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

December 7, 2009
U7-C-STP-NRC-090217

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
Responses to Requests for Additional Information

References:
1. Letter, Scott Head to Document Control Desk, "Response to Request for Additional Information" for the South Texas Combined License Application dated August 26, 2009, U7-C-STP-NRC-090111 (ML092430131)

2. Letter, Mark McBurnett to Document Control Desk, "Response to Request for Additional Information" for the South Texas Combined License Application dated September 16, 2009, U7-C-STP-NRC-090148.

Attachment 1 to this letter provides the response to an NRC staff question in Request for Additional Information (RAI) letter 287, related to COLA Part 2, Tier 2, Section 8.1.1, "Offsite Transmission Network." This letter provides the complete response to RAI letter 287. Additionally, attachment 2 to this letter revises the response to RAI 03.05.01.03-1 that was provided in Reference 1. Additionally, attachment 3 to this letter provides a supplement to the response to RAI 19-22 that was provided in Reference 2.

Attachments provide the responses to the following NRC staff questions as described above:

08.01-2
03.05.01.03-1, Revision 1
19-22, Supplement 1

This letter revises the commitment associated with RAI 03.05.01.03-1 and includes a new commitment summarized as Attachment 4.

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

D091
NRO

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

Executed on 12/7/09

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

rhb

Attachments:

1. RAI 08.01-2
2. RAI 03.05.01.03-1, Revision 1
3. RAI 19-22, Supplement 1
4. Commitment 19.9-29

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

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**RAI 08.01-2**

**QUESTION:**

In response to RAI 08.01-1, the applicant stated that the Regulatory Guides (RG) that are applicable to the ABWR design are provided in ABWR DCD, Tier 2, Table 1.8-20. In particular, the applicant stated that:

(a) Because RG 1.160 was not listed in ABWR DCD, Tier 2, Table 8.1-1, there was no departure to this portion of the certified design and as such no change is required. The applicant also stated that this RG was applicable to the plant-specific Maintenance Rule Program.

(b) RG 1.182 was applicable to the plant-specific Maintenance Rule Program

(c) RG 1.180 relates to Instrument and Controls (I&C) platform departures and that is not applicable to the Electrical Power System and, therefore, no changes to FSAR Table 8.1-1 were required for this item.

(d) Because RG 1.204 was also added to FSAR Section 8A.1.2 in COLA Revision 2, the RG would be also added to FSAR Table 8.1-1.

The staff does not agree with the applicant's position regarding item (c). Operating experience indicates that solid state and digital components are being used in many safety-related systems, including the electrical power system. Electromagnetic interference (EMI) and radio-frequency interference (RFI), and power surges have been identified as environmental conditions that can affect the performance of safety-related electrical equipment. GDC 4 requires that SSCs important to safety shall be designed to accommodate the effects of and to be compatible with the environmental conditions associated with normal operation, maintenance, testing, and postulated accidents, including LOCAs. Such environmental effects could result in the common cause/common mode failure of independent and redundant system and component. The staff requests the applicant to discuss whether solid state and digital devices are being used in the STP electrical power system. If such devices are being used, the applicant is requested to discuss how the GDC 4 requirements will be met for solid state and digital components regarding the EMI/RFI and power surges.

**RESPONSE:**

Procurement specifications for the electrical power system are not complete; however, it is anticipated that the STP electrical power system will use solid state and digital devices in applications such as the Class 1E and Non-Class 1E Vital Power Supply Systems (solid state inverters and transfer switches), and the Medium Voltage Class 1E Power Distribution System (microprocessor controlled protective relaying equipment).

The GDC 4 requirements relative to EMI/RFI and power surges as environmental conditions have previously been addressed. FSAR section 8.2.2.1(2) specifies that the Class 1E system be

compatible with EMI/RFI and power surge requirements in accordance with FSAR Tier 2, Section 7A. FSAR Tier 2, Section 7A.2, Response 4, requires: conformance with EMI and RFI test guidelines in accordance with ANSI/IEEE-C63.12, "American National Standard for Electromagnetic Compatibility Limits--Recommended Practice"; testing for susceptibility to noise from portable radio transceivers in accordance with ANSI/IEEE-C37.90.2, "IEEE Trial Use Standard, Withstand Capability of Relay Systems to Radiated Electromagnetic Interference from Transceivers"; testing for surge capability in accordance with ANSI/IEEE-C62.41, "Guide for Surge Voltages in Low-Voltage AC Power Circuits," and ANSI/IEEE-C62.45, "Guide on Surge Testing for Equipment Connected to Low-Voltage AC Power Circuits." Finally, additional design and testing guidance will be taken from military standard MIL-STD-461E, "Electromagnetic Emission and Susceptibility Requirements for the Control of Electromagnetic Interference" as applicable.

No COLA revision is required as a result of 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 (Revision 1):**

By letter U7-C-STP-NRC-090111, dated August 26, 2009, STPNOC provided a response to the above RAI. During a telephone conference with the NRC Staff on November 19, 2009, STPNOC agreed to revise the response. This response replaces the previous response in its entirety.

The STP Units 3 and 4 turbine system maintenance program will be submitted for NRC approval within three years following receipt of the COL. STPNOC will revise COL License Information Item 3.13 in FSAR Subsection 3.5.4.5 to be consistent with Subsection 3.5.1.1.1.3 of the ABWR DCD.

The second sentence in COLA Part 2, Tier 2, Subsection 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 the COL 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 19-22**

**QUESTION:**

With respect to determination of the housing capability referred to in STP 3/4 COL application FSAR, Tier 2, Revision 2, Section 19.9.21 (COL License Information Item 19.19b) to withstand the site-specific seismic events, flooding, and other site-specific external events, provide more detailed information addressing the approach, analysis methods, computer codes, seismic structural modeling, damping and pertinent sections of SRP acceptance criteria to be used in determining the housing structural capacity.

**ORIGINAL RESPONSE:**

The Alternating Current Independent Water Addition (ACIWA) equipment is located in the Fire Water Pump House (FWPH) which houses portions of the Fire Protection System. The FWPH is a non-safety related structure, designed to commercial building codes. However, as described in the DCD, the ACIWA is a risk-significant system and portions of the FWPH housing ACIWA equipment will be designed to ensure that ACIWA equipment remains functional following a Safe Shutdown Earthquake (SSE). As described in FSAR (Tier 2), Section 19, "Response to Severe Accident Policy Statement," the capability of the ACIWA housing will be included in the plant-specific Probabilistic Risk Assessment (PRA).

As described below, the design of the portion of the FWPH structure housing ACIWA equipment will consider site-specific events including postulated seismic events and wind. The FWPH is located above the design basis flood level for the site (33 feet MSL) for non-safety related structures, and therefore flooding is not a design consideration for the ACIWA housing. Factored loads are combined using a strength design approach including both concrete and steel design. Basic load combinations are found in American Society of Civil Engineers (ASCE) 7-05. In addition to earthquake and wind, these load combinations include a variety of other types of load applicable to commercial structures, including but not limited to dead load, hydrostatic pressure, earth pressure, live load, snow, rain, and thermal load.

Site-specific extreme loads are conservatively substituted in these combinations for loads that otherwise can be determined by ASCE 7-05. The site-specific SSE is conservatively substituted for the earthquake load, E. The design site-specific SSE response spectra will be per Regulatory Guide 1.60, Revision 1," Design Response Spectra for Seismic Design of Nuclear Power Plants," anchored at 0.13 g, modified as discussed in the STPNOC response to NRC RAI No. 03.07.01-2. The site-specific wind speed used in the design of the ACIWA housing will be, at a minimum, the 50-year recurrence maximum (125 mph – 3-second gust) as specified in FSAR Table 2.0-2, "Comparison of ABWR Standard Plant Site Design Parameters and STP 3 & 4 Site Characteristics."

RISA 3D is the structural analysis and design tool. Input to RISA 3D includes building geometry, boundary conditions, material properties, section properties, nodal loads, line loads,

surface loads, and seismic design criteria. Output includes member loads, stresses, member deflections, building drift, seismic loads, and mode shapes. In addition, RISA 3D performs steel member design in accordance with appropriate codes, such as the American Institute of Steel Construction (AISC) Steel Manual, 13th Edition. RISA 3D is an industry-accepted structural analysis code used extensively in commercial and industrial applications. RISA 3D is capable of performing concrete beam, slab, and column design in accordance with codes such as American Concrete Institute (ACI) 318-05. The pca Column computer program is used for detailed concrete column design along with various MathCAD worksheets.

Seismic structural modeling is done in the RISA 3D environment where seismic parameters required by ASCE 7-05 are supplied. Typically, the response spectrum used for seismic analysis is the curve found in ASCE 7-05 Section 11.4.5; however, this will be replaced by the site specific SSE, as noted above. Seismic design is in accordance with ASCE 7-05 using an occupancy category of IV and the appropriate response modification factor, R, system overstrength factor, $\Omega_o$, and deflection amplification factor, $C_d$, which are dependent on the seismic force-resisting system selected.

Structural damping is used in accordance with Regulatory Guide 1.61, Revision 1, "Damping Values for Seismic Design of Nuclear Power Plants." Damping values used in the seismic model will be taken from Table 2 (OBE Damping Values) of Regulatory Guide 1.61. These values range from 3 percent to 5 percent of the critical damping, depending upon the material being considered.

The acceptance criteria found in NUREG 0800, Revision 3, "Standard Review Plan for the Review of Safety Analysis Reports for Nuclear Power Plants-LWR Edition," are applied as described below:

Wind Loading – Standard Review Plan 3.3.1:

1) The procedures used to transform the wind speed into an equivalent pressure to be applied to the ACIWA housing are as delineated in American Society of Civil Engineers/Structural Engineering Institute (ASCE/SEI) 7-05, "Minimum Design Loads for Buildings and Other Structures."

Seismic System Analysis – Standard Review Plan 3.7.2:

1) An Equivalent Static Load Method will be used for this structure. Justification will be provided that the system can be realistically represented by a simple model and the method produces conservative results in terms of responses.

2) The model will account for relative motion between all points of support.

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

**SUPPLEMENTAL RESPONSE:**

As discussed in a telephone conference (telcon) with the NRC on November 25, 2009, STPNOC hereby supplements its original response to NRC RAI No. 19-22 (reiterated above) regarding structural capability of the Alternating Current Independent Water Addition (ACIWA) equipment housing (STPNOC Letter U7-C-STP-NRC-090148, dated September 16, 2009). As supplemental information, this response augments but does not materially affect the information provided in STPNOC's original response.

As indicated in the November 25, 2009 telcon, the Fire Water Pump House (FWPH) that houses ACIWA equipment will be verified to have a seismic high confidence low probability of failure (HCLPF) acceleration value of at least 0.5g. This is consistent with DCD Section 19.7.3 regarding the PRA studies verifying the seismic capacities of the ACIWA equipment itself, which states:

> *The AC-independent water addition system including the direct diesel-driven pump and the associated piping and manual valves have a seismic HCLPF of 0.5g.*

The methodology for calculation of the FWPH HCLPF accelerations for important accident sequences and accident classes will be consistent with that described in DCD Section 19I.1 for the ABWR seismic margins analysis. Specifically, the methodology involves a modification of the fragility analysis method of NUREG/CR-5270, "Assessment of Seismic Margin Calculation Methods," March 1989, as detailed further in DCD Section 19I.

This supplemental response will be incorporated into the STP Units 3 and 4 FSAR (Tier 2), Section 19.9.21, as indicated in the following markup:

**19.9.21 Housing of ACIWA Equipment**

The following standard supplement addresses COL License Information Item 19.19b.

The capability of the building housing the ACIWA equipment to withstand site-specific seismic events, flooding, and other site-specific external events will be confirmed and will be included in the plant-specific PRA prior to fuel loading in accordance with 10 CFR 50.71(h)(1). (COM 19.9-20)

Prior to fuel loading, the building that houses the ACIWA equipment will be verified to have a seismic high confidence low probability of failure (HCLPF) acceleration value of at least 0.5g. The methodology for HCLPF acceleration calculations will be consistent with that described in DCD Section 19I.1 for the ABWR seismic margins analysis. (COM 19.9-29)

**COM 19.9-29**

| Commitment | Description | Completion Date |
|---|---|---|
| COM 19.9-29 Action 1 | The building that houses the ACIWS equipment will be verified to have a seismic high confidence low probability of failure (HCLPF) acceleration value of at least 0.5g. The methodology for HCLPF acceleration calculations will be consistent with that described in DCD Section 19I.1 for the ABWR seismic margins analysis. | Prior to fuel load |