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Dominion®

July 23, 2008

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

Serial No. NA3-08-055R
Docket No. 52-017
COL/MEP

DOMINION VIRGINIA POWER
NORTH ANNA UNIT 3 COMBINED LICENSE APPLICATION
RESPONSE TO REQUEST FOR ADDITIONAL INFORMATION LETTER NO. 007

On June 11, 2008, the NRC requested additional information to support the review of certain portions of the North Anna Unit 3 Combined License Application (COLA). The responses to the following RAIs are provided in Enclosures 1 through 7:

- RAI Question 09.03.02-1, Sampling Containment Atmosphere
- RAI Question 11.02-2, LWMS: Sampling Non-Radioactive Systems
- RAI Question 11.03-0, Gaseous Waste-CBA
- RAI Question 11.03-1, Bypassing Offsite Gas
- RAI Question 11.04-2, SWMS: Sampling Non-Radioactive Systems
- RAI Question 11.05-3, FSAR vs. ER: ODCM and NEI 07-09
- RAI Question 13.05.02.01-1, Management of Radioactive Wastes

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 007, RAI Question 09.03.02-1
2. Response to RAI Letter Number 007, RAI Question 11.02-2
3. Response to RAI Letter Number 007, RAI Question 11.03-0
4. Response to RAI Letter Number 007, RAI Question 11.03-1
5. Response to RAI Letter Number 007, RAI Question 11.04-2
6. Response to RAI Letter Number 007, RAI Question 11.05-3
7. Response to RAI Letter Number 007, RAI Question 13.05.02.01-1

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 23rd day of July, 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
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K. Ainger, Exelon
P. Smith, DTE

ENCLOSURE 1

Response to NRC RAI Letter 007

RAI Question 09.03.02-1

NRC RAI 09.03.02-1

FSAR Section 9.3.2.2 (System Description) references Section 11.5.3.2.12 of the ESBWR DCD Revision 4 regarding available provisions in sampling the containment atmosphere. This reference is incorrect since DCD Section 11.5.3.2.12 addresses the radiation monitoring system for the technical support center air intake. Accordingly, please correct the reference citation in FSAR Section 9.3.2.2.

Dominion Response

As stated in the RAI, Section 9.3.2.2 refers to DCD Section 11.5.3.2.12 for post-accident sampling of the containment atmosphere. The correct reference is DCD Section 11.5.3.2.11.

Proposed COLA Revision

Section 9.3.2.2 will be revised as indicated in the attached markup to reference DCD Section 11.5.3.2.11.

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.

9.3 Process Auxiliaries

9.3.1 Compressed Air Systems

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

9.3.2 Process Sampling System

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

9.3.2.2 System Description

Add the following at the end of this section.

STD COL 9.3.2-1-A

Post-Accident Sampling Program

The post-accident sampling program consists of the following:

- Emergency Operating Procedures that rely on Emergency Action Levels, defined in the Emergency Plan, are used to classify fuel damage events. These procedures rely on installed post-accident radiation monitoring instrumentation described in DCD Section 7.5 and do not require the capability to obtain and analyze highly radioactive coolant samples although sample analyses may be used for classification as well.
- Plant procedures contain instructions for obtaining highly radioactive grab samples from the following:

  Reactor Coolant - from the RWCU/SDC sample line using the Reactor Building Sample Station. These samples can be analyzed for the parameters indicated in DCD Table 9.3-1. If coolant activity is greater than 1.0 Ci/ml, handling of the samples is delayed to avoid overexposure of personnel.

  Suppression Pool - from FAPCS sample line at the Reactor Building Sample Station. These samples can be analyzed for the parameters indicated in DCD Table 9.3-1. If coolant activity is greater than 1.0 Ci/ml, handling of the samples is delayed to avoid overexposure of personnel.

  Containment Atmosphere - may be taken as described in DCD Section ~~11.5.3.2.12~~ 11.5.3.2.11 and analyzed for fission products.

ENCLOSURE 2

Response to NRC RAI Letter 007

RAI Question 11.02-2

NRC RAI 11.02-2

FSAR Section 11.2.2.3 presents an updated description of some portions of the Liquid Waste Management System (LWMS) on sampling of permanently installed non-radioactive plant systems in upstream locations of radioactive systems in avoiding uncontrolled and unmonitored releases to the environment. Staff review indicates there is no specific information describing such sampling provisions and where samples would be collected to confirm that clean plant systems have not been cross-contaminated by radioactive process streams, other than the Reactor Component Cooling Water System. Inclusion of such information in the FSAR would ensure that sampling provisions are clearly identified and not likely to be omitted in the sampling and analysis program for the plant-specific Offsite Dose Calculation Manual in confirming compliance with liquid effluent concentration limits of Table 2 in Appendix B to Part 20 and numerical objectives of Appendix I to Part 50. Accordingly, please supplement Section 11.2.2.3, or other appropriate FSAR sections, with such detailed sampling information.

Dominion Response

To meet the action required in IE Bulletin 80-10, the connecting systems that are non-radioactive by design are periodically sampled for contamination to verify no cross-contamination has occurred. As described in DCD 9.3.2, Process Sampling System, local grab sampling points are provided for certain non-radioactive plant systems, including the Reactor Component Cooling Water System, the Turbine Component Cooling Water System, the Plant Service Water System, the Chilled Water System and the Circulating Water System. The exact locations of these and additional sampling points will be determined as part of the detailed design of the standard plant.

The ODCM describes the sampling and analysis program and the dose calculation methodology for evaluating routine radioactive releases to the environment. The ODCM does not include the sampling and analysis program for detecting contamination in normally non-radioactive systems required by IE Bulletin 80-10. However, such sampling is routinely performed and, in accordance with the guidance of Regulatory Guide 1.109, exposure pathways that may arise due to unique conditions are considered if they are likely to provide a significant contribution to the total dose.

Proposed COLA Revision

To clarify the intent of the sampling program, the last sentence of the first paragraph of FSAR Section 11.2.2.3 will be replaced with the following:

> Plant procedures describe sampling of non-radioactive systems that could potentially become contaminated by cross-connection with systems containing radioactive material. In accordance with the guidance in Regulatory Guide 1.109, exposure pathways that may arise due to unique conditions are considered for incorporation into the plant specific ODCM if they are likely to provide a significant contribution to the total dose.

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.

- Labor Cost Correction Factor (LCCF) - Obtained from RG 1.110, Table A-4, this factor takes into account the relative labor cost differences among geographical regions. A factor of 1 (the lowest value) is assumed in this analysis.

A value of $1,000 per person-rem is prescribed in 10 CFR 50, Appendix I.

If it is conservatively assumed that each radwaste treatment system augment is a "perfect" technology that reduces the effluent dose by 100 percent, the annual cost of the augment can be determined and the lowest annual cost can be considered a threshold value. The lowest-cost option for augments is a 20 gpm cartridge filter at $11,380 per year, which yields a threshold value of 11.38 person-rem whole body or thyroid dose from liquid effluents.

The total body and thyroid doses to the population for the liquid effluents from Unit 3 are given in Section 12.2.2.4.2. None of the augments provided in RG 1.110 is found to be cost beneficial in reducing the annual population doses of 1.0 person-rem total body and 0.69 person-rem thyroid.

The lowest cost liquid radwaste augment is $11,380/year. Implementing this augment would cost $11,380 per person-rem in total body dose reduction, which exceeds the $1,000 per total body person-rem criterion prescribed in 10 CFR 50, Appendix I. Also, implementing this augment would cost $16,500 per person-rem in thyroid dose reduction which exceeds the $1,000 per person-thyroid-rem criterion prescribed in 10 CFR 50, Appendix I. Therefore, even this lowest-cost augment is not cost beneficial.

11.2.2.3 **Detailed System Component Description**

11.2.2.3.3 **Processing Systems**

Replace the first two paragraphs with the following.

STD COL 11.2-1-A

Specific equipment connection configuration and plant sampling procedures are used to implement the guidance in Inspection and Enforcement (IE) Bulletin 80-10 (DCD Reference 11.2-10). The permanent and mobile/portable non-radioactive systems, which are connected to radioactive or potentially radioactive portions of process LWMS, are protected from contamination with an arrangement of double

check valves in each line. The configuration of each line is also equipped with a tell-tale connection, which permits periodic checks to confirm the integrity of the line and its check valve arrangement. ~~Sampling of permanently installed clean system normal sample points further upstream is also included in the plant's sampling program.~~ Plant procedures describe sampling of non-radioactive systems that could become contaminated by cross-connection with systems that contain radioactive material. In accordance with the guidance in RG 1.109, exposure pathways that may arise due to unique conditions are considered for incorporation into the plant-specific ODCM if they are likely to contribute significantly to the total dose.

STD COL 11.2-2-A Section 12.6 discusses how ESBWR design features and procedures for operation will minimize contamination of the facility and environment, facilitate decommissioning, and minimize the generation of radioactive wastes, in compliance with 10 CFR 20.1406. Section 13.5 describes the requirement for procedures for operation of radioactive waste processing system. Operating procedures for LWMS process systems required by Section 12.4, Section 12.5, and Section 13.5 address the requirements of 10 CFR 20.1406.

11.2.6 COL Information

11.2-1-A Implementation of IE Bulletin 80-10

STD COL 11.2-1-A This COL item is addressed in Section 11.2.2.3.

11.2-2-A Implementation of Part 20.1406

STD COL 11.2-2-A This COL item is addressed in Section 11.2.2.3.

11.2.7 References

11.2-201 [Deleted]

11.2-202 OMB Circular A-94, "Guidelines and Discount Rates for Benefit-Cost Analysis of Federal Programs," October 29, 1992, Office of Management and Budget.

11.3 Gaseous Waste Management System

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

ENCLOSURE 3

Response to NRC RAI Letter 007

RAI Question 11.03-0

NRC RAI 11.03-0

FSAR Section 11.3.1, NAP ESP COL 11.1-1 incorporates by reference the current draft of NEI Template 07-11 and a supplemental analysis as the bases of the cost-benefit analysis intended to justify, in part, the design of the GWMS. NEI, however, withdrew NEI Template 07-11 from further consideration. As a result, NEI Template 07-11 is no longer relevant. Accordingly, please provide an updated plant- and site-specific cost-benefit analysis in FSAR Section 11.3.1 for the GWMS. This cost/benefit analysis should provide sufficient information for the staff to evaluate the bases and assumptions used in the analysis and to conduct an independent confirmation of compliance with NRC regulations and guidance.

Dominion Response

The use of draft NEI Template 07-11 will be removed from Section 11.3.1. The methodology for the cost-benefit analysis for radwaste systems specific to North Anna Unit 3 and the North Anna Power Station site will be provided in Section 11.2.1 in response to RAI 11.02-1. The bases and assumptions used in the analysis will be identified to allow independent confirmation of compliance with NRC regulations and guidance.

Information will be added in Section 11.3.1 demonstrating that the design of the Unit 3 Gaseous Waste Management System (GWMS) complies with the ALARA cost-benefit requirements of Section II.D of Appendix I to Title 10 of the Code of Federal Regulations, Part 50 (10 CFR 50).

The GWMS cost-benefit analysis follows the guidance in NRC Regulatory Guide (RG) 1.110, RG 1.206, and Standard Review Plan Section 11.3. This approach is consistent with the guidance provided in the letter from W.D. Reckley, NRC, to R. J. Bell, NEI, Suspension of Topical Report Nuclear Energy Institute 07-11, "Generic Template Guidance for Cost-Benefit Analysis for Radwaste Systems for Light-Water-Cooled Nuclear Power Reactors" (Project No. 689, TAC No. MD6940), March 19, 2008.

Proposed COLA Revision

Section 11.3.1 will be revised to refer to Section 11.2.1 for the methodology for performing the cost-benefit analysis which complies with NRC's guidance in RG 1.110. Section 11.3.1 will also present the results of the analysis for the Unit 3 GWMS. For reducing annual whole body dose, no GWMS augments are cost-beneficial based on the ALARA cost-benefit ratio requirement of Section II.D of Appendix I to 10 CFR 50.

For reducing annual thyroid doses, Section 11.3.1 will provide evaluations of the GWMS augments from RG 1.110. The GWMS augments are either not an effective technology to add to the ESBWR design, or are not cost-beneficial for reducing annual thyroid dose based on the ALARA cost-benefit ratio requirement of Section II.D of Appendix I to 10 CFR 50.

Note that changes shown in FSAR Section 11.3.1 to the thyroid doses from the various sources are due to changes in the source terms in ESBWR DCD Revision 5.

COLA Impact

FSAR Section 11.3.1 will be revised as indicated in 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.

11.3.1 Design Basis

Add the following ~~text~~ at the end of this section.

NAPS ESP
COL 11.1-1

The ~~guidance~~ methodology for performing cost-benefit analysis for the ~~gaseous~~ radwaste system is ~~addressed~~ 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.

~~The conclusions in NEI 07-11, Section 5, regarding annual dose estimates from gaseous effluents are as follows:~~

> ~~For light water reactors, applications with dose estimates less than the following values would not need to perform any further cost-benefit analysis to demonstrate compliance with 10 CFR 50, Appendix I, Section II.D:~~
>
> > ~~6.32 person-rem whole body or thyroid dose from gaseous effluents~~

As shown in Table 12.2-204, the Unit 3 annual whole body dose from gaseous effluents is ~~6~~ 7.7 person-rem/yr, which is below the ~~6.32~~ 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 ~~NEI 07-11~~ cost-benefit analysis demonstrates compliance with 10 CFR 50, Appendix I, Section II.D, ~~without further cost-benefit analysis~~ for this type of dose.

As shown in the table below, the Unit 3 thyroid dose from gaseous effluents is ~~39.3~~ 28 person-rem/yr, which exceeds the ~~6.32~~ 7.96 person-rem/yr threshold value for a BWR. Because the Unit 3 estimate exceeds ~~the NEI 07-11~~ this threshold value, further analysis is provided below.

Source	Thyroid Dose (person-rem/year)	% of Total
Iodines	~~3.36E+01~~ 20	~~85.5%~~ 72.9
Particulates	~~6.45E-01~~ 0.65	~~1.6%~~ 2.3
Noble gases	~~1.36E+00~~ 1.5	~~3.5%~~ 5.4
C-14	~~3.51E+00~~ 5.1	~~8.9%~~ 18.6
H-3	~~2.02E-01~~ 0.20	~~0.5%~~ 0.7
Total	~~3.93E+01~~ 28	100.0%

The cost-benefit analysis ~~performed~~ described in ~~NEI 07-11~~ Section 11.2.1 is based on RG 1.110~~. The "Cost Benefit Analysis For Radwaste Systems Light Water Cooled Nuclear Power Reactors Work Sheet" in NEI 07-11~~, which provides the gaseous radwaste augments to be considered for Unit 3. Based on the estimated ~~39.3~~ 28 person-rem/year thyroid dose, those augments with a "Total Annual Cost" less than $~~39,300~~ 28,000 are considered below.

~~**15,000 cfm Charcoal/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 exceeds the 7079 l/sec (15,000 cfm) charcoal filtration system specified in NEI 07-11 by at least a factor of two. As a result, this option is not effective for Unit 3 and is eliminated from further consideration.~~

~~**15,000 cfm Charcoal/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 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 option is not effective for Unit 3 and is eliminated from further consideration.~~

~~**Charcoal Vault Refrigeration**~~

~~Charcoal vault refrigeration would improve the performance of the offgas system (OGS) which uses activated charcoal absorber beds to minimize and control the release of radioactive material into the atmosphere by delaying release of the offgas process stream. The OGS is the only system with charcoal absorber beds for treatment of normal operating gaseous effluents. DCD Table 12.2-16 shows that the annual airborne releases from the offgas system represent only 3.6 percent of the total estimated annual airborne releases from Unit 3. Refrigeration of the charcoal vault would improve the holdup times of the noble gas isotopes, but those isotopes only contribute 3.5 percent to the thyroid dose. Therefore, charcoal vault refrigeration could make a maximum improvement of 0.13 percent of the 39.3 person-rem/year thyroid dose, or 0.05 person-rem/year. The $27,170/year cost of the charcoal vault refrigeration augment divided by the annual dose reduction of 0.05 person-rem/year, results in an estimated cost of over $500,000/person-rem saved. This augment exceeds the cost-benefit ratio of $1000/person-rem prescribed in NEI 07-11 and is eliminated from further consideration.~~

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

~~As discussed above~~ 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 ~~through the CONAVS and REPAVS exhaust fans~~ exceed the proposed 7079 l/sec (15,000 cfm) HEPA filtration system. Therefore, this ~~option~~ augment is not effective for Unit 3 and is eliminated from further consideration.

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

~~As discussed above, the normal flow rates through the turbine building exhaust fans are assumed to exceed the proposed 7079 l/sec~~

~~(15,000 cfm) HEPA filtration system.~~ 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 ~~option~~ augment is not effective for Unit 3 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.~~

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 ~~3.6~~ about 4 percent of the total annual airborne releases from Unit 3. Additional charcoal adsorbers would improve the holdup times of the ~~xenon and krypton isotopes~~ noble gases and C-14, but those only contribute ~~3.5~~ approximately 24 percent to the thyroid dose. Therefore, additional charcoal adsorber material could make a maximum improvement of ~~0.13~~ 0.96 percent of the ~~39.3~~ 28 person-rem/year thyroid dose, or ~~0.05~~ 0.27 person-rem/year. The $~~8,770~~ 9,450/year cost of the 3-ton charcoal adsorber augment divided by the annual dose reduction of ~~0.05~~ 0.27 person-rem/year, results in an estimated cost of over $~~175,000~~ 35,000/person-rem saved. This augment exceeds the cost-benefit ratio of $1000/person-rem prescribed in ~~NEI 07-11~~ 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 ~~0.6~~ approximately 0.7 percent of the total annual airborne iodine releases from Unit 3. Because the iodines contribute ~~85.5~~ about 73 percent to the ~~39.3~~ 28 person-rem/year thyroid dose, this

represents a maximum improvement of 0.5 percent to the thyroid dose, or ~~0.2~~ 0.14 person-rem-year. The ~~$7,690~~ 8,170/year cost of the MCVP HEPA filtration system augment divided by the annual dose reduction of ~~0.2~~ 0.14 person-rem/year, results in an estimated cost of over ~~$38,000~~ 58,000/person-rem saved. This augment exceeds the cost-benefit ratio of $1000/person-rem prescribed in ~~NEI 07-11~~ 10 CFR 50, Appendix I, and is eliminated from further consideration.

~~**1000 cfm Charcoal/HEPA Filtration System**~~

~~As discussed above for other charcoal/HEPA filtration systems, the Unit 3 building exhaust system flow rates greatly exceed 472 l/sec (1000 cfm). Therefore, this option is not effective for Unit 3 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 time is not sufficient even for short half-life noble gas decay and subsequent dose reduction. Therefore, this ~~option~~ augment is not effective for Unit 3 and is eliminated from further consideration.

1000 cfm Charcoal/HEPA Filtration System

As discussed above for ~~other charcoal/~~ 15,000 cfm HEPA filtration systems, the Unit 3 building exhaust system flow rates greatly exceed 472 l/sec (1000 cfm). Therefore, this ~~option~~ 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.

ENCLOSURE 4

Response to NRC RAI Letter 007

RAI Question 11.03-1

NRC RAI 11.03-1

Staff review of FSAR Section 11.3.1 indicates that the operation of the Gaseous Waste Management System does not address a provision that allows the full bypass of the Offgas System (OGS) charcoal adsorber beds, as described in ESBWR DCD, Revision 4, Section 11.3.2.1 (Pages11.3-7). The ESBWR DCD OGS design provides the capability to bypass all charcoal adsorber beds under two conditions, "when fuel performance allows," and when "resulting activity release is acceptable." FSAR Section 11.3.1 does not acknowledge this provision of the ESBWR design and does not identify methods (e.g., operating procedures or OGS permissive interlocks) to control an inadvertent bypass of all charcoal beds that could result in gaseous effluent releases exceeding NRC regulatory limits. To address Part 50.34a and 50.36a in complying with offsite gaseous effluent concentration limits of Appendix B (Table 2, Column 1) to Part 20 and numerical guides of Section II of Appendix I to Part 50, please revise FSAR Section 11.3.1 to include the following: 1) description of operational plant conditions and criteria on allowable fuel performance and radioactivity releases (as noble gases, iodines, and particulates) that would allow a full bypass of the OGS charcoal adsorber beds; 2) operational controls that would be used for the activation of this feature; and, 3) description of procedures and/or system interlocks that would be used to avoid the inadvertent activation of the OGS charcoal adsorber bed bypass.

Dominion Response

The Gaseous Radwaste Management System (Offgas System) as described in the DCD has provisions for bypassing the charcoal adsorbers and is incorporated by reference into FSAR Section 11.3. The DCD states that although operation of the OGS in this mode is not normal for power operation, it may be used if the resulting activity release is acceptable.

Operation in this mode is acceptable as long as the release conditions stated in the Offsite Dose Calculation Manual (ODCM) Program Description, FSAR Section 11.5.4.5, are met. Section 6.3.5 of the ODCM Program Description provides guidance as to when the OGS shall be placed into service and also provides limitations on operation in the bypass mode. These limitations are based on projected gaseous effluent air doses due to gaseous effluent releases to areas at and beyond the site boundary. Fuel performance is taken into account when it is desired to place the OGS in bypass because primary coolant activity is a contributor to this dose projection.

Operational controls required in this mode are controlled by plant procedures. Plant procedures require that the limits specified in the ODCM Program Description are adhered to and that proper operations management approval is obtained prior to placing the OGS in the bypass mode.

The system interlocks that are included in the system design will protect the environment and public during operation in this mode. As described in DCD Rev 5 Section 11.3.7.1, the OGS automatically places the OGS in the treat mode (taking the system out of bypass mode) if the radioactivity levels in the OGS process gas downstream of the charcoal beds exceeds the High-High setpoint. Normal operation of the OGS takes place

in the treat mode. The treat mode provides for an alignment to send process flow through one guard bed and the remaining charcoal adsorbers.

As described in DCD Rev 5 Section 11.3.2.5.10, the design of the OGS bypass valve arrangement is such that no single valve failure or valve mis-operation would allow total charcoal bypass. Further, as described in DCD Rev 5 Section 11.3.7.1, bypassing all tanks requires the operator to key in the command with two separate permissives. Because the bypass of all charcoal beds would require both operator error (keying in the wrong command) and receiving two specific permissives for the incorrect decisions, it is assumed not credible.

Even in the event of multiple operator errors, design of the system provides protection against inadvertent bypass of charcoal beds. Downstream of the charcoal beds (shown on DCD Rev 5 Figure 11.3-1) are a series of two redundant radiation monitoring instruments and an air-operated isolation valve. Upon receiving a High signal, the system alarms in the MCR. A High-High signal causes the system to automatically re-align to process offgas flow through both the guard beds and the charcoal beds. Therefore, bypass of the charcoal beds during periods with significant radioactive flow through the OGS are limited and/or automatically terminated by actuation of the downstream sensors. A High-High-High signal isolates flow through the OGS. (DCD Rev 5, Section 11.3.7.1)

Proposed COLA Revision

None

ENCLOSURE 5

Response to NRC RAI Letter 007

RAI Question 11.04-2

NRC RAI 11.04-2

FSAR Section 11.4.2.3 presents an updated description of some portions of the Solid Waste Management System (SWMS) on sampling of permanently installed non-radioactive plant systems in upstream locations of radioactive systems in avoiding uncontrolled and unmonitored releases to the environment. Staff review indicates there is no specific information describing such sampling provisions and where samples would be collected to confirm that clean plant systems have not been cross-contaminated by radioactive process streams. Such information would ensure that such provisions are clearly identified and not likely to be omitted in the sampling and analysis program for the plant specific Offsite Dose Calculation Manual in confirming compliance with liquid effluent concentration limits of Table 2 in Appendix B to Part 20 and numerical objectives of Appendix I to Part 50. Accordingly, please supplement Section 11.4.2.3, or other appropriate FSAR sections, with such detailed sampling information.

Dominion Response

To meet the action required in IE Bulletin 80-10, the connecting systems that are non-radioactive by design are periodically sampled for contamination to verify no cross-contamination has occurred. As described in DCD 9.3.2, Process Sampling System, local grab sampling points are provided for certain non-radioactive plant systems, including the Reactor Component Cooling Water System, the Turbine Component Cooling Water System, the Plant Service Water System, the Chilled Water System and the Circulating Water System. The exact locations of these and additional sampling points will be determined as part of the detailed design of the standard plant.

The ODCM describes the sampling and analysis program and the dose calculation methodology for evaluating routine radioactive releases to the environment. The ODCM does not include the sampling and analysis program for detecting contamination in normally non-radioactive systems required by IE Bulletin 80-10. However, such sampling is routinely performed and, in accordance with the guidance of Regulatory Guide 1.109, exposure pathways that may arise due to unique conditions are considered if they are likely to provide a significant contribution to the total dose.

Proposed COLA Revision

To clarify the intent of the sampling program, the last sentence of the second paragraph of FSAR Section 11.4.2.3.5 will be replaced with the following:

> Plant procedures describe sampling of non-radioactive systems that could potentially become contaminated by cross-connection with systems containing radioactive material. In accordance with the guidance in Regulatory Guide 1.109, exposure pathways that may arise due to unique conditions are considered for incorporation into the plant specific ODCM if they are likely to provide a significant contribution to the total dose.

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.

11.4.2.3 **Detailed System Component Description**

11.4.2.3.5 **Wet Solid Waste Processing Subsystems**

Replace the last three sentences of the second paragraph with the following ~~paragraphs~~.

STD COL 11.4-1-A

Testing of the SWMS includes testing specified in Table 1 of RG 1.143. Implementation of the programs described in Section 12.1, for maintaining occupational dose ALARA, and Section 12.5, Radiation Protection Program, ensure that operation, maintenance, and testing of the SWMS satisfy the guidance contained in RG 8.8.

STD COL 11.4-2-A

Specific equipment connection configuration and plant sampling procedures are used to implement the guidance in Inspection and Enforcement (IE) Bulletin 80-10 (DCD Reference 11.4-19). The permanent and mobile/portable non-radioactive systems, which are connected to radioactive or potentially radioactive portions of SWMS, are protected from contamination with an arrangement of double check valves in each line. The configuration of each line is also equipped with a tell-tale connection, which permits periodic checks to confirm the integrity of the line and its check valve arrangement. ~~Sampling of permanently installed clean system normal sample points further upstream is also included in the plant's sampling program.~~ Plant procedures describe sampling of non-radioactive systems that could potentially become contaminated by cross-connection with systems that contain radioactive material. In accordance with the guidance in RG 1.109, exposure pathways that may arise due to unique conditions are considered for incorporation into the plant-specific ODCM if they are likely to contribute significantly to the total dose.

STD COL 11.4-3-A

Waste classification and process controls are described in the PCP. NEI 07-10, "Generic FSAR Template Guidance for Process Control Program (PCP) Description," which is under review by the NRC, is incorporated by reference. (Reference 11.4-201) The milestone for development and implementation of the PCP is addressed in Section 13.4.

ENCLOSURE 6

Response to NRC RAI Letter 007

RAI Question 11.05-3

NRC RAI 11.05-3

SRP Section: 11.05 – Process and Effluent Radiological Monitoring Instrumentation and Sampling Systems FSAR Section 11.5.4.5, STD COL 11.5-2-A commits to the development of an Offsite Dose Calculation Manual (ODCM) using the final version of NEI Template 07-09. However, this commitment is inconsistent with the technical basis and approach presented in the Environmental Report - Combined License Stage (Part 3, Rev. 0, November 2007) and Early Site Permit Application (Part 3, Rev. 9, September 2006). Staff review identified the following inconsistencies: (a) the technical basis described in the North Anna ESP (Sect. 6.2.1, p.3-6-6) cites NUREG-0472 as the basis but this document is for PWR plant designs (applicable document is NUREG-1302, Offsite Dose Calculation Manual Guidance: Standard Radiological Effluent Controls for Boiling Water Reactors, given the change implemented under NRC Generic Letter 89-01 (Suppl. No. 1); and (b) the approach described in the North Anna ESP (Sect. 6.2.1, p.3-6-6) states that the programmatic elements of the radiological environmental monitoring program would be implemented through the existing ODCM for NAPS Unit 1 and 2. Accordingly, please clarify in FSAR Section 11.5.4.5 the commitment to NEI Template 07-09 relative to ODCM descriptions and commitments documented elsewhere.

Dominion Response

As noted in the subject RAI, the North Anna Unit 3 (NA3) Combined License Application (COLA) Final Safety Analysis Report (FSAR) has different reference documents than the North Anna Early Site Permit Application Environmental Report (ESPA-ER) for the basis for the Offsite Dose Calculation Manual (ODCM) and the Radiological Environmental Monitoring Program (REMP). However, these differences are not significant under the 10 CFR Part 52 new and significant process for identifying information to be included in the COLA-ER and, therefore, the updated references were not added to the COLA-ER.

That is, although the COLA-FSAR identifies that there will be different NRC regulatory guidance documents invoked when the REMP is established and implemented by the ODCM for Unit 3 (i.e., different from those identified in the ESPA-ER), the change in guidance documents would not affect the radiological impacts to the environment or the NRC's conclusion in the Final Environmental Impact Statement for the ESP site (ESP-FEIS) regarding radiological monitoring. For new information to be "significant" and addressed in the COLA-ER, it must be material to the issue being considered; that is, it must have the potential to affect the findings or conclusions of the NRC Staff's evaluation of the issue. See 72 FR 49431. For Unit 3, continuing to meet applicable NRC guidance (i.e., NUREG-1302 for an ESBWR) will ensure adequate radiological monitoring and NRC's conclusion in the ESP-FEIS would not change.

While there was no need to update the ESP-ER references, the COLA-FSAR must present the current licensing basis for the REMP and ODCM. COLA-FSAR Section 11.5.4.5 appropriately identifies the commitment to NEI Topical Report 07-09 with the template for a REMP and ODCM for Unit 3 as a BWR.

The RAI requests that a clarification be added in COLA-FSAR Section 11.5.4.5 to explain how the commitment to NEI Template 07-09 is different from and yet consistent with the ODCM basis document descriptions and commitments documented elsewhere (i.e., in the ESPA-ER). The explanation is provided above, but is inappropriate to add to COLA-FSAR Section 11.5.4.5 as it is tangential to the commitment to NEI 07-09 in COLA-FSAR Section 11.5.4.5. Also, the

information as currently presented is consistent with the FSAR content guidance in NRC Regulatory Guide 1.206. Therefore, no changes to the COLA FSAR are required.

Proposed COLA Revision

None.

ENCLOSURE 7

Response to NRC RAI Letter 007

RAI Question 13.05.02.01-01

NRC RAI 13.05.02.01-01

FSAR Section 13.5.2.2.1 provides a broad overview of illustrative functions that will be addressed by radiation protection procedures. However, it does not include the management of radioactive wastes for offsite shipment, disposal, and treatment. In comparison, the staff notes that Section 13.5.2.2.4 addresses chemistry procedures used to characterize the radiological properties of radioactive wastes and Section 13.5.2.2.5 focuses on onsite management activities of radioactive wastes. Accordingly, please revise Section 13.5.2.2.1 to include the management of radioactive wastes for offsite shipment, disposal, and treatment. In addition, please confirm, or revise, the citation of Section 13.5.2.1.1 in the last sentence of FSAR Section 13.5.2.2.5 as the appropriate reference.

Dominion Response

Section 11.4, Solid Waste Management System, incorporates by reference NEI 07-10, "Generic FSAR Template Guidance for Process Control Program (PCP) Description." NEI 07-10 addresses procedural requirements for aspects of the PCP including management of wastes for offsite shipment, disposal, and treatment. However, for clarification, Section 13.5.2.2.1 will be revised to include the management of radioactive wastes for offsite shipment, disposal, and treatment.

The procedures discussed in Section 13.5.2.2.5 are procedures used for operation of radwaste processing systems. These are classified as System Operating Procedures which are addressed in Section 13.5.2.1.1. The reference to Section 13.5.2.1.1 is appropriate. Therefore, no revision to the COLA is required for this item.

Proposed COLA Revision

Section 13.5 will be revised as indicated on 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.

for core alterations, monitoring core criticality status, accountability of fuel, and partial or complete refueling operations.

STD SUP 13.5-26

13.5.2.2 **Maintenance and Other Operating Procedures**

The QAPD provides guidance for procedural adherence.

STD SUP 13.5-27

13.5.2.2.1 **Plant Radiation Protection Procedures**

The plant radiation protection program is contained in procedures. Procedures are developed and implemented for such things as: maintaining personnel exposures, plant contamination levels, and plant effluents ALARA; monitoring both external and internal exposures of workers, considering industry-accepted techniques; performing routine radiation surveys; performing environmental monitoring in the vicinity of the plant; monitoring radiation levels during maintenance and special work activities; evaluating radiation protection implications of proposed modifications; management of radioactive wastes for offsite shipment, disposal, and treatment; and maintaining radiation exposure records of workers and others.

STD SUP 13.5-28

13.5.2.2.2 **Emergency Preparedness Procedures**

A discussion of emergency preparedness procedures can be found in the Emergency Plan. A list of implementing procedures is maintained in the Emergency Plan.

STD SUP 13.5-29

13.5.2.2.3 **Instrument Calibration and Test Procedures**

The QAPD provides a description of procedural requirements for instrumentation calibration and testing.

STD SUP 13.5-30

13.5.2.2.4 **Chemistry Procedures**

Procedures provided for chemical and radiochemical control activities include the nature and frequency of sampling and analyses; instructions for maintaining fluid quality within prescribed limits; the use of control and diagnostic parameters; and limitations on concentrations of agents that could cause corrosive attack, foul heat transfer surfaces or become sources of radiation hazards due to activation.

Procedures are also provided for the control, treatment, and management of radioactive wastes and control of radioactive calibration sources.