Nuclear Operating Company

South Texas Project Electric Generating Station 4000 Avenue F – Suite A Bay City, Texas 77414

August 26, 2009
U7-C-STP-NRC-090111

U. S. Nuclear Regulatory Commission
Attention: Document Control Desk
One White Flint North
11555 Rockville Pike
Rockville MD 20852-2738

South Texas Project
Units 3 and 4
Docket Nos. 52-012 and 52-013
Response to Request for Additional Information

Attached are the responses to the NRC staff questions included in Request for Additional Information (RAI) letter numbers 149, 168, 169, and 179 related to Combined License Application (COLA) Part 2, Tier 2, Sections 3.2, 3.3, 3.5, 3.6, and 3.7.

Attachments 1 through 20 address the responses to the RAI questions listed below:

RAI 03.02.02-1	RAI 03.03.01-2
RAI 03.02.02-2	RAI 03.03.01-3
RAI 03.02.02-3	RAI 03.03.01-4
RAI 03.02.02-4	RAI 03.03.01-5
RAI 03.02.02-5	RAI 03.03.01-6
RAI 03.02.02-6	RAI 03.03.01-7
RAI 03.02.02-7	RAI 03.03.01-8
RAI 03.02.02-8	RAI 03.05.01.03-1
RAI 03.02.02-9	RAI 03.06.01-2
RAI 03.03.01-1	RAI 03.07.01-14

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

D091
NRO

STI 32523717

There are no commitments in this letter.

If you have any questions, 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 8/26/09

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

jep

Attachments:

1. RAI 03.02.02-1
2. RAI 03.02.02-2
3. RAI 03.02.02-3
4. RAI 03.02.02-4
5. RAI 03.02.02-5
6. RAI 03.02.02-6
7. RAI 03.02.02-7
8. RAI 03.02.02-8
9. RAI 03.02.02-9
10. RAI 03.03.01-1
11. RAI 03.03.01-2
12. RAI 03.03.01-3
13. RAI 03.03.01-4
14. RAI 03.03.01-5
15. RAI 03.03.01-6
16. RAI 03.03.01-7
17. RAI 03.03.01-8
18. RAI 03.05.01.03-1
19. RAI 03.06.01-2
20. RAI 03.07.01-14

cc: w/o attachment except*
(paper copy)

Director, Office of New Reactors
U. S. Nuclear Regulatory Commission
One White Flint North
11555 Rockville Pike
Rockville, MD 20852-2738

Regional Administrator, Region IV
U. S. Nuclear Regulatory Commission
611 Ryan Plaza Drive, Suite 400
Arlington, Texas 76011-8064

Kathy C. Perkins, RN, MBA
Assistant Commissioner
Division for Regulatory Services
Texas Department of State Health Services
P. O. Box 149347
Austin, Texas 78714-9347

Alice Hamilton Rogers, P.E.
Inspections Unit Manager
Texas Department of State Health Services
P.O. Box 149347
Austin, TX 87814-9347

C. M. Canady
City of Austin
Electric Utility Department
721 Barton Springs Road
Austin, TX 78704

*Steven P. Frantz, Esquire
A. H. Gutterman, Esquire
Morgan, Lewis & Bockius LLP
1111 Pennsylvania Ave. NW
Washington D.C. 20004

*George F. Wunder
*Tom Tai
Two White Flint North
11545 Rockville Pike
Rockville, MD 20852

(electronic copy)

*George F. Wunder
*Tom Tai
Loren R. Plisco
U. S. Nuclear Regulatory Commission

Steve Winn
Eddy Daniels
Joseph Kiwak
Nuclear Innovation North America

Jon C. Wood, Esquire
Cox Smith Matthews

J. J. Nesrsta
R. K. Temple
Kevin Pollo
L. D. Blaylock
CPS Energy

RAI 03.02.02-1

QUESTION:

The applicant is expected to identify site-specific SSCs that are not included in the DCD. COLA Table 3.2-1 includes additional SSCs that are not included in the ABWR DCD, but it appears there are certain SSCs, such as the RSW pumps and RSW strainers, that are not included in either ABWR DCD Table 3.2-1 or the COLA Table 3.2-1. Review the COLA for completeness to identify any SSCs that have not been classified and clarify when this quality group classification information will be submitted.

RESPONSE:

STPNOC Letter dated August 6, 2009 (U7-C-STP-NRC-090096) provides a response to RAI 03.02.01-2 updating the ABWR DCD, Tier 2, Table 3.2-1. COLA FSAR Table 3.2-1, which provides the changes, is updated and included. The classification information on this table includes quality group classification and seismic classification, with other classification information, following the format of ABWR DCD, Tier 2, Table 3.2-1. The updated COLA table, as a result of RAI 03.02.01-2 response, will be provided in a future COLA update.

No additional COLA change is required as a result of this RAI response.

RAI 03.02.02-2

QUESTION:

The quality group or corresponding ASME Code class should be shown on piping and instrumentation diagrams (P&IDs). The P&IDs included in the FSAR do not appear to identify quality group or ASME Code class. Identify quality group or ASME Code class boundaries on P&IDs or otherwise explain how the quality group and ASME Code Class boundaries are identified.

RESPONSE:

The legend for the Piping and Instrumentation Diagram (P&ID) Symbols used in the ABWR DCD and STP 3 & 4 COLA Part 2 is provided on Tier 2 Figure 1.7-1, Sheets 1 and 2. This figure is located in Chapter 21. As noted in COLA Part 2, Tier 2, Section 21.0, "The figures in this section of the reference ABWR DCD are incorporated by reference except for figures listed in the Table 21.1." Figure 1.7-1 is also identified as MPL No. A10-3030 on sheet 1. This MPL No. reference is used to identify the Piping and Instrument Diagram Symbols as a "supporting document" on the P&IDs.

An example of a typical P&ID boundary is provided on Figure 1.7-1, Sheet 1, showing breaks of Design Quality Class and Seismic Class, referring to Note 11 on Sheet 2. Note 11 provides (1) the correlation of Design and/or Quality Class with Safety Designation (Class) and Quality Group, and (2) and the correlation of Seismic Design Classification with Seismic Category 1 or non-seismic category. The correlations refer to Table 3.2-2 of Document 23A6100, ABWR SSAR (predecessor to ABWR DCD Tier 2, as noted in the ABWR Final Safety Evaluation Report, NUREG-1503), for description of Safety Designation (Class) and Quality Group and Seismic Category. Table 3.2-3 of the ABWR DCD provides correlation between Quality Group classification and ASME Code classification. Based on Design Quality Class noted at the boundary of change, the ASME Code class is determined.

No COLA change is required as a result of this RAI response.

RAI 03.02.02-3

QUESTION:

Certain site-specific components that are nonsafety-related, such as the containment hydrogen and oxygen monitors and fuel servicing equipment, may be considered important to safety or risk-significant and special treatment may be required. Clarify if any nonsafety-related site-specific components included in COLA Table 3.2-1 are considered risk-significant and, if so, identify the special treatment requirements applicable to these systems.

RESPONSE:

Risk-significance of systems, structures, and components (SSCs) in the Standard Review Plan (SRP) NUREG-0800, Section 3.2.2, Revision 2, refers to a risk-informed categorization process using an alternative approach under 10 CFR 50.69. As described in the SRP, the risk-informed approach described in Regulatory Guide (RG) 1.176 and RG 1.206 is optional. STP Units 3 & 4 are not using the optional approach described in these RGs. COLA Table 3.2-1, when revised (see reference), will include the site-specific SSCs, classified using the guidance provided by Standard Review Plan NUREG-0800, Section 3.2.2, Revision 1.

The question identifies two example systems for consideration. These systems are non-safety-related, with special QA requirement for both and seismic requirements for the Fuel Servicing Equipment. The classification information on these two systems is provided in the reference, in a markup of FSAR Table 3.2-1, Item No. D3 (System D23, Containment Atmospheric Monitoring System – H_2/O_2 Monitoring) and Item No. F1 (System F11, Fuel Servicing Equipment). However, these systems are not site-specific. They are changed because of the identified standard departures.

The site-specific PRA for STP 3 & 4 described in Chapter 19 of the FSAR identifies risk-significant SSCs. In particular, FSAR Appendix 19K, PRA-Based Reliability and Maintenance, identifies SSCs that are risk-significant, irrespective of the safety classification of the SSCs, and specifies any special maintenance or testing requirements associated with these SSCs. Site-specific, risk-significant, non-safety related SSCs and associated maintenance or testing requirements are identified in FSAR Table 19K-4 (with DCD Table 19K-4 incorporated or applied by reference), e.g., the Reactor Service Water pump house sump pumps and sump level switches.

Reference: STPNOC Letter U7-C-STP-NRC-090096, Response to Request for Additional Information - RAI 03.02.01-2, dated August 6, 2009.

No additional COLA change is required as a result of this RAI response.

RAI 03.02.02-4

QUESTION:

Identify if any nonmetallic piping will be used in any risk-significant systems and, if so, identify specific systems and specific applications (underground, sizes, etc.) where the piping is to be used. Also identify the basis for the use of nonmetallic materials, including applicable ASME Code, endorsed code cases, supplemental requirements/special treatment and technical justification such as an engineering evaluation.

RESPONSE:

Non-metallic piping is not included in the STP 3 & 4 COLA.

No COLA change is required as a result of this RAI response.

RAI 03.02.02-5

QUESTION:

COL FSAR Section 1.8 identifies limited codes and standards, but these codes and standards do not appear to be complete or current. SRM dated July 21,1993 concerning SECY-93-087 identified that the staff will review evolutionary plant design applications using the newest codes and standards endorsed by the NRC and unapproved revisions to the codes will be reviewed on a case by case basis. Identify a complete list of codes and standards and clarify which editions are not NRC endorsed and, for those editions, clarify if the edition is current.

RESPONSE:

The complete list of Industrial Codes and Standards consists of those listed in COLA Part 2, Tier 2, Section 1.8 and the ABWR DCD Section 1.8, which is incorporated by reference, including Tables 1.8-21 and 1.8-21a.

Changes (departures, revisions and supplementation for omission) to DCD Table 1.8-21 are noted in COLA Part 2, Tier 2, Table 1.8-21, and supplements for the site-specific codes and standards are provided in COLA Part 2, Tier 2, Table 1.8-21a.

Tables 1.8-21 and 1.8-21a were last updated in COLA Revision 2. Similarly, DCD Table 5.2-1, Reactor Coolant Pressure Boundary Components Applicable Code Cases, was last updated in COLA Revision 2, as part of FSAR Section 5.2 update.

Further specific clarification, revision or supplements are being proposed in response to RAIs, as appropriate, and will be incorporated in future revision(s) of the COLA. For example, further clarification concerning applicability of IEEE standards to STP 3 & 4 Instrumentation and Control platforms have been proposed as changes to Table 1.8-21 and are provided in a new Table 1.9S-1a in Enclosure 2b of STPNOC Letter U7-STP-NRC-09-0009, dated February 9, 2009.

Additional examples are (1) Use of Code Case No. N-580-2, RAI 04.05.02-3, as discussed in STPNOC Letter U7-STP-NRC-09-0027, dated April 2, 2009, and (2) Use of 2006 International building Code, RAI 03.08.01-1. The response to RAI 03.08.01-1 is currently planned for September 3, 2009.

No COLA change is required as a result of this RAI response.

RAI 03.02.02-6

QUESTION:

SRP 14.3 identifies that the ITAAC for site-specific design features should be developed at the COL stage. SRP 14.3 further identifies that the safety classification of SSCs are described in each system's design description and the functional drawings identify the boundaries of the ASME classification that are applicable to the safety class. The SRP 14.3 Appendix C design description checklist also specifically includes seismic classification and ASME code classifications that should be verified as part of ITAAC. Piping, equipment, individual system components and supports comprise a system. As stated in SRP 14.3, ASME code class boundaries for mechanical equipment and piping are shown on the figure and form the basis for the basic configuration check (system) that is required for each individual system ITAAC.

Section 14.3S of the FSAR identifies that the selection criteria and methodology provided in Section 14.3 of the reference ABWR DCD for the certified ABWR design were utilized as the site-specific selection criteria and methodology for ITAAC and, in general, the ITAAC for site-specific systems were developed to correspond with the interface criteria in Tier 1 of the reference ABWR DCD. DCD subsection 14.3.2.1 includes system and component classification information as design information that should be included in Tier 1 design descriptions and DCD subsection 14.3.2.2 states that the scope and content of the ITAAC correspond to the scope and content of the Tier 1 design descriptions. The site-specific ITAAC included in Part 9 of the COLA include basic configuration ITAAC for site-specific systems, but the definition of basic configuration in Section 1.1 of the ABWR CDM does not specifically identify classifications as part of the basic configuration ITAAC for a building or a system.

Clarify if the ITAAC criteria to verify the basic configuration include verification of seismic category and ASME Code classification for ASME systems or, if not included, explain how the as-built system classifications are verified, such as through a generic piping design ITAAC described in the DCD.

Also, the COLA ITAAC included in Part 9 of the application do not specifically define ITAAC for classification of site-specific SSCs as Tier 1, but the referenced ABWR DCD does not appear to identify any departures from Tier 1 system ITAAC for ASME Code and Seismic Category I requirements. Clarify if the classification ITAAC for plant-specific SSCs, such as the UHS, are included in Tier 1 or explain why they are not considered as Tier 1.

RESPONSE:

Response to NRC Question related to ITAAC for Classifications

As discussed in the response to RAI 03.02.02-2, the STP Units 3 & 4 FSAR Piping and Instrumentation Diagrams (P&IDs) provide the ASME Code classification and seismic design classification.

As discussed in the response to RAI 03.02.01-5 (see letter U7-C-STP-NRC-090096 dated August 6, 2009) , COLA Part 9 includes ITAAC for verification of basic configuration, and those ITAAC use the methodology for verification of basic configuration as provided in ABWR DCD Tier 1, Section 1.2. That methodology provides for the verification of:

- Inspections of system functional arrangement
- Inspections of pressure boundary welds for ASME Code Class 1, 2 or 3 components
- Type tests and analyses to demonstrate that Seismic Category I mechanical and electrical equipment are qualified to withstand design basis dynamic loads
- Type tests and analyses to demonstrate that Class 1E electrical equipment are qualified to withstand environmental conditions associated with design basis accidents
- Tests of motor operated valves

The verification of basic configuration does not include a verification of seismic category or ASME Code classification, other than as may be indirectly encompassed within the bullets discussed above. Similarly, the design acceptance criteria (DAC) for piping systems in ABWR DCD Tier 1, Section 3.3, does not include a verification of seismic category or ASME Code classification, other than as may be indirectly encompassed within the ASME stress reports.

In developing the Tier 1 document and ITAAC for the ABWR, a conscious decision was made to specify the seismic category and ASME Code Class in the Tier 1 design descriptions, but not to require a verification of seismic category and ASME Code Class as part of the ITAAC. General Electric Nuclear Energy (GE) developed the *ABWR Certified Design Material/ITAAC Review Guidance* (April 1994) as a guide for preparing the Tier 1 document. The guide was submitted by GE to the NRC on the ABWR design certification docket in a letter April 13, 1994. That guide reflected the results of years of interactions between GE and the NRC to develop the Tier 1 document. The table on pages 62 – 64 of that guide explicitly provide that the safety classification, seismic classification, and ASME Code Class were to be identified in the certified design material (CDM), but that there would be no ITAAC for such classifications. The relevant entries from that table are reproduced below.

Technical Issue	CDM Treatment	Corresponding Treatment in ITAAC
Safety-related or non-safety-related	Identify portions of system which are safety-related and non-safety-related.	None. Basis: system safety-related status covered by other ITAAC such as separation, Class 1E power supplies, etc.
System seismic classification	Identify Seismic Category I portions of safety-related systems.	None (seismic/dynamic qualification covered by configuration).
ASME Code Class and Quality Groups	In general, do not identify Quality Groups in the CDM. ASME Code Class should be identified on the figure using the legend in Appendix A of the CDM. This should be referred to in the text per Supplement 5b.	None. (Welding covered by configuration.)

This same approach is specified in the checklists contained in Appendix C to Standard Review Plan (SRP), Section 14.3 (March 2007). In particular, the checklists for the Tier 1 design descriptions and figures (SRP pp. 14.3-34 and 14.3-35) include entries for seismic and ASME Code classifications. In contrast, the checklist for the ITAAC (SRP pg. 14.3-36) does not include any entries for seismic or ASME Code classifications.

As provided in COLA Part 2, Tier 2, Section 14.3S, the selection criteria and methodology used for the ABWR ITAAC were utilized to develop the STP site-specific ITAAC. Therefore, in accordance with the approach discussed above for the ABWR Tier 1 document and in accordance with SRP Section 14.3, Appendix C, the STP site-specific ITAAC do not include entries to verify seismic category or ASME Code Class (but those classifications will be identified in the figures referenced in the ITAAC).

No COLA change is required as a result of this response.

Response to NRC Question related to Inclusion of ITAAC for Site-Specific Systems in Tier 1

ABWR DCD Tier 1 does not include ITAAC for site-specific systems, such as the Ultimate Heat Sink (UHS). Instead, Chapter 4 of the ABWR DCD Tier 1 identifies Interface Requirements for site-specific systems (e.g., Tier 1, Section 4.1 identifies Interface Requirements for the UHS). In turn, COLA Part 9 identifies ITAAC for the site-specific systems, and as discussed in COLA Part 2, Tier 2, Section 14.3S those ITAAC in general correspond to the Tier 1 Interface Requirements. The ITAAC for the site-specific systems in COLA Part 9 are not considered as Tier 1, because the concepts of Tier 1 and Tier 2 only apply to Design Control Documents, not to site-specific information in a COLA. In that regard, the purpose of Tier 1 and Tier 2 is to apply different change control criteria to different tiers of information, as provided in Section VIII of the design certification rule. In contrast, changes to site-specific information after the COL is issued are controlled by 10 CFR 52.98, and that section requires NRC approval of a license amendment for a change in the ITAAC.

No COLA change is required as a result of this response.

RAI 03.02.02-7

QUESTION:

Concerning the application of ITAAC criteria to site-specific structural and systems engineering, SRP 14.3.2 identifies that design descriptions, figures (including key dimensions) and ITAAC should be developed and grouped by systems and building structures. Building structures and electrical systems are not classified by quality group, but seismic classification does apply. The review checklists for fluid systems, electrical systems and building structures in Appendix C of SRP Section 14.3 should be used as aids for establishing consistency and completeness for the Tier 1 information.

The STP site-specific ITAAC includes a basic configuration ITAAC, but does not specifically identify an ITAAC to verify the seismic or ASME Code classification boundaries. Clarify if ITAAC, such as the basic configuration ITAAC or generic piping ITAAC, are used to verify the seismic classification and ASME Code class boundaries or, if not included in these ITAAC, describe how the as-built classification boundaries are verified.

RESPONSE:

See the response to RAI 03.02.02-6.

RAI 03.02.02-8

QUESTION:

Concerning the application of ITAAC criteria to site-specific piping systems and components, SRP 14.3.3 identifies that Tier 1 ASME code classification, safety classification, and seismic classification of piping systems should be indicated clearly on the figures or described in the design descriptions and consistent with DCD Tier 2, Section 3.2. System boundaries and interfaces are to be indicated clearly in Tier 1 and the figures are to be in accordance with the legends. The ABWR DCD Table 14.3-12 for interface requirements identifies that the UHS be classified as Seismic Category I. For certain site-specific systems such as the Ultimate Heat Sink and PSW, the ASME code classification or safety classification and seismic classification are not clearly shown on the figures. Clarify if the FSAR figures will be updated to include the classifications and boundaries.

SRP 14.3.3 identifies that safety-related piping systems should be designated in Tier 1 as seismic Category I and ASME Code Class 1, 2 or 3. COLA Tier 1 does not include ITAAC for site-specific safety-related SSCs. Clarify if classification ITAAC for plant-specific safety-related systems, such as RSW, should be included in Tier 1 or, if subject to change, be identified as Tier 2*.

RESPONSE:

See the response to RAI 03.02.02-6.

As discussed in that response, the concepts of Tier 1 and Tier 2 only apply to Design Control Documents, not to site-specific information in a COLA. Therefore, the concepts of Tier 1 and Tier 2 are not applicable to the ITAAC in COLA Part 9, such as the ITAAC for the UHS and RSW.

No additional COLA change is required as a result of this RAI response.

RAI 03.02.02-9

QUESTION:

Concerning the application of ITAAC criteria to site-specific plant systems, SRP 14.3.7 identifies that plant systems not part of the core reactor systems are clearly described in Tier 1 including the key performance characteristics and safety functions. Seismic and ASME Code classifications are identified as a Tier 1 issue important to safety to be verified by ITAAC. Equipment and components that are not considered piping are still part of a system. Clearly describe if there is an ITAAC to verify the as-built Seismic and ASME Code class of plant systems, including equipment, components and supports that are not part of the core reactor systems. Also clarify if this ITAAC is included in Tier 1.

RESPONSE:

See the response to RAI 03.02.02-6.

RAI 03.03.01-1

QUESTION:

The supplement of Section 3.3.1.1 Design Wind Velocity of the STP 3 and 4 COL FSAR states that: "The 177 km/h for 50 year recurrence interval and 197 km/h for 100 year recurrence interval are based on Reference 3.3-1, which is "fastest mile". Per Reference 3.3-4 Table 1609.3.1, these correspond to a wind velocity (3 second gust) of 203 km/h with a recurrence interval of 50 years and 225 km/h with a recurrence interval of 100 years." Discuss and justify the applicant's rationale for asserting that the above quoted 177 km/h for 50 year recurrence interval and 197 km/h for 100 year recurrence interval pertain to the "fastest mile" basic wind velocities.

Also confirm that the equation used by STP 3 and 4 COLA FSAR in converting wind velocity (fastest mile) to wind velocity (3 second gust) is identical to Equation 16-34 listed in Section 1609.3.1 of the International Building Code (2006). The staff could not exactly verify the 3 second gust wind velocities of 203 km/h and 225 km/h reported in the applicant's supplement and needs additional clarification.

RESPONSE:

As stated in COLA Part 2, Tier 2, Section 3.3.1.1, the 177 km/h for 50-year recurrence interval and 197 km/h for 100-year recurrence interval are based on ABWR DCD Reference 3.3-1, which defines these speeds in terms of "fastest mile" (see Section 6.2 and Figure 1 of Reference 3.3-1). The conversion of these fastest mile wind speeds to the 3-second gust wind speed is accomplished using the International Code Council 2006 International Building Code (IBC 2006). COLA Part 2, Tier 2, Reference 3.3-4 will be revised to show IBC 2006. Section 1609.3.1 of IBC 2006 provides equation 16-34 to convert fastest mile wind speeds to 3-second gust wind speeds as shown below:

50-year recurrence "fastest mile" wind speed of 177 km/h = 110 mph
100-year recurrence "fastest mile" wind speed of 197 km/h = 122 mph

Then, using Equation 16-34 of IBC 2006, and wind speed in mph:

Converting to 50-year recurrence 3-second gust wind speed:
$V_{fm} = (V_{3s} - 10.5)/1.05$, or $V_{3s} = V_{fm} \times 1.05 + 10.5$
$V_{3s} = 110 \times 1.05 + 10.5$ mph= 126 mph, which is equivalent to 203 km/h.

Converting to 100 year recurrence 3-second gust wind speed:
$V_{3s} = V_{fm} \times 1.05 + 10.5 = 122 \times 1.05 + 10.5$ mph = 139 mph, which is equivalent to 224 km/h.

COLA Part 2, Tier 2, Sections 2.3S.1.3.1, 3.3.1.1 and Table 2.0-2 will be revised to show 224 km/h and 139 mph 3-second gust wind speed for a recurrence interval of 100 years.

The COLA will be revised as follows:

2.3S.1.3.1 Extreme Winds

The basic wind speed is approximately 125 mph (201 km/h), as estimated by linear interpolation from the plot of basic wind speeds in Figure 6-1 of ASCE 2002 (Reference 2.3S-10) for that portion of the U.S. that includes the site for STP 3 & 4. From a probabilistic standpoint, this value is associated with a mean recurrence interval of 50 years. Section C6.0 (Table C6-3) of the ASCE-SEI design standard provides conversion factors for estimating 3-second-gust wind speeds for other recurrence intervals (Reference 2.3S-10). Based on this guidance, the 100-year return period value is determined by multiplying the 50-year return period value by a scaling factor of 1.07, which yields a 100-year return period 3 second-gust wind speed for the site of approximately 134 mph (215 km/h). Three second gust wind speed is always greater than the fastest mile wind speed. In the reference ABWR DCD, the actual extreme of122 mph is the fastest mile wind speed. This corresponds to a 140139 mph 3-second gust, therefore the calculated 100-year fastest mile 3-second gust related to the reference ABWR DCD is not exceeded. The reference ABWR DCD Tier 1, Table 5.0 and reference ABWR DCD Tier 2, Table 2.0-1 include the following site parameter values for Extreme Wind, for which the ABWR plant is designed:

- 177 km/h (110 mph) equivalent to 126 mph (3-second gust) - Basic Wind Speed, 50-year recurrence interval (for design of nonsafety-related structures only)
- 197 km/h (122 mph) equivalent to 140139 mph (3-second gust) - 100-year recurrence interval (for design of safety-related structures only)

3.3.1.1 Design Wind Velocity

The information in this subsection of the reference ABWR DCD is incorporated by reference with the following standard supplement.

The 177 km/h for 50-year recurrence interval and 197 km/h for 100 year recurrence interval are based on DCD Reference 3.3-1, which is “fastest mile”. Per Reference 3.3-4 Table 1609.3.1 and Equation 16-34, these correspond to a wind velocity (3 second gust) of 203 km/h with a recurrence interval of 50 years and 225224 km/h with a recurrence interval of 100 years.

3.3.4 References

The information in this subsection of the reference ABWR DCD is incorporated by reference with the following standard supplement.

3.3-4 International Code Council, 20032006 International Building Code.

COLA Table 2.0-2 on Extreme Wind will be revised as follows:

Table 2.0-2 Comparison of ABWR Standard Plant Site Design Parameters and STP 3 & 4 Site Characteristics

Subject	ABWR Standard Plant Site Design Parameters	STP 3 & 4 Site Characteristics	Bounded (Yes/No)	Discussion
Extreme Wind	Basic Wind Speed: 177 km/h [1] / 197 km/h [2] Per Section 3.3.1.1, the reference ABWR DCD basic wind speed corresponds to a 50-year/100-year wind velocity (3 second wind gust) of: 203 km/h/225224 km/h (126 mph/140139 mph)	201 km/h/215 km/h (125 mph/134 mph) for 3-second wind gust	Yes	Further information on extreme winds is provided in Subsection 2.3S.1.

Footnote [2] of COLA Table 2.0-2 will be revised as follows:

[2] 100-year recurrence interval; value to be utilized for design for safety-related structures only; corresponds to a wind velocity (3-second gust) of 225224 km/h per subsection 3.3.1.1.

RAI 03.03.01-2

QUESTION:

With respect to the information presented in Appendix 3H.6.2, discuss the technical basis for adopting a simplified approach, for the conceptual design of the UHS basin and the pump house of each unit, by applying the free-field peak ground motion acceleration of 0.15g in the two horizontal (N-S and E-W) directions and the vertical direction, ignoring the effects of seismic soil structure interaction (SSI). Discuss the basis for using a 10% amplification factor for the cooling towers and an acceleration of 0.165g applied in the three directions. Discuss how the Hydrodynamic effects of the water in the basin were considered. Also provide a detailed discussion describing how the so-called final seismic analysis of the UHS structure will comply with the applicable acceptance criteria of SRP Sections 3.7 and 3.8. Additionally, indicate the updating status of the FSAR in accordance with 10 CFR 50.71(e) which was tentatively scheduled to be submitted by the second quarter of 2009 for staff review.

RESPONSE:

The final UHS seismic analysis has been performed implementing SRP Sections 3.7 and 3.8 requirements and is documented in the enclosure of the response to RAI 03.07.01-13 (see letter U7-C-STP-NRC-090112 dated August 20, 2009). This enclosure also includes the basis for determination of the hydrodynamic effects of the water in the basin. Attachment 1 to letter U7-C-STP-NRC-090112 provides the schedule for submitting additional information.

No additional COLA change is required for this response.

RAI 03.03.01-3

QUESTION:

With respect to the site-specific supplement related to COL License Information Item 3.1, the applicant states that, "The site-specific design basis wind does not exceed the design basis wind given in Table 2.0-1 of the reference ABWR DCD." Provide a justification including a comparative velocity data to support the STP assertion that the site-specific design basis wind velocities do not exceed the design basis wind velocities given in Table 2.0-1 of the reference ABWR DCD.

RESPONSE:

The site-specific wind speed was determined using American Society of Civil Engineers, ASCE 7-05, Figure 6.1-A. Based on this figure, the basic wind speed at the STP 3 & 4 site is 125 mph (3-second gust) for 50-year recurrence interval. Using the conversion factor of 1.07 for 100-year recurrence interval from ASCE 7-05, Table C6-7, the 100-year recurrence interval wind speed is:

1.07 x 125 mph = 133.75 mph or 134 mph (215 km/h)

The 215 km/h is bounded by the ABWR DCD 100-year recurrence interval wind speed of 224 km/h (3-second gust) which is equivalent to the fastest mile wind speed of 197 km/h shown in ABWR DCD Table 2.0-1. See Wind Speed Comparison Table provided below and in COLA Part 2, Tier 2, Table 2.0-2.

Wind Speed Comparison Between DCD Table 2.0-1 and ASCE 7-05 (STP Units 3 & 4)

	DCD Table 2.0-1				ASCE 7-05	
Mean Recurrence Interval, MRI (yrs)	Fastest mile, V_{fm}		(Note 1) 3-sec Gust, V_{3S}		3-sec Gust, V_{3S}	
	km/h	mph	km/h	mph	km/h	mph
50	177	110	203	126	201	125
100 (Note 2)	197	122	224	139	215	134

Notes:

1) To convert V_{3S} (mph) from V_{fm} (mph), use the equation below (developed from Equation 16-34 of IBC 2006):

$$V_{3S\,(mph)} = 1.05\, V_{fm} + 10.5 \quad \text{(mph)}$$

$$V_{fm}\,\text{(mph)} = \frac{(V_{3S} - 10.5)}{1.05} \quad \text{(mph)}$$

(IBC 2006 Equation 16-34)

2) To convert MRI = 50 yrs to MRI =100 yrs, use the following equation from ASCE 7-05 Table C6-7:

$$V_{100yr} = 1.07 \times V_{50yr}$$

No COLA change is required for this response.

RAI 03.03.01-4

QUESTION:

With respect to the supplement listed in Section 3.3.3.3, provide more detailed discussion of the approaches and analyses to be used by STP to ensure that SSCs not designed for wind loads are analyzed and checked to ensure that their mode of failure will not affect the ability of safety-related SSCs to perform their intended safety functions. Also, discuss the codes and standards (e.g., ASCE-SEI 7-05) that will be used to ensure realization of an expected SSC performance outcome. The discussion should refer to pertinent SRP acceptance criteria or guidance that were relied upon in performing the analyses.

RESPONSE:

See the response to RAI 03.03.01-5.

RAI 03.03.01-5

QUESTION:

With respect to the site-specific supplement provided in STP 3 and 4 FSAR Section 3.3.3.3 to address COL license information item 3.3, the applicant has committed to design the remainder of SSCs based on an importance factor "I" of 1.11. ASCE 7-05, Chapter 6 Wind Loads, Table 6-1 specifies an importance factor of 1.15 for hurricane prone regions. The factor I=1.15 converts wind speed to a 100 year recurrence period, which is consistent with the design of Seismic Category I SSCs. As the proposed factor of 1.11 is not a part of ASCE 7-05, the Applicant is requested to justify the use of the importance factor of 1.11 instead of 1.15. In addition, the Applicant is also requested to specify the remaining parameters of the basic wind equation used to determine the building wind loads.

RESPONSE:

STP agrees that the importance factor of 1.15 in ASCE 7-05 converts wind speed to a 100-year recurrence period, which is consistent with SRP 3.3.1 which covers the design of Seismic Category I SSCs. The importance factor of 1.15 will also be used to design, for no collapse, the non-safety-related structures, systems, and components (SSCs) located in close proximity to Category I structures, i.e., SSCs designed for II/I interactions. Close proximity means that the distance between the Seismic Category I SSC and the non-safety-related SSC, is less than the height above grade of the non-safety-related SSC.

Therefore, the severe wind design, for no collapse, for SSCs with II/I interactions shall be in accordance with ASCE 7-05 and the following parameters as described in COLA Section 3H.6.4.3.2.

For a design wind speed, V, the velocity pressure, qz, evaluated at height, z, is given by:

$$qz = 0.00256\ KzKdtKdV^2I\ (lb/ft^2)$$

Where:

Kz = velocity pressure exposure coefficient evaluated at height, z, as defined in ASCE/SEI 7-05, Table 6-3, but not less than 0.87

Basic wind speed, V, (50 year recurrence interval, 3-second gust) = 125 mph

Wind Exposure Category = C

I = importance factor = 1.15

Kdt = topographic factor = 1.0

Kd = wind directionality factor = 1.0

Design wind loads shall be determined in accordance with the following sections in ASCE/SEI 7-05, as applicable.

Design Wind Loads on Enclosed and Partially Enclosed Buildings - Section 6.5.12

Design Wind Loads on Open Buildings with Monoslope, Pitched, or Troughed Roofs - Section 6.5.13

Design Wind Loads on Solid Freestanding Walls and Signs - Section 6.5.14

Design Wind Loads on Other Structures - Section 6.5.15

COLA Section 3.3.3.3 will be revised as follows:

3.3.3.3 Effect of Remainder of Plant Structures, Systems and Components Not Designed for Wind Loads

The following site-specific supplement addresses COL License Information Item 3.3.

The design criteria for plant structures, systems and components (SSCs) not designed for wind loads are as follows: Such SSCs not designed for wind loads are analyzed using the ~~1.11~~ 1.15 importance factor or are checked to ensure that their mode of failure will not affect the ability of safety-related SSCs to perform their intended safety functions.

RAI 03.03.01-6

QUESTION:

STP Units 3 and 4 COLA FSAR, Tier 2, Section 2.3S.1.3.3 does not explicitly discuss the hurricane wind speeds. The 100 year return period value required per SRP Section 2.3 is presumed to include hurricane wind speed. According to the data described in Section 2.3S.1.3.3 (FSAR), there have been 5 hurricanes of Category 4 and 5 in 155 years in the site region. General Design Criteria 2 of 10CFR 50 Appendix A requires the Applicant to consider the effects of the most severe of the natural phenomena historically reported. Please justify that the basic wind velocity interpolated from ASCE 7-05, Figure 6-1A in fact covers the most severe hurricanes historically reported.

RESPONSE:

Please refer to the response to RAI 02.03.01-21 (see letter U7-C-STP-NRC-090049 dated May 26, 2009), where hurricane winds were addressed.

No additional COLA change is required for this response.

RAI 03.03.01-7

QUESTION:

In COLA FSAR/Tier 2, Revision 2, Sections 2.3S.1.3.1 and 3.3.1, the Applicant has provided the procedures and parameters of wind design. Wind parameters are given for 50 and 100 years Mean Recurrence Intervals (MRI). According to SRP 2.3.1, Section II Acceptance Criteria, SRP Acceptance Criteria 4, the Seismic Category I structures shall be designed to withstand the 100 year return period 3-second gust wind speed. Therefore, the Applicant is requested to confirm that the site-specific Seismic Category I SSCs including the UHS structure will be designed to withstand the 100 year MRI 3-second gust winds.

RESPONSE:

As stated in Section 3H.6.4.3.2 of the enclosure to the response to RAI 03.07.01-13 (see letter U7-C-STP-NRC-090112 dated August 20, 2009), the site-specific Seismic Category I structures, systems, and components (SSCs), including the Ultimate Heat Sink structure, are designed to withstand the 100-year recurrence interval 3-second gust winds.

No additional COLA change is required for this response.

RAI 03.03.01-8

QUESTION:

With respect to the supplement provided in Section 3.3.1.2 of the STP 3 and 4 FSAR related to the applied forces and the procedures used to determine the wind loading on the UHS structure, since ASCE/SEI 7-05 (SRP Section 3.3.1 SRP Acceptance Criteria) changed the definition of Exposure D compared to ASCE 7-1990 (Reference 3.3-1 in ABWR DCD), please ensure that the correct exposure coefficient is used for STP site-specific structures including the UHS structure. As exposure D is more representative of STP site conditions, justify if another exposure (not D) is used to determine the wind loads.

RESPONSE:

In ABWR DCD Reference 3.3-1, Category D was defined as areas that extended inland from the shoreline a distance of 1500 ft or 10 times the height of the structure, whichever is greater. Category D applied to shorelines exposed to wind flowing over a body of water for a distance of at least a mile across and included hurricane coastline areas.

In ASCE 7-98, the definition for Category D was revised to exclude areas in hurricane prone regions. In ASCE 7-05, further confirmation that Exposure D does not include hurricane prone regions is found in the caption under the Exposure D photo of ASCE 7-05, page 290:

> Exposure D – A building at the shoreline (excluding shorelines in hurricane-prone regions) with wind flowing over open water for a distance of at least 1 mile. Shorelines in Exposure D include inland waterways, the Great Lakes, and coastal areas of California, Oregon, Washington, and Alaska.

Thus, hurricane prone regions are currently defined in ASCE 7-05 Section 6.2 as "The U.S. Atlantic Ocean and Gulf of Mexico coasts where the basic wind speed is greater than 90 mph." The STP site has a basic wind speed (50 yr – 3 second gust) of 125 mph which exceeds the hurricane threshold of 90 mph. Thus, the STP site falls under the definition of a hurricane prone region. Therefore, all structures at the STP site are designed for Exposure Category C.

Exposure Category C applies when the ground surface roughness condition, as defined by surface roughness C, prevails in the upwind direction. Surface Roughness C is defined in ASCE 7-05 Section 6.2 as follows:

> "Surface Roughness C: Open terrain with scattered obstructions having heights generally less than 30 ft (9.1m). This category includes flat open country, grasslands, and all water surfaces in hurricane prone regions".

Further confirmation that Exposure Category C applies to the STP site is found in the following paragraph taken from SRP 3.3.1 Acceptance Criteria 3.B:

> "For each wind direction considered, the upwind exposure category should be based on ground surface roughness that is determined from natural topography, vegetation, and constructed facilities. Surface roughness C is defined as open terrain with scattered obstructions having heights generally less than 30 ft. This category includes flat open country, grasslands, and all water surfaces in hurricane prone regions. Because most nuclear plants are located in relatively open country, Kz values in Table 6-3 should be selected from the Exposure C column. The definition of Exposure C is provided in ASCE/SEI 7-05, Section 6.5.6.3.

As noted in Section 3H.6.4.3.2 of the enclosure to the response to RAI 03.07.01-13 (see letter U7-C-STP-NRC-090112 dated August 20, 2009), Exposure Category C was used in the design of site-specific safety related structures.

No additional COLA change is required for this response.

RAI 03.05.01.03-1

QUESTION:

Subsection 3.5.1.1.1.3 of the ABWR DCD states that the COL applicant will submit for NRC approval, within three years of obtaining an operating license, a turbine system maintenance program including probability calculations of turbine missile generation based on the NRC approved methodology, or the COL applicant will volumetrically inspect all low pressure turbine rotors at the second refueling outage and every other (alternate) refueling outage thereafter until a maintenance program is approved by the staff. The staff reviewed COL License information item 3.5.4.5 in the STP COL, it states that "A turbine system maintenance program will be made available for NRC review prior to fuel load that includes a probability calculation of turbine missile generation and shows that the turbine meets the minimum requirements in Table 3.5-1. (COM 3.5-1)"

Please revise the submittal timeline for these two items from "prior to fuel load" to "within three years of obtaining an operating license."

RESPONSE:

The STP Unit 3 & 4 turbine system maintenance program will be submitted for NRC approval within three years following receipt of a COL (or the start of construction, if that occurs later). STPNOC will revise COL License information item 3.5.4.5 to be consistent with Subsection 3.5.1.1.1.3 of the ABWR DCD.

The second sentence in COLA Tier 2 Section 3.5.4.5 will be revised as shown below. Changes are highlighted in gray shading.

3.5.4.5 Turbine System Maintenance Program

The following site-specific supplement addresses COL License Information Item 3.13.

A turbine system maintenance program will be ~~made available for NRC review prior to fuel load~~ submitted within three years following receipt of a COL (or the start of construction, if that occurs later) that includes a probability calculation of turbine missile generation and shows that the turbine meets the minimum requirements as given in Table 3.5-1. (COM 3.5-1)

RAI 03.06.01-2

QUESTION:

This is the supplemental RAI for RAI 129, 03.06.01-1

In the response to (E-RAI 129) RAI 03.06.01-1, the applicant stated:

> ITAAC 3.3 Item 2 requires inspections of both the Pipe Break Analysis Report and the as-built high and moderate energy pipe break mitigation features (including spatial separation), but the acceptance criteria do not specify that the Pipe Break Analysis Report will be made available for staff review prior to installation. It is expected that all design-related ITAAC will be scheduled following completion of the applicable design documents and early in the construction phase. Section 3.6.5.1 of the COLA will be revised to commit to notifying the NRC staff of the availability of the Pipe Break Hazards Analysis Report(s) prior to installation of affected systems or components. The necessary details of that information will be provided in the next COLA revision occurring beyond three months after completion of the Pipe Break Analysis Report(s).
>
> Section 3.6.5.1 will be revised to add the following paragraph at the end of the section:
>
> "The NRC staff will be notified of the availability of the-design Pipe Break Hazards Analysis Report(s) prior to installation of affected systems or components. The necessary details of that information will be provided in the next COLA revision occurring beyond three months after completion of the Pipe Break Analysis Report(s)."

The staff found this response insufficient. ITAAC 3.3 Item 2 only addresses the as-build aspect of the Pipe Break Analysis Report and not the as-designed. Additionally, Section 3.6.5.1 of the reference ABWR DCD refers to Section 3.6.2.5 and states that the details of the pipe break analysis results and protection methods shall be provided by the COL applicant for the operating license review.

10 CFR 52.79(d)(3) states that the final safety analysis report must demonstrate that all requirements and restrictions set forth in the referenced design certification rule, other than those imposed under 10 CFR Part 50.36b, must be satisfied by the date of issuance of the combined license. Any requirements and restrictions set forth in the referenced design certification rule that could not be satisfied by the time of issuance of the combined license, must be set forth as terms or conditions of the combined license.

The applicant is therefore, requested to complete and submit the as-designed Pipe Break Analysis Report within the COL review phase; or to propose a site-specific ITAAC to address the as-designed Pipe Break Analysis Report with a license condition that provides a description pertaining to the closure schedule of the report; or an acceptable alternative.

RESPONSE:

The ABWR design certification provides for certain aspects of the design that cannot be completed prior to certification to be addressed via design acceptance criteria (DAC) ITAAC as provided in DCD Tier 1 Section 3.0. As noted in the ABWR Final Safety Evaluation Report (FSER) NUREG-1503, page 14-48:

> "The design information and appropriate design methodologies, codes, and standards provided in the SSAR, together with the design descriptions and DAC, are sufficiently detailed to provide an adequate basis for the staff to make a final safety determination regarding the design, subject only to satisfactory design implementation and verification of the DAC by the COL applicant or licensee."

The FSER acknowledges that the design information and DAC are sufficient for a final safety determination, subject to satisfactory completion of the DAC.

With respect to the DAC in question, i.e. ITAAC 3.3.2, the FSER states:

> "Piping - The verification of the overall piping design including the effects of high-energy line breaks and the application of leak-before-break (as applicable) is performed in conjunction with the piping DAC." (pg. 14-37)

> "To ensure that the applicable requirements of GDC 4 have been adequately addressed, ITAAC were established to verify that the safety-related SSCs have been designed to the dynamic effects of pipe breaks." (pg. 14-40)

> "The material in CDM Section 3.3 provides the design process to develop the piping for the nuclear safety-related (seismic Category I) systems of the ABWR design. . . . The CDM ensures that the piping systems will be designed to perform their safety-related functions under all postulated combinations of normal operating conditions, system operating transients, postulated pipe breaks, and seismic events. The material in the CDM section also addresses the consequential effects of pipe ruptures such as jet impingement, potential missile generation, and pressure and temperature effects." (pg. 14-51)

As summarized in the FSER, the piping DAC clearly cover the aspects of the design of the piping system necessary for issuance of the design certification. The DCD includes the ITAAC that were determined to be necessary to support the safety determination for the ABWR piping. The STP 3&4 COLA makes no changes that would necessitate revisiting the piping ITAAC in the DCD, therefore there is no basis for additional ITAAC. Further, it is clear that the purpose of the DAC, including the piping DAC, is to enable the design in those areas to be deferred.

DCD Tier 1 Section 3.3 states:

> "Each postulated piping failure shall be documented in a Pipe Break Analysis Report which concludes the reactor can be shut down safely and maintained in a safe, cold

shutdown condition without offsite power... The as-built piping shall be reconciled with the piping design required by this section."

As such, it is clear that the Pipe Break Analysis Report will be prepared for the as-designed condition, as well as requiring reconciliation of the as-built condition. Although ITAAC 3.3.2 states in the acceptance criteria that the Pipe Break Analysis Report must exist for the as-built plant, this DAC is a requirement for the final product, which includes the design basis and the as-built reconciliation. As noted in response to RAI 03.06.01-1, to clarify that an as-designed Pipe Break Analysis Report will indeed be provided, STPNOC is adding a statement to the COLA that states the as-designed Pipe Break Analysis Report will be provided and NRC will be notified when it is available. STPNOC believes that this addition to the COLA, in conjunction with DCD Tier 1 Section 3.3 and DAC ITAAC 3.3.2, is sufficient, and that no additional ITAAC or other commitments are required.

No COLA change is required as a result of this response.

RAI 03.07.01-14

QUESTION:

The STP FSAR Section 2.5S.4.5.2.4 states that a reinforced concrete (RC) retaining wall will be constructed on the east side of the Reactor Buildings and Turbine Buildings (TB) to facilitate the excavation activities and accommodate the reach of heavy lift crane. The walls will vary in exposed height to a maximum of 90 ft. The area on the west side of the retaining walls will be backfilled as construction progresses and the walls will be abandoned in place.

As such, the applicant is requested to describe in the FSAR how is this retaining wall explicitly included in the SSI modeling and analysis of the Reactor Building and Control Building and if not, what is the justification for not considering them and what would be the impact of this on the seismic response of these structures.

RESPONSE:

In the soil-structure interaction (SSI) analysis of the Reactor and Control Buildings, the subject retaining wall is not explicitly included. However, based on the following considerations, it is concluded that the effect of this retaining wall on the SSI analyses of the Reactor and Control Buildings will be negligible:

1. The ABWR DCD Tier 2, Appendix 3A describes analyses to evaluate the potential effect of structure-to-structure interaction. This evaluation considered three heavily loaded structures (i.e. the Reactor, Control and Turbine Buildings). Furthermore, the analysis considered three soil cases, including the softest (UB) soil profile (refer to Table 3A-7 of the ABWR DCD), and concluded that the potential effect of structure-to-structure interaction was relatively small.

2. The impact of the subject retaining wall on the SSI analyses of the Reactor and Control Buildings will be less than the impact of Control Building on Reactor Building or Reactor and Turbine Buildings on Control Building because:

- The retaining wall is located over 10 feet away from the Reactor and Control Building, whereas there is no gap (excluding the seismic gap) between the Reactor, Control and Turbine Buildings.
- In comparison to the Reactor, Control and Turbine Buildings, the retaining wall is a light structure and a lighter structure will have less influence on the seismic behavior of the heavy adjacent structures.

3. The results presented in COLA Part 2, Tier 2, Appendix 3A of the enclosure to the response to RAI 03.07.01-2 (see letter U7-C-STP-NRC-090105 dated August 20, 2009) show that the site-specific results in terms of forces and spectra in the frequency range of interest are, in general, lower by a factor of 2 to 5 than the ABWR DCD results. This large margin more than

accommodates the relatively small effect of the structure-to-structure interaction due to the retaining wall.

No additional COLA change is required for this response.