Dominion®

North Anna 3 Combined License Application

Part 7: Departures Report

(Includes Information on Departures, Exemptions, and Variances)

Revision 3

June 2010

REVISION SUMMARY

Revision 3

Section	Changes
Departures	Deleted Departure NAPS DEP 11.4-1. Added 14 Departures and their associated justifications. Added 5 Exemption Requests. Deleted the Supplements section.
Variances	RAI 02.04.12-2, Modeling of Groundwater Elevation Levels
	Revised Variances NAPS ESP VAR 2.0-1, 2.0-2, 2.04, 2.0-6, and 2.0-7 to reflect the change from ESBWR technology to US-APWR technology.
	Revised Variance NAPS ESP VAR 2.0-2 to to provide elevations in both NAVD88 and NGVD29 datums.
	Added Variance 2.4-4 - Lake Level Increase
	Deleted Variance 2.5-2 - Engineered Fill
	Revised Variance 11.3-2 to reflect changes in food production rates within 50 miles of the plant and the resulting population doses.
	Changed Variance NAPS ESP VAR 12.2-3 to NAPS ESP VAR 11.2-1; Revised to reflect the change from ESBWR technology to US-APWR technology.
	Changed Variance NAPS ESP VAR 12.2-1 to NAPS ESP VAR 11.3-1; Changed NAPS ESP VAR 12.2-4 to NAPS ESP VAR 11.3-2; Revised to reflect the change from ESBWR technology to US-APWR technology.

Revision 2

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

Revision 1

Section	Changes
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
Exemptions	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

Contents

1 Departures

Introduction

A *departure* is a plant-specific deviation from design information in a standard design certification rule. Departures from the reference US-APWR 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 US-APWR Design Certification Application is currently under review with the NRC, departures are evaluated using the guidance in Regulatory Guide (RG) 1.206, Section C.IV.3.3.

It is anticipated that the final certification rulemaking for the US-APWR would have the same change process requirements as that in the current appendices to 10 CFR 52. References in this Part to the Design Certification Rule are understood to mean Appendix "X" to 10 CFR 52 once the US-APWR rulemaking is final, where "X" refers to the appendix number assigned by the NRC at the time of rulemaking.

The departure evaluation summaries provided in this Part refer to both DCD Tier 1 and Tier 2 content. Unless otherwise noted, "DCD" refers to US-APWR DCD Tier 2 information. References in this Part to Tier 1 information are noted explicitly as "DCD Tier 1."

The following departures are summarized in this report:

NAPS DEP 2.0(1):	Maximum Non-Coincident Wet Bulb Temperature
NAPS DEP 2.3(1):	Main Control Room Atmospheric Dispersion Factors, Source to Receptor Distance Determination
NAPS DEP 3.7(1):	Seismic Spectra Exceedance
NAPS DEP 3.7(2):	Site Amplification Functions and Site Response Analysis
NAPS DEP 3.7(3):	MNES Improvements to Seismic Analysis Methods
NAPS DEP 8.2(1):	Clarification of GDC 2 and 4 Applicability for Off-Site Power
NAPS DEP 9.2(1):	Replacement of Boron Recycle System with a Degasifier Subsystem
NAPS DEP 9.2(2):	Non-Essential Service Water Temperature, Design Service Water Temperature
NAPS DEP 9.5(1):	Power Source Fuel Storage Vault Elevation
NAPS DEP 10.2(1):	Main Turbine Type Change
NAPS DEP 10.4(1):	Main Condenser Type Change
NAPS DEP 14.2(1):	Initial Plant Test Program (ITP) Administration

NAPS DEP 14.2(2): Separation of Startup Organization into Preoperational and Startup Testing Organizations

NAPS DEP 14.2(3): Initial Test Program Scope

Departure: NAPS DEP 2.0(1) - Maximum Non-Coincident Wet Bulb Temperature

1. Summary of Departure

The Unit 3 site characteristic for 0 percent annual exceedance maximum wet bulb non-coincident temperature is established to be 88°F and is not bounded by the DCD Table 2.0-1 value of 86°F for this site parameter. Therefore, this is a departure from the DCD. DCD Tier 1 also presents this same parameter and value (of 86°F) and, therefore, a request for exemption from DCD Tier 1 information is provided in Section 2.

2. Scope/Extent of Departure

This departure is identified in FSAR Table 2.0-201.

DCD Tier 1 Table 2.1-1 also presents this value of 86°F. Therefore, a request for exemption is required in that the Unit 3 site characteristic of 88°F is not bounded by the DCD Tier 1 key site parameter. Section 2 of this Part provides the related exemption request.

3. Departure Justification

DCD Table 2.0-1 specifies “Key Site Parameters” for ambient design air temperature limits for various maximum and minimum statistical conditions. Included in the DCD Table 2.0-1 listing is the value of 86°F for 0 percent annual exceedance maximum for non-coincident wet bulb temperature. The Unit 3 site characteristic for this parameter is 88°F per FSAR Table 2.0-201 and therefore departs from this DCD key site parameter.

While the parameter of 0 percent exceedance maximum wet bulb non-coincident temperature is specified in DCD Tier 2 Table 2.0-1, this site parameter is not used as a design input and is therefore not relevant to safety analyses.

4. Departure Evaluation

As noted above, the 0 percent exceedance maximum wet bulb non-coincident temperature parameter is not used as a design input and is not relevant to safety analyses. 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)).

Departure: NAPS DEP 2.3(1) - Main Control Room Atmospheric Dispersion Factors, Source-to-Receptor Distance Determination

1. Summary of Departure

DCD Tables 2.3.4-1 through 7 provide certain inputs used in the determination of standard plant atmospheric dispersion factors for the main control room (MCR). One such input parameter is the horizontal distance between a given source and its associated receptor. In four instances, the horizontal distance used for the determination of Unit 3 site-specific MCR-related dispersion factor value is greater than that used to determine the standard plant dispersion factor values. FSAR Table 2.3-217 provides site-specific distances used to determine on-site dispersion factors. The

following lists the four instances in which site-specific input source-to-receptor distances are greater than that listed in DCD Tables 2.3.4-3, 4, 6, and 7:

- Distance from plant vent (source) to the MCR heating, ventilation, and air conditioning (HVAC) west intake (receptor) is increased from 53 m to 57.7 m[1].
- Distance from plant vent (source) to the reactor building door (receptor) is increased from 37 m to 40.0 m.
- Distance from fuel handling area (source) to the MCR HVAC east intake (receptor) is increased from 78 m to 84.3 m[1].
- Distance from fuel handling area (source) to the Class 1E Electrical Room northeast HVAC intake (receptor) is increased from 76 m to 79.9 m.

The use of distances for site-specific MCR-related dispersion factors that are greater than corresponding values in DCD Tables 2.3.4-3, 4, 6, and 7 represents a departure from DCD Tier 2 information.

2. Scope/Extent of Departure

This departure is identified in the FSAR Section 2.3.

3. Departure Justification

Horizontal source-to-receptor distances presented in the DCD were calculated using the nearest edge of rectangular receptors for the endpoint in determining source-to-receptor distances. The Unit 3 distance determination is based on consideration of the center of the source and receptor and results in estimation of a longer source-to-receptor distance. While the approach used in these instances differs from that used in the determination of distances presented in the DCD, this approach complies with the guidance of NRC RG 1.194 for determination of source-to-receptor distance.

4. Departure Evaluation

The approach used to determine source-to-receptor distances for the above noted site-specific instances complies with RG 1.194. Resulting site-specific dispersion factors are bounded by the values listed in DCD Table 2.0-1. 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;

1. The southeast Class 1E Electrical Room HVAC intake, as listed in DCD Tables 2.3.4-3, 2.3.4-4, 2.3.4-6, and 2.3.4-7, has the same louver as the east MCR HVAC intake. Likewise, the southwest Class 1E Electrical Room HVAC intake has the same louver as the west MCR HVAC intake.

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)).

Departure: NAPS DEP 3.7(1) - Seismic Spectra Exceedance

1. Summary of Departure

The safe-shutdown earthquake (SSE) ground motion and related certified seismic design response spectra (CSDRS) are specified in DCD Table 2.0-1. The Unit 3 site-specific seismic spectra exhibit exceedances when compared to the CSDRS (both horizontal and vertical). The site-specific SSE peak ground acceleration (PGA) is greater than the value of 0.3g as defined in DCD Table 2.0-1. Therefore, response spectra exceedances and the PGA greater than 0.3g represent departures from DCD Tier 2 information. Also included in this departure are:

- Use of site-specific groundwater levels for determination of factors of safety for overturning and sliding different from those used in standard plant analyses;
- Exceedances of the broadened in-structure response spectra (ISRS);

- The addition of shear rebar dowels to the Power Source Building basemat design related to lateral loads; and
- The provision of an alternative methodology for the computation of the factor of safety against overturning.

This departure pertains to buildings within the DCD standard plant design, that is: 1) the reactor building (R/B) complex, which includes the R/B, the pre-stressed concrete containment vessel, and the containment internal structure on their common basemat; and 2) the east and west power source buildings (PS/Bs).

The Essential Service Water Pipe Tunnel, the Ultimate Heat Sink Related Structures, and the east and west Power Source Fuel Storage Vaults, as discussed in DCD Section 3.7.1.1, are not part of the standard plant structural design and are not within the scope of this departure.

Because the SSE PGA value, as well as the horizontal and vertical CSDRS, are also defined in DCD Tier 1, Table 2.1-1, the FSAR information also represents a departure from DCD Tier 1 information. Therefore, a request for exemption from DCD Tier 1 information is provided in Section 2.

2. Scope/Extent of Departure

This departure is identified in the following sections of the FSAR:

- Section 2.0
- Section 3.7
- Section 3.8
- Appendices 3NN and 3OO
- Section 6.2
- Section 19.1

As noted above, an associated request for exemption from DCD Tier 1 information is provided in Section 2.

3. Departure Justification

SSE and CSDRS Exceedance

DCD Table 2.0-1 states the SSE ground motion to be 0.3g PGA. This table also defines the CSDRS associated with the SSE for horizontal and vertical directions as those presented in DCD Figures 3.7.1-1 and 3.7.1-2, respectively. As discussed in FSAR Section 3.7.1.1, the site-specific SSE PGA is greater than 0.3g and the site-specific ground motion response spectra (GMRS) and foundation input response spectra (FIRS) demonstrate exceedances of the CSDRS. Comparisons of site-specific spectra with the CSDRS are presented in FSAR Figures 3.7-201, 3.7-202, 3.7-203, and 3.7-204 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 GMRS and CSDRS for Seismic Category I design structures, specifically for the R/B complex and the PS/B. The site-specific site response analysis and development of resulting spectra are presented in detail in FSAR Appendix 3OO.

FSAR Figures 3.7-211 and 3.7-212 present site-dependent design ground motions at plant grade for horizontal and vertical directions, respectively. These figures reflect the CSDRS anchored at 0.1g; therefore, DCD Figures 3.7.1-1 and 3.7.1-2 (which defined the CSDRS) are not replaced by this departure, but rather are included in the enveloped results of FSAR Figures 3.7-211 and 3.7-212 defining the site-dependent SSE free-field design ground motion at grade. This approach satisfies the minimum requirements for design ground motion as described in Appendix S to 10 CFR 50 (as discussed in FSAR Section 3.7.1.1).

FSAR Section 3.7.2.4 and FSAR Appendix 3NN discuss the site-specific soil structure-interaction (SSI) analyses that are performed to validate design of the standard plant Seismic Category I structures, based on the site-specific SSI Input motions and the site-specific seismic input parameters. Details regarding the modeling and site-specific SSI analyses of the R/B complex and the PS/Bs are addressed in FSAR Appendix 3NN. The results of the site-specific SSI analyses documented in FSAR Appendix 3NN demonstrate that the standard plant seismic design of structural members envelopes the site-specific seismic responses for the R/B complex and the PS/Bs (as discussed in FSAR Section 3.7.2.4.1).

DCD Table 2.0-1 lists the key site parameter for maximum groundwater level as 1 foot below plant grade. This parameter is used in some, but not all, analyses involving groundwater level as an input parameter in the standard plant design for the R/B complex and PS/Bs. DCD Section 3.8.5.5 discusses the load combinations applicable to the design of these structures. Although not specified in the DCD, the standard plant analyses to determine that the overturning factor of safety and sliding factor of safety (i.e., DCD Sections 3.8.5.5.1 and 3.3.5.5.2, respectively) are met assume a groundwater level below the basemats of the R/B complex and the PS/Bs. The site-specific analyses use site-specific groundwater levels based on the hydrology of the Unit 3 site. Although not specified in the DCD, this represents a departure from the standard plant design input parameter for these stability analyses from groundwater below the basemats to higher values, as appropriate for each structure, as reported in FSAR Section 2.4.12. The results of the site-specific analyses are presented in FSAR Table 3.8-203.

DCD Sections 19.1.5.1 and 19.1.6.3 discuss the seismic risk evaluation. The review level earthquake in the DCD seismic margins analysis is based on an SSE of 0.3g (per DCD Section 19.1.5.1.1). As discussed above, the site-specific SSE PGA is greater than 0.3g. FSAR Section 19.1 discusses the increased review level earthquake resulting from an SSE PGA higher than that stated in the DCD.

Broadened ISRS Exceedance

DCD Section 3.7.2.4.1 requires verification that the results of the site-specific SSI analysis for the broadened ISRS are enveloped by the standard design. The broadened ISRS are developed for the R/B complex and the PS/Bs as described in FSAR Section 3.7.2.5. The standard plant broadened ISRS do not envelope all of the corresponding site-specific broadened ISRS at all frequencies. This condition constitutes a departure from DCD Tier 2 information.

Additional detail on the development of site-specific broadened ISRS is presented in FSAR Appendix 3NN. As discussed in FSAR Section 3.7.2.4.1, seismic designs of standard plant subsystems affected by site-specific exceedances of the standard plant input motion are required to be evaluated to confirm suitability of the designs in accordance with SRP 3.7.3. FSAR Sections 3.7.2.4.1 and 3.10 provide additional details on this process, including the procurement and seismic qualification of equipment and components.

PS/B Basemat, Structural Features Related to Lateral Loads

DCD Sections 3.8.4.4.2 and 3.8.5.1.2 discuss structural features of the PS/Bs, including the basemat. As discussed in the corresponding FSAR sections, the Unit 3 design provides for shear rebar dowels at the bottom of the PS/B basemat to transfer building lateral loads into the structural concrete fill and/or rock.

Overturning Acceptance Criteria

DCD Section 3.8.5.5.1 discusses the computation of the factor of safety against overturning. FSAR Section 3.8.5.5.1 provides alternative methodologies that may be used to determine this factor of safety. This change to DCD Section 3.8.5.5.1 is considered a departure from DCD Tier 2 information. The alternative methodologies are based on a kinetic energy method. FSAR Section 3.8.5.5.1 provides supporting references for additional background information.

4. Departure Evaluation

As discussed above, appropriate site-specific analyses have been conducted to assess the subject exceedances of the DCD specified SSE and CSDRS. This departure has been evaluated and determined to require prior NRC approval in accordance with the Design Certification Rule, Section VIII.B.5.

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)).

Departure: NAPS DEP 3.7(2) - Site Amplification Functions and Site Response Analysis

1. Summary of Departure

The DCD specifies how a site amplification function must be determined and how the site response analysis must be performed. The Unit 3 FSAR clarifies that certain DCD requirements do not apply to development of the Unit 3 GMRS or to the derivation of the free-field outcrop spectra of site-specific horizontal ground motions. This clarification requires a departure from DCD Tier 2 information.

2. Scope/Extent of Departure

This departure is identified in FSAR Sections 2.5 and 3.7.

3. Departure Justification

a. *Use of Hard Rock Conditions to define Unit 3 GMRS*. DCD Section 3.7.1.1, under *Site-Specific GMRS*, indicates that horizontal GMRS are developed using a site amplification function obtained from site response analyses performed on site-specific soil profiles that include the layers of soil and rock over the generic rock defined as the rock with shear wave velocity exceeding 9200 ft/s. This DCD section anticipates that COL applicants would perform this portion of the seismic analysis only in the manner specified in the DCD. However, as described in FSAR Section 2.5.2 and in the Request for Variance from the ESP, VAR 2.0-4 (Section 3), hard rock conditions (with a shear wave velocity exceeding 9200 ft/sec) are at a depth of about 145 feet from finished grade. In addition, the hard rock conditions are consistent with the ground motion attenuation relations used in the site-specific probabilistic seismic hazard analysis (PSHA). This hard rock horizon, which is well below the foundation levels of all safety-related structures, is used to define the Unit 3 GMRS. Therefore, for the purpose of defining the GMRS, the site amplification analysis was not required. However, as described in FSAR Section 3.7, the seismic wave transmission characteristics of the site were considered in the development of the amplification of the GMRS hard rock ground motions at the higher elevations to obtain the site-specific foundation input response spectra (FIRS).

b. *Considerations of Material Relative to the Control Point*. DCD Section 3.7.1.1 also identifies (under *FIRS*) that the free-field outcrop spectra of site-specific horizontal ground motion are derived from the horizontal GMRS using site response analyses that consider only the wave propagation effects in materials that are below the control point elevation at the bottom of the basemat. This DCD section does not allow that material present above the control point elevation to be included in the site response analysis. In soil-structure interaction (SSI) analysis, structures can be analyzed with surface or embedded foundations. As described in FSAR Section 3.7.2, the site-specific SSI analyses of the different Seismic Category I structures consider one or both of the SSI modeling approaches. In the case where the structures are analyzed as embedded, the free-field outcrop spectra are developed at the foundation level from site response analysis of the full height soil

column, which requires consideration of the material above the bottom of the basemat. In the case where the structures are analyzed as surface founded, the free-field outcrop spectra are developed as geologic outcrop spectra from truncated soil column response (TSCR) analysis. The TSCR analysis approach, as described in NRC Interim Staff Guidance DC/COL-ISG-017, requires the consideration of the effects of the material above the bottom of the basemat. The methodology is described in detail in FSAR Appendix 3OO.

4. Departure Evaluation

This departure provides clarification that certain DCD requirements do not apply to development of the Unit 3 GMRS or to the derivation of the free-field outcrop spectra of site-specific horizontal ground motions. This departure has been evaluated and determined to require prior NRC approval in accordance with the Design Certification Rule, Section VIII.B.5.

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)).

Departure: NAPS DEP 3.7(3) - MNES Improvements to Seismic Analysis Methods

1. Summary of Departure

Certain changes have been made in the methodology and models used for the USAPWR standard plant seismic analyses, which affect the NRC review of the USAPWR application for design certification. These changes, applicable to the standard plant design analysis, including soil-structure interaction analysis, were submitted to the NRC in MHI Technical Report MUAP-10001 (Reference 1). The associated analysis results for the standard plant seismic design were provided to the NRC in MHI Technical Report MUAP-10006 (Reference 2).

The changes described in the above referenced technical reports will serve as the basis for a subsequent DCD revision as stated in MHI responses to NRC Requests for Additional Information[1] on the seismic design basis analyses. The analysis methods described in these reports are applicable to the Unit 3 FSAR analyses. In that the DCD has not yet been revised to incorporate the changes addressed in the referenced reports, the use of these improved analyses methods represents a temporary departure from DCD Tier 2 information. Following the incorporation of required information into the DCD, it is anticipated that appropriate updates would be made to the Unit 3 FSAR, and this departure would be withdrawn.

1. Relevant NRC questions are identified, along with MHI resolutions, in MUAP-10001.

The following list provides a summary of the topics involved in this departure:

1. Establishment of Certified Seismic Design Response Spectra (CSDRS) compatible acceleration time histories, synthesized from seed recorded earthquake ground motions;
2. Development of generic layered soil profiles and strain compatible properties;
3. Enhancement of the SSI model for the Reactor Building (R/B) complex, which includes the R/B, the pre-stressed concrete containment vessel, and the containment internal structure on their common basemat. Enhancements include adjusting member properties where necessary to account for the effects of concrete cracking, incorporating single degree of freedom models representing the out-of-plane flexibility of slabs and walls, and integration of the previously used stick models with a finite element model of the R/B complex basement to form the overall SSI model of the R/B complex;
4. Development and validation of a finite element model for seismic analysis of the Power Source Buildings (PS/Bs);
5. Consideration of concrete cracking; and
6. Updated dimensions for R/B complex and PS/B structures

2. Scope/Extent of Departure

This departure is identified in the following sections of the FSAR:

- Section 3.7
- Section 3.8
- Associated Appendices

3. Departure Justification

CSDRS Compatible Ground Motion Time Histories

DCD Section 3.7.1.1, under “Design Ground Motion Time History,” indicates that input motion in the earthquake response analysis of the US-APWR standard plant utilizes one set of three statistically independent time histories of seismic motion which was synthesized artificially. The enhanced standard plant analyses described in MUAP-10001 utilize CSDRS-compatible time histories that are synthesized from seed recorded earthquake ground motions. These modified time histories are used as input for the enhanced standard plant seismic analyses described in MUAP-10001. Because the seismic analyses and associated results in MUAP-10006 are used as the basis for comparison and validation of the standard plant at the Unit 3 site, this constitutes a departure from DCD Tier 2 information in DCD Section 3.7.

Generic Layered Soil Profiles and Strain Compatible Properties

DCD Sections 3.7 and 3.8 discuss the analytical treatment of soil subgrade types and the consideration of frequency independent springs. FSAR Sections 3.7 and 3.8 document site-specific seismic analysis results. The site-specific analysis results are compared to the enhanced standard plant analysis results (documented in MUAP-10006) that are derived from frequency-dependent SSI analysis of generic layered soil profiles and strain compatible properties. Because the comparison and validation of the standard plant seismic design for the Unit 3 site is performed using the generic layered soil profiles and strain compatible properties that are not present in DCD, this represents a departure from the DCD Tier 2 information in DCD Sections 3.7 and 3.8.

Enhancement of the SSI Model for the Reactor Building Complex

DCD Section 3.7.2 indicates that the seismic response of major buildings in the standard plant design is obtained from the time history analysis of lumped mass stick models with lumped parameter constants representing the stiffness and damping properties of frequency-independent SSI analyses. FSAR Section 3.7.2 discusses enhancements made to the seismic response analysis for standard plant structures, based on MHI Technical Reports MUAP-10001 and MUAP-10006, and therefore departs from DCD Tier 2 information. Enhancements to the SSI model include adjusting member properties where necessary to account for the effects of concrete cracking (discussed separately further below), incorporating single degree of freedom models representing the out-of-plane flexibility of slabs and walls, and integration of the previously used stick models with a finite element model of the R/B complex basement to form the overall SSI model of the R/B complex. Analysis of the standard plant SSI model, including the generic soil profiles described above, is performed with the computer program ACS SASSI, which uses time history analysis in the frequency domain utilizing the substructuring technique. To validate the standard plant seismic design at the Unit 3 site, the seismic responses and in-structure response spectra obtained from the site-specific analyses of the R/B complex are compared with the seismic design of the standard plant analyses documented in MHI Technical Report MUAP-10006. The comparisons are presented in FSAR Appendix 3NN. Because the comparison and validation of the standard plant seismic design for the Unit 3 site is performed using the enhanced R/B complex SSI model that is not present in DCD Revision 2, this represents a departure from the DCD Tier 2 information in DCD Section 3.7.2.

Finite Element Method Model of the Power Source Buildings

DCD Section 3.7.2 discusses modeling of the PS/Bs. A lumped mass stick model is utilized for performing the seismic analyses. FSAR Section 3.7.2 and the supporting technical report (Reference 1) describe the use of a finite element model for the PS/B's SSI model, and associated validation measures, and therefore represent a departure from DCD Tier 2 information in DCD Section 3.7. See FSAR Section 3.7.2 for additional detail on the finite element modeling of the PS/Bs and validation measures used for seismic analysis.

Consideration of Concrete Cracking in Dynamic Analyses

DCD Sections 3.7.2, 3.8.1, and 3.8.3 address considerations of concrete cracking in the dynamic structural models used for SSI analyses of the R/B complex and PS/Bs. FSAR Sections 3.7.2 and 3.8 provide additional detail on improved modeling and considerations of effective stiffness of reinforced concrete members for dynamic analyses. This additional detail on the considerations of concrete cracking represents a departure from DCD Tier 2 information in DCD Sections 3.7.2, 3.8.1, and 3.8.3. As discussed in Section 3.5 of MUAP-10001, stresses in the reinforced concrete members under the most critical seismic load combination are evaluated and used to assess the potential for concrete cracking. The stiffness of the reinforced concrete members that crack under the most critical load combination are adjusted based on the provisions and recommendations of the industry standards.

DCD Table 3.7.1-3, Standard Plant Structure Dimensions

DCD Table 3.7.1-3 provides major dimensions of Seismic Category I structures. FSAR Table 3.7.1-3R has been revised with regard to the R/B complex and PS/B structures to show dimensions that are changed to reflect recent detailed design and in response to NRC Requests for Additional Information. The updated dimensions were used in the standard plant analyses documented in Technical Reports MUAP-10001 and MUAP-10006 and in the site-specific analyses of these structures documented in FSAR Appendix 3NN. It is anticipated that these changes will be incorporated into Table 3.7.1-3 in a subsequent DCD revision. In that the FSAR Table 3.7.1-3R contains this updated information, this is considered part of this departure from DCD Tier 2 information. (Note that other changes to this FSAR table are in response to COL information items identified in the table and are therefore not within the scope of this departure.)

4. Departure Evaluation

As discussed above, this departure is due to incorporation of information on seismic response analysis relative to the standard plant design that has been submitted to the NRC in support of the standard plant design review. The information described in the referenced technical reports will serve as the basis for a subsequent revision of the affected portions of the DCD. The information contained in the referenced technical reports and in the FSAR related to this departure represent appropriate improvements to the seismic response analysis in response to the NRC review of the standard design DCD as documented in MUAP-10001. This departure has been evaluated and determined to require prior NRC approval in accordance with the Design Certification Rule, Section VIII.B.5.

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)).

5. References

1. "Seismic Design Bases of the US-APWR Standard Plant," MUAP-10001, Revision 1, Mitsubishi Heavy Industries, Ltd., May 2010.

2. "Soil-Structure Interaction Analyses and Results for the US-APWR Standard Plant," MUAP-10006, Revision 0, Mitsubishi Heavy Industries, Ltd., April 2010.

Departure: NAPS DEP 8.2(1) - Clarification of GDC 2 and 4 Applicability for Off-Site Power

1. Summary of Departure

The DCD indicates that GDC 2 and 4 are applicable to the off-site power system which supplies power for a US-APWR unit. The FSAR clarifies that GDC 2 and 4 do not apply to the off-site power system and, as such, requires a departure from DCD Tier 2 information.

2. Scope/Extent of Departure

This departure is identified in the following sections of the FSAR:

- Section 1.9
- Section 8.1
- Section 8.2

3. Departure Justification

As discussed in DCD Section 8.2.1.2, the off-site power system is a nonsafety-related, non-Class 1E system. While DCD Tables 1.9.2-8 and 8.1-1 indicate that GDCs 2 and 4 are applicable to DCD Section 8.2 with regard to the off-site power system, DCD Section 8.2.2.1 provides additional detail by way of exceptions and clarifications which indicate the lack of conformance with these GDC. To avoid confusion regarding the design and licensing basis, FSAR Sections 1.9, 8.1, and 8.2 indicate that GDC 2 and 4 do not apply to the off-site power system. This position is consistent with NRC Staff communications with the industry on this subject (ADAMS Accession ML090650404).

4. Departure Evaluation

In that GDC 2 and 4 are not applicable to the off-site power system for Unit 3, this departure does not reduce the design requirements and standards for the off-site power system SSCs. Because the requirements and standards that appropriately apply to the off-site power system are not being

reduced by this clarification of GDC 2 and 4 applicability, this departure does not have an adverse effect on the intended design function of the off-site power system. 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 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 previously evaluated 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 analysis.

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)).

Departure: NAPS DEP 9.2(1) - Replacement of Boron Recycle System with a Degasifier Subsystem

1. Summary of Departure

The standard design for the chemical and volume control system (CVCS) includes the boron recycle system (BRS) for recycling discharged reactor coolant. As indicated in DCD Section 9.2, distilled water discharged from the BRS boric acid evaporator is provided to Primary Makeup Water Tanks. As indicated in DCD Section 9.3, effluents from the evaporator are reprocessed as makeup

water and concentrated boric acid water. The Unit 3 design, as a matter of engineering and operations preference, replaces the BRS with a degasifier subsystem and removes the interface between the affected portion of the CVCS (i.e., the boric acid evaporator) and the Boric Acid Tanks, Primary Makeup Water Tanks, and associated systems. The degasifier subsystem processes reactor coolant discharged from the reactor coolant system with output streams to the gaseous and liquid waste management systems. As a result, there is no longer a boron recycle function. Therefore, the Unit 3 design departs from the standard design discussed in DCD Sections 9.2, 9.3 and multiple other DCD sections.

2. Scope/Extent of Departure

This departure is identified in the following sections of the FSAR:

- Section 1.2
- Section 3.2
- Appendix 3E
- Section 7.4
- Section 9.2
- Section 9.3
- Appendix 9A
- Section 10.4
- Section 11.2
- Section 11.3
- Section 11.4
- Section 11.5
- Section 12.2
- Section 12.3
- Section 14.2
- Appendix 14A

In addition, there are references to the BRS in DCD Tier 1, Section 2.4.6 and Figure 2.4.6-1 that require changes to reflect the Unit 3 degasifier subsystem. A request for exemption for these changes is provided in Section 2.

3. Departure Justification

As stated in DCD Table 3.2-2 the CVCS piping and valves related to the holdup tanks, the boric acid evaporator feed pumps, the boric acid evaporator, and the boric acid evaporator feed demineralizer are classified Quality Group D, non-seismic, and therefore, as discussed in classification

descriptions (DCD Section 3.2.1), have no safety function. FSAR Table 3.2-2R, which reflects this departure from the DCD, indicates the CVCS piping and valves related to the holdup tanks, holdup tank pumps, degasifier, and the degasifier feed demineralizer retain the classification of Quality Group D and non-seismic and thus have no safety function.

Interfaces between CVCS and CCWS, primary water makeup tanks, demineralized water system, process grab sampling, and the auxiliary steam supply system have been evaluated and no significant impacts exist.

The replacement of the BRS requires changes to the DCD analyses of accidental tank failure. The site-specific analyses are presented in FSAR Section 2.4.13 and indicate resulting receptor concentrations meet the requirements of 10 CFR 20, Appendix B and therefore satisfy the requirements of 10 CFR 20.1301 and 10 CFR 20.1302.

The replacement of the BRS with the degasifier subsystem required a reassessment of the normal liquid and gaseous effluent process stream radionuclide activities, concentrations, and off-site dose results. As discussed in FSAR Sections 11.2 and 11.3, the analyses demonstrate compliance with the requirements of 10 CFR 20, 10 CFR 50 Appendix I, and 40 CFR 190.

Replacement of the BRS with the degasifier subsystem involves changes in the names of BRS-related equipment and changes in equipment and piping locations, thus requiring a reassessment of sources and radiation zone maps. Radiation sources and shielding calculations have been evaluated and only minor impacts exist as presented in FSAR Sections 12.2 and 12.3.

4. Departure Evaluation

The above discussed systems and components affected by this departure are nonseismic and have no safety function. Key analyses required by the replacement of the BRS with a degasifier subsystem include reanalysis of compliance with limits associated with normal operating liquid and gaseous radioactive effluents. These reanalyses demonstrated compliance with applicable regulations.

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;

1. 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;

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

3. 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;

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

5. 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;

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

7. 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)).

Departure: NAPS DEP 9.2(2) - Non-Essential Service Water System, Design Service Water Temperature

1. Summary of Departure

The design temperature of the non-essential service water (non-ESW) system as stated in DCD Section 9.2.9.2.1 is 88.5°F. The Unit 3 design temperature for this system is increased to 100°F and, as such, represents a departure from DCD Tier 2 information.

2. Scope/Extent of Departure

This departure is identified in FSAR Section 9.2.

3. Departure Justification

The non-ESW service water design temperature is increased in the Unit 3 design to be consistent with the design temperature associated with the circulating water system which supplies water to the non-ESW system (per FSAR Section 9.2.9.2.1). FSAR Table 10.4.5-1R provides design parameters associated with the circulating water system. As discussed in DCD Section 9.2.9.1.1, the non-ESW system has no safety-related function and, therefore, no nuclear safety design basis.

4. Departure Evaluation

Because the non-ESW system has no safety-related function or nuclear safety design basis, this departure has no impact on DCD safety analyses. 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)).

Departure: NAPS DEP 9.5(1) - Power Source Fuel Storage Vault Elevation

1. Summary of Departure

DCD Section 3.8.4.1.3 and other DCD sections describe the power source fuel storage vaults (PSFSVs) as underground structures. The Unit 3 design modified this design to increase the relative plan elevation of the PSFSVs such that these structures are partially underground and, therefore, departs from the standard design. This change in design is required to ensure seismic

stability of the structure primarily to account for the effects of buoyancy based on the normal groundwater elevation at the Unit 3 site.

DCD Tier 1 Section 2.2 also describes the PSFSVs as underground and, therefore, a request for exemption from DCD Tier 1 information is also required. Conforming changes to DCD Generic Technical Specification (GTS) Bases are also included in the request for exemption. See Section 2.

2. Scope/Extent of Departure

This departure is identified in the following sections of the FSAR:

- Section 1.2
- Section 1.9
- Section 3.5
- Section 3.7
- Section 3.8
- Section 8.3
- Section 9.5
- Appendix 19A
- COLA Part 4, Section A

As noted above, an associated request for exemption from DCD Tier 1 information is provided in Section 2.

3. Departure Justification

As described in DCD Sections 1.2.1.7.1 and 3.8.4.1.3, the PSFSVs are designed as seismic category I structures, and house safety-related systems and components. The site-specific design of the PSFSVs is in conformance with the DCD requirements that the structure withstand the effects of the site-specific safe shutdown earthquake without a loss of structural integrity, and that the safety-related systems and components housed by the PSFSVs, including the safety-related gas turbine generator fuel storage tanks and associated piping and components, are adequately supported to be able to perform their design basis functions following a safe-shutdown earthquake. Therefore, the seismic design basis functions of the PSFSVs are not affected by the proposed changes.

In addition, design requirements applicable to the PSFSVs and SSCs housed therein, including protection from tornado/hurricane missiles, turbine missiles, and external floods, as well as fire protection requirements, have been considered in the evaluation of this departure, based on the site-specific design.

With regard to turbine-generator orientation and missile hazards, FSAR Section 3.5.1.3.1 indicates that the site-specific design locates the PSFSVs within the strike zone of low-trajectory turbine

missiles. This location, in concert with the structures' partial embedment, warranted special consideration of the turbine missile hazard. FSAR Section 3.5.1.3.2 demonstrates that overall risk complies with RG 1.115.

4. Departure Evaluation

Increasing the elevation of the PSFSVs such that these structures are partially underground will not affect their intended function. 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 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)). See FSAR Appendix 19A.

Departure: NAPS DEP 10.2(1) - Main Turbine Type Change

1. Summary of Departure

The standard design for the low pressure turbines (LPTs) is described in DCD Section 10.2 and consists of a set of three double flow LPTs with 74-inch last stage blades. The Unit 3 design of the LPTs and selected balance of plant power production equipment performance requirements are modified from the standard plant design to accommodate the use of a different set of LPTs that have 54-inch last stage blades. The smaller turbine results in a decrease in expected generator output at 100 percent nuclear steam supply system output.

2. Scope/Extent of Departure

This departure is identified in the following sections of the FSAR:

- Section 1.2
- Section 3.5
- Appendix 9A
- Section 10.1
- Section 10.2
- Section 10.4
- Section 11.5
- Section 12.3

3. Departure Justification

As described in DCD Section 10.2, the LPTs and associated power production equipment perform no safety-related functions. The LPTs and associated power production equipment perform multiple power generation functions.

Performance requirements of the LPTs and associated power production equipment are based upon maximizing the efficiency of the heat cycle. These performance requirements have no effect on any safety analysis described in the DCD. However, the site-specific low pressure turbine maintenance and inspection program is evaluated based on the site-specific turbine missile generation calculation. The selection of appropriate program inspection and test frequencies ensures that the probability of missile generation is consistent with criteria presented in DCD Section 10.2.2.1.

4. Departure Evaluation

The LPTs and associated power production equipment related to this change are nonsafety-related and perform no safety-related functions. There are no changes to the design functions performed by the LPTs and the supporting balance of plant power production equipment required as a result of this change.

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)).

Departure: NAPS DEP 10.4(1) - Main Condenser Type Change

1. Summary of Departure

The standard design for the main condenser is described in DCD Section 10.4. Unit 3 uses closed-cycle cooling towers. For optimum performance, a modification to the standard condenser design is required. The condenser is modified from a single pressure condenser to a multi-pressure condenser with the three main condenser shells operating at different pressures and temperatures.

To support the main condenser change, there are changes to some of the interfacing systems, including:

- The Unit 3 design modifies the standard design for the Main Condenser Evacuation System (MCES) from three vacuum pumps to four vacuum pumps.
- The Unit 3 design modifies the standard design for the CWS from eight, 12.5 percent capacity circulating water pumps to four, 25 percent capacity circulating water pumps. The Unit 3 main condenser design results in various modified operating parameters of the CWS.

2. Scope/Extent of Departure

This departure is identified in the following sections of the FSAR:

- Section 1.2
- Appendix 9A
- Section 10.1
- Section 10.4
- Section 11.5
- Section 12.3

3. Departure Justification

As described in DCD Section 10.4.1, the main condenser performs no safety-related function. The power generation functions of the main condenser, including condensation of turbine exhaust steam, condensation of turbine bypass steam, and deaeration of condensate, are not adversely affected by the proposed design changes. The intended functions of the main condenser's interfacing systems, including the MCES and CWS, are associated with power generation and include no safety-related functions. The intended functions of these interfacing systems are not affected by the proposed changes. The proposed design change has no effect on any safety analysis described in the DCD.

4. Departure Evaluation

The main condenser and portions of the interfacing systems related to this change are nonsafety-related and perform no safety-related functions. There are no changes to the design functions performed by the main condenser and portions of the interfacing systems required as a result of this change.

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)).

Departure: NAPS DEP 14.2(1) – Initial Test Program (ITP) Administration

1. Summary of Departure

DCD Section 14.2 references an MHI Technical Report, MUAP-08009, Revision 1, “US-APWR Test Program Description,” for the description of site-specific administrative aspects of the ITP and the program for testing site-specific components and systems. Unit 3 ITP administrative requirements are described in FSAR Appendix 14AA, “Description of Initial Test Program Administration.”

2. Scope/Extent of Departure

This departure is identified in FSAR Section 14.2.

3. Departure Justification

Both MUAP-08009 and FSAR Appendix 14AA address the requirements of RG 1.68, Revision 3, “Initial Test Programs for Water-Cooled Nuclear Power Plants.” The major differences between the

two documents are the format used and site-specific content. Although the documents differ in the level of detail provided for specific topics, both documents supplement the content of DCD Section 14.2 and conform to the regulatory guidance of RG 1.68, Rev. 3, and Regulatory Guide 1.206.

SRP 14.2 and RG 1.68 describe an acceptable means of meeting regulatory requirements for COL applications to describe an initial test program required by 10 CFR 52.79(a)(28). 10 CFR 52.47 requires design certification applications to provide information for the DCD scope of ITPs. DCD Section 14.2 describes an ITP and references MUAP-08009 for site-specific scope testing and for administrative requirements for the ITP. The Unit 3 program meets all the technical provisions of RG 1.68 with the exception of RG 1.68, Appendix A,1.k(2) and 1.k(3). Those two items address testing of personnel monitors, radiation survey instruments, and laboratory equipment used to analyze and measure radiation. DCD Table 14A-1 includes the same exception. Because the program description meets the information and technical requirements of RG 1.68, FSAR Section 14.2 is adequate. SSC testing scope and test descriptions are not affected by this change.

4. Departure Evaluation

This departure only affects the format and level of detail of the description of the ITP. The scope of testing and the administrative controls meet the regulatory guidance of RG 1.68. This departure does not affect the design, analysis or scope of testing of SSCs. 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 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 previously evaluated 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 analysis.

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)).

Departure: NAPS DEP 14.2(2) – Separation of Startup Organization into Preoperational and Startup Testing Organizations

1. Summary of Departure

DCD Section 14.2 states that the startup organization performs the ITP including preoperational and startup testing. The Unit 3 FSAR describes two organizations, a Preoperational Test Group and a Startup Test Group.

2. Scope/Extent of Departure

This departure is identified in FSAR Section 14.2 and Appendix 14AA.

3. Departure Justification

The scope of this departure is limited to an organizational choice made to separate the responsibility for the ITP between two groups instead of one organization as described in the DCD. DCD Section 14.2 discusses the preoperational and startup testing organization. The applicant has chosen to identify two organizations with responsibility for the ITP in contrast to the single organization identified in the DCD. The scope of the ITP and the administrative controls are not affected by this change. There is no deviation from the regulatory guidance of RG 1.68 or SRP 14.2 associated with this departure.

4. Departure Evaluation

The description of a Preoperational Test Group and a Startup Test Group in the SCOLA compared to a single Startup Group described in the DCD does not affect the ITP function. The scope and administrative controls of the program are not affected by this departure. SSC design and analysis and testing are not affected. 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 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 previously evaluated 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 analysis.

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)).

Departure: NAPS DEP 14.2(3) – Initial Test Program Scope

1. Summary of Departure

DCD Section 14.2 defines the scope of the Initial Test Program (ITP) to include construction, preoperational and startup testing. The Unit 3 program includes preoperational and startup testing consistent with SRP 14.2. The Unit 3 ITP, as described in FSAR Section 14.2, does not include construction testing.

2. Scope/Extent of Departure

This departure is identified in the following sections of the FSAR:

- Section 3.9
- Section 6.2
- Section 6.3
- Section 6.5
- Section 14.2.

3. Departure Justification

DCD Section 14.2 includes construction, preoperational and startup testing in the ITP. SRP 14.2 and RG 1.68, Revision 3, define the ITP to include only preoperational and startup testing. RG 1.68, Revision 3, Appendix A, provides a representative listing of systems and components to be included in the ITP and the scope of testing for them. The regulatory guidance addresses a number of issues associated with these tests, including procedure format, qualifications of procedure writers and reviewers, processing of test results, utilization of plant procedures in initial tests, utilization of plant operations personnel in conducting tests, etc. The DCD does not address these programmatic aspects for construction tests.

Construction testing will be performed prior to Preoperational Testing as discussed in FSAR Section 14AA.3.2. The objectives of construction testing are to verify that construction and installation were completed in accordance with the design and that the SSCs are ready for preoperational testing. Preoperational testing demonstrates that SSCs operate in accordance with design and are capable of meeting their design bases.

Construction testing is discussed in DCD Section 14.2.1.2.1. FSAR Section 14.2.1 states that the ITP consists of preoperational and startup testing for the reasons stated above, but does discuss construction tests as prerequisites for preoperational testing in FSAR Section 14AA.3.2.

4. Departure Evaluation

This departure affects the scope of the ITP. Construction tests are performed as part of construction completion but are not subject to the criteria of SRP 14.2 and RG 1.68. Preoperational testing confirms that construction was completed correctly in accordance with the plant design. Therefore, the departure does not affect the description or the analysis of the plant presented in the DCD. This departure has been evaluated and determined to comply with the requirements of the Design Certification Rule, Section VIII.B.5. 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 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 previously evaluated 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 analysis.

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)).

2 Exemptions

An *exemption* must be obtained if information proposed in the COL application is inconsistent with one or more NRC regulations. 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) and additional considerations of 10 CFR 52.63(b)(1).

The following requests for exemption are provided in this report:

- Seismic Spectra Exceedance
- Maximum Non-Coincident Wet Bulb Temperature
- Power Source Fuel Storage Vault Elevation
- Replacement of Boron Recycle System with a Degasifier Subsystem
- Change to Generic Technical Specifications Regarding a Setpoint Control Program

Exemption Subject: Seismic Spectra Exceedance

1. Description

Pursuant to 10 CFR 52.7 and Section VIII.A.4 of the Design Certification Rule, an exemption is requested from DCD Tier 1 information. The safe-shutdown earthquake (SSE) ground motion and related certified seismic design response spectra (CSDRS) are specified in DCD Tier 1, Table 2.1-1 “Key Site Parameters.” The Unit 3 site-specific seismic spectra exhibit exceedances when compared to the CSDRS (both horizontal and vertical) which are provided in DCD Tier 1, Figures 2.1-1 and 2.1-2. The site-specific SSE peak ground acceleration (PGA) is greater than the value of 0.3g, as defined in DCD Tier 1, Table 2.1-1. As a result, a request for exemption from DCD Tier 1 information in the above-referenced table and figures is required.

2. Discussion

As discussed under departure DEP 3.7(1) in Section 1, appropriate site-specific analyses have been conducted to assess the subject exceedances of the DCD-specified SSE ground motion and CSDRS. Modeling and site-specific analyses of the affected standard plant structures, as discussed under departure DEP 3.7(1), are presented in FSAR Appendix 3NN. The results in that appendix demonstrate that the standard plant seismic design of structural members envelopes the site-specific seismic responses for the affected standard plant structures.

Also, as discussed under departure DEP 3.7(1), FSAR Figures 3.7-211 and 3.7-212 present site-dependent design ground motions at plant grade for horizontal and vertical directions, respectively. These figures reflect the CSDRS anchored at 0.1 g; therefore, DCD Tier 1, Figures 3.7.1-1 and 3.7-2 (which defined the CSDRS) are not replaced by this departure, but rather are included in the enveloped results of FSAR Figures 3.7-211 and 3.7-212 defining the

site-dependent SSE free-field design ground motion at grade. 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).

Based on the analyses referenced under departure DEP 3.7(1), the granting of this exemption will not result in a significant decrease in the level of safety otherwise provided by the design.

3. Conclusion

This exemption from DCD Tier 1 information is requested in accordance with the provisions of the Design Certification Rule, Section VIII.A.4.

1. This request is authorized by law based on compliance with the provisions of the Design Certification Rule, Section VIII.A.4. The granting of this exemption will not present an undue risk to the public health and safety. The request is consistent with the common defense and security.

2. Special circumstances are present as specified in 10 CFR 50.12(a)(2). Specifically, special circumstance (ii) is present. The subject exceedances are due to seismic conditions existing at the Unit 3 site. DCD Tier 1, Section 2.1.1 recognizes the potential that deviations from DCD-stated site parameters may exist and that justification may be provided to demonstrate that a proposed facility is acceptable at a proposed site. Thus, the consideration of site-specific seismic exceedances is a recognized part of the licensing process. Conformance to the specific subject seismic criteria is not required to achieve the underlying purpose of the rule.

3. 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 DCD Tier 1 information is the result of a site-specific consideration, namely Unit 3 site seismic ground motion analysis.

Therefore, full standardization in this instance is not practical. As stated above, this departure from DCD Tier 1 information will not result in a significant decrease in the level of safety otherwise provided by the design.

Therefore, the consideration of 10 CFR 52.63(b)(1) supports the granting of this request for exemption. Accordingly, an exemption from DCD Tier 1 information, as described above, is requested.

Exemption Subject: Maximum Non-Coincident Wet Bulb Temperature

1. Description

Pursuant to 10 CFR 52.7 and Section VIII.A.4 of the Design Certification Rule, an exemption is requested from DCD Tier 1 information and the requirements of 10 CFR 52.79(d)(1), which require the final safety analysis report to demonstrate that the site characteristics fall within the site parameters specified in the Design Certification Rule. As discussed under departure DEP 2.0(1) in Section 1, the Unit 3 site characteristic for 0 percent annual exceedance maximum wet bulb non-coincident temperature is established to be 88°F and is not bounded by the DCD Tier 1, Table 2.1-1 value of 86°F for this site parameter. Therefore, this Unit 3 site characteristic does not fall within the associated DCD Tier 1 site parameter and a request for exemption from the 10 CFR 52.79(d)(1) requirements and information in DCD Tier 1, Table 2.1-1 is required.

2. Discussion

As discussed under departure DEP 2.0(1) in Section 1, the 0 percent exceedance maximum wet bulb non-coincident temperature is not used as design input and is therefore not relevant to safety analyses. As such, the granting of this exemption will not result in a significant decrease in the level of safety otherwise provided by the design.

3. Conclusion

This exemption from DCD Tier 1 information and from the requirements of 10 CFR 52.79(d)(1) is requested in accordance with the provisions of the Design Certification Rule, Section VIII.A.4.

1. This request is authorized by law based on compliance with the provisions of the Design Certification Rule, Section VIII.A.4. The granting of this exemption will not present an undue risk to the public health and safety. The request is consistent with the common defense and security.

2. Special circumstances are present as specified in 10 CFR 50.12(a)(2). Specifically, special circumstance (ii) is present, because the application of 10 CFR 52.79(d)(1) and the subject site parameter in DCD Tier 1 is not necessary in this case to achieve the underlying purpose of the rule in that the subject site parameter is not relevant to safety analyses.

3. 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 DCD Tier 1 information is required due to a site-specific condition, that is, a Unit 3 site characteristic. And further, the associated DCD Tier 1 site parameter (0 percent exceedance maximum non-coincident wet bulb temperature) is not used as design input and is not relevant

to safety analyses. This departure represents neither an effective reduction in standardization nor a significant decrease in the level of safety. Therefore, the consideration of 10 CFR 52.63(b)(1) supports the granting of this request for exemption.

Accordingly, an exemption from 10 CFR 52.79(d)(1) and DCD Tier 1 information, as described above, is requested.

Exemption Subject: Power Source Fuel Storage Vault Elevation

1. Description

Pursuant to 10 CFR 52.7 and Section VIII.A.4 of the Design Certification Rule, an exemption is requested from DCD Tier 1 information. DCD Tier 1, Section 2.2.1.5 states that the power source fuel storage vaults (PSFSVs) are underground structures. However, as discussed under departure DEP 9.5(1) in Section 1, the Unit 3 PSFSVs are partially underground due to site-specific considerations of buoyancy impacts on seismic structural stability. As a result, a request for exemption from DCD Tier 1 information in Section 2.2.1.5 is required.

In addition, pursuant to 10 CFR 52.7 and Section VIII.C.4 of the Design Certification Rule, an exemption is requested from the requirements of the DCD Generic Technical Specifications (GTS) Bases Section B3.8.3, “Class 1E Gas Turbine Fuel Oil, Lube Oil, and Starting Air.” The Section B3.8.3 Background, second paragraph, includes the following sentence: “All outside tanks, pumps, and piping are located underground.” These “outside tanks” include the outside fuel oil storage tanks which are located inside the PSFSVs. The change requested by this exemption is to delete this sentence.

2. Discussion

As discussed under departure DEP 9.5(1) in Section 1, the intended function of the PSFSVs will not be impacted by this departure. The Seismic Category I classification of these structures is not affected by the change in elevation. In addition, other appropriate design requirements applicable to the PSFSVs and to the associated SSCs housed therein were considered in the evaluation of departure DEP 9.5(1) summarized in Section 1. With regard to the requested exemption from the GTS Bases, TS 3.8.3 Limiting Conditions for Operation (LCOs) specifies requirements for gas turbine generator (GTG) fuel oil such as volume and oil quality. TS 3.8.3 Surveillance Requirements (SR) specifies requirements to verify GTG fuel oil volume and oil quality at specified frequencies. Changing the design of the PSFSVs, which house the fuel oil storage tanks, from underground to partially underground does not affect the Bases for the TS 3.8.3 LCO requirements or Surveillance Requirements. The relevant sentence in GTS B3.8.3 is providing only background information. Therefore, the sentence is being deleted. As such, the granting of this exemption will not result in a significant decrease in the level of safety otherwise provided by the design.

3. Conclusion

This exemption from DCD Tier 1 information and GTS Bases is requested in accordance with the provisions of the Design Certification Rule, Sections VIII.A.4 and VIII.C.4, respectively.

1. This request is authorized by law based on compliance with the provisions of the Design Certification Rule, Sections VIII.A.4 and VIII.C.4. The granting of this exemption will not present an undue risk to the public health and safety. The request is consistent with the common defense and security.

2. Special circumstances are present as specified in 10 CFR 50.12(a)(2). Specifically, special circumstance (ii) is present. The required increased elevation of these structures is a result of site-specific considerations, namely Unit 3 site groundwater levels. In addition, the intended function of the PSFSVs will not be affected by this departure. Therefore, these structures need not be fully underground to achieve the underlying purpose of the rule.

3. As required by 10 CFR .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 DCD Tier 1 information and GTS Bases is the result of a site-specific consideration, namely Unit 3 site groundwater levels and a resulting analysis related to buoyancy impacts on the seismic structural stability of the PSFSVs. Therefore, full standardization in this instance is not practical. In that the intended function of the PSFSVs will not be affected by this departure, there is no significant decrease in the level of safety otherwise provided by the design.

Therefore, the consideration of 10 CFR 52.63(b)(1) supports the granting of this request for exemption.

Accordingly, an exemption from DCD Tier 1 information and GTS Bases, as described above, is requested.

Exemption Subject: Boron Recycle System Removal

1. Description

Pursuant to 10 CFR 52.7 and Section VIII.A.4 of the Design Certification Rule, an exemption is requested from DCD Tier 1 information. As discussed under departure DEP 9.2(1) in Section 1, the boron recycle system (BRS) is replaced in the Unit 3 design with a degasifier subsystem. To support this change, DCD Tier 1, Section 2.4.6.1 and Figure 2.4.6-1 require revision to replace references to the BRS with terminology appropriate to the degasifier subsystem, as follows:

1. DCD Tier 1, Section 2.4.6.1, first paragraph, second sentence, change “boron recycle system (BRS)” to “degasifier subsystem.”

1. DCD Figure 2.4.6-1, Sheet 2 of 2, change content in pointer downstream of valve LCV-121A from “CVS Boron Recycle System” to “CVS Holdup Tanks.”

In accordance with the Design Certification Rule, Section VIII.A.4, these changes to DCD Tier 1 content require an exemption from the standard plant design description.

2. Discussion

As discussed under departure DEP 9.2(1) in Section 1, systems and components related to BRS, as affected by this departure, are non-seismic and have no safety function. As such, the granting of this exemption will not result in a significant decrease in the level of safety otherwise provided by the design.

3. Conclusion

This exemption from DCD Tier 1 information is requested in accordance with the provisions of the Design Certification Rule, Section VIII.A.4.

1. This request is authorized by law based on compliance with the provisions of the Design Certification Rule, Section VIII.A.4. The granting of this exemption will not present an undue risk to the public health and safety. The request is consistent with the common defense and security.

2. Special circumstances are present as specified in 10 CFR 50.12(a)(2). Specifically, special circumstance (ii) is present. The decision regarding the use of a boron recycle system or an alternative system, such as a degasifier, to support gaseous and liquid waste management systems is an owner preference and the BRS-related systems and components are non-seismic and have no safety function. Therefore, the use of the BRS in this case is not necessary to achieve the underlying purpose of the rule.

3. 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 DCD Tier 1 information is the result of the applicant’s operational preference in replacing the standard plant’s BRS with a degasifier for waste processing. In that the BRS has no safety function, it effectively has a diminished value in terms of standardization. As such, the replacement of the nonsafety-related BRS represents neither a significant decrease in safety nor an effective reduction in standardization. Therefore, the consideration of 10 CFR 52.63(b)(1) supports the granting of this request for exemption.

Accordingly, an exemption from DCD Tier 1 information, as described above, is requested.

Exemption Subject: Change to Generic Technical Specifications Regarding a Setpoint Control Program

1. Description

Pursuant to 10 CFR 52.7 and Section VIII.C.4 of the design certification rule, an exemption is requested from the requirements of the US-APWR Design Control Document (DCD), Generic Technical Specifications (GTS). GTS contain tables and surveillance requirements where allowable values and setpoints for various instruments are to be filled in by the COL applicant. These GTS include the following:

- Table 3.3.1-1
- Table 3.3.2-1
- Table 3.3.6-1
- Surveillance requirement 3.3.5.3

The change under this exemption request removes the columns (including the bracketed COL item locations) for allowable values and setpoints in Tables 3.3.1-1, 3.3.2-1, and 3.3.6-1 and the bracketed locations for allowable values and setpoints in surveillance requirement 3.3.5.3. A setpoint control program description is added to Unit 3 Technical Specification 5.5.21 (i.e., COLA Part 4). Setpoints and allowable values will be determined in accordance with an NRC-approved instrument setpoint methodology as described in new Technical Specification 5.5.21. Corresponding changes were also made to the applicable Bases sections. Technical Specification 5.5.21 will maintain brackets around the methodology document title, revision, and date until the document is approved by the NRC.

2. Discussion

This change is being made so that the plant-specific Technical Specifications will meet NRC Interim Staff Guidance Document DC/COL-ISG-8, “Necessary Content of Plant-Specific Technical Specifications When a Combined License Is Issued.” This ISG specifies that COL applicants may resolve open COL items requiring allowable values and setpoints in Technical Specifications by using one of three options:

1. Provide a plant-specific value
2. Provide a value that bounds the plant-specific value, but by which the plant may be safely operated (i.e., a usable bounding value).
3. Establish a plant Technical Specification Section 5.5 or 5.6 administrative controls program or report.

In response to an NRC request for additional information (RAI), MHI submitted a DCD change to remove the above-referenced COL items for allowable values and setpoints and instead establish a

setpoint control program in accordance with Option 3 of ISG-8 (MHI letter UAP-HF-09493, dated October 30, 2009). However, this change was not included in Revision 2 of the DCD.

Therefore, in order to satisfy ISG-8, the Unit 3 COLA adopted the Technical Specification changes proposed by MHI for the DCD in response to the RAI. Because these changes were not included in Revision 2 of the DCD, they require an exemption in accordance with 10 CFR 52.7 and Section VIII.C.4 of the design certification rule.

This change does not present an undue risk to the public because the change follows NRC guidance in ISG-8, Option 3. As discussed above, this option permits the use of an NRC-reviewed and -approved methodology for determining the plant-specific allowable values and setpoints. Technical Specification 5.5.21 describes the setpoint control program that meets 10 CFR 50.36(c)(1)(ii)(A) requirements.

Once approved by the NRC, this program will be used to determine the appropriate setpoints and allowable values for the instruments listed in Technical Specification Tables 3.3.1-1, 3.3.2-1, and 3.3.6-1, and surveillance requirement 3.3.5.3. The US-APWR setpoint methodology was submitted to the NRC for review under MHI letter UAP-HF-09493, dated October 30, 2009. This methodology will be referenced in Technical Specification 5.5.21 once it is approved by the NRC.

Once the DCD is updated to include the changes proposed in response to the aforementioned RAI, and the Unit 3 COLA references the revised DCD, this request for exemption will be withdrawn.

3. Conclusion

This exemption from the GTS is requested in accordance with the provisions of the Design Certification Rule, Section VIII.C.4.

1. This request is authorized by law based on compliance with the provisions of the Design Certification Rule, Section VIII.C.4. As discussed above, the granting of this exemption will not present an undue risk to the public health and safety. The request is consistent with the common defense and security.

2. Special circumstances are present as specified in 10 CFR 50.12(a)(2). Specifically, special circumstance (ii) is present in that the specification of specific instrumentation setpoint information vs. the implementation of a setpoint control program is not necessary to achieve the underlying purpose of the rule.

3. 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. Given the DCD is expected to be updated to include the subject setpoint control program (as a result of the above-mentioned MHI submittal), the net effect of this exemption allowing the requested

changes to Unit 3 Technical Specifications has the long term effect of promoting standardization. Therefore, the consideration of 10 CFR 52.63(b)(1) supports the granting of this request for exemption.

Accordingly, an exemption from the GTS, as described above, is requested.

3 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 Dispersion Estimates (X/Q and D/Q)
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 2.4-1 - 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 2.5-1 - Stability of Slopes
NAPS ESP VAR 2.5-2 - [Deleted]

NAPS ESP VAR 11.2-1 - Annual Liquid Effluent Releases[1]
NAPS ESP VAR 11.3-1 - Gaseous Pathway Doses[1]
NAPS ESP VAR 11.3-2 - Existing Units' Doses[1]
NAPS ESP VAR 12.2-2 - [Deleted]

Variance: NAPS ESP VAR 2.0-1 – Long-Term Dispersion Estimates (χ/Q and D/Q)

Request

This is a request to use the Unit 3 maximum long-term dispersion estimates (χ/Q and D/Q values) provided in FSAR Table 2.3-16R for types of locations other than the EAB rather than the corresponding ESP values in FSER Supplement 1, Appendix A and in SSAR Table 2.3-16. The Unit 3 values do not fall within (are larger than) the ESP and SSAR values.

This variance results from a review of the Radiological Environmental Monitoring Program (FSAR Reference 2.3-201) and a subsequent field survey. The field survey determined that since the time of the SSAR, distances to several of the "closest receptors" had changed. FSAR Table 2.3-15R shows the closest of all receptors to be a residence in the Northwest direction. The χ/Q and D/Q evaluation, and the subsequent normal gaseous effluent dose evaluation, conservatively assumed that each receptor (meat animal, vegetable garden, residence) is at the distance of that closest receptor and in the true East-Southeast direction, which is the direction with the maximum annual average χ/Q value at that distance.

Justification

This variance is acceptable because all estimated annual doses from normal gaseous effluent releases remain within applicable limits as shown in FSAR Table 11.3-201.

Because of the change in Unit 3 maximum long-term dispersion estimates, some of the gaseous effluent doses are higher than the corresponding ESP value. See related variance NAPS ESP VAR 11.3-1, 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.

1. Variances NAPS ESP VAR 11.3-1, 11.2-1 and 11.3-2 were previously numbered NAPS ESP VAR 12.2-1, 12.2-3 and 12.2-4, respectively. The renumbering and update to these requests for variance reflect the organization and content of the US-APWR DCD.

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 resulting from a postulated accidental release of liquid effluents in the groundwater pathways. The calculated radionuclide concentrations 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 elevation at the Unit 3 site incorporated the hydraulic conductivity values measured for the Unit 3 subsurface investigation. FSAR Figure 2.4-216 contains a table showing the maximum groundwater levels at selected points in the power block area. The maximum groundwater elevation in the power block area near the UHSRS is predicted to be 5.6 ft below the Unit 3 design plant grade. As shown in FSAR Table 2.0-201, this Unit 3 site characteristic value for maximum groundwater elevation falls within the DCD site parameter value in DCD Table 2.0-1.

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 m per 100 m (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 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 horizontal and vertical ground motion response spectra (GMRS) for Unit 3 defined at the hard rock horizon (with a shear wave velocity of 9200 ft/sec or greater) rather than at the top of competent rock (Zone III-IV) as in the ESP and SSAR. FSAR Section 2.5.4 discusses the variability of subsurface materials and corresponding shear-wave velocities across the Unit 3 site, warranting the re-defining of the GMRS at the hard rock horizon, consistent with the SRP 2.5.2. The Unit 3 SSE values at the hard rock horizon fall within (are the same as) the ESP and SSAR values at the hard rock horizon. However, the change in definition for the control point for defining the GMRS is a variance from the ESP Figure 2 and SSAR Figure 2.5-48A.

The variance to change the control point results from the need to use the engineering properties of the subsurface materials above the hard rock horizon to develop the foundation input response spectra (FIRS), as described in FSAR Section 3.7, consistent with the GMRS. As it is now not needed to define the GMRS in FSAR Section 2.5.2, information provided in SSAR Section 2.5.2.5, related to seismic analysis of subsurface materials above the hard rock horizon, is moved from SSAR Section 2.5.2 to FSAR Section 3.7.

The Unit 3 site-specific horizontal and vertical GMRS at the hard rock horizon at a depth of about 145 feet from finished grade, as described in FSAR Section 2.5.4.7.1.a, are plotted in FSAR Figure 2.5-201. The corresponding ESP spectra are provided in SSAR Figure 2.5-48. The

Unit 3 FSAR and ESP/SSAR response spectra are the same, except that the Unit 3 figure provides 38 frequencies while the ESP figure provides 21 frequencies.

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 which records free-field ground motions at grade.

Justification

The variance in the GMRS control point location is justified given the additional subsurface information obtained after the SSAR was prepared, as well as the identification and specification of the various Seismic Category I structures above and below the depth of the top of Zone III-IV, a horizon of competent material considered in the SSAR. FSAR Section 2.5.4 discusses notable variability across the Unit 3 site of the shear-wave velocities above and below the top of Zone III-IV - e.g., see FSAR Figure 2.5-237. Redefining the GMRS horizon at the hard rock horizon below all Seismic Category I structure foundations not only facilitates consistent definition of input reference ground motions for development of the FIRS in FSAR Section 3.7, but is also consistent with the SRP 2.5.2 that specifies that the GMRS be defined on an outcrop or a hypothetical outcrop that will exist after excavation.

The variance in GMRS control point location is acceptable because the US-APWR certified seismic design response spectra (CSDRS) cannot be used for analysis of the seismic design of Unit 3 Seismic Category I structures at higher frequencies. The seismic response at the Unit 3 site has high-frequency exceedances of the CSDRS. Due to the spatial variation of the input ground motion, FSAR Section 3.7 provides the results of site-specific soil-structure interaction (SSI) analyses which consider the incoherence of the input control motion. The site-specific SSI analyses use the site-specific FIRS which are based on site-specific soil properties as input. The suitability of the US-APWR standard plant Seismic Category I structures for use at the Unit 3 site is confirmed by the validation analyses which compare the standard plant designs to the site-specific seismic loadings. The SSI analyses also demonstrate the seismic design adequacy of the site-specific Seismic Category I structures. See FSAR Section 3.7.2 for the results of the site-specific SSI analyses.

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

The specification of OBE in SSAR Section 2.5.2.7 is moved to FSAR Section 3.7 because neither the 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 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 subsurface pathways. The SSAR K_d values were assigned using literature values. Most of the Unit 3 K_d values were obtained by laboratory testing as provided in FSAR Table 2.4-207. The K_d values for Zr-95 and it progeny (Nb-95m and Nb-95) were conservatively assigned the tenth percentile of the Zr-95 distribution based on data published in NUREG/CR-6697 (FSAR Reference 2.4-215).

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 and conservative literature K_d values, where site-specific data is not available, to evaluate radionuclide concentrations as a result of a postulated accidental 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 US-APWR. The DCD Chapter 15 source terms replace the DBA source terms in ESP-003, Appendix B, and in SSAR Chapter 15. The DCD Chapter 15 doses replace the 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. However, because the US-APWR was not addressed in the SSAR, the accident analyses evaluated in SSAR Chapter 15 did not include source terms for potential accidents for this type of pressurized water reactor (PWR).

A comparison of DBA source terms evaluated for the US-APWR in DCD Chapter 15 shows that they are not bounded by the ESP-003 DBA 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 US-APWR 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 US-APWR was selected for Unit 3, and the arrangement of a single US-APWR 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 US-APWR 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 2.4-1 – 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 0.037 m/day (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 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

This variance in the observation well information is acceptable because the new corrected information continues to identify that there are observation wells installed for the 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. 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, which also incorporates a higher pool elevation for the Waste Heat Treatment Facility (WHTF). The changes did not significantly affect the previous evaluation of groundwater flow in the power block area. The revised post-construction piezometric head contour map (FSAR Figure 2.4-216) indicates that maximum groundwater level elevations in the power block area range from about 270.0 to 284.4 ft NAVD88 (270.86 to 285.26 ft NGVD29) compared to a range of 271 to 283 ft NAVD88 (271.86 to 283.86 ft NGVD29) previously reported in the FSAR. The changes in observed groundwater levels for well No. WP-3 would not affect 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 250.25 ft NGVD29 in the FSAR rather than the corresponding ESP Application SSAR value of 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 2.5-1 – 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 11.2-1 – Annual Liquid Effluent Releases

Request

This is a request to use the Unit 3 expected annual liquid release values provided in FSAR Table 11.2-10R rather than the corresponding ESP value in EIS Appendix I and ESP-ER Table 5.4-6. 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 11.2-10R.

This variance results because the US-APWR was not among the designs considered in the ESP-ER. 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. ESP-ER Table 5.4-6 also contained more radionuclides than FSAR Table 11.2-10R, 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 11.2-12R.

The estimated annual doses from Unit 3 to the MEI from liquid effluents are compared with the applicable limits in FSAR Table 11.2-15R. The Unit 3 doses meet the 10 CFR Part 50, Appendix I, limits, and the total Unit 3 dose estimates are lower than the corresponding ESP values, as indicated in FSAR Table 11.2-201.

Variance: NAPS ESP VAR 11.3-1 – 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 11.3-201 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 11.3-201.

This variance is due to a change in maximum long-term dispersion estimates from those used in the ESP Application as discussed above under NAPS ESP VAR 2.0-1. Also, the US-APWR was not among the designs used to develop composite source terms in the ESP Application.

Justification

This variance is acceptable because estimated annual doses from normal gaseous effluent releases remain within applicable limits. FSAR Table 11.3-201 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. The Unit 3 values that exceed the corresponding ESP value are shown in bold font in FSAR Table 11.3-201.

Although some 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 11.3-9R. As shown, the Unit 3 annual total body dose meets the 10 CFR 50, Appendix I, limit. Table 11.3-201 also shows that total body, thyroid, and skin doses to the MEI from all pathways are within the corresponding ESP values.

Variance: NAPS ESP VAR 11.3-2 - Existing Units' Doses

Request

This is a request to use updated information for doses for the existing units in FSAR Table 11.3-202 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 11.3-202, 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 11.3-202.

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 caused the FSAR values to exceed those in the ESP Application.

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 11.3-202, 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 12.2-2 – [Deleted]

References

1. Early Site Permit (ESP) for the North Anna ESP Site, ESP-003, U.S. Nuclear Regulatory Commission, November 2007.
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.