Nuclear Operating Company

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

February 22, 2010
U7-C-STP-NRC-100046

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

Reference: Letter, Scott Head to Document Control Desk, "Response to Request for Additional Information" dated September 28, 2009, U7-C-STP-NRC-090163 (ML092730239)

The Attachment to this letter revises the response to RAI 17.04-2 that was provided in the Reference identified above.

17.04-2 Revised Response

There are no commitments in this letter.

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.

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

STI 32616559

D091
NRO

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

Executed on 2/22/10

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

dws

Attachment:
Question 17.04-2, Revised Response

cc: w/o attachment except*
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RAI 17.04-2

QUESTION:

Section 19K ("PRA-Based Reliability and Maintenance") of the STP FSAR, Revision 2, identifies the risk-significant systems, structures, and components (SSCs) in scope of the Reliability Assurance Program (RAP). The following components are deleted from Tables 19K-1 and 19K-2 of Section 19K of the STP FSAR, suggesting that these components may no longer be in scope of the RAP:

- RCIC Pres Sensor PIS-Z605 Miscalibrated
- RCIC Flow Sensor FT-007-2 Miscalibrated
- RHR Flow Transmitters (CCF Miscalibration)
- Level 8 Sensors (CCF Miscalibration)

However, this seems inconsistent with Table 19K-4 ("Failure Modes and RAP Activities") of the STP FSAR, which includes these components in RAP through incorporation by reference to Table 19K-4 of the ABWR DCD, Revision 4. The staff requests that the applicant clarify whether these components are in scope of the RAP and, if necessary, revise Section 19K of the STP FSAR accordingly.

REVISED RESPONSE:

As a result of corrections to the reconstituted STP 3&4 PRA model, the previous response to RAI 17.04-2 is replaced in its entirety with the following response.

A previously NRC identified error in the ABWR reference PRA concerning common cause failure modeling of the Residual Heat Removal, High Pressure Core Flooder, Reactor Building Cooling Water, and Reactor Service Water Systems is described in STD DEP 19.3-1. The correction was incorporated into the PRA described in the ABWR Design Control Document (DCD) and became the new reference model for the ABWR PRA for use in evaluating design departures for STP 3&4. This reference model was modified to incorporate departures that potentially affected the PRA models described in the DCD and becomes the STP 3&4 plant-specific PRA. A modified set of risk-significant structures, systems, and components (SSCs) that meet the criteria for inclusion into Appendix 19K Tables 19K-1, 19K-2, and 19K-4 was developed from this PRA model. In addition, the set of dominant initiating events presented in Table 19K-3 was slightly modified as a result of the correction described in STD DEP 19.3-1.

The SSCs identified in this Request for Additional Information are contained in Table 19K-2, remain in Table 19K-4, and remain in the scope of the Reliability Assurance Program.

FSAR Appendix 19K and Tables 19K-1, 19K-2, and 19K-3 are modified as shown below as a result of the STP 3&4 plant-specific PRA , and will be revised in a future revision to the COLA.

19K.3 Determination of "Important Structures, Systems and Components" for Level 1 Analysis

To determine which plant structures, systems and components (SSCs) are the most important with respect to CDF, the Level 1 analysis results were analyzed. The SSCs were listed in order of Fussell-Vesely (FV) importance, or the percent of cutsets that contribute to the CDF, as calculated by the CAFTA code. A second criterion for selecting SSCs was to consider those SSCs with high "risk achievement worth", or the increase in CDF if that SSC always fails. The ~~21~~14 34 SSCs of greatest importance, in that they had modest FV importance are shown in Table 19K-1. ~~Five~~ Nine ~~additional SSCs with modest values of risk achievement worth were considered.~~ Not shown in Table 19K-1 are several post initiating event human error contributions. Significant human errors are addressed in Subsection 19D.7.

~~*The 26 23 SSCs in Table 19K-1 were further evaluated to eliminate those with a combination of low values for both FV importance and risk achievement worth. The five SSCs meeting this criterion are so indicated. However, one of those five is retained because of its designation as a "critical task" in the human factors evaluation of Subsection 18E.2. The other four are not considered further in this subsection.*~~

The ~~remaining 22 designated~~ SSCs of Table 19K-1 should be included with important SSCs being considered for periodic testing and/or preventive maintenance (PM) as part of the Reliability Assurance Program (RAP) of the plant owner/operator. The reliability and maintenance actions suggested for the listed SSCs are identified in Subsection 19K.11.

A second table, Table 19K-2, was prepared to show those SSCs with small to moderate values of risk achievement worth. These SSCs all have very low Fussell-Vesely importance, indicating a low probability of failure. However, if they fail, the impact on CDF is not negligible. Most of these SSCs have ~~the same~~ similar risk achievement worths because their failure would result in failure of the RHR system or the RCIC system to perform ~~its~~ their functions.

Initiating events that are significant contributors to CDF in the Level 1 analysis are listed in Table 19K-3. There are ~~five~~ ~~six~~ seven such events which are shown. ~~The three~~ Three of the most significant events, accounting ~~account~~ for more than one-half of the CDF, are all station blackout events. ~~The two most important events are isolation/loss of feedwater and unplanned manual reactor shutdown. Three station blackout events and turbine trip account for modest contributions to CDF.~~ The remainder of the ~~next two~~ events, contributing small fractions ~~of~~ to CDF are loss of offsite power for two to eight hours, unplanned manual reactor shutdown, medium break loss of coolant accident (LOCA), and isolation/loss of feedwater ~~and manual reactor shutdown~~. All other initiating events contribute small amounts to CDF.

19K.11.1 Component Inspections and Maintenance

The systems of greatest FV importance with respect to outage time ~~is~~ are *the RCIC System, which has been assigned a small unavailability for test and maintenance* and the RHR Loops. *The amount of time* these systems are ~~*the RCIC System is*~~ *unavailable because of test and maintenance should be monitored to assure that* ~~*it*~~ they *remains within the specified assumptions annually. Sensitivity studies of increased SSC unavailabilities showed that an increase in RCIC unavailability would cause the greatest increase in estimated core damage frequency of any SSC. The RCIC System was also found to be the most sensitive system to increased outage time assumptions. The highest contributor to uncertainties in the CDF as well as the CDF estimate was RCIC test and maintenance.*

Table 19K-1 ABWR SSCs of Greatest Importance for CDF, Level 1 Analysis

SSC	Fussell-Vesely Importance (%)*	Risk Achievement Worth*
Combustion Turbine Generator		
Emergency Diesel Generator **CCF**		
***SRV* CCF (Open and reseat)**		
RHR Loop Maintenance		
RBCW CCF		
RSW CCF		
RHR Pump (individual pumps)		
Control Rod Drive Injection (Level Control)		
RCIC Unavailable Due To Testing Or Maintenance		
RHR Pump Room AC		
Div II Power Cable		
~~*Multiplex Transmission Network*~~ **Essential Communication Function (ECF)** CCF		
RCIC Turbine		
RHR Core Flooding CCF		
Minimum Flow Bypass Valve E11-F021A (B, C) (NOFO) ‡		
RCIC Pump		
RHR Heat Exchanger Inlet Valve P21-F013A (B,C) (NCFC) ‡		
RHR Strainer E11-D001A (B, C)		
Suppression Pool Return Line Valve E11-F008A (B, C) (NCFC) ‡		
~~*Trip*~~ **System Logic Unit CCF**		
~~*Remote Multiplexing Units*~~ **Remote Digital Logic Controller CCF**		
~~*RCIC Turbine Lubrication System*~~		
HPCF-B (Unavailable, Test or Maintenance)		
HPCF CCF		
RCIC Pump Room AC Unit		
Station Batteries CCF		
Single Offsite Power Line ‡		
RCIC Min Flow Bypass Valve E51-F011 (NOFO) ‡		
RCIC Injection Valve F004 (NCFC) ‡		
RCIC Min Flow Bypass Valve E51-F011 (NCFC) ‡		
RCIC Steam Supply Valve E51-F037 (NCFC) ‡		
HPCF Maintenance Valve E22-F005B ‡		
Suppression Pool Temperature		
Division 1 Transmission Network (ECF)		
RCIC Isolation Signal Logic		
~~*Both Offsite Power Sources*~~		
~~*HPCF Pump* ‡~~		
~~*SRVs* ‡~~		
~~*RHR Flow Transmitters (CCF Miscalibration)*~~		
~~*Level 2 Sensors (CCF)*~~		

SSC	Fussell-Vesely Importance (%)*	Risk Achievement Worth*
~~Level 8 Sensors (CCF Miscalibration)~~		
~~Digital Trip Modules (CCF)~~		

*-*Not part of DCD* ~~(Refer to SSAR).~~ (contained in plant-specific PRA documentation)

~~† SSCs with low FV importance and low risk achievement worth. Not considered further for RAP on the basis of Level 1 analysis.~~

‡ *Valves that are closed during normal operation, and fail to open when required during a transient, are designated NCFC. Technically, they are "fail as is" conditions, which is closed. The minimum flow bypass valve is closed during normal operation, but during transients requiring RCIC operation, the bypass valve opens. Failure of this valve to open at that demand is shown as NCFC. Later in the transient this bypass valve, which is normally open at this time, should close on demand. If it fails to close, the shorthand description NOFO is used.*

~~ƒ SSC with low FV importance and low risk achievement worth, but retained because of human factor importance.~~

Table 19K-2 ABWR SSCs With Moderate Risk Achievement Worth For CDF, Level 1 Analysis*

SSC	Fussell-Vesely Importance % †	Risk Achievement Worth†
Suppression Pool Water Level (Pool Rupture)		
Digital Trip Units CCF		
SRV CCF [ADS]		
Level 8 Sensors (Miscalibrated CCF)		
AC Distribution Power Cables		
1st ESF RIF-~~*RMU*~~ *Div 1* **(3 Divisions)** *Fails*		
2nd ESF RIF ~~*RMU*~~ *Div 1* **(3 Divisions)** *Fails*		
Div 1 **(2, 3)** ECF ~~*EMS Transmission Network*~~ *Failure*		
Class 1E 4160V/480V Transformers		
RBCW Temperature Control Valve P21-F006A (B, C) (NOFC)		
RHR -Flow Transmitter FT008A (B, C) (CCF Miscalibration)		
RHR Pump A (B, C)		
RHR Heat Exchanger Bypass FCV E11-F013A (B, C) (NCFO)		
RHR Wetwell Spray Valve E11-F019A (B, C) (NCFO)		
RHR Injection Valve E11-F005A (B, C) (NCFO)		
RPV SDC Suction Line Isolation Valve E11-F012A (B, C) (NCFO)		
RHR Suppression Pool Suction Valve E11-F001A (B, C) (NOFC)		
RHR Heat Exchanger FCV E11-F004A (B, C) (NOFC)		
RHR Pump Discharge Check Valve E11-F002A (B, C)		
RHR Pump Discharge Manual Valve E11-F003A (B, C)		
RHR Heat Exchanger A (B, C)		
RHR Pump Motor Bearing Cooler A (B, C)		
RHR Pump Mechanical Seal Cooler A (B, C)		
RHR Suppression Pool Temp Signal T53-TRS-601A & B		
RHR Flow Transmitters (CCF Miscalibration)		
Class 1E 4160V Switchgear		
Class 1E 480V Switchgear		
Class 1E 480V MCCs		
Class 1E DC Power Distribution Panels		
RBCW Temperature Control Valve P21-F006A (B, C) (NOFC)		
HPCF Flow Transmitters (CCF Miscalibration)		
HPCF Pressure Transmitters (CCF Miscalibration)		
Level 2 Sensors (CCF)		
Both Offsite Power Sources (CCF)		
Pipe Rupture (RCW Loop)		
Pipe Rupture (RSW Loop)		
NBS Isolation Check Valve B21-F003B (FW Isolation) Fails Closed		
NBS Isolation Check Valve B21-F004B (FW Isolation) Fails Closed		
RCIC Check Valve E51-F003 Fails to Open		
RCIC Outboard Check Valve F005 Fails to Open		
RCIC Check Valve F038 Fails to Open		
NBS Manual Valve B21-F005B (NOFC) Fails Closed		

Table 19K-2 ABWR SSCs With Moderate Risk Achievement Worth For CDF, Level 1 Analysis (continued)

SSC	Fussell-Vesely Importance % †	Risk Achievement Worth†
RCIC Valve E51-F011 (NOFO) Fails		
RCIC Valve E51-F004 (NCFC) Fails		
RCIC Valve E51-F011 (NCFC) Fails		
RCIC Valve E51-F037 (NCFC) Fails		
RCIC Isolation Valve F035 Fails (NOFC)		
RCIC Isolation Valve F036 Fails (NOFC)		
RCIC Isolation Valve F039 Fails (NOFC)		
RCIC Turbine Exhaust Isolation Valve F039 Limit Switch Fails		
RCIC Steam Supply Bypass Valve F045 Limit Switch Fails		
RCIC Flow Sensor FT-007-2 Miscalibrated		
RCIC Pressure Sensor PIS-Z605 Miscalibrated		
RCIC Flow Sensor E51-FT007-2 Fails		
RCIC Pressure Sensor PIS-Z605 Fails		
Diode SID Open		
SLF/ECF ~~*SLU/EMS*~~ *Link for Div 1 SLU 1 Fails (RCIC Fails)*		
SLF/ECF ~~*SLU/EMS*~~ *Link for Div 1 SLU 2 Fails (RCIC Fails)*		

† *Not part of DCD* ~~(Refer to SSAR).~~ (contained in plant-specific PRA documentation)

Table 19K-3 ABWR Initiating Event Contribution to CDF, Level 1 Analysis

Initiating Event	Events Per Year*	Total CDF *	Percent CDF Contribution*
Station Blackout for Less Than Two Hours			
Station Blackout for Two to Eight Hours			
Loss of Offsite Power for Two to Eight Hours			
Unplanned Manual Reactor Shutdown			
Station Blackout for More Than Eight Hours			
Medium Break LOCA			
Isolation/Loss of Feedwater			

* *Not part of DCD* ~~(Refer to SSAR).~~ (contained in plant-specific PRA documentation)