



South Texas Project Electric Generating Station P.O. Box 289 Wadsworth, Texas 77483

December 21, 2009
U7-C-STP-NRC-090227

U. S. Nuclear Regulatory Commission
Attention: Document Control Desk
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South Texas Project
Units 3 and 4
Docket Nos. 52-012 and 52-013
Response to Request for Additional Information

Attached are responses to NRC staff questions in Request for Additional Information (RAI) letter 233, related to COLA Part 2, Tier 2, Section 2.3S.4, "Short-Term Atmospheric Diffusion Estimates for Accident Releases," and Section 2.5S.4, "Stability of Subsurface Materials and Foundations." This letter provides the complete response to RAI letter 233.

Attachments 1 and 2 provide responses to the following NRC staff questions:

02.03.04-10

02.05.04-32

When a change to the COLA is indicated, the change will be incorporated into the next routine revision of the COLA following NRC acceptance of the RAI response.

There are no commitments in this letter.

If you have any questions regarding these responses, please contact me at (361) 972-7136, or Bill Mookhoek at (361) 972-7274.

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

Executed on 12/21/09

Scott Head
Manager, Regulatory Affairs
South Texas Project Units 3 & 4

rhb

Attachments:

1. RAI 02.03.04-10
2. RAI 02.05.04-32

cc: w/o attachments and enclosure except*
(paper copy)

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RAI 02.03.04-10**Question:**

This question is related to the applicant's responses to RAIs 02.03.04-1 and 15.00.03-1.

The applicant's response to RAI 02.03.04-1 provided the inputs used to execute the ARCON96 atmospheric dispersion computer code to derive the site-specific control room (CR) and technical support center (TSC) atmospheric dispersion factors (CHI/Q values) presented in FSAR Table 2.3S-25 and the site-specific CR CHI/Q values presented in FSAR Table 15.6.5S-1. The applicant's response to RAI 15.00.03-1 subsequently revised the original set of site-specific CHI/Q values presented in FSAR Tables 2.3S-25 and 15.6.5S-1.

- (a) Revise the response to RAI 02.03.04-1 to provide the inputs used to rerun the ARCON96 model to derive the revised set of site-specific CR and TSC CHI/Q values presented in the response to RAI 15.00.03-1. Discuss the reasons why the input values were changed. The staff requires this information in order to review the inputs to the ARCON96 model and perform its own confirmatory analyses.
- (b) Consider presenting all the DCD Turbine Building Limit CHI/Q values presented in FSAR Table 2.3S-25 to the third significant digit (e.g., 5.17E-04 for the 0-2 hour CR and TSC air intakes) as was done in FSAR Table 15.6.5S-1. This precision is necessary in FSAR Table 2.3S-25 to conclude that the 0-2 hour site-specific turbine building release CHI/Q value (5.20E-04) exceeds the corresponding DCD value of 5.17E-04.
- (c) The response to RAI 15.00.03-1 states that there are three instances for which the site-specific CR CHI/Q values exceed the corresponding DCD CHI/Q values (i.e., 0-2 hour turbine building release, the 4-30 day turbine building release, and the 4-30 day reactor building release). However, the proposed revision to FSAR Section 2.3S.4.2.1.2 states that there are only two instances where the site-specific CR CHI/Q values exceed the corresponding DCD CHI/Q values (i.e., the 4-30 day turbine building release and the 4-30 day reactor building release). Please clarify this apparent discrepancy.

Response:

Item (a):

The following information provides a description of the revised inputs used to execute the ARCON96 code for each source-receptor combination. The information provided in response to Item (a) supersedes and replaces the response to RAI 02.03.04-1. It is assumed that there are two TSC air intakes, one is located to the southwest corner of the TSC and the other is located at the northwest corner of the TSC.

Source 1

Reactor Building Plant Stack

Release Type		Ground
Height of Release Point	[m]	26.2
Vertical Velocity	[m/s]	0
Stack Flow	[m ³ /s]	0
Stack Radius	[m]	0
Cross-sectional area*	[m ²]	2,173.60

	Receptor 1	Receptor 2	Receptor 3
	Control Room Air Intake "C"	Control Room Air Intake "B"	Tech Support Center Air Intake
Receptor Air Intake Height	8.8	8.8	10.2
Direction to Source from Receptor / Window Width	224/90	177/90	259/90*
Distance from Source to Receptor	73.2	52.9	60.3*

* Assuming the closest TSC air intake is located at the southwest corner of the TSC.

Initial diffusion coefficients, meter: 0.0, 0.0. This is representative of a point source release.

To calculate the Reactor Building Plant Stack CHI/Q values, the building cross-sectional area was estimated to be the side of the Reactor Building adjacent to the Control Building, which is the smaller side of the Reactor Building. This is a conservative approach because a smaller cross-sectional area will result in higher CHI/Q values.

Source 2 <i>Turbine Building Truck Doors</i>				
Release Type		Ground		
Height of Release Point	[m]	1		
Vertical Velocity	[m/s]	0		
Stack Flow	[m ³ /s]	0		
Stack Radius	[m]	0		
Cross-sectional area*	[m ²]	3,813.50		
		Receptor 1	Receptor 2	Receptor 3
		Control Room Air Intake "C"	Control Room Air Intake "B"	Tech Support Center Air Intake
Receptor Air Intake Height	[m]	8.8	8.8	10.2
Direction to Source from Receptor / Window Width	[degrees/degrees]	324/90	347/90	319/90*
Distance from Source to Receptor	[m]	131.5	108.5	132.1

*Assuming the closest TSC air intake is located at the northwest corner of the TSC.

Initial diffusion coefficients, meter: 0.0, 0.0. This is representative of a point source release.

To calculate the Turbine Building Truck Door CHI/Q values, the building cross-sectional area was estimated to be the side of the Turbine Building adjacent to the Control Building, which is the smaller side of the Turbine Building. This is a conservative approach because a smaller cross-sectional area will result in higher CHI/Q values.

Default Values used (both sources):

Surface Roughness Length, meters:	0.2
Wind Direction Window, degrees:	90
Minimum Wind Speed, meters/second:	0.5
Averaging Sector Width Constant:	4.3
Hours in Averages:	1 2 4 8 12 24 96 168 360 720
Minimum Number of Hours:	1 2 4 8 11 22 87 152 324 648
Flag for Expanded Output:	n

Certain input values have been revised from those presented in the response to RAI 02.03.04-1 (STPNOC Letter ABR-AE-08000039, dated May 29, 2008). These revisions resulted from updated information regarding locations and specifications for sources and receptors (e.g., some

of the receptor intake heights, directions to source from receptor, and distances from source to receptor). The most significant revisions result from: 1) reduction of the plant stack release height location from 76 m to 26.2 m because, consistent with DCD Tier 2, Subsection 15.6.5.5.3.2, the release is assumed to occur at the stack base (26.2 m) instead of the top of the stack (76 m); and 2) reduction of distances from sources to TSC air intakes because the air intakes are now conservatively assumed to be located at the southwest and northwest corners of the TSC, thus closer to the Reactor Building stack and Turbine Building Truck Door, respectively.

Item (b):

The DCD Turbine Building Limit CHI/Q values presented in FSAR Table 2.3S-25 will be revised to show the third significant digit (e.g., $5.17\text{E-}04 \text{ sec/m}^3$ for the 0-2 hour CR and TSC air intakes) consistent with FSAR Table 15.6.5S-1. The DCD does not provide a 0-2 hour DCD Control Room Limit from which to calculate the corresponding DCD Turbine Building Limit for comparison to the calculated 0-2 hour site-specific Turbine Building release CHI/Q value ($5.20\text{E-}04 \text{ sec/m}^3$). For purposes of this table, the 0-8 hour DCD Turbine Building Limit ($5.17\text{E-}04 \text{ sec/m}^3$) is provided in the 0-2 hours column. For comparison purposes, a 0-8 hour site-specific value ($4.44\text{E-}04 \text{ sec/m}^3$) was calculated based on the methodology provided in Section 3.7 of NUREG/CR-6331 (Reference 1) to show that this value does not exceed the 0-8 hour DCD Turbine Building Limit. See the revised FSAR Table 2.3S-25, Note 3.

Item (c):

The response to RAI 15.00.03-1 has been revised to reflect that there are only two instances for which the site-specific CR CHI/Q values exceed the corresponding DCD CHI/Q values. The revised response was submitted to the NRC on November 30, 2009 (STPNOC Letter, U7-C-STP-NRC-090213).

References:

1. NUREG/CR-6331, "Atmospheric Relative Concentrations in Building Wakes," Revision 1, May 1997.

FSAR Table 2.3S-25 will be revised as shown below with changes gray shaded:

Table 2.3S-25 ARCON96 χ/Q Values (sec/m³)

ARCON96 χ/Q Values at the Control Room Air Intake "C"

Release Point	0 – 2 hours	2 – 8 hours	8 – 24 hours	1 – 4 days	4 – 30 days
Reactor Building	4.52E-04	2.80E-04	1.14E-04	9.36E-05	6.47E-05
Plant Stack	9.14E-04	4.98E-04	2.22E-04	1.68E-04	1.16E-04
DCD Control Room Limit	3.1E-03 [1] 3.10E-03 [1]	NA	1.83E-03	1.16E-03	5.12E-04
Turbine Building	3.69E-04	2.75E-04	1.30E-04	6.94E-05	5.98E-05
Truck Doors	3.38E-04	2.43E-04	1.16E-04	6.28E-05	5.43E-05
DCD Turbine Building Limit [2]	5.2E-04 5.17E-04	NA	3.1E-04 3.05E-04	1.9E-04 1.93E-04	8.5E-05 8.53E-05

ARCON96 χ/Q Values at the Control Room Air Intake "B"

Release Point	0 – 2 hours	2 – 8 hours	8 – 24 hours	1 – 4 days	4 – 30 days
Reactor Building	7.49E-04	6.11E-04	2.46E-04	2.49E-04	2.15E-04
Plant Stack	2.03E-03	1.68E-03	5.88E-04	6.29E-04	5.59E-04
DCD Control Room Limit	3.1E-03 [1] 3.10E-03 [1]	NA	1.83E-03	1.16E-03	5.12E-04
Turbine Building	5.18E-04	4.17E-04	1.79E-04	1.19E-04	9.13E-05
Truck Doors	5.20E-04	4.18E-04	1.84E-04	1.18E-04	9.15E-05
DCD Turbine Building Limit [2]	5.2E-04 5.17E-04 [3]	NA	3.1E-04 3.05E-04	1.9E-04 1.93E-04	8.5E-05 8.53E-05

ARCON96 χ/Q Values at the Technical Support Center Air Intake

Release Point	0 – 2 hours	2 – 8 hours	8 – 24 hours	1 – 4 days	4 – 30 days
Reactor Building	1.94E-04	1.35E-04	5.28E-05	3.29E-05	2.59E-05
Plant Stack	5.89E-04	4.50E-04	1.91E-04	1.27E-04	9.39E-05
DCD Control Room Limit	3.1E-03 [1] 3.10E-03	NA	1.83E-03	1.16E-03	5.12E-04
Turbine Building	2.02E-04	1.40E-04	6.47E-05	3.50E-05	3.03E-05
Truck Doors	3.28E-04	2.26E-04	1.06E-04	5.67E-05	4.99E-05
DCD Turbine Building Limit [2]	5.2E-04 5.17E-04	NA	3.1E-04 3.05E-04	1.9E-04 1.93E-04	8.5E-05 8.53E-05

Notes:

NA – Not available

[1] The reference ABWR DCD specifies that this value is for 0-8 hours.

[2] The reference ABWR DCD specifies that the χ/Q values for Turbine Building release are a factor of 6 less than those from the Reactor Building release.

[3] The value provided in the 0-2 hour column for the DCD Turbine Building Limit is the 0-8 hour DCD Turbine Building Limit. The equivalent calculated ARCON96 0-8 hr value is estimated to be 4.44E-04 sec/m³ based on the method provided in Section 3.7 of NUREG/CR-6331, which does not exceed the 0-8 hour DCD Turbine Building Limit (5.17E-04 sec/m³).

RAI 02.05.04-32**Question:**

Revision 3 of STP COLA indicates that there is concrete backfill below all of the Category I structures ranging from 2 feet to 10 feet thickness. The staff could not locate specifications or placement methods for the concrete backfill in Section 2.5.4.5.

Please provide concrete specifications or placement methods.

Response:

The concrete backfill is an unreinforced section that transfers bearing loads from the foundation to the subgrade. It will have a compressive strength of 3000 psi at 28 days. The testing, inspection, and placement of this concrete will be in accordance with the requirements of ACI 349, "Code Requirements for Nuclear Safety-Related Concrete Structures," and other applicable codes and standards, including the following:

- ACI 211.1: Practice for Selecting Proportions for Normal, Heavy Weight, and Mass Concrete
- ACI 212: Guide for Admixture in Concrete
- ACI 214: Recommended Practice for Evaluation of Strength Test Results of Concrete
- ACI 304: Practice for Measuring, Mixing, Transporting, and Placing of Concrete
- ACI 305: Specification for Hot Weather Concreting
- ACI 306: Specification for Cold Weather Concreting
- ACI 308: Practice for Curing Concrete
- ACI 309: Practice for Consolidation of Concrete
- ACI 311.1R: ACI Manual of Concrete Inspection
- ACI 311.4R: Guide for Concrete Inspection

No COLA changes are required as a result of this response.