^3/g
	K_d (Ar)	6.4 cm^3/g
	Guard tank charcoal mass	7,500 kg (single tank)
	Adsorber tank charcoal mass	27,750 kg (each)
	Adsorber tank arrangement	2 parallel trains of 4 tanks each
	Turbine Gland Sealing System Exhaust	
	I-131 release	0.81 Ci/yr per µCi/g of I-131 in coolant
	I-133 release	0.22 Ci/yr per µCi/g of I-133 in coolant

NAPS COL 12.2-2-A
NAPS ESP COL 11.1-1
NAPS ESP VAR 12.2-1

Table 12.2-18bR Gaseous Pathway Doses to the MEI (mrem/yr)

		ESP			Unit 3		
Location	**Pathway**	**Total Body**	**Thyroid**	**Skin**	**Total Body**	**Thyroid**	**Skin**
Nearest Garden/ Residence/ Meat Cow (Varies for ESP-ER; 1191 m (0.74 mi) ESE for FSAR)	All						
	Adult	1.6E+00	4.9E+00	4.0E+00	8.3E-01	**5.3E+00**	6.5E-01
	Teen	1.6E+00	6.6E+00	4.0E+00	1.0E+00	**7.0E+00**	6.5E-01
	Child	1.6E+00	1.3E+01	4.0E+00	**1.9E+00**	1.3E+01	6.5E-01
	Infant	1.5E+00	1.3E+00	4.0E+00	3.3E-01	**1.4E+00**	6.5E-01

Notes:

1. There are no infant doses for the vegetable and meat pathways because infants do not consume these foods.
2. "NA" denotes "not applicable."
3. 1 mrem = 0.01 msv
4. For Unit 3, the doses shown for "nearest garden/residence/meat cow" location are the sum of garden, residence, and meat cow doses at 1191m ESE. For ESP, these doses are the maximum of garden, residence, and meat cow doses at 1513m NE, 1545 m NNE, and 2205m SE, respectively. The site boundary and residence plume doses include ground shine contribution.
5. The maximum (child) bone dose for Unit 3 from all gaseous effluent pathways is shown in Table 12.2-203.

NAPS COL 12.2-2-A
NAPS COL 12.2-3-A
NAPS ESP COL 11.1-1

Table 12.2-204 Collective Total Body (Population) Doses Within 50 Miles

Units in person-rem/yr

	ESP (Single Unit)	Unit 3
Liquid	8.6	1.0
Noble Gases (Gaseous)	3.5	1.5
Iodines and Particulates (Gaseous)	1.4	0.88
H-3 and C-14 (Gaseous)	14	5.3
Gaseous Total	19	7.7
Total	28	8.7

Notes:

1. 1 rem = 0.01 ~~s~~Sv
2. ESP doses are based on data from ESP-ER Tables 2.5-8, 5.4-1, and 5.4-3.
3. The corresponding collective thyroid doses for Unit 3 are 0.69 person-rem/year from liquid effluents and 28 person-rem/year from gaseous effluents.
4. The long-term χ/Q and D/Q values used in deriving Unit 3 collective doses from routine gaseous effluent releases within 50 miles of the plant are shown in Tables 2.3-208 to 2.3-215.

Table 5.4-4 Gaseous Pathway Doses (mrem/yr) to the MEI

Notes:

1. There are no infant doses for the vegetable and meat pathways because infants do not consume these foods.
2. "N/A" denotes "not applicable."
3. 1 mrem = 0.01 mSv
4. For Unit 3, the doses shown for "nearest garden/residence/meat cow" location are the sum of garden, residence, and meat cow doses at 0.74 mi ESE. For ESP-ER, these doses are the maximum of garden, residence, and meat cow doses at 0.94 mi NE, 0.96 mi NNE, and 1.37 mi SE, respectively. The site boundary and residence plume doses include ground shine contribution.
5. The maximum (child) bone dose for Unit 3 from all gaseous effluent pathways is shown in Table 5.4-6.

Table 5.4-7 Collective Total Body (Population) Doses (person-rem/yr) Within 50 Miles

	ESP-ER 1 New Unit	Unit 3
Liquid	8.6E+00	1.0E+00
Noble Gases (Gaseous)	3.5E+00	1.5E+00
Iodines and Particulates (Gaseous)	1.4E+00	8.8E-01
H-3 and C-14 (Gaseous)	1.4E+01	5.3E+00
Total	2.8E+01	8.7E+00
Natural Background	9.2E+05	9.2E+05

Notes:

1. 1 rem = 0.01 Sv
2. ESP doses are based on data from ESP-ER Tables 2.5-8, 5.4-1, and 5.4-3.
3. The corresponding collective thyroid doses for Unit 3 are 0.69 person-rem/year from liquid effluents and 28 person-rem/year from gaseous effluents.
4. The long-term χ/Q and D/Q values used in deriving Unit 3 collective doses from routine gaseous effluent releases within 50 miles of the plant are shown in Tables 2.7-5 to 2.7-12.

ENCLOSURE 6

Response to NRC RAI Letter 030

RAI Question 12.02-12

NRC RAI 12.02-12

Dominion responded to RAI 12.02-2 by letter NA3-08-063R (dated 08/04/08). The staff generally concurs with the response to RAI 12.02-2 and proposed update of FSAR Section 12.2.2.4.4 and Table 12.2-203, with a request for the following clarifications:

a. Although the discussion on external radiation due to N-16 in the RAI response preamble is deemed acceptable, the issue is not closed in the proposed revision of Table 12.2-203. The proposed revision of Table 12.2-203 still does not identify turbine building skyshine as a contributing source of radiation for Unit 3 since the direct dose from NAPS 1 & 2 does not have this characteristic. It may be construed that the addition of 1 mrem/yr (under revised footnote 2) would include dose contributions from turbine building skyshine when it does not. It is suggested that a new footnote be added only for the annual total body dose entry of 1.9 mrem in Table 12.2-203 for Unit 3 stating that the total annual dose includes the negligible contribution from turbine building skyshine ($<2.0 \times 10^{-4}$ mrem/yr) at the location of highest expected exposures at the EAB.

b. On p.12-8 of the proposed revision of FSAR Section 12.2.2.4.4, the text discusses the dose contribution from the ISFSI facility and states that the dose at the closest point on the EAB is expected to be about 1.7 mrem/yr, based on 40 fully-loaded cask modules. This new information should be supported with a reference(s) and note whether it is based on data for NAPS 1 & 2 or generic PWR and BWR fuel data and cask modules.

Accordingly, the applicant is requested to update its proposed revision to the corresponding FSAR Section 12.2.2.4.4 in addressing the above observations.

Dominion Response

a. FSAR Table 12.2-203 and ER Table 5.4-6 will be revised to add a new footnote 5 to clearly address the Unit 3 turbine building skyshine contribution. Under "Unit 3 (ESBWR)," the "Total" column heading will be changed to "Total[(5)]" and footnote 5 will be added to the table, stating, "Unit 3 total annual doses include a turbine building skyshine contribution of less than 1.66E-04 mrem/yr."

b. Please note that, as indicated in Dominion's response to RAI 12.02-10, dated October 17, 2008 (Serial No. NA3-08-116), FSAR Section 12.2.2.4.4 will be revised to reflect a fully-filled ISFSI, which changes the direct radiation dose contribution from the NAPS ISFSI to 3.6 mrem/yr based on 84 casks/modules. This number of casks/modules is consistent with the ESP Application. The calculation of the dose rate for this number of casks/modules is based on NAPS 1 and 2 fuel data and the types of casks/modules to be stored at the NAPS ISFSI as described in the NAPS ISFSI SAR, which has been added as a general reference for FSAR Section 12.2.

Proposed COLA Revision

The FSAR and ER will be revised as stated in the above response. These changes are shown on the attached FSAR and ER markups.

Markup of North Anna COLA

The attached markup represents Dominion's good faith effort to show how the COLA will be revised in a future COLA submittal in response to the subject RAI. However, the same COLA content may be impacted by revisions to the ESBWR DCD, responses to other COLA RAIs, other COLA changes, plant design changes, editorial or typographical corrections, etc. As a result, the final COLA content that appears in a future submittal may be somewhat different than as presented herein.

12.2.2.4.1 Compliance with 10 CFR 50, Appendix I, Section II.A

Table 12.2-202 demonstrates that offsite doses due to Unit 3 radioactive liquid effluents comply with the regulatory dose limits in 10 CFR 50, Appendix I, Section II.A.

NAPS ESP COL 11.1-1

12.2.2.4.2 Compliance with 10 CFR 50, Appendix I, Section II.D

Population dose is determined for the liquid effluent releases from Unit 3 for both total body dose and thyroid dose. The total body dose is 1.0 person-rem/yr as shown in Table 12.2-204. The thyroid dose is 0.69 person-rem/yr. The cost-benefit analysis performed to consider liquid radwaste augments to reduce doses due to liquid effluents is presented in Section 11.2. Based on the above liquid effluent dose estimate values and the threshold value from the cost-benefit analysis, no augments are cost-beneficial. Therefore, Unit 3 complies with 10 CFR 50, Appendix I, Section II.D.

12.2.2.4.3 Compliance with 10 CFR 20, Appendix B, Table 2, Column 2

Compliance with 10 CFR 20, Appendix B, Table 2, Column 2 is demonstrated in Table 12.2-19bR.

12.2.2.4.4 Compliance with 10 CFR 20.1301 and 20.1302

This section demonstrates that offsite doses due to Unit 3, combined with offsite doses due to Units 1 and 2 and the NAPS independent spent fuel storage installation (ISFSI), comply with the regulatory limits in 10 CFR 20.1301 for doses to members of the public.

Using the Unit 3-specific gaseous effluent release activities identified in Table 12.2-17R, and the Unit 3-specific liquid effluent release activities identified in Table 12.2-19bR, the total annual doses to the MEI and the population resulting from Unit 3 liquid and gaseous effluents are calculated and presented in Tables 12.2-203 and 12.2-204, respectively.

The direct radiation contribution from operation of Unit 3 is negligible. The direct dose contribution from Unit 3 at two distances is provided in DCD Table 12.2-21. That table shows the annual dose at 1000 m (0.62 mi) to be 1.66E-06 mSv/yr (1.66E-04 mrem/yr). Section 9.3.9 shows that Unit 3 uses hydrogen water chemistry, and DCD Section 12.2.1.3 explains that the direct dose contribution takes into account hydrogen water chemistry. The distance from Unit 3 to the nearest residence is 1191 m (0.74 mi) in the NW direction, as shown in

Table 2.3-15R. The distance from Unit 3 to the location on the site boundary with the highest gaseous effluent annual dose is 1416 m (0.88 mile) in the ESE direction. This is the distance from Unit 3 to the site boundary, that is, the exclusion area boundary (EAB) in the direction of maximum annual χ/Q, as shown in Table 2.3-16R. These distances from Unit 3 to each type of receptor location are greater than those presented in the DCD, so the Unit 3 direct radiation dose rate at each location us even lower than the very low rate cited above for 1000 m (0.62 mi).

The total annual doses to the MEI resulting from North Anna Units 1 and 2 liquid and gaseous effluents are provided in Table 12.2-203. The values shown are representative based on review of Units 1 and 2 annual radiological environmental operating reports (e.g., Reference 12.2-203).

The direct radiation contribution from operation of Units 1 and 2 is negligible. An evaluation of operating plants by the NRC states that:

> "...because the primary coolant of an LWR is contained in a heavily shielded area, dose rates in the vicinity of light water reactors are generally undetectable and are less than 1 mrem/year at the site boundary."

The NRC concludes that the direct radiation from normal operation results in "small contributions at site boundaries" (Reference 12.2-204, Section 4.6.1.2). For the NAPS site, the nearest residence is at a distance typical of a site boundary evaluated by NRC. An assumed value of 1 mrem/yr is included in Table 12.2-203 to account for the dose to the MEI at the nearest residence from operation of Units 1 and 2.

Discharged fuel assemblies from NAPS Units 1 and 2 are stored in the NAPS ISFSI (Reference 12.2-205). The direct radiation contribution from operation of the NAPS ISFSI is small, both at the residence nearest to the ISFSI, which is south and slightly east of the ISFSI at about 870 m (0.54 mi), and at the closest point to the site boundary, which is south and slightly west of the ISFSI at approximately 760 m (0.47 ~~m~~mi). The annual contribution at the site boundary from the ISFSI is no more than 3.6E-02 mSv/yr (3.6 mrem/yr). This value is based on a conservatively estimated peak dose rate from a fully-filled ISFSI with 84 ~~fully-loaded~~ casks/modules ~~in the ISFSI~~ containing NAPS Units 1 and 2 fuel assemblies and the distance from the ISFSI to the site boundary, which is shorter than that to the residence nearest the ISFSI. This ISFSI dose

12.2-4-A Other Contained Sources

STD COL 12.2-4-A This COL item is addressed in Section 12.2.1.5.

12.2.5 References

12.2-201 [Deleted]

12.2-202 [Deleted]

12.2-203 Virginia Electric and Power Company, North Anna Units 1 & 2 and Independent Spent Fuel Storage Installation (ISFSI) Annual Radiological Environmental Operating Report, April 17, 2006.

12.2-204 NUREG-1437, Generic Environmental Impact Statement for License Renewal of Nuclear Plants, U. S. Nuclear Regulatory Commission, May 1996.

12.2-205 Virginia Electric and Power Company, North Anna Independent Spent Fuel Storage Installation, Final Safety Analysis Report, Revision 6, Docket No. 72-16, License No. 2507, June 2008.

NAPS COL 12.2-2-A
NAPS COL 12.2-3-A
NAPS ESP COL 11.1-1
NAPS ESP VAR 12.2-4

Table 12.2-203 Comparison of Site Doses to the MEI

Type of Dose	ESP Site Total(1)	Unit 3 (ESBWR) Liquid	Gaseous	Total (5)	Existing Units(2)	Site Total(3)	40 CFR 190 Limit
Total Body (mrem/yr)	6.8	0.094	1.9	2.0	**5.0**	**6.9**	25
Thyroid (mrem/yr)	27	0.18	13	13	**5.1**	18	75
Bone (mrem/yr)	12	1.3	8.0	9.2	**5.1**	**14**	25

Notes:

1. The ESP site total doses are for two new units and two existing units, and do not include a dose contribution from the ISFSI.
2. The doses from existing units include ISFSI contribution and an assumed dose of 1 mrem/yr due to direct radiation from the existing units.
3. This site total dose includes the Unit 3 total dose and the dose from the existing units.
4. 1 mrem = 0.01 mSv
5. Unit 3 total annual doses include a Tubine Building skyshine contribution of less than 1.66E-04 mrem/yr.

Table 5.4-6 Comparison of Site Doses (mrem/yr) to the MEI

Type of Dose	ESP Site Total (1)	North Anna Unit 3 (ESBWR)			Existing Units (2)	Site Total (3)	40 CFR 190 Limit
		Liquid	Gaseous	Total(5)			
Total Body (mrem/yr)	6.8	0.094	1.9	2.0	5.0	6.9	25
Thyroid (mrem/yr)	27	0.18	13	13	5.1	18	75
Bone (mrem/yr)	12	1.3	8.0	9.2	5.1	14	25

Notes:

1. The ESP site total doses are for two new units and the two existing units, and do not include a dose contribution from the ISFSI.
2. The doses from existing units include ISFSI contribution and an assumed dose of 1 mrem/yr due to direct radiation from the existing units.
3. This site total dose includes the Unit 3 total dose and the dose from the existing units.
4. 1 mrem = 0.01 mSv
5. Unit 3 total annual doses include a Turbine Building skyshine contribution of less than 1.66E-04 mrem/yr.

ENCLOSURE 7

Response to NRC RAI Letter 030

RAI Question 12.03-12.04-9

NRC RAI 12.03-12.04-9

The staff has identified the following items for which correction is requested.

a. Section 12.1.4 of the North Anna FSAR, the title of STD COL 1-3-A should read "Operational Considerations" instead of "Occupational Radiation Exposures".

b. The 3 COL Information Items listed in Section 12.5.4 of the North Anna FSAR do not agree with the numbering system listed in Section 12.5.4 of the ESBWR DCD. The correct numbering of these COL Information Items should be as follows:

* *COL 12.5-1-A Equipment, Instrumentation, and Facilities*
* *COL 12.5-2-A Compliance with 10 CFR 50.34(f)(2)(xxvii) and NUREG-0737 Item III.D.3.3*
* *COL 12.5-3-A Radiation Protection Program*

c. In Table 1.9-203 of the North Anna FSAR, Sections C.III.1 (12.2.1) and C.III.1 12.3.4) of RG 1.206 are addressed in the North Anna FSAR by COL information items. Therefore, the column labeled "Conformance Evaluation" for these entries in Table 1.9-203 should be modified to include the specific section of the North Anna FSAR where these issues are addressed.

d. There is an inconsistency between the "evaluation" sections of Tables 1.9-201 and Tables 1.9-202 of the North Anna FSAR with respect to compliance with the guidance contained in RG 1.16. Table 1.9-201 (section on SRP Section 12.5, acceptance criteria II.1) states that the North Anna FSAR conforms with Section 12.5 of the SRP with the exception that Sections C.1.b(2) and C.1.b(3) of RG 1.16 are no longer applicable to licensees. However, Table 1.9-202 states that the North Anna FSAR conforms to the guidance of RG 1.16, with no mention of the two sections of this RG which are no longer applicable. Correct the evaluation section of the reference to RG 1.16 in Table 9-202 to be consistent with the reference in Table 1.9-201.

e. In Table 1.9-202 of the North Anna FSAR, there are two errors in the RGs referenced in the "evaluation" column. For the entries for RGs 8.26 and 8.32, correct the references to "RG 8.20" to read "RG 8.26" and "RG 8.32", respectively.

Dominion Response

a. Dominion agrees with the staff on the recommended resolution. In Section 12.1.4, the title of STD COL 1-3-A will be revised to read "Operational Considerations".

b. Dominion agrees with the staff on the recommended resolution. The 3 COL Information Items listed in Section 12.5.4 will be revised to be consistent with the numbering system in DCD Section 12.5.4.

c. Dominion agrees with the staff on the recommended resolution. FSAR Table 1.9-203, "Conformance Evaluation" column will be revised to include the specific section of the FSAR where these issues are addressed. Section C.III.1 (12.2.1) will be revised to add "Addressed in DCD Section 12.2.1" in the "Conformance Evaluation"

column. Section C.III.1 (12.3.4) will be revised to add "Addressed in Sections 12.3 and 12.5" in the "Conformance Evaluation" column.

d. Dominion agrees with the staff on the recommended resolution. FSAR Table 1.9-202, RG 1.16 "Evaluation" column will be revised to include the exception of the reporting requirements so that the information in Table 1.9-202 is consistent with the information in Table 1.9-201.

e. Dominion agrees with the staff on the recommended resolution. FSAR Table 1.9-202 will be revised to correct the references in the "Evaluation" column. For the entry for RG 8.26, in the "Evaluation" column, "RG 8.20" will be revised to read "RG 8.26". For the entry for RG 8.32, in the "Evaluation" column, "RG 8.20" will be revised to read "RG 8.32".

Proposed COLA Revision

The FSAR will be revised as stated in the above response. These changes are as shown on the attached markup.

Markup of North Anna COLA

The attached markup represents Dominion's good faith effort to show how the COLA will be revised in a future COLA submittal in response to the subject RAI. However, the same COLA content may be impacted by revisions to the ESBWR DCD, responses to other COLA RAIs, other COLA changes, plant design changes, editorial or typographical corrections, etc. As a result, the final COLA content that appears in a future submittal may be somewhat different than as presented herein.

NAPS COL 1.9-3-A

Table 1.9-202 Conformance with Regulatory Guides

RG Number	Title	Revision	Date	RG Position	Evaluation
1.14	Reactor Coolant Pump Flywheel Integrity	Rev. 1	Aug-75	General	Not applicable
1.16	Reporting of Operating Information–Appendix A Technical Specifications	Rev. 4	Aug-75	General	Conforms with the following exceptions: Reporting per C.1.b(2) and C.1.b(3) is no longer required
1.20	Comprehensive Vibration Assessment Program for Reactor Internals During Preoperational and Initial Startup Testing	Rev. 3	Mar-07	C.1	Conforms.
				C.2	Conforms
				C.3	Conforms
1.21	Measuring, Evaluating, and Reporting Radioactivity in Solid Wastes and Releases of Radioactive Materials in Liquid and Gaseous Effluents from Light-Water-Cooled Nuclear Power Plants	Rev. 1	Jun-74	General	Conforms. Sections 11.4.2.3 (NEI 07-10) and 11.5.4.5 (NEI 07-09) provide descriptions of the PCP and ODCM, respectively. Implementation milestones are provided in Section 13.4.
1.22	Periodic Testing of Protection System Actuation Functions	Rev. 0	Feb-72	General	Conforms. Operational program implementation is described in Section 13.4.
1.23	Meteorological Monitoring Programs for Nuclear Power Plants	Rev. 1	Mar-07	General	Exception. Conform to Proposed Revision 1 to RG 1.23. See SSAR Section 1.8.2.

NAPS COL 1.9-3-A

Table 1.9-202 Conformance with Regulatory Guides

RG Number	Title	Revision	Date	RG Position	Evaluation
8.26	Applications of Bioassay for Fission and Activation Products	Rev. 0	Sep-80	General	Exception. Per NUREG-1736, ~~RG 8.20~~ RG 8.26 is outdated. RG 8.9 is used. Operational program implementation is described in Section 13.4.
8.27	Radiation Protection Training for Personnel at Light-Water-Cooled Nuclear Power Plants	Rev. 0	Mar-81	General	Conforms. Operational program implementation is described in Section 13.4.
8.28	Audible-Alarm Dosimeters	Rev. 0	Jul-81	General	Conforms. Operational program implementation is described in Section 13.4.
8.29	Instruction Concerning Risks from Occupational Radiation Exposure	Rev. 1	Feb-96	General	Conforms. Operational program implementation is described in Section 13.4.
8.32	Criteria for Establishing a Tritium Bioassay Program	Rev. 0	Jul-88	General	Exception. Per NUREG-1736, ~~RG 8.20~~ RG 8.32 is outdated. RG 8.9 is used. Operational program implementation is described in Section 13.4.
8.33	Quality Management Program	Rev. 0	Oct-91	General	Not applicable to nuclear power plants. RG 8.33 applies to nuclear medicine.

NAPS COL 1.9-3-A

Table 1.9-203 Conformance With the FSAR Content Guidance In RG 1.206

Section	Section Title	Conformance Evaluation
C.III.1 11.5.2 (5)	System Description	Conforms. Addressed in DCD Sections 3.1 and 11.5.
C.III.1 11.5.2 (6)	System Description	Conforms
C.III.1 11.5.2 (7)	System Description	Conforms
C.III.1 11.5.3	Effluent Monitoring and Sampling	Conforms
C.III.1 11.5.4	Process Monitoring and Sampling	Conforms
C.III.1 12.1.1	Policy Considerations	Conforms. Addressed in Sections 12.1 and 12.5.
C.III.1 12.1.2	Design Considerations	Conforms. Addressed in Section 12.5.
C.III.1 12.1.3	Operational Considerations	Conforms. Addressed in Sections 12.1 and 12.5.
C.III.1 12.2.1	Contained Sources	Conforms. Addressed in DCD Section 12.2.1.
C.III.1 12.2.2	Airborne Radioactive Material Sources	Conforms
C.III.1 12.3.1	Facility Design Features	Conforms
C.III.1 12.3.2	Shielding	Conforms
C.III.1 12.3.3	Ventilation	Conforms. Addressed in DCD Sections 9.4.1 and 12.3.
C.III.1 12.3.4	Area Radiation and Airborne Radioactivity Monitoring Instrumentation	Conforms. Addressed in Sections 12.3 and 12.5.
C.III.1 12.3.5	Dose Assessment	Conforms. Addressed in DCD Section 12.4 and in Section 12.4.
C.III.1 12.4	Dose Assessment	Conforms
C.III.1 12.5 (1) (a)	Operational Radiation Protection Program: Organization	Conforms. Addressed in Sections 12.5 and 13.1.
C.III.1 12.5 (1) (b)	Facilities	Conforms

Chapter 12 Radiation Protection

12.1 Ensuring That Occupational Radiation Exposures Are ALARA

This section of the referenced DCD is incorporated by reference with the following departures and/or supplements.

Add the following at the beginning of this section.

STD SUP 12.1-1 The ALARA program is addressed in Appendices 12AA and 12BB.

12.1.1.3.1 Compliance with Regulatory Guide 8.8

Replace the first paragraph of this section with the following.

STD COL 12.1-4-A Compliance with Regulatory Guide 8.8 is addressed in Appendix 12BB.

12.1.1.3.2 Compliance with Regulatory Guide 8.10

Replace this section with the following.

STD COL 12.1-1-A Compliance with Regulatory Guide 8.10 is addressed in Appendix 12BB.

12.1.1.3.3 Compliance with Regulatory Guide 1.8

Replace this section with the following.

STD COL 12.1-2-A Compliance with Regulatory Guide 1.8 is addressed in Appendix 12BB.

12.1.3 Operational Considerations

Replace this section with the following.

STD COL 12.1-3-A ALARA program implementation is addressed in Appendix 12BB.

12.1.4 COL Information

12.1-1-A Regulatory Guide 8.10

STD COL 12.1-1-A This COL item is addressed in Section 12.1.1.3.2 and Appendix 12BB.

12.1-2-A Regulatory Guide 1.8

STD COL 12.1-2-A This COL item is addressed in Section 12.1.1.3.3 and Appendix 12BB.

12.1-3-A Operational Considerations

STD COL 12.1-3-A

This COL item is addressed in Section 12.1.3 and Appendix 12BB.

12.1-4-A Regulatory Guide 8.8

STD COL 12.1-4-A

This COL item is addressed in Section 12.1.1.3.1 and Appendix 12BB.

12.2 Plant Sources

This section of the referenced DCD is incorporated by reference with the following departures and/or supplements.

12.2.1.5 Other Contained Sources

Replace this section with the following.

STD COL 12.2-4-A

In addition to the contained sources identified above, additional contained sources which contain by-product, source, or special nuclear materials may be maintained on site. These contained sources are used as calibration, check, or radiography sources. These sources are not part of the permanent plant design, and their control and use are governed by plant procedures. The procedures consider the guidance provided in RG 8.8 to ensure that occupational doses from the control and use of the sources are as low as is reasonably achievable (ALARA).

Various types and quantities of radioactive sources are employed to calibrate the process and effluent radiation monitors, the area radiation monitors, and portable and laboratory radiation detectors. Check sources that are integral to the area, process, and effluent monitors consist of small quantities of by-product material and do not require special handling, storage, or use procedures for radiation protection purposes. The same consideration applies to solid and liquid radionuclide sources of exempt quantities or concentrations which are used to calibrate or check the portable and laboratory radiation measurement instruments.

Instrument calibrators are normally used for calibrating gamma dose rate instrumentation. These may be self-contained, heavily shielded, multiple source calibrators. Beta and alpha radiation sources are also available for instrument calibration. Calibration sources are traceable to the National Institute of Standards and Technology, or equivalent.

Radiography sources are surveyed upon entry to the site. Radiation protection personnel maintain copies of the most recent leak test records

- The current locations and readings for TLDs located closest to the Unit 3 site.
- The most recent effluent release data for Units 1 and 2 as reported in the 2006 Annual Radioactive Effluent Release Report (Reference 12.4-201).
- Spent fuel cask types planned for the onsite Independent Spent Fuel Storage Installation have changed.
- The estimated peak number of construction workers is now 2500-3000 (versus 5000 in the ESP-ER).

Based on the results of this review, it is concluded that the 120 person-rem calculated in the ESP-ER remains a conservative estimate of the maximum annual collective dose to the construction work force.

12.4.9 References

12.4-201 Annual Radioactive Effluent Release Report, January 1, 2006 – December 31, 2006, Dominion Virginia Power.

12.5 Operational Radiation Protection Program

This section of the referenced DCD is incorporated by reference with the following departures and/or supplements.

12.5.3 Operational Considerations

Replace this section with the following.

STD COL 12.5-1-A
STD COL 12.5-2-A
STD COL 12.5-3-A

The operational program for radiation protection is addressed in Appendix 12BB.

12.5.4 COL Information

12.5-1-A Equipment, Instrumentation, and Facilities

STD COL 12.5-1-A

This COL item is addressed in Appendix 12BB.

12.5-2-A Compliance with 10 CFR Part 50.34(f)(2)(xxvii) and NUREG-0737 Item III.D.3.3

STD COL 12.5-2-A

This COL item is addressed in Appendix 12BB.

12.5-3-A Radiation Protection Program

STD COL 12.5-3-A

This COL item is addressed in Appendix 12BB.

12.6 Minimization of Contamination and Radwaste Generation

This section of the referenced DCD is incorporated by reference with the following departures and/or supplements.

12.6.1 Minimization of Contamination to Facilitate Decommissioning

Add the following at the end of this section.

STD SUP 12.6-1

In addition to design features, measures are implemented in operating procedures to minimize contamination. Appendix 12BB establishes contamination control measures to ensure compliance with 10 CFR 20.1406. Practical measures to prevent the spread of contamination are employed, including:

- Engineering controls, such as portable ventilation or filtration units to reduce concentrations of radioactivity in air or fluids, are used where practical
- Criteria for selecting tools, material, and equipment for use in contaminated areas include minimizing the use of porous or other materials that are difficult to decontaminate
- Leaks and spills are contained promptly and repaired or cleaned up as soon as practical
- Containments, caches, and enclosures are used during maintenance, repairs, and testing, when practical, to contain spills or releases
- Contaminated tools and equipment are segregated from clean tools and equipment
- Potentially contaminated systems, equipment, and components are surveyed for the presence of contamination when opened or prior to removal
- Procedures ensure that equipment performs and is operated in accordance with the design requirements