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February 18, 2011

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

Serial No. NA3-10-031RA  
Docket No. 52-017  
COL/MWH

**DOMINION VIRGINIA POWER**  
**NORTH ANNA UNIT 3 COMBINED LICENSE APPLICATION**  
**SRP 2.3.4: RESPONSE TO RAI LETTER 49**

On December 2, 2010, the NRC requested additional information to support the review of certain portions of the North Anna Unit 3 Combined License Application (COLA). Dominion letter NA3-10-031R, dated January 10, 2011, provided a preliminary response to Request for Additional Information (RAI) Question 02.03.04-2, ARCON96 Input and Output Files. The final response to this RAI Question is provided in Enclosure 1.

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

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

Very truly yours,

Eugene S. Grecheck

D089  
MWH

Enclosure:

1. Response to NRC RAI Letter Number 49, RAI 5184 Question 02.03.04-2

Commitments made by this letter:

1. Incorporate proposed changes in a future COLA submission.

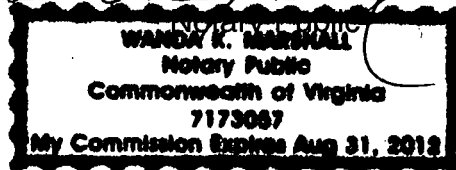
COMMONWEALTH OF VIRGINIA

COUNTY OF HENRICO

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

Acknowledged before me this 18<sup>th</sup> day of February, 2011  
My registration number is 7173057 and my  
Commission expires: August 31, 2012

Wanda K. Marshall



cc: U. S. Nuclear Regulatory Commission, Region II (w/o CD-ROM)  
C. P. Patel, NRC  
T. S. Dozier, NRC (w/o CD-ROM)  
J. T. Reece, NRC (w/o CD-ROM)

**ENCLOSURE 1**

**Response to NRC RAI Letter 49**

**RAI 5184 Question 02.03.04-2**

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**RESPONSE TO REQUEST FOR ADDITIONAL INFORMATION**

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**North Anna Unit 3**

**Dominion**

**Docket No. 52-017**

**RAI NO.: 5184 (RAI Letter 49)**

**SRP SECTION: 02.03.04 – SHORT-TERM ATMOSPHERIC DISPERSION ESTIMATES FOR  
ACCIDENT RELEASES**

**QUESTIONS for Siting and Accident Conseq Branch (RSAC)**

**DATE OF RAI ISSUE: 12/02/2010**

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**QUESTION NO.: 02.03.04-2**

10 CFR Part 50, Appendix A, General Design Criterion 19 (GDC 19) requires that a control room shall be provided from which actions can be taken to operate the nuclear power unit safely under normal conditions and to maintain it in a safe condition under accident conditions, including loss-of-coolant accidents. NUREG-0800, Section 2.3.4, sets forth the staff's review procedures for control room habitability analysis, please provide an electronic copy of the ARCON96 input and output files used in FSAR Section 2.3.4, along with justifications for any assumptions that were made in generating the input files.

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**Dominion Response**

The North Anna Unit 3 (NA3) S-COLA FSAR was prepared based on Revision 2 of the US-APWR Design Control Document (DCD). As a result of NRC DCD RAI Question 02.03.04-9, certain short term atmospheric dispersion estimates for accident releases used for the standard plant analyses will be increased in Revision 3 of the DCD. The revised values are provided in the response to DCD RAI Question 02.03.04-9 in Mitsubishi Heavy Industries, Ltd. (MHI) letter UAP-HF-10122, dated April 28, 2010 (ADAMS ML101250161).

The revised DCD short term atmospheric dispersion values for the Main Control Room to be presented in DCD, Revision 3, Tier 2, Section 2.3 will bound the corresponding NA3 site-specific values for the source to receptor distances without the need for departures from the DCD distances. Short term atmospheric dispersion analyses for NA3 have been revised to be consistent with the revised DCD values. The results of the revised NA3 analyses are included in this response. Electronic copies of the ARCON96 input and output files for the revised analyses are provided on the enclosed CD-ROM. Revised on-site  $\chi/Q$  values for use in evaluating potential doses from NA3 postulated release locations (sources) to on-site receptor locations are now based on the standard site plan shown in DCD Figure 2.3-2. Because the distance to the on-site receptor locations are based on DCD values, Departure 2.3(1), *Main*

*Control Room Atmospheric Dispersion Factors, Source-to-Receptor Distance Determination*, will no longer be required and will be deleted in a future submission of the COLA.

The FSAR will be revised to reflect the atmospheric dispersion factors ( $\chi/Q$  values) based on the updated analyses. In addition, the FSAR and Departures Report will be updated to eliminate departure 2.3(1). An administrative error was identified during the preparation of this RAI response that affected the sub-headings in FSAR Table 2.3-218, Sheets 2 through 7. The FSAR will be revised to correct the table subheadings.

#### ARCON96 Inputs and Assumptions

The meteorological data used as an input to the ARCON96 computer code was acquired over a three year interval (1996-1998). As described in Section 2.3.4.1 of the Early Site Permit Application (ESPA) Site Safety Analysis Report (SSAR), the site meteorological data for 1996–1998 was used for quantitative evaluations at the site. This onsite data provided representative measurements of local dilution conditions appropriate to the site, and was reasonably representative of long-term conditions. Consistent with 10 CFR 52.39, this site characteristic data continues to be used in the FSAR.

The inputs and assumptions used in generating the input files along with justification for each are provided below.

- 1) In accordance with Regulatory Guide 1.194, *Atmospheric Relative Concentrations for Control Room Radiological Habitability Assessments at Nuclear Power Plants*, Revision 0, all sources were assumed to be point sources with the exception of the containment shell. The containment shell, as allowed by Regulatory Guide 1.194, was modeled as a diffuse area source to remove unnecessary over conservatism.
- 2) A surface roughness of 0.2 was used. This value is in accordance with NRC guidance in Regulatory Guide 1.194 on the use of ARCON96 for determining Control Room  $\chi/Q$  values.
- 3) An averaging sector width constant of 4.3 was used instead of the ARCON96 code default value of 4.0. This is consistent with the guidance in Regulatory Guide 1.194.
- 4) The stability classes are based on the classification system in Table 1 of Regulatory Guide 1.23, *Meteorological Monitoring Programs for Nuclear Power Plants*, Revision 1.
- 5) The effective area of the Reactor Building used in the determination of building-wake effects is obtained from DCD Figure 2.3-1:

$$\text{Width}_{\text{area source}} = 157 \text{ ft} = 47.9 \text{ m} \qquad \text{Height}_{\text{area source}} = 99 \text{ ft} = 30.2 \text{ m}$$

$$\text{Cross-Sectional Area} = \text{Width} \times \text{Height} = 1,447 \text{ m}^2$$

For additional conservatism, since a smaller cross-sectional area results in a higher atmospheric dispersion coefficient, a building cross-sectional area of 1,200 m<sup>2</sup> is used.

- 6) No credit was taken for increased distances due to flow around or over structures.

**Proposed COLA Revision**

The NA3 COLA Part 2, FSAR, and Part 7, Departures Report, will be revised as indicated on the attached 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 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.

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**NAPS COL 1.8(3)**

**Table 1.8-202 Departures from the Referenced Certified Design**

<b>Number</b>	<b>Subject</b>	<b>FSAR Section</b>
NAPS DEP 02.0(1)	Maximum Non-Coincident Wet Bulb Temperature	2.0
<del>NAPS DEP 02.3(1)</del>	<del>Main Control Room- Atmospheric Dispersion- Factors, Source to Receptor- Distance Determination</del>	<del>2.3</del>
NAPS DEP 03.7(1)	Seismic Spectra Exceedance	2.0, 3.7, 3.8, Appendix 3NN, Appendix 3OO, 6.2, 19.1
NAPS DEP 03.7(2)	Site Amplification Functions and Site Response Analysis	2.5, 3.7
NAPS DEP 03.7(3)	MNES Improvements to Seismic Analysis Methods	3.7, 3.8, Associated Appendices
NAPS DEP 08.2(1)	Clarification of GDC 2 and 4 Applicability for Offsite Power	1.9, 8.1, 8.2
NAPS DEP 09.2(1)	Replacement of Boron Recycle System with a Degasser Subsystem	1.2, 3.2, Appendix 3E, 7.4, 9.2, 9.3, Appendix 9A, 10.4, 11.2, 11.3, 11.4, 11.5, 12.2, 12.3, 14.2
NAPS DEP 09.2(2)	Non-Essential Service Water System, Design Service Water Temperature	9.2
NAPS DEP 09.5(1)	Power Source Fuel Storage Vault Elevation	1.2, 1.9, 3.5, 3.7, 3.8, 8.3, 9.5, Appendix 19A; COLA Part 4, Section A
NAPS DEP 10.2(1)	Main Turbine Type Change	1.2, 3.5, Appendix 9A, 10.1, 10.2, 10.4, 11.5, 12.3
NAPS DEP 10.4(1)	Main Condenser Type Change	1.2, Appendix 9A, 10.1, 10.4, 11.5, 12.3
NAPS DEP 14.2(1)	Initial Test Program (ITP) Administration	14.2
NAPS DEP 14.2(2)	Separation of Startup Organization into Preoperational and Startup Testing Organizations	14.2, Appendix 14AA
NAPS DEP 14.2(3)	Initial Test Program Scope	3.9, 6.2, 6.3, 6.5, 14.2



**Table 2.0-201 Evaluation of Site/Design Parameters and Characteristics**

Parameter Description <sup>(15)</sup>	DCD Site Parameter Value <sup>(15)</sup>	Site Characteristic	Evaluation
<b>NAPS SUP 2.0(1) Part 1 – Evaluation of DCD Site Parameters</b>			
<b>Atmospheric Dispersion Factors (X/Q Values) for Main Control Room (MCR) Heating, Ventilation, and Air Conditioning (HVAC) Intake for Specified Release Points<sup>(2)</sup></b>			
<b>Plant Vent<sup>(5)</sup></b>			
0–8 hours	1.1E-03 s/m <sup>3</sup>	<b>ESP</b> No value provided  <b>Unit 3</b> <del>8.3E-04 s/m<sup>3</sup></del> <u>9.1E-04 s/m<sup>3</sup></u>	The Unit 3 site characteristic value is provided in Table 2.3-218, Sheet 2, and falls within (is less than) the DCD site parameter value.
8–24 hours	6.6E-04 s/m <sup>3</sup>	<b>ESP</b> No value provided  <b>Unit 3</b> <del>3.2E-04 s/m<sup>3</sup></del> <u>3.4E-04 s/m<sup>3</sup></u>	The Unit 3 site characteristic value is provided in Table 2.3-218, Sheet 2, and falls within (is less than) the DCD site parameter value.
1–4 days	4.2E-04 s/m <sup>3</sup>	<b>ESP</b> No value provided  <b>Unit 3</b> <del>2.4E-04 s/m<sup>3</sup></del> <u>2.6E-04 s/m<sup>3</sup></u>	The Unit 3 site characteristic value is provided in Table 2.3-218, Sheet 2, and falls within (is less than) the DCD site parameter value.
4–30 days	<del>1.9E-04 s/m<sup>3</sup></del> <u>2.8E-04 s/m<sup>3</sup></u>	<b>ESP</b> No value provided  <b>Unit 3</b> <del>1.9E-04 s/m<sup>3</sup></del> <u>2.0E-04 s/m<sup>3</sup></u>	The Unit 3 site characteristic value is provided in Table 2.3-218, Sheet 2, and falls within (is equal to is less than) the DCD site parameter value.

**Table 2.0-201 Evaluation of Site/Design Parameters and Characteristics**

Parameter Description <sup>(15)</sup>	DCD Site Parameter Value <sup>(15)</sup>	Site Characteristic	Evaluation
NAPS SUP 2.0(1)	<b>Part 1 – Evaluation of DCD Site Parameters</b>		
	<b>Atmospheric Dispersion Factors (X/Q Values) for Main Control Room (MCR) Heating, Ventilation, and Air Conditioning (HVAC) Intake for Specified Release Points<sup>(2)</sup> (continued)</b>		
	<b>Ground-Level Containment Releases<sup>(4)</sup></b>		
	0–8 hours	2.2E-03 s/m <sup>3</sup>	<b>ESP</b> No value provided
		<b>Unit 3</b> 8.7E-04 s/m <sup>3</sup>	The Unit 3 site characteristic value is provided in Table 2.3-218, Sheet 1, and falls within (is less than) the DCD site parameter value.
	8–24 hours	1.3E-03 s/m <sup>3</sup>	<b>ESP</b> No value provided
		<b>Unit 3</b> 3.4E-04 s/m <sup>3</sup> 3.4E-04 s/m <sup>3</sup>	The Unit 3 site characteristic value is provided in Table 2.3-218, Sheet 1, and falls within (is less than) the DCD site parameter value.
	1–4 days	8.3E-04 s/m <sup>3</sup>	<b>ESP</b> No value provided
		<b>Unit 3</b> 2.5E-04 s/m <sup>3</sup>	The Unit 3 site characteristic value is provided in Table 2.3-218, Sheet 1, and falls within (is less than) the DCD site parameter value.
	4–30 days	<del>3.6E-04 s/m<sup>3</sup></del> <u>5.5E-04 s/m<sup>3</sup></u>	<b>ESP</b> No value provided
		<b>Unit 3</b> 1.9E-04 s/m <sup>3</sup>	The Unit 3 site characteristic value is provided in Table 2.3-218, Sheet 1, and falls within (is less than) the DCD site parameter value.

**Table 2.0-201 Evaluation of Site/Design Parameters and Characteristics**

Parameter Description <sup>(15)</sup>	DCD Site Parameter Value <sup>(15)</sup>	Site Characteristic	Evaluation
<b>NAPS SUP 2.0(1) Part 1 – Evaluation of DCD Site Parameters</b>			
<b>Atmospheric Dispersion Factors (X/Q Values) for Main Control Room (MCR) Heating, Ventilation, and Air Conditioning (HVAC) Intake for Specified Release Points<sup>(2)</sup> (continued)</b>			
<b>Main Steam Relief Valve and Safety Valve Releases<sup>(6)</sup></b>			
0–8 hours	5.3E-03 s/m <sup>3</sup>	<b>ESP</b> No value provided  <b>Unit 3</b> 3.5E-03 s/m <sup>3</sup>	The Unit 3 site characteristic value is provided in Table 2.3-218, Sheet 2, and falls within (is less than) the DCD site parameter value.
8–24 hours	3.1E-03 s/m <sup>3</sup>	<b>ESP</b> No value provided  <b>Unit 3</b> 1.2E-03 s/m <sup>3</sup>	The Unit 3 site characteristic value is provided in Table 2.3-218, Sheet 2, and falls within (is less than) the DCD site parameter value.
1–4 days	2.0E-03 s/m <sup>3</sup>	<b>ESP</b> No value provided  <b>Unit 3</b> 8.8E-04 s/m <sup>3</sup>	The Unit 3 site characteristic value is provided in Table 2.3-218, Sheet 2, and falls within (is less than) the DCD site parameter value.
4–30 days	<del>8.7E-04 s/m<sup>3</sup></del> <u>1.3E-03 s/m<sup>3</sup></u>	<b>ESP</b> No value provided  <b>Unit 3</b> 7.1E-04 s/m <sup>3</sup>	The Unit 3 site characteristic value is provided in Table 2.3-218, Sheet 2, and falls within (is less than) the DCD site parameter value.

**Table 2.0-201 Evaluation of Site/Design Parameters and Characteristics**

Parameter Description <sup>(15)</sup>	DCD Site Parameter Value <sup>(15)</sup>	Site Characteristic	Evaluation
<b>NAPS SUP 2.0(1) Part 1 – Evaluation of DCD Site Parameters</b>			
<b>Atmospheric Dispersion Factors (X/Q Values) for Main Control Room (MCR) Heating, Ventilation, and Air Conditioning (HVAC) Intake for Specified Release Points<sup>(2)</sup> (continued)</b>			
<b>Steam Line Break Releases<sup>(8)</sup></b>			
0–8 hours	1.9E-02 s/m <sup>3</sup>	<b>ESP</b> No value provided	
		<b>Unit 3</b> 1.2E-02 s/m <sup>3</sup>	The Unit 3 site characteristic value is provided in Table 2.3-218, Sheet 1, and falls within (is less than) the DCD site parameter value.
8–24 hours	1.1E-02 s/m <sup>3</sup>	<b>ESP</b> No value provided	
		<b>Unit 3</b> 3.5E-03 s/m <sup>3</sup>	The Unit 3 site characteristic value is provided in Table 2.3-218, Sheet 1, and falls within (is less than) the DCD site parameter value.
1–4 days	7.1E-03 s/m <sup>3</sup>	<b>ESP</b> No value provided	
		<b>Unit 3</b> 2.4E-03 s/m <sup>3</sup>	The Unit 3 site characteristic value is provided in Table 2.3-218, Sheet 1, and falls within (is less than) the DCD site parameter value.
4–30 days	<del>3.1E-03 s/m<sup>3</sup></del> <u>4.7E-03 s/m<sup>3</sup></u>	<b>ESP</b> No value provided	
		<b>Unit 3</b> 2.2E-03 s/m <sup>3</sup>	The Unit 3 site characteristic value is provided in Table 2.3-218, Sheet 1, and falls within (is less than) the DCD site parameter value.

**Table 2.0-201 Evaluation of Site/Design Parameters and Characteristics**

Parameter Description <sup>(15)</sup>	DCD Site Parameter Value <sup>(15)</sup>	Site Characteristic	Evaluation
<b>NAPS SUP 2.0(1) Part 1 – Evaluation of DCD Site Parameters</b>			
<b>Atmospheric Dispersion Factors (X/Q Values) for Main Control Room (MCR) Heating, Ventilation, and Air Conditioning (HVAC) Intake for Specified Release Points<sup>(2)</sup> (continued)</b>			
<b>Fuel Handling Area Releases<sup>(7)</sup></b>			
0–8 hours	1.1E-03 s/m <sup>3</sup>	<b>ESP</b> No value provided  <b>Unit 3</b> <del>7.4E-04 s/m<sup>3</sup></del> <u>8.5E-04 s/m<sup>3</sup></u>	The Unit 3 site characteristic value is provided in Table 2.3-218, Sheet 1, and falls within (is less than) the DCD site parameter value
8–24 hours	6.4E-04 s/m <sup>3</sup>	<b>ESP</b> No value provided  <b>Unit 3</b> <del>3.1E-04 s/m<sup>3</sup></del> <u>3.6E-04 s/m<sup>3</sup></u>	The Unit 3 site characteristic value is provided in Table 2.3-218, Sheet 1, and falls within (is less than) the DCD site parameter value.
1–4 days	4.1E-04 s/m <sup>3</sup>	<b>ESP</b> No value provided  <b>Unit 3</b> <del>2.1E-04 s/m<sup>3</sup></del> <u>2.4E-04 s/m<sup>3</sup></u>	The Unit 3 site characteristic value is provided in Table 2.3-218, Sheet 1, and falls within (is less than) the DCD site parameter value.
4–30 days	<del>1.8E-04 s/m<sup>3</sup></del> <u>2.7E-04 s/m<sup>3</sup></u>	<b>ESP</b> No value provided  <b>Unit 3</b> <del>1.7E-04 s/m<sup>3</sup></del> <u>1.9E-04 s/m<sup>3</sup></u>	The Unit 3 site characteristic value is provided in Table 2.3-218, Sheet 1, and falls within (is less than) the DCD site parameter value.

**Table 2.0-201 Evaluation of Site/Design Parameters and Characteristics**

Parameter Description <sup>(15)</sup>	DCD Site Parameter Value <sup>(15)</sup>	Site Characteristic	Evaluation
<b>NAPS SUP 2.0(1)</b>			
<b>Part 1 – Evaluation of DCD Site Parameters</b>			
<b>Atmospheric Dispersion Factors (X/Q Values) for MCR Inleak for Specified Release Points<sup>(3)</sup></b>			
<b>Plant Vent<sup>(9)</sup></b>			
0–8 hours	1.3E-03 s/m <sup>3</sup>	<b>ESP</b> No value provided  <b>Unit 3</b> <del>9.8E-04 s/m<sup>3</sup></del> <u>1.0E-03 s/m<sup>3</sup></u>	The Unit 3 site characteristic value is provided in Table 2.3-218, Sheet 3, and falls within (is less than) the DCD site parameter value.
8–24 hours	7.8E-04 s/m <sup>3</sup>	<b>ESP</b> No value provided  <b>Unit 3</b> <del>3.6E-04 s/m<sup>3</sup></del> <u>3.7E-04 s/m<sup>3</sup></u>	The Unit 3 site characteristic value is provided in Table 2.3-218, Sheet 3, and falls within (is less than) the DCD site parameter value.
1–4 days	4.9E-04 s/m <sup>3</sup>	<b>ESP</b> No value provided  <b>Unit 3</b> <del>2.8E-04 s/m<sup>3</sup></del> <u>2.9E-04 s/m<sup>3</sup></u>	The Unit 3 site characteristic value is provided in Table 2.3-218, Sheet 3, and falls within (is less than) the DCD site parameter value.
4–30 days	<del>2.2E-04 s/m<sup>3</sup></del> <u>3.3E-04 s/m<sup>3</sup></u>	<b>ESP</b> No value provided  <b>Unit 3</b> <del>2.2E-04 s/m<sup>3</sup></del> <u>2.3E-04 s/m<sup>3</sup></u>	The Unit 3 site characteristic value is provided in Table 2.3-218, Sheet 3, and falls within (is equal to <u>is less than</u> ) the DCD site parameter value.

**Table 2.0-201 Evaluation of Site/Design Parameters and Characteristics**

Parameter Description <sup>(15)</sup>	DCD Site Parameter Value <sup>(15)</sup>	Site Characteristic	Evaluation
<b>NAPS SUP 2.0(1) Part 1 – Evaluation of DCD Site Parameters</b>			
<b>Atmospheric Dispersion Factors (X/Q Values) for MCR Inleak for Specified Release Points<sup>(3)</sup> (continued)</b>			
<b>Plant Vent<sup>(10)</sup></b>			
0–8 hours	$1.4 \times 10^{-3} \text{ s/m}^3$	<b>ESP</b> No value provided  <b>Unit 3</b> <del><math>9.8 \times 10^{-4} \text{ s/m}^3</math></del> $1.0 \times 10^{-3} \text{ s/m}^3$	The Unit 3 site characteristic value is provided in Table 2.3-218, Sheet 3, and falls within (is less than) the DCD site parameter value.
8–24 hours	$8.0 \times 10^{-4} \text{ s/m}^3$	<b>ESP</b> No value provided  <b>Unit 3</b> <del><math>3.6 \times 10^{-4} \text{ s/m}^3</math></del> $3.7 \times 10^{-4} \text{ s/m}^3$	The Unit 3 site characteristic value is provided in Table 2.3-218, Sheet 3, and falls within (is less than) the DCD site parameter value.
1–4 days	$5.1 \times 10^{-4} \text{ s/m}^3$	<b>ESP</b> No value provided  <b>Unit 3</b> <del><math>2.8 \times 10^{-4} \text{ s/m}^3</math></del> $2.9 \times 10^{-4} \text{ s/m}^3$	The Unit 3 site characteristic value is provided in Table 2.3-218, Sheet 3, and falls within (is less than) the DCD site parameter value.
4–30 days	<del><math>2.2 \times 10^{-4} \text{ s/m}^3</math></del> $3.3 \times 10^{-4} \text{ s/m}^3$	<b>ESP</b> No value provided  <b>Unit 3</b> <del><math>2.2 \times 10^{-4} \text{ s/m}^3</math></del> $2.3 \times 10^{-4} \text{ s/m}^3$	The Unit 3 site characteristic value is provided in Table 2.3-218, Sheet 3, and falls within (is equal to is less than) the DCD site parameter value.

**Table 2.0-201 Evaluation of Site/Design Parameters and Characteristics**

Parameter Description <sup>(15)</sup>	DCD Site Parameter Value <sup>(15)</sup>	Site Characteristic	Evaluation
<b>NAPS SUP 2.0(1) Part 1 – Evaluation of DCD Site Parameters</b>			
<b>Atmospheric Dispersion Factors (X/Q Values) for MCR Inleak for Specified Release Points<sup>(3)</sup> (continued)</b>			
<b>Ground-Level Containment Releases to Class 1E Electrical Room HVAC Intake<sup>(4)</sup></b>			
0–8 hours	2.4E-03 s/m <sup>3</sup>	<b>ESP</b> No value provided  <b>Unit 3</b> 8.8E-04 s/m <sup>3</sup>	The Unit 3 site characteristic value is provided in Table 2.3-218, Sheet 4, and falls within (is less than) the DCD site parameter value.
8–24 hours	1.4E-03 s/m <sup>3</sup>	<b>ESP</b> No value provided  <b>Unit 3</b> 3.5E-04 s/m <sup>3</sup>	The Unit 3 site characteristic value is provided in Table 2.3-218, Sheet 4, and falls within (is less than) the DCD site parameter value.
1–4 days	9.1E-04 s/m <sup>3</sup>	<b>ESP</b> No value provided  <b>Unit 3</b> 2.5E-04 s/m <sup>3</sup>	The Unit 3 site characteristic value is provided in Table 2.3-218, Sheets 1 and 4, and falls within (is less than) the DCD site parameter value.
4–30 days	<del>4.0E-04 s/m<sup>3</sup></del> <u>6.0 x 10<sup>-4</sup> s/m<sup>3</sup></u>	<b>ESP</b> No value provided  <b>Unit 3</b> 1.9E-04 s/m <sup>3</sup>	The Unit 3 site characteristic value is provided in Table 2.3-218, Sheets 1, 4, and 5, and falls within (is less than) the DCD site parameter value.



**Table 2.0-201 Evaluation of Site/Design Parameters and Characteristics**

Parameter Description <sup>(15)</sup>	DCD Site Parameter Value <sup>(15)</sup>	Site Characteristic	Evaluation
<b>NAPS SUP 2.0(1) Part 1 – Evaluation of DCD Site Parameters</b>			
<b>Atmospheric Dispersion Factors (X/Q Values) for MCR Inleak for Specified Release Points<sup>(3)</sup> (continued)</b>			
<b>Main Steam Relief Valve and Safety Valve Releases<sup>(6)</sup></b>			
0–8 hours	5.3E-03 s/m <sup>3</sup>	<b>ESP</b> No value provided	The Unit 3 site characteristic value is provided in Table 2.3-218, Sheet 5, and falls within (is less than) the DCD site parameter value.
		<b>Unit 3</b> 3.6E-03 s/m <sup>3</sup>	
8–24 hours	3.1E-03 s/m <sup>3</sup>	<b>ESP</b> No value provided	The Unit 3 site characteristic value is provided in Table 2.3-218, Sheet 5, and falls within (is less than) the DCD site parameter value.
		<b>Unit 3</b> 1.3E-03 s/m <sup>3</sup>	
1–4 days	2.0E-03 s/m <sup>3</sup>	<b>ESP</b> No value provided	The Unit 3 site characteristic value is provided in Table 2.3-218, Sheet 5, and falls within (is less than) the DCD site parameter value.
		<b>Unit 3</b> 9.0E-04 s/m <sup>3</sup>	
4–30 days	<del>8.7E-04 s/m<sup>3</sup></del> <u>1.3E-03 s/m<sup>3</sup></u>	<b>ESP</b> No value provided	The Unit 3 site characteristic value is provided in Table 2.3-218, Sheet 5, and falls within (is less than) the DCD site parameter value.
		<b>Unit 3</b> 7.5E-04 s/m <sup>3</sup>	

**Table 2.0-201 Evaluation of Site/Design Parameters and Characteristics**

	Parameter Description <sup>(15)</sup>	DCD Site Parameter Value <sup>(15)</sup>	Site Characteristic	Evaluation
NAPS SUP 2.0(1)	Part 1 – Evaluation of DCD Site Parameters			
	Atmospheric Dispersion Factors (X/Q Values) for MCR Inleak for Specified Release Points <sup>(3)</sup> (continued)			
	Steam Line Break Releases <sup>(8)</sup>			
	0–8 hours	1.9E-02 s/m <sup>3</sup>	ESP No value provided	The Unit 3 site characteristic value is provided in Table 2.3-218, Sheet 1, and falls within (is less than) the DCD site parameter value.
			Unit 3 1.2E-02 s/m <sup>3</sup>	
	8–24 hours	1.1E-02 s/m <sup>3</sup>	ESP No value provided	The Unit 3 site characteristic value is provided in Table 2.3-218, Sheet 1, and falls within (is less than) the DCD site parameter value.
			Unit 3 3.5E-03 s/m <sup>3</sup>	
	1–4 days	7.1E-03 s/m <sup>3</sup>	ESP No value provided	The Unit 3 site characteristic value is provided in Table 2.3-218, Sheet 1, and falls within (is less than) the DCD site parameter value.
			Unit 3 2.4E-03 s/m <sup>3</sup>	
	4–30 days	<del>3.1E-03 s/m<sup>3</sup></del> <u>4.7E-03 s/m<sup>3</sup></u>	ESP No value provided	The Unit 3 site characteristic value is provided in Table 2.3-218, Sheet 1, and falls within (is less than) the DCD site parameter value.
		Unit 3 2.2E-03 s/m <sup>3</sup>		

**Table 2.0-201 Evaluation of Site/Design Parameters and Characteristics**

Parameter Description <sup>(15)</sup>	DCD Site Parameter Value <sup>(15)</sup>	Site Characteristic	Evaluation
<b>NAPS SUP 2.0(1) Part 1 – Evaluation of DCD Site Parameters</b>			
<b>Atmospheric Dispersion Factors (X/Q Values) for MCR Inleak for Specified Release Points<sup>(3)</sup> (continued)</b>			
<b>Fuel Handling Area Releases<sup>(7)</sup></b>			
0–8 hours	1.1E-03 s/m <sup>3</sup>	<b>ESP</b> No value provided  <b>Unit 3</b> <del>8.2E-04 s/m<sup>3</sup></del> <u>9.0E-04 s/m<sup>3</sup></u>	The Unit 3 site characteristic value is provided in Table 2.3-218, Sheet 4, and falls within (is less than) the DCD site parameter value.
8–24 hours	6.7E-04 s/m <sup>3</sup>	<b>ESP</b> No value provided  <b>Unit 3</b> <del>3.4E-04 s/m<sup>3</sup></del> <u>3.8E-04 s/m<sup>3</sup></u>	The Unit 3 site characteristic value is provided in Table 2.3-218, Sheet 4, and falls within (is less than) the DCD site parameter value.
1–4 days	4.3E-04 s/m <sup>3</sup>	<b>ESP</b> No value provided  <b>Unit 3</b> <del>2.3E-04 s/m<sup>3</sup></del> <u>2.5E-04 s/m<sup>3</sup></u>	The Unit 3 site characteristic value is provided in Table 2.3-218, Sheet 4, and falls within (is less than) the DCD site parameter value.
4–30 days	<del>1.9E-04 s/m<sup>3</sup></del> <u>2.8E-04 s/m<sup>3</sup></u>	<b>ESP</b> No value provided  <b>Unit 3</b> <del>1.8E-04 s/m<sup>3</sup></del> <u>2.0E-04 s/m<sup>3</sup></u>	The Unit 3 site characteristic value is provided in Table 2.3-218, Sheet 4, and falls within (is less than) the DCD site parameter value.

**NAPS ESP COL 2.3-2**

**2.3.4.3 Atmospheric Dispersion Factors for On-Site Doses**

Onsite  $\chi/Q$  values for use in evaluating potential doses from Unit 3 postulated release locations (sources) to on-site receptor locations are based on the Unit 3 plant layout shown in DCD Figure 2.3-2. The meteorological data used in evaluating on-site doses is the same data used for the accident condition dose calculations in SSAR Section 2.3.4. The  $\chi/Q$  values for the control room and technical support center were calculated using the ARCON96 computer code in accordance with guidance as documented in RG 1.194. Necessary inputs to calculate  $\chi/Q$  values for the MCR and TSC using ARCON96 are shown in Table 2.3-1R, and DCD Tables 2.3-2 and 2.3-3. The horizontal distances and directions for the source and receptor combinations are shown in DCD Tables 2.3.4-1 through 2.3.4-7. ~~Onsite site specific distances used to determine  $\chi/Q$ 's are provided in Table 2.3-217.~~ Directions shown in these tables are adjusted by the difference in angle (142.46° clockwise) between the US-APWR plant north and true north. DCD Figure 2.3-2 shows the locations of postulated accidental releases from Unit 3 and the Unit 3 receptor locations.

These release locations are considered ground level releases and are treated as point sources except for a release from the containment shell which is considered as a diffuse area source. MCR and TSC  $\chi/Q$ s for the 95% time averaging periods of 0 to 2 hours, 2 to 8 hours, 8 to 24 hours, 1 to 4 days and 4 to 30 days which were obtained from the ARCON96 modeling results are summarized in Table 2.3-218 Sheets 1 through 7 for given source receptor pairs. Table 2.3-218 presents: intake  $\chi/Q$ s for the MCR in Sheets 1 and 2, inleak  $\chi/Q$ s in sheets 1 through 5, and both inleak and intake  $\chi/Q$ s for the TSC in sheets 6 and 7. The DCD provides  $\chi/Q$ s for the 95% time averaging period of 0 to 8 hours. In order to compare  $\chi/Q$  values to the DCD values,  $\chi/Q$ s for the 0 to 8 hour time period were calculated from the ARCON96 output using the methodology described in NUREG/CR-6331 (Reference 2.3-209) and are provided in Table 2.3-218. ~~The distances presented in Table 2.3-217 represent NAPS DEP 2.3(1) from the US APWR DCD source receptor distances listed in DCD Tables 2.3.4-1 through 2.3.4-7.~~

**NAPS DEP 2.3(1)**

**NAPS-DEP 2.3(4)**  
**NAPS COL 2.3(2)**

**Table 2.3-1R Common Input Parameters for  $\lambda/Q$  Calculation of MCR and TSC**

Common parameter for ARCON96	
Building area (m <sup>2</sup> )	<del>2000</del> <u>1200</u> <sup>(1)</sup>
Plant vent vertical velocity (m/s)	NA <sup>(2)</sup>
Stack flow (m <sup>3</sup> /s)	0 <sup>(3)</sup>
Stack radius (m)	0 <sup>(4)</sup>
Elevation difference (m)	0

Notes:

- (1) ~~According to the RG 1.194, the default value (2000 m<sup>2</sup>) is used to reasonably calculate.~~  
The default value (2000 m<sup>3</sup>) as described in RG 1.194, is not used for site-specific calculations.
- (2) The plant vent vertical velocity is not used due to ground release.
- (3) The stack flow is conservatively set to zero. (See ~~the~~ RG 1.194.)
- (4) The stack radius is set to zero according to ~~the~~ RG 1.194 due to zero stack flow.

~~NAPS COL 2.3(2)~~  
~~NAPS DEP 2.3(4)~~

**Table 2.3-217 ~~Distances and Directions Departures for Sources—~~  
~~Receptors used for ARCON06 [Deleted]~~**

<del>Source to Receptor</del>	<del>Distance (m)</del>	<del>Direction— (True North, °)</del>	<del>DCD Table Number</del>
<del>Fuel Handling Area to Control Room East HVAC/Class 1E Electrical Room South East HVAC Intake</del>	<del>84.3</del>	<del>220</del>	<del>2.3.4.7</del>
<del>Plant Vent to Control Room West HVAC/Class 1E Electrical Room South West HVAC Intake</del>	<del>57.7</del>	<del>237</del>	<del>2.3.4.4 2.3.4.7</del>
<del>Plant Vent to Reactor Building Door Intake</del>	<del>40.0</del>	<del>246</del>	<del>2.3.4.3 2.3.4.4 2.3.4.6 2.3.4.7</del>
<del>Fuel Handling Area to Class 1E Electrical Room North East HVAC Intake</del>	<del>70.0</del>	<del>220</del>	<del>2.3.4.7</del>

~~Note: Bearings listed in DCD Tables 2.3.4.1 through 2.3.4.7 are listed relative to Plant North. The difference from Plant North to True North is clockwise 142.46° (see Figure 1.2-1R).~~

~~The distances and bearings listed above are departures from the US APWR DCD listed in DCD Tables 2.3.4.1 through 2.3.4.7 and are the basis for NAPS DEP 2.3(4).~~

NAPS COL 2.3(2)

**Table 2.3-218 Main Control Room and TSC Atmospheric Dispersion Factors ( $\chi/Q$ ) for Accident Dose Analysis (Sheet 1 of 7)**

**Main Control Room  $\chi/Q$  (sec/m<sup>3</sup>) at the East HVAC Intake  
(Same as Inleakage via Class 1E Electrical Room South-East Intake)**

Time Interval	Plant Vent	Main Steam Line (East)	Main Steam Line (West)	Fuel Handling Area	Main Steam Relief Valve (East)
0-8 hours	7.1E-04	1.2E-02	2.1E-03	<del>7.4E-04</del> 8.5E-04	3.1E-03
0-2 hours	8.4E-04	1.6E-02	2.9E-03	<del>8.4E-04</del> 9.5E-04	3.8E-03
2-8 hours	6.7E-04	1.0E-02	1.8E-03	<del>7.2E-04</del> 8.1E-04	2.9E-03
8-24 hours	2.8E-04	3.5E-03	6.2E-04	<del>3.4E-04</del> 3.6E-04	1.1E-03
1-4 days	1.9E-04	2.4E-03	4.5E-04	<del>2.4E-04</del> 2.4E-04	7.4E-04
4-30 days	1.5E-04	2.2E-03	3.6E-04	<del>4.7E-04</del> 1.9E-04	5.8E-04

Time Interval	Main Steam Relief Valve (West)	Main Steam Safety Valve (East)	Main Steam Safety Valve (West)	Containment Shell
0-8 hours	1.8E-03	3.4E-03	1.8E-03	8.7E-04
0-2 hours	2.3E-03	4.3E-03	2.4E-03	1.1E-03
2-8 hours	1.6E-03	3.1E-03	1.6E-03	7.9E-04
8-24 hours	5.9E-04	1.1E-03	5.5E-04	3.4E-04
1-4 days	3.9E-04	7.2E-04	3.9E-04	2.5E-04
4-30 days	3.1E-04	5.8E-04	3.1E-04	1.9E-04

NAPS COL 2.3(2)

**Table 2.3-218 Main Control Room and TSC Atmospheric Dispersion Factors ( $\chi/Q$ ) for Accident Dose Analysis (Sheet 2 of 7)**

**Main Control Room  $\chi/Q$  (sec/m<sup>3</sup>) at the ~~East-West~~ HVAC Intake  
(Same as Inleakage via Class 1E Electrical Room ~~South-East~~  
South-West Intake)**

Time Interval	Plant Vent	Main Steam Line (East)	Main Steam Line (West)	Fuel Handling Area	Main Steam Relief Valve (East)
0-8 hours	<del>8.3E-04</del> <u>9.1E-04</u>	1.8E-03	5.8E-03	4.4E-04	1.7E-03
0-2 hours	<del>4.0E-03</del> <u>1.1E-03</u>	2.2E-03	6.9E-03	5.5E-04	2.2E-03
2-8 hours	<del>7.7E-04</del> <u>8.4E-04</u>	1.7E-03	5.4E-03	4.0E-04	1.5E-03
8-24 hours	<del>3.2E-04</del> <u>3.4E-04</u>	7.3E-04	2.3E-03	1.6E-04	5.9E-04
1-4 days	<del>2.4E-04</del> <u>2.6E-04</u>	5.3E-04	1.7E-03	1.2E-04	4.2E-04
4-30 days	<del>4.9E-04</del> <u>2.0E-04</u>	4.4E-04	1.4E-03	1.0E-04	3.5E-04
Time Interval	Main Steam Relief Valve (West)	Main Steam Safety Valve (East)	Main Steam Safety Valve (West)	Containment Shell	
0-8 hours	2.9E-03	1.9E-03	3.5E-03	8.2E-04	
0-2 hours	3.7E-03	2.5E-03	4.5E-03	1.1E-03	
2-8 hours	2.6E-03	1.7E-03	3.2E-03	7.2E-04	
8-24 hours	9.8E-04	6.8E-04	1.2E-03	2.8E-04	
1-4 days	6.8E-04	4.9E-04	8.8E-04	2.2E-04	
4-30 days	5.7E-04	4.0E-04	7.1E-04	1.8E-04	



**NAPS COL 2.3(2) Table 2.3-218 Main Control Room and TSC Atmospheric Dispersion Factors ( $\lambda/Q$ ) for Accident Dose Analysis (Sheet 3 of 7)**

**Main Control Room  $\lambda/Q$  (sec/m<sup>3</sup>) at the ~~East HVAC Intake~~  
(~~Same as Inleakage via Class 1E Electrical Room South-East Intake~~) Reactor Building Door**

Time Interval	Plant Vent	Main Steam Line (East)	Main Steam Line (West)	Fuel Handling Area	Main Steam Relief Valve (East)
0-8 hours	<del>9.8E-04</del> <u>1.0E-03</u>	1.6E-03	3.3E-03	5.3E-04	1.8E-03
0-2 hours	<del>1.2E-03</del> <u>1.3E-03</u>	1.8E-03	3.8E-03	6.8E-04	2.2E-03
2-8 hours	<del>9.0E-04</del> <u>9.5E-04</u>	1.5E-03	3.1E-03	4.8E-04	1.6E-03
8-24 hours	<del>3.6E-04</del> <u>3.7E-04</u>	6.2E-04	1.3E-03	2.0E-04	6.2E-04
1-4 days	<del>2.8E-04</del> <u>2.9E-04</u>	4.4E-04	9.0E-04	1.5E-04	4.5E-04
4-30 days	<del>2.2E-04</del> <u>2.3E-04</u>	3.6E-04	7.2E-04	1.2E-04	3.7E-04
Time Interval	Main Steam Relief Valve (West)	Main Steam Safety Valve (East)	Main Steam Safety Valve (West)	Containment Shell	
0-8 hours	2.9E-03	1.9E-03	3.2E-03	8.5E-04	
0-2 hours	3.6E-03	2.3E-03	3.9E-03	1.2E-03	
2-8 hours	2.6E-03	1.7E-03	2.9E-03	7.3E-04	
8-24 hours	1.0E-03	6.8E-04	1.2E-03	2.7E-04	
1-4 days	7.3E-04	5.0E-04	8.9E-04	2.1E-04	
4-30 days	6.1E-04	4.0E-04	6.9E-04	1.8E-04	

NAPS COL 2.3(2)

**Table 2.3-218 Main Control Room and TSC Atmospheric Dispersion Factors ( $\chi/Q$ ) for Accident Dose Analysis (Sheet 4 of 7)**

**Main Control Room  $\chi/Q$  (sec/m<sup>3</sup>) at the ~~East HVAC Intake~~  
(~~Same as Inleakage via Class 1E Electrical Room South-East-North-East~~  
Intake)**

Time Interval	Plant Vent	Main Steam Line (East)	Main Steam Line (West)	Fuel Handling Area	Main Steam Relief Valve (East)
0-8 hours	7.3E-04	8.9E-03	2.1E-03	<del>8.2E-04</del> 9.0E-04	3.2E-03
0-2 hours	8.6E-04	1.2E-02	2.9E-03	<del>8.0E-04</del> 9.8E-04	4.0E-03
2-8 hours	6.9E-04	7.9E-03	1.8E-03	<del>7.0E-04</del> 8.7E-04	2.9E-03
8-24 hours	2.8E-04	2.9E-03	6.0E-04	<del>3.4E-04</del> 3.8E-04	1.1E-03
1-4 days	2.0E-04	2.0E-03	4.4E-04	<del>2.3E-04</del> 2.5E-04	7.3E-04
4-30 days	1.5E-04	1.8E-03	3.7E-04	<del>4.8E-04</del> 2.0E-04	5.9E-04
Time Interval	Main Steam Relief Valve (West)	Main Steam Safety Valve (East)	Main Steam Safety Valve (West)	Containment Shell	
0-8 hours	1.8E-03	3.4E-03	1.8E-03	8.8E-04	
0-2 hours	2.3E-03	4.3E-03	2.4E-03	1.1E-03	
2-8 hours	1.6E-03	3.1E-03	1.6E-03	8.1E-04	
8-24 hours	5.8E-04	1.0E-03	5.5E-04	3.5E-04	
1-4 days	3.9E-04	7.1E-04	3.8E-04	2.5E-04	
4-30 days	3.1E-04	5.7E-04	3.1E-04	1.9E-04	

NAPS COL 2.3(2)

**Table 2.3-218 Main Control Room and TSC Atmospheric Dispersion Factors ( $\lambda/Q$ ) for Accident Dose Analysis (Sheet 5 of 7)**

**Main Control Room  $\lambda/Q$  (sec/m<sup>3</sup>) at the ~~East HVAC Intake~~  
~~(Same as Inleakage via Class 1E Electrical Room South-East-North-West Intake)~~**

Time Interval	Plant Vent	Main Steam Line (East)	Main Steam Line (West)	Fuel Handling Area	Main Steam Relief Valve (East)
0-8 hours	9.2E-04	1.8E-03	5.4E-03	4.5E-04	1.8E-03
0-2 hours	1.1E-03	2.2E-03	6.2E-03	5.5E-04	2.3E-03
2-8 hours	8.6E-04	1.7E-03	5.1E-03	4.1E-04	1.6E-03
8-24 hours	3.5E-04	7.5E-04	2.2E-03	1.7E-04	6.1E-04
1-4 days	2.7E-04	5.3E-04	1.6E-03	1.2E-04	4.3E-04
4-30 days	2.1E-04	4.5E-04	1.3E-03	1.0E-04	3.6E-04
Time Interval	Main Steam Relief Valve (West)	Main Steam Safety Valve (East)	Main Steam Safety Valve (West)	Containment Shell	
0-8 hours	3.0E-03	2.0E-03	3.6E-03	8.3E-04	
0-2 hours	3.9E-03	2.5E-03	4.6E-03	1.1E-03	
2-8 hours	2.7E-03	1.8E-03	3.2E-03	7.4E-04	
8-24 hours	1.0E-03	6.9E-04	1.3E-03	2.8E-04	
1-4 days	7.3E-04	5.0E-04	9.0E-04	2.2E-04	
4-30 days	5.8E-04	4.0E-04	7.5E-04	1.9E-04	

NAPS COL 2.3(2)

**Table 2.3-218 Main Control Room and TSC Atmospheric Dispersion Factors ( $\chi/Q$ ) for Accident Dose Analysis (Sheet 6 of 7)**

**Main Control Room  $\chi/Q$  ( $\text{sec}/\text{m}^3$ ) at the East HVAC Intake**  
**(Same as Inleakage via Class 1E Electrical Room South-East Intake) South**  
**Intake Technical Support Center Dispersion Factor  $\chi/Q$  ( $\text{sec}/\text{m}^3$ )**

Time Interval	Plant Vent	Main Steam Line (East)	Main Steam Line (West)	Fuel Handling Area	Main Steam Relief Valve (East)
0–8 hours	8.2E-04	5.6E-04	9.9E-04	3.1E-04	7.5E-04
0–2 hours	1.1E-03	6.6E-04	1.2E-03	4.0E-04	9.1E-04
2–8 hours	7.3E-04	5.3E-04	9.2E-04	2.8E-04	7.0E-04
8–24 hours	2.7E-04	2.4E-04	4.1E-04	1.2E-04	2.8E-04
1–4 days	2.0E-04	1.7E-04	3.0E-04	8.3E-05	2.1E-04
4–30 days	1.7E-04	1.3E-04	2.3E-04	7.4E-05	1.6E-04
Time Interval	Main Steam Relief Valve (West)	Main Steam Safety Valve (East)	Main Steam Safety Valve (West)	Containment Shell	
0–8 hours	1.2E-03	7.5E-04	1.2E-03	6.7E-04	
0–2 hours	1.4E-03	9.0E-04	1.4E-03	9.2E-04	
2–8 hours	1.1E-03	7.0E-04	1.1E-03	5.9E-04	
8–24 hours	4.2E-04	2.8E-04	4.4E-04	2.2E-04	
1–4 days	3.2E-04	2.1E-04	3.2E-04	1.7E-04	
4–30 days	2.5E-04	1.6E-04	2.5E-04	1.4E-04	

NAPS COL 2.3(2)

**Table 2.3-218 Main Control Room and TSC Atmospheric Dispersion Factors ( $\chi/Q$ ) for Accident Dose Analysis (Sheet 7 of 7)**

**Main Control Room  $\chi/Q$  ( $\text{sec}/\text{m}^3$ ) at the East HVAC Intake**  
**(Same as Inleakage via Class 1E Electrical Room South-East Intake) North**  
**Intake Technical Support Center Dispersion Factor  $\chi/Q$  ( $\text{sec}/\text{m}^3$ )**

Time Interval	Plant Vent	Main Steam Line (East)	Main Steam Line (West)	Fuel Handling Area	Main Steam Relief Valve (East)
0–8 hours	9.3E-04	4.9E-04	7.7E-04	3.5E-04	7.1E-04
0–2 hours	1.2E-03	5.6E-04	8.9E-04	4.5E-04	8.3E-04
2–8 hours	8.4E-04	4.7E-04	7.3E-04	3.1E-04	6.7E-04
8–24 hours	3.2E-04	2.0E-04	3.0E-04	1.4E-04	2.8E-04
1–4 days	2.3E-04	1.4E-04	2.1E-04	9.4E-05	2.1E-04
4–30 days	1.9E-04	1.1E-04	1.7E-04	8.3E-05	1.6E-04
Time Interval	Main Steam Relief Valve (West)	Main Steam Safety Valve (East)	Main Steam Safety Valve (West)	Containment Shell	
0–8 hours	1.0E-03	6.9E-04	1.0E-03	7.2E-04	
0–2 hours	1.2E-03	8.1E-04	1.2E-03	9.5E-04	
2–8 hours	9.9E-04	6.5E-04	9.4E-04	6.4E-04	
8–24 hours	4.2E-04	2.8E-04	4.1E-04	2.4E-04	
1–4 days	3.0E-04	2.0E-04	2.8E-04	1.9E-04	
4–30 days	2.5E-04	1.6E-04	2.4E-04	1.5E-04	

## 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

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<sup>1</sup>.~~
- ~~• 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<sup>1</sup>.~~
- ~~• Distance from fuel handling area (source) to the Class 1E Electrical Room northeast HVAC intake (receptor) is increased from 76 m to 79.0 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;~~

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~~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 40 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);