PMNorthAnna3COLPEmails Resource

From: Jean-Claude Dehmel
Sent: Wednesday, October 08, 2008 7:35 AM
To: Stephen Williams
Cc: Timothy Frye; NorthAnna3COL Resource
Subject: NA RAI Punch list

The attached file presents the current compilation of staff RAIs on the RCOLA.

North Anna 3 RAI Listing Sept ...

Regards, Jean-Claude ...
Office: 301-415-6619
Fax: 301-415-5399
Cell: 703-407-7784

Hearing Identifier: NorthAnna3_Public_EX
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Subject: NA RAI Punch list
Sent Date: 10/8/2008 7:35:28 AM
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From: Jean-Claude Dehmel

Created By: Jean-Claude.Dehmel@nrc.gov

Recipients:
"Timothy Frye" <Timothy.Frye@nrc.gov>
Tracking Status: None
"NorthAnna3COL Resource" <NorthAnna3COL.Resource@nrc.gov>
Tracking Status: None
"Stephen Williams" <Stephen.Williams@nrc.gov>
Tracking Status: None

Post Office: HQCLSTR01.nrc.gov

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North Anna 3 R-COLA
NRO/DCIP/CHPB RAI Punch List
on
FSAR Chapters 11 and 12, Rev. 0, Nov. 2007

The following presents a running list of RAIs generated during the review of Chapters 11 and 12 of the North Anna 3 R-COLA. This listing is a working compilation of draft RAIs prepared by CHPB staff and is used to prepare RAIs for input into the EPM-RAI database. These RAIs are pre-decisional and not final. Only the RAIs processed and listed in the EPM database and sent via NRC letters to the applicant are formal NRC RAIs.

File initiation: March 4, 2008. **Author:** Jean-Claude Dehmel, Sr. HP

Overview of NRC Request for Additional Information (RAI) Process

1. CHPB chapter lead writes draft RAIs, enters each into the EPM-RAI flow process, and sends RAIs to the CHPB Branch Chief. Each RAI has two components: a brief summary in plain language, and (b) the full technical version of the question.

2. CHPB chapter lead addresses and resolves any questions with CHPB Branch Chief.

3. CHPB Branch Chief, NRC Chapter PM, CHPB chapter lead, and Project PM may discuss question(s) with applicant, and NRC PM may decide to hold, revise, or issue question as a formal RAI.

4. For issuance to applicant, concurrence process includes CHPB Branch Chief, Chapter PM, Project PM, and Office of General Council before formal submission to applicant.

5. Once concurrence is complete, including CHPB chapter lead review of edited RAI, Project PM sends RAI to applicant as formal notification, via letter.

6. Applicant issues response to RAI, about 30 days after receipt of NRC letter. Other response time frames may be allowed by PM, as needed.

7. Staff evaluates response and discusses with Chapter PM and CHPB Branch Chief.

8. CHPB chapter lead closes RAI if fully satisfactory, may requests a call with the applicant for further input, clarification, or informs of rejection, and may issue a supplemental RAI, as needed.

9. If the RAI remains open, the issue and RAI are summarized in PSER with open items.

10. If the RAI is closed, it is tracked as a confirmatory item until the issue has been included in the next revision of the R/S-COLA and its inclusion is consistent with the resolution presented in the accepted RAI response.

A. Active RAIs

1. FSAR Sect. 12.2.2.2, Gaseous Effluent Dose Results

EPM date	EPM RAI/Q No.	NRC letter date	NRC letter No.	Appl. Question
3/4/08	20/25	3/20/08	001	12.02-1

RAI Summary: A review of FSAR Section 12.2.2.2 indicates two different offsite doses from gaseous effluents for the child thyroid. Please review the dose results presented in the FSAR and address this inconsistency. In addition, discuss how the correct does complies with the requirements of Appendix I to Part 50 for the child thyroid.

Full RAI: FSAR Section 12.2.2.2, p.12-3, states that offsite doses from gaseous effluents are in compliance with Sections II.B and II.C of Appendix I to Part 50. However, revised DCD Table 12.2-18br (FSAR, p.12-16) indicates that for gaseous effluents (radioiodines), the dose to child-thyroid is above Part 50 App. I criteria when summed up over all exposure pathways for the ESE Sector at 1191 m. The total dose from radioiodines in this sector is 16.95 mrem/yr, while the Part 50 App. I limit is 15 mrem/yr from all exposure pathways. The total projected dose for Unit 3 is due to the dose from the nearest garden (15 mrem/yr), inhalation at the nearest residence (1.6 mrem/yr), and nearest meat cattle (0.35 mrem/yr). These results are also inconsistent with FSAR Table 12.2-201 (p.12-21) which lists a dose of 14 mrem/yr for iodines and particulates for Unit 3, and FSAR Table 12.2-203 (p.12-23) which lists a gaseous dose of 15 mrem/yr for Unit 3. All other exposure groups and projected doses were found to be in compliance with App. I dose criteria. Similarly, data presented on compliance with gaseous and liquid effluent concentration limits of Part 20 App. B, Table 2 were found to be in compliance. In light of the above, please provide an explanation as to the reasons for the child-thyroid dose result to be in excess of the criteria of Section II.C of Appendix I to Part 50. Also note that under RAI 12.2-9S02, GEH is about to revise the gaseous effluent source terms in DCD Tier 2, Section 12.2.2.1. As a result, Dominion needs to assess the ramifications of the proposed changes to DCD Tier 2, Rev.5, Section 12.2.2.1 in revising FSAR Section 12.2.2.2 of the North Anna 3 R-COLA.

OGC Version:

Revised DCD Table 12.2-18br (FSAR, p.12-16) indicates the gaseous effluent (radioiodines) dose to the child-thyroid when summed up over all exposure pathways for the ESE Sector at 1191 m. The total dose from radioiodines in this sector is 16.95 mrem/yr. The total projected dose for Unit 3 is due to the dose from the nearest garden (15 mrem/yr), inhalation at the nearest residence (1.6 mrem/yr), and nearest meat cattle (0.35 mrem/yr). These results are inconsistent with FSAR Table 12.2-201 (p.12-21) which lists a dose of 14 mrem/yr for iodines and particulates for Unit 3, and FSAR Table 12.2-203 (p.12-23) which lists a gaseous dose of 15 mrem/yr for Unit 3. In light of the above, please explain the inconsistency between DCD Table 12.2-18br and Tables 12.2-201 and 12.2.203. Please provide corrections, if necessary, to resolve the inconsistency. Please explain how the child-thyroid dose, whether or not corrected, complies with the criteria of Section II.C of Appendix I to Part 50. Also note that as described in RAI 12.2-9S02, GEH is about to revise the gaseous effluent source terms in DCD Tier 2, Section 12.2.2.1. As a result, Dominion needs to assess the ramifications of the proposed changes to DCD Tier 2, Rev.5, Section 12.2.2.1 in revising FSAR Section 12.2.2.2 of the North Anna 3 R-COLA.2.

2. FSAR Sect. 11.2.1, Liquid Waste Management System - Cost-Benefit Analysis

EPM date	EPM RAI/Q No.	NRC letter date	NRC letter No.	Appl. Question
4/7/08	124/323.1	5/19/08	004	11.02-1

RAI Summary: FSAR Section 11.2.1, STD SUP 11.2-1 needs to present an updated cost-benefit analysis for the Liquid Waste Management System (LWMS) in demonstrating compliance with Appendix I to Part 50, given that NEI Template 07-11 has been withdrawn from further consideration by NEI.

Full RAI: FSAR Section 11.2.1, STD SUP 11.2-1 includes, by reference, draft NEI Template 07-11 as the basis of the cost-benefit analysis in justifying, in part, the design of the LWMS. The NEI template presents a bounding envelope of population doses associated with liquid effluent releases, which, if met, would demonstrate compliance with ALARA cost-benefit requirements of Section II.D of Appendix I to Part 50. However, NEI Template 07-11 has been withdrawn from further consideration by NEI. As a result, NEI Template 07-11 is no longer relevant and there is need to develop a plant and site-specific cost-benefit analysis demonstrating compliance with Section II.D of Appendix I to Part 50. Accordingly, provide an updated cost-benefit analysis in FSAR Section 11.2.1 for the LWMS and provide sufficient information for the staff to evaluate the bases and assumptions used in the analysis and for conducting an independent confirmation of compliance with NRC regulations and guidance.

3. FSAR Sect. 11.2, Liquid Waste Management System, 4/7/08, RAI 124, Q.323.2 Retracted at request of PM, 4/17/08. Hold and save for Phase 2 FSAR Rev. 1 review, based on DCD Rev. 5.

RAI Summary: FSAR Section 11.2 endorses the conceptual design and system features of the Liquid Waste Management System (LWMS) described in draft ESBWR DCD, Tier 2, Revision 4, Section 11.2. FSAR Section 11.2 needs to be updated to reflect the final design features of the LWMS, as described in the most current revision of the ESBWR DCD, Tier 2, Section 11.2.

Full RAI: With respect to liquid radioactive waste processing, FSAR Section 11.2 incorporates the conceptual design and features of the LWMS described in draft ESBWR DCD, Tier 2, Revision 4, Section 11.2. This approach is being revised by GEH in the currently proposed update (Rev. 5) of Chapter 11.2 of the ESBWR DCD by including specific LWMS design details for permanently installed subsystems not previously described in Revision 4 of the DCD. Accordingly, FSAR Section 11.2 needs to be revised and reflect specific endorsements and/or departures to the LWMS, which will be described in the next revision of the ESBWR DCD, Tier 2, Section 11.2. If departures or exceptions to the LWMS are taken in the FSAR when compared to the most current revision of the ESBWR DCD, provide the justification and supporting information for the staff to evaluate the technical and regulatory merits of such deviations for the purpose of conducting an independent confirmation of compliance with Part 50.34a and guidance of Chapter 11.2 of the Standard Review Plan (NUREG-0800) and Regulatory Guide 1.206. This information will be evaluated in conjunction with the staff's ongoing review of the ESBWR DCD, Tier 2, Section 11.2, as part of its final certification process.

4. FSAR Sect. 11.4.1, Solid Waste Management System

EPM date	EPM RAI/Q No.	NRC letter date	NRC letter No.	Appl. Question
4/7/08	125/324	5/19/08	004	11.04-1

1.A FSAR Sect. 11.4.1, Solid Waste Management System - Cost-Benefit Analysis

RAI Summary: FSAR Section 11.4.1 does not present a cost-benefit analysis for the Solid Waste Management System (SWMS) nor makes reference to the cost-benefit analyses presented in FSAR Sections 11.2.1 and 11.3.1 in processing and treating liquid and gaseous effluents, as by-products of processing solid wastes, in demonstrating compliance with Appendix I to Part 50.

Full RAI: FSAR Section 11.4.1 does not present a cost-benefit analysis for the SWMS nor makes reference to the cost-benefit analyses presented in FSAR Sections 11.2.1 and 11.3.1 in processing and treating liquid and gaseous effluents, as by-products of processing solid wastes, in demonstrating compliance with Section II.D of Appendix I to Part 50. This section of the FSAR should provide a justification for not including such an analysis or describe how the analyses presented for the LWMS and GWMS encompass the incremental amounts of liquid and gaseous effluents generated as by-products of solid waste processing. Accordingly, the applicant should revise FSAR Section 11.4.1 to include a cost-benefit analysis for the SWMS or provide the technical justification as to why the results presented in FSAR Sections 11.2 and 11.3 are adequately encompassing and in compliance with NRC regulations and guidance. Provide sufficient information for the staff to evaluate the bases and assumptions used in the analysis and for conducting an independent confirmation of compliance with NRC regulations and guidance.

1.B FSAR Sect. 11.4.2.3, Solid Waste Management System - Process Control Program

RAI Summary: FSAR Section 11.4.2.3, STD COL 11.4-3-A needs to update its commitment to the Process Control Program (PCP) described in draft NEI Template 07-10 against the final version of the template once issued by NEI.

Full RAI: FSAR Section 11.4.2.3, STD COL 11.4-3-A includes a commitment to the use of a Process Control Program (PCP), as an operational program document, based on draft NEI Template 07-10. The NEI template presents the functional elements of a PCP, which, if met, would demonstrate compliance with Part 50.34a and 50.36a. Accordingly, FSAR Section 11.4.2.3, STD COL 11.4-3-A needs to be updated as to its commitment to the final NEI PCP template once issued by NEI. Update internal citations of the final PCP template in all applicable FSAR subsections and references.

Edited version of item 2, 4/18/08

RAI Summary: The commitment in FSAR Section 11.4.2.3, STD COL 11.4-3-A to the Process Control Program (PCP) described in draft NEI Template 07-10 needs to be updated to a reference citing the final version of the PCP.

Full RAI: FSAR Section 11.4.2.3, STD COL 11.4-3-A includes a commitment to the use of the Process Control Program (PCP) as an operational program document, based on draft NEI

Template 07-10. The NEI template presents the functional elements of a PCP, which, if met, would demonstrate compliance with Part 50.34a and 50.36a. Accordingly, the commitment of FSAR Section 11.4.2.3, STD COL 11.4-3-A needs to be updated by referencing the final PCP, consistent with Regulatory Guide 1.206 and Section 11.4 of the Standard Review Plan (NUREG-0800). Update all internal citations to the final PCP in applicable FSAR subsections and references.

5. Former RAI No. 125/Q/324.2 subsumed in item 4 above

6. FSAR Sect. 11.4, Solid Waste Management System, 4/7/08, RAI 125, Q.324.3
Retracted at request of PM, 4/17/08.
Hold and save for Phase 2 FSAR Rev. 1 review, based on DCD Rev. 5.

RAI Summary: FSAR Section 11.4 endorses the conceptual design and system features of the Solid Waste Management System (SWMS) described in draft ESBWR DCD, Tier 2, Revision 4, Section 11.4. FSAR Section 11.4 needs to be updated to reflect the final design features of the SWMS, as described in the most current revision of the ESBWR DCD, Tier 2, Section 11.4.

Full RAI: With respect to solid radioactive waste processing, FSAR Section 11.4 incorporates the conceptual design and features of the SWMS described in draft ESBWR DCD, Tier 2, Revision 4, Section 11.4. This approach is being revised by GEH in the currently proposed update (Rev. 5) of Chapter 11.4 of the ESBWR DCD by including specific SWMS design details for permanently installed subsystems not previously described in Revision 4 of the DCD. Accordingly, FSAR Section 11.4 needs to be revised and reflect specific endorsements and/or departures to the SWMS described in the next revision of the ESBWR DCD, Tier 2, Section 11.4. If departures or exceptions to the SWMS are taken in the FSAR when compared to the most current revision of the ESBWR DCD, provide the justification and supporting information for the staff to evaluate the technical and regulatory merits of such deviations for the purpose of conducting an independent confirmation of compliance with Part 50.34a and guidance of Chapter 11.4 of the Standard Review Plan (NUREG-0800) and Regulatory Guide 1.206. This information will be evaluated in conjunction with the staff's ongoing review of the ESBWR DCD, Tier 2, Section 11.4, as part of its final certification process.

7. FSAR Sect. 11.3.1, Gaseous Waste Management System - Cost-Benefit Analysis

EPM date	EPM RAI/Q No.	NRC letter date	NRC letter No.	Appl. Question
4/7/08 8/13/08	126/325.1 1011/3560	007	6/11/08	11.03-0

RAI Summary: FSAR Section 11.3.1, NAPS ESP COL 11.1-1 needs to present an updated cost-benefit analysis for the Gaseous Waste Management System (GWMS) in demonstrating compliance with Appendix I to Part 50 given that NEI Template 07-11 has been withdrawn from further consideration by NEI.

Full RAI: FSAR Section 11.3.1, NAP ESP COL 11.1-1 includes, by reference, the current draft of NEI Template 07-11 and a supplemental analysis as the bases of the cost-benefit analysis in justifying, in part, the design of the GWMS. The NEI template presents a bounding envelope of population doses associated with gaseous effluent releases, which, if met, would demonstrate compliance with ALARA cost-benefit requirements of Section II.D of Appendix I to Part 50. However, NEI Template 07-11 has been withdrawn from further consideration by NEI. As a result, NEI Template 07-11 is no longer relevant and the applicant needs to develop a plant and

site-specific cost-benefit analysis demonstrating compliance with Section II.D of Appendix I to Part 50. Accordingly, provide an updated cost-benefit analysis in FSAR Section 11.3.1 for the GWMS and provide sufficient information for the staff to evaluate the bases and assumptions used in the analysis and for conducting an independent confirmation of compliance with NRC regulations and guidance.

Supplemental Questions to Dominion's Response to NRC RAI Letter No. 007 on RAI No. 11.03-0. See Dominion Letter NA3-08-055R, dated July 23, 2008.

Full RAI: Staff RAI 11.03-0 and Dominion's response addresses 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:

1) 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.

2) 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.

3) The discussion and rationale for excluding the 600 ft3 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.

4) 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.

OGC Edited Version, 9/2/08

Supplemental questions to Dominion's response to NRC RAI Letter No. 007 on RAI No. 11.03-0. See Dominion Letter NA3-08-055R, dated July 23, 2008.

Full RAI: Staff RAI 11.03-0 and Dominion's response addresses 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:

1) 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.

2) 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.

3) The discussion and rationale for excluding the 600 ft3 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.

4) 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.

8. FSAR Sect. 11.3.1, Gaseous Waste Management System, 4/7/08, RAI 126

EPM date	EPM RAI/Q No.	NRC letter date	NRC letter No.	Appl. Question
4/7/08 5/14/08	126/325.2/639 312/1027	n/a 6/11/08	n/a 007	n/a 11.03-1

RAI Summary: A review of FSAR Section 11.3.1 indicates that the operation of the Gaseous Waste Management System (GWMS) does not address the regulatory implications of allowing a full bypass of the Offgas System (OGS) charcoal adsorber beds against the requirements of Part 50.34a and 50.36a in complying with offsite gaseous effluent concentration limits of Appendix B to Part 20 and numerical guides of Appendix I to Part 50.

Full RAI: A 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, Tier 2, Revision 4,

Section 11.3.2.1 (p.11.3-7). 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. This mode of operation could result in gaseous effluent releases exceeding NRC regulatory limits. The implementation of such a design feature should be evaluated against the requirements of 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. Accordingly, FSAR Section 11.3.1 should be revised to include (i) a 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, (ii) operational controls that would be used for the activation of this feature, and (iii) a description of procedures and/or system interlocks that would be used to avoid the inadvertent activation of the OGS charcoal adsorber bed bypass.

9. FSAR Sect. 11.5.4.5, Offsite Dose Calculation Manual

EPM date	EPM RAI/Q No.	NRC letter date	NRC letter No.	Appl. Question
4/7/08	127/326	5/19/08	004	11.05-1

RAI Summary: FSAR Section 11.5.4.5, STD COL 11.5-2-A needs to update its commitment to the Offsite Dose Calculation Manual (ODCM) described in draft NEI Template 07-09 against the final version of the template once issued by NEI.

Full RAI: FSAR Section 11.5.4.5, STD COL 11.5-2-A includes a commitment to the use of an Offsite Dose Calculation Manual (ODCM), as an operational program document, based on draft NEI Template 07-09. The NEI template presents the functional elements of an ODCM, which, if met, would demonstrate compliance with Part 50.34a, 50.36a, and Appendix I to Part 50. Accordingly, FSAR Section 11.5.4.5, STD COL 11.5-2-A needs to be updated as to its commitment to the final NEI ODCM template once issued by NEI. Update internal citations of the final ODCM template in all applicable FSAR subsections and references.

OGC Version: -See next version below

RAI Summary: The commitment in FSAR Section 11.5.4.5, STD COL 11.5-2-A to the Offsite Dose Calculation Manual (ODCM) described in draft NEI Template 07-09 needs to be updated to reference a final version of the template that might ultimately be approved by the NRC and issued by NEI.

Full RAI: FSAR Section 11.5.4.5, STD COL 11.5-2-A includes a commitment to the use of an Offsite Dose Calculation Manual (ODCM), as an operational program document, based on draft NEI Template 07-09. The NEI template is currently under NRC staff review. The NEI template is intended to present the functional elements of an ODCM that, if met, would demonstrate compliance with 10 CFR 50.34a, 50.36a, and Part 50, Appendix I. Accordingly, the commitment in FSAR Section 11.5.4.5, STD COL 11.5-2-A needs to be updated to reference a final NEI ODCM template that might ultimately be approved by the NRC and issued by NEI. Internal citations to the ODCM template in all applicable FSAR subsections and references need to be updated consistent with the above.

Edit of OGC version at request of PM, 4/17/08

RAI Summary: The commitment in FSAR Section 11.5.4.5, STD COL 11.5-2-A to the Offsite Dose Calculation Manual (ODCM) described in draft NEI Template 07-09 needs to be updated to a reference citing the final version of the ODCM.

Full RAI: FSAR Section 11.5.4.5, STD COL 11.5-2-A includes a commitment to the use of an Offsite Dose Calculation Manual (ODCM), as an operational program document, based on draft NEI Template 07-09. The NEI template presents the functional elements of an ODCM, which, if met, would demonstrate compliance with Part 50.34a, 50.36a, and Appendix I to Part 50. Accordingly, the commitment of FSAR Section 11.5.4.5, STD COL 11.5-2-A needs to be updated by referencing the final ODCM, consistent with Regulatory Guide 1.206 and Section 11.5 of the Standard Review Plan (NUREG-0800). Update all internal citations to the final ODCM in applicable FSAR subsections and references.

10. FSAR Sect. 11.5.4.6, Process and Effluent Monitoring Program

EPM date	EPM RAI/Q No.	NRC letter date	NRC letter No.	Appl. Question
4/9/08	142/371	5/19/08	004	11.05-2

RAI Summary: FSAR Section 11.5.4.6, on process and effluent monitoring and sampling, presents information in Table 11.5-201 on sampling for several North Anna Unit 3 plant systems. A review of the information indicates that Table 11.5-201 footnotes describing sampling provisions and how process streams would be treated in the event of radioactive cross-contamination are inconsistent for three listed systems.

Full RAI: FSAR Section 11.5.4.6, on process and effluent monitoring and sampling, presents information in Table 11.5-201 on sampling for several North Anna Unit 3 plant systems, including the plant service water system (item 2), storm drains and cooling tower blowdown (item 11), and sanitary waste water (item 14). A review of the information indicates internal inconsistencies in describing sampling provisions and where the supporting information may be found in the DCD and/or FSAR. The observations are:

(a) Plant Service Water System (PSWS, line item 2) - For this system, footnotes No. 6 and 8 of Table 11.5-201 are provided in clarifying sampling provisions and how this sampling stream would be treated through the liquid waste management system (LWMS). However, a review of MFN 06-417 (Supp. 4) indicates that in response to DCD RAI 9.2-8 S02, footnote 8 is being replaced with footnote 4, but Table 11.5-201 does not reflect that change. Accordingly, update FSAR Table 11.5-201, line item 2 for the PSWS, to include the proper footnote citations. This information would ensure that such provisions are clearly identified in the FSAR and not likely to be omitted during the development of 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.

(b) Storm Drains and Cooling Tower Blowdown (line item 11) – For these systems, footnote No. 4 of Table 11.5-201 does not refer to specific sampling provisions for these two systems, such as sampling points or installation of automatic composite samplers. A review of FSAR Sections 11.5, 9.2, and 10.4 indicates that no such provisions are provided for either system. Confirm whether this observation is correct and update FSAR Sections 11.5, 9.2, and 10.4 by providing specific references to DCD and/or FSAR sections where this information is presented, and, if not, supplement the

appropriate FSAR sections with additional design details. This information would ensure that such provisions are clearly identified in the FSAR and not likely to be omitted during the development of 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.

(c) Sanitary Waste Water System (line item 14) – For this system, a new footnote should be added to the system's line item 14 (Col. 3 in Table 11.5-201) indicating that composite samplers are installed in the sanitary waste discharge lines to the sewage treatment plant for the purpose of detecting the presence of radioactivity, based on FSAR Section 9.2.4.2. This information would ensure that such provisions are clearly identified in the FSAR and not likely to be omitted during the development of 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.

11. FSAR Sect. 11.2.2.3, Liquid Waste Management System - Detailed System Component Description

EPM date	EPM RAI/Q No.	NRC letter date	NRC letter No.	Appl. Question
4/9/08	143/373	6/11/08	007	12.02-2

RAI Summary: 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 system in upstream locations. A review of that information indicates that sampling provisions and where samples would be collected in the event of radioactive cross-contamination are incomplete as to where the supporting information is located in DCD and /or FSAR sections.

Full RAI: 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 system in upstream locations of radioactive systems in avoiding uncontrolled and unmonitored releases to the environment. A review of that information indicates that 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. Accordingly, update FSAR Section 11.2.2.3 with specific references to DCD and/or other FSAR sections where this information is provided and, if not, supplement the appropriate FSAR sections with additional engineering design details. This information would ensure that such provisions are clearly identified in the FSAR and not likely to be omitted during the development of 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.

12. FSAR Sect. 11.4.2.3, Solid Waste Management System - Detailed System Component Description

EPM date	EPM RAI/Q No.	NRC letter date	NRC letter No.	Appl. Question
4/9/08	145/377	6/11/08	007	11.04-2

RAI Summary: 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 system in upstream locations. A review of that information indicates that sampling provisions and where samples would be collected in the event of radioactive cross-contamination are incomplete as to where the supporting information is located in DCD and /or FSAR sections.

Full RAI: 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 system in upstream locations of radioactive systems in avoiding uncontrolled and unmonitored releases to the environment. A review of that information indicates that 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. Accordingly, update FSAR Section 11.4.2.3 with specific references to DCD and/or other FSAR sections where this information is provided, and, if not, supplement the appropriate FSAR sections with additional engineering design details. This would ensure that such provisions are clearly identified in the FSAR and not likely to be omitted during the development of 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.

13. FSAR Sect. 12.2.2.4.4, Compliance with 10 CFR Part 20.1301 and 20.1302

EPM date	EPM RAI/Q No.	NRC letter date	NRC letter No.	Appl. Question
4/10/08	196/548	6/19/08	011	12.02-2

RAI Summary: FSAR Section 12.2.2.4.4, Compliance with 10 CFR Part 20.1301 and 20.1302, presents an updated analysis of doses to the maximally exposed individual and compares dose results against the dose standards of 40 CFR Part 190 and 10 CFR Part 20.1301(e). A review of that information indicates that it is not clear if the analysis considered increased external radiation levels at the nearest residence due to the use of hydrogen water chemistry with that of all other sources of external radiation from plant buildings and systems.

Full RAI: FSAR Section 12.2.2.4.4, Compliance with 10 CFR Part 20.1301 and 20.1302, presents an updated analysis of doses to the maximally exposed individual and compares dose results against the EPA environmental dose standards of 40 CFR Part 190, as implemented under Part 20.1301(e). The discussion is presented on FSAR page 12-7 and the results are shown in Table 12.2-203. Although the discussion points out that the dose from direct external radiation has been considered in the evaluation, it is not clear if the analysis did consider increased external radiation levels at the nearest residence associated with the use of hydrogen water chemistry. The FSAR discussion addresses annual dose rates at the EAB (ESE at 1416 m), while the distance to the nearest resident is closer in to the site (ESE at 1191 m). DCD Tier 2, Revision 4, Section 12.2.1.3 acknowledges increased external radiation levels whenever hydrogen water chemistry is used and presents the results of a generic analysis (Table 12.2-21) using arbitrary site conditions and distance only for the EAB. Accordingly, update the North Anna Unit 3 plant and site-specific analysis to demonstrate that, when added to the dose contribution from all other direct sources of external radiation to the nearest residence, the sum of direct sources of radiation will not exceed the dose standards of 40 CFR Part 190 and 10 CFR Part 20.1301(e). Update FSAR Section 12.2.2.4.4 with the results of a plant and site-specific analysis and provide sufficient information for the staff to evaluate the bases and

assumptions used in this analysis for the purpose of conducting an independent confirmation of compliance with NRC and EPA regulations.

14. FSAR Section 9.3.2, Process Sampling System

EPM date	EPM RAI/Q No.	NRC letter date	NRC letter No.	Appl. Question
5/6/08	281/967	06/11/08	007	9.03-02-1

RAI Summary: FSAR Subsection 9.3.2.2 references an inappropriate subsection of chapter 11.5 of the ESBWR DCD, Tier 2, regarding provisions used for the sampling of containment atmosphere.

Full RAI: FSAR Subsection 9.3.2.2 (System Description) references incorrectly to Section 11.5.3.2.12 of the ESBWR DCD (Tier 2) regarding available provisions in sampling the containment atmosphere. This subsection of the ESBWR DCD addresses the radiation monitoring system for the technical support center air intake. Accordingly, update the reference citation in FSAR subsection 9.3.2.2 with the proper DCD Tier 2, Chapter 11.5 subsection addressing provisions for the sampling of containment atmosphere.

15. FSAR Section 13.5.2.2.1, Plant Radiation Protection Procedures

EPM date	EPM RAI/Q No.	NRC letter date	NRC letter No.	Appl. Question
5/8/08	284/975	06/11/08	007	13.05.02.01-1

RAI Summary: FSAR Subsection 13.5.2.2.1 provides an incomplete description of the scope of radiation protection procedures.

Full RAI: Although FSAR Subsection 13.5.2.2.1 provides a broad overview of illustrative functions that will be addressed by radiation protection procedures, it fails to include in its listing the management of radioactive wastes for offsite shipment, disposal, and treatment. Note that FSAR Section 13.5.2.2.4 addresses itself to chemistry procedures used to characterize the radiological properties of radioactive wastes and FSAR Section 13.5.2.2.5 focuses on onsite management activities of radioactive wastes. Accordingly, update the listing of illustrative functions in FSAR Section 13.5.2.2.1 to include the management of radioactive wastes for offsite shipment, disposal, and treatment. Finally, confirm whether the citation of FSAR Section 13.5.2.1.1 in the last sentence of FSAR Section 13.5.2.2.5 should be instead referring to FSAR Section 13.5.2.2.1 as being a more appropriate reference, given the specific topic.

16. FSAR Sect. 11.5.4.5, Offsite Dose Calculation Manual

EPM date	EPM RAI/Q No.	NRC letter date	NRC letter No.	Appl. Question
5/14/08	314/1030	06/11/08	007	11.05-3

RAI Summary: 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 Applicant's Environmental Report - Combined License Stage (Part 3, Rev. 0, November 2007) and Early Site Permit Application (Part 3, Rev. 9, September 2006).

Full RAI: 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 Applicant's Environmental Report - Combined License Stage (Part 3, Rev. 0, November 2007) and Early Site Permit Application (Part 3, Rev. 9, September 2006). The applicant should review FSAR Section 11.5.4.5 and introduce the following two departures as the basis of the ODCM and approach used for the implementation of the North Anna Unit 3 ODCM:

(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. For the North Anna Unit 3 application, the 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). Accordingly, the applicant should introduce in FSAR Section 11.5.4.5 a departure identifying NUREG-1302 as the correct technical basis document.

(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. Given that this section of the FSAR has endorsed by reference the use of NEI Template 07-09, the applicant should remove any references to the use of the NAPS Unit 1 and 2 ODCM. Accordingly, the applicant should introduce in FSAR Section 11.5.4.5 a departure stating that the implementation of the radiological environmental monitoring program would be accomplished through the ODCM based on the final version of NEI Template 07-09.

17. FSAR Sect. 11.4.1, Solid Waste Management System, Design Bases

EPM date	EPM RAI/Q No.	NRC letter date	NRC letter No.	Appl. Question
5/21/08	341/1115	n/a	n/a	n/a
6/19/08	125/na	020	07/27/08	11.04-3

RAI Summary: FSAR Section 11.4.1, STD COL 11.4-4-A states that the proposed plant will not utilize any temporary storage facilities for low-level radioactive wastes. Given the uncertainty about the availability and access to a regional land disposal facility, describe the operational program and facilities that will be used to manage and store radioactive wastes in the long-term at the North Anna Unit 3 plant.

Full RAI: FSAR Section 11.4.1, STD COL 11.4-4-A states that the proposed plant will not utilize any temporary storage facilities for low-level radioactive wastes. Given the uncertainty about the availability and access to a regional land disposal facility licensed under Part 61, describe the operational program and facilities that will be used to manage and store radioactive wastes in the long-term at the North Anna Unit 3 plant. A review of the Applicant's Environmental Report - Combined License Stage, Sections 3.5 and 3.8, (Part 3, Rev. 0, November 2007) reveals that the issue of long-term storage is not addressed, given that the ESBWR DCD provides a storage capacity for six months only - see DCD Tier 2, Rev. 4, Section 11.4.1 (p.11.4-2). Given the requirements of Part 20.2001, revise the FSAR to address the following:

(a) Using the guidance of Regulatory Guide 1.206 and Section 11.4 of the Standard Review Plan (NUREG-0800, Rev. 3), describe facilities and equipment that will be used for the long-term storage of radioactive wastes, including Class A, B, C, greater-than-

class C, and mixed wastes given the projected types of waste streams and waste volumes listed in Table 11.4-2 of the ESBWR DCD, Tier 2, Rev. 4.

(b) If the projected radioactive waste volumes of North Anna Unit 3 are to be managed with that of NAPS Units 1 and 2, demonstrate that the existing waste storage facilities and equipment are adequate in accommodating the incremental operational waste volumes generated by North Anna Unit 3 over the long-term.

(c) Describe how and where the provisions of Section 11.4 of the Standard Review Plan (NUREG-0800, Rev. 3) will be integrated in the operational program addressing the long-term management and storage of radioactive wastes generated during the operation of North Anna Unit 3.

Edited RAI version at the request of OGC, out to eRAI on 6/19/08

RAI Summary: FSAR Section 11.4.1, STD COL 11.4-4-A states that the proposed plant will not utilize temporary storage facilities for low-level radioactive wastes. Given that the ESBWR DCD design provides a storage capacity for 6 months, the applicant is requested to describe facilities that will be used in the long-term to store radioactive wastes at the North Anna Unit 3 plant.

Full RAI: FSAR Section 11.4.1, STD COL 11.4-4-A states that the proposed plant will not utilize temporary low-level radioactive waste storage facilities to support plant operation. Given that Section 11.4.1 of the ESBWR DCD provides a storage capacity for 6 months, the applicant is requested to describe the facilities and operational program addressing the long-term management and storage of radioactive wastes generated during the operation of North Anna Unit 3 using the guidance of Regulatory Guide 1.206 and Section 11.4 of the Standard Review Plan (NUREG-0800, Rev. 3).

18. FSAR Sect. 12.2.2.4, Liquid Doses Offsite

EPM date	EPM RAI/Q No.	NRC letter date	NRC letter No.	Appl. Question
6/5/08	413/1331	07/09/08	016	12.02-3

RAI Summary: A review of FSAR Section 12.2.2.4 indicates internal inconsistencies in the presentation of results on the liquid effluent source term and doses as compared with the ESBWR DCD, Applicant's Environmental Report – Combined License Stage, and the North Anna ESP Environmental Report.

Full RAI: A review of FSAR Section 12.2.2.4 indicates internal inconsistencies in the presentation of supporting data and results on source terms and doses as compared with the ESBWR DCD, Applicant's Environmental Report – Combined License Stage, and the North Anna ESP Environmental Report. Specifically, address and resolve the following discrepancies in the North Anna 3 FSAR:

(a) The ESP-ER doses and Unit 3 doses listed in FSAR Table 12.2-20bR are lower by a factor of 100 as compared to Table 5.4-2 of the Applicant's Environmental Report – Combined License Stage (Rev. 0, Nov. 2007).

(b) In demonstrating compliance with the unity rule of Table 2 (Column 2) of Appendix B to Part 20, add a listing to FSAR Table 12.2-19bR showing the ratio of each radionuclide

and sum-of-the-ratios for all radionuclides. Currently, the tabulation does not present the sum-of-the-ratios.

(c) A review of the discussion on the comparison of radionuclides with higher activity levels between the North Anna ESP-ER and the FSAR (p.12-8) indicates that Table 12.2.19bR lists only 11 highlighted radionuclides and not 12 as stated in the FSAR. Confirm whether Ba-139 should be highlighted as well in Table 12.2-19bR to be consistent with Table 5.4-1 of the Applicant's Environmental Report – Combined License Stage (Rev. 0, Nov. 2007).

(d) A review of FSAR Table 12.2-19bR indicates that the source term (Ci/yr) is based on a plant capacity factor of 0.8 while the ESBWR design is rated at 0.92. The staff's analysis reveals that all FSAR results are low by a factor of 1.15 (0.92/0.8).

(e) A review of FSAR Table 12.2-19bR indicates that "Unit 3 Concentrations" (Bq/ml) for nine radionuclides were found to be higher than the staff's analysis by factors ranging from 1.11 to 1.7. The radionuclides are tritium, Mn-54, Fe-55, Co-60, Zn-65, Sr-90, Zr-95, Cs-134, and Cs-137. Note that the staff's analysis matches the corresponding FSAR liquid effluent source terms (Ci/yr) for the same radionuclides, as presented in Table 12.2-19bR.

(f) Provide the technical basis and year of data in FSAR Table 12.2-19bR for the incremental liquid 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.

OGC edited version, 7/1/09

RAI Summary: A review of FSAR Section 12.2.2.4 identifies apparent inconsistencies in the results on the liquid effluent source term and doses as compared with the ESBWR DCD, Applicant's Environmental Report – Combined License Stage, and the North Anna ESP Environmental Report.

Full RAI: A review of FSAR Section 12.2.2.4 identifies apparent inconsistencies in the supporting data and results on source terms and doses as compared with the ESBWR DCD, Applicant's Environmental Report – Combined License Stage, and the North Anna ESP Environmental Report. Specifically, address and resolve the following discrepancies in the North Anna 3 FSAR:

(a) The ESP-ER doses and Unit 3 doses listed in FSAR Table 12.2-20bR are lower by a factor of 100 as compared to Table 5.4-2 of the Applicant's Environmental Report – Combined License Stage (Rev. 0, Nov. 2007).

(b) To demonstrate compliance with the unity rule of Table 2 (Column 2) of Appendix B to Part 20, add a listing to FSAR Table 12.2-19bR showing the ratio of each radionuclide and sum-of-the-ratios for all radionuclides. Currently, the tabulation does not present the sum-of-the-ratios.

(c) A review of the discussion on the comparison of radionuclides with higher activity levels between the North Anna ESP-ER and the FSAR (p.12-8) indicates that Table

12.2.19bR lists only 11 highlighted radionuclides and not 12 as stated in the FSAR. Confirm whether Ba-139 should be highlighted as well in Table 12.2-19bR to be consistent with Table 5.4-1 of the Applicant's Environmental Report – Combined License Stage (Rev. 0, Nov. 2007).

(d) A review of FSAR Table 12.2-19bR indicates that the source term (Ci/yr) is based on a plant capacity factor of 0.8 while the ESBWR design is rated at 0.92. The staff's analysis reveals that all FSAR results are low by a factor of 1.15 (0.92/0.8).

(e) A review of FSAR Table 12.2-19bR indicates that "Unit 3 Concentrations" (Bq/ml) for nine radionuclides were found to be higher than the staff's analysis by factors ranging from 1.11 to 1.7. The radionuclides are tritium, Mn-54, Fe-55, Co-60, Zn-65, Sr-90, Zr-95, Cs-134, and Cs-137. Note that the staff's analysis matches the corresponding FSAR liquid effluent source terms (Ci/yr) for the same radionuclides, as presented in Table 12.2-19bR.

(f) Provide the technical basis and year of data in FSAR Table 12.2-19bR for the incremental liquid 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.

19. Supplemental RAI 12.02-1 S01 to Dominion Response in Letter NA3-08-043

EPM date	EPM RAI/Q No.	NRC letter date	NRC letter No.	Appl. Question
7/2/08	652/2116	na	na	na
7/23/08	652/2116	08/12/08	025	12.02-10

RAI Summary: Based on an evaluation of Dominion's response (letter NA3-08-043) to NRC RAI 12.02-1, the staff requests further clarification in the presentation of FSAR data and dose results supporting the demonstration of regulatory compliance.

Full RAI: A review of the proposed revision of FSAR Section 12.2.2 in Dominion letter NA3-08-043 indicates internal inconsistencies in the presentation of FSAR data and dose results supporting the demonstration of regulatory compliance. Specifically, the applicant is requested to address and resolve the following items:

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

(b) In demonstrating compliance with the unity rule of Table 2 (Column 1) of Appendix B to Part 20, add a listing to FSAR Table 12.2-17R showing the ratio of each radionuclide and sum-of-the-ratios for all radionuclides. Currently, the tabulation does not present the sum-of-the-ratios.

(c) 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.

(d) The staff's evaluation and results generally concur with the information presented in FSAR Table 12.2-18bR. However, the following observations were noted: (i) footnote 4 should state that the dose also includes the exposure from plume and ground shine contributions; (ii) the applicant's dose associated with plume exposure at the nearest residence is nearly 1.5 times higher than the staff's estimate; and (iii) a new footnote should be added to this table 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.

(e) The applicant should address and resolve the following items in FSAR Table 12.2-203: (i) the presentation of dose results for North Anna Unit 3 should note whether the listed dose results include an incremental dose contribution from turbine building skyshine associated with the use of hydrogen water chemistry (as described in FSAR Section 9.3.9) in demonstrating compliance with Part 20.1301(e); and (ii) confirm whether the new total body doses reported for the existing units (6^{th} column of table) need to be identified in the Departure Report (Part 7 of the North Anna Unit 3 application), given that they are higher by a factor of about 5 when compared to the corresponding information presented in ER Table 5.4-11 of the North Anna ESP (Rev. 9, Sept. 2006).

(f) The staff's evaluation and results generally concur with the information presented in FSAR Table 12.2-204. However, the following observations were noted: (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) the applicant should confirm that the data presented in ER Tables 5.4-1, 5.4-3, and 2.5-8 of the North Anna ESP (Rev. 9, Sept. 2006) are still valid for the current version of the FSAR; (iii) 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; (iv) a new footnote should be added specifying the basis and 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; and (v) the applicant should confirm whether changes in the basis of collective population doses need to be identified in the Departure Report (Part 7 of the North Anna Unit 3 application).

I. Reworked Technical RAI for EPM-eRAI Submission at PM's Request

Supplemental RAI for Dominion's Response in Letter NA3-08-043 (4/28/08) to NRC RAI 12.02-1 (NRC tracking: RAI No. 20 and Question No. 25)

RAI Summary: Based on an evaluation of Dominion's response (letter NA3-08-043) to NRC RAI 12.02-1, the staff requests further clarification in the presentation of FSAR data and dose results supporting the demonstration of regulatory compliance.

Full RAI: A review of the proposed revision of FSAR Section 12.2.2 in Dominion Letter NA3-08-043 indicates internal inconsistencies in the presentation of FSAR data and dose results supporting the demonstration of regulatory compliance. Specifically, the applicant is requested to address and resolve the following items:

(a) In demonstrating compliance with the unity rule of Table 2 (Column 1) of Appendix B to Part 20, add a listing to FSAR Table 12.2-17R showing the ratio of each radionuclide and sum-of-the-ratios for all radionuclides. Currently, the tabulation does not present the sum-of-the-ratios.

(b) The staff's evaluation and analyses generally concur with dose results presented in FSAR Table 12.2-18bR. However, the following observations were noted: (i) the applicant's dose associated with plume exposure at the nearest residence is nearly 1.5 times higher than the staff's estimate; and (ii) in confirming compliance with Part 50 Appendix I, Section II design objectives, the applicant is requested to revise footnote 4 to state that the reported dose includes exposures from plume and ground shine contributions.

(c) The applicant should address and resolve the following items in FSAR Tables 12.2-203 and 12.2-204: (i) the presentation of dose results for North Anna Unit 3 should note whether the listed dose results include the incremental dose contribution from turbine building skyshine associated with the use of hydrogen water chemistry (as described in FSAR Section 9.3.9) in demonstrating compliance with Part 20.1301(e); (ii) confirm whether the new total body doses reported for the existing units (6^{th} column of table) need to be identified in the Departure Report (Part 7 of the North Anna Unit 3 application) given that they are higher by a factor of about 5 when compared to the corresponding information presented in ER Table 5.4-11 of the North Anna ESP (Rev. 9, Sept. 2006); (iii) the applicant should confirm whether changes in the basis of collective population doses need to be identified in the Departure Report (Part 7 of the North Anna Unit 3 application) when compared to the information and data presented in North Anna ESP (Rev. 9, Sept. 2006), and (iv) the applicant should confirm that the data presented in ER Tables 5.4-1, 5.4-3, and 2.5-8 of the North Anna ESP (Rev. 9, Sept. 2006) are still valid in terms of the applicability of supporting data for the current and forthcoming versions of the FSAR and supplemental ER.

II. Reworked Quality RAI for Submission by North Anna Project PM to Applicant at PM's Request

The following presents items identified during an evaluation of Dominion's response in Letter NA3-08-043 (dated 4/28/08) to NRC RAI 12.02-1. 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) Anew 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.

20. FSAR Section 11.5.4.6, Process and Effluent Monitoring Program

EPM date	EPM RAI/Q No.	NRC letter date	NRC letter No.	Appl. Question
7/17/08	763/2484	08/19/08	026	11.05-4

RAI Summary: A review of FSAR Section 11.5.4.6 indicates that the supplemental information presented in supplemental FSAR Table 11.5-201 does not include a line item identifying sampling provisions and criteria for condensate water that might be discharged from the condensate storage tank basin to the storm drain in the event of a leak or spill.

Full RAI: A review of North Anna Unit 3 FSAR Section 11.5.4.6 and ESBWR DCD Tier 2, Revision 5, Section 9.2.6.2 indicates that the supplemental information presented in FSAR Table 11.5-201 does not include a system line item identifying sampling provisions for condensate water that might be present in the condensate storage tank basin. The condensate storage tank basin is designed to contain the entire volume of the storage tank in the event of a tank rupture or spill. The basin's design includes a sump with provisions to pump water out of the basin to the LWMS or to release it to the storm drain, depending on radionuclide concentrations and requirements of Table 2, Col. 2 of Appendix B to Part 20 and design objectives of Appendix I to Part 50. FSAR Table 11.5-201 does not identify any sampling provisions and criteria for the case where water contained in the condensate tank basin would be discharged to the storm drain. Accordingly, a new system line item should be added to Table 11.5-201 in describing sampling provisions and criteria given the possibility of discharging such water to the storm drain. This information would ensure that such provisions are clearly identified in the FSAR and not likely to be omitted during the development of 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.

21. FSAR Part 10: ITAAC, Sect. 2.4.10, Mobile Liquid Radwaste System (Portion Outside Scope of Certified Design), and Sect. 2.4.11, Mobile Solid Radwaste System (Portion Outside Scope of Certified Design),

EPM date	EPM RAI/Q No.	NRC letter date	NRC letter No.	Appl. Question
7/23/08	862/2718			

RAI Summary: FSAR Part 10, Tier 1 ITAAC, Section 2.4.10, Mobile Liquid Radwaste System, and Section 2.4.11, Mobile Solid Radwaste System state that there are no ITAAC entries for

these systems. A review indicates that this approach is not consistent with the current version of ESBWR DCD Tier 2, Revision 5, Sections 11.2 and 11.4 and DCD Tier 1, Section 2.10 since these sections of the DCD include new design details and ITAACs for permanently installed subsystems not previously described in Revision 4 of the DCD.

1. FSAR Part 10, Tier 1 ITAAC, Section 2.4.10, Mobile Liquid Radwaste System, states that there are no ITAAC entries for this system. With respect to the liquid waste management system (LWMS), FSAR Section 11.2 incorporates the conceptual design and features of the LWMS described in draft ESBWR DCD, Tier 2, Revision 4, Section 11.2. However, this approach has been revised in Chapter 11.2 and DCD Tier 1, Revision 5, Section 2.10.1 by including specific LWMS design details and ITAACs for permanently installed subsystems not previously described in Revision 4 of the DCD. Accordingly, the applicant is requested to revise FSAR Part 10, Tier 1 ITAAC, Section 2.4.10 to reflect specific design features and associated ITAACs for the LWMS as described in ESBWR DCD, Tier 2, Revision 5, Section 11.2 and DCD Tier 1, Section 2.10.1.

2. FSAR Part 10, Tier 1 ITAAC, Section 2.4.11, Mobile Solid Radwaste System, states that there are no ITAAC entries for this system. With respect to the solid waste management system (SWMS), FSAR Section 11.4 incorporates the conceptual design and features of the SWMS described in draft ESBWR DCD, Tier 2, Revision 4, Section 11.4. However, this approach has been revised in Chapter 11.4 and DCD Tier 1, Revision 5, Section 2.10.2 by including specific SWMS design details and ITAACs for permanently installed subsystems not previously described in Revision 4 of the DCD. Accordingly, the applicant is requested to revise FSAR Part 10, Tier 1 ITAAC, Section 2.4.11 to reflect specific design features and associated ITAACs for the SWMS as described in ESBWR DCD, Tier 2, Revision 5, Section 11.4 and DCD Tier 1, Section 2.10.2.

22. Supplemental Staff RAI to Dominion's Response to Staff RAI 11.03-0, Dominion Letter NA3-08-055R, July 23, 2008

EPM date	EPM RAI/Q No.	NRC letter date	NRC letter No.	Appl. Question
8/13/08	1011/3560			

Supplemental questions to Dominion's response to NRC RAI Letter No. 007 on RAI No. 11.03-0. See Dominion Letter NA3-08-055R, dated July 23, 2008.

Full RAI: Staff RAI 11.03-0 and Dominion's response addresses 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:

1) 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.

2) 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.

3) The discussion and rationale for excluding the 600 ft3 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.

4) 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.

23. Supplemental Staff RAI to Dominion's Response to Staff RAI 12.02-2, Dominion Letter NA3-08-063R, August 4, 2008

EPM date	EPM RAI/Q No.	NRC letter date	NRC letter No.	Appl. Question
9/24/08	1294/4549			

Supplemental Staff RAI to Dominion's Response to Staff RAI 12.02-2, Dominion Letter NA3-08-063R, August 4, 2008.

1. CHPB generally concurs with the response to Staff 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.

2. 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.

B. RAI Questions on Hold Pending Issuance of ESBWR, DCD Rev. 5

1. FSAR Part 10: ITAAC, Sect. 2.4.10, Mobile Liquid Radwaste System (Portion Outside Scope of Certified Design), 4/10/08, RAI 157, Q.397
Retracted at request of PM, 4/17/08.
Hold and save for Phase 2 FSAR Rev. 1 review, based on DCD Rev. 5.
Reissued under RAI 862/Q2718, 7/23/08

RAI Summary: FSAR Part 10, Tier 1 ITAAC, Section 2.4.10, Mobile Liquid Radwaste System, states that there are no ITAAC entries for this system. A review indicates that this approach is not consistent with the proposed update of DCD Tier 2, Chapter 11.2 and DCD Tier 1, Section 2.10.1 since these sections of the DCD will include new design details and ITAACs for permanently installed subsystems not previously described in Revision 4 of the DCD.

Full RAI: FSAR Part 10, Tier 1 ITAAC, Section 2.4.10, Mobile Liquid Radwaste System, states that there are no ITAAC entries for this system. With respect to the liquid waste management system (LWMS), FSAR Section 11.2 incorporates the conceptual design and features of the LWMS described in draft ESBWR DCD, Tier 2, Revision 4, Section 11.2. However, this approach is being revised by GEH in the currently proposed update (Rev. 5) of Chapter 11.2 and DCD Tier 1, Section 2.10.1 by including specific LWMS design details and ITAACs for permanently installed subsystems not previously described in Revision 4 of the DCD. Accordingly, FSAR Part 10, Tier 1 ITAAC, Section 2.4.10 needs to be revised and reflect specific design features and associated ITAACs for the LWMS as described in the next revision of the ESBWR DCD, Tier 2, Section 11.2 and DCD Tier 1, Section 2.10.1.

2. FSAR Part 10: ITAAC, Sect. 2.4.11, Mobile Solid Radwaste System (Portion Outside Scope of Certified Design), 4/10/08, RAI 158, Q.399.
Retracted at request of PM, 4/17/08.
Hold and save for Phase 2 FSAR Rev. 1 review, based on DCD Rev. 5.
Reissued under RAI 862/Q2718, 7/23/08

RAI Summary: FSAR Part 10, Tier 1 ITAAC, Section 2.4.11, Mobile Solid Radwaste System, states that there are no ITAAC entries for this system. A review indicates that this approach is not consistent with the proposed update of DCD Tier 2, Chapter 11.4 and DCD Tier 1, Section 2.10.2 since these sections of the DCD will include new design details and ITAACs for permanently installed subsystems not previously described in Revision 4 of the DCD.

Full RAI: FSAR Part 10, Tier 1 ITAAC, Section 2.4.11, Mobile Solid Radwaste System, states that there are no ITAAC entries for this system. With respect to the solid waste management system (SWMS), FSAR Section 11.4 incorporates the conceptual design and features of the SWMS described in draft ESBWR DCD, Tier 2, Revision 4, Section 11.4. However, this approach is being revised by GEH in the currently proposed update (Rev. 5) of Chapter 11.4 and DCD Tier 1, Section 2.10.2 by including specific SWMS design details and ITAACs for permanently installed subsystems not previously described in Revision 4 of the DCD. Accordingly, FSAR Part 10, Tier 1 ITAAC, Section 2.4.11 needs to be revised and reflect specific design features and associated ITAACs for the SWMS as described in the next revision of the ESBWR DCD, Tier 2, Section 11.4 and DCD Tier 1, Section 2.10.2.

C. Qualifiers for Insertion in EPM Task Completion Notes Dialogue Box

North Anna Unit 3 R-COLA (Rev. 0) is based on Rev. 4 of the GE's ESBWR DCD design. GE will issue Rev. 5 of the ESBWR DCD in May 2008. As a result, the North Anna R-COLA is expected to be revised to reflect future updates of the ESBWR DCD. At this time, it is not possible to determine the impacts on the associated FSAR sections should Dominion decide to update its application for consistency with the current revision of the ESBWR DCD. Accordingly, CHPB reserves the option of reopening the review of this FSAR section as needed by future revisions of the North Anna R-COLA.

The CHPB schedule needs to be realigned with that of RHEB given that CHPB has secondary review responsibility while recognizing that any RAIs generated by CHPB need to be coordinated with RHEB. Note that RHEB and CHPB are in the process of issuing an ISG on resolving inconsistent guidance between SRP Section 2.4.13 and BTP 11-6 of SRP Section 11.2.