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North Anna 3 Combined License Application

Part 7: Departures Report

(Includes Information on Departures, Variances, Exemptions and Supplemental Information)

Revision 5

July 2013

REVISION SUMMARY

Revision 5

Section	Changes
All	Technology change from US-APWR to ESBWR

Revision 2

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

Revision 1

Section	Changes
Departures	RAI 09.05.01-17, Fire Water Supply Locations
Variances	Revised to reflect issuance of ESP-003.
	Updated to align with DCD R5.
	RAI 12.02-1, Update to Commitment to Final Version of NEI 07-03
	RAI 12.02-10, Clarification of FSAR Tables in Chapter 12
	RAI 15.06.05-1, Dose Evaluation Factors
Exemption Requests	Deleted 10 CFR 26 Exemption Request.
	Added exemption for eliminating the expected minimum accumulator pressure value in the Bases for SR 3.1.5.1.
	Added exemption to revise the Bases description for SR 3.7.2.3 to include an expanded discussion of the acceptance criteria for differential pressure across the Emergency Filter Unit (EFU). [

Contents

DEPARTURES

Introduction

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

The following departure is evaluated in this report:

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

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

Summary of Departure

The ESBWR DCD identifies that on-site storage space for a six-month volume of packaged waste is provided in the Radwaste Building. The North Anna Unit 3 Radwaste Building is configured to accommodate a minimum of ten years volume of packaged Class B and C waste, while maintaining space for at least three months of packaged Class A waste.

Scope/Extent of Departure

This departure affects Tier 2 information in the ESBWR DCD. This departure is identified in FSAR Sections 11.4.1 and 11.4.2.2.4.

Departure Justification

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

Class A, B, and C low-level radioactive waste is normally promptly disposed of at licensed offsite processing and disposal facilities. In the event that an offsite facility is not available to accept Class B and C waste shipments, the North Anna Unit 3 Radwaste Building waste storage space has been configured to accommodate at least ten years of Class B and C waste generated during plant operation. Shielding analysis results show that the dose rates in surrounding areas, both within the building and externally, are maintained below the allowable limits in accordance with the radiological area classification in FSAR Section 12.3.1.3. Long-term, temporary storage of Class B and C waste HICs, with design lifetimes of 300 years, will not have an adverse effect on the

integrity of the waste containers. Periodic inspections will be performed to confirm container integrity during storage.

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

Departure Evaluation

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

1. Result in more than a minimal increase in the frequency of occurrence of an accident previously evaluated in the plant-specific DCD;
2. Result in more than a minimal increase in the likelihood of occurrence of a malfunction of a structure, system, or component (SSC) important to safety previously evaluated in the plant-specific DCD;
3. Result in more than a minimal increase in the consequences of an accident previously evaluated in the plant-specific DCD;
4. Result in more than a minimal increase in the consequences of a malfunction of a SSC important to safety previously evaluated in the plant-specific DCD;
5. Create a possibility for an accident of a different type than any evaluated previously in the plant-specific DCD;
6. Create a possibility for a malfunction of an SSC important to safety with a different result than any evaluated previously in the plant-specific DCD;
7. Result in a design basis limit for a fission product barrier as described in the plant-specific DCD being exceeded or altered; or
8. Result in a departure from a method of evaluation described in the plant-specific DCD used in establishing the design bases or in the safety analyses.

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

Therefore, this departure has no safety significance.

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 2.5-1 - Stability of Slopes
NAPS ESP VAR 2.5-2 - Engineered Fill
NAPS ESP VAR 12.2-1 - Gaseous Pathway Doses
NAPS ESP VAR 12.2-2 - [Deleted]
NAPS ESP VAR 12.2-3 - Annual Liquid Effluent Releases
NAPS ESP VAR 12.2-4 - Existing Units' and Site Total Doses

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). The review 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 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 12.2-201.

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 12.2-1, which is addressed below.

Variance: NAPS ESP VAR 2.0-2 – Hydraulic Conductivity

Request

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

The ESP value of 1.04 m/day (3.4 ft/day) represents the upper limit of the values obtained by in situ hydraulic conductivity testing of observation wells installed for the ESP subsurface investigation. These values varied from 0.076 to 1.04 m/day (0.25 to 3.4 ft/day) as shown in SSAR Table 2.4-16. The corresponding maximum hydraulic conductivity value reported in FSAR Section 2.4.12.1.2 is 3.0 m/day (9.9 ft/day) based on an expanded range from 0.076 to 3.0 m/day (0.25 to 9.9 ft/day). This data set includes in situ hydraulic conductivity test results for the observation wells installed for the ESP subsurface investigation plus additional observation wells installed for the Unit 3 subsurface investigation. Unit 3 values provided in FSAR Section 2.4.12.1.2 associated with

hydraulic conductivity that do not fall within (are larger than) the ESP/SSAR values are as follows:

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

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

Justification

The variance in hydraulic conductivity values is acceptable because:

1. Compliance with 10 CFR 20 is demonstrated in FSAR Section 2.4.13 with the use of a hydraulic conductivity value of 1.04 m/day (3.4 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 1.04 m/day (3.4 ft/day) is greater than 87.5 percent of the data included in FSAR Table 2.4-16R, in addition to other conservative assumptions used in the evaluation. The field test data that established the Unit 3 values includes only two measurements that exceed the ESP maximum hydraulic conductivity value of 1.04 m/day (3.4 ft/day). These two measured values are not relevant to the evaluation of the postulated accidental release of liquid effluent from the radwaste building to the groundwater pathways because they were observed at well locations that are not in the pathway from the radwaste building to the lake.

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. The maximum groundwater elevation is predicted to be 2.13 m (7 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. The ESBWR design assumes a maximum groundwater level no higher than 0.61 m (2 ft) below the design plant grade elevation at a site and the Unit 3 site characteristic value of 2.13 m (7 ft) below the Unit 3 design plant grade meets this requirement.

Variance: NAPS ESP VAR 2.0-3 – Hydraulic Gradient

Request

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

SSAR Section 2.4.12.1.2 states that there is a hydraulic gradient toward Lake Anna of about 3 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 4 m per 100 m (4 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 4 m per 100 m (4 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 Unit 3 horizontal and vertical spectral acceleration (g) values for the site-specific safe shutdown earthquake (SSE) at the top of competent rock (Zone III-IV) rather than the corresponding ESP spectra. The Unit 3 values do not fall within (are slightly larger than) the ESP and SSAR values at frequencies less than 3 Hz for the horizontal spectrum, and less than 4 Hz for the vertical spectrum, although by only 1.05 percent and 1.4 percent or less, respectively.

The Unit 3 site-specific SSE horizontal and vertical spectra at the top of competent material (Zone III-IV) at elevation 83.2 m (273 ft) are plotted in FSAR Figure 2.5-205. The corresponding ESP spectra at elevation 76.2 m (250 ft) are provided in FSER Supplement 1, Appendix A, Figure 2, and in SSAR Figure 2.5-48A. FSAR Figure 2.0-206 compares the Unit 3 and ESP horizontal response spectra. FSAR Figure 2.0-207 compares the Unit 3 and ESP vertical response spectra. While the ESP values exceed or essentially match the Unit 3 values, at frequencies less than 3 or 4 Hz, FSAR Table 2.0-202 and FSAR Table 2.0-203 show that the Unit 3 values exceed the corresponding ESP values by a small amount.

This variance in spectral acceleration (g) values results from the use of the additional data from the Unit 3 subsurface investigation. The data showed that the top of competent rock under Unit 3 Seismic Category I structures is higher than assumed for the ESP. Also, the data provided the seismic wave transmission characteristics of the materials specifically under the Unit 3 Seismic Category I structures.

Justification

The variance in spectral acceleration (g) values is acceptable because the ESBWR certified seismic design response spectra (CSDRS) is used for design of Unit 3 Seismic Category I structures, and not the Unit 3 site-specific SSE spectra at the top of competent material. FSAR Table 2.0-201 demonstrates Unit 3 foundation input response spectra (FIRS) for Unit 3 Seismic Category I structures fall within the ESBWR CSDRS. See "SSE Horizontal Ground Response Spectra" and "SSE Vertical Ground Response Spectra" under Seismology in Part 1 of that table.

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 2.4-209 (10% K_d) rather than the corresponding values in SSAR Table 1.9-1 and SSAR Table 2.4-20. The Unit 3 values do not fall within (are smaller than) the SSAR values and therefore would predict higher doses than the K_d values in the SSAR.

This variance in K_d values results from a more conservative approach to selecting Unit 3 values for estimating the radionuclide migration to surface waters via subsurface pathways. Both the SSAR and the Unit 3 K_d values were assigned using literature values. However, the Unit 3 K_d values were selected assuming the literature data to be log-normally distributed and then selecting the 10th percentile of the distribution to conservatively assign a low value for the radionuclide transport analysis. NUREG/CR-6697 (FSAR Reference 2.4-215), Attachment C, Table 3.9-1, was used to assign the mean and standard deviation for each of the distributions.

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 lower K_d values to evaluate radionuclide concentrations as a result of a postulated accidental release of liquid effluents in the groundwater pathways. Also, samples from the Unit 3 site were analyzed and the measured K_d values are presented in FSAR Table 2.4-208. The measured results show that the Unit 3 site characteristic values are conservative.

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

Request

This is a request to use the Unit 3 source terms and resulting doses from DCD Chapter 15 analyses of design basis accidents (DBAs). DCD Chapter 15 provides the required analyses of design basis accidents for the ESBWR. The DCD Chapter 15 source terms replace the ESBWR accident source

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terms in ESP-003, Appendix B, and in SSAR Chapter 15. The DCD Chapter 15 doses replace the ESBWR DBA doses in SSAR Chapter 15.

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

A comparison of DBA source terms evaluated for the ESBWR in DCD Chapter 15 shows that they are not bounded by the ESP-003 source terms in all cases. Some Unit 3 values do not fall within (are larger than) the ESP and SSAR values. Also, some Unit 3 doses from DBAs do not fall within (are larger than) the SSAR values.

Justification

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

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

Request - Coordinates

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

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

Coordinates (State NAD 83 South Zone) are incorrect as shown. A variance from ESP, Appendix A, Figure 1, Note 1 is requested to correct these values.

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

Justification

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

Request - Abandoned Mat Foundations

This is a request to not remove the abandoned mat foundations for the originally planned North Anna Units 3 and 4 unless a Unit 3 Seismic Category I or II structure would be located above an abandoned foundation. ESP Appendix A, *Characteristics of the Dominion Nuclear North Anna, LLC ESP Site*, contains Figure 1 (Figure 2.4.14-1), *The Proposed Facility Boundary for the ESP Site*. Note 2 on Figure 1 states: “Abandoned Unit 3 and 4 Reactor Building Mat Foundations are to be removed.” This corresponds to Note 2 on ESP SSAR, Figure 1.2-4. The requirement to remove the foundations was established to address the possibility that a Seismic Category I or II structure might be situated above a foundation.

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

Justification

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

Variance: NAPS ESP VAR 2.4-1 – 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 0.085 m/day (0.28 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 2.5-1 – 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 - Engineered Fill

Request

This is a request to allow use of Zone IIB saprolite as structural fill for Seismic Category I and II structures, which includes all safety-related structures.

This variance is a result of the broad wording of ESP Condition 3.E(5) which states:

> The permit holder and an applicant for a CP or COL referencing this ESP shall not use an engineered fill with high compressibility and low maximum density, such as saprolite.

As written, this condition implies that all saprolites consist of material with high compressibility and low maximum density; and that there is no type of saprolite which can be used for support of Unit 3 structures. However, saprolite has a wide range of physical properties and Zone IIB saprolite materials are acceptable as structural (engineered) fill for support of Unit 3 structures including Seismic Category I and II structures.

Justification

SSAR Section 2.5.1.2.6 describes the Zone IIA saprolite under the Service Water Reservoir (SWR) pump house for the existing units as mainly sandy silt, with frequent layers of micaceous sandy silt. The micaceous nature of this Zone IIA material was noted as making such material unacceptable for use as engineered fill. NUREG-1835 Section 2.5.1.3.2 agreed, but was not specific to identify the Zone IIA saprolite as the type of saprolite with high compressibility and low maximum density unacceptable for use as engineered fill under safety-related structures.

This conclusion is evident in NUREG-1835 (Reference 5), Section 2.5.4.3.7 which allows consideration of saprolite as engineered fill under safety-related structures. This section states that "it is appropriate to consider the construction of safety-related structures on improved Zone IIA, and Zone IIB, and Zone III materials." Zone IIA and IIB materials are saprolite and, as this quote shows, saprolite can be considered for support of safety-related Unit 3 structures.

Therefore, a variance from ESP Condition 3.E(5) is requested to allow use of Zone IIB saprolite as structural fill for Seismic Category I and II structures. This interprets the Permit Condition as prohibiting only Zone IIA saprolite from use in support of Seismic Category I and II structures.

This variance is acceptable because it clarifies the intent of Permit Condition 3.E(5). This Condition reflects the experience gained from the settlement of SWR pump house and prevents use of material with high compressibility and low maximum density as structural fill for safety-related structures. For the Unit 3 site, Zone IIA saprolite is the material that needs to be prohibited from use as structural fill for such structures. Zone IIB saprolite that meets the requirements for structural fill in FSAR Section 2.5.4.5.3 is acceptable for use in supporting Unit 3 structures including Seismic Category I or II structures. Crushed rock is expected to be the majority of the structural fill supporting Unit 3 Seismic Category I or II structures.

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

Request

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

This variance is due 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.

Justification

This variance is acceptable because estimated annual doses from normal gaseous effluent releases remain within applicable limits. FSAR Table 12.2-18bR shows the annual gaseous pathway doses to the maximally exposed individual (MEI) for Unit 3 and compares each to the corresponding estimate from the ESP-ER Table 5.4-9. Not all doses increased for the three locations with higher long term dispersion estimates because the normal release source term is lower for Unit 3 than the composite source term used to bound the multiple reactor types considered in the ESP Application. The effect of these changes is slight increases in some Unit 3 total body and thyroid doses when compared to the earlier estimates for the ESP. The Unit 3 values that exceed the corresponding ESP value are shown in bold font in FSAR Table 12.2-18bR.

Although 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 12.2-201. As shown, the Unit 3 annual total body dose meets the 10 CFR 50, Appendix I, limit. This table also shows that the Unit 3 total body dose estimate is lower than the corresponding ESP value.

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

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

Request

This is a request to use the Unit 3 maximum annual liquid release values provided in FSAR Table 12.2-19bR rather than the corresponding ESP 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 12.2-19bR.

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

Justification

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

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

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

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

Request

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

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

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

Justification

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

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.

EXEMPTION REQUESTS

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

Table 3-1 identifies the exemptions requested by Dominion and provides the information specified by NRC regulations.

Table 3-1 Exemption Requests

FSAR Section	Exemption	Discussion
N/A	Pursuant to 10 CFR 52.7, 52.93 and **Appendix [xxx, Section yyy]**, Dominion requests an exemption from the requirements of 10 CFR Part 52, **Appendix [xxx Section zzz]** to eliminate or change information provided in the Generic Technical Specifications.	Dominion is revising the Bases description for SR 3.1.5.1 for accumulator pressure to eliminate the discussion of the specific expected pressure (normal operating pressure) of the accumulator and replacing it with the additional discussion of the design details of the minimum accumulator pressure. The removal of this level of detail, in this case a discussion of the normal expected pressures for the accumulator, from the TS Bases is acceptable because this type of information is not necessary to be included in the Technical Specifications to provide adequate protections of public health and safety. This value is just for information and does not provide a limit or technical basis for operation. Expected values or ranges of TS parameters are not used in system/component design or accident analysis. This level of detail is not necessary to achieve the underlying purpose of the rule/requirement (establish the bases for the TS surveillance). These generic TS Bases changes are authorized by law and will not present an undue risk to the public health and safety, and are consistent with the common defense and security.
N/A	Pursuant to 10 CFR 52.7, 52.93 and **Appendix [xxx, Section yyy]**, Dominion requests and exemption from the requirements of 10 CFR Part 52, **Appendix [xxx Section zzz]** to eliminate or change information provided in the Generic Technical Specifications.	Dominion is revising the Bases description for SR 3.7.2.3 to include an expanded discussion of the acceptance criteria for the differential pressure across the Emergency Filter Unit (EFU). The inclusion of this level of detail, in this case a discussion of the basis of the acceptance criteria for the differential pressure across the EFU, into the TS Bases is acceptable because this type of expanded basis information does not effect or change the requirements of the surveillance. Although unnecessary to be included in the Technical Specifications to provide adequate protections of public health and safety, this additional text is being included to further describe the basis for the acceptance criteria. This expanded level of detail does not affect the underlying purpose of the rule/requirement (establish the bases for the TS surveillance). These generic TS Bases changes are authorized by law and will not present an undue risk to the public health and safety, and are consistent with the common defense and security.

SUPPLEMENTS

Supplements (or supplemental information) is FSAR information that includes information not related to COL items, departures, variances, conceptual design, ESPA corrections, or permit conditions; or is information to demonstrate that the design of the facility falls within the site characteristics and design parameters specified in the DCD.

Supplemental information is provided throughout the FSAR primarily to conform with RG 1.206 guidance. In addition, supplemental information is added in FSAR Section 3.9 to address a DCD option, in FSAR Sections 3.10, 5.4, 6.5 and 15.3 to address SRP acceptance criteria, and in FSAR Chapter 17 to ensure completeness.