Eugene S. Grecheck
Vice President
Nuclear Development

Dominion Energy, Inc. • Dominion Generation
Innsbrook Technical Center
5000 Dominion Boulevard, Glen Allen, VA 23060
Phone: 804-273-2442, Fax: 804-273-3903
E-mail: Eugene.Grecheck@dom.com

Dominion®

June 30, 2008

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

Serial No. NA3-08-051
Docket No. 52-017
COL/JPH

DOMINION VIRGINIA POWER
NORTH ANNA UNIT 3 COMBINED LICENSE APPLICATION
RESPONSE TO REQUEST FOR ADDITIONAL INFORMATION LETTER NO. 004

On May 19, 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 as enclosures to this letter:

- RAI Question 11.02-1 Liquid Waste - Cost Benefit Analysis
- RAI Question 11.04-1A Solid Waste - Cost Benefit Analysis
- RAI Question 11.04-1B Solid Waste - Process Control Program
- RAI Question 11.05-1 Offsite Dose Calculation Manual
- RAI Question 11.05-2 Process & Effluent Monitoring

This information will be incorporated into a future submission of the North Anna Unit 3 COLA.

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

Very truly yours,

Eugene S. Grecheck

D079
NRO

Enclosures:

Enclosure 1 - Response to RAI Letter Number 004 (RAI Question 11.02-1)
Enclosure 2 - Response to RAI Letter Number 004 (RAI Question 11.04-1A)
Enclosure 3 - Response to RAI Letter Number 004 (RAI Question 11.04-1B)
Enclosure 4 - Response to RAI Letter Number 004 (RAI Question 11.05-1)
Enclosure 5 - Response to RAI Letter Number 004 (RAI Question 11.05-2)

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 30th day of June, 2008
My registration number is 7173057 and my
Commission expires: August 31, 2012

Wanda K. Marshall
Notary Public

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

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

ENCLOSURE 1

Response to NRC RAI Letter No. 004

RAI Question 11.02-1

NRC RAI 11.02-1

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 presented 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 was 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 11.2.1 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.

Dominion Response

Draft NEI Template 07-11 will be removed from FSAR Section 11.2.1. A cost-benefit analysis specific to North Anna Unit 3 and the North Anna Power Station site has been performed and will be provided in FSAR Section 11.2.1. The analysis demonstrates that the design of the Unit 3 Liquid Waste Management System (LWMS) complies with the as low as reasonably achievable (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 bases and assumptions used in the analysis are identified along with the results to allow independent confirmation of compliance with NRC regulations and guidance.

The cost-benefit analysis follows the guidance in NRC Regulatory Guide (RG) 1.110, RG 1.206, and Standard Review Plan Section 11.2. 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

COLA FSAR Section 11.2.1 will be revised to provide a cost-benefit analysis that complies with NRC's guidance in RG 1.110. The analysis utilizes fixed cost values from the RG as well as site-specific variable costs for the following items: Capital Recovery Factor (CRF), Indirect Cost Factor (ICF), and Labor Cost Correction Factor (LCCF). The costs of augments identified in the RG are compared to the population doses specific to the liquid effluents for North Anna Unit 3 at the North Anna Power Station site to demonstrate that no LWMS augments are cost-beneficial based on the ALARA cost-benefit requirements of Section II.D of Appendix I to 10 CFR 50.

FSAR Section 11.2.7 will be revised to correct the reference document.

Markup of North Anna COLA

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

Chapter 11 Radioactive Waste Management

11.1 Source Terms

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

11.2 Liquid Waste Management System

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

STD CDI

The conceptual design information in this DCD section is the plant specific design.

11.2.1 Design Basis

Safety Design Bases

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

~~STD~~ NAPS SUP 11.2-1

~~NEI 07 11, Generic FSAR Template Guidance for Cost Benefit Analysis for Radwaste Systems for Light Water Cooled Nuclear Power Reactors, which is currently under review by the NRC staff, is incorporated by reference. (Reference 11.2 201)~~

RG 1.110 methodology was applied to satisfy the cost-benefit analysis requirements of 10 CFR 50, Appendix I, Section II.D. Fixed parameters used to calculate the Total Annual Cost (TAC) for each radwaste treatment system augment listed in RG 1.110 are given, including the Annual Operating Cost (AOC) (Table A-2), Annual Maintenance Cost (AMC) (Table A-3), Direct Cost of Equipment and Materials (DCEM) (Table A-1), and Direct Labor Cost (DLC) (Table A-1). Variable parameters, determined by the licensee, are as follows:

- Capital Recovery Factor (CRF) - Obtained from RG 1.110, Table A-6, this factor reflects the cost of money for capital expenditures. A cost-of-money value of 7 percent per year is assumed in this analysis, consistent with "Guidelines and Discount Rates for Benefit-Cost Analysis of Federal Programs" (OMB Circular A-94) (Reference 11.2-202). Based on a 30-year service life, Table A-6 gives a CRF of 0.0806.

- Indirect Cost Factor (ICF) - Obtained from RG 1.110, Table A-5, this factor takes into account whether the radwaste system is unitized or shared (in the case of a multi-unit site). Because this is a single ESBWR unit site, this analysis is for a single unit, which gives an ICF of 1.75.
- 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

Replace the sixth paragraph 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 mobile/portable 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.

Replace the seventh paragraph with the following:

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 mobile/portable LWMS 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 ~~NEI 07-11, Generic FSAR Template Guidance for Cost Benefit Analysis for Radwaste Systems for Light Water Cooled Nuclear Power Reactors.~~ [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 2

Response to NRC RAI Letter No. 004

RAI Question 11.04-1A

NRC RAI 11.04-1A

FSAR Section 11.4.1 does not present a cost-benefit analysis for the SWMS nor does it make 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, provide the technical justification as to why the results presented in FSAR Sections 11.2 and 11.3 are adequately encompassing, or otherwise provide a justification for not including such an analysis in compliance with NRC regulations and guidance. 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 cost-benefit analyses in FSAR Section 11.2.1 for the LWMS and in FSAR Section 11.3.1 for the GWMS encompass the incremental amounts of liquids and gases that are generated as by-products of the solid waste processed by the SWMS. Because these two cost-benefit analyses include the SWMS liquid and gas contributions to liquid and gaseous effluents from normal operation, and no augments are needed for the LWMS and GWMS to comply with 10 CFR 50, Appendix I, Section II.D, no augments are needed for the SWMS to comply with 10 CFR 50, Appendix I, Section II.D.

An addition will be made to the FSAR with the above technical justification. When combined with the ESBWR DCD information that is incorporated by reference in the FSAR, this provides sufficient information to evaluate the bases and assumptions in the cost-benefit analyses and to conduct an independent confirmation.

The following information from ESBWR DCD Revision 5 shows that liquids and gases generated as by-products of solid waste processing from the SWMS flow to the LWMS and GWMS.

From DCD Revision 5, Section 11.4.1:

> The SWMS is designed to provide collection, processing, packaging, and storage of bead resin, filter backwash, and dry solid waste resulting from normal operations.

This section also states:

> Any resultant gaseous and liquid wastes are routed to other plant sections. Gaseous radionuclides from the SWMS are processed by the monitored radwaste building ventilation system.

From DCD Revision 5, Section 11.4.2.1:

> Liquids from SWMS operations are sent to the appropriate LWMS section for processing as depicted in Figure 11.4-1 and described in Section 11.2.

From DCD Revision 5, Section 11.4.2.3.2:

> All SWMS tanks are vented to radwaste ventilation.

From DCD Revision 5, Section 11.4.2.3.4:

> Makeup and exhaust ventilation is described in Section 9.4.

DCD Revision 5, Section 9.4.3.1, states the following about the Radwaste Building General Area (RWGA) HVAC Subsystem (RWGAVS):

> The RWGAVS maintains the Radwaste Building general area at a slight negative pressure (design -31 Pa (-0.125"w.g.)) relative to adjacent areas and outside atmosphere to prevent the exfiltration of air to adjacent areas.
>
> The RWGAVS provides the capability to exhaust air from the radwaste processing systems.
>
> All exhaust air from the RWGA is discharged to the RWB vent stack.
>
> The RWGAVS limits the release of airborne radioactive particulates to the atmosphere by HEPA filtration of the exhaust air from the building prior to discharge to the atmosphere.
>
> The exhaust air is monitored for radiation prior to discharge to atmosphere.

Based on these DCD statements, it can be concluded that in performing its design functions, the SWMS does not perform a design function to remove radioactive isotopes from liquid or gaseous effluents that will be released from the plant into the environment by way of the SWMS. That is, the SWMS does not have release points to the environment for normal liquid or gaseous effluents.

Rather, except for small, permissible quantities of free standing water in packaged solid radioactive waste in high integrity containers, the liquid and gaseous materials that are generated by the SWMS are collected, conveyed, controlled, treated, and monitored by the LWMS or GMWS. Liquids generated from dewatering of resins and sludges in the SWMS are collected and treated in the equipment and floor drain collection portion of the LWMS. SWMS piping drains and vents, and incidental spillage are routed to the LWMS for treatment. SWMS tank vents and room ventilation exhausts are routed to the Radwaste Building HVAC system and subsequently to the filtered and monitored Radwaste Building Vent Stack.

With liquid effluents from the SWMS flowing as inputs to the LWMS, offsite doses from liquid effluents from the SWMS are included in the calculations of doses from the LWMS, which are described in FSAR Section 12.2.2.4. Similarly, with gaseous effluents from the SWMS flowing as inputs to the GWMS, offsite doses from gaseous effluents from the SWMS are included in the calculations of doses from the GWMS, which are described in FSAR Section 12.2.2.2. Therefore, the cost-benefit analyses in FSAR Section 11.2.1 for the LWMS and in FSAR Section 11.3.1 for the GWMS address the liquid and gaseous effluents that are generated from solid waste processing by the SWMS. Because these two cost-benefit analyses include the liquid and gaseous effluents from the SWMS, the augments considered for the LWMS and GWMS apply to the SWMS, which provides inputs to those systems. As described in FSAR Sections 11.2.1 and 11.3.1, no augments are needed for the LWMS and GWMS to comply with 10 CFR 50, Appendix I, Section II.D. Therefore, no augments are needed for the SWMS to comply with 10 CFR 50, Appendix I, Section II.D.

Proposed COLA Revision

The above technical justification will be added to FSAR Section 11.4.1 as indicated in the attached markup to show that LWMS and GWMS cost-benefit analyses address the SWMS contributions without the need for system augments to comply with 10 CFR 50, Appendix I, Section II.D. Note that the cost-benefit analysis referred to above for FSAR Section 11.2.1 for the LWMS is being revised in response to RAI 11.02-1. Also, the cost-benefit analysis for FSAR Section 11.3.1 for the GWMS is being revised in response to RAI 11.03-0.

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.

11.4.1 **Design Bases**

SWMS Bases

Add the following after the second paragraph.

STD SUP 11.4-1

The LWMS offsite dose calculations, which are described in Section 12.2.2.4, include the offsite doses from the SWMS liquid effluents, as they are processed by the LWMS. Similarly, the GWMS offsite dose calculations, which are described in Section 12.2.2.2, include the offsite doses from the SWMS gaseous effluents, as they are inputs processed by the GWMS. The cost-benefit analyses in Section 11.2.1 for the LWMS and in Section 11.3.1 for the GWMS address the liquid and gaseous effluents that are generated from solid waste processing by the SWMS. Because these two cost-benefit analyses include the liquid and gaseous effluents from the SWMS, the augments considered for the LWMS and GWMS apply to the SWMS, which provides inputs to those systems. As described in Sections 11.2.1 and 11.3.1, no augments are needed for the LWMS and GWMS to comply with 10 CFR 50, Appendix I, Section II.D. Therefore, no augments are needed for the SWMS to comply with 10 CFR 50, Appendix I, Section II.D.

Add the following to the seventh bullet.

STD COL 11.4-4-A

The site does not utilize any temporary storage facilities to support plant operation.

Replace the fourth sentence of the fifth paragraph with the following:

STD COL 11.4-5-A

Section 12.6 discusses how the 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 the radioactive waste processing system. Operating procedures for mobile/portable SWMS required by Sections 12.4, 12.5, and 13.5 address requirements of 10 CFR 20.1406.

ENCLOSURE 3

Response to NRC RAI Letter No. 004

RAI Question 11.04-1B

NRC RAI 11.04-1B

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, which is still undergoing NRC staff review, presents the functional elements of a PCP intended to demonstrate compliance with 10 CFR 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), if it is ultimately approved by the NRC staff. Update all internal citations to the final PCP in applicable FSAR subsections and references.

Dominion Response

FSAR, Rev 0, Section 11.4.2.3 references the revision of NEI Topical Report 07-10, "Generic FSAR Template Guidance for Process Control Program (PCP) Description," that was submitted to the NRC for review at the time of COLA submittal. This FSAR section also includes the statement that recognizes that NEI Topical Report 07-10 is under NRC staff review.

If NEI Topical Report 07-10 is approved by the NRC, FSAR Tables 1.6-201 and 1.9-202 and FSAR Section 11.4.2.3 will be updated to reference the approved revision of NEI Topical Report 07-10. If the NEI Topical Report is not approved by the NRC, the FSAR will be revised to provide an alternate PCP program description.

Proposed COLA Revision

The FSAR markup is not included because the NRC has not completed its review of NEI Topical Report 07-10.

ENCLOSURE 4

Response to NRC RAI Letter No. 004

RAI Question 11.05-1

NRC RAI 11.05-1

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, which is under NRC staff review. The NEI template presents the functional elements of an ODCM intended to demonstrate compliance with 10 CFR 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), contingent on whether it is approved by the NRC staff. Update all internal citations to the final ODCM in applicable FSAR subsections and references.

Dominion Response

The FSAR, Rev 0, Section 11.5.4.5 references the revision of NEI Topical Report 07-09, "Generic FSAR Template Guidance for Offsite Dose Calculation Manual (ODCM) Program Description," that was submitted to the NRC for review at the time of COLA submittal. This FSAR section also includes the statement that recognizes that NEI Topical Report 07-09 is under NRC staff review.

If NEI Topical Report 07-09 is approved by the NRC, FSAR Tables 1.6-201 and 1.9-202 and FSAR Section 11.5.4.5 will be updated to reference the approved revision of NEI Topical Report 07-09. If the NEI Topical Report is not approved by the NRC, the FSAR will be revised to provide an alternate ODCM program description.

Proposed COLA Revision

The FSAR markup is not included because the NRC has not completed its review of NEI Topical Report 07-09.

ENCLOSURE 5

Response to NRC RAI Letter No. 004

RAI Question 11.05-2

NRC RAI 11.05-2

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). Footnotes to the table appear internally inconsistent in describing sampling provisions and where the supporting information may be found in the DCD and/or FSAR. The apparent inconsistencies 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 (Sup. 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. FSAR Sections 11.5, 9.2, and 10.4 do not appear to make such provisions 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 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.

Dominion Response

Dominion has reviewed the basis for the sampling provisions shown in FSAR Table 11.5-201 for (1) Plant Service Water System, (2) the Storm Drains and Cooling Tower Blowdown, and (3) the Sanitary Waste Water System. The following discussion addresses each of these systems and provides the bases for the sampling requirements for the effluent stream for each system. The discussion also addresses related changes to FSAR Table 11.5-201.

a. Plant Service Water System

Sampling Provisions for the Plant Service Water System

Dominion has reviewed the basis for sampling provisions for the Plant Service Water System (PSWS) cooling tower blowdown (effluent). Grab sampling provisions are included in the design of the PSWS (i.e., the cooling tower basins provide that capability) and a footnote with a cross-reference to FSAR Section 9.2.1.2 will be added to FSAR Table 11.5-201 for line item 2 to identify that the basins provide effluent grab sampling capability. FSAR Section 9.2.1.2 will be revised to address grab sampling provisions.

However, grab sampling capability for PSWS effluent is not provided for use in developing the sampling and analysis program for radioactive effluents in the ODCM as indicated in the RAI. An ODCM provides the procedural details for controls on expected radioactive effluents and for environmental monitoring. The PSWS for an ESBWR is designed to remain a nonradioactive system that does not have the potential to generate radioactive effluent as the result of a single pressure boundary failure. Therefore, it is inappropriate to apply radioactive effluent monitoring or sampling requirements to PSWS cooling tower effluent (blowdown).

Rather, the capability to obtain and analyze grab samples from the PSWS basins complies with the required action in NRC Inspection and Enforcement (IE) Bulletin No. 80-10, *Contamination of Nonradioactive System and Resulting Potential for Unmonitored, Uncontrolled Release of Radioactivity to Environment*, which was reinforced in NRC Information Notice (IN) No. 91-40, *Contamination of Nonradioactive System and Resulting Possibility for Unmonitored, Uncontrolled Release to the Environment.* The NRC Bulletin requested licensees with an operating license to establish a routine sampling/analysis or monitoring program for systems that are considered as nonradioactive (or described as nonradioactive in the FSAR), but that could possibly become radioactive through interfaces with radioactive systems.

To meet the action required in IE Bulletin 80-10, Dominion will establish a routine sampling and analysis program for the PSWS cooling tower basins in order to identify any contaminating events which could lead to unmonitored, uncontrolled liquid radioactive releases to the environment. In the unlikely event that PSWS would become contaminated, periodic grab samples obtained from the PSWS cooling tower basins would provide the defense in depth protection needed for detection of such contamination.

However, there is only a very small likelihood of PSWS becoming contaminated. The systems cooled by PSWS are the Reactor Component Cooling Water System (RCCWS) and the Turbine Component Cooling Water System (TCCWS). Both of these systems are also nonradioactive systems.

Of these two systems, only the RCCWS provides a buffer between PSWS and systems containing radioactive liquids. However, leakage from a radioactive system into RCCWS is also highly unlikely. If it would occur due to a pressure boundary failure in a heat exchanger, leakage of a radioactive liquid into RCCWS would be readily detected. The RCCWS has radiation monitors to detect an increase in radioactivity. These are continuous radiation monitors in each cooling water train that would detect intersystem inleakage of radioactive liquid into the respective RCCWS loop. The continuous radiation monitors alarm on a high radiation signal, and if such an alarm occurs, the applicable RCCWS train would be isolated. See DCD Tier 2, Revision 5, Section 9.2.2.5, Section 11.5.3.2.6, and Table 11.5-4.

In addition, inleakage into RCCWS would cause water to be added to the head tank in the RCCWS. The high water level in the head tank is alarmed/annunciated in the main control room. See DCD Tier 2, Revision 5, Section 9.2.2.5. The alarm would indicate a malfunction, such as, inleakage from one of the RCCWS cooling loads or a leaking makeup water valve, and would initiate actions to identify the source of inleakage.

These two methods of inleakage detection into the RCCWS mean that in addition to a failure of the pressure boundary between a radioactive system and RCCWS allowing intersystem inleakage, failures of both methods of leakage detection would need to occur before the RCCWS would have the potential for undetected inleakage of a radioactive liquid into PSWS.

Also, an additional failure would need to occur before PSWS would become contaminated. As described in DCD Tier 2, Revision 5, Section 9.2.2.2, the PSWS cools the RCCWS heat loads using plate type heat exchangers. Leakage through holes or cracks in the plates is not considered credible based on industry experience with plate type heat exchangers. However, this unlikely type of heat exchanger pressure boundary failure would need to occur for intersystem inleakage from RCCWS into PSWS. Intersystem inleakage does not occur from gasket failures for this type of heat exchanger.

The RCCWS heat exchangers are designed such that any gasket leakage from either RCCWS or PSWS drains to the Equipment and Floor Drain System. This design means leakage past a gasket from either system flows to a radioactive drain system for collection and treatment, and not into the other system which precludes intersystem inleakage due to a gasket failure.

To summarize, the following failures would need to occur for PSWS to become contaminated with a radioactive liquid:

- Failure of a pressure boundary between a system with a radioactive liquid and the RCCWS
- Failure of the radiation monitor alarms in RCCWS to alert operators to increasing radioactivity levels in the RCCWS
- Failure of the RCCWS head tank level instrumentation to alert operators to an increasing water inventory in the RCCWS
- Failure of a plate-type heat exchanger allowing contaminated RCCWS liquid to flow into PSWS

Given that this combination of events is so unlikely, the PSWS is appropriately classified as a nonradioactive system that is not a potential radioactive effluent pathway and is not subject to radioactive effluent monitoring or sampling requirements. However, for added assurance, PSWS cooling tower effluent (blowdown) will be subject to periodic grab sample and analysis requirements consistent with the action required by IE Bulletin 80-10. FSAR

Table 11.5-201 line item 2 and the associated footnotes will be revised to more clearly reflect this approach for PSWS.

In revising line item 2 in FSAR Table 11.5-201, the changes will show that continuous sampling is not performed for PSWS cooling tower basin blowdown (effluent). This approach complies with the requirements of Table 2 of SRP Section 11.5 because continuous sampling is not applicable for the PSWS of an ESBWR. This SRP section's Table 2 requirement for continuous sampling applies to existing BWRs for those modes of operation when a service water system is used to cool a heat exchanger with a radioactive liquid directly across the heat exchanger's pressure boundary. This occurs during shutdown for removal of decay heat via a service water system for existing BWRs.

As described above, for an ESBWR, there are no systems containing a radioactive liquid cooled directly by PSWS flow. The RCCWS always provides a buffer between such radioactive systems and PSWS. Because of this fundamental design improvement, an ESBWR never needs to implement continuous sampling for PSWS effluent while for existing BWRs, when service water systems are used for decay heat removal, continuous effluent sampling is performed. Also consistent with current practice, when existing BWRs are in normal operation and a component cooling water system provides a buffer for a service water system, continuous sampling is not required and sampling is performed periodically to meet IE Bulletin 80-10.

Plant Service Water System Line Item 2 Expanded to Include Cooling Tower Blowdown from Line Item 11

In addition to the changes described above, FSAR Table 11.5-201 line item 2 and the associated footnotes will be expanded to address sampling provisions for the Circulating Water System (CIRC) cooling tower blowdown (effluent). Line item 2 is the appropriate location in Table 11.5-201 to address CIRC effluent sampling provisions based on Table 2 of SRP Section 11.5, row No. 3, "Service Water System and/or Circulating Water System." Accordingly, "cooling tower blowdown" identified in line item 11 of FSAR Table 11.5-201 is being moved to line item 2.

Like PSWS, grab sampling provisions are included in the design of the CIRC (i.e., the cooling tower basin provides that capability) and a footnote with a cross-reference to FSAR Section 10.4.5.2.3 will be added to FSAR Table 11.5-201 for CIRC in line item 2 to identify that the basin provides effluent grab sampling capability. FSAR Section 10.4.5.2.3 will be revised to address grab sampling provisions.

However, grab sampling capability for CIRC is also not provided for use in developing the sampling and analysis program for radioactive effluents in the ODCM as indicated in the RAI. The CIRC for an ESBWR is designed to remain a nonradioactive system that does not generate radioactive effluent. Therefore, it is inappropriate to apply radioactive effluent monitoring or sampling requirements to CIRC cooling tower effluent (blowdown).

Again, the capability to obtain and analyze grab samples from the CIRC basin complies with IE Bulletin 80-10. Dominion will establish a routine sampling and analysis program for the CIRC cooling tower basin in order to identify any contaminating events which could lead to unmonitored, uncontrolled liquid radioactive releases to the environment. In the unlikely event that CIRC would become contaminated, periodic grab samples obtained from the

CIRC cooling tower basin would provide the defense in depth protection needed for detection of such contamination.

However, there is only a very small likelihood of CIRC becoming contaminated. The main condenser cooled by CIRC operates at a vacuum. The continuous evacuation of the inside of the main condenser results in a lower pressure in the condenser shell than in the CIRC system. Leakage from the condenser into the tubes and CIRC does not occur. Rather, leakage of circulating water into the condenser shell is the recognized concern and is monitored by the online instrumentation as described in DCD Tier 2, Revision 5, Section 10.4.1.5.4. Condensate conductivity and selected impurities are monitored at the discharge of the condensate pumps. High condensate conductivity or impurity content, which indicates a condenser tube leak, is individually alarmed in the main control room. Condenser tube leaks are located with tracer gases or other appropriate means and repaired as needed to support plant chemistry control.

Given that contamination of CIRC water flow is so unlikely, CIRC is appropriately classified as a nonradioactive system that is not a potential radioactive effluent pathway and is not subject to radioactive effluent monitoring or sampling requirements. However, for added assurance, CIRC cooling tower effluent (blowdown) will be subject to periodic grab sample and analysis requirements consistent with the action required by IE Bulletin 80-10. CIRC will be added to FSAR Table 11.5-201 line item 2 and the associated footnotes will be revised to more clearly reflect this approach for CIRC cooling tower blowdown.

COLA FSAR Revisions

Based on the response provided above for PSWS and CIRC cooling tower effluent sampling provisions, the following revisions will be made to COLA FSAR Table 11.5-201 related to line item 2:

- In the column for "Process Systems as listed in NUREG-0800, SRP 11.5 Table 2 (Draft Rev. 4)," add "...and/or Circulating Water System."
- In the column for "ESBWR System(s) that Perform the Equivalent SRP 11.5 Function," add "...and Circulating Water System." This system was moved from the row with line item 11 to be consistent with Table 2 of SRP Section 11.5.
- In the column for "In Effluent – Grab" sampling provisions, add a new footnote 9. This footnote will provide the cross-reference to the applicable FSAR sections by stating: "Grab samples can be obtained from a cooling tower basin. See Section 9.2.1.2 for the PSWS cooling tower basin and Section 10.4.5.2.3 for the Circulating Water System cooling tower basin."
- In the column for "In Effluent – Continuous" sampling provisions, delete (S&A) and Notes 6 & 8. Add a short dash. These changes indicate that continuous sampling is not performed for this effluent stream. Therefore, the RAI's request to replace footnote 8 with footnote 4 would be inappropriate.
- At the end of Table 11.5-201, add a new footnote 9 as described above.

In addition, FSAR Sections 9.2.1.2 and 10.4.5.2.3 will be revised to address grab sampling provisions.

b. Storm Drains and Cooling Tower Blowdown

Dominion has reviewed the basis for sampling provisions for the storm drains and cooling tower blowdown. As described above, the Circulating Water System (CIRC) and its cooling tower blowdown (effluent) will be moved to line item 2 in FSAR Table 11.5-201 for consistency with Table 2 in SRP Section 11.5.

For the liquid effluent in the storm drains in the storm drainage system, the sampling provisions identified in line item 11 in Table 11.5-201 will be clarified by adding a new footnote with a cross-reference to DCD Section 9.2.6.2. This DCD section describes the design details for grab sampling provisions for the only storm drainage system liquid effluent with the potential to be contaminated. As described in FSAR Section 2.4.13, the Unit 3 condensate storage tank (CST) is the only above-grade tank that contains radioactivity outside of containment. A basin surrounding the tank is designed to prevent uncontrolled runoff in the event of a tank failure. The enclosed space is sized to contain the total tank capacity. Tank overflow is also collected in this space. A sump is provided inside the retention area with provisions for sampling collected liquids prior to routing them to the Liquid Waste Management System or the storm drainage system as per sampling and release requirements. These design features preclude uncontrolled releases to the environment. No capability for continuous sampling is required because the basin contents are treated as a batch.

Therefore, grab sampling capability for the storm drainage system (specifically for the CST basin sump) is not provided for use in developing the sampling and analysis program for radioactive effluents in the ODCM as indicated in the RAI. An ODCM provides the procedural details for controls on expected radioactive effluents and for environmental monitoring. The CST basin is designed to remain a nonradioactive system that does not generate radioactive effluent. Sampling and analysis for each batch ensures liquids sent to the storm drainage system are not radioactive. Therefore, it is inappropriate to apply radioactive effluent monitoring or sampling requirements to storm drainage system effluents.

Rather, the capability to obtain and analyze grab samples from the CST basin sump complies with IE Bulletin 80-10. To meet the action required in IE Bulletin 80-10, Dominion will establish a per batch sampling and analysis program for the CST basin sump in order to identify any contaminating events which could lead to unmonitored, uncontrolled liquid radioactive releases to the environment. In the unlikely event that the CST would fail or overfill and the basin liquid would become contaminated, the grab sample obtained from the sump would detect such contamination before the effluent would be routed to the storm drainage system.

COLA FSAR Revisions

Based on the response provided above for the storm drains and cooling tower blowdown sampling provisions, the following revisions will be made to COLA FSAR Table 11.5-201 related to line item 11:

- In the column for "ESBWR System(s) that Perform the Equivalent SRP 11.5 Function," delete "...and Cooling Tower Blowdown." The Circulating Water System and the associated sampling provisions for cooling tower blowdown will be moved to the row with line item 2 and is addressed above.

- In the column for "In Effluent – Grab" sampling provisions, delete the parenthesis from (S&A, H3) and delete Note 6. These changes indicate that grab sampling is performed for this effluent stream, rather than downstream. Also, delete Note 4. This change indicates that sampling for the CST basin sump is not in support of the sampling and analysis program for radioactive effluents in the ODCM, but rather for meeting the action required in IE Bulletin 80-10.

- In the same column, add a new footnote 10. This footnote will provide the cross-reference to the FSAR section (i.e., a DCD section incorporated by reference) by stating: "Grab samples can be obtained from the Condensate Storage Tank (CST) basin sump. See DCD Section 9.2.6.2."

- In the column for "In Effluent – Continuous" sampling provisions, delete (S&A) and Notes 3 & 6. Add a short dash. These changes indicate that continuous sampling is not performed for this effluent stream. If the effluent from the CST basin would be routed to the Liquid Waste Management System, then downstream sampling is also performed on a batch basis per line item 1.

- At the end of Table 11.5-201, add a new footnote 10 as described above.

c. Sanitary Waste Water System

Dominion has reviewed the basis for sampling provisions for the effluent from the Sanitary Waste Water System [to be re-titled as Sanitary Waste Discharge System (SWDS)]. Grab sampling provisions are included in the design of the SWDS [i.e., the sludge tank in the sewage treatment plant (STP) provides that capability] and a footnote with a cross-reference to FSAR Section 9.2.4.2 will be added to FSAR Table 11.5-201 for line item 14 to identify that the STP provides grab sampling capability. FSAR Section 9.2.4.2 will be revised to address grab sampling provisions.

However, grab sampling capability for SWDS is not provided for use in developing the sampling and analysis program for radioactive effluents in the ODCM as indicated in the RAI. An ODCM provides the procedural details for controls on expected radioactive effluents and for environmental monitoring. The SWDS for an ESBWR is designed to remain a nonradioactive system that does not have the potential to generate radioactive effluent. The SWDS is not designed to handle radioactive fluids. It is neither connected to, nor does it interface with, any system that may contain radioactive fluids. Therefore, it is inappropriate to apply radioactive effluent monitoring or sampling requirements to SWDS effluents.

Rather, the capability to obtain and analyze grab samples from the STP in the SWDS complies with IE Bulletin 80-10. Sanitary waste systems are specifically identified in IE Bulletin 80-10 as a type of system for which special consideration should be given. Dominion will establish a per batch sampling and analysis program for the STP sludge tank in order to identify any contaminating events which could lead to unmonitored, uncontrolled liquid radioactive releases to the environment. In the unlikely event that the SWDS would become contaminated, periodic grab samples obtained from the STP sludge tank would provide the defense in depth protection needed for detection of such contamination.

If radioactive contamination would be detected, the contents of the STP sludge tank would be pumped to a drying bed. The sludge would be allowed to dry completely. Once dry, Radiation Protection personnel would survey the bed and collect all contaminated sludge. The sludge would be packaged in an appropriately sized DOT approved shipping container for disposal at a licensed burial facility. Alternatively, the packaged sludge may be shipped to a third party vendor for further processing (e.g., volume reduction by incineration), re-packaging and final disposal.

No capability for continuous sampling is required because the STP sludge tank contents are treated as a batch. The installation of composite samplers in the sanitary waste lines is not warranted. Accordingly, FSAR Section 9.2.4 and Figure 9.2-203 will be revised and the continuous samplers removed. The use of per batch grab samples to meet IE Bulletin 80-10 will be added to this FSAR section.

COLA FSAR Revisions

Based on the response provided above for the SWDS sampling provisions, the following revisions will be made to COLA FSAR Table 11.5-201 related to line item 14:

- In the column for "ESBWR System(s) that Perform the Equivalent SRP 11.5 Function," change "Sanitary Waste Water" to "Sanitary Waste Discharge System" to be consistent with the system title in FSAR Section 9.2.4.
- In the column for "In Effluent – Grab" sampling provisions, delete the parenthesis from (S&A, H3) and delete Note 6. These changes indicate that grab sampling is performed for the SWDS effluent stream, rather than downstream.
- In the same column, delete Note 3. This note would indicate that the SWDS liquid effluent could be sampled downstream after treatment as liquid radwaste in the Liquid Waste Management System. As described above, sludge with radioactive contamination would be dried and disposed of as solid radioactive waste and would not be sent to the Liquid Waste Management System.
- In the same column, delete Note 4. This change indicates that sampling for the SWDS is not in support of the sampling and analysis program for radioactive effluents in the ODCM, but rather for meeting the action required in IE Bulletin 80-10.
- In the same column, add a new footnote 11. This footnote will provide the cross-reference to the FSAR section by stating: "Grab samples can be obtained from the sewage treatment plant. See Section 9.2.4.2."
- In the column for "In Effluent – Continuous" sampling provisions, delete (S&A) and Note 4. Add a short dash. These changes indicate that continuous

sampling is not performed for this effluent stream and is not in support of the sampling and analysis program for radioactive effluents in the ODCM.

- At the end of Table 11.5-201, add new footnote 11 as described above.

In addition, FSAR Section 9.2.4.2 will be revised to address grab sampling provisions.

d. Related Changes to FSAR Table 11.5-201

While the FSAR changes described above in sections a through c show the sampling provisions to meet the required action in NRC I&E Bulletin 80-10, there are other changes to FSAR Table 11.5-201 needed to clarify the sampling provisions that support development of the plant specific Offsite Dose Calculation Manual.

COLA FSAR Revisions

The following revisions will be made to COLA FSAR Table 11.5-201 related to line item 1:

- In the column for "ESBWR System(s) that Perform the Equivalent SRP 11.5 Function," add "Detergent Drain System" to be consistent with DCD Revision 5 Section 11.2.2.2.4 and Figure 11.2-1.
- In the column for "In Effluent – Grab" sampling provisions, add Note 4 which will be revised to the following: "Monitoring of effluents from the Equipment, Floor, and Detergent Drain Subsystems is included in the Offsite Dose Calculation Manual."
- At the end of Table 11.5-201, revise footnote 4 as described above.

COLA Impact

FSAR Sections 9.2.1.2 and 10.4.5.2.3 will be revised as indicated in the attached markup to address grab sampling provisions.

FSAR Section 9.2.4.2 and Figure 9.2-203 will be revised as indicated in the attached markup. The continuous samplers will be removed and the use of grab samples to meet IE Bulletin 80-10 will be added to this FSAR section.

FSAR Table 11.5-201 will be revised as indicated in the attached markup and described in the response above.

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.

water level is monitored to ensure sufficient NPSH at design flow is provided to the PSWS pumps.

The pumps in each train are powered from redundant electrical buses. During a LOPP, the pumps are powered from the two nonsafety-related standby diesel-generators.

Where needed, valves are provided with hard seats to withstand erosion. The valves are arranged for ease of maintenance, repair, and in-service inspection. During a LOPP, the motor-operated valves are powered from the two nonsafety-related standby diesel-generators.

The AHS provided for each PSWS train is a separate, multi-celled, 100 percent capacity mechanical draft plume abated cooling tower, with the fans in the tower from each train supplied by one of the two redundant electrical buses. During a LOPP, the fans are powered from the two nonsafety-related standby diesel-generators. Each tower cell has an adjustable-speed, reversible motor fan unit that can be controlled for cold weather conditions to prevent freezing in the basin. A full flow bypass is provided to return water directly to the PSWS basin to allow ease of cold weather startup. Mechanical and electrical isolation allows maintenance on one tower, including complete disassembly, during full power operation. The Station Water System (SWS) provides makeup for blowdown, drift, and evaporation losses from the basin. Refer to Section 9.2.10 for the SWS discussion. Fiberglass reinforced polyester pipe is used for buried PSWS piping to preclude long-term corrosion.

NAPS COL 9.2.1-1-A Appropriate chemical treatment is added to the PSWS basin to preclude long-term corrosion and fouling of the PSWS based on site water quality analysis.

In the event of a LOPP, the PSWS supports the RCCWS in bringing the plant to cold shutdown condition in 36 hours assuming the most limiting single active or passive component failure.

Unit 3 PSWS heat loads are shown in DCD Table 9.2-1. The PSWS component design characteristics are shown in Table 9.2-201.

The PSWS design detects and alarms in the MCR any potential gross leakage and permits the isolation of any such leak in a sufficiently short period of time to preclude extensive plant damage.

~~Means are provided to detect leakage into the PSWS from the RCCWS, which may contain low levels of radioactivity.~~ Analysis of routine PSWS basin grab samples will detect RCCWS leakage, which may contain low levels of radioactivity, into the PSWS. This provides the action required by NRC Inspection and Enforcement Bulletin No. 80-10.

The potential for water hammer is mitigated through the use of various system design and layout features, such as automatic air release/vacuum valves installed at high points in system piping and at the pump discharge, proper valve actuation times to minimize water hammer, limiting fluid velocities in piping, procedural requirements ensuring proper line filling prior to system operation and after maintenance operations, and the use of check valves at pump discharges to prevent backflow into the pumps.

Operation

The PSWS operates during startup, normal power operation, hot standby, cooldown, shutdown/refueling, and LOPP.

During normal plant operation, the cross-tie valves in the PSWS pump discharge header are open, allowing two of the four 50 percent capacity PSWS pumps to supply water to both PSWS trains. Heat removed from the RCCWS and TCCWS is rejected to the auxiliary heat sink.

Operation of any two of the four PSWS pumps is sufficient for the design heat load removal in any normal operating mode. During normal and LOPP cooldown mode, three pumps can be used for operational convenience to bring the plant to cold shutdown condition in 24 hours.

During a LOPP, running PSWS pumps restart automatically using power supplied by the nonsafety-related standby diesel-generators.

9.2.1.6 COL Information

9.2.1-1-A Material Selection

NAPS COL 9.2.1-1-A This COL item is addressed in Section 9.2.1.2.

9.2.2 Reactor Component Cooling Water System

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

The potable water system supplies the quality of water required by the authorities having jurisdiction.

The sanitary waste discharge system is designed to produce a waste water effluent quality required by Federal, state, and local regulations and permits.

9.2.4.2 System Description

Potable Water System

The PWS consists of ground wells at various locations on site. As shown on Figure 9.2-202, for each well house there is a pump, compressor, hydro-pneumatic tank, and interconnecting piping and valves. Combined potable water volume of the hydro-pneumatic tanks is 50,000 liters (13,200 gallons). Potable water from hydro-pneumatic tanks flows to a common potable water header for supply to Unit 3 facilities. The Unit 3 PWS underground header is connected to the Unit 1 and 2 domestic water header via a normally-closed isolation valve. This cross-tie connection is provided for operational flexibility and ease of system maintenance. In addition to non-radiological areas, potable water is provided to areas where inadvertent backflow into the system could result in radiological contamination of the potable water. For those PWS branches with outlets in areas where the potential for radiological contamination exists, backflow prevention is provided through the installation of backflow preventers.

Sanitary Waste Discharge System

The sanitary waste generated by Unit 3 is collected by a network of sumps and is pumped to the Unit 3 Sewage Treatment Plant (STP). The Unit 3 STP consists of two extended aeration type packaged units, each rated for a normal capacity of 94,500 liters per day (25,000 gallons per day). The two packaged units in parallel can treat 189,000 liters per day (50,000 gallons per day) of sanitary sewage. During normal plant operation, only one of the packaged units is required, and during outages, both packaged units can be operated to serve additional demand. The effluent is discharged to the cooling tower blow down sump and subsequently drained to the WHTF.

~~For buildings with systems containing radioactivity, either there are no sanitary waste lines from the building, or where the potential for radioactive contamination exists, composite samplers are installed in the sanitary waste lines to the STP to detect radiological contamination in the~~

sanitary waste. Analysis of routine STP sludge tank grab samples will detect events that might contaminate the STP downstream of the sludge tank. This provides the action required by Inspection and Enforcement Bulletin No. 80-10. The quality of effluent meets, at a minimum, the standards established by Federal, state, and local regulations and permits. Sewage sludge is transferred to a truck for off-site disposal. A simplified diagram of the SWDS is shown in Figure 9.2-203.

9.2.4.3 Safety Evaluation

Potable Water System

The PWS has no safety-related function and is not connected to any safety-related system or component. Failure of the system does not compromise any safety-related equipment or component and does not prevent safe shutdown of the plant. The PWS does not handle radioactive fluids. It is neither connected to, nor does it interface with any system that may contain radioactive fluids.

Sanitary Waste Discharge System

The SWDS has no safety-related function and is not connected to any safety-related system or component. Failure of the system does not compromise any safety-related equipment or component and does not prevent safe shutdown of the plant.

The SWDS is not designed to handle radioactive fluids. It is neither connected to, nor does it interface with, any system that may contain radioactive fluids. As a precautionary measure and as shown in Figure 9.2-203, the SWDS effluent is monitored, the STP sludge tank is grab sampled on a batch basis for potential radiological contamination at several locations in the sanitary waste lines to the STP. In the event radioactivity is detected above preset predetermined limits, controls are in place to prevent offsite disposal of sewage sludge prior to on-site evaluation of potential radiological contamination and treatment when contamination is beyond acceptable limits initiate treatment and prevent unmonitored, uncontrolled radioactive releases to the environment.

9.2.4.4 Testing and Inspection Requirements

The PWS and SWDS are proven operable by their use during normal plant operation.

9.2.4.5 Instrumentation Requirements

The PWS and SWDS are furnished with instrumentation that permit local and/or remote monitoring, and local control of each of the respective processes. This instrumentation includes meters, switches, indicators, pressure gauges, flow switches, ~~composite samplers,~~ transmitters, controllers, and valves as required for service, operation, and protection of plant personnel and equipment.

9.2.5 Ultimate Heat Sink

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

Replace the second to last sentence in the seventh paragraph with the following.

STD COL 9.2.5-1-A Procedures that identify and prioritize available makeup sources seven days after an accident, and provide instructions for establishing necessary connections, will be developed in accordance with the procedure development milestone in Section 13.5.

9.2.5.1 COL Information

9.2.5-1-A Post 7 day Makeup to UHS

STD COL 9.2.5-1-A This COL Item is addressed in Section 9.2.5.

9.2.6 Condensate Storage and Transfer System

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

9.2.6.2 System Description

Add the following at the end of the first paragraph.

STD SUP 9.2.6-1 Freeze protection is provided for the CS&TS.

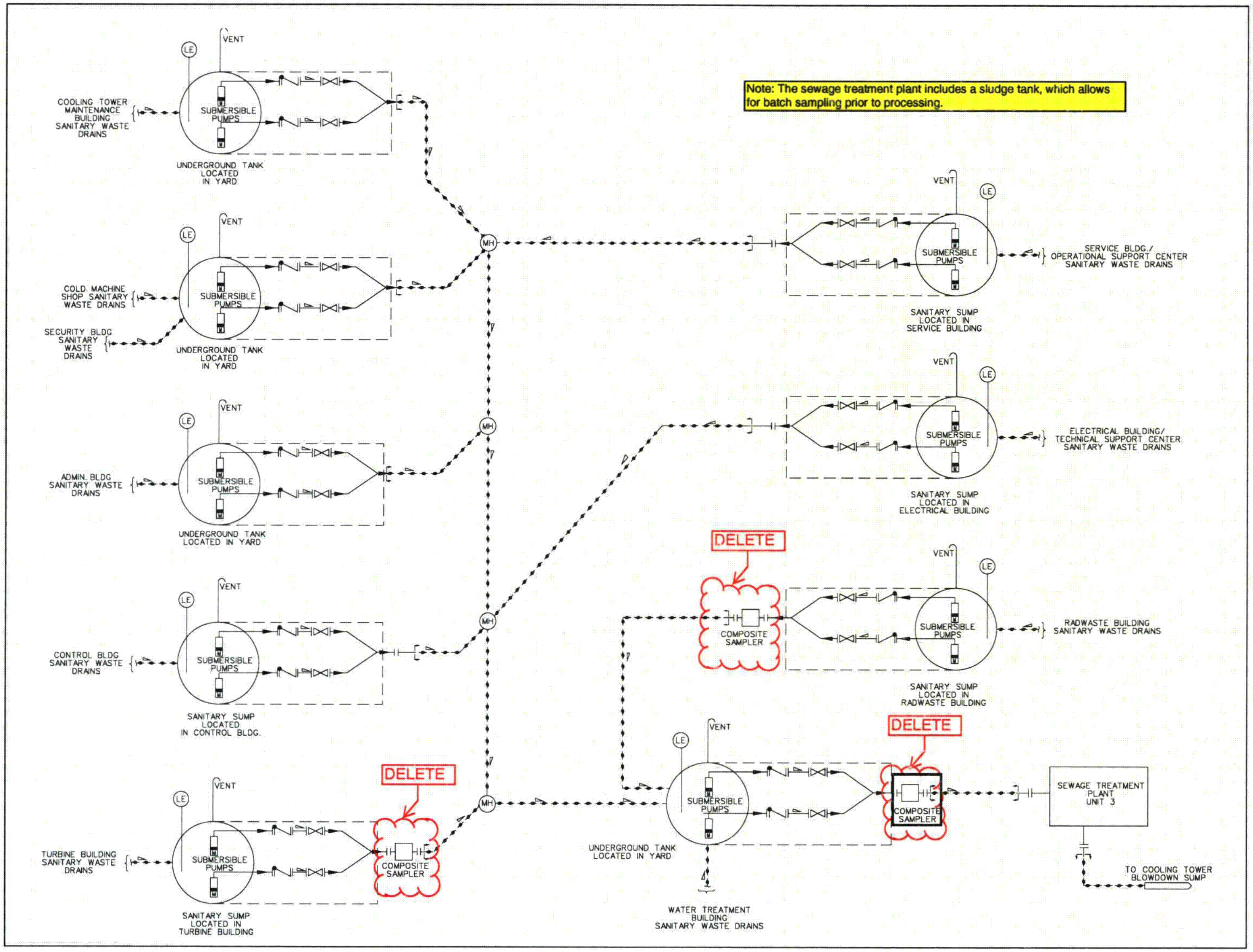
9.2.7 Chilled Water System

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

9.2.8 Turbine Component Cooling Water System

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

NAPS CDI **Figure 9.2-203 Sanitary Waste Discharge System Simplified Diagram**



select mechanical draft fans are started, operated at reduced speed, or stopped, select portions or all of the NPHS is bypassed, and condenser halves are isolated. These alternate and transitional configurations are utilized to provide benefits such as freeze protection, water conservation, energy conservation, plume minimization, and isolation of portions of the CIRC and other systems for maintenance.

Selected components may be taken out of service during power operation. These alternate configurations normally change plant thermal performance. In some configurations, reactor power reduction may be required to avoid a turbine trip on decreasing condenser vacuum.

The SWS supplies makeup water to the circulating water pump forebay to replace water losses due to evaporation, drift, and blowdown. Blowdown from the CIRC is taken from the cross-connect near the turbine building. The blowdown flow is discharged to the plant discharge canal at a maximum of 37.8°C (100°F).

A condenser tube cleaning subsystem cleans the circulating water side of the main condenser tubes.

Leakage of condensate from the main condenser into the CIRC via a condenser tube leak is not likely during power operation, since the CIRC normally operates at a greater pressure than the shell (condensate) side of the condenser. Analysis of routine CIRC cooling tower grab samples will detect events that could lead to unmonitored, uncontrolled radioactive releases to the environment. This provides the action required by NRC Inspection and Enforcement Bulletin No. 80-10.

10.4.5.5 **Instrumentation Applications**

Insert the following between the fourth and fifth paragraphs.

NAPS CDI

Level instrumentation provided in the circulating water pump forebay controls makeup flow from the SWS to the pump forebay via the N-DCIS. Level instrumentation in the pump forebay initiates alarms in the main control room on abnormally low or high water level.

Pressure indication is provided on the circulating water pump discharge. Differential pressure instrumentation is provided across the inlet and outlet to the condenser and is used to determine the frequency of operating the condenser tube cleaning system.

STD COL 11.5-3-A

Table 11.5-201 Provisions for Sampling Liquid Streams

No.	Process Systems as listed in NUREG-0800, SRP 11.5 Table 2 (Draft Rev. 4)	ESBWR System (s) that Perform the Equivalent SRP 11.5 Function (Note 1)	In Process: Grab Notes 2 & 7	In Effluent: Grab Notes 2 & 7	In Effluent: Continuous Notes 2 & 7
1.	Liquid Radwaste (Batch) Effluent System Note 3	Equipment (Low Conductivity Drain Subsystem Floor (High Conductivity) Drain Subsystem Detergent Drain Subsystem	S&A	S&A, H3 Note 4	-
2.	Service Water System and/or Circulating Water System	Plant Service Water System and Circulating Water System	-	S&A, H3 Note 9	(S&A) Notes 6 & 8 -
3.	Component Cooling Water System	Reactor Component Cooling Water System	S&A	S&A H3	(S&A) Notes 6 & 8
4.	Spent Fuel Pool Treatment System	Spent Fuel Pool Treatment System	S&A	S&A H3	(S&A) Notes 6 & 8
5.	Equipment & Floor Drain Collection and Treatment Systems	LCW Drain Subsystem HCW Drain Subsystem Detergent Drain Subsystem Chemical Waste Drain Subsystem Reactor Component Cooling Water System (RCCWS) Drain Subsystem	-	S&A H3	(S&A) Notes 6 & 8
6.	Phase Separator Decant & Holding Basin Systems	Equipment (Low Conductivity) Drain Subsystem Floor (High) Drain Subsystem	-	S&A H3	(S&A) Notes 6 & 8
7.	Chemical & Regeneration Solution Waste Systems	Chemical Waste Drain Subsystem	-	S&A H3	(S&A) Notes 6 & 8
8.	Laboratory & Sample System Waste Systems	Chemical Waste Drain Subsystem	-	S&A H3	(S&A) Notes 6 & 8

STD COL 11.5-3-A **Table 11.5-201 Provisions for Sampling Liquid Streams**

No.	Process Systems as listed in NUREG-0800, SRP 11.5 Table 2 (Draft Rev. 4)	ESBWR System (s) that Perform the Equivalent SRP 11.5 Function (Note 1)	In Process Grab Notes 2 & 7	In Effluent Grab Notes 2 & 7	In Effluent Continuous Notes 2 & 7
9.	Laundry & Decontamination Waste Systems	Detergent Drain Subsystem	-	S&A H3	(S&A) Notes 6 & 8
10.	Resin Slurry, Solidification & Baling Drain Systems	Equipment (Low Conductivity) Drain Subsystem, Floor (High) Drain Subsystem	-	S&A H3	(S&A) Notes 6 & 8
11.	Storm & Underdrain Water System	Storm Drains ~~and Cooling Tower Blowdown~~	-	~~(~~S&A, H3~~)~~ Notes 3~~, 4,~~ & ~~6~~10	~~(S&A) Notes 3& 6~~ -
12.	Tanks and Sumps Inside Reactor Building	Equipment (Low Conductivity) Drain Subsystem Floor (High) Drain Subsystem Chemical Waste Drain Subsystem Detergent Drain Subsystem	-	S&A H3	(S&A) Notes 6 & 8
13.	Ultrasonic Resin Cleanup Waste Systems	Note 5	-	Note 5	Note 5
14.	Non-Contaminated Waste Water System	Sanitary Waste ~~Water~~ Discharge System	-	~~(~~S&A, H3~~)~~ Notes ~~3, 4 & 6~~11	~~(S&A) Note 4~~ -
15.	Mobile Liquid Radioactive Waste Processing Systems (Includes Reverse Osmosis Systems)	Mobile Liquid Radioactive Waste Processing Systems (Includes Reverse Osmosis Systems)	S&A	(S&A, H3)	(S&A) Notes 6 & 8

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Table 11.5-201 Provisions for Sampling Liquid Streams

No.	Process Systems as listed in NUREG-0800, SRP 11.5 Table 2 (Draft Rev. 4)	ESBWR System (s) that Perform the Equivalent SRP 11.5 Function (Note 1)	In Process	In Effluent	
			Grab Notes 2 & 7	Grab Notes 2 & 7	Continuous Notes 2 & 7

Notes for Table 11.5-201:

1. Table 11.5-5 addresses sampling provisions for BWRs as identified in Table 2 of SRP 11.5. For process systems identified for BWRs in Table 2, but not shown in Table 11.5-5, those systems are not applicable to ESBWR. In some cases, there are multiple subsystems that are used to perform the overall equivalent SRP function and are listed as such in the column.
2. S&A = Sampling & Analysis of radionuclides, to include gross radioactivity, identification and concentration of principal radionuclides and concentration of alpha emitters; R = Gross radioactivity (beta radiation, or total beta plus gamma); H3 = Tritium
3. Liquid Radwaste is processed on a batch-wise basis. The Liquid Waste Management System sample tanks can be sampled for analysis of the batch. See DCD Section 11.2.2.2 for more information on Liquid Radwaste Management.
4. Monitoring of effluents from ~~storm drains, the cooling tower blow down, and sanitation wastes are~~ the Equipment, Floor, and Detergent Drain Subsystems is included in the ~~plant-specific~~ Offsite Dose Calculation Manual.
5. The ESBWR does not include ultrasonic resin cleanup waste system at this time. Should one be installed, the Liquid Waste Management System would provide sampling and monitoring provisions.
6. The use of parenthesis indicates that these provisions are required only for the systems not monitored, sampled, or analyzed (as indicated) prior to release by downstream provisions.
7. The sensitivity of detection, also defined here as the Lower Limit of Detection (LLD), for each indicated measured variable, is based on the applicable radionuclide (or collection of radionuclides as applicable) as given in ANSI/IEEE N42.18.
8. Processed through radwaste Liquid Waste Management System (LWMS) prior to discharge. Therefore, this process system is monitored, sampled, or analyzed prior to release by downstream provisions. See Note 6 above. Depending on Utility's discretion, additional sampling lines may be installed.
   Continuous Effluent sampling is not required per Standard Review Plan 11.5 Draft Rev. 4, April 1996, Table 2 for this system function.
9. Grab samples can be obtained from a cooling tower basin. See Section 9.2.1.2 for the PSWS cooling tower basin and Section 10.4.5.2.3 for the Circulating Water System cooling tower basin.
10. Grab samples can be obtained from the Condensate Storage Tank (CST) basin sump. See DCD Section 9.2.6.2.
11. Grab samples can be obtained from the sewage treatment plant. See Section 9.2.4.2.