BASIS: ESBWR COLA
(Entirety)

Dominion®

North Anna 3 Combined License Application

Part 7: Departures Report

(Includes Information on Departures, Variances, and Exemptions)

Revision 6

December 2013

REVISION SUMMARY

Revision 6

Section	Changes	Reason for Change
Departures, Introduction	Added second paragraph making reference to final certification rulemaking	Consistency with EF3 COLA and editorial change reflecting multiple departures
	Added NAPS DEP 3.7-1, NAPS DEP 8.1-1, NAPS DEP 8.1-2, & NAPS DEP 12.3-1	New departures
Departures, DEP 3.7-1	Added departure for Ground Response Spectra	New departure
Departures, DEP 8.1-1	Added departure for Electrical Power Distribution System	New departure
Departures, DEP 8.1-2	Added departure for On-site Power System SRP Criteria Applicability Matrix	New departure
Departures, DEP 11.4-1, Summary of Departure	Address the LWMS and SWMS	Consistency with EF3 COLA
Departures, DEP 11.4-1, Scope/Extent of Departure	Added references to all FSAR locations affected by NAPS DEP 11.4-1	Consistency with EF3 COLA
Departures, DEP 11.4-1, Departure Evaluation	Added new first paragraph stating departure affects Tier 2 information. Revised last paragraph to reference RG 1.206 and 10 CFR 52 Appendix E	Consistency with EF3 COLA
Departures, DEP 12.3-1	Added departure	NAPS DEP 12.3-1
Variances, Introduction	Revised NAPS ESP VAR 2.0-1 title	No longer a variance for χ/Q, only D/Q
	Added NAPS ESP VAR 2.3-1	New variance
	Added NAPS ESP VAR 2.4-3	New variance
	Added NAPS ESP VAR 2.4-4, “Lake Level Increase”	Consistency with US-APWR S-COLA
	Added NAPS ESP VAR 2.4-5	New variance
	Revised NAPS ESP VAR 2.5-2 entry to “Deleted”	No longer seeking variance
	Added NAPS ESP VAR 12.2-5	New variance
Variances, VAR 2.0-1	Revised	No longer a variance for χ/Q, only D/Q

Revision 6 *(continued)*

Section	Changes	Reason for Change
Variances, VAR 2.0-2, Justification	Revised the maximum groundwater elevation values	Incorporate revised groundwater model
Variances, VAR 2.0-3	Revised hydraulic gradient values	Consistency with US-APWR S-COLA
	Deleted metric units	Editorial
Variances, VAR 2.0-4	Revised variance to reflect ground motion response spectra	New GMRS based on CEUS and Mineral, VA earthquake
Variances, VAR 2.0-5	Revised variance	Revised analysis of accidental release of liquid radioactive waste
Variances, VAR 2.3-1	Added variance	Revised site characteristics for tornadoes and consistency with US-APWR S-COLA
Variances, VAR 2.4-1	Revised seepage velocity	Consistency with US-APWR S-COLA
	Deleted metric units	Editorial
Variances, VAR 2.4-3	Added variance	Consistency with US-APWR S-COLA (RAI 0.04.12-2); updated for well No. WP-3 and maximum groundwater elevations information
Variances, VAR 2.4-4	Added NAPS ESP VAR 2.4-4, “Lake Level Increase”	Consistency with US-APWR S-COLA
Variances, VAR 2.4-5	Added variance	Revised Lake Anna PMF analysis
Variances, VAR 2.5-2	Deleted variance	No longer seeking variance
Variances, VAR 12.2-1	Revised variance	Consistency with FSAR Section 12.2
Variances, VAR 12.2-3	Added reference to SSAR	Completeness
Variances, VAR 12.2-4	Revised variance	Consistency with FSAR Section 12.2
Variances, VAR 12.2-5	Added variance	DCD R9 gaseous effluent releases are not bounded by ESP
Variances, References	Added Reference 6	To include EIS

Revision 6 *(continued)*

Section	Changes	Reason for Change
Exemptions	Changed title from “Exemption Requests” to “Exemptions”	Consistency with EF3 COLA
Exemptions, Exemption 1	Added exemption for special nuclear material	Consistency with EF3 COLA
Exemptions, Exemption 2	Added exemption for intermediate switchyard	New exemption
Exemptions, Exemption 3	Added exemption request	New exemption
Exemptions, Table 3-1	Deleted Table 3-1	DCD R9
Exemptions, Exemption 4	Added exemption request	NAPS DEP 12.3-1

Revision 5

Section	Changes
All	Technology change from US-APWR to ESBWR

Revision 2

Section	Changes
Departures	Added Departure NAPS DEP 11.4-1 and associated justification.

Revision 1

Section	Changes
Departures	RAI 09.05.01-17, Fire Water Supply Locations
Variances	Revised to reflect issuance of ESP-003.
	Updated to align with DCD R5.
	RAI 12.02-1, Update to Commitment to Final Version of NEI 07-03
	RAI 12.02-10, Clarification of FSAR Tables in Chapter 12
	RAI 15.06.05-1, Dose Evaluation Factors

Revision 1 *(continued)*

Section	Changes
Exemption Requests	Deleted 10 CFR 26 Exemption Request.
	Added exemption for eliminating the expected minimum accumulator pressure value in the Bases for SR 3.1.5.1.
	Added exemption to revise the Bases description for SR 3.7.2.3 to include an expanded discussion of the acceptance criteria for differential pressure across the Emergency Filter Unit (EFU). [

Contents

DEPARTURES

Introduction

A *departure* is a plant-specific deviation from design information in a standard design certification rule. Departures from the reference ESBWR Design Control Document (DCD) are identified and evaluated consistent with regulatory requirements and guidance. Each departure is examined in accordance with 10 CFR 52 requirements. Although the ESBWR Design Certification Application is currently under review with the NRC, departures are evaluated utilizing the guidance provided in Regulatory Guide 1.206, Section C.IV.3.3.

It is anticipated that the final certification rulemaking for the ESBWR would have the same change process as that in current appendices to 10 CFR 52 and in the proposed 10 CFR 52 Appendix E, "Design Certification Rule for the ESBWR Design." References in this part to the Design Certification Rule (DCR) or 10 CFR 52 Appendix E are understood to mean the proposed 10 CFR 52 Appendix E and the anticipated final ESBWR DCR.

The following departures are evaluated in this report:

NAPS DEP 3.7-1, Ground Response Spectra for Seismic Structural Loads and Floor Response Spectra

NAPS DEP 8.1-1: Figure 8.1-1, Sheet 1, *Electrical Power Distribution System*

NAPS DEP 8.1-2: Table 8.1-1, On-site Power System SRP Criteria Applicability Matrix

NAPS DEP 11.4-1: Long-term, Temporary Storage of Class B and C Low-Level Radioactive Waste

NAPS DEP 12.3-1: Liquid Radwaste Effluent Discharge Piping Flow Path

Departure: NAPS DEP 3.7-1, Ground Response Spectra for Seismic Structural Loads and Floor Response Spectra

1. Summary of Departure

DCD Table 2.0-1, *Envelope of ESBWR Standard Plant Site Parameters*, defines the safe shutdown earthquake (SSE) horizontal and vertical design ground response spectra of 5 percent damping, also termed the Certified Seismic Design Response Spectra (CSDRS), as the free-field outcrop spectra at the foundation level (bottom of the base slab) of the Reactor Building/Fuel Building and Control Building structures, as shown in DCD Figures 2.0-1 and 2.0-2. As specified in DCD Table 2.0-1, Note (9) for the Firewater Service Complex, which is essentially a surface founded structure, the CSDRS is 1.35 times the values shown in DCD Figures 2.0-1 and 2.0-2 and is defined as free-field outcrop spectra at the foundation level (bottom of the base slab) of the Firewater Service Complex structure. The Unit 3 site-specific horizontal and vertical seismic response spectra exhibit exceedances at certain frequencies, when compared to the CSDRS. As a

result of these exceedances, Dominion performed site-specific soil-structure interaction (SSI) analyses for the RB/FB, CB and FWSC structures and revised the SSE definition to include the ESBWR CSDRS and the site-specific foundation input response spectra (FIRS) for each seismically qualified structure for use in performing seismic design, analysis, and qualification of structures, systems and components (SSCs).

Because the SSE is also defined in DCD Tier 1, Table 5.1-1, the changes to the site-specific definition requires a departure from DCD Tier 1 information. Therefore, a request for exemption from DCD Tier 1 information is provided in Exemption 3.

Finally, DCD Section 3.7 defines, as Tier 2* information, the ESBWR Operating Basis Earthquake (OBE) as one-third of the SSE ground motion. Because the Unit 3 SSE is being defined through this departure as consisting of both the CSDRS and FIRS for each structure, two spectra are used to define the Unit 3 OBE design ground motion: one-third of the CSDRS and a site-dependent spectrum, both of which must be exceeded in order to require a plant shutdown.

2. Scope/Extent of Departure

This departure is for the site-specific FIRS exceeding the CSDRS at certain frequencies and a revision of the SSE definition to include the site-specific FIRS for each seismically qualified structure. The changes are identified in FSAR Sections 1.3, 2.0, 3.7, 3.8, 4.2, 19.2, and Appendices 3A, 3C, and 19A. The departure also involves redefinition of the OBE. The changes to the OBE definition are identified in FSAR Section 3.7.

As noted above, an associated request for exemption from DCD Tier 1 information is provided in Exemption 3.

3. Departure Justification

For the RB/FB and CB structures, DCD Table 2.0-1 defines the CSDRS associated with the SSE for horizontal and vertical directions as those presented in DCD Figures 2.0-1 and 2.0-2, respectively. For the FWSC, DCD Table 2.0-1, Note (9) defines the CSDRS. Comparisons of site-specific spectra with the CSDRS are presented in FSAR Figures 2.0-201, 2.0-202, 2.0-203, and 2.0-204 for both full column outcrop motions and geologic outcrop motions. As discussed in FSAR Section 3.7.1.1, these figures show that the site-dependent FIRS exceed the CSDRS for Seismic Category I structures. The site-specific SSI analyses results are presented in FSAR Section 3.7.2.4 for the RB/FB, CB and FWSC structures.

FSAR Figures 2.0-201, 2.0-202, 2.0-203, and 2.0-204 present the CSDRS and Unit 3 site-specific FIRS for the horizontal and vertical directions, for all of the Unit 3 Seismic Category I structures. These figures reflect the Unit 3 site-specific horizontal and vertical seismic spectra, therefore DCD Figures 2.0-1 and 2.0-2 for the RB/FB and CB structures and DCD Table 2.0-1, Note (9) for the FWSC structure, which defined the CSDRS, are not replaced by this departure. Unit 3 seismic design, analyses, and qualification of site-specific structures, systems, and components use both the CSDRS and the Unit 3 site-specific FIRS for purposes of establishing the SSE ground motion

response spectra, as defined in FSAR Section 3.7.1. This approach satisfies the minimum requirements for design ground motion as described in 10 CFR 50, Appendix S (as discussed in FSAR Section 3.7.1.1).

FSAR Section 3.7.2.4 discusses the site-specific SSI analyses that are performed to validate design of the standard plant Seismic Category I structures, based on the site-specific SSI input motions. The results of the site-specific SSI analyses, documented in FSAR Section 3.7.2.4.1.6.1, demonstrate that the standard plant seismic design of structural members envelops the site-specific seismic responses for the RB/FB, CB and FWSC (as discussed in FSAR Section 3.7.2.4.1). FSAR Section 3.7.2.8 states that the same process is used for design and analyses for the Seismic Category II and Radwaste Building structures.

FSAR Section 19.2.3.2.4 discusses the Unit 3 seismic risk evaluation.

In FSAR Section 3.7.2.4.1.6.1, the site-specific floor response spectra for the best estimate, lower bound, and upper bound subsurface profiles are compared with the DCD enveloping floor response spectra at 5 percent damping. Figures are added to FSAR Section 3.7.2 to compare the site-specific in-structure response spectra (ISRS), to the DCD corresponding floor response spectra at 5 percent damping. In some locations, the Unit 3 floor response spectra exceed the DCD enveloping floor response spectra. The floor response spectra used for seismic design of systems and components considers the DCD floor response spectra and the site-specific ISRS.

The OBE is defined for purposes of requiring a plant shutdown, as described in FSAR Section 3.7.4.4. The OBE for Unit 3 is based on two spectra defining the OBE design ground motion at grade. The first plant-shutdown OBE spectrum is one-third of the CSDRS, and the second plant-shutdown OBE spectrum is the site-dependent OBE described in FSAR Section 3.7.1.1.6. The use of two sets of spectra for the plant shutdown OBE is justified because the SSCs will be designed, analyzed, and qualified to the higher of the two sets of SSE spectra. Therefore, only for events which result in measured ground motion exceeding both sets of spectra of the plant shutdown OBE would a plant shutdown be required.

4. Departure Evaluation

As discussed above, appropriate site-specific analyses for the RB/FB, CB, and FWSC structures have been conducted to assess site-specific FIRS exceeding the CSDRS at certain frequencies and a revision of the SSE definition to include the FIRS for each seismically qualified structure. This departure has been evaluated and determined to comply with the requirements of the Design Certification Rule, Section VIII.B.5.

Accordingly, this departure does not:

1. Result in more than a minimal increase in the frequency of occurrence of an accident previously evaluated in the plant-specific DCD;

2. Result in more than a minimal increase in the likelihood of occurrence of a malfunction of a structure, system, or component (SSC) important to safety previously evaluated in the plant-specific DCD;

3. Result in more than a minimal increase in the consequences of an accident previously evaluated in the plant-specific DCD;

4. Result in more than a minimal increase in the consequences of a malfunction of a SSC important to safety previously evaluated in the plant-specific DCD;

5. Create a possibility for an accident of a different type than any evaluated previously in the plant-specific DCD;

6. Create a possibility for a malfunction of an SSC important to safety with a different result than any evaluated previously in the plant-specific DCD;

7. Result in a design basis limit for a fission product barrier as described in the plant-specific DCD being exceeded or altered; or

8. Result in a departure from a method of evaluation described in the plant-specific DCD used in establishing the design bases or in the safety analyses.

This departure does not affect resolution of an ex-vessel severe accident design feature identified in the DCD.

This departure does not modify design features and functional capabilities that are supported in a required assessment of a DCD design regarding aircraft impact hazards (i.e., as required by 10 CFR 50.150(a)(1)).

This departure involves a change to DCD Tier 1 and DCD Tier 2* information. Pursuant to Section VIII.B.2.b.5a of the ESBWR design certification rule, NRC approval is necessary; Exemption 3 requests the approval for the exemption from the DCD Tier 1 information.

Departure: NAPS DEP 8.1-1 - Figure 8.1-1, Sheet 1, *Electrical Power Distribution System*

1. Summary of Departure

DCD Tier 2, Figure 8.1-1, Sheet 1, *Electrical Power Distribution System*, has a horizontal dashed line with components in the “Turbine Island/Transformer Yard” shown below the line and components in the “Switchyard” shown above the line. This figure shows the location of the main generator circuit breaker and its motor-operated disconnects (MODs) below the dashed line in the “Turbine Island/Transformer Yard” area of the plant. The space available at the North Anna Power Station site for Unit 3 does not allow installing these components in this area of the plant. As shown

in FSAR Figure 8.1-1R, an intermediate switchyard is needed for Unit 3 and the main generator circuit breaker and its MODs will be located in the intermediate switchyard. Therefore, the location of these components in the intermediate switchyard at Unit 3 represents a departure from DCD Tier 2 information. There are no changes to the functions performed by the main generator circuit breaker and its MODs, how the functions are performed, or the ability to perform the functions due to the change in location to the intermediate switchyard.

Also, because these components need to be located in the intermediate switchyard at Unit 3, the dashed line in DCD Tier 2, Figure 8.1-1, Sheet 1, needs to be used to clarify that the departure affects physical location but not functional performance. FSAR Figure 8.1-1R shows the addition of labels above and below the dashed line to indicate that there is not a departure from the functions performed by these components in the on-site power supply system of the ESBWR standard plant. Therefore, the addition of the labels represents a departure from DCD Tier 2 information.

Because the dashed line and the location of the main generator circuit breaker and its MODs are also defined in DCD Tier 1, Figure 2.13.1-1, Sheet 1, *Electric Power Distribution System Functional Arrangement*, adding the labels and locating these components in the intermediate switchyard also represent departures from DCD Tier 1 information. Therefore, a request for an exemption from DCD Tier 1 information is included in Exemption 2.

This Tier 2 departure does not pertain to the changes to DCD Tier 2, Figure 8.1-1, Sheet 1, to add the intermediate switchyard or to show a 500/230 kV intermediate transformer with high side circuit breaker and three MODs in the intermediate switchyard as part of the Unit 3 off-site power supply system in FSAR Figure 8.1-1R. For DCD Tier 2, the designs of the off-site power supply system and switchyard are required to be addressed in the FSAR by DCD Tier 2 COL Items. Changes to a DCD Tier 2 figure to address DCD COL Items do not require a departure.

2. Scope/Extent of Departure

This Tier 2 departure is for the location of the main generator circuit breaker and its MODs in the on-site power supply system and the addition of labels on both sides of the dashed line. These changes are shown in FSAR Figure 8.1-1R, Sheet 1. As noted above, an associated request for exemption from DCD Tier 1 information is provided.

3. Departure Justification

DCD Tier 2, Figure 8.1-1, Sheet 1, shows the overall electrical power distribution system including both the on-site and off-site power distribution systems. This figure has a horizontal dashed line with the “Turbine Island/Transformer Yard” below the line and the “Switchyard” above the line. This dashed line is nearly identical with the physical interfaces between the on-site power supply system and the off-site power supply system.

DCD Tier 2, Section 8.1.2.2, *Offsite Power System Description*, describes these physical interfaces more specifically as follows. This section states that the off-site power supply system includes the switchyard and the high voltage lines up to the high voltage side (high-side) MODs of the main

generator circuit breaker, up to the high-side MODs of the circuit breakers for the unit auxiliary transformers, and up to the high-side MODs of the reserve auxiliary transformers.

Based on this description of the interface between the on-site and off-site power supply systems, the main generator circuit breaker and its MODs are part of the on-site power supply system and are included in the scope of the ESBWR standard plant design as described in the DCD. Per the DCD's description, the main generator circuit breaker and its MODs are part of the on-site power supply system's functional design. Per DCD Tier 2, Figure 8.1-1, these components are to be located in the area of the plant identified as the Turbine Island/Transformer Yard.

The space available for Unit 3 at the site does not allow the main generator circuit breaker and its MODs to be located in the Turbine Island/Transformer Yard area of the plant. Therefore, Unit 3 requires a departure from this DCD figure to locate the main generator circuit breaker and its MODs in the intermediate switchyard. To indicate that the main generator circuit breaker and its high-side MODs remain functionally in the on-site power supply system, the dashed line between "Turbine Island/Transformer Yard" and "Switchyard" is used inside of the intermediate switchyard to create two areas to clarify the departure affects location but not functional performance. The portion below the dashed line in the intermediate switchyard is labeled: "ESBWR standard plant." The portion above the dashed line in the intermediate switchyard is labeled: "Unit 3 site-specific design." These labels show that the departure is only related to the location of the main generator circuit breaker and its MODs, and does not affect the functions performed by these ESBWR standard plant components.

There are no proposed changes to the functions performed by the main generator circuit breaker and its MODs and no proposed changes to the method of operation. Because only the location of these components is being revised for this departure, there are no intended design functions, performance requirements, or DCD methods of evaluation that are affected by the proposed departure. The functional requirements for the main generator circuit breaker and its MODs that are established in the DCD for the on-site power supply system as part of the ESBWR standard plant design will continue to apply. Both the Turbine Island/Transformer Yard and the Intermediate Switchyard are outdoor locations. The main generator circuit breaker and its MODs are designed as outdoor equipment and are rated for the environmental conditions that are the same for both locations. There is no change to a design function, the ability to perform a design function, or the types of malfunctions identified for the main generator breaker and associated MODs as a result of the change in location. Therefore, the proposed departure does not have an adverse effect on an intended design function.

For DCD Tier 2, the design of the switchyard and off-site power supply system shown in DCD Tier 2, Figure 8.1-1, Sheet 1, is required to be added to the FSAR as indicated in DCD Tier 2 Section 8.2.1.1, *Transmission System*, see COL 8.2.4-1-A; and Section 8.2.1.2.1, *Switchyard*, see COL 8.2.4-2-A. Therefore, changes to the Tier 2 figure to add the intermediate switchyard and show a 500/230 kV intermediate transformer with high-side circuit breaker and three MODs in the

intermediate switchyard as part of the Unit 3 off-site power supply system are not departures from DCD Tier 2 information.

4. Departure Evaluation

As described above, locating the main generator circuit breaker and its MODs in the intermediate switchyard and adding labels on each side of the dashed line in the intermediate switchyard drawing do not adversely affect any intended DCD design functions. This departure has been evaluated and determined to comply with the requirements of the Design Certification Rule, Section VIII.B.5.

Accordingly, this departure does not:

1. Result in more than a minimal increase in the frequency of occurrence of an accident previously evaluated in the plant-specific DCD;

2. Result in more than a minimal increase in the likelihood of occurrence of a malfunction of a structure, system, or component (SSC) important to safety previously evaluated in the plant-specific DCD;

3. Result in more than a minimal increase in the consequences of an accident previously evaluated in the plant-specific DCD;

4. Result in more than a minimal increase in the consequences of a malfunction of a SSC important to safety previously evaluated in the plant-specific DCD;

5. Create a possibility for an accident of a different type than any evaluated previously in the plant-specific DCD;

6. Create a possibility for a malfunction of an SSC important to safety with a different result than any evaluated previously in the plant-specific DCD;

7. Result in a design basis limit for a fission product barrier as described in the plant-specific DCD being exceeded or altered; or

8. Result in a departure from a method of evaluation described in the plant-specific DCD used in establishing the design bases or in the safety analyses.

This departure does not affect resolution of an ex-vessel severe accident design feature identified in the DCD.

This departure does not modify design features and functional capabilities that are supported in a required assessment of a DCD design regarding aircraft impact hazards (i.e., as required by 10 CFR 50.150(a)(1)).

This departure involves a change to DCD Tier 1 information. Pursuant to Section VIII.B.2.b.5a of the ESBWR Design Certification Rule, NRC approval is necessary; Exemption 2 requests this approval.

Departure: NAPS DEP 8.1-2 – Table 8.1-1, Onsite Power System SRP Criteria Applicability Matrix

1. Summary of Departure

DCD Tier 2, Section 8.1.5.2.4 and Table 8.1-1, indicate that the off-site power system complies with Regulatory Guide (RG) 1.204. In RG 1.204, the NRC endorses four Institute of Electrical and Electronics Engineers (IEEE) documents that provide methods acceptable to the NRC for the design and implementation of lightning protection systems to ensure that electrical transients resulting from lightning phenomena do not render safety-related systems inoperable or cause spurious operation of such systems. The four IEEE documents are: IEEE Guide for Generating Station Grounding, Std. 665-1995 (reaffirmed 2001); IEEE Design Guide for Electrical Power Service Systems for Generating Stations, Std. 666-1991 (reaffirmed 1996); IEEE Guide for Instrumentation and Control Equipment Grounding in Generating Stations, Std. 1050-1996; and IEEE Application Guide for Surge Protection of Electric Generating Plants, Std. C62.23-1995 (reaffirmed 2001).

The North Anna Power Station (NAPS) switchyard was designed and constructed in the 1970s in accordance with Dominion transmission system standards to serve up to four units at the NAPS site. North Anna Units 1 and 2 were placed on line in 1978 and 1980, respectively, and have been in continuous operation using the NAPS switchyard. The design and construction of the NAPS switchyard significantly predates the issue of RG 1.204 (initially issued as DG-1137, dated February 2005) and, as such, the NAPS switchyard design conforms to part, but not all, of RG 1.204. IEEE Stds. 665, 666, and 1050 provide design and installation practices relevant to the standard plant. IEEE Std. 665 also provides recommended practices for connecting the power plant grounding grid to the switchyard grounding grid. The NAPS switchyard grounding grid connection to the plant grid is consistent with IEEE Std. 665. The NAPS switchyard surge protection is designed to Dominion transmission system standards that provide similar protection, but do not specifically match all of the guidance provided in IEEE Std. C62.23. Therefore, a departure is needed from DCD Section 8.1.5.2.4 and Table 8.1-1 that indicates full compliance with RG 1.204 for the NAPS switchyard lightning protection system design.

2. Scope/Extent of Departure

This Tier 2 departure documents an exception to the requirements of RG 1.204 as it relates to the NAPS switchyard design for lighting/surge protection. These changes are shown in FSAR Section 8.1.5.2.4 an Table 8.1-1R. There is no associated departure for Tier 1. Section 2.13.9 and the ITAAC in Table 2.13.9-1 remain valid.

3. Departure Justification

The NAPS switchyard and its lightning protection system were designed and constructed in the 1970s, in accordance with Dominion transmission system standards, to serve up to four units at the NAPS site. North Anna Units 1 and 2 were placed on line in 1978 and 1980, respectively, and have been in continuous operation using the NAPS switchyard. The design and construction of the NAPS switchyard significantly predates the issue date of RG 1.204 (initially issued as DG-1137, dated February 2005) and, as such, the NAPS switchyard lightning protection system design conforms to part, but not all, of RG 1.204. IEEE Stds. 665, 666, and 1050 provide design and installation practices relevant to the standard plant. IEEE Std. 665 also provides recommended practices for connecting the power plant grounding grid to the switchyard grounding grid. The NAPS switchyard grounding grid connection to the plant grid is consistent with IEEE Std. 665. The NAPS switchyard conforms to IEEE Std. C62.23 with certain exceptions, and conforms to the corresponding NAPS switchyard surge protection design practices outlined in the Dominion transmission standards.

There are no proposed changes to the functions performed by the switchyard equipment or its surge protection, and no proposed changes to the method of operation. The off-site power system and switchyard are site-specific and meet the interface requirements specified for off-site power in the DCD; thus, there are no intended DCD design functions, DCD performance requirements, or DCD methods of evaluation that are affected by the proposed departure. The functional requirements for the off-site power system that are established in the DCD will continue to apply. There is no change to the types of malfunctions identified for the switchyard as a result of the exceptions to IEEE C62.23 for the surge protection. Therefore, the proposed departure does not have an adverse effect on an intended design function.

4. Departure Evaluation

This departure affects Tier 2 information.

As described above, deviations from the IEEE C62.23 guidance for switchyard surge protection does not adversely affect any DCD intended design functions. This departure has been evaluated and determined to comply with the requirements of the DCR, Section VIII.B.5.

Accordingly, this departure does not:

1. Result in more than a minimal increase in the frequency of occurrence of an accident previously evaluated in the plant-specific DCD;

2. Result in more than a minimal increase in the likelihood of occurrence of a malfunction of a structure, system, or component (SSC) important to safety previously evaluated in the plant-specific DCD;

3. Result in more than a minimal increase in the consequences of an accident previously evaluated in the plant-specific DCD;

4. Result in more than a minimal increase in the consequences of a malfunction of a SSC important to safety previously evaluated in the plant-specific DCD;

5. Create a possibility for an accident of a different type than any evaluated previously in the plant-specific DCD;

6. Create a possibility for a malfunction of an SSC important to safety with a different result than any evaluated previously in the plant-specific DCD;

7. Result in a design basis limit for a fission product barrier as described in the plant-specific DCD being exceeded or altered; or

8. Result in a departure from a method of evaluation described in the plant-specific DCD used in establishing the design bases or in the safety analyses.

This departure does not affect resolution of an ex-vessel severe accident design feature identified in the DCD.

This departure does not modify design features and functional capabilities that are supported in a required assessment of a DCD design regarding aircraft impact hazards (i.e., as required by 10 CFR 50.150(a)(1)).

Therefore, in accordance with RG 1.206, Section C.IV.3.3, and the DCR, Section VIII.B.5, this departure does not require prior NRC approval or an exemption from 10 CFR 52.

Departure: NAPS DEP 11.4-1 - Long-Term, Temporary Storage of Class B and C Low-Level Radioactive Waste

1. Summary of Departure

The ESBWR DCD identifies that on-site storage space for a six-month volume of packaged waste is provided in the Radwaste Building. The Unit 3 Radwaste Building is configured to accommodate a minimum of ten years volume of packaged Class B and C waste, while maintaining space for at least three months of packaged Class A waste. This departure reconfigures the arrangement of systems and components within the ESBWR Radwaste Building volume. The systems, structures, and components requiring re-arrangement are associated with the Liquid Waste Management System and Solid Waste Management System (SWMS). The existing Radwaste Building Fire Protection and HVAC Systems have sufficient capacity to accommodate the extra volume of Class B and C wastes, and require no modification.

2. Scope/Extent of Departure

This departure affects Tier 2 information in the ESBWR DCD. The departure from the Tier 2 information does not involve a change to or departure from Tier 1 information, Tier 2* information, operational requirements, or the Technical Specifications. This departure is identified in

FSAR Sections 1.2.2.10.2, 1.2.2.16.9, 11.4, 11.4.1, 11.4.2.2.1, 11.4.2.2.2, 11.4.2.2.4, 11.4.2.3.1, 12.2 and 12.3; FSAR Tables 1.9-11R, 9A.5-5R, 11.4-1R, 11.4-2R, 12.2-22R, and 12.3-8R; and FSAR Figures 1.2-21R, 1.2-22R, 1.2-23R, 1.2-24R, 1.2-25R, 9A.2-20R, 9A.2-21R, 9A.2-22R, 9A.2-23R, 9A.2-24R, 11.4-1R, 11.4-2R, 12.3-19R, 12.3-20R, 12.3-21R, 12.3-22R, 12.3-39R, 12.3-40R, 12.3-41R, 12.3-42R, 12.3-61R, 12.3-62R, 12.3-63R, and 12.3-64R.

3. Departure Justification

DCD Sections 11.4.1, SWMS Design Basis, and 11.4.2.2.4, Container Storage Subsystem, discuss on-site storage space for low-level radioactive waste. The design accommodates a six-month volume of packaged waste storage in the Radwaste Building.

Class A, B, and C low-level radioactive waste is normally promptly disposed of at licensed off-site processing and disposal facilities. In the event that an off-site facility is not available to accept Class B and C waste shipments, the Unit 3 Radwaste Building waste storage space has been configured to accommodate at least ten years of Class B and C waste generated during plant operation. Shielding analysis results show that the dose rates in surrounding areas, both within the building and externally, are maintained below the allowable limits in accordance with the radiological area classification in FSAR Section 12.3. Long-term, temporary storage of Class B and C waste HICs, with design lifetimes of 300 years, will not have an adverse effect on the integrity of the waste containers. Periodic inspections will be performed to confirm container integrity during storage.

The increased Class B and C waste storage space is consistent with the regulatory guidance of NUREG-0800, Section 11.4, Appendix 11.4-A. The storage space reserved for Class A waste exceeds that recommended by NUREG-0800, Standard Review Plan, Branch Technical Position 11-3.

4. Departure Evaluation

This departure affects DCD Tier 2 information.

This Tier 2 departure does not affect off-site dose rates or the integrity of waste containers in storage. As such, the potential for increased radiation exposure to members of the public is not created. Accordingly, it does not:

1. Result in more than a minimal increase in the frequency of occurrence of an accident previously evaluated in the plant-specific DCD;

2. Result in more than a minimal increase in the likelihood of occurrence of a malfunction of a structure, system, or component (SSC) important to safety previously evaluated in the plant-specific DCD;

3. Result in more than a minimal increase in the consequences of an accident previously evaluated in the plant-specific DCD;

4. Result in more than a minimal increase in the consequences of a malfunction of a SSC important to safety previously evaluated in the plant-specific DCD;

5. Create a possibility for an accident of a different type than any evaluated previously in the plant-specific DCD;

6. Create a possibility for a malfunction of an SSC important to safety with a different result than any evaluated previously in the plant-specific DCD;

7. Result in a design basis limit for a fission product barrier as described in the plant-specific DCD being exceeded or altered; or

8. Result in a departure from a method of evaluation described in the plant-specific DCD used in establishing the design bases or in the safety analyses.

This departure does not affect resolution of an ex-vessel severe accident design feature identified in the ESBWR DCD.

This departure does not modify design features and functional capabilities that are supported in a required assessment of a DCD design regarding aircraft impact hazards (i.e., as required by 10 CFR 50.150(a)(1)).

Therefore, in accordance with RG 1.206, Section C.IV.3.3, and the DCR, this departure does not require prior NRC approval or an exemption from 10 CFR 52.

Departure: NAPS DEP 12.3-1 - Liquid Radwaste Effluent Discharge Piping Flow Path

1. Summary of Departure

The DCD describes that the Liquid Waste Management System (LWMS) either returns processed water to the condensate system or discharges to the environment via the circulating water system. The DCD also describes that the portion of the circulating water system which receives the LWMS discharge is the cooling tower blowdown line. For Unit 3, the discharges from the LWMS to the environment will use only the liquid radioactive waste effluent discharge pipeline and not the cooling tower blowdown line. This departure will simplify design and construction of the cooling tower blowdown line.

The change to not use the cooling tower blowdown line for transfer of liquid radwaste effluent means that a departure is needed from certain DCD Tier 2 information. Also, because DCD Tier 1 describes the use of the circulating water system for discharge of LWMS effluent, a request for an exemption from DCD Tier 1 information is included in Exemption 4.

2. Scope/Extent of Departure

This Tier 2 departure is for not using the cooling tower blowdown line in the circulating water system as part of the flow path for liquid radwaste effluent discharges to the environment. The Unit 3 flow

path is limited to the liquid radwaste effluent discharge pipeline between the Radwaste Building and the environment. The changes needed in DCD Tier 2 Chapters 11 and 12 are contained in the following FSAR sections, figure and table.

DCD Section 11.2.3.2, *Design Description*, describes that all radioactive releases will be discharged to the circulating water system. This departure changes the sentence in FSAR Section 11.2.3.2 to: “Liquid radioactive releases will be discharged using the liquid radwaste effluent discharge pipeline.”

DCD Figure 11.2-1b, *Floor Drain*, identifies that the “Floor Drain Process Subsystem” has a LWMS effluent discharge flow path labeled: “DISCHARGE VIA RADIATION MONITOR TO CIRCULATING WATER.” This departure changes the label in FSAR Figure 11.2-1bR to: “DISCHARGE VIA RADIATION MONITOR TO LIQUID RADWASTE EFFLUENT DISCHARGE PIPELINE.”

DCD Section 12.3.1.5.1, *Design Considerations*, indicates the “Cooling Tower Blowdown Line” is one of four piping segments that will contain radioactive materials, will have to run underground, and will be designed to preclude inadvertent or unidentified leakage to the environment. These piping segments are enclosed within a guard pipe and monitored for leakage, or are accessible for visual inspections via a trench or tunnel. This departure deletes the “Cooling Tower Blowdown Line” from the list because the liquid “Radwaste Effluent Discharge Pipeline” (as shown on the list) will no longer be directed to the cooling tower blowdown line. The cooling tower blowdown line will therefore not contain liquid radwaste effluent and will not need to be designed with these special features, which simplifies the design.

DCD Table 12.3-18, *Regulatory Guide 4.21 Design Objective and Applicable DCD Subsection Information*, Design Objective 3, identifies DCD Section 11.2.3.2 as a section which includes a description of a design feature used to meet the objective. This table repeats the sentence from that DCD section describing that all radioactive releases will be discharged to the circulating water system. This departure changes the sentence in FSAR Table 12.3-18R to: “Liquid radioactive releases will be discharged using the liquid radwaste effluent discharge pipeline.”

As noted above, an associated request for exemption from DCD Tier 1 information is provided.

3. Departure Justification

For the affected DCD Tier 2 sections, figure, and table listed above, the intended function of the circulating water system, and specifically the cooling tower blowdown line in the system, is to be a portion of the discharge path from the LWMS in the Radwaste Building to the environment. The liquid radwaste effluent discharge pipeline in the LWMS was to be discharged to the cooling tower blowdown line which would in turn discharge to the environment. For a COL Applicant, the DCD was intending that the cooling tower blowdown line be treated as containing liquid radwaste. To perform the function of containing the liquid radwaste with the performance requirement to not allow inadvertent or unidentified leakage to the environment, the cooling tower blowdown line was to be

either enclosed within a guard pipe and monitored for leakage, or made accessible for visual inspections via a trench or tunnel.

The change is to not use the cooling tower blowdown line to transfer radwaste effluent to the environment and to extend the liquid radwaste effluent discharge pipeline to transfer liquid radwaste from the LWMS in the Radwaste Building to the environment. This change involves pipelines that are required to comply with regulations at 10 CFR 20.1406 to minimize, to the extent practicable, contamination of the facility and the environment.

With the departure, the cooling tower blowdown line will not be used to contain liquid radwaste and so the special design requirements for performing that function will not be required for the Unit 3 cooling tower blowdown line. This change does not have an adverse effect on a DCD-described design function because the liquid radwaste effluent discharge pipeline in the LWMS will be extended to transfer liquid radwaste from the Radwaste Building to the environment and that pipeline continues to meet the special design requirements and the regulations. The underground segments of the liquid radwaste effluent discharge pipeline will either be enclosed within a guard pipe and monitored for leakage, or made accessible for visual inspections via a trench or tunnel. The change for this departure to use only the liquid radwaste effluent discharge pipeline for transfer to the environment will mean that the Unit 3 design continues to meet the DCD requirement for the piping to comply with 10 CFR 20.1406.

4. Departure Evaluation

As described above, not using the cooling tower blowdown line for transfer of liquid radwaste effluent discharges and extending the liquid radwaste effluent discharge pipeline to transfer liquid radwaste from the Radwaste Building to the environment do not adversely affect any intended DCD design functions. This departure has been evaluated and determined to comply with the requirements of the Design Certification Rule, Section VIII.B.5.

Accordingly, this departure does not:

1. Result in more than a minimal increase in the frequency of occurrence of an accident previously evaluated in the plant-specific DCD;

2. Result in more than a minimal increase in the likelihood of occurrence of a malfunction of a structure, system, or component (SSC) important to safety previously evaluated in the plant-specific DCD;

3. Result in more than a minimal increase in the consequences of an accident previously evaluated in the plant-specific DCD;

4. Result in more than a minimal increase in the consequences of a malfunction of a SSC important to safety previously evaluated in the plant-specific DCD;

5. Create a possibility for an accident of a different type than any evaluated previously in the plant-specific DCD;

6. Create a possibility for a malfunction of an SSC important to safety with a different result than any evaluated previously in the plant-specific DCD;

7. Result in a design basis limit for a fission product barrier as described in the plant-specific DCD being exceeded or altered; or

8. Result in a departure from a method of evaluation described in the plant-specific DCD used in establishing the design bases or in the safety analyses.

This departure does not affect resolution of an ex-vessel severe accident design feature identified in the DCD.

This departure does not modify design features and functional capabilities that are supported in a required assessment of a DCD design regarding aircraft impact hazards (i.e., as required by 10 CFR 50.150(a)(1)).

This departure involves a change to DCD Tier 1 information. Pursuant to Section VIII.B.2.b.5a of the ESBWR Design Certification Rule, NRC approval is necessary; Exemption 4 requests this approval.

VARIANCES

Introduction

A *variance* is a plant-specific deviation from one or more of the site characteristics, design parameters, or terms and conditions of an ESP or from the site safety analysis report (SSAR). A variance to an ESP is analogous to a departure from a standard design certification.

The following sections provide requests for variances from the site characteristics for the North Anna ESP (Reference 1) and from the ESPA SSAR. The requests comply with the requirements of 10 CFR 52.39 and 10 CFR 52.93. To support a decision whether to grant a variance, each variance request provides the technical justification and supporting cross-references to the Unit 3 FSAR information that meet the technically relevant regulatory acceptance criteria.

This COLA complies with the requirements of 10 CFR 52.79, *Contents of Applications; Technical Information in Final Safety Analysis Report*, and 10 CFR 52.39, *Finality of Early Site Permit Determinations*. In accordance with 10 CFR 52.79(b)(2) and 10 CFR 52.39(d), this COLA requests a variance where the Unit 3 FSAR references the North Anna ESP and: a) the Unit 3 FSAR does not demonstrate that the design of Unit 3 falls within the ESP site characteristics; or b) the Unit 3 FSAR does not demonstrate that the design of Unit 3 falls within the ESP (design) controlling parameters; or c) the Unit 3 FSAR does not incorporate the ESP SSAR information by reference without the need for certain changes. Accordingly, this COLA includes the following requests for variances:

NAPS ESP VAR 2.0-1 - Long-Term Deposition Value (D/Q) Estimate
NAPS ESP VAR 2.0-2 - Hydraulic Conductivity
NAPS ESP VAR 2.0-3 - Hydraulic Gradient
NAPS ESP VAR 2.0-4 - Vibratory Ground Motion
NAPS ESP VAR 2.0-5 - Distribution Coefficients (K_d)
NAPS ESP VAR 2.0-6 - DBA Source Term Parameters and Doses
NAPS ESP VAR 2.0-7 - Coordinates and Abandoned Mat Foundations
NAPS ESP VAR 2.3-1 - Tornado Site Characteristics
NAPS ESP VAR 2.4-1 - Void Ratio, Porosity, and Seepage Velocity
NAPS ESP VAR 2.4-2 - NAPS Water Supply Well Information
NAPS ESP VAR 2.4-3 - Well Reference Point Elevation
NAPS ESP VAR 2.4.4 - Lake Level Increase
NAPS ESP VAR 2.4-5 - Lake Anna PMF Level Increase
NAPS ESP VAR 2.5-1 - Stability of Slopes
NAPS ESP VAR 2.5-2 - [Deleted]
NAPS ESP VAR 12.2-1 - Gaseous Pathway Doses
NAPS ESP VAR 12.2-2 - [Deleted]

NAPS ESP VAR 12.2-3 - Annual Liquid Effluent Releases
NAPS ESP VAR 12.2-4 - Existing Units' and Site Total Doses
NAPS ESP VAR 12.2-5 - Annual Gaseous Effluent Releases

Variance: NAPS ESP VAR 2.0-1 – Long-Term Deposition Value (D/Q) Estimate

Request

This is a request to use the Unit 3 maximum long-term deposition value (D/Q) estimate provided in FSAR Table 2.3-16R for the maximum annual average meat animal D/Q value in the South direction for releases from the Radwaste Building ventilation stack rather than the corresponding ESP value in FSER Supplement 1, Appendix A and in SSAR Table 2.3-16. The Unit 3 value (4.4×10^{-9} 1/m^2) does not fall within (is larger than) the ESP and SSAR value (3.1×10^{-9} 1/m^2).

This variance results from a review of the Radiological Environmental Monitoring Program (FSAR Reference 2.3-201). The review and subsequent plotting of updated receptor locations using Geographic Information System (GIS) technology determined that since the time of the SSAR, locations of and distances to several of the "closest receptors" had changed. FSAR Table 2.3-15R shows a meat animal present in the South direction which did not have such receptor at the time of the SSAR.

Justification

This variance is acceptable because this Unit 3 D/Q value (along with other updated Unit 3 long-term dispersion and deposition estimates) were used to determine Unit 3 doses. The estimated annual doses from normal gaseous effluent releases remain within applicable limits as shown in FSAR Table 12.2-201.

Because of the changes in Unit 3 maximum long-term dispersion and deposition estimates, and also because of changes in maximum annual gaseous release values, some of the gaseous effluent doses are higher than the corresponding ESP value. See related variance NAPS ESP VAR 12.2-1, which is addressed below.

Variance: NAPS ESP VAR 2.0-2 – Hydraulic Conductivity

Request

This is a request to use the Unit 3 maximum hydraulic conductivity value provided in FSAR Section 2.4.12.1.2 rather than the corresponding ESP value in FSER Supplement 1, Appendix A and in SSAR Table 1.9-1. The Unit 3 value does not fall within (is larger than) the ESP and SSAR value.

The ESP value of 1.04 m/day (3.4 ft/day) represents the upper limit of the values obtained by in situ hydraulic conductivity testing of observation wells installed for the ESP subsurface investigation.

These values varied from 0.076 to 1.04 m/day (0.25 to 3.4 ft/day) as shown in SSAR Table 2.4-16. The corresponding maximum hydraulic conductivity value reported in FSAR Section 2.4.12.1.2 is 3.0 m/day (9.9 ft/day) based on an expanded range from 0.076 to 3.0 m/day (0.25 to 9.9 ft/day). This data set includes in situ hydraulic conductivity test results for the observation wells installed for the ESP subsurface investigation plus additional observation wells installed for the Unit 3 subsurface investigation. Unit 3 values provided in FSAR Section 2.4.12.1.2 associated with hydraulic conductivity that do not fall within (are larger than) the ESP/SSAR values are as follows:

Value	ESP/SSAR Value	Unit 3 Value
Maximum – Saprolite	3.4 ft/day	9.9 ft/day
Geometric mean – Saprolite	1.3 ft/day	1.74 ft/day
Maximum – Bedrock	3 ft/day	6.3 ft/day

The variance in hydraulic conductivity values results from the hydraulic conductivity testing of the additional observation wells installed for the Unit 3 subsurface investigation.

Justification

The variance in hydraulic conductivity values is acceptable because:

1. Compliance with 10 CFR 20 is demonstrated in FSAR Section 2.4.13 with the use of a hydraulic conductivity value of 9.9 ft/day to evaluate radionuclide concentrations and associated doses resulting from a postulated accidental release of liquid effluents in the groundwater pathways. The calculated radionuclide concentrations and associated doses are conservative as the hydraulic conductivity of 9.9 ft/day is the maximum value identified in FSAR Table 2.4-16R.

2. The groundwater flow model used to evaluate the maximum groundwater level elevation at the Unit 3 site incorporated the hydraulic conductivity values measured for the Unit 3 subsurface investigation. The maximum groundwater level elevation in the power block area is predicted to range from approximately 270 to 284 ft NAVD88 (270.86 to 284.86 ft NGVD29). The maximum groundwater level elevation in the power block area around Seismic Category I structures is approximately 282.6 ft NAVD88 (283.46 ft NGVD29) or 7.4 ft below the design plant grade elevation of 290 ft NAVD88 (290.86 ft NGVD29). As shown in FSAR Table 2.0-201, this Unit 3 site characteristic value for maximum groundwater level elevation falls within the DCD site parameter value in DCD Table 2.0-1. The ESBWR design assumes a maximum groundwater level no higher than 0.61 m (2 ft) below the design plant grade elevation at a site and the Unit 3 site characteristic value of 7.4 ft below the Unit 3 design plant grade meets this requirement.

Variance: NAPS ESP VAR 2.0-3 – Hydraulic Gradient

Request

This is a request to use the Unit 3 hydraulic gradient value provided in FSAR Section 2.4.12.1.2 rather than the corresponding ESP value in FSER Supplement 1, Appendix A and in SSAR Table 1.9-1. The Unit 3 value does not fall within (is larger than) the ESP and SSAR value.

SSAR Section 2.4.12.1.2 states that there is a hydraulic gradient toward Lake Anna of about 3 ft per 100 ft. The corresponding Unit 3 hydraulic gradient in FSAR Section 2.4.12.1.2 is calculated to be 5 ft per 100 ft.

The variance in hydraulic gradient results from the use of additional groundwater data collected from the Unit 3 subsurface investigation.

Justification

The variance in hydraulic gradient is acceptable because compliance with 10 CFR 20 is demonstrated in FSAR Section 2.4.13 with the use of the higher hydraulic gradient of 5 ft per 100 ft to evaluate radionuclide concentrations and associated doses as a result of a postulated accidental release of liquid effluents in the groundwater pathways.

Variance: NAPS ESP VAR 2.0-4 – Vibratory Ground Motion

Request

This is a request to use the Unit 3 horizontal and vertical spectral acceleration (g) values for the ground motion response spectra (GMRS) at the top of a hypothetical outcrop under the reactor building/fuel building (RB/FB) common foundation (Elevation 224 ft NAVD88 (224.86 ft NGVD29)), rather than hypothetical outcrop control point safe shutdown earthquake (SSE) spectrum at the top of Zone III-IV (Elevation 249.14 ft NAVD88 (250 ft NGVD29)), as presented in the ESP and SSAR. The Unit 3 values do not fall within (are larger than) the ESP and SSAR values at almost all frequencies.

The Unit 3 GMRS horizontal and vertical spectra at Elevation 224 ft NAVD88 (224.86 ft NGVD29) are plotted in FSAR Figure 2.5.2-313. The corresponding ESP spectra at Elevation 249.14 ft NAVD88 (250 ft NGVD29) are provided in ESP FSER NUREG-1835, Supplement 1, Appendix A, Figure 2, and in SSAR Figure 2.5-48A. FSAR Figure 2.0-206 and Table 2.0-202 compare the Unit 3 and ESP horizontal response spectra. FSAR Figure 2.0-207 and Table 2.0-203 compare the Unit 3 and ESP vertical response spectra. There are 38 frequencies used for the Unit 3 spectra, while 21 frequencies were used for the ESP spectra.

Besides the difference in elevation at which the SSE and GMRS are defined in the SSAR and FSAR, there are additional differences in models, data, and methodologies that contribute to the differences of the resulting SSE and GMRS.

A significant change in the FSAR is the replacement of the starting EPRI-SOG models and databases used in the SSAR (SSAR Section 2.5 References 1, 115, 120, and 121) by the starting models and databases of the Central and Eastern US Seismic Source Characterization (CEUS SSC) report by EPRI et al. (FSAR Reference 2.5-223). The new CEUS SSC models and databases included a new earthquake catalog, different characterization of the seismic sources, and state-of-the-knowledge evaluation of maximum magnitudes.

Unlike the EPRI-SOG earthquake catalog, the CEUS SSC earthquake catalog does not include a specific tabulation of Modified Mercalli intensities (MMI). Measures of MMI were considered in the development of the CEUS SSC earthquake catalog in estimating a uniform measure of magnitude; however, their exclusion in the final catalog tabulation is reflected in the earthquake tabulation in FSAR Table 2.5.2-202.

While the EPRI (2004) model of ground motion prediction equations (FSAR Reference 2.5-224) was used to determine median ground motions for both the SSAR and the FSAR, and the EPRI (2004) model of ground motion aleatory uncertainties was used in the PSHA for the SSAR, the model of ground motion aleatory uncertainties used for the FSAR was taken from EPRI (2006) (FSAR Reference 2.5-225).

The procedures by which the rock ground motions are developed and used as input to the site response analyses in the SSAR and FSAR are different in two notable ways because the FSAR follows RG 1.208; the SSAR was based on earlier guidance. First, in the SSAR, the hard rock SSE was developed as a hybrid envelope of two methods: a modified reference probability approach from then-active RG 1.165 and a “pre-RG 1.208” performance-based approach. In the FSAR, only the published RG 1.208 performance-based approach was used. Second, in the SSAR, the rock motions used for input to the site response were high frequency (HF) and low frequency (LF) components of the hard rock SSE. In the FSAR, the performance-based methodology in RG 1.208 was applied not to rock motions (as in the SSAR), but to the GMRS-horizon motions resulting from the site response analyses. That is, for the FSAR, the HF and LF rock motions corresponding to uniform hazard response spectra (UHRS) at mean annual frequencies (MAFE) of 10^{-4} and 10^{-5} were used as rock motion inputs to the site response analyses, resulting in GMRS-horizon UHRS at MAFEs of 10^{-4} and 10^{-5}. The RG 1.208 performance-based methodology is then applied to the GMRS-horizon UHRS to obtain the GMRS ground motions. Another input to the site response analyses was the additional FSAR data from the Unit 3 subsurface investigation, which provided the seismic wave transmission characteristics of the materials specifically applied to the Unit 3 Seismic Category I RB/FB.

In the FSAR’s development of the Unit 3 horizontal spectral acceleration (g) values for the GMRS at a hypothetical outcrop at Elevation 224 ft NAVD88 (224.86 ft NGVD29), the site response analysis program P-SHAKE was used, rather than SHAKE2000, which was used in the SSAR evaluations. Operating exclusively in the frequency domain, P-SHAKE uses power spectral density functions derived from input rock response spectra, in lieu of earthquake time histories matched to those

same rock response spectra, and then used as input to SHAKE2000, as was the approach used in the SSAR analysis. Simulating the effect of numerous input spectrally-matched time histories, the methodology used in P-SHAKE derives a more robust consideration of the variability of input ground motions. The resulting smooth output ground motions from P-SHAKE do not require a post-process fitting function, as was used to smooth the ground motions for the top of Zone III-IV SSE in the SSAR analysis.

In the SSAR, the subsurface soil/rock column characterization was represented by 50 simulated profiles, while for the FSAR, 60 simulated profiles were used.

This variance also includes moving the definition of the operating basis earthquake (OBE) from SSAR Section 2.5.2 to FSAR Section 3.7 in order to facilitate compatibility with OBE instrumentation that records free-field ground motions at grade.

Justification

The variance in the GMRS control point location is justified because its location at a hypothetical outcrop under the RB/FB foundation is representative of the Unit 3 site below the foundations for the Seismic Category I structures in the power block area. This location is also consistent with NUREG-0800, SRP 2.5.2, which specifies that the GMRS be defined on an outcrop or a hypothetical outcrop that will exist after excavation.

The variance in the horizontal and vertical spectral acceleration values results from and is justified not only by the change in control point location but also from application of updated methodology and data, consistent with current NRC guidance. The GMRS was derived using the performance-based approach endorsed in RG 1.208, and the new CEUS SSC models and databases. To evaluate the potential significance of any reinterpretation of past earthquakes and to consider the impact of more recent seismicity, including the 2011 **M** 5.8 Mineral, Virginia earthquake, the CEUS SSC earthquake catalog was reviewed and updated for the period 2009 through mid-December 2011. Therefore, by using RG 1.208 and updating the CEUS, the Unit 3 GMRS is acceptable.

The number of frequencies was increased to 38 frequencies based on the minimum number of points specified in RG 1.206 and RG 1.208. The SSAR, which presents 21 points, was written before these documents were issued. Therefore, the FSAR was updated to conform to the existing guidance.

The specification of OBE in SSAR Section 2.5.2.7 is moved to FSAR Section 3.7 because neither SRP 2.5.2 nor the DCD requests the OBE information to be described in FSAR Section 2.5.2. Further, given that OBE instrumentation is likely to be at a surface location, the definition of the OBE ground motions should consider the site response of multiple possible surface or at grade locations, which is not assessed in FSAR Section 2.5.2, but is in FSAR Section 3.7. Therefore, the OBE is defined in FSAR Section 3.7.

Variance: NAPS ESP VAR 2.0-5 – Distribution Coefficients (K_d)

Request

This is a request to use the Unit 3 distribution coefficient (K_d) values provided in FSAR Table 2.4-206 rather than the corresponding values in SSAR Table 1.9-1 and SSAR Table 2.4-20. Some of the values provided in FSAR Table 2.4-206 do not fall within (are smaller than) the SSAR values and therefore would predict higher doses than the K_d values in the SSAR.

A variance for several K_d values results from using the minimum site-specific K_d values from FSAR Table 2.4-207 for estimating the radionuclide migration to surface waters via groundwater pathways. The SSAR K_d values were assigned using literature values. The measured Unit 3 K_d values were obtained by laboratory testing and are provided in FSAR Table 2.4-207.

Justification

The variance in K_d values is acceptable because compliance with 10 CFR 20 is demonstrated in FSAR Section 2.4.13 with the use of the minimum site-specific K_d values to evaluate radionuclide concentrations and associated doses as a result of a postulated accident release of liquid effluents in the groundwater pathways.

Variance: NAPS ESP VAR 2.0-6 – DBA Source Term Parameters and Doses

Request

This is a request to use the Unit 3 source terms and resulting doses from DCD Chapter 15 analyses of design basis accidents (DBAs). DCD Chapter 15 provides the required analyses of design basis accidents for the ESBWR. The DCD Chapter 15 source terms replace the ESBWR accident source terms in ESP-003, Appendix B, and in SSAR Chapter 15. The DCD Chapter 15 doses replace the ESBWR DBA doses in SSAR Chapter 15.

10 CFR 52.17(a)(1) required that the SSAR demonstrate the acceptability of the ESP site under the radiological consequences evaluation factors identified in 10 CFR 50.34(a)(1) and that site characteristics comply with 10 CFR 100. Specifically, 10 CFR 100.21(c)(2) requires that radiological dose consequences of postulated accidents meet the criteria set forth in 10 CFR 50.34(a)(1). Therefore, SSAR Chapter 15 analyzed a set of postulated accidents to demonstrate that a reactor or reactors bounded by parameters defined therein could be operated on the ESP site without undue risk to the health and safety of the public. Accident analyses evaluated in SSAR Chapter 15 were based on accidents and associated source terms for a range of possible reactor designs, including the AP1000, ABWR, and the ESBWR plant designs. Based on these analyses, the DBA source term parameters were established for the site in ESP-003, Appendix B.

A comparison of DBA source terms evaluated for the ESBWR in DCD Chapter 15 shows that they are not bounded by the ESP-003 source terms in all cases. Some Unit 3 values do not fall within

(are larger than) the ESP and SSAR values. Also, some Unit 3 doses from DBAs do not fall within (are larger than) the SSAR values.

Justification

This variance in DBA source term parameters and doses is acceptable because calculated doses for the ESBWR design are shown in DCD Chapter 15 to be within limits set by regulatory guidance documents and applicable regulations. These DCD analyses determined DBA dose results based on assumed site parameters for short term (accident) meteorological dispersion factors (χ/Q). Unit 3 site-specific short term χ/Q values are demonstrated in FSAR Table 2.0-201 to fall within (are less than) the associated DCD site parameter values. Therefore, the dose consequences for the DBAs evaluated in DCD Chapter 15 are bounding and applicable for the Unit 3 site, and as shown in DCD Chapter 15 analyses, are within limits set by regulatory guidance documents and applicable regulations.

Variance: NAPS ESP VAR 2.0-7 - Coordinates and Abandoned Mat Foundations

Request - Coordinates

This is a request to use the set of values given in FSAR Figure 2.0-205 as COORDINATES (STATE PLANE NAD 83 VA SOUTH ZONE) rather than the ESP (Reference 1), Appendix A, Figure 1 values given as Coordinates (State NAD 83 South Zone).

There is an error associated with the coordinates of the proposed facility boundaries, which are the coordinates of the eight points that define “ESP Plant Parameter Envelope” shown in ESP, Appendix A, Figure 1. In the ESP, Appendix A, Figure 1, Note 1 states: “North Anna Site and State NAD 83 (South Zone) coordinates are shown as noted.” However, the set of values given as Coordinates (State NAD 83 South Zone) are incorrect as shown. A variance from ESP, Appendix A, Figure 1, Note 1 is requested to correct these values.

The error with the coordinates originated in Dominion Letter 05-785B (Reference 2). In that letter, the response to Draft Safety Evaluation Report (Reference 3), Open Item 2.4-1 contained incorrect State Plane coordinates. Corrected and revised values were provided to NRC in Dominion Letter 05-457 (Reference 4). Figure 1 of the ESP contains the incorrect values; therefore, correction of the coordinates is required.

Justification

This variance is acceptable because it is an administrative change to establish the correct State Plane coordinates.

Request - Abandoned Mat Foundations

This is a request to not remove the abandoned mat foundations for the originally planned North Anna Units 3 and 4 unless a Unit 3 Seismic Category I or II structure would be located above an

abandoned foundation. ESP Appendix A, *Characteristics of the Dominion Nuclear North Anna, LLC ESP Site*, contains Figure 1 (Figure 2.4.14-1), *The Proposed Facility Boundary for the ESP Site*. Note 2 on Figure 1 states: "Abandoned Unit 3 and 4 Reactor Building Mat Foundations are to be removed." This corresponds to Note 2 on ESP SSAR, Figure 1.2-4. The requirement to remove the foundations was established to address the possibility that a Seismic Category I or II structure might be situated above a foundation.

After ESP SSAR, Figure 1.2-4, Note 2 was written, the ESBWR was selected for Unit 3, and the arrangement of a single ESBWR unit allows the power block Seismic Category I and II structures to be located away from the abandoned mat foundations. Therefore it is no longer necessary to remove the abandoned foundations. A variance from ESP, Appendix A, Figure 1, Note 2 is requested.

Justification

It is now known that the abandoned Units 3 and 4 reactor building mat foundations will not interfere with the Unit 3 Seismic Category I or II structures. Although the abandoned Units 3 and 4 reactor building mat foundations are within the ESP proposed facility boundary (ESP plant parameter envelope) as shown in ESP Appendix A, Figure 1, these mat foundations are located away from the Unit 3 ESBWR power block Seismic Category I and II structures. Therefore, this variance is acceptable because the abandoned foundations will not adversely affect Unit 3 safety-related or Seismic Category I or II structures.

Variance: NAPS ESP VAR 2.3-1 - Tornado Site Characteristics

Request

This is a request to use the Unit 3 site characteristic values for tornadoes provided in FSAR Section 2.3.1.3.2 and Table 2.3-225 rather than the corresponding values provided in ESP Appendix A, SSAR Section 2.3.1.3.2 and SSAR Tables 1.9-1 and 2.3-1. These tornado characteristics are: maximum tornado wind speed, maximum rotational speed, maximum translational speed, pressure drop and maximum rate of pressure drop. The values for these site characteristics in the FSAR do not fall within (are lower than) the corresponding values in the ESP and SSAR and therefore would result in smaller tornado-related loads than would result using the values present in the ESP and SSAR.

Because the ESP was issued based on the SSAR site characteristic values that would result in higher tornado loads, lowering these values is a variance. The ESP and SSAR values were determined before NRC had completed reviews of tornado site characteristics and issued Revision 1 of RG 1.76 in March 2007. Adopting the new lower values in Revision 1 of this RG creates a variance in tornado site characteristic values for the Unit 3 site.

Justification

The variance in tornado site characteristic values is acceptable because compliance with NRC regulations, including 10 CFR 50 Appendix A, GDC 2 is demonstrated by conformance to RG 1.76, Revision 1. The use of RG 1.76, Revision 1 is also consistent with the site parameter values for an ESBWR as shown in FSAR Table 2.0-201. The comparisons in that table demonstrate that the DCD site parameters for tornado characteristics bound the values for Unit 3.

Variance: NAPS ESP VAR 2.4-1 – Void Ratio, Porosity, and Seepage Velocity

Request

This is a request to use the Unit 3 values for void ratio, porosity, and seepage velocity of saprolite rather than the SSAR values. The Unit 3 values are as follows from FSAR Section 2.4.12.1.2: void ratio equals 0.45, total porosity equals 31 percent, effective porosity equals 25 percent, and seepage velocity equals 0.35 ft/day. Corresponding SSAR Section 2.4.12.1.2 values for saprolite are as follows: void ratio equals 0.7, total porosity equals 41 percent, effective porosity equals 33 percent, and seepage velocity equals 0.12 ft/day. The Unit 3 values result in a seepage velocity that does not fall within (is larger than) the SSAR value.

The variance in Unit 3 values for void ratio, porosity, and seepage velocity from the SSAR values results from the use of additional data collected from the Unit 3 subsurface investigation.

Justification

The variance in values for void ratio, porosity, and seepage velocity is acceptable because compliance with 10 CFR 20 is demonstrated in FSAR Section 2.4.13 which evaluates radionuclide concentrations and associated doses as a result of a postulated accidental release of liquid effluents in the groundwater pathways.

Variance: NAPS ESP VAR 2.4-2 – NAPS Water Supply Well Information

Request

This is a request to use corrected information for Unit 3 regarding the NAPS water supply wells rather than the SSAR information. The information in FSAR Table 2.4-17R revises SSAR Table 2.4-17 to correct certain information that is now known to be different and to reflect updated information on water supply wells at the NAPS site.

This variance results from the need to provide corrected information for well No. 2 and the Security Training Building well which is based on a reconsideration of technical content of the references for SSAR Table 2.4-17.

Justification

This variance in the NAPS water supply well information is acceptable because the corrected and new information continues to support the conclusions in SSAR Section 2.4.12.1.3 that: "Any groundwater supply required by the new units would likely come from an increase in the storage capacity for the existing wells or from drilling additional wells. In either event, additional groundwater withdrawal by the new units is not expected to impact any offsite wells due to: 1) their distance from the site, 2) the direction of the hydraulic gradient toward Lake Anna and the lake's recharge effect, and 3) the existence of hydrologic divides between the ESP site and the offsite wells."

Variance: NAPS ESP VAR 2.4-3 - Well Reference Point Elevation

Request

This is a request to use corrected information for Unit 3 regarding observation well No. WP-3 rather than the SSAR information. The information in FSAR Table 2.4-15R revises SSAR Table 2.4-15 to correct the reference point elevation that is now known to be different and to reflect corrected information on groundwater levels for this well at the NAPS site.

This variance results from the need to provide the corrected reference point elevation for observation well No. WP-3. The reference point elevation for well No. WP-3 provided in SSAR Table 2.4-15 was based on a field observation, specifically a label attached to the well surface casing. To remove the uncertainty in the elevation, which is reflected in the footnote in FSAR Table 2.4-15R, a field survey was performed in early 2009. The corrected reference point elevation is based on the survey measurement of the reference point for this well.

Justification

The variance in the observation well information is acceptable because the new corrected information continues to identify that there are observation wells installed for the independent spent fuel storage installation (ISFSI). There is no change to the information on this well in FSAR Section 2.4.12.1.2: "The other wells being monitored (P- and WP-) were installed previously for Units 1 and 2 groundwater monitoring purposes around the SWR and the ISFSI, respectively. FSAR Figure 2.4-206 shows the locations of the observation wells."

The corrected reference point elevation resulted in minor revisions to FSAR Table 2.4-15R and FSAR Figures 2.4-207 through 2.4-214b, the piezometric head contour maps for the site. These changes in observed groundwater levels for well No. WP-3, while not near the plant area for Unit 3, have been incorporated into the latest revision of the groundwater flow model. The revised post-construction piezometric head contour map (FSAR Figure 2.4-216) indicates that the maximum groundwater level elevation in the power block area around Seismic Category I structures is approximately 282.6 ft NAVD88 (283.46 ft NGVD29). The changes in observed

groundwater levels for well No. WP-3 are also accounted for the analysis of a postulated, accidental release of radioactive liquid effluents to the groundwater at the Unit 3 site.

Variance: NAPS ESP VAR 2.4-4 - Lake Level Increase

Request

This is a request to use a lake level of 249.39 ft NAVD88 (250.25 ft NGVD29) in the FSAR rather than the corresponding ESP Application SSAR value of 249.14 ft NAVD88 (250 ft NGVD29). The new value does not fall within (is larger than) the SSAR value.

Lake level is used throughout FSAR Section 2.4 as an input for various hydrological evaluations. For example, FSAR Section 2.4.1.3 updates SSAR Table 2.4-1, Lake Anna Storage Allocation, which identifies volumes of water stored in Lake Anna based on lake level.

The variance in lake level results from the decision to increase lake level to reduce impacts on the ecology, wetlands, and recreation in Lake Anna and downstream.

Justification

The variance in lake level increase is acceptable because the new lake level is addressed as an input to various hydrological evaluations in FSAR Section 2.4 (for example, storage allocations, flooding, and groundwater). This FSAR section demonstrates that the increase in lake level does not result in hydrological site characteristics that could affect the safe design or siting of Unit 3.

Variance: NAPS ESP VAR 2.4-5 - Lake Anna PMF Level Increase

Request

This is a request to use a Lake Anna PMF level of 266.56 ft NAVD88 (267.42 ft NGVD29) at Unit 3 in the FSAR rather than the corresponding ESP Application SSAR value of 266.53 ft NAVD88 (267.39 ft NGVD29). The new value does not fall within (is larger than) the SSAR value.

The variance in the PMF level results from a revised PMF analysis that incorporates the lake level increase in NAPS ESP VAR 2.4-4 and a peaked unit hydrograph. The revised analysis is consistent with a Lake Anna PMF analysis performed in 2012 for NAPS Units 1 & 2.

Justification

The variance in PMF level increase is acceptable because the new PMF level is addressed in FSAR Section 2.4. This FSAR section demonstrates that the increase in the PMF level does not result in hydrological site characteristics that could affect the safe design or siting of Unit 3.

Variance: NAPS ESP VAR 2.5-1 – Stability of Slopes

Request

This is a request to use the information presented in FSAR Section 2.5.5 on slopes and the safety of the slopes rather than the information in SSAR Section 2.5.5. The slopes near Unit 3 are different from those anticipated in the SSAR, and, for the seismic slope stability analysis, the peak ground acceleration being applied is different. The method of analysis remains essentially the same.

This variance results from the need to provide Unit 3-specific information which is different from that presented in the SSAR.

Justification

This variance in Unit 3 slopes and slope analyses is acceptable because the slopes being considered in FSAR Section 2.5.5 are lower, less steep, and have a smaller applied seismic acceleration than the slopes analyzed in SSAR Section 2.5.5. As a result, the Unit 3 slopes have a higher computed factor of safety against failure, and are shown to be stable under both long-term static and short-term seismic conditions.

Variance: NAPS ESP VAR 2.5-2 - [Deleted]

Variance: NAPS ESP VAR 12.2-1 – Gaseous Pathway Doses

Request

This is a request to use updated information for Unit 3 gaseous effluent doses rather than the SSAR information which referred to ESP-ER Section 5.4. Several of the gaseous pathway doses to the maximally exposed individual (MEI) in FSAR Table 12.2-18bR do not fall within (are greater than) the corresponding values in ESP-ER Table 5.4-9. The Unit 3 values which are higher are shown in bold font in FSAR Table 12.2-18bR.

This variance is due in part to changes in maximum long-term dispersion estimates from those used in the ESP Application as discussed above under NAPS ESP VAR 2.0-1. The variance is also due to changes in maximum annual gaseous release values from those used in the ESP Application, as discussed below in NAPS ESP VAR 12.2-5.

Justification

This variance is acceptable because estimated annual doses from normal gaseous effluent releases remain within applicable limits. FSAR Table 12.2-18bR shows the annual gaseous pathway doses to the maximally exposed individual (MEI) for Unit 3 and compares each to the corresponding estimate from the ESP-ER Table 5.4-9. Not all doses increased due to changes in long term dispersion estimates because the normal release source term is lower for Unit 3 than the composite source term used to bound the multiple reactor types considered in the ESP Application.

The effect of these changes is slight increases in two Unit 3 thyroid doses when compared to the earlier estimates for the ESP. The Unit 3 values that exceed the corresponding ESP value are shown in bold font in FSAR Table 12.2-18bR.

Although two of the individual pathway doses increased compared to the ESP Application, all gaseous effluent doses are acceptable when compared with the applicable limits in FSAR Table 12.2-201. As shown, the Unit 3 doses meet the 10 CFR 50, Appendix I, limits. This table also shows that the Unit 3 doses are lower than the corresponding ESP values.

Variance: NAPS ESP VAR 12.2-2 – [Deleted]

Variance: NAPS ESP VAR 12.2-3 – Annual Liquid Effluent Releases

Request

This is a request to use the Unit 3 maximum annual liquid release values provided in FSAR Table 12.2-19bR rather than the corresponding ESP values in EIS Appendix I (Reference 6) and ESP-ER Section 5.4 as referenced in SSAR Section 2.3.5.1. The Unit 3 values for some nuclides do not fall within (are larger than) the ESP and ER values, as shown in bold font in FSAR Table 12.2-19bR.

This variance results from a change in the annual release values for the ESBWR since the ESP-ER table was submitted. ESP-ER Table 5.4-6 presented the annual release values for a single unit nuclear plant, based on a composite of possible radionuclide releases from a number of reactor designs including the ESBWR. ESP-ER Table 5.4-6 also contained more radionuclides than FSAR Table 12.2-19bR, due to the use of the composite set of nuclides from multiple reactor designs.

Justification

This variance is acceptable because the estimated Unit 3 concentrations of normal liquid effluent releases remain within the applicable concentration limits and the annual doses from normal liquid effluent releases remain within applicable limits.

The estimated Unit 3 concentrations of normal liquid effluent releases for all nuclides meet the 10 CFR 20 concentration limits as shown in FSAR Table 12.2-19bR.

The estimated annual doses from Unit 3 to the MEI from liquid effluents are compared with the applicable limit in FSAR Table 12.2-202. The Unit 3 dose meets the 10 CFR Part 50, Appendix I, limit, and the Unit 3 dose estimates are lower than the corresponding ESP values.

Variance: NAPS ESP VAR 12.2-4 - Existing Units' and Site Total Doses

Request

This is a request to use updated information for doses for the existing units and the site total doses in FSAR Table 12.2-203 rather than the information in SSAR Section 2.3.5.1 that refers to ESP ER Section 5.4, which contains ESP ER Table 5.4-11.

The doses for total body, thyroid, and bone due to the existing units, as shown in FSAR Table 12.2-203, do not fall within (are greater than) the corresponding values in ESP ER Table 5.4-11. Because these values are higher, they are shown in bold font in FSAR Table 12.2-203.

This variance is due to the conservative dose estimates for direct radiation from Units 1 and 2 and the Independent Spent Fuel Storage Installation (ISFSI), which were added to the doses for liquid and gaseous effluents from Units 1 and 2. The direct radiation dose contributions were included in the FSAR dose estimates, but not in the ESP Application dose estimates. The addition of these direct radiation doses to the existing units' doses (annual total body, thyroid, and bone) caused the FSAR values to exceed the SSAR values.

Justification

This variance is acceptable because the dose estimates are more conservative and complete with the addition of the dose contributions from direct radiation from the existing units and the ISFSI. As shown in FSAR Table 12.2-203, the annual total body, thyroid, and bone doses for the site, including the doses from the existing units and the ISFSI, meet the applicable 40 CFR 190 limits.

Variance: NAPS ESP VAR 12.2-5 - Annual Gaseous Effluent Releases

Request

This is a request to use the Unit 3 maximum annual gaseous effluent release values provided in FSAR Table 12.2-17R rather than the corresponding ESP values in EIS (Reference 6) Appendix I and ESP-ER Section 5.4, as reference in SSAR Section 2.3.5.1. The Unit 3 values for some nuclides do not fall within (are larger than) the ESP and ER values, as shown in bold font in FSAR Table 12.2-17R. This variance results from a change in the annual release values for the ESBWR since the ESP-ER table was submitted. ESP-ER Table 5.4-7 presented the annual release values for a single unit nuclear plant, based on a composite of possible radionuclide releases from a number of reactor designs, including the ESBWR. ESP-ER Table 5.4-7 also contained more radionuclides than FSAR Table 12.2-17R, due to the use of the composite set of nuclides from multiple reactor designs.

Justification

This variance is acceptable because the estimated Unit 3 concentrations of normal gaseous effluent releases remain within the applicable concentration limits and the annual doses from normal gaseous effluent releases remain within applicable limits. The estimated Unit 3 concentrations of normal gaseous effluent releases for all nuclides meet the 10 CFR 20 concentration limits as shown in FSAR Table 12.2-17R. The estimated annual doses from Unit 3 to the MEI from gaseous effluent releases are compared with the applicable limit in FSAR Table 12.2-201. The Unit 3 doses meet the 10 CFR 50, Appendix I, limits, and the Unit 3 dose estimates are lower than the corresponding ESP values.

References

1. Early Site Permit (ESP) for the North Anna ESP Site, No. ESP-003, Amendment No. 3, U.S. Nuclear Regulatory Commission, January 2013.
2. Dominion Nuclear North Anna, LLC, letter to U.S. Nuclear Regulatory Commission, Responses to Draft Safety Evaluation Report Open Items, Serial Number 05-785B, March 3, 2005.
3. Draft Safety Evaluation Report for the North Anna Early Site Permit Application, U.S. Nuclear Regulatory Commission, January 2005.
4. Dominion Nuclear North Anna, LLC, letter to U.S. Nuclear Regulatory Commission, Final Safety Evaluation Report Review Items and Revision 5 to the North Anna ESP Application, Serial Number 05-457, July 25, 2005.
5. NUREG-1835, Safety Evaluation Report for an Early Site Permit (ESP) at the North Anna ESP Site, U.S. Nuclear Regulatory Commission, September 2005.
6. NUREG-1811, Environmental Impact Statement for an Early Site Permit (ESP) at the North Anna ESP Site, U.S. Nuclear Regulatory Commission, December 2006.

EXEMPTIONS

An *exemption* must be obtained if information proposed in the COL application is inconsistent with one or more NRC regulation. Exemptions are submitted pursuant to 10 CFR 52.7 and 52.93 and must comply with the special circumstances in 10 CFR 50.12(a).

Exemption 1: Special Nuclear Material Accountability

Introduction

Dominion requests an exemption from the requirements of 10 CFR §§ 70.22(b), 70.32(c), 74.31, 74.41, and 74.51. Section 70.22(b) requires an application for a license for special nuclear material (SNM) to contain a full description of the applicant's program for material control and accounting (MC&A) of special nuclear material under §§ 74.31, 74.33, 74.41, and 74.51 (While not containing an explicit exception for Part 50 reactors, § 74.33 applies only to uranium enrichment facilities and thus is not directly implicated in this exemption request). Section 70.32(c) requires a license authorizing the use of special nuclear material to contain and be subject to a condition requiring the licensee to maintain and follow a special nuclear material control and accounting program, measurement control program, and other material control procedures, including the corresponding records management requirements. However, §§ 70.22(b), 70.32(c), 74.31, 74.41, and 74.51 contain exceptions for nuclear reactors licensed under 10 CFR Part 50. The regulations applicable to the MC&A of special nuclear material for nuclear reactors licensed under 10 CFR Part 50 are provided in 10 CFR Part 74, Subpart B, §§ 74.11 through 74.19, excluding § 74.17. The purpose of this exemption request is to seek similar exceptions for this combined license (COL) under 10 CFR Part 52, such that the same regulations will be applied to the special nuclear material MC&A program as nuclear reactors licensed under 10 CFR Part 50.

Summary of Exemption

Applicable Regulation(s): As permitted by 10 CFR 70.17 and 10 CFR 74.7 exemptions are requested from the provisions of 10 CFR §§ 70.22(b), 70.32(c), 74.31, 74.41, and 74.51 relating to SNM accountability. Specifically, this exemption request would extend the current exceptions embodied in these regulations applicable to 10 CFR Part 50 licensees to the requested Unit 3 10 CFR 52 COL.

Specific wording from which exemption is requested:

10 CFR 70.22(b), Contents of applications:

(b) Each application for a license to possess special nuclear material, to possess equipment capable of enriching uranium, to operate an uranium enrichment facility, to possess and use at any one time and location special nuclear material in a quantity exceeding one effective kilogram, except for applications for use as sealed sources and for those uses involved in the operation of a nuclear reactor licensed pursuant to part 50 of this chapter

and those involved in a waste disposal operation, must contain a full description of the applicant's program for control and accounting of such special nuclear material or enrichment equipment that will be in the applicant's possession under license to show how compliance with the requirements of §§ 74.31, 74.33, 74.41, or 74.51 of this chapter, as applicable, will be accomplished.

10 CFR 70.32, Conditions of licenses:

(c) (1) Each license authorizing the possession and use at any one time and location of uranium source material at an uranium enrichment facility or special nuclear material in a quantity exceeding one effective kilogram, except for use as sealed sources and those uses involved in the operation of a nuclear reactor licensed pursuant to part 50 of this chapter and those involved in a waste disposal operation, shall contain and be subject to a condition requiring the licensee to maintain and follow:

(i) The program for control and accounting of uranium source material at an uranium enrichment facility and special nuclear material at all applicable facilities as implemented pursuant to § 70.22(b), or §§ 74.31(b), 74.33(b), 74.41(b), or 74.51(c) of this chapter, as appropriate;

(ii) The measurement control program for uranium source material at an uranium enrichment facility and for special nuclear material at all applicable facilities as implemented pursuant to §§ 74.31(b), 74.33(b), 74.45(c), or 74.59(e) of this chapter, as appropriate; and

(iii) Other material control procedures as the Commission determines to be essential for the safeguarding of uranium source material at an uranium enrichment facility or of special nuclear material and providing that the licensee shall make no change that would decrease the effectiveness of the material control and accounting program implemented pursuant to § 70.22(b), or §§ 74.31 (b), 74.33(b), 74.41(b), or 74.51(c) of this chapter, and the measurement control program implemented pursuant to §§ 74.31(b), 74.33(b), 74.41(b), or 74.59(e) of this chapter without the prior approval of the Commission. A licensee desiring to make changes that would decrease the effectiveness of its material control and accounting program or its measurement control program shall submit an application for amendment to its license pursuant to § 70.34.

10 CFR 74.31, Nuclear material control and accounting for special nuclear material of low strategic significance:

(a) General performance objectives. Each licensee who is authorized to possess and use more than one effective kilogram of special nuclear material of low strategic significance, excluding sealed sources, at any site or contiguous sites subject to control by the licensee, other than a production or utilization facility licensed pursuant to part 50 or 70 of this chapter, or operations involved in waste disposal, shall implement and maintain a Commission approved material control and accounting system that will achieve the following objectives:

10 CFR 74.41, Nuclear material control and accounting for special nuclear material of moderate strategic significance:

(a) General performance objectives. Each licensee who is authorized to possess special nuclear material (SNM) of moderate strategic significance or SNM in a quantity exceeding one effective kilogram of strategic special nuclear material in irradiated fuel reprocessing operations other than as sealed sources and to use this material at any site other than a nuclear reactor licensed pursuant to part 50 of this chapter; or as reactor irradiated fuels involved in research, development, and evaluation programs in facilities other than irradiated fuel reprocessing plants; or an operation involved with waste disposal, shall establish, implement, and maintain a Commission-approved material control and accounting (MC&A) system that will achieve the following performance objectives:

10 CFR 74.51, Nuclear material control and accounting for strategic special nuclear material:

(a) General performance objectives. Each licensee who is authorized to possess five or more formula kilograms of strategic special nuclear material (SSNM) and to use such material at any site, other than a nuclear reactor licensed pursuant to part 50 of this chapter, an irradiated fuel reprocessing plant, an operation involved with waste disposal, or an independent spent fuel storage facility licensed pursuant to part 72 of this chapter shall establish, implement, and maintain a Commission-approved material control and accounting (MC&A) system that will achieve the following objectives:

Exemption Discussion

Nuclear reactors licensed under Part 50 are explicitly excepted from the requirements of §§ 70.22(b), 70.32(c), 74.31, 74.41, and 74.51. There is no technical or regulatory reason to treat nuclear reactors licensed under Part 52 differently than reactors licensed under Part 50 with respect to the MC&A provisions in 10 CFR Part 74. As indicated in the Statement of Considerations for 10 CFR § 52.0(b) (72 Fed. Reg. 49352, 49372, 49436 (Aug. 28, 2007)), applicants and licensees under Part 52 are subject to all of the applicable requirements in 10 CFR Chapter I, whether or not those provisions explicitly mention a COL under Part 52. This regulation clearly indicates that plants licensed under Part 52 are to be treated no differently than plants licensed under Part 50 with respect to the substantive provisions in 10 CFR Chapter I (which includes Parts 70 and 74). In particular, the exception for nuclear reactors licensed under Part 50, as contained in §§ 70.22(b), 70.32(c), 74.31, 74.41, or 74.51, should also be applied to reactors licensed under Part 52.

An exemption from the requirements of §§ 70.22(b), 70.32(c), 74.31, 74.41, and 74.51 would not mean that a MC&A program would be unnecessary or that the COL application would be silent regarding MC&A. To the contrary, the MC&A requirements in Subpart B to Part 74 would still be applicable to the COL just as they are to licenses issued under Part 50. Additionally, the COL application describes the MC&A program for satisfying Subpart B to Part 74.

The exemption is being requested as permitted by 10 CFR 70.17(a) and 10 CFR 74.7. This exemption request is evaluated under 10 CFR § 52.7, which incorporates the evaluation criteria of § 50.12 and are extended to the evaluation of exemptions requested under 10 CFR 70.17(a) and 10 CFR 74.7. These sections allow the Commission to grant an exemption if 1) the exemption is authorized by law, 2) will not present an undue risk to the public health and safety, 3) is consistent with the common defense and security, and 4) special circumstances are present as specified in 10 CFR § 50.12(a)(2). The criteria in § 50.12 encompass the criteria for an exemption in 10 CFR §§ 70.17(a) and 74.7, the specific exemption requirements for Parts 70 and 74, respectively. Therefore, by demonstrating that the exemption criteria in § 50.12 are satisfied, this request also demonstrates that the exemption criteria in §§ 52.7, 70.17(a) and 74.7 are satisfied.

Evaluation Against Exemption Criteria

1. This exemption is not inconsistent with the Atomic Energy Act or any other statute and is therefore authorized by law.

2. An exemption from the requirements of 10 CFR §§ 70.22(b), 70.32(c), 74.31, 74.41, and 74.51 would not present an undue risk to public health and safety. The exemption would extend to the requested Unit 3 COL the exceptions currently included in these sections that are applicable to 10 CFR Part 50 licensees. Furthermore, the COL application contains a description of the applicant's MC&A program under Subpart B to Part 74. Therefore, the exemption from 10 CFR §§ 70.22(b), 70.32(c), 74.31, 74.41, and 74.51 would not present an undue risk to public health and safety.

3. An exemption from the requirements of 10 CFR §§ 70.22(b), 70.32(c), 74.31, 74.41, and 74.51 would not be inconsistent with the common defense and security. The exemption would extend to the requested Unit 3 COL the exceptions currently included in these sections that are applicable to 10 CFR 50 licensees. Furthermore, the COL application contains a description of the applicant's MC&A program under Subpart B to Part 74. Therefore, the exemption from §§ 70.22(b), 70.32(c), 74.31, 74.41, and 74.51 is consistent with the common defense and security.

4. The exemption request involves special circumstances under 10 CFR § 50.12(a)(2)(ii). That subsection defines special circumstances as when "[a]pplication of the regulation in the particular circumstances would not serve the underlying purpose of the rule or is not necessary to achieve the underlying purpose of the rule." Since the Commission determined that the requirements in 10 CFR §§ 70.22(b), 70.32(c), 74.31, 74.41, and 74.51 are unnecessary for Part 50 applicants, those requirements are also unnecessary for Part 52 applicants.

As demonstrated above, the exemption complies with the requirements of 10 CFR §§ 50.12, 52.7, 70.17, and 74.7. For these reasons, approval of the requested exemption is requested from the regulations of 10 CFR §§ 70.22(b), 70.32(c), 74.31, 74.41, and 74.51, as described herein.

Exemption 2: *Electric Power Distribution System Functional Arrangement*

Introduction

Pursuant to 10 CFR 52.7 and Section VIII.A.4 of the Design Certification Rule, Dominion requests an exemption from DCD Tier 1 information. The location of the main generator circuit breaker and the two motor-operated disconnects (MODs) in the on-site power supply system are specified in DCD Tier 1, Figure 2.13.1-1, Sheet 1, *Electric Power Distribution System Functional Arrangement*. This figure shows a horizontal dashed line with these components below the line indicating that these components are to be installed in the "Turbine Island/ Transformer Yard" area of the plant. Due to space limitations for Unit 3 at the North Anna Power Station site, an intermediate switchyard is needed for Unit 3 and these components are to be physically located in the intermediate switchyard. As a result, an exemption from DCD Tier 1 to revise the location information for the main generator circuit breaker and the two motor-operated disconnects (MODs) in the above-referenced figure is requested.

Although the off-site power supply system is not part of the ESBWR standard plant design, DCD Tier 1, Figure 2.13.1-1, Sheet 1, also shows the off-site power supply system portion of the normal preferred power supply. Therefore, changes to this figure are needed to show a 500/230 kV intermediate transformer with high side circuit breaker and three MODs in the intermediate switchyard. As a result, an exemption from DCD Tier 1 to revise the off-site power supply system information in the above-referenced figure is requested.

Finally, DCD Tier 1, Figure 2.13.1-1, Sheet 1, shows a dashed line with the "Turbine Island / Transformer Yard" below the line and the "Switchyard" above the line. The addition of labels on each side of this dashed line in the intermediate switchyard drawing is needed to indicate that although the main generator circuit breaker and its MODs are to be located in the intermediate switchyard, there are no changes to the functions performed by these components as part of the on-site power supply system for the ESBWR standard plant design. The portion below the dashed line in the intermediate switchyard is labeled: "ESBWR standard plant." The portion above the dashed line in the intermediate switchyard is labeled "Unit 3 site-specific design." As a result, an exemption from DCD Tier 1 to add these labels to the above-referenced figure is requested.

Summary of Exemption

Applicable Regulations: As permitted by 10 CFR 52.7 and Section VIII.A.4 of the Design Certification Rule, an exemption is requested for certain information depicted on DCD, Tier 1, Figure 2.13.1-1, *Electric Power Distribution System Functional Arrangement*, Sheet 1. The changes for this figure are:

An intermediate switchyard is shown on the figure,

The location of the main generator circuit breaker and its MODs in the on-site power supply system is in the intermediate switchyard,

A 500/230 kV intermediate transformer with high side circuit breaker and three MODs are included in the off-site power supply system in the intermediate switchyard, and

The dashed line with the “Turbine Island/Transformer Yard” below the line and the “Switchyard” above the line is used inside of the intermediate switchyard to clarify that the departure affects location but not functional performance. The portion below the dashed line in the intermediate switchyard is labeled: “ESBWR standard plant,” and the portion above the dashed line in the intermediate switchyard is labeled “Unit 3 site-specific design.”

Exemption Discussion

The addition of the intermediate switchyard to DCD Tier 1, Figure 2.13.1-1, Sheet 1, adds details regarding the site-specific design of the switchyard for Unit 3 and is consistent with this DCD figure in that it specifies the off-site normal and alternate preferred power supplies are in the switchyard area of the plant. This change more specifically identifies that some of the off-site normal preferred power supply is located in the site-specific intermediate switchyard. Adding the intermediate switchyard to the figure does not change the functions performed by the components shown on this figure and has no effect on how the functions are performed by the components.

As described in departure NAPS DEP 8.1-1, the location of the main generator breaker and its MODs is changed from the Turbine Island/Transformer Yard as shown in DCD Tier 1, to the intermediate switchyard, but there is no change to a design function, the ability to perform a design function, or the types of malfunctions identified for these components as a result of the change in location. Therefore, the proposed departure does not have an adverse effect on an intended design function.

The addition of the 500/230 kV intermediate transformer with high side circuit breaker and three MODs in the intermediate switchyard to DCD Tier 1, Figure 2.13.1-1, Sheet 1, adds details regarding the site-specific design of the off-site power supply system for Unit 3 and is consistent with DCD Tier 1, Section 4.2, *Offsite Power*. No changes to the interface requirements of DCD Tier 1, Section 4.1 are needed because of the addition of these components. The intermediate transformer is used to meet the interface requirements regarding the capability of supplying voltage and frequency to the on-site portions of the normal preferred power supply that will support operation of safety-related loads during design basis operating modes.

The addition of labels on each side of the dashed line in the intermediate switchyard drawing is needed because the main generator circuit breaker and its MODs will not be located in the Turbine Island/Transformer Yard area of the plant. However, the design of these components remains the same as described in the DCD for the on-site power supply system in the ESBWR standard plant. The addition of labels is a conforming change to clarify that these components remain part of the “ESBWR standard plant” while the intermediate transformer, circuit breaker, and MODs in the intermediate switchyard are part of the “Unit 3 site-specific design.”

Evaluation Against Exemption Criteria

1. This exemption is not inconsistent with the Atomic Energy Act or any other statute and is therefore authorized by law.

2. An exemption from DCD Tier 1 information shown in Figure 2.13.1-1, Sheet 1 would not present an undue risk to public health and safety, or be inconsistent with the common defense and security. The exemption would update the figure to change the installation location of ESBWR standard plant components and add site-specific components not included in the ESBWR standard plant design. The exemption will not change the functions performed by the ESBWR standard plant components shown in this DCD Tier 1 figure. There is no adverse effect on an intended design function.

3. The exemption request involves special circumstances under 10 CFR § 50.12(a)(2)(ii). That subsection defines special circumstances as when "[a]pplication of the regulation in the particular circumstances would not serve the underlying purpose of the rule or is not necessary to achieve the underlying purpose of the rule." The proposed changes for DCD Tier 1 Figure 2.13.1-1, Sheet 1, are due to space limitations existing at the NAPS site and the need to add site-specific details related to the off-site power supply system. Addition of the site specific details is consistent with DCD Tier 1, Section 4.2, *Offsite Power*. Thus, consideration of the site-specific design details is part of the licensing process. Conformance to the DCD Tier 1 figure information is not required to achieve the underlying purpose of the rule.

4. As required by 10 CFR 52.63(b)(1), the Commission must also consider whether the special circumstances that § 52.7 requires to be present outweigh any decrease in safety that may result from the reduction in standardization caused by the exemption. This departure from Tier 1 information is a result of a site-specific consideration, namely the space limitations for the NAPS site. Therefore, full standardization in this instance is not practical. As stated above, the departure from Tier 1 information will not result in a significant decrease in the level of safety otherwise provided in the design. Therefore, the consideration of 10 CFR 52.63(b)(1) supports the granting of this request for exemption.

As demonstrated above, this exemption complies with the requirements of 10 CFR §§ 50.12, 52.7, and 52.63(b)(1). For these reasons, approval of the requested exemption is requested for certain DCD Tier 1 information represented on Figure 2.13.1-1, Sheet 1, as described herein.

Exemption 3: Ground Response Spectra for Seismic Structural Loads and Floor Response Spectra

NAPS DEP 3.7-1 identifies changes that affect information in DCD Tier 1 and add information to COLA Part 10.

Exemption 3 Introduction

Safe Shutdown Earthquake (SSE) design ground response spectra of 5 percent damping, also termed certified seismic design response spectra (CSDRS), are defined in DCD Tier 1 as free-field outcrop spectra at the foundation level (bottom of the base slab) of the Reactor Building/Fuel Building and Control Building structures, as shown in DCD Tier 1 Figures 5.1-1 and 5.1-2. As specified in DCD Tier 1, Table 5.1-1, Footnote (4) for the Firewater Service Complex, which is essentially a surface founded structure, the CSDRS is 1.35 times the values shown in DCD Tier 1 Figures 5.1-1 and 5.1-2 and is defined as free-field outcrop spectra at the foundation level (bottom of the base slab) of the Firewater Service Complex structure.

For Unit 3, the site-specific seismic conditions described in FSAR Chapter 2 and Section 3.7.1 indicate that certain seismic design characteristics are not bounded by the DCD seismic design parameters. Therefore, Unit 3 defines the SSE to include the CSDRS and the site-specific foundation input response spectra (FIRS) for each seismically qualified structure.

Summary of Exemption

The Unit 3 horizontal and vertical foundation input response spectra for the RB/FB, CB, and FWSC structures are not bounded by the CSDRS at all frequencies. The definition of the SSE for Unit 3 has therefore been revised to include both: 1) the CSDRS, as described in DCD Tier 1, Table 5.1-1, Footnote (4), and DCD Tier 1 Figures 5.1-1 and 5.1-2; and 2) the site-specific FIRS, representative of the Unit 3 site seismological and geological conditions. DCD Tier 1, Section 5.1, provides for site-specific soil structure interaction analyses to be performed to confirm the seismic adequacy of the certified design using approved methods and acceptance criteria. Site-specific soil structure interaction (SSI) analyses have been performed for Unit 3 Seismic Category I structures and evaluation of the results has confirmed the standard design to be adequate. The site-specific definition of SSE will be applied in the ITAAC for ensuring seismic capability of the plant.

Exemption Discussion

The exemption involves a new definition in Tier 1 and a change to DCD Tier 1, Table 5.1-1, Footnote (4) to define the Unit 3 SSE for purposes of performing the verification, through inspections, tests, and analyses, that applicable acceptance criteria specified in DCD Tier 1 ITAAC are met for the seismic design, analyses, and qualification of structures, systems, and components. This exemption represents the Tier 1 changes that relate to Departure NAPS DEP 3.7-1 for Tier 2 and Tier 2* information regarding site-specific CSDRS partial exceedances. COLA Part 10 reflects these changes to Tier 1 and includes revisions to site-specific ITAAC.

Evaluation Against Exemption Criteria

According to the ESBWR Design Certification Rule, Section VIII, exemptions from Tier 1 information are governed by the requirements in 10 CFR 52.63(b)(1) and 52.98(f), and these refer to the criteria specified in 10 CFR 52.7. A request for an exemption would be denied if the design change would result in a significant decrease in the level of safety otherwise provided by the design. An evaluation against exemption criteria follows.

1. The exemption is not inconsistent with the Atomic Energy Act or any other statute and is therefore authorized by law.

2. An exemption from DCD Tier 1 would not present an undue risk to public health and safety in that it continues to ensure that seismic design and analyses are performed and verified for Unit 3 using site-specific seismic conditions as well as the standard CSDRS.

3. The exemption would not be inconsistent with the common defense and security because it would ensure that structures, systems, and components at the site are designed, analyzed, and verified to meet requirements for Unit site-specific seismic conditions as well as the standard CSDRS conditions.

4. The exemption request involves special circumstances under 10 CFR 50.12(a)(2)(ii). That subsection defines special circumstances as when "[a]pplication of the regulation in the particular circumstances would not serve the underlying purpose of the rule or is not necessary to achieve the underlying purpose of the rule." For Unit 3, the site-specific seismic conditions described in FSAR Chapter 2 and Section 3.7.1 indicate that certain seismic design characteristics are not bounded by the DCD seismic design parameters. Therefore, site-specific SSI analyses have been performed and the analyses and results are provided in FSAR Sections 3.7.2, 3.8.4, and 3.8.5. The changes that involve DCD Tier 1 are set forth in COLA Part 10. These changes augment the ESBWR standard design for the Unit 3 site-specific seismic conditions to ensure that the adequacy of the Unit 3 seismic design and analyses are verified through appropriate ITAAC. The new definition for the site-specific SSE ensures that the as-built plant will be seismically designed, analyzed, and qualified for meeting both the standard design and the site-specific conditions.

5. 5. As required by 10 CFR 52.63(b)(1), the Commission must also consider whether the special circumstances that §52.7 requires to be present outweigh any decrease in safety that may result from the reduction in standardization caused by the exemption. This exemption from DCD Tier 1 information is a result of site-specific conditions, and does not undermine the purpose of standardization because the standard design is maintained, with adjustments to account for CSDRS exceedances for the Unit 3 site conditions. As stated above, a new

definition for a site-specific SSE ensures that the as-built plant will be seismically designed, analyzed, and qualified for meeting the site-specific conditions. Therefore, the consideration of 10 CFR 52.63(b)(1) supports the granting of this request for exemption.

As demonstrated above, the exemption does not result in a significant decrease in the level of safety otherwise provided by the ESBWR standard design and it complies with the requirements of 10 CFR §§50.12, 52.7, and 52.63(b)(1). For these reasons, granting of the exemption request, and approval of the associated departure, is requested.

Table 3-1 [Deleted]

Exemption 4: Liquid Radwaste Effluent Discharge Piping Flow Path

Introduction

Pursuant to 10 CFR 52.7 and Section VIII.A.4 of the Design Certification Rule, Dominion requests an exemption from DCD Tier 1 information. Tier 1 Section 2.10.1 describes that the Liquid Waste Management System (LWMS) discharges processed water "to the environment via the circulating water system." This description refers to the expected use of the cooling tower blowdown line in the circulating water system to transfer liquid radwaste effluent to the environment. To simplify the design of the cooling tower blowdown line, the liquid radwaste effluent discharge pipeline in the LWMS will be designed to not discharge to the cooling tower blowdown line. The liquid radwaste effluent discharge pipeline will be extended to transfer liquid radwaste effluent from the LWMS in the Radwaste Building to the environment. As a result, an exemption from DCD Tier 1 to revise the discharge piping information for the LWMS in the above-referenced subsection is requested.

Summary of Exemption

Applicable Regulations: As permitted by 10 CFR 52.7 and Section VIII.A.4 of the Design Certification Rule, an exemption is requested for certain information described in DCD Tier 1, Section 2.10.1, Design Description. The last sentence of the fourth paragraph states: "The LWMS either returns processed water to the condensate system or discharges to the environment via the circulating water system." This description is changed to: "The LWMS either returns processed water to the condensate system or discharges to the environment using the liquid radwaste effluent discharge pipeline."

Exemption Discussion

As explained in the related departure NAPS DEP 12.3-1, the DCD Tier 1 sentence provided above was intending for the circulating water system, and specifically the cooling tower blowdown line in the system, to be a portion of the discharge flow path from the LWMS in the Radwaste Building to the environment. The liquid radwaste effluent discharge pipeline in the LWMS was to be discharged to the cooling tower blowdown line which would in turn discharge to the environment. For a COL

Applicant, the DCD was intending that the cooling tower blowdown line be treated as containing liquid radwaste. To perform the function of containing the liquid radwaste with the performance requirement to not allow inadvertent or unidentified leakage to the environment, the cooling tower blowdown line was to be either enclosed within a guard pipe and monitored for leakage, or made accessible for visual inspections via a trench or tunnel.

The Tier 1 change is to not use the circulating water system, i.e., the cooling tower blowdown line, to transfer radwaste effluent to the environment and to extend the liquid radwaste effluent discharge pipeline to transfer liquid radwaste from the LWMS in the Radwaste Building to the environment. This change involves pipelines that are required to comply with regulations at 10 CFR 20.1406 to minimize, to the extent practicable, contamination of the facility and the environment.

With the Tier 1 change, the circulating water system, i.e., the cooling tower blowdown line, will not be used to contain liquid radwaste; therefore the special design requirements for performing that function will not be required for the Unit 3 cooling tower blowdown line. This change does not have an adverse effect on a DCD described design function because the liquid radwaste effluent discharge pipeline in the LWMS will be extended to transfer liquid radwaste from the Radwaste Building to the environment and that pipeline continues to meet the special design requirements and the regulations. The underground segments of the liquid radwaste effluent discharge pipeline will either be enclosed within a guard pipe and monitored for leakage, or made accessible for visual inspections via a trench or tunnel. The Tier 1 change to use only the liquid radwaste effluent discharge pipeline for transfer to the environment will mean that the Unit 3 design continues to meet the DCD requirement for the piping to comply with 10 CFR 20.1406.

Evaluation Against Exemption Criteria

1. This exemption is not inconsistent with the Atomic Energy Act or any other statute and is therefore authorized by law.

2. An exemption from using the circulating water system, i.e., cooling tower blowdown line, and instead using the liquid radwaste effluent discharge piping for transfer of radwaste effluent to the environment would not present an undue risk to public health and safety, or be inconsistent with the common defense and security. The liquid radwaste effluent discharge piping meets the requirements to minimize, to the extent practicable, contamination of the facility and the environment. The liquid radwaste effluent discharge piping will either be enclosed within a guard pipe and monitored for leakage, or made accessible for visual inspections via a trench or tunnel. There is no adverse effect on an intended design function.

3. The exemption request involves special circumstances under 10 CFR § 50.12(a)(2)(ii). That subsection defines special circumstances as when “[a]pplication of the regulation in the particular circumstances would not serve the underlying purpose of the rule or is not necessary to achieve the underlying purpose of the rule.” The proposed changes for DCD Tier 1,

Section 2.10.1 are due to the additional work to understand the design needed to meet the special design requirements for piping associated with transfer of liquid radwaste effluent. Not using the cooling tower blowdown line simplifies its site-specific design and is consistent with DCD Tier 1, Section 2.11.8, *Circulating Water System*, which shows that no ITAAC are required for this system. Conformance to the DCD Tier 1, Section 2.10.1 description is not required to achieve the underlying purpose of the rule.

As demonstrated above, the exemption complies with the requirements of 10 CFR §§ 50.12, 52.7, and 52.63(b)(1). For these reasons, approval of the requested exemption is requested from DCD Tier 1, Section 2.10.1, as described herein.