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**Dominion®**

July 14, 2008

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

Serial No. NA3-08-052R
Docket No. 52-017
COL/BCB

**DOMINION VIRGINIA POWER**
**NORTH ANNA UNIT 3 COMBINED LICENSE APPLICATION**
**RESPONSE TO REQUEST FOR ADDITIONAL INFORMATION LETTER NO. 005**

On June 4, 2008, the NRC requested additional information to support the review of certain portions of the North Anna Unit 3 Combined License Application (COLA). The responses to the following RAIs are provided in Enclosures 1 through 4:

- RAI Question 17.04-1 Reliability Assurance Program (RAP)
- RAI Question 17.06-1 Maintenance Rule
- RAI Question 19-1 PRA and Severe Accident Evaluation (Internal Flooding)
- RAI Question 19-2 PRA and Severe Accident Evaluation (Site-Specific)

This information will be incorporated into a future submission of the North Anna Unit 3 COLA, as described in the Enclosures.

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

Very truly yours,

Eugene S. Grecheck

D079
NRO

Enclosures:

1. Response to NRC RAI Letter No. 005, RAI Question No. 17.04-1
2. Response to NRC RAI Letter No. 005, RAI Question No. 17.06-1
3. Response to NRC RAI Letter No. 005, RAI Question No. 19-1
4. Response to NRC RAI Letter No. 005, RAI Question No. 19-2

Commitments made by this letter:

1. The information provided in the RAI responses will be incorporated into a future submission of the North Anna Unit 3 COLA, as described in the Enclosures.

COMMONWEALTH OF VIRGINIA

COUNTY OF HENRICO

The foregoing document was acknowledged before me, in and for the County and Commonwealth aforesaid, today by Eugene S. Grecheck, who is Vice President-Nuclear Development of Virginia Electric and Power Company (Dominion Virginia Power). He has affirmed before me that he is duly authorized to execute and file the foregoing document on behalf of the Company, and that the statements in the document are true to the best of his knowledge and belief.

Acknowledged before me this 14th day of July, 2008
My registration number is 7173057 and my
Commission expires: August 31, 2012

Notary Public

Wanda E. Marshall
Notary Public
Commonwealth of Virginia
7173057
My Commission Expires Aug 31, 2012

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

**ENCLOSURE 1**

**Response to NRC RAI Letter No. 005**

**RAI Question No. 17.04-1**

**NRC RAI 17.04-1**

*SRP 17.4 and Regulatory Guide 1.206 (C.III.1, Page 182) identify the need to address 1) qualification requirements of the expert panel, if such panel is used, and 2) a description of the corrective action process for design and operational errors that degrade non-safety-related SSCs within the scope of the RAP. FSAR Section 17.4 does not address either the expert panel qualifications or the corrective action process. Please provide in FSAR Section 17.4 the following: 1) expert panel qualification requirements, if a panel is to be used, and 2) description of the corrective action process.*

**Dominion Response**

1) Qualification Requirements of the Expert Panel

   FSAR Section 17.6 incorporates by reference NEI 07-02, "Generic FSAR Template Guidance for Maintenance Rule Program Description for Plants Licensed Under 10 CFR Part 52." The qualification requirements of the expert panel are addressed in NEI-07-2 Section 17.X.1.1.c, which states that "the expert panel is established in accordance with NUMARC 93-01." NUMARC 93-01, Revision 2, page 17 states that "if a utility selects a method based on PRA to establish risk significance, it should begin the process by assembling a panel of individuals experienced with the plant PRA and with operations and maintenance."

2) Corrective Action Process

   As stated in FSAR Section 17.4.1, the objectives of the operations phase RAP are integrated into the Quality Assurance Program (Section 17.5), the Maintenance Rule Program (Section 17.6), and other operational programs.

   The corrective action processes for design and operational errors that degrade non-safety-related SSCs within the scope of the RAP are described in FSAR Sections 17.5 and 17.6.

   FSAR Section 17.5, Quality Assurance Program Description – Design Certification, Early Site Permits, and New License Applicants, references the Quality Assurance Program Description (FSAR Appendix 17BB), which includes requirements for a corrective action process and is applicable to certain nonsafety-related SSCs that support safe, economic, and reliable plant operations, in addition to safety-related SSCs.

   FSAR Section 17.6, Maintenance Rule Program, describes the application of corrective actions to SSCs within the scope of the MR Program (including

certain nonsafety-related SSCs). FSAR Section 17.6.1.2 states that corrective actions will be implemented in accordance with the site Corrective Action Program.

**Proposed COLA Revision**

None.

**ENCLOSURE 2**

**Response to NRC RAI Letter No. 005**

**RAI Question No. 17.06-1**

**NRC RAI 17.06-1**

*In FSAR Section 17.6.3, Maintenance Rule Program Relationship with Reliability Assurance Activities, the STD SUP 17.6-2 includes, in the last sentence, reference to the "preventive maintenance program." Since the preventive maintenance program is not referenced in staff guidance in SRP 17.4 or 17.6, please describe how the preventive maintenance program is intended to support the Reliability Assurance Activities.*

**Dominion Response**

Standard Supplement STD SUP 17.6-2 to FSAR Section 17.6.3 was developed based on NEI 07-02, Revision 1, "Generic FSAR Template Guidance for Maintenance Rule Program Description for Plants Licensed Under 10 CFR Part 52." During the acceptance review of NEI 07-02, Revision 1, the NRC requested additional information related to Section 17.X.3, "Maintenance Rule Program Relationship with Reliability Assurance Activities." NEI responded to the RAI by agreeing to change the program referenced in this section from "the preventive maintenance program" to more broadly reference "maintenance programs." This change was incorporated into NEI 07-02, Revision 2 and remains in the NRC approved version, NEI 07-02A, dated March 2008.

**Proposed COLA Revision**

- FSAR Section 17.6.3, Standard Supplement STD SUP 17.6-2 will be revised to change the program referenced by this section from "the preventive maintenance program" to "maintenance programs," consistent with NEI 07-02A.

- The reference to NEI 07-02 in FSAR Table 1.6-201 will be changed to NEI 07-02A and the date revised to March 2008 to reflect the NRC's approval of Revision 3 of the NEI template.

These changes are shown on the attached FSAR markup.

# Markup of North Anna COLA

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

NAPS SUP 1.6-1

## Table 1.6-201 Referenced Topical Reports

| Report No. | Title | Section |
|---|---|---|
| NEI 06-13A | Nuclear Energy Institute, "Technical Report on Template for an Industry Training Program Description," NEI 06-13A, Revision 1, March 2008 | 13BB |
| ~~NEI 07-02~~ NEI 07-02A | Nuclear Energy Institute, "Generic FSAR Template Guidance for Maintenance Rule Program Description for Plants Licensed under 10 CFR Part 52," ~~NEI 07-02, Revision 3, September 2007~~ NEI 07-02A, March 2008 | 17.6 |
| NEI 07-03 | Nuclear Energy Institute, "Generic FSAR Template Guidance for Radiation Protection Program Description," NEI 07-03, Revision 3, October 2007 | 12BB |
| NEI 07-08 | Nuclear Energy Institute, "Generic FSAR Template Guidance for Ensuring That Occupational Radiation Exposures Are As Low As Is Reasonably Achievable (ALARA)," NEI 07-08, Revision 0, September 2007 | 12AA |
| NEI 07-09 | Nuclear Energy Institute, "Generic FSAR Template Guidance for Offsite Dose Calculation Manual (ODCM) Program Description," NEI 07-09, Revision 0, September 2007 | 11.5 |
| NEI 07-10 | Nuclear Energy Institute, "Generic FSAR Template Guidance for Process Control Program (PCP) Description," NEI 07-10, Revision 1, October 2007 | 11.4 |
| NEI 07-11 | Nuclear Energy Institute, "Generic FSAR Template Guidance for Cost-Benefit Analysis for Radwaste Systems for Light-Water-Cooled Nuclear Power Reactors," NEI 07-11, Revision 0, September 2007 | 11.2 |

### 17.6.3 Maintenance Rule Program Relationship with Reliability Assurance Activities

Replace with the following.

**STD SUP 17.6-2**

Reliability during the operations phase is assured through the implementation of operational programs, i.e., the MR program (Section 17.6), the Quality Assurance Program (Section 17.5), the Inservice Inspection Program (Sections 5.2.4 and 6.6, and DCD Section 3.6.1.7.3), and the Inservice Testing Program (Sections 3.9.6 and 3.9.3.7.1(3)e), as well as the Technical Specifications Surveillance Requirements (Chapter 16) and maintenance programs.

### 17.6.6 References

17.6-201 Nuclear Energy Institute, "Generic FSAR Template Guidance for Maintenance Rule Program Description for Plants Licensed Under 10 CFR Part 52," NEI 07-02.

**ENCLOSURE 3**

**Response to NRC RAI Letter No. 005**

**RAI Question No. 19-1**

**NRC RAI 19-1**

*SRP 19.0 identifies the need for the plant-specific PRA to address internal flooding analysis. Neither FSAR Chapter 19 nor ESBWR topical report NEDE/NEDO 33386 identifies the North Anna plant-specific flooding zones of the yard and service water building. Please provide 1) description, preferably with drawings, of the yard and service water building flooding zones and 2) description of the impact of these plant-specific flooding zones on the PRA results.*

**Dominion Response**

Internal Flooding Associated with the Yard Area

The yard flood zone is essentially all outside areas of the site, and thus the site plot drawing (FSAR Figure 2.1-201) illustrates the areas of concern. In addition, DCD Section 3.4.1.1 stipulates that the plant grade level is above the design flood level. The only components located in the yard that support a safety function are the manual fire hose connections to the Reactor Building and Fuel Building. They provide the capability to connect another source of water to the IC/PCCS pools and the Spent Fuel Pool after seven days following a postulated accident. This timeframe is beyond the time required to be considered for the PRA; therefore, external flooding in the yard does not affect PRA equipment.

Internal Flooding Associated with the Service Water Building

The Service Water Structure is a site-specific design feature. It is treated in a bounding manner in the ESBWR PRA to demonstrate that site-specific differences in Service Water Structure design do not have a significant effect on the PRA results. The Service Water Structure houses the four Service Water pumps and their associated power supplies and controls. Because Service Water is a RTNSS function, in accordance with DCD Table 19A-4, the design and installation of the Service Water Structure is required to include protection from the effects of external and internal flooding.

In the ESBWR PRA model, the Service Water Structure is conservatively considered to be one flood zone. All four pumps are assumed to fail in an internal flood. Thus, the ESBWR PRA is bounding for design differences in the Service Water Structure. In addition, the ESBWR PRA model does not credit operator actions to mitigate a flooding event, so differences in building location are not significant.

The conclusion in DCD Section 19.2.3.2.2 is that there are no significant flood-initiated accident sequences due to the low core damage frequency (CDF). The CDF due to flooding is 1.6E-9 per year for at-power conditions and 5.2E-9 per

year for shutdown conditions. Overall, the potential effects of Service Water Structure design differences are accounted for by using a bounding analysis, and therefore, are not significant to the ESBWR PRA.

**Proposed COLA Revision**

- Appendix 19AA, Summary of Plant-Specific PRA Review, will be added to the FSAR to incorporate the response to this RAI.
- FSAR Section 19.5, NAPS Sup 19.5-1 will be revised to include a reference to Appendix 19AA.

These changes are shown on the attached FSAR markup.

# Markup of North Anna COLA

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

## 19.5 Conclusions

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

**NAPS SUP 19.5-1**

In accordance with 10 CFR 52.79(a)(46), this report is required to contain a description of the plant-specific PRA and its results. As part of the development of the certified design PRA, site and plant specific information were reviewed to determine if any changes from the certified design PRA were warranted. This review included consideration of site-specific information such as site meteorological data and site-specific population distributions, as well as plant-specific design information that replaced conceptual design information described in the DCD. Section 1.8.5 was also reviewed to determine if there were any departures affecting the PRA results. This review is summarized in Appendix 19AA.

The review of site-specific information and plant-specific design information determined that: 1) the DCD PRA bounds site-specific and plant-specific design parameters and design features and 2) these parameters and features have no significant impact on the DCD PRA results and insights. Therefore, based on this review, it is concluded that there is no significant change from the certified design PRA. In that there are no significant changes from the certified design PRA, incorporation of DCD Chapter 19 into the FSAR satisfies the requirement of 10 CFR 52.79(a)(46) for a description of the plant-specific PRA and its results.

## Appendix 19A Regulatory Treatment of Non-Safety Systems (RTNSS)

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

## Appendix 19ACM Availability Controls Manual

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

## Appendix 19B Deterministic Analysis for Containment Pressure Capability

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

## Appendix 19C Probabilistic Analysis for Containment Pressure Fragility

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

NAPS SUP 19.5-1

## Appendix 19AA Summary of Plant-Specific PRA Review

### 19AA.1 Introduction

In accordance with 10 CFR 52.79(a)(46), this appendix provides a summary of the plant-specific PRA and its results.

### 19AA.2 Development of the ESBWR and Plant-Specific PRAs

The ESBWR PRA used the following North Anna site-specific PRA information to develop bounding PRA parameters:

- Loss of Preferred Power (LOPP) frequency - to determine if the site has unusual off-site power availability problems. The LOPP frequency is divided into plant-centered, switchyard, grid-related, and weather-related initiating events.
- Loss of Service Water frequency - to determine if any unusual characteristics would apply to a particular site, with consideration to loss of ultimate heat sink, and the effects of extreme seasonal temperatures.
- Seismic fragilities - to determine if Early Site Permit fragilities can be applied. Note that High Confidence Low Probability of Failure (HCLPF) values will be confirmed as described in Section 19.2.3.2.4.
- Other Known Site-Specific Issues - to identify site-specific initiating events that are not identified in the ESBWR PRA, such as unique offsite consequence issues.

These parameters represent site-specific features that have the potential to affect the PRA. To ensure that the ESBWR PRA is a bounding standard design, the site-specific values for these parameters were used to develop the ESBWR PRA standard values.

The ESBWR LOPP frequencies are based on NUREG/CR-6890, "Reevaluation of Station Blackout Risk at Nuclear Power Plants Analysis of Loss of Offsite Power Events: 1986-2004." The Grand Gulf and North Anna LOPP frequencies were compared to the ESBWR frequencies to identify any outliers. The data shows that grid-related losses of power are significantly more frequent than plant-centered, switchyard, or

weather-related losses of power. Although there is a variance in the values for the LOPP frequencies, their range is acceptable. The conclusions in ESBWR DCD Section 19.2.3.1, Risk from Internal Events, remain valid for the minor variances in LOPP frequencies

The ESBWR Loss of Service Water frequency is based on NUREG/CR-5750, "Rates of Initiating Events at U. S. Nuclear Power Plants: 1987-1995." The contribution of loss of Service Water is less than one percent of core damage frequency (CDF). Variances between the reported values depend on the design configuration (e.g., redundancy) of the current plants versus the ESBWR design, or external influences such as loss or degradation of heat sink. Although there is a variance in the values for the loss of Service Water frequencies, their range is acceptable. The conclusions in DCD Section 19.2.3.1, Risk from Internal Events, also remain valid for the minor variances in Loss of Service Water frequencies.

The ESBWR design incorporates a seismic response spectrum that bounds the potential U.S. sites. The conclusions in DCD Section 19.2.3.2.4, Evaluation of External Event Seismic, remain valid for site-specific differences in seismic response.

There are no unusual terrain features that would affect meteorological data or plume dispersion. The conclusions in DCD Section 19.2.5 for offsite consequences remain valid for any potential differences between site features.

In addition to the bounding treatment of PRA parameters, there are no departures from the standard design in any systems considered in the PRA model. Therefore, there are no site-specific design features that affect the PRA because the boundary of the certified design covers all of the SSCs necessary for the PRA.

## 19AA.3 Internal Flooding

### 19AA.3.1 Internal Flooding Associated with the Yard Area

The yard flood zone is essentially all outside areas of the site, and thus the site plot drawing (FSAR Figure 2.1-201) illustrates the areas of concern. In addition DCD Section 3.4.1.1 stipulates that the plant grade level is above the design flood level. The only components located in the yard that support a safety function are the manual fire hose connections to the Reactor Building and Fuel Building. They provide the capability to

connect another source of water to the IC/PCCS pools and the Spent Fuel Pool after seven days following a postulated accident. This timeframe is beyond the time required to be considered for the PRA; therefore, external flooding in the yard does not affect PRA equipment.

### 19AA.3.2 Internal Flooding Associated with the Service Water Building

The Service Water Structure is a site-specific design feature. It is treated in a bounding manner in the ESBWR PRA to demonstrate that site-specific differences in Service Water Structure design do not have a significant effect on the PRA results. The Service Water Structure houses the four Service Water pumps and their associated power supplies and controls. Because Service Water is a RTNSS function, in accordance with DCD Table 19A-4, the design and installation of the Service Water Structure is required to include protection from the effects of external and internal flooding.

In the ESBWR PRA model, the Service Water Structure is conservatively considered to be one flood zone. All four pumps are assumed to fail in an internal flood. Thus, the ESBWR PRA is bounding for design differences in the Service Water Structure. In addition, the ESBWR PRA model does not credit operator actions to mitigate a flooding event, so differences in building location are not significant.

The conclusion in DCD Section 19.2.3.2.2 is that there are no significant flood-initiated accident sequences due to the low CDF. Overall, the potential effects of Service Water Structure design differences are accounted for by using a bounding analysis, and therefore, are not significant to the ESBWR PRA.

In summary, the ESBWR PRA provides a reasonable representation of the parameters and conditions that are specific to the North Anna site.

**ENCLOSURE 4**

**Response to NRC RAI Letter No. 005**

**RAI Question No. 19-2**

**NRC RAI 19-2**

*FSAR Section 19.5, in support of meeting the requirement of 10 CFR 52.79(a)(46) pertaining to the plant-specific PRA, states the following: "The review of site-specific information and plant-specific design information determined that: 1) the DCD PRA bounds site-specific and plant-specific design parameters and design features, and 2) these parameters and features have no significant impact on the DCD PRA results and insights." Please justify the FSAR statements by providing the following: 1) describe the criteria used to determine whether or not site-specific and plant-specific design parameters and design features are bounded by the DCD PRA and explain how the criteria were applied in the evaluation, 2) describe the quantitative criteria used to determine whether or not a site-specific or plant-specific design parameter or design feature has a significant impact on the DCD PRA results and insights, and 3) describe each of the site-specific and plant-specific design parameters and design features that were considered in the evaluation and a brief explanation of the technical basis for concluding there is no significant impact on the DCD PRA results and insights.*

**Dominion Response**

The ESBWR PRA used the following North Anna site-specific PRA information to develop bounding PRA parameters:

- Loss of Preferred Power (LOPP) frequency – to determine if the site has unusual off-site power availability problems. The LOPP frequency is divided into plant-centered, switchyard, grid-related, and weather-related initiating events.

- Loss of Service Water frequency – to determine if any unusual characteristics would apply to a particular site, with consideration to loss of ultimate heat sink, and the effects of extreme seasonal temperatures.

- Seismic fragilities – to determine if Early Site Permit fragilities can be applied. Note that High Confidence Low Probability of Failure (HCLPF) values will be confirmed as described in Section 19.2.3.2.4.

- Other Known Site-Specific Issues – to identify site-specific initiating events that are not identified in the ESBWR PRA, such as unique offsite consequence issues.

These parameters represent site-specific features that have the potential to affect the PRA. To ensure that the ESBWR PRA is a bounding standard design, the

site-specific values for these parameters were used to develop the ESBWR PRA standard values.

The ESBWR LOPP frequencies are based on NUREG/CR-6890, "Reevaluation of Station Blackout Risk at Nuclear Power Plants Analysis of Loss of Offsite Power Events: 1986-2004." The Grand Gulf and North Anna LOPP frequencies were compared to the ESBWR frequencies to identify any outliers. The data shows that grid-related losses of power are significantly more frequent than plant-centered, switchyard, or weather-related losses of power. Although there is a variance in the values for the LOPP frequencies, their range is acceptable because the change in CDF by using the highest frequency is less than 1E-10 per year. The conclusions in ESBWR DCD Section 19.2.3.1, Risk from Internal Events, remain valid for the minor variances in LOPP frequencies.

The ESBWR Loss of Service Water frequency is based on NUREG/CR-5750, "Rates of Initiating Events at U. S. Nuclear Power Plants: 1987-1995." The contribution of loss of Service Water is less than one percent of CDF. Variances between the reported values depend on the design configuration (e.g., redundancy) of the current plants versus the ESBWR design, or external influences such as loss or degradation of heat sink. Although there is a variance in the values for the loss of Service Water frequencies, their range is acceptable because the change in CDF by using the highest frequency is less than 1E-9 per year. The conclusions in EWBWR DCD Section 19.2.3.1, Risk from Internal Events, also remain valid for the minor variances in Loss of Service Water frequencies.

The ESBWR design incorporates a seismic response spectrum that bounds the potential U.S. sites. The conclusions in ESBWR DCD Section 19.2.3.2.4, Evaluation of External Event Seismic, remain valid for site-specific differences in seismic response.

There are no unusual terrain features that would affect meteorological data or plume dispersion. The conclusions in ESBWR DCD Section 19.2.5 for offsite consequences remain valid for any potential differences between site features.

In addition to the bounding treatment of PRA parameters, there are no departures from the standard design in any systems considered in the PRA model. Therefore, there are no site-specific design features (and no shared systems) that affect the PRA because the boundary of the certified design covers all of the SSCs necessary for the PRA.

The effect of outage planning and controls on the PRA is included in DCD Table 19.2-3, Risk Insights and Assumptions, and is addressed through operational program procedures. This DCD Table states that the outage planning and control program is consistent with NUMARC 91-06, "Guidelines for Industry

Actions to Assess Shutdown Management." The implementation of outage planning procedures is described in FSAR Section 13.5.2.2.9, which states that procedures will provide guidance for the development of refueling and outage plans that will address the guidance described in NUMARC 91-06.

In summary, the ESBWR PRA provides a reasonable representation of the parameters and conditions that are specific to the North Anna site.

**Proposed COLA Revision**

- Appendix 19AA, Summary of Plant-Specific PRA Review, will be added to the FSAR to incorporate the response to this RAI.
- FSAR Section 19.5, NAPS Sup 19.5-1 will be revised to include a reference to Appendix 19AA.

These changes are shown on the attached FSAR markup.

# Markup of North Anna COLA

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

## 19.5 Conclusions

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

**NAPS SUP 19.5-1**

In accordance with 10 CFR 52.79(a)(46), this report is required to contain a description of the plant-specific PRA and its results. As part of the development of the certified design PRA, site and plant specific information were reviewed to determine if any changes from the certified design PRA were warranted. This review included consideration of site-specific information such as site meteorological data and site-specific population distributions, as well as plant-specific design information that replaced conceptual design information described in the DCD. Section 1.8.5 was also reviewed to determine if there were any departures affecting the PRA results. This review is summarized in Appendix 19AA.

The review of site-specific information and plant-specific design information determined that: 1) the DCD PRA bounds site-specific and plant-specific design parameters and design features and 2) these parameters and features have no significant impact on the DCD PRA results and insights. Therefore, based on this review, it is concluded that there is no significant change from the certified design PRA. In that there are no significant changes from the certified design PRA, incorporation of DCD Chapter 19 into the FSAR satisfies the requirement of 10 CFR 52.79(a)(46) for a description of the plant-specific PRA and its results.

## Appendix 19A Regulatory Treatment of Non-Safety Systems (RTNSS)

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

## Appendix 19ACM Availability Controls Manual

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

## Appendix 19B Deterministic Analysis for Containment Pressure Capability

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

## Appendix 19C Probabilistic Analysis for Containment Pressure Fragility

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

NAPS SUP 19.5-1

## Appendix 19AA Summary of Plant-Specific PRA Review

### 19AA.1 Introduction

In accordance with 10 CFR 52.79(a)(46), this appendix provides a summary of the plant-specific PRA and its results.

### 19AA.2 Development of the ESBWR and Plant-Specific PRAs

The ESBWR PRA used the following North Anna site-specific PRA information to develop bounding PRA parameters:

- Loss of Preferred Power (LOPP) frequency - to determine if the site has unusual off-site power availability problems. The LOPP frequency is divided into plant-centered, switchyard, grid-related, and weather-related initiating events.
- Loss of Service Water frequency - to determine if any unusual characteristics would apply to a particular site, with consideration to loss of ultimate heat sink, and the effects of extreme seasonal temperatures.
- Seismic fragilities - to determine if Early Site Permit fragilities can be applied. Note that High Confidence Low Probability of Failure (HCLPF) values will be confirmed as described in Section 19.2.3.2.4.
- Other Known Site-Specific Issues - to identify site-specific initiating events that are not identified in the ESBWR PRA, such as unique offsite consequence issues.

These parameters represent site-specific features that have the potential to affect the PRA. To ensure that the ESBWR PRA is a bounding standard design, the site-specific values for these parameters were used to develop the ESBWR PRA standard values.

The ESBWR LOPP frequencies are based on NUREG/CR-6890, "Reevaluation of Station Blackout Risk at Nuclear Power Plants Analysis of Loss of Offsite Power Events: 1986-2004." The Grand Gulf and North Anna LOPP frequencies were compared to the ESBWR frequencies to identify any outliers. The data shows that grid-related losses of power are significantly more frequent than plant-centered, switchyard, or

weather-related losses of power. Although there is a variance in the values for the LOPP frequencies, their range is acceptable. The conclusions in ESBWR DCD Section 19.2.3.1, Risk from Internal Events, remain valid for the minor variances in LOPP frequencies

The ESBWR Loss of Service Water frequency is based on NUREG/CR-5750, "Rates of Initiating Events at U. S. Nuclear Power Plants: 1987-1995." The contribution of loss of Service Water is less than one percent of core damage frequency (CDF). Variances between the reported values depend on the design configuration (e.g., redundancy) of the current plants versus the ESBWR design, or external influences such as loss or degradation of heat sink. Although there is a variance in the values for the loss of Service Water frequencies, their range is acceptable. The conclusions in DCD Section 19.2.3.1, Risk from Internal Events, also remain valid for the minor variances in Loss of Service Water frequencies.

The ESBWR design incorporates a seismic response spectrum that bounds the potential U.S. sites. The conclusions in DCD Section 19.2.3.2.4, Evaluation of External Event Seismic, remain valid for site-specific differences in seismic response.

There are no unusual terrain features that would affect meteorological data or plume dispersion. The conclusions in DCD Section 19.2.5 for offsite consequences remain valid for any potential differences between site features.

In addition to the bounding treatment of PRA parameters, there are no departures from the standard design in any systems considered in the PRA model. Therefore, there are no site-specific design features that affect the PRA because the boundary of the certified design covers all of the SSCs necessary for the PRA.

## 19AA.3 Internal Flooding

### 19AA.3.1 Internal Flooding Associated with the Yard Area

The yard flood zone is essentially all outside areas of the site, and thus the site plot drawing (FSAR Figure 2.1-201) illustrates the areas of concern. In addition DCD Section 3.4.1.1 stipulates that the plant grade level is above the design flood level. The only components located in the yard that support a safety function are the manual fire hose connections to the Reactor Building and Fuel Building. They provide the capability to

connect another source of water to the IC/PCCS pools and the Spent Fuel Pool after seven days following a postulated accident. This timeframe is beyond the time required to be considered for the PRA; therefore, external flooding in the yard does not affect PRA equipment.

### 19AA.3.2 Internal Flooding Associated with the Service Water Building

The Service Water Structure is a site-specific design feature. It is treated in a bounding manner in the ESBWR PRA to demonstrate that site-specific differences in Service Water Structure design do not have a significant effect on the PRA results. The Service Water Structure houses the four Service Water pumps and their associated power supplies and controls. Because Service Water is a RTNSS function, in accordance with DCD Table 19A-4, the design and installation of the Service Water Structure is required to include protection from the effects of external and internal flooding.

In the ESBWR PRA model, the Service Water Structure is conservatively considered to be one flood zone. All four pumps are assumed to fail in an internal flood. Thus, the ESBWR PRA is bounding for design differences in the Service Water Structure. In addition, the ESBWR PRA model does not credit operator actions to mitigate a flooding event, so differences in building location are not significant.

The conclusion in DCD Section 19.2.3.2.2 is that there are no significant flood-initiated accident sequences due to the low CDF. Overall, the potential effects of Service Water Structure design differences are accounted for by using a bounding analysis, and therefore, are not significant to the ESBWR PRA.

In summary, the ESBWR PRA provides a reasonable representation of the parameters and conditions that are specific to the North Anna site.