Entergy

Entergy Operations, Inc.
1340 Echelon Parkway
Jackson, Mississippi 39213-8298

William K. Hughey
Director, Licensing – New Plant
(601) 368-5327
whughey@entergy.com

G3NO-2008-00006

October 13, 2008

U. S. Nuclear Regulatory Commission
Washington, DC 20555-0001
Attention: Document Control Desk

DOCKET NO.: 52-024

SUBJECT: Responses to NRC Requests for Additional Information, Letter No. 2 (GG3 COLA)

REFERENCE: NRC Letter to Entergy Nuclear, Request for Additional Information Letter No. 02 Related to SRP Section 2.3.1, 2.3.4, and 2.3.5 for the Grand Gulf Combined License Application, dated September 12, 2008 (ADAMS Accession No. ML082550663)

Dear Sir or Madam:

In the referenced letter, the NRC requested additional information on seven items to support the review of certain portions of the Grand Gulf Unit 3 Combined License Application (COLA). The responses to the following Requests for Additional Information (RAIs) are provided as Attachments 1 through 7 to this letter:

- RAI No. 02.03.01-1, Winter Precipitation Site Characteristics
- RAI No. 02.03.01-2, 2% Exceedance Temperature Values
- RAI No. 02.03.01-3, 1% Exceedance Temperature Values
- RAI No. 02.03.01-4, 1% Exceedance Temperature Values
- RAI No. 02.03.01-5, 0% Exceedance Temperature Values
- RAI No. 02.03.04-1, Control Room X/Q Values
- RAI No. 02.03.05-1, Long Term Dispersion Estimates

D088
NRO

Should you have any questions, please contact me or Mr. Tom Williamson of my staff. Mr. Williamson may be reached as follows:

Telephone: (601-368-5786)

Mailing Address: 1340 Echelon Parkway
Mail Stop M-ECH-21
Jackson, MS 39213

E-Mail Address: twilli2@entergy.com

This letter contains commitments as identified in Attachment 8.

I declare under penalty of perjury that the foregoing is true and correct.

Executed on October 13, 2008.

Sincerely,

WKH/ghd

Attachments:
1. Response to RAI Question No. 02.03.01-1
2. Response to RAI Question No. 02.03.01-2
3. Response to RAI Question No. 02.03.01-3
4. Response to RAI Question No. 02.03.01-4
5. Response to RAI Question No. 02.03.01-5
6. Response to RAI Question No. 02.03.04-1
7. Response to RAI Question No. 02.03.05-1
8. Regulatory Commitments

cc (email, unless otherwise specified):

Mr. T. A. Burke (ECH)
Mr. S. P. Frantz (Morgan, Lewis & Bockius)
Mr. B. R. Johnson (GE-Hitachi)
Ms. M. Kray (NuStart)
Mr. P. D. Hinnenkamp (ECH)

NRC Project Manager – GGNS COLA
NRC Director – Division of Construction Projects (Region II)
NRC Regional Administrator - Region IV
NRC Resident Inspectors' Office - GGNS

ATTACHMENT 1

G3NO-2008-00006

RESPONSE TO NRC RAI LETTER NO. 2

RAI QUESTION NO. 02.03.01-1

RAI QUESTION NO. 02.03.01-1

NRC RAI 02.03.01-1

Revise the FSAR to list the normal winter precipitation event, the extreme frozen winter precipitation event, and extreme liquid winter precipitation event as site characteristics in accordance with the Proposed Interim Staff Guidance (ISG) DC/COL-ISG-07, "Interim Staff Guidance on Assessment of Normal and Extreme Winter Precipitation Loads on the Roofs of Seismic Category I Structures," (ML081990438). Provide a basis for the chosen site parameter values.

Entergy Response

Proposed Interim Staff Guidance (ISG) DC/COL-ISG-07 defines the events and requested site characteristics, and an acceptable method for determining each, as follows:

Normal Winter Precipitation Event

> *The normal winter precipitation event should be the highest ground-level weight (in lb/ft^2) among (1) the 100-year return period snowpack, (2) the historical maximum snowpack, (3) the 100-year return period snowfall event, or (4) the historical maximum snowfall event in the site region. An appropriate source for the 100-year return period snowpack is the American Society of Civil Engineers (ASCE) Standard No. 7-05, "Minimum Design Loads for Buildings and Other Structures." Figure 7-1 of ASCE 7-05 presents a map of the continental United States showing ground snowpack values (in lb/ft$_2$) with a 50-year mean recurrence interval. Table C7-3 of ASCE 7-05 suggests that 1.22 is a reasonable factor to convert the 50-year mean recurrence interval values to 100-year mean recurrence interval values.*

ESP SSAR Section 2.3.1.2.4 provides the 100-year return site characteristic winter precipitation snow load of 6.1 psf based on a 50-year return snow load of 5 psf from Figure 7-1 of ASCE 7-02 (equivalent to the normal winter precipitation event as defined in the ISG). Figure 7-1 of ASCE 7-05 also indicates a value of 5 psf for the 50-year return snow load for the Grand Gulf site area. The 100-year return snow load site characteristic of 6.1 psf is listed in the Grand Gulf Early Site Permit (ESP-002), Appendix A (p. A-4).

Extreme Frozen Winter Precipitation Event

> *The extreme frozen winter precipitation event should be the higher ground-level weight (in lb/ft^2) between (1) the 100-year return period snowfall event and (2) the historical maximum snowfall event in the site region. An appropriate source for the 100-year return period snowfall event and the historical maximum snowfall event is the National Climatic Data Center's (NCDC's) Snow Climatology web site (Reference 11). The two-day 100-year return period and observed maximum snowfall amounts available from this web site are appropriate for use in defining the 100-year return period snowfall event and the historical maximum snowfall event, respectively.*

The following data were obtained for the 2-day 100-yr return snowfall and the 2-day observed maximum snowfall for a number of weather stations around the Grand Gulf site from the NCDC website (Reference 11 of the proposed ISG).

Weather Station Location [a]	2-day 100-yr Return Snowfall (inches)	Observed Maximum (inches) [b]
Port Gibson 3 NE	10.3	9.0
Jackson WSFO Airport	NA	6.0
Jackson 4 NW	NA	10.5 [c]
Vicksburg Military Park	NA	7.5
Vicksburg (229220)	NA	10.0
Vicksburg (229215)	NA	8.0

NOTES: a. Data taken from website http://www.ncdc.noaa.gov/ussc
b. 2-day Observed Max
c. The observed maximum for the period from August – July is 10.6 inches
NA Not Applicable, or insufficient data to compute

The maximum 24-hour snowfall at Jackson, MS was 10.6 inches in January 1940 (SSAR Section 2.3.1.2.4). This value is greater than the 2-day 100-yr return snowfall recorded for Port Gibson, MS and is greater than any 2-day observed maximum snowfall for any of the other weather stations, above, in Mississippi in areas surrounding the Grand Gulf site. Therefore, the site characteristic extreme frozen winter precipitation event snowfall is 10.6 inches of snow. Using an average snow density of 0.11 inches of water per inch of snow [Ref. SSAR Section 2.3.1.2.4 – average snow density is (0.07 + 0.15)/2 = 0.11] and the maximum 24-hour snowfall of 10.6 inches results in a snow load of 6.06 psf. As noted in SSAR Section 2.3.1.2.4 and above for the normal winter precipitation event, this value is consistent with the SEI/ASCE 7-02 derived 100-yr return snow load of 6.1 psf.

Extreme Liquid Winter Precipitation Event

> *The extreme liquid winter precipitation event is defined as the theoretically greatest depth of precipitation (in inches of water) for a 48-hour period that is physically possible over a 25.9-square-kilometer (10-square-mile) area at a particular geographical location during those months with the historically highest snowpacks. The extreme liquid winter precipitation event should be determined in accordance with the Hydrometeorological Reports (HMR) published by NOAA's Hydrometeorological Design Studies Center (e.g., References 5–9).*

SSAR 2.3.1.2.5 provides the extreme liquid winter precipitation event site characteristic of 35 inches of rainwater, based on Hydrometeorological Report (HMR) No. 53 dated April 1980. The 48-hour probable maximum winter precipitation site characteristic of 35 inches of water is listed in the Grand Gulf Early Site Permit (ESP-002), Appendix A (p. A-4).

Proposed COLA Revision

None. Because this information is provided in ESP SSAR Sections 2.3.1.2.4 and 2.3.1.2.5, and has not changed based on this RAI response, the FSAR is not being revised.

ATTACHMENT 2

G3NO-2008-00006

RESPONSE TO NRC RAI LETTER NO. 2

RAI QUESTION NO. 02.03.01-2

RAI QUESTION NO. 02.03.01-2

NRC RAI 02.03.01-2

FSAR Table 2.0-201 lists a Unit 3 maximum 2% exceedance coincident wet bulb site characteristic value of 78°F (Sheet 4 of 25) and states that the maximum 2% exceedance noncoincident wet bulb value was not provided in the GGNS ESPA SSAR (Sheet 5 of 25). The staff believes that the 78°F value listed in FSAR Table 2.0-201 as a Unit 3 maximum 2% exceedance coincident wet bulb value is actually the Unit 3 maximum 2% exceedance non-coincident wet bulb value.

Entergy Response

The value of 78°F in Table 2.0-201, Sheet 4 of 25, identified as a coincident wet bulb temperature, is actually the non-coincident wet bulb temperature taken from SSAR Table 2.3-3. A 2% annual exceedance wet bulb mean coincident temperature site characteristic was not provided in the SSAR. Therefore, a 2% exceedance mean coincident value of 76°F, taken from the 2001 ASHRAE Fundamentals Handbook (ASHRAE 2001) for Jackson, MS corresponding to a 2% annual exceedance dry bulb temperature of 92°F, also taken from the ASHRAE 2001 for Jackson, MS, will be used for this site characteristic for Grand Gulf.

In addition to the above correction and change, the site characteristic maximum 2% annual exceedance wet bulb non-coincident temperature on Sheet 5 of 25 of Table 2.0-201 utilized the SSAR Table 2.3-3 0.4% exceedance value of 80°F for comparison to the ESBWR site parameter. The 2% annual exceedance non-coincident wet bulb temperature of 78°F, based on ASHRAE 2001, for Jackson, MS, was provided in SSAR Table 2.3-3 as noted above. Therefore, the site characteristic 2% annual exceedance wet bulb non-coincident temperature in Table 2.0-201 will be revised to use the ASHRAE value of 78°F as listed in SSAR Table 2.3-3.

Other changes to the **Ambient Design Temperature** information in Table 2.0-201 are reflected in the attached FSAR draft markup to incorporate changes made in Revision 5 of DCD Table 2.0-1; e.g., to indicate that the 1% and 2% exceedance temperatures are annual exceedance values, that the coincident wet bulb temperatures are mean coincident values, and to revise Note 6 of Table 2.0-201 to agree with changes to the corresponding DCD Table 2.0-1 Note 6.

Proposed COLA Revision

FSAR Table 2.0-201 will be revised as indicated in the attached draft markup.

Markup of Grand Gulf COLA

The following markup represents Entergy'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.

Grand Gulf Nuclear Station, Unit 3
COL Application
Part 2, FSAR

GGNS COL 2.0-1-A

TABLE 2.0-201 (Sheet 4 of 31)
COMPARISON OF ESBWR DCD SITE PARAMETERS (1) WITH UNIT 3 SITE CHARACTERISTICS

Parameter	ESBWR Site Parameter	Unit 3 Site Characteristic	Bounding Yes/No	Comments
Maximum Ground Snow Load (5) (100-year recurrence interval):	2394 Pa (50 lbf/ft^2)	6.1 lbf/ft^2	Yes	SSAR 2.3.1.4 provides a maximum ground snow load lower than that in the DCD. Therefore, the Unit 3 site characteristic value for maximum ground snow load within the value established by the ESBWR site parameter.
Maximum 48-hr Winter Rainfall: (5)	91.4 cm (36 in.)	35 in.	Yes	SSAR 2.3.1.2.5 provides a maximum 48-hr winter rainfall lower than that in the DCD. Therefore, the Unit 3 site characteristic value for maximum 48-hr winter rainfall falls within the value established by the ESBWR site parameter.
Ambient Design Temperature:(6)				
2% Annual Exceedance Values				
Maximum:	35.6°C (96°F) dry bulb	92°F dry bulb	Yes	SSAR Table 2.3-3 provides a maximum 2% annual exceedance dry bulb temperature lower than that in the DCD. Therefore, the Unit 3 site characteristic value for maximum 2% annual exceedance dry bulb temperature falls within the value established by the ESBWR site parameter.

Grand Gulf Nuclear Station, Unit 3
COL Application
Part 2, FSAR

GGNS COL 2.0-1-A

TABLE 2.0-201 (Sheet 5 of 31)
COMPARISON OF ESBWR DCD SITE PARAMETERS (1) WITH UNIT 3 SITE CHARACTERISTICS

Parameter	ESBWR Site Parameter	Unit 3 Site Characteristic	Bounding Yes/No	Comments
	26.1°C (79°F) wet bulb (mean coincident)	~~78~~76°F wet bulb (coincident) See Comment	Yes	~~SSAR Table 2.3-3 provides a maximum 2% exceedance coincident wet bulb temperature lower than that in the DCD.~~The 2% annual exceedance dry bulb temperature is taken from ASHRAE Fundamentals Handbook 2001, for Jackson, MS, as indicated in SSAR Table 2.3-3. The site characteristic 2% annual exceedance coincident wet bulb temperature was not provided in the SSAR. The ASHRAE 2001 2% annual exceedance mean coincident wet bulb temperature is 76°F for a 92°F dry bulb for the Jackson, MS area, which is lower than the corresponding DCD site parameter. Therefore, the Unit 3 site characteristic value for maximum 2% annual exceedance coincident wet bulb temperature falls within the value established by the ESBWR site parameter.
Maximum:	27.2°C (81°F) wet bulb (non-coincident)	~~80~~78°F wet bulb (non-coincident) ~~(0.4% exceedance value)~~ ~~See Comment~~	Yes	~~The site characteristic 2% annual exceedance value for the maximum wet bulb temperature (non-coincident) was not provided in the SSAR. However, the value would be lower than the site 0.4% annual exceedance value of 80°F shown, which is from SSAR Table 2.3-3.~~ SSAR Table 2.3-3 provides a maximum 2% annual exceedance non-coincident wet bulb temperature of 78°F, taken from ASHRAE 2001, for Jackson, MS, which is lower than that in the DCD. Therefore, the Unit 3 site characteristic value for maximum 2% annual exceedance non-coincident wet bulb temperature falls within the value established by the ESBWR site parameter.

Grand Gulf Nuclear Station, Unit 3
COL Application
Part 2, FSAR

GGNS COL 2.0-1-A

TABLE 2.0-201 (Sheet 6 of 31)
COMPARISON OF ESBWR DCD SITE PARAMETERS (1) WITH UNIT 3 SITE CHARACTERISTICS

Parameter	ESBWR Site Parameter	Unit 3 Site Characteristic	Bounding Yes/No	Comments
Minimum:	-23.3°C (-10°F)	25°F (1% exceedance value) See Comment	Yes	The site characteristic 2% annual exceedance value for minimum temperature was not provided in the SSAR. However, the value would be greater than the site 1% annual exceedance value of 25°F shown, which is from SSAR Table 2.3-3. Therefore, the Unit 3 site characteristic value for minimum 2% annual exceedance temperature falls within the value established by the ESBWR site parameter.
1% Annual Exceedance Values				
Maximum:	37.8°C (100°F) dry bulb	~~95~~93°F dry bulb ~~(0.4% exceedance value)~~ See comment	Yes	The site characteristic 1% annual exceedance value for the maximum dry bulb temperature was not provided in the SSAR. ~~However, the value would be lower than the site 0.4% annual exceedance value of 95°F shown, which is from SSAR Table 2.3-3.~~ASHRAE 2001 indicates a 1% annual exceedance dry bulb temperature of 93°F for the Jackson, MS area, which is lower than the corresponding DCD site parameter. Using this ASHRAE 2001 value as the Unit 3 site characteristic is consistent with the methodology for establishment of the 2% annual exceedance dry bulb temperature values. Therefore, the Unit 3 site characteristic value for maximum 1% annual exceedance dry bulb temperature falls within the value established by the ESBWR site parameter.

Grand Gulf Nuclear Station, Unit 3
COL Application
Part 2, FSAR

GGNS COL 2.0-1-A

TABLE 2.0-201 (Sheet 7 of 31)
COMPARISON OF ESBWR DCD SITE PARAMETERS (1) WITH UNIT 3 SITE CHARACTERISTICS

Parameter	ESBWR Site Parameter	Unit 3 Site Characteristic	Bounding Yes/No	Comments
Maximum:	26.1°C (79°F) wet bulb (mean coincident)	~~80~~76°F wet bulb (coincident) ~~(0.4% exceedance value)~~ See comment	Yes	The site characteristic 1% annual exceedance value for the maximum wet bulb temperature (coincident) was not provided in the SSAR. ~~The value of 80°F provided is the site 0.4% exceedance value from SSAR Table 2.3-3 (referenced to the 2001 ASHRAE Fundamentals Handbook for Jackson, MS). This site characteristic exceeds the site parameter given in the DCD. However, the HVAC design is based on the combination of maximum dry bulb and maximum coincident wet bulb temperature. Therefore, a site characteristic of coincident wet bulb temperature greater than the site parameter is acceptable, given that the maximum dry bulb site characteristic is bounded by the ESBWR dry bulb site parameter.~~ ASHRAE 2001 indicates a mean coincident 1% annual exceedance wet bulb temperature of 76°F for the Jackson, MS area, which is lower than the corresponding DCD site parameter. Using this ASHRAE value as the Unit 3 site characteristic is consistent with the methodology for establishment of the 2% annual exceedance values. Therefore, the Unit 3 site characteristic value for the 1% annual exceedance mean coincident wet bulb temperature falls within the value established as the ESBWR site parameter.

GGNS COL
2.0-1-A

TABLE 2.0-201 (Sheet 8 of 31)
COMPARISON OF ESBWR DCD SITE PARAMETERS (1) WITH UNIT 3 SITE CHARACTERISTICS

Parameter	ESBWR Site Parameter	Unit 3 Site Characteristic	Bounding Yes/No	Comments
	27.8°C (82°F) wet bulb (non-coincident)	~~80.4~~79°F (non-coincident) ~~(0.4% exceedance value)~~ See comment	Yes	The site characteristic 1% annual exceedance value for the maximum wet bulb temperature (non-coincident) was not provided in the SSAR. ~~However, the value would be lower than the site 0.4% annual exceedance value of 80.4°F shown, which is from SSAR Table 2.3-3~~ASHRAE 2001 provides a 1% annual exceedance non-coincident wet bulb temperature for the Jackson, MS area of 79°F, which is lower than the corresponding DCD site parameter. Using this ASHRAE value as the Unit 3 site characteristic is consistent with the methodology for establishment of the 2% annual exceedance values. Therefore, the Unit 3 site characteristic value for maximum 1% annual exceedance non-coincident wet bulb temperature falls within the value established by the ESBWR site parameter.
Minimum:	-23.3°C (-10°F)	25°F	Yes	SSAR Table 2.3-3 provides a minimum 1% annual exceedance temperature greater than that in the DCD. Therefore, the Unit 3 site characteristic value for minimum 1% annual exceedance temperature falls within the value established by the ESBWR site parameter.

GGNS COL 2.0-1-A

TABLE 2.0-201 (Sheet 9 of 31)
COMPARISON OF ESBWR DCD SITE PARAMETERS (1) WITH UNIT 3 SITE CHARACTERISTICS

Parameter	ESBWR Site Parameter	Unit 3 Site Characteristic	Bounding Yes/No	Comments
0% Exceedance Values				
Maximum:	47.2°C (117°F) dry bulb	108°F dry bulb (100-year return period) See comment	Yes	The site characteristic 0% ~~annual~~ exceedance value for maximum temperature was not provided in the SSAR. A 0% exceedance maximum dry bulb value of 104°F was determined using methodology consistent with that in the Advanced Light Water Reactor-Utility Requirement Document (ALWR-URD) using 35 years of meteorological data taken from the Jackson, MS airport weather station. ~~However, the value would not exceed the site~~A 100-year return period value of 108°F ~~shown, which is from~~provided in SSAR 2.3.2.1.2. This site characteristic will use the higher of these values, 108°F. ~~Therefore, the~~The Unit 3 site characteristic value for maximum 0% exceedance dry bulb temperature falls within (is less than) the value established by the ESBWR site parameter.

Grand Gulf Nuclear Station, Unit 3
COL Application
Part 2, FSAR

GGNS COL
2.0-1-A

TABLE 2.0-201 (Sheet 10 of 31)
COMPARISON OF ESBWR DCD SITE PARAMETERS (1) WITH UNIT 3 SITE CHARACTERISTICS

Parameter	ESBWR Site Parameter	Unit 3 Site Characteristic	Bounding Yes/No	Comments
	26.7°C (80°F) wet bulb (mean coincident)	~~81~~80°F wet bulb ~~(average for worst 1 day)~~ ~~See comment~~	Yes	The site characteristic 0% ~~annual~~ exceedance value for maximum (mean coincident) wet bulb temperature was not provided in the SSAR. A maximum 0% exceedance coincident wet bulb temperature of 80°F was determined for the maximum 0% exceedance dry bulb temperature of 104°F defined above, using 35 years of meteorological data taken from the Jackson, MS airport weather station. The maximum coincident wet bulb temperature would be greater than the mean coincident value. ~~The value of 81°F provided is the worst single day average temperature from SSAR Table 2.3-16. This site characteristic exceeds the site parameter given in the DCD. However, the HVAC design is based on the combination of maximum dry bulb and maximum coincident wet bulb temperature. Therefore, a site characteristic of coincident wet bulb temperature greater than the site parameter is acceptable, given that the maximum dry bulb site characteristic is bounded by the ESBWR dry bulb site parameter.~~ The Unit 3 site characteristic value for the maximum coincident 0% exceedance wet bulb temperature falls within (is equal to) the value established by the ESBWR site parameter.

Grand Gulf Nuclear Station, Unit 3
COL Application
Part 2, FSAR

GGNS COL 2.0-1-A

TABLE 2.0-201 (Sheet 11 of 31)
COMPARISON OF ESBWR DCD SITE PARAMETERS (1) WITH UNIT 3 SITE CHARACTERISTICS

Parameter	ESBWR Site Parameter	Unit 3 Site Characteristic	Bounding Yes/No	Comments
Maximum:	31.1°C (88°F) wet bulb (non-coincident)	~~81~~83°F wet bulb (~~average for worst 1 day~~non-coincident) ~~See comment~~	Yes	The site characteristic 0% ~~annual~~ exceedance value for maximum (non-coincident) wet bulb temperature was not provided in the SSAR. A value of 83°F has been determined for this site characteristic using methodology consistent with that in the Advanced Light Water Reactor-Utility Requirement Document (ALWR-URD), using 35 years of meteorological data taken from the Jackson, MS airport weather station. ~~However, the value would not exceed the average temperature for the worst single day value of 81°F shown, which is from SSAR Table 2.3-16. Therefore, the~~The Unit 3 site characteristic value for maximum 0% exceedance non-coincident wet bulb temperature falls within (is less than) the value established by the ESBWR site parameter.
Minimum:	-40°C (-40°F)	-6°F (100-year return period) See comment	Yes	The site characteristic 0% annual exceedance value for minimum temperature was not provided in the SSAR. However, the value would not be lower than the site 100-year return period value of -6°F shown, which is from SSAR 2.3.2.1.2. Therefore, the Unit 3 site characteristic value for minimum 0% exceedance temperature falls within (is greater than) the value established by the ESBWR site parameter.
Soil Properties:				
Minimum Static Bearing Capacity: (7)				
Reactor/Fuel Building:	699 kPa (14,600 lbf/ft^2)	261,000 lbf/ft^2	Yes	FSAR 2.5.4.10.2 provides a Reactor/Fuel Building static bearing capacity greater than that in the DCD. Therefore, the Unit 3 site characteristic value for Reactor/Fuel Building minimum static bearing capacity falls within the value established by the ESBWR site parameter.

Grand Gulf Nuclear Station, Unit 3
COL Application
Part 2, FSAR

GGNS COL
2.0-1-A

TABLE 2.0-201 (Sheet 29 of 31)
COMPARISON OF ESBWR DCD SITE PARAMETERS (1) WITH UNIT 3 SITE CHARACTERISTICS

Notes for Table 2.0-201:

(1) The design of the Radwaste Building uses a set of design parameters that are specified in RG 1.143, Table 2, Class RW IIa instead of the corresponding values given in this table.

(2) PMF, as defined in Table 1.2-6 of Volume III of DCD Reference 2.0-4.

(3) Maximum speed selected is based on Attachment 1 of DCD Reference 2.0-5, which summarizes the NRC Interim Position on RG 1.76. Concrete structures designed to resist Spectrum I missiles of SRP 3.5.1.4, Rev. 2, will also resist missiles postulated in RG 1.76, Revision 1.

(4) Based on probable maximum precipitation (PMP) for one hour over 2.6 km^2 (one square mile) with a ratio of 5 minutes to one hour PMP of 0.32 as found in DCD Reference 2.0-3. Roof scuppers and drains are designed independently to limit water accumulation on the roof to no more than100 mm (4 in) during PMP conditions. See also DCD Table 3G.1-2.

(5) Maximum design roof load accommodates snow load and 48-hour probable maximum winter precipitation (PMWP) in DCD References 2.0-2 and 2.0-6. Roof scuppers and drains are designed independently to limit water accumulation on the roof to no more than an average depth of 100 mm (4 in) during PMWP conditions. See also DCD Table 3G.1-2.

(6) ESBWR Site Parameter ~~Z~~zero percent exceedance values are based on conservative estimates of historical high and low values for potential sites. Consistent with DCD Reference 2.0-4, they represent historical limits, excluding peaks of less than two hours. One and two percent annual exceedance values were selected in order to bound the values presented in DCD Reference 2.0-4 and available Early Site Permit applications.

ATTACHMENT 3

G3NO-2008-00006

RESPONSE TO NRC RAI LETTER NO. 2

RAI QUESTION NO. 02.03.01-3

RAI QUESTION NO. 02.03.01-3

NRC RAI 02.03.01-3

FSAR Table 2.0-201 (Sheet 6 of 25) lists a Unit 3 maximum 0.4% exceedance coincident wet bulb site characteristic value of 80°F. The staff believes that the 80°F value listed in FSAR Table 2.0-201 as a Unit 3 maximum 0.4% exceedance coincident wet bulb value is actually the Unit 3 maximum 0.4% exceedance non-coincident wet bulb value.

Entergy Response

The site characteristic 1% exceedance value of 80°F in Table 2.0-201 (Sheet 6 of 25), is identified in the table as a 0.4% exceedance coincident wet bulb temperature; however, the value of 80°F listed is actually a non-coincident wet bulb temperature taken from SSAR Table 2.3-3. Neither a 1% exceedance dry bulb temperature nor a 1% exceedance wet bulb mean coincident temperature site characteristic were provided in the SSAR. Therefore, a maximum 1% exceedance mean coincident wet bulb temperature of 76°F corresponding to a maximum 1% exceedance dry bulb temperature of 93°F, both taken from the ASHRAE 2001 for Jackson, MS, will be used for these site characteristics for Grand Gulf.

Proposed COLA Revision

FSAR Table 2.0-201 will be revised as indicated in the draft markup included with Attachment 2.

ATTACHMENT 4

G3NO-2008-00006

RESPONSE TO NRC RAI LETTER NO. 2

RAI QUESTION NO. 02.03.01-4

RAI QUESTION NO. 02.03.01-4

NRC RAI 02.03.01-4

FSAR Table 2.0-201 (Sheet 6 of 25) states the Unit 3 maximum 1% exceedance coincident wet bulb site characteristic value of 80°F exceeds the corresponding ESBWR site parameter value of 79°F. Identify the ESBWR standard plant structures, systems, and components (SSCs) which used the maximum 1% exceedance coincident wet bulb site parameter value of 79°F as a design-basis and perform an evaluation demonstrating that these SSCs have sufficient margin to accommodate a 1°F change in the coincident wet bulb temperature.

Entergy Response

As indicated in the response to RAI 02.03.01-3, a 1% annual exceedance wet bulb coincident temperature of 76°F taken from ASHRAE 2001 for the Jackson, MS area will be used as the site characteristic for the Grand Gulf site. This value is less than (falls within) the ESBWR DCD Site Parameter for the maximum mean coincident wet bulb temperature of 79°F; therefore, there is no associated departure nor impact to the ESBWR standard plant design.

In addition to the change to the site characteristic maximum 1% exceedance mean coincident wet bulb temperature described above, the site characteristic maximum 1% exceedance non-coincident wet bulb temperature is revised to utilize the value of 79°F from ASHRAE 2001 for the Jackson, MS area. This change establishes this site characteristic utilizing a source consistent with that for other 1% and 2% exceedance ambient design temperature information; i.e., ASHRAE 2001 for Jackson, MS.

Proposed COLA Revision

FSAR Table 2.0-201 will be revised as indicated in the draft markup included with Attachment 2.

ATTACHMENT 5

G3NO-2008-00006

RESPONSE TO NRC RAI LETTER NO. 2

RAI QUESTION NO. 02.03.01-5

RAI QUESTION NO. 02.03.01-5

NRC RAI 02.03.01-5

FSAR Table 2.0-201 (Sheet 7 of 25) lists Unit 3 maximum 0% exceedance coincident and noncoincident wet bulb site characteristic values of 81°F based on the worst (i.e., highest) 1-day value presented in the GGNS ESPA SSAR. These highest 1-day wet bulb values are inconsistent with ESBWR DCD Tier 2 Table 2.0-1 footnote 06 which states 0% exceedance values are based on conservative estimates of historical high and low (i.e., maximum hourly) values for potential sites.

10 CFR 52.79(a)(1)(iii) states, in part, that COL applications must identify the meteorological characteristics of the proposed site with appropriate consideration of the most severe of the natural phenomena that have been historically reported for the site and surrounding area and with sufficient margin for the limited accuracy, quantity, and period of time in which the historical data have been accumulated. In order to be compliant with 10 CFR 52.79(a)(1)(iii), the highest of either the 100-year return period or historic maximum coincident and wet bulb temperatures should be compared to the corresponding ESBWR 0% exceedance maximum ambient design temperature site parameters. Use of the 100-year return period temperatures are intended to cover situations where the historical data used to characterize a site may not extend over a significant time interval to capture cyclical events.

Entergy Response

Table 2.0-201 provides a 0% exceedance maximum dry bulb temperature site characteristic of 108°F, which is a calculated 100-year return value from the ESP SSAR Section 2.3.2.1.2. A coincident wet bulb temperature for this 100-year return dry bulb temperature was not established in the SSAR. Use of this 100-year return value for the 0% exceedance dry bulb temperature as the site characteristic satisfies the above stated requirement.

Regional climatological data available from the National Oceanic and Atmospheric Administration National Climatic Data Center (NOAA/NCDC) for Jackson International Airport, Mississippi, Station No. 03940, spanning 35 years (1973-2007), was obtained to support determination of 0% exceedance coincident and non-coincident wet bulb site characteristic values. The selection and retrieval of this data was performed in accordance with NRC Regulatory Guide (RG) 1.27 Section C.1.a, and Standard Review Plan (SRP) 2.3.1. In accordance with SRP 2.3.1 and RG 1.27, 30 years of meteorological data provides an adequate basis for evaluating nuclear power plant ultimate heat sinks.

The 0% exceedance maximum non-coincident wet bulb temperature was determined in accordance the criteria defined in Advanced Light Water Reactor Utility Requirement Document (ALWR URD) Table 1.2-6 (DCD Section 2.0, Reference 2.0-4). The maximum non-coincident wet bulb temperature is the highest wet bulb temperature that persists for at least 2 hours; this temperature has been determined to be 83°F from the 35-year sequential hourly meteorological data set for the Jackson, MS International Airport National Weather Service (NWS) station. This maximum wet bulb temperature (non-coincident) of 83°F will be reported in FSAR Table 2.0-201.

The 0% exceedance coincident wet bulb temperature is based on the maximum dry bulb temperature that exists in the population of dry bulb/wet bulb temperatures evaluated; this coincident wet bulb temperature is typically the mean (ASHRAE 2001) of all the occurrences of the associated maximum dry bulb. The highest 0% exceedance dry bulb temperature that persists for at least 2 hours was determined to be 104°F from the 35-year sequential hourly meteorological data set for the NWS station at Jackson, MS International Airport. The maximum of the coincident wet bulb temperatures for this 104°F dry bulb temperature is 80°F. This maximum coincident wet bulb temperature will be reported in FSAR Table 2.0-201. Consequently, the site characteristic "coincident wet bulb temperature" is not defined in the same way as in the standard NCDC "Engineering Weather Data" and ASHRAE "Climatic Design Information" references (i.e., it is not the maximum coincident wet bulb temperature).

Using the maximum coincident wet bulb temperature as the site characteristic, based on the maximum dry bulb temperature that has existed for 2 hours, in the data set evaluated is conservative because of the use of the maximum rather than the mean. Use of the 100-year return temperature of 108°F, as discussed above, rather than the value of 104°F determined from the 35-year data set above, is also conservative and meets requirements for this site characteristic.

Proposed COLA Revision

FSAR Table 2.0-201 will be revised as indicated in the draft markup included with Attachment 2.

ATTACHMENT 6

G3NO-2008-00006

RESPONSE TO NRC RAI LETTER NO. 2

RAI QUESTION NO. 02.03.04-1

RAI QUESTION NO. 02.03.04-1

NRC RAI 02.03.04-1

Provide a revised set of short-term control room and technical support center atmospheric dispersion factors utilizing the onsite receptor/source locations and ARCON96 inputs provided in Appendix 2A in Tier 2 to ESBWR DCD Revision 5.

Entergy Response

An evaluation to determine revised short-term control room and technical support center atmospheric dispersion factors utilizing the onsite receptor/source locations, site-specific meteorological data, and ARCON96 computer code inputs provided in Appendix 2A in Tier 2 to ESBWR DCD Revision 5 has been completed. An atmospheric dispersion coefficient used to evaluate the effects of a GGNS Unit 1 accident on the Unit 3 control room has also been determined. COLA FSAR Section 2.3.4 and associated tables and figures will be revised to reflect the results of this evaluation.

Additional FSAR changes to reflect the addition of Appendix 2A to Tier 2 of the ESBWR DCD, Revision 5, and revisions to DCD Table 2.0-1 for short-term control room and technical support center atmospheric dispersion factors, are also included in the draft COLA revisions submitted with this response.

Proposed COLA Revision

FSAR Table 2.0-201 will be revised as indicated in the draft markup included with Attachment 2.

The following changes will be incorporated into the FSAR as indicated in the attached draft markup:

- FSAR Section 2.3.4 and Tables 2.3-201 through 2.3-208 will be revised.
- FSAR Figures 2.3-201 through 2.3-205 will be deleted.
- A new FSAR Appendix 2A will be added.

Markup of Grand Gulf COLA

The following markup represents Entergy'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.

LIST OF TABLES (CONTINUED)

LIST OF FIGURES

GGNS COL
2.0-1-A

TABLE 2.0-201 (Sheet 19 of 31)
COMPARISON OF ESBWR DCD SITE PARAMETERS (1) WITH UNIT 3 SITE CHARACTERISTICS

Parameter	ESBWR Site Parameter	Unit 3 Site Characteristic	Bounding Yes/No	Comments
Control Room χ/Q: Reactor Building Unfiltered inleakage				
0-2 hours:	1.90E-03 s/m^3	~~1.33~~1.47E-03 s/m^3	Yes	FSAR Table 2.3-204 provides Control Room χ/Q values for Reactor Building unfiltered inleakage less than those in the DCD. Therefore, the Unit 3 site characteristic values for Control Room χ/Q for Reactor Building unfiltered inleakage fall within the values established by the ESBWR site parameters.
2-8 hours:	1.30E-03 s/m^3	~~6.56~~6.98E-04 s/m^3	Yes	
8-24 hours:	5.90E-04 s/m^3	~~2.79~~3.21E-04 s/m^3	Yes	
1-4 days:	5.00E-04 s/m^3	~~1.84~~2.15E-04 s/m^3	Yes	
4-30 days:	4.40E-04 s/m^3	~~1.38~~1.48E-04 s/m^3	Yes	
Control Room χ/Q: Reactor Building Filtered air intake (emergency and normal)				
0-2 hours:	1.50E-03 s/m^3	~~1.06~~1.07E-03 s/m^3 ~~(Normal)~~	Yes	~~Normal intake χ/Q values bound emergency intake χ/Q values.~~ FSAR Table 2.3-204 provides Control Room χ/Q values for Reactor Building filtered air intake less than those in the DCD. Therefore, the Unit 3 site characteristic values for Control Room χ/Q for Reactor Building filtered air intake fall within the values established by the ESBWR site parameters.
2-8 hours:	1.10E-03 s/m^3	~~6.18~~5.57E-04 s/m^3 ~~(Normal)~~	Yes	
8-24 hours:	5.00E-04 s/m^3	~~2.90~~2.78E-04 s/m^3 ~~(Normal)~~	Yes	
1-4 days:	4.20E-04 s/m^3	~~1.73~~1.52E-04 s/m^3 ~~(Normal)~~	Yes	
4-30 days:	3.80E-04 s/m^3	~~1.52~~1.30E-04 s/m^3 ~~(Normal)~~	Yes	

GGNS COL 2.0-1-A

TABLE 2.0-201 (Sheet 20 of 31)
COMPARISON OF ESBWR DCD SITE PARAMETERS (1) WITH UNIT 3 SITE CHARACTERISTICS

Parameter	ESBWR Site Parameter	Unit 3 Site Characteristic	Bounding Yes/No	Comments
Control Room χ/Q: Passive Containment Cooling System (PCCS) / Reactor Building Roof Unfiltered inleakage				
0-2 hours:	3.40E-03 s/m^3	~~2.33~~1.57E-03 s/m^3	Yes	FSAR Table 2.3-206 provides Control Room χ/Q values for PCCS/Reactor Building Roof unfiltered inleakage less than those in the DCD. Therefore, the Unit 3 site characteristic values for Control Room χ/Q for PCCS/Reactor Building Roof unfiltered inleakage fall within the values established by the ESBWR site parameters.
2-8 hours:	2.70E-03 s/m^3	~~1.28~~1.28E-03 s/m^3	Yes	
8-24 hours:	1.40E-03 s/m^3	~~4.51~~5.34E-04 s/m^3	Yes	
1-4 days:	1.10E-03 s/m^3	~~4.19~~3.05E-04 s/m^3	Yes	
4-30 days:	7.90E-04 s/m^3	~~3.56~~2.64E-04 s/m^3	Yes	
Control Room χ/Q: Passive Containment Cooling System / Reactor Building Roof Filtered air intake (emergency and normal)				
0-2 hours:	3.00E-03 s/m^3	~~1.98~~1.19E-03 s/m^3 ~~(Normal)~~	Yes	~~Normal intake χ/Q values bound emergency intake χ/Q values.~~ FSAR Table 2.3-206 provides Control Room χ/Q values for PCCS/Reactor Building Roof filtered air intake less than those in the DCD. Therefore, the Unit 3 site characteristic values for Control Room χ/Q for PCCS/Reactor Building Roof filtered air intake fall within the values established by the ESBWR site parameters.
2-8 hours:	2.50E-03 s/m^3	~~1.31E-03~~8.19E-04 s/m^3 ~~(Normal)~~	Yes	
8-24 hours:	1.20E-03 s/m^3	~~4.88~~3.47E-04 s/m^3 ~~(Normal)~~	Yes	
1-4 days:	9.00E-04 s/m^3	~~4.50~~1.96E-04 s/m^3 ~~(Normal)~~	Yes	
4-30 days:	7.00E-04 s/m^3	~~3.96~~1.69E-04 s/m^3 ~~(Normal)~~	Yes	

GGNS COL
2.0-1-A

TABLE 2.0-201 (Sheet 21 of 31)
COMPARISON OF ESBWR DCD SITE PARAMETERS (1) WITH UNIT 3 SITE CHARACTERISTICS

Parameter	ESBWR Site Parameter	Unit 3 Site Characteristic	Bounding Yes/No	Comments
Control Room χ/Q: Blowout Panels / Reactor Building Roof Unfiltered inleakage				
0-2 hours:	7.00E-03 s/m^3	2.10E-03 s/m^3	Yes	FSAR Table 2.3-206 provides Control Room χ/Q values for Blowout Panels / Reactor Building Roof unfiltered inleakage less than those in the DCD. Therefore, the Unit 3 site characteristic values for Control Room χ/Q for Blowout Panels / Reactor Building Roof unfiltered inleakage fall within the values established by the ESBWR site parameters.
2-8 hours:	5.00E-03 s/m^3	1.71E-03 s/m^3	Yes	
8-24 hours:	2.10E-03 s/m^3	7.57E-04 s/m^3	Yes	
1-4 days:	1.70E-03 s/m^3	4.80E-04 s/m^3	Yes	
4-30 days:	1.50E-03 s/m^3	3.55E-04 s/m^3	Yes	
Control Room χ/Q: Blowout Panels / Reactor Building Roof Filtered air intake (emergency and normal)				
0-2 hours:	5.90E-03 s/m^3	1.72E-03 s/m^3	Yes	FSAR Table 2.3-206 provides Control Room χ/Q values for Blowout Panels / Reactor Building Roof filtered air intake less than those in the DCD. Therefore, the Unit 3 site characteristic values for Control Room χ/Q for Blowout Panels / Reactor Building Roof filtered air intake fall within the values established by the ESBWR site parameters.
2-8 hours:	4.70E-03 s/m^3	1.12E-03 s/m^3	Yes	
8-24 hours:	1.50E-03 s/m^3	5.01E-04 s/m^3	Yes	
1-4 days:	1.10E-03 s/m^3	2.92E-04 s/m^3	Yes	
4-30 days:	1.00E-03 s/m^3	2.36E-04 s/m^3	Yes	
Control Room χ/Q: Turbine Building Unfiltered inleakage				
0-2 hours:	1.20E-03 s/m^3	~~1.07E-03~~8.53E-04 s/m^3	Yes	FSAR Table 2.3-205 provides Control Room χ/Q values for Turbine Building unfiltered inleakage less than those in the DCD. Therefore, the Unit 3 site characteristic values for Control Room χ/Q for Turbine Building unfiltered inleakage fall within the values established by the ESBWR site parameters.
2-8 hours:	9.80E-04 s/m^3	~~8.10~~5.34E-04 s/m^3	Yes	
8-24 hours:	3.90E-04 s/m^3	~~3.62~~2.67E-04 s/m^3	Yes	
1-4 days:	3.80E-04 s/m^3	~~3.43~~2.30E-04 s/m^3	Yes	
4-30 days:	3.20E-04 s/m^3	~~2.75~~1.84E-04 s/m^3	Yes	

GGNS COL
2.0-1-A

TABLE 2.0-201 (Sheet 22 of 31)
COMPARISON OF ESBWR DCD SITE PARAMETERS (1) WITH UNIT 3 SITE CHARACTERISTICS

Parameter	ESBWR Site Parameter	Unit 3 Site Characteristic	Bounding Yes/No	Comments
Control Room χ/Q: Turbine Building Filtered air intake (emergency and normal)				
0-2 hours:	1.20E-03 s/m^3	~~7.13~~8.88E-04 s/m^3 ~~(Normal)~~	Yes	~~Normal intake χ/Q values bound emergency intake χ/Q values.~~ FSAR Table 2.3-205 provides Control Room χ/Q values for Turbine Building filtered air intake less than those in the DCD. Therefore, the Unit 3 site characteristic values for Control Room χ/Q for Turbine Building filtered air intake fall within the values established by the ESBWR site parameters.
2-8 hours:	9.80E-04 s/m^3	~~5.21~~4.60E-04 s/m^3 ~~(Normal)~~	Yes	
8-24 hours:	3.90E-04 s/m^3	~~2.75~~2.54E-04 s/m^3 ~~(Normal)~~	Yes	
1-4 days:	3.80E-04 s/m^3	~~2.04~~1.82E-04 s/m^3 ~~(Normal)~~	Yes	
4-30 days:	3.20E-04 s/m^3	~~1.47~~1.55E-04 s/m^3 ~~(Normal)~~	Yes	
Control Room χ/Q: Fuel Building – ~~Diffuse Source Filtered air intake (emergency and normal)~~Unfiltered inleakage				
0-2 hours:	2.80E-03 s/m^3	~~2.24~~2.25E-03 s/m^3	Yes	FSAR Table 2.3-207 provides Control Room χ/Q values for Fuel Building ~~Diffuse Source filtered air intake~~ unfiltered inleakage less than those in the DCD. Therefore, the Unit 3 site characteristic values for Control Room χ/Q for Fuel Building ~~Diffuse Source filtered air intake~~unfiltered inleakage fall within the values established by the ESBWR site parameters.
2-8 hours:	2.50E-03 s/m^3	~~1.16~~1.23E-03 s/m^3	Yes	
8-24 hours:	~~3.99~~1.25E-03 s/m^3	~~3.99~~4.38E-04 s/m^3	Yes	
1-4 days:	~~3.89~~1.10E-03 s/m^3	~~3.19~~3.72E-04 s/m^3	Yes	
4-30 days:	~~3.29~~1.00E-03 s/m^3	~~2.71~~2.87E-04 s/m^3	Yes	

GGNS COL
2.0-1-A

TABLE 2.0-201 (Sheet 23 of 31)
COMPARISON OF ESBWR DCD SITE PARAMETERS (1) WITH UNIT 3 SITE CHARACTERISTICS

Parameter	ESBWR Site Parameter	Unit 3 Site Characteristic	Bounding Yes/No	Comments
Control Room χ/Q: Fuel Building Filtered air intake (emergency and normal)				
0-2 hours:	2.80E-03 s/m^3	1.82E-03 s/m^3	Yes	FSAR Table 2.3-207 provides Control Room χ/Q values for Fuel Building filtered air intake less than those in the DCD. Therefore, the Unit 3 site characteristic values for Control Room χ/Q for Fuel Building filtered air intake fall within the values established by the ESBWR site parameters.
2-8 hours:	2.50E-03 s/m^3	9.61E-04 s/m^3	Yes	
8-24 hours:	1.25E-03 s/m^3	3.60E-04 s/m^3	Yes	
1-4 days:	1.10E-03 s/m^3	2.70E-04 s/m^3	Yes	
4-30 days:	1.00E-03 s/m^3	2.22E-04 s/m^3	Yes	
~~Control Room χ/Q: Fuel Building Cask Doors Filtered air intake (emergency and normal)~~				
~~0-2 hours:~~	~~1.50E-03 s/m^3~~	~~8.61E-04 s/m^3~~	~~Yes~~	~~FSAR Table 2.3-207 provides Control Room χ/Q values for Fuel Building Cask Doors filtered air intake less than those in the DCD. Therefore, the Unit 3 site characteristic values for Control Room χ/Q for Fuel Building Cask Doors filtered air intake fall within the values established by the ESBWR site parameters.~~
~~2-8 hours:~~	~~1.30E-03 s/m^3~~	~~4.63E-04 s/m^3~~	~~Yes~~	
~~8-24 hours:~~	~~6.80E-04 s/m^3~~	~~1.95E-04 s/m^3~~	~~Yes~~	
~~1-4 days:~~	~~5.60E-04 s/m^3~~	~~1.40E-04 s/m^3~~	~~Yes~~	
~~4-30 days~~	~~4.30E-04 s/m^3~~	~~1.21E-04 s/m^3~~	~~Yes~~	
Control Room χ/Q: Radwaste Building - Unfiltered inleakage				
0-2 hours:	3.40E-03 s/m^3	5.90E-04 s/m^3	Yes	DCD Table 2.0-1 does not provide Radwaste Building to Control Room χ/Q values. PCCS χ/Q values are used in the DCD Chapter 15 dose analysis for liquid-containing tank failure in the Radwaste Building (DCD Section 15.3.16). Therefore, the PCCS χ/Q values are used for this comparison. FSAR Table 2.3-207 provides Control Room χ/Q values for Radwaste Building unfiltered inleakage less than those in the DCD. Therefore, the Unit 3 site characteristic values for Control Room χ/Q for Radwaste Building unfiltered inleakage fall within the values established by the ESBWR site parameters.
2-8 hours:	2.70E-03 s/m^3	4.40E-04 s/m^3	Yes	
8-24 hours:	1.40E-03 s/m^3	1.74E-04 s/m^3	Yes	
1-4 days:	1.10E-03 s/m^3	1.02E-04 s/m^3	Yes	
4-30 days:	7.90E-04 s/m^3	8.95E-05 s/m^3	Yes	

GGNS COL
2.0-1-A

TABLE 2.0-201 (Sheet 24 of 31)
COMPARISON OF ESBWR DCD SITE PARAMETERS (1) WITH UNIT 3 SITE CHARACTERISTICS

Parameter	ESBWR Site Parameter	Unit 3 Site Characteristic	Bounding Yes/No	Comments
Control Room χ/Q: Radwaste Building Filtered air intake (emergency and normal)				
0-2 hours:	~~1.50~~3.00E-03 s/m^3	~~1.11E-03~~4.43E-04 s/m^3	Yes	DCD Table 2.0-1 does not provide Radwaste Building to Control Room χ/Q values. PCCS χ/Q values are used in the DCD Chapter 15 dose analysis for liquid-containing tank failure in the Radwaste Building (DCD Section 15.3.16). Therefore, the PCCS χ/Q values are used for this comparison. FSAR Table 2.3-207 provides Control Room χ/Q values for Radwaste Building filtered air intake less than those in the DCD. Therefore, the Unit 3 site characteristic values for Control Room χ/Q for Radwaste Building filtered air intake fall within the values established by the ESBWR site parameters.
2-8 hours:	~~1.30~~2.50E-03 s/m^3	~~7.93~~3.33E-04 s/m^3	Yes	
8-24 hours:	~~6.80E-04~~1.20E-03 s/m^3	~~3.18~~1.32E-04 s/m^3	Yes	
1-4 days:	~~5.60~~9.00E-04 s/m^3	~~1.96E-04~~8.17E-05 s/m^3	Yes	
4-30 days:	~~4.30~~7.00E-04 s/m^3	~~1.64E-04~~6.85E-05 s/m^3	Yes	
Technical Support Center χ/Q: Reactor Building release				
0-2 hours:	1.00E-03 s/m^3	2.38E-04 s/m^3	Yes	FSAR Table 2.3-208 provides TSC χ/Q values for a Reactor Building release less than those in the DCD. Therefore, the Unit 3 site characteristic values for TSC χ/Q for Reactor Building release fall within the values established by the ESBWR site parameters.
2-8 hours:	6.00E-04 s/m^3	1.50E-04 s/m^3	Yes	
8-24 hours:	3.00E-04 s/m^3	6.47E-05 s/m^3	Yes	
1-4 days:	2.00E-04 s/m^3	4.91E-05 s/m^3	Yes	
4-30 days:	1.00E-04 s/m^3	3.59E-05 s/m^3	Yes	

GGNS COL
2.0-1-A

TABLE 2.0-201 (Sheet 25 of 31)
COMPARISON OF ESBWR DCD SITE PARAMETERS (1) WITH UNIT 3 SITE CHARACTERISTICS

Parameter	ESBWR Site Parameter	Unit 3 Site Characteristic	Bounding Yes/No	Comments
Technical Support Center χ/Q: Turbine Building release				
0-2 hours:	2.00E-03 s/m^3	1.60E-03 s/m^3	Yes	FSAR Table 2.3-208 provides TSC χ/Q values for a Turbine Building release less than those in the DCD. Therefore, the Unit 3 site characteristic values for TSC χ/Q for Turbine Building release fall within the values established by the ESBWR site parameters.
2-8 hours:	1.50E-03 s/m^3	9.99E-04 s/m^3	Yes	
8-24 hours:	8.00E-04 s/m^3	5.46E-04 s/m^3	Yes	
1-4 days:	6.00E-04 s/m^3	3.75E-04 s/m^3	Yes	
4-30 days:	5.00E-04 s/m^3	2.61E-04 s/m^3	Yes	
Technical Support Center χ/Q: Passive Containment Cooling System / Reactor Building Roof release				
0-2 hours:	2.00E-03 s/m^3	4.22E-04 s/m^3	Yes	FSAR Table 2.3-208 provides TSC χ/Q values for PCCS/ Reactor Building Roof release less than those in the DCD. Therefore, the Unit 3 site characteristic values for TSC χ/Q for PCCS/Reactor Building Roof release fall within the values established by the ESBWR site parameters.
2-8 hours:	1.10E-03 s/m^3	3.11E-04 s/m^3	Yes	
8-24 hours:	5.00E-04 s/m^3	1.35E-04 s/m^3	Yes	
1-4.days:	4.00E-04 s/m^3	1.06E-04 s/m^3	Yes	
4-30 days:	3.00E-04 s/m^3	7.30E-05 s/m^3	Yes	
Long Term Dispersion Estimates:				
χ/Q:	2.0E-06 s/m^3	4.7 E-8 sec/m^3 (Undepleted / No Decay χ/Q Value at Nearest Milk Cow, 10 miles)	Yes	

predicted within about 660 ft. in the north-northwest direction). This would have no adverse impact on the meteorological tower measurements.

2.3.4 SHORT TERM DIFFUSION ESTIMATES

GGNS ESP COL 2.3-2

GGNS COL 2.0-10-A

GGNS COL 2A.2-1-A

ESP COL Action Item 2.3-2 states that a COL or CP applicant should evaluate dispersion of radioactive materials to the control room. The following information is provided to address the relative concentration estimates at the control room intakes and replaces Sections 2.3.4.3 and 2.3.4.4 of the SSAR in their entirety.

2.3.4.3 RELATIVE CONCENTRATION ESTIMATES AT THE CONTROL ROOM EMERGENCY INTAKE

The atmospheric dispersion estimates (χ/Q) for the various control room intake and technical support center (TSC) locations ~~were~~are calculated based on the guidance provided in RG 1.194, ~~June 2003~~as described in DCD Appendix 2A. The control room χ/Qs ~~were~~are calculated for ~~all probable release points to the control room emergency and normal air intakes~~ using the ARCON96 computer code (NUREG/CR-6331) and hourly GGNS meteorological data from 2002 and 2003.

Four air intake locations ~~were~~are considered in the control room dispersion evaluations. These are the two redundant control room habitability area HVAC subsystem emergency filter unit (EFU) air intakes, the control room normal air intake, and an assumed control room inleakage location (see DCD Appendix 2A Figure 2A-1). The Control Room Habitability Area HVAC Subsystem (CRHAVS) is provided with two safety-related charcoal filter trains (EFUs) (see DCD Section 9.4.1); and χ/Q values were determined for each of the EFU charcoal filter train intake locations. These locations are presented as "EN" ~~(Emergency Intake North)~~ and "ES" ~~(Emergency Intake South)~~ in DCD Figure ~~2.3-201~~2A-1. ~~For most cases, only the closest emergency air intake is evaluated.~~ DCD Figure ~~2.3-201~~2A-1 also shows the location of the normal air intake (Point "N") and the assumed inleakage location (Point "CBL").

~~The assumed location for unfiltered inleakage is a louver located on the CB west wall (shown as Point "A" in Figure 2.3-202) intended to provide cooling through natural circulation for the nonsafety related equipment located at design grade elevation in the CB.~~ The control room habitability area (CRHA) is located entirely below plant grade (DCD Section 6.4.3) and the inleakage locations represent inleakage into the ~~CB~~Control Building rather than the control room itself, thus, this assumed inleakage location is extremely conservative. Control Room habitability for toxic gas releases is discussed in FSAR Section 6.4.

Two TSC intakes, as indicated in DCD Figure 2A-1, are also considered in the dispersion evaluations.

2.3.4.3.1 Release and Receptor Locations

The release location depends on the event, the release pathway, and the event scenario. Release locations ~~were~~are evaluated for ~~various design basis events~~sources and receptors used for the DCD Chapter 15 dose analyses, and other potential release locations are included for completeness (e.g., turbine building truck door, and ventilation stacks). DCD Appendix 2A Table 2A-2 defines the various release and receptor locations used in the analyses and shown in DCD Figure 2A-1. Unit 3 receptor to source directions for the control room and TSC intakes are shown in Table 2.3-201.

~~**Loss of Coolant Accident (LOCA)** - The LOCA dose calculation credits operation of the EFU charcoal filter trains, therefore the assumed receptor locations are the emergency air intakes. The CB louvers are conservatively assumed as the unfiltered inleakage term. The release points associated with the design basis LOCA are:~~

~~1. Containment leakage to the reactor building was assumed to be a diffuse source released through the east face of the building. The reactor building face was projected to the east side of the stairwell in accordance with RG 1.194 guidance. The area was conservatively assumed to be 2000 m^2. See Figure 2.3-203.~~

~~2. Containment leakage though the PCCS was assumed to be released through the moisture separators located on the 27,500 mm elevation. The leakage is routed through Seismic Category I ductwork to the reactor building roof. See Figure 2.3-204.~~

~~3. MSIV leakage is released via the main condenser, which is located in the turbine building. The turbine building is designed to Seismic Category II standards, therefore it is expected to remain intact following a SSE. This scenario evaluates a diffuse source over the entire area of the turbine building (conservatively assumed to be 2000 m^2), with the source/receptor reduced as appropriate. See Figure 2.3-205.~~

~~**Fuel Handling Accident (FHA)** - No credit is taken for the control room EFU charcoal filter trains in the FHA dose consequence analysis; therefore, the only receptor location evaluated is the control room normal air intake.~~

~~1. One potential release location for a FHA is the reactor building, which was previously discussed for the LOCA.~~

~~2. The other postulated release location for a FHA is the fuel building. Two release scenarios were evaluated:~~

a. Equipment (cask) doors located on the west side of the fuel building. The cask doors are modeled as a point. The release height is assumed to be one (1) m above design plant grade.

b. The east side of the fuel building is significantly closer to the CB; however, a release from the west side of the building is modeled as a diffuse release.

Main Steam Line Break (MSLB) - No credit is taken for the EFU charcoal filter trains in the MSLB dose consequence analysis; therefore, the only receptor location evaluated is the control room normal air intake. The MSLB release location is assumed to be the turbine building (diffuse release). See Figure 2.3-205.

Liquid Radwaste Tank Failure - No credit is taken for the EFU charcoal filter trains in the liquid radwaste tank failure dose consequence analysis; therefore, the only receptor location evaluated is the control room normal air intake. The release point assumed for this event is the radwaste building, which is west of the turbine building. The release is assumed to be a point source. The distance used is assumed to be the same as the fuel building cask doors, which is conservative due to geometric symmetry.

Instrument Line Break - No credit is taken for the EFU charcoal filter trains in the instrument line break dose consequence analysis; therefore, the only receptor location evaluated is the control room normal air intake. The instrument line break release location is assumed to be the reactor building (diffuse release).

Feedwater Line Break (FWLB) - No credit is taken for the EFU charcoal filter trains in the FWLB dose consequence analysis; therefore, the only receptor location evaluated is the control room normal air intake. The FWLB release location is assumed to be the turbine building (diffuse release).

Reactor Water Cleanup (RWCU) Line Break - No credit is taken for the EFU charcoal filter trains in the RWCU dose consequence analysis; therefore, the only receptor location evaluated is the control room normal air intake. The RWCU line break is assumed to occur in the reactor building (diffuse release).

1000 Failed Fuel Rods Analysis - No credit is taken for the EFU charcoal filter trains in the 1000 rods dose consequence analysis; therefore, the only receptor location evaluated is the control room normal air intake. There are two release locations for this event. One is the main condenser/turbine building (diffuse release) and the other is the off-gas system that vents through the main plant stack. Dispersion factors are only calculated for the turbine building; therefore, those values are used in the analysis.

Atmospheric dispersion is also evaluated for the TSC. The TSC intake is located north of line E6 and east of column ED of the electrical building as indicated on DCD Figure 1.2-26. Distances to the TSC are based on the shortest linear

~~distance from the reactor building, turbine building, and PCCS vent duct to line E6, column ED, as appropriate.~~

2.3.4.3.2 Methodology

~~A diffuse release is assumed to occur over the area of the reactor building facing the CB. The reactor building roof elevation is 52.7 m (see DCD Figure 3G.1-6) and the design plant grade elevation of 4.65 m (el. 134 ft.) which gives a building height above design plant grade of 48.05 m. The width of the building is 47 m. Thus, the total surface area of the building above design plant grade is approximately 2280 m^2. This analysis conservatively uses a value of 2000 m^2 for the building area. Review of the turbine building general arrangement drawings confirms that the cross-sectional area of the turbine building is significantly greater than that of the reactor building. An area of 2000 m^2 will be conservatively assumed to apply to the turbine building as well.~~

~~For the reactor building releases the release height is assumed to be at the center of the reactor building, or roughly 24 m above ground elevation. The release height for the turbine building is assumed to be half of the total building height. The turbine building roof elevation is 54 m; therefore, the release height is assumed to be 24.5 m. The PCCS release is a point source assumed to occur at the reactor building roofline (48.05 m).~~

~~The CB air intakes are assumed to be ~1m below the building roof elevation of 13,500 mm, or a "height" of 8 m. The height of the CB louvers (and the HVAC/ electrical/piping chase) is assumed to be 1 m. The intake for the TSC is assumed to be located at elevation 27.0 m, or a height of approximately 22.0 m.~~

~~Releases from the fuel building are assumed to occur either as a diffuse release on the east side of the building, or through the spent fuel cask equipment doors located on the west side of the building. For the diffuse release, the assumed fuel building width and height are based on the east/west cross-section of the building, which is conservative for all other locations. As such, the assumed width is 21.0 m and the height is 22.5 m based on DCD Figure 1.2-10. The release height for the diffuse source is then 11.25 m.~~

~~A release height of 5.0 m is assumed for the fuel building cask door release point. A release height of 8.0 m is assumed for the radwaste building. This value minimizes the slant path for releases from the radwaste building.~~

DCD Appendix 2A describes the methodology used to determine ESBWR standard plant bounding χ/Q values for the control room and the TSC. For Unit 3, the cases identified in DCD Table 2A-3 are analyzed using site-specific meteorological data and site-specific plant layout.

~~The distances and directions from the assumed release points to the control room HVAC Intake are shown on Table 2.3-201. In all cases, the intervening structures between the release point and the control room intake were ignored for~~

~~calculational simplicity, thereby underestimating the true distance to the control room intakes.~~Design inputs for the Unit 3 ARCON96 analyses are identical to those for the ESBWR standard plant shown in DCD Appendix 2A Table 2A-3.

Meteorological data from 2002 and 2003, as described in SSAR Section 2.3, is used in this analysis. Atmospheric stability ~~was~~is determined by the vertical temperature difference (ΔT) measured over the difference in measurement height and the stability classes given in RG 1.23. ~~All releases were assumed to be point ground level releases. For each of the source to receptor combinations, the χ/Q value that is not exceeded more than 5.0 percent of the total hours in the meteorological data set (e.g., 95 percentile χ/Q) was determined.~~ Meteorological instrument heights are provided in SSAR Section 2.3.3.

The additional parameters that the ARCON96 code requires ~~values for a number of additional parameters. RG 1.194, Table A-2, provides useful guidance in determining reasonable values for a number of them. The remaining parameters are discussed below~~are provided in DCD Table 2A-1.

~~In ARCON96, the value of the "vertical velocity" is used only in vent and stack release models. Since these models are not used in this analysis the vertical velocity is set to 0 m/sec. Similarly, the "stack flow" value is set to 0 m/s as well. Since the "stack flow" is 0, the stack radius is set to 0 m in accordance with RG 1.194 recommendations.~~

~~ARCON96 uses the "surface roughness length" parameter to adjust wind speeds to account for differences in meteorological instrumentation height and release height. This analysis will utilize the value of 0.2 m recommended by RG 1.194. The default value of 90 degrees will be assumed for the wind direction window. The default value for minimum wind speed (0.5 m/s) is assumed. A value of 4.3 is used for the "averaging sector width" in accordance with RG 1.194.~~

~~Initial diffusion coefficients are used in modeling a diffuse source. For the point source evaluations the values will be set to 0 m. RG 1.194, Section 3.2.4.4 states that for diffuse sources the two initial diffusion coefficients should be modified as follows (in the absence of site specific empirical data)~~

~~$$\sigma_{y_0} = \frac{Width}{6}$$~~

~~$$\sigma_{z_0} = \frac{Height}{6}$$~~

~~Finally, the ARCON96 code default values are used for the "hours in averages" and "minimum number of hours" parameters in accordance with RG 1.194, Table A-2. The ARCON96 parameters are summarized in Tables 2.3-202 and 2.3-203.~~

Dispersion factors are required so that the Unit 3 operator doses from a Unit 1 accident may be calculated. The cross-unit χ/Q values are conservatively based on a simple point source model. A distance of 350 m between Unit 1 and Unit 3 is assumed. The release height and receptor height are both assumed to be 10 m. The ARCON96 default value of 2000 m^2 is conservatively used for the building area input as directed by RG 1.194 in Table A-2. Default values and other parameters in DCD Table 2A-1 are also used in this analysis. The cross-unit angle is the direction from receptor to source in degrees from true north. The receptor is assumed to be the closest point on the control building, and the Unit 1 source is assumed to be the reactor building. The direction from Unit 1 reactor building to Unit 3 control room is approximately 132 degrees from true north.

2.3.4.3.3 Results

For each of the source-to-receptor pairs, the χ/Q value that is not exceeded more than 5.0 percent of the total hours in the meteorological data set (e.g., 95-percentile χ/Q) is determined. The χ/Q values for each source-receptor pair are shown in Tables 2.3-204 through 2.3-~~207~~208. The site-specific χ/Qs are less than the corresponding DCD values in all cases (see Table 2.0-201).

~~Dispersion factors are required so that the doses from a Unit 1 accident on Unit 3 operators may be calculated. The cross-unit χ/Q values are conservatively based on a simple point source model. A distance of 350 m between Unit 1 and Unit 3 is conservatively assumed (actual distance is approximately 400 m). The release height and receptor height are both assumed to be 10 m.~~ The results of the cross-unit evaluation are presented in Table 2.3-208. ~~The calculated results, as well as the results with a "safety factor" of 1.5, are presented. The "safety factor" is used to account for any variations in release locations.~~

2.3.4.4 INGRESS/EGRESS DIFFUSION ESTIMATES

For the purposes of evaluating dose to personnel for control room ingress and egress, the atmospheric dispersion coefficients calculated at the unfiltered CB louver intake are used.

2.3.5 LONG TERM DIFFUSION ESTIMATES

GGNS ESP COL 2.3-3

ESP COL Action Item 2.3-3 states that a COL or CP applicant should confirm specific release point characteristics and locations of potential receptors for routine release dose computations. This action item requires verification that the

GGNS ESP COL 2.3-2

GGNS COL 2.0-10-A

TABLE 2.3-201
RELEASE LOCATION DISTANCE AND DIRECTION DATA

Description	Distance (m)	Unit 1 Direction (deg)
Reactor Building Diffuse		
Reactor Building to Control Building Louvers	10.0	300
Reactor Building to Emergency Intake North (EN)	30.0	282
Reactor Building to Emergency Intake South (ES)	30.0	318
Reactor Building to Normal Air Intake (N)	30.0	328
Reactor Building to TSC	80.0	269
Turbine Building Diffuse		
Turbine Building to Control Building Louvers	30.0	30
Turbine Building to Emergency Intake North (EN)	30.0	350
Turbine Building to Emergency Intake South (ES)	50.0	356
Turbine Building to Normal CR Air Intake (N)	50.0	3
Turbine Building to TSC	20.0	300
PCCS Stack Point		
PCCS to Control Building Louvers	32.5	338
PCCS to Emergency Intake North (EN)	40.0	318
PCCS to Emergency Intake South (ES)	50.0	340
PCCS to Normal CR Air Intake (N)	50.0	346
PCCS to TSC	80.0	269
Fuel Building Cask Doors		
Fuel Building Cask Door to Normal CR Air Intake (N)	70.0	286
Fuel Building Diffuse Source		
Fuel Building Diffuse Source to Normal CR Air Intake (N)	30.0	283
Radwaste Building		
Radwaste Building to Normal CR Air Intake (N)	70.0	330
Cross Unit Impacts		
Unit 1 to Unit 3	350.0	135

REPLACE ABOVE WITH TABLE ON NEXT TWO PAGES

GGNS ESP
COL 2.3-2

GGNS COL
2.0-10-A

TABLE 2.3-201 (Sheet 1 of 2)
ARCON96 INPUT - RECEPTOR TO SOURCE DIRECTION

Source/Receptor	Receptor to Source Direction (deg.)
RB to CBL	300
RB to EN	290
RB to ES	310
RB to N	314
RB to TSCE	242
RB to TSCW	230
PCCS to CBL	339
PCCS to EN	315
PCCS to ES	334
PCCS to N	338
PCCS to TSCE	244
PCCS to TSCW	231
TB to CBL	13
TB to EN	354
TB to ES	1
TB to N	6
TB to TSCE	262
TB to TSCW	244
TB-TD to CBL	11
TB-TD to EN	1
TB-TD to TSCW	307
FB to CBL	258
FB to EN	264
FB to ES	278
FB to N	282
RW to N	334
RB-VS to CBL	277
RB-VS to ES	291
RB-VS-N	292

GGNS ESP
COL 2.3-2

GGNS COL
2.0-10-A

TABLE 2.3-201 (Sheet 2 of 2)
ARCON96 INPUT - RECEPTOR TO SOURCE DIRECTION

Source/Receptor	Receptor to Source Direction (deg.)
TB-VS to CBL	26
TB-VS to EN	11
TB-VS to N	18
RW-VS to CBL	332
RW-VS to EN	320
RW-VS to N	334
BPN to CBL	352
BPN to EN	315
BPN to ES	336
BPN to N	345
BPS to CBL	249
BPS to EN	259
BPS to ES	285
BPS to N	289

~~GGNS ESP COL 2.3-2~~

~~GGNS COL 2.0-10-A~~

TABLE 2.3-202
~~RELEASE LOCATION PARAMETERS~~DELETED

~~Parameter~~	~~Reactor Building~~	~~Turbine Building~~	~~RB Roof/ PCCS~~	~~Fuel Building~~	~~FB Cask Door~~	~~Radwaste Building~~
~~Release Height (m)~~	~~24.00~~	~~24.50~~	~~48.05[2]~~	~~5.00~~	~~5.00~~	~~8.00~~
~~Total Width (m)[1]~~	~~47.00~~	~~59.00~~	~~N/A~~	~~22.5~~	~~N/A~~	~~N/A~~
~~Total Height (m)[1]~~	~~48.05~~	~~49.00~~	~~N/A~~	~~22.0~~	~~N/A~~	~~N/A~~
~~Building Area (m^2)~~	~~2000~~	~~2000~~	~~0.01~~	~~472.5~~	~~0.01~~	~~0.01~~
~~Initial Diffusion Coefficients (m)~~						
~~σ_{Yo}~~	~~7.83~~	~~9.83~~	~~N/A~~	~~3.75~~	~~N/A~~	~~N/A~~
~~σ_{Zo}~~	~~7.96~~	~~8.17~~	~~N/A~~	~~3.50~~	~~N/A~~	~~N/A~~
~~Release Type~~	~~Diffuse~~	~~Diffuse~~	~~Point~~	~~Diffuse~~	~~Point~~	~~Point~~

~~Notes:~~

~~1. Building height and width are not directly used by ARCON96. They are used to calculate σ_{Yo} and σ_{Zo} as well as to determine the diffuse source area, release heights, and release directions.~~

~~2. The release height for the PCCS/TSC evaluation was assumed to be 24.0 m (same elevation as the TSC air intake to minimize the "slant path").~~

~~GGNS ESP COL 2.3-2~~

~~GGNS COL 2.0-10-A~~

TABLE 2.3-203
~~ARCON96 INPUT PARAMETERS~~DELETED

~~Parameter~~	~~Value~~
~~Lower Instrument Height (m)~~	~~10.0~~
~~Upper Instrument Height (m)~~	~~50.0~~
~~Release Type (Point/Diffuse/Stack)~~	~~Table 2.3-202~~
~~Release Height (m)~~	~~Table 2.3-202~~
~~Diffuse Source Area (m^2)~~	~~Table 2.3-202~~
~~Vertical Velocity (m/s)~~	~~0.0~~
~~Stack Flow (m/s)~~	~~0.0~~
~~Stack Radius (m)~~	~~0.0~~
~~Direction - Receptor to Source~~	~~Table 2.3-201~~
~~Wind Direction Window (degrees)~~	~~90.0~~
~~Distance to Receptor (m)~~	~~Table 2.3-201~~
~~Intake Height (m)~~	
~~Control Building Louvers~~	~~1.0~~
~~Control Room Air Intakes~~	~~8.0~~
~~TSC Air Intake~~	~~22.0~~
~~Elevation Difference (m)~~	~~0.0~~
~~Surface Roughness Length (m)~~	~~0.2~~
~~σ_{y0}~~	~~Table 2.3-202~~
~~σ_{z0}~~	~~Table 2.3-202~~
~~Hours in Averages (hr)~~	~~ARCON96 Default~~
~~Minimum Number of Hours (hr)~~	~~ARCON96 Default~~

~~Notes:~~

~~1. All information was normalized to the design plant grade elevation; therefore no adjustments for elevation differences are required for ARCON96~~

~~GGNS ESP COL 2.3-2~~

~~GGNS COL 2.0-10-A~~

~~**TABLE 2.3-204**~~
~~**REACTOR BUILDING (DIFFUSE SOURCE) RELEASE**~~
~~**χ/Q RESULTS (S/M^3)**~~

~~Description~~	~~Direction~~	~~Time Interval~~				
		~~0–2 hrs~~	~~2–8 hrs~~	~~8–24 hrs~~	~~1–4 days~~	~~4–30 days~~
~~CB Louvers~~	~~300º~~	~~1.33E-03~~	~~6.56E-04~~	~~2.79E-04~~	~~1.84E-04~~	~~1.38E-04~~
~~Control Room Emergency North Intake~~	~~282º~~	~~1.03E-03~~	~~5.01E-04~~	~~1.83E-04~~	~~1.36E-04~~	~~1.13E-04~~
~~Control Room Emergency South Intake~~	~~318º~~	~~1.04E-03~~	~~5.60E-04~~	~~2.65E-04~~	~~1.51E-04~~	~~1.32E-04~~
~~Control Room Normal Intake~~	~~328º~~	~~1.06E-03~~	~~6.18E-04~~	~~2.90E-04~~	~~1.73E-04~~	~~1.52E-04~~
~~TSC~~	~~269º~~	~~3.98E-04~~	~~2.12E-04~~	~~6.92E-05~~	~~5.70E-05~~	~~4.84E-05~~

REPLACE ABOVE WITH TABLE ON NEXT PAGE

GGNS ESP
COL 2.3-2

GGNS COL
2.0-10-A

TABLE 2.3-204
REACTOR BUILDING RELEASE
CONTROL ROOM χ/Q RESULTS (S/M^3)

Release/Receptor Description[1]	Time Interval 0 - 2 hrs	2 - 8 hrs	8 - 24 hrs	1 - 4 days	4 - 30 days
RB Control Room Intake - Emergency and Normal					
RB to EN	9.54E-04	4.84E-04	1.94E-04	1.35E-04	9.70E-05
RB to ES	9.55E-04	5.17E-04	2.41E-04	1.39E-04	1.11E-04
RB to N	1.07E-03	5.57E-04	2.78E-04	1.52E-04	1.30E-04
RB-VS to ES	5.75E-04	3.21E-04	1.35E-04	8.88E-05	7.36E-05
RB-VS to N	6.28E-04	3.50E-04	1.49E-04	9.75E-05	8.00E-05
RB Control Room Inleakage - Unfiltered					
RB to CBL	1.47E-03	6.98E-04	3.21E-04	2.15E-04	1.48E-04
RB-VS to CBL	7.68E-04	4.17E-04	1.64E-04	1.27E-04	9.78E-05

Notes:

1. See DCD Table 2A-2.

~~GGNS ESP COL 2.3-2~~

~~GGNS COL 2.0-10-A~~

~~**TABLE 2.3-205**~~
~~**TURBINE BUILDING RELEASE**~~
~~**χ/Q RESULTS (S/M^3)**~~

~~Description~~	~~Direction~~	~~Time Interval~~				
		~~0 – 2 hrs~~	~~2 – 8 hrs~~	~~8 – 24 hrs~~	~~1 – 4 days~~	~~4 – 30 days~~
~~CB Louvers~~	~~30º~~	~~1.07E-03~~	~~8.10E-04~~	~~3.62E-04~~	~~3.43E-04~~	~~2.75E-04~~
~~Control Room Emergency North Intake~~	~~350º~~	~~1.04E-03~~	~~6.60E-04~~	~~3.28E-04~~	~~2.26E-04~~	~~1.87E-04~~
~~Control Room Emergency South Intake~~	~~356º~~	~~6.90E-04~~	~~5.05E-04~~	~~2.57E-04~~	~~1.77E-04~~	~~1.38E-04~~
~~Control Room Normal Intake~~	~~3º~~	~~7.13E-04~~	~~5.21E-04~~	~~2.75E-04~~	~~2.04E-04~~	~~1.47E-04~~
~~TSC~~	~~300º~~	~~1.35E-03~~	~~6.79E-04~~	~~2.83E-04~~	~~1.96E-04~~	~~1.39E-04~~

REPLACE ABOVE WITH TABLE ON NEXT PAGE

GGNS ESP
COL 2.3-2

GGNS COL
2.0-10-A

TABLE 2.3-205
TURBINE BUILDING RELEASE
CONTROL ROOM χ/Q RESULTS (S/M^3)

Release/Receptor Description[1]	Time Interval 0 - 2 hrs	2 - 8 hrs	8 - 24 hrs	1 - 4 days	4 - 30 days
TB Control Room Intake - Emergency and Normal					
TB to EN	8.88E-04	4.60E-04	2.54E-04	1.82E-04	1.55E-04
TB to ES	6.26E-04	4.21E-04	2.24E-04	1.62E-04	1.28E-04
TB to N	6.09E-04	4.18E-04	2.18E-04	1.71E-04	1.29E-04
TB-TD to EN	2.39E-04	2.10E-04	9.79E-05	6.35E-05	5.12E-05
TB-VS to EN	3.82E-04	3.12E-04	1.43E-04	9.78E-05	7.51E-05
TB-VS to N	2.93E-04	2.47E-04	1.10E-04	7.70E-05	6.14E-05
TB Control Room Inleakage - Unfiltered					
TB to CBL	8.53E-04	5.34E-04	2.67E-04	2.30E-04	1.84E-04
TB-TD to CBL	2.46E-04	2.20E-04	1.03E-04	7.18E-05	5.88E-05
TB-VS to CBL	3.56E-04	2.99E-04	1.29E-04	9.51E-05	7.56E-05

Notes:

1. See DCD Table 2A-2.

GGNS ESP COL 2.3-2

GGNS COL 2.0-10-A

TABLE 2.3-206
REACTOR BUILDING ROOF/PCCS VENT RELEASE
χ/Q RESULTS (S/M^3)

Description	Direction	Time Interval				
		0–2 hrs	2–8 hrs	8–24 hrs	1–4 days	4–30 days
CB Louvers	338º	2.33E-03	1.28E-03	4.51E-04	4.19E-04	3.56E-04
Control Room Emergency North Intake	318º	7.78E-04	2.15E-04	1.03E-04	7.36E-05	6.19E-05
Control Room Emergency South Intake	340º	1.90E-03	1.11E-03	3.88E-04	3.67E-04	3.05E-04
Control Room Normal Intake	349º	1.98E-03	1.31E-03	4.88E-04	4.50E-04	3.96E-04
TSC	269º	7.83E-04	4.02E-04	1.57E-04	1.33E-04	1.01E-04

REPLACE ABOVE WITH TABLE ON NEXT PAGE

GGNS ESP
COL 2.3-2

GGNS COL
2.0-10-A

TABLE 2.3-206
REACTOR BUILDING ROOF/PCCS VENT AND BLOWOUT PANELS RELEASE CONTROL ROOM χ/Q RESULTS (S/M^3)

	Time Interval				
Release/Receptor Description[1]	0 - 2 hrs	2 - 8 hrs	8 - 24 hrs	1 - 4 days	4 - 30 days
PCCS Control Room Intake - Emergency and Normal					
PCCS to EN	1.19E-03	7.68E-04	3.30E-04	1.88E-04	1.59E-04
PCCS to ES	1.04E-03	7.73E-04	3.28E-04	1.86E-04	1.59E-04
PCCS to N	1.07E-03	8.19E-04	3.47E-04	1.96E-04	1.69E-04
PCCS Control Room Inleakage - Unfiltered					
PCCS to CBL	1.57E-03	1.28E-03	5.34E-04	3.05E-04	2.64E-04
RB Blowout Panel Control Room Intake - Emergency and Normal					
BPN to EN	1.63E-03	1.06E-03	4.59E-04	2.61E-04	2.24E-04
BPN to ES	1.41E-03	1.07E-03	4.53E-04	2.55E-04	2.21E-04
BPN to N	1.43E-03	1.12E-03	5.01E-04	2.92E-04	2.36E-04
BPS to EN	1.34E-03	7.57E-04	3.53E-04	2.53E-04	1.85E-04
BPS to ES	1.52E-03	8.34E-04	3.36E-04	2.35E-04	1.99E-04
BPS to N	1.72E-03	9.40E-04	3.97E-04	2.65E-04	2.18E-04
RB Blowout Panel Control Room Inleakage - Unfiltered					
BPN to CBL	2.10E-03	1.71E-03	7.57E-04	4.80E-04	3.55E-04
BPS to CBL	1.98E-03	1.19E-03	5.25E-04	3.70E-04	2.75E-04

Notes:

1. See DCD Table 2A-2.

GGNS ESP COL 2.3-2

GGNS COL 2.0-10-A

TABLE 2.3-207
FUEL BUILDING AND RADWASTE BUILDING RELEASE χ/Q RESULTS (S/M^3)

Description	Direction	Time Interval 0–2 hrs	2–8 hrs	8–24 hrs	1–4 days	4–30 days
FB Cask Door to Normal Intake	286º	8.61E-04	4.63E-04	1.95E-04	1.40E-04	1.21E-04
FB Diffuse Source to Normal Intake	286º	2.24E-03	1.16E-03	3.99E-04	3.19E-04	2.71E-04
Radwaste to Normal Intake	330º	1.11E-03	7.93E-04	3.18E-04	1.96E-04	1.64E-04

REPLACE ABOVE WITH TABLE ON NEXT PAGE

GGNS ESP
COL 2.3-2

GGNS COL
2.0-10-A

TABLE 2.3-207
FUEL BUILDING AND RADWASTE BUILDING RELEASE
CONTROL ROOM χ/Q RESULTS (S/M^3)

Release/Receptor Description[1]	Time Interval 0 - 2 hrs	2 - 8 hrs	8 - 24 hrs	1 - 4 days	4 - 30 days
FB Control Room Intake - Emergency and Normal					
FB to EN	1.05E-03	5.58E-04	2.04E-04	1.71E-04	1.35E-04
FB to ES	1.47E-03	7.64E-04	2.79E-04	2.23E-04	1.73E-04
FB to N	1.82E-03	9.61E-04	3.60E-04	2.70E-04	2.22E-04
FB Control Room Inleakage - Unfiltered					
FB to CBL	2.25E-03	1.23E-03	4.38E-04	3.72E-04	2.87E-04
RW Building Control Room Intake - Emergency and Normal					
RW to N	4.43E-04	3.33E-04	1.32E-04	8.17E-05	6.85E-05
RW-VS to ES	4.43E-04	2.94E-04	1.19E-04	7.44E-05	6.29E-05
RW-VS to N	4.01E-04	2.99E-04	1.20E-04	7.11E-05	6.24E-05
RW Building Control Room Inleakage - Unfiltered					
RW-VS to CBL	5.90E-04	4.40E-04	1.74E-04	1.02E-04	8.95E-05

Notes:

1. See DCD Table 2A-2.

~~GGNS ESP COL 2.3-2~~

~~GGNS COL 2.0-10-A~~

~~TABLE 2.3-208~~
~~CROSS UNIT RESULTS~~
~~χ/Q RESULTS (SEC/M^3)~~

~~Description~~	~~Direction~~	~~Time Interval~~				
		~~0–2 hrs~~	~~2–8 hrs~~	~~8–24 hrs~~	~~1–4 days~~	~~4–30 days~~
~~Unit 1 to Unit 3~~	~~135º~~	~~6.85E-05~~	~~5.96E-05~~	~~2.28E-05~~	~~1.82E-05~~	~~1.35E-05~~
~~w/ Safety Factor = 1.5~~	~~n/a~~	~~1.03E-04~~	~~8.94E-05~~	~~3.42E-05~~	~~2.73E-05~~	~~2.03E-05~~

~~Notes:~~

~~1. The Safety Factor is applied to account for any variations in the release locations.~~

REPLACE ABOVE WITH TABLE ON NEXT PAGE

GGNS ESP
COL 2.3-2

GGNS COL
2.0-10-A

TABLE 2.3-208
CONTROL ROOM CROSS-UNIT AND TSC
χ/Q RESULTS (S/M^3)

Release/Receptor Description	Direction (Receptor to source)	Time Interval 0 - 2 hrs	2 - 8 hrs	8 - 24 hrs	1 - 4 days	4 - 30 days
CROSS-UNIT						
Unit 1 (source) to Unit 3[2]	132°	6.69E-05	5.65E-05	2.14E-05	1.79E-05	1.30E-05
TSC Results[1]						
RB to TSCE		1.99E-04	1.22E-04	4.75E-05	3.85E-05	2.83E-05
RB to TSCW		2.38E-04	1.50E-04	6.47E-05	4.91E-05	3.59E-05
PCCS to TSCE		3.23E-04	2.10E-04	9.05E-05	6.71E-05	4.68E-05
PCCS to TSCW		4.22E-04	3.11E-04	1.35E-04	1.06E-04	7.30E-05
TB to TSCE		7.72E-04	3.69E-04	1.44E-04	1.20E-04	8.61E-05
TB to TSCW		1.60E-03	9.99E-04	5.46E-04	3.75E-04	2.61E-04
TB-TD to TSCW		9.71E-04	5.82E-04	2.45E-04	1.54E-04	1.35E-04

Notes:

1. See DCD Table 2A-2.
2. Distance from Unit 1 Reactor Building to Unit 3 Control Building is 350 m.

Grand Gulf Nuclear Station, Unit 3
COL Application
Part 2, FSAR

~~{{{Security-Related Information - Withheld Under 10 CFR 2.390(d)(1)}}}~~
~~(See COL Application - Part 9)~~

Deleted

Figure 2.3-201. ~~Control Room Air Intake Locations~~

Grand Gulf Nuclear Station, Unit 3
COL Application
Part 2, FSAR

~~{{{Security-Related Information - Withheld Under 10 CFR 2.390(d)(1)}}}~~
~~(See COL Application - Part 9)~~

Deleted

Figure 2.3-202. ~~Control Building Unfiltered Inleakage Location~~

Grand Gulf Nuclear Station, Unit 3
COL Application
Part 2, FSAR

~~*{{{Security-Related Information - Withheld Under 10 CFR 2.390(d)(1)}}}*~~
~~(See COL Application - Part 9)~~

Deleted

Figure 2.3-203. ~~Reactor Building Diffuse Source (Release Ducted Vertically to Reactor Building Roof)~~

Grand Gulf Nuclear Station, Unit 3
COL Application
Part 2, FSAR

~~{{{Security-Related Information - Withheld Under 10 CFR 2.390(d)(1)}}}~~
~~(See COL Application - Part 9)~~

Deleted

Figure 2.3-204. ~~PCCS Duct Location (Release Ducted Vertically to Reactor Building Roof)~~

Grand Gulf Nuclear Station, Unit 3
COL Application
Part 2, FSAR

~~{{{Security-Related Information - Withheld Under 10 CFR 2.390(d)(1)}}}~~
~~(See COL Application - Part 9)~~

Deleted

Figure 2.3-205. ~~Turbine Building Release Points~~

APPENDIX 2A ARCON96 SOURCE/RECEPTOR INPUTS

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

2.A.2.1 Meteorological Data

Add the following as the last sentence of this section.

GGNS COL 2A.2-1-A

Instrumentation heights used in the analysis are described in SSAR Section 2.3.3.2. Meteorological data from 2002 and 2003 as described in SSAR Section 2.3 is used in the analysis.

2.A.2.3 ARCON96 ESBWR Inputs

Revise the last sentence of the first paragraph as follows.

GGNS COL 2A.2-1-A

These directions are adjusted by the difference in angle (approximately 30 degrees counterclockwise) between ESBWR plant north and the Unit 3 plant north; Unit 3 receptor to source directions are shown in Table 2.3-201.

2.A.2.4 Confirmation of the ESBWR χ/Q Values

Replace the DCD paragraph with the following.

GGNS COL 2A.2-1-A

DCD Figure 2A-1 shows the locations of the sources and receptors for ESBWR control room determinations, also used in the Unit 3 evaluations. The dimensions of the diffuse source planes provided in DCD Table 2A-3 are determined as directed by Regulatory Position 3.2.4.5 of Regulatory Guide 1.194 for the nearest receptor locations. ARCON96 calculations are performed for source/receptor pairs listed in DCD Tables 2A-3 and 2A-4 using site-specific meteorological data. Results of the site-specific analysis are provided in Tables 2.3-204 through 2.3-208.

2.A.2.5 Confirmation of the Reactor Building χ/Q Values

Replace the DCD paragraph with the following.

GGNS COL 2A.2-2-A

During refueling the stairwell doors on the east side of the reactor building, if open, could act as a point source that could result in control room χ/Q values that are higher than the ESBWR χ/Q values for a release from the reactor building. Therefore, the doors are administratively controlled prior to movement of irradiated fuel bundles, and during movement of irradiated fuel bundles such that the doors on the east side of the reactor building are promptly closed under conditions indicative of a fuel handling accident.

2.A.3 COL INFORMATION

2A.2-1-A Confirmation of the ESBWR χ/Q Values

GGNS COL 2A.2-1-A

This COL item is addressed in Section 2.3.4.3 and in Section 2A.2.4.

2A.2-2-A Confirmation of the Reactor Building χ/Q Values

GGNS COL 2A.2-2-A

This COL item is addressed in Section 2A.2.5.