Nuclear Operating Company

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

March 29, 2010
U7-C-STP-NRC-100071

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 is the response to an NRC staff question included in Request for Additional Information (RAI) letter number 322 related to Combined License Application (COLA) Part 2, Tier 2, Section 7.1. This response, combined with the submittal of WCAP-17119-P, "Methodology for South Texas Project Units 3 & 4 ABWR Technical Specification Setpoints" in letter U7-C-STP-NRC-100072, dated March 29, 2010, completes the response to the RAI listed below:

RAI 07.01-15

There are no commitments in this letter.

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

D091
NRO

STI 32639900

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

Executed on 3/29/10

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

gsc

Attachment:
RAI 07.01-15

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

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RAI 07.01-15

QUESTION:

10 CFR 50.36(c)(1)(ii)(A), "Technical Specifications," requires that, where a limiting safety system setting (LSSS) is specified for a variable on which a safety limit has been placed, the setting be so chosen that automatic protective action will correct the abnormal situation before a safety limit is exceeded. LSSSs are settings for automatic protective devices related to variables with significant safety functions. Setpoints found to exceed technical specification limits are considered as malfunctions of an automatic safety system. Such an occurrence could challenge the integrity of the reactor core, reactor coolant pressure boundary, containment, and associated systems.

The NRC staff has the following request for additional information with regards to WCAP-17119-P, Revision 0, "Methodology for South Texas Project Units 3 and 4 ABWR Technical Specification Setpoints:"

1. According to Figure 3-1 in WCAP-17119-P, the "as left" tolerance is same as the "as found" tolerance for the rack. Whereas Section 2.2, "Sensor Allowances" states that sensor calibration accuracy (SCA) is the difference between the "as left" value and the desired value, and Sensor drift (SD) is the difference between "as found" value and the "as left" value. Also as stated in Section 2.3, "Rack Allowances," rack calibration accuracy (RCA) is the difference between the "as left value and the desired value, and Rack drift (RD) is the difference between the "as found" and "as left" values. The applicant is asked to resolve the above stated discrepancies and clarify whether the "as left" value is same as the "as found" value, and also provide a description for the desired value.

2. From evaluation of WCAP-17119-P, the staff was unable to determine the uncertainty components that make up the "As Found Tolerance" and "As Left" values. The applicant is asked to provide the uncertainties components used to calculate the "As Left" and "As Found" values for each of the sensor and rack.

3. As defined in Section 3.2 of WCAP-17119-P, Margin is calculated by subtracting Channel Statistical Allowance (CSA) from Total Allowance (TA), and TA is calculated by subtracting Nominal Trip Setpoint (NTS) from Safety Analysis Limit (SAL). Because there are two unknowns namely; Margin and NTS, the staff is unable to identify the method used for determining the Margin and/or NTS. The applicant is asked to provide the criteria for determining Margin and/or NTS.

4. From evaluation of WCAP-17119-P, the staff believes that "As Found" and "As Left" values are significant in determining the NTS. Therefore, the applicant is asked to include the "As Left" and "As Found" tolerance values to the Tables 3-xx containing the uncertainties components for calculation of CSA for various functions.

5. According to WCAP-17119-P Section 3.2, "Definitions for Protection System Setpoint Tolerances," the "as found" tolerance for instrument racks equals the instrument process rack calibration accuracy (RCA) defined in the uncertainty calculations, whereas the "as found" tolerance for transmitters is defined as the sensor drift (SD) magnitude. This definition for As Found Tolerance also states, "On a first pass, channel operability is defined as the ability to maintain calibration or be restored to within the calibration accuracy." The applicant is asked to explain how drift is accounted for determination of channel operability.

6. 10 CFR 50.36 (c) (1) (ii) (A) states that the limiting safety system settings (LSSS) are settings for automatic protective devices related to those variable having significant safety functions. The applicant is asked to clarify which setting is represented as LSSS.

RESPONSE:

1. To clarify the terms As Found and As Left, the following breakdown is provided to show the method for determining As Found and As Left for racks and sensors/transmitters.

   Racks

   The As Left condition is stated in Section 3.2 of WCAP-17119-P as the condition in which the rack is left following calibration or setpoint verification. Rack Calibration Accuracy (RCA) is the difference between the As Left value and the desired value, or Nominal Trip Setpoint (NTS). This is consistent with the statement in Section 2.3 of the WCAP. The "as left" limit is the As Left Tolerance and is defined in the plant calibration procedures. The As Left Tolerance is equal to the RCA term defined in the uncertainty calculations.

   The As Found condition, stated in Section 3.2 of the WCAP, is the condition in which the rack is found after a period of operation. The difference between the As Left condition and the As Found condition is the difference between the trip setting at calibration at the beginning of a surveillance interval, and that determined through surveillance testing performed after a period of operation. This difference is also known as the Rack Drift (RD). The "as found" limit is the As Found Tolerance and is defined in plant surveillance procedures. In the case of digital racks, significant drift is not experienced or expected. The rack drift shown in the uncertainty calculations of WCAP-17119-P is quite small and has minimal effect on the uncertainty calculation, as compared to the RCA term. Therefore, as the RD term is considered insignificant, the As Found condition is expected to be well within the magnitude of ±RCA about the NTS; and therefore, the As Found Tolerance is stated to be equal to the As Left Tolerance. Because As Found Tolerance is equal to As Left Tolerance, As Found Tolerance is equal to the RCA term defined in the uncertainty calculations.

   Thus Figure 3-1 of the WCAP showing As Left Tolerance equal to As Found Tolerance is consistent with the statements in Section 3.3 and Section 2.3.

   Sensors/Transmitters

   The As Left condition is the condition of the sensor/transmitter after calibration. Sensor Calibration Accuracy (SCA) is the difference between the As Left value and the desired value. This is consistent with the statement in Section 2.2 of the WCAP. The "as left" limit is the As Left Tolerance identified in the plant calibration procedures. The As Left Tolerance is equal to the SCA term defined in the uncertainty calculations.

   The As Found condition, stated in Section 2.2, is the condition in which the sensor/transmitter is found after a period of operation. Sensor Drift (SD) is the difference between the As Left value and the As Found value. Sensors/transmitters will normally experience greater drift over a period of operation than digital racks. The "as found" limit is the As Found Tolerance identified in the plant calibration procedures. The As Found Tolerance is equal to the SD term defined in the uncertainty calculations.

Summary

To clarify the differences between the As Found Tolerances in racks using the RCA term, the following clarification has been made to WCAP-17119-P Section 2.3 and also to the definitions of As Found Tolerance and Nominal Trip Setpoint in Section 3.2 of the WCAP.

Section 2.3:

The following statement has been added to the last paragraph (underlined text):

> "RCA is the difference between the "as left" value and the desired value. RD is the difference between the "as found" and the "as left" values. As digital process racks do not experience significant drift, as found limit and as left limit values are considered the same for digital racks.

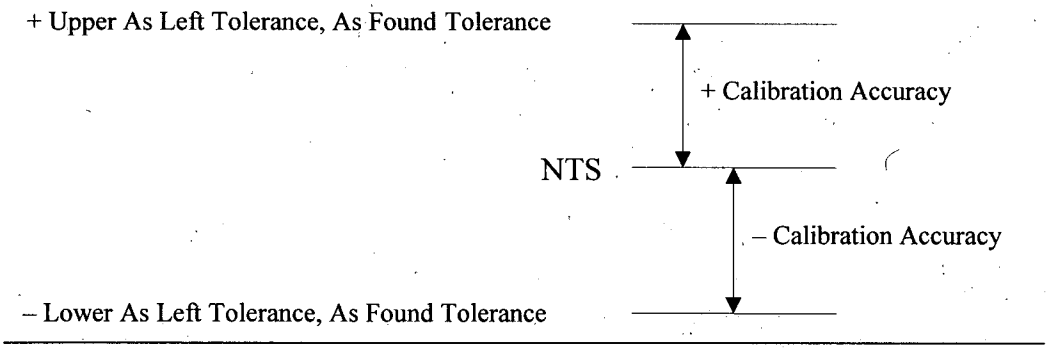
Section 3.2:

The following statement has been added to the As Found Tolerance definition (underlined text):

> "The "as-found" tolerance equals the instrument process rack calibration accuracy defined in the uncertainty calculation. This is based on the design premise that digital racks do not experience significant drift."

The following statement has been added to the end of the Nominal Trip Setpoint definition:

> "Evaluations of as left and as found data for analog and digital process racks suggest rack drift (RD) is significantly smaller than the procedure allowed as left tolerance. Thus, the expectation that the rack module is found within the as left tolerance, and the definition of AFT =ALT, as noted below."



These changes are included in WCAP-17119-P, Revision 1, submitted separately by letter U7-C-STP-NRC-100072.

2. To clarify the uncertainty components used in defining As Found and As Left values and tolerances, the following breakdown is provided.

As Left Value

For process racks: Rack Calibration Accuracy (RCA) is the uncertainty component taken into account when determining the difference between the as left value and the desired value.

For sensors/transmitters: Sensor Calibration Accuracy (SCA) is the uncertainty component taken into account when determining the difference between the as left value and the desired value.

As Found Value

For process racks: Rack Calibration Accuracy (RCA) is the uncertainty component taken into account when determining the difference between the as found value and the desired value. This is because drift in digital racks is not considered significant.
For sensors/transmitters: Sensor Drift (SD) is the uncertainty component taken into account when determining the difference between the as found value and as left value.

As Left Tolerance

For process racks: As Left Tolerance = Rack Calibration Accuracy (RCA)

For sensors/transmitters: As Left Tolerance = Sensor Calibration Accuracy (SCA)

RCA and SCA are defined in the function uncertainty calculations and plant procedures.

As Found Tolerance

For process racks: As Found Tolerance = Rack Calibration Accuracy (RCA)

For sensors/transmitters: As Found Tolerance = Sensor Drift (SD)

RCA and SD are defined in the function uncertainty calculations and plant procedures.

3. To clarify the methods used in determining margin criteria and establishing Nominal Trip Setpoints, the following breakdown of each is provided.

Margin Criteria

Margin is defined in Section 3.2 of WCAP-17119-P as the difference between the Channel Statistical Allowance (CSA) and the Total Allowance (TA). An acceptable criteria for the magnitude for margin has been defined as greater than or equal to Rack Calibration Accuracy. This is established in Section 3.3 of WCAP-17119-P.

Establishing Acceptable Nominal Trip Setpoints

Because ABWR plant setpoints were not yet available, a method had to be used to determine acceptable plant setpoints. Therefore the following approaches were used to determine a Nominal Trip Setpoint:

a) Typical BWR Values

For many functions, operating BWR plant setpoints were reviewed and historic values were used. Margin was then determined using these values for the corresponding ABWR functions.

b) Methodology Approaches for the Analysis/Operability Functions

In those cases where corresponding BWR plant setpoints were not yet available, a determination was made by reviewing differences between the methodology shown in WCAP-17119-P and those used by existing BWR plants. The key difference is the treatment of harsh environment terms. In the BWR methodology, harsh environment terms are treated as random; treated within the Square Root Sum of the Squares (SRSS); while in the Westinghouse methodology (WCAP-17119-P) harsh environment terms are treated as a limit of error, summed with the SRSS. A review of sensor/transmitter locations determined that sensors/transmitters for functions associated with analysis/operability, e.g., Reactor Pressure and Level, are not located in areas subjected to harsh environments. Therefore, with the harsh environment terms having minimal effect, the setpoint calculated using the BWR method and the Westinghouse methodology (WCAP-17119-P) have minimal differences. An acceptable setpoint can be established that meets the margin criteria based on methodology approaches having these minimal differences.

c) Emergency Core Cooling Functions

Sensors/transmitters used in the Emergency Core Cooling Systems functions are located in harsh environments. Historic setpoints were not available for some of these functions. In these cases, it was determined that separate sensors/ transmitters would have to be used for the trip function and the display. Reducing the span would minimize the affect of the harsh environment term. Also, unlike the analysis functions where Safety Analysis Limits are established, the Safety Analysis Limits for these Emergency Core Cooling functions are based on procured hardware, e.g., pump curves; and therefore, options for reanalysis are available, if required. Therefore, a setpoint was determined that would meet the margin criteria by using a sensor/transmitter specific to the trip function, which would minimize the harsh environment effect. In addition, the setpoints for these functions have an option for reanalysis of the Safety Analysis Limit as the Safety Analysis Limits are based on procured hardware.

4. As noted in the response to 2 above:

<u>As Left Tolerance</u>

For process racks: As Left Tolerance = Rack Calibration Accuracy (RCA)

For sensors/transmitters: As Left Tolerance = Sensor Calibration Accuracy (SCA)

<u>As Found Tolerance</u>

For process racks: As Found Tolerance = Rack Calibration Accuracy (RCA)

For sensors/transmitters: As Found Tolerance = Sensor Drift (SD)

These terms are identified in each of the function specific tables provided in Section 3 of WCAP-17119-P. To clarify the relation of these terms to As Left Tolerance and As Found Tolerance, references to the appropriate tables in Section 3 have been added to the definitions in Section 3.2 as follows:

Note: This definition modification for As Found Tolerance includes the modification based on Response 1.

As Found Tolerance: The "as found' limit is identified in the plant surveillance procedures. This defines the operability criterion for the instrument process rack. The "as found" tolerance equals the instrument process rack calibration accuracy (RCA) defined in the uncertainty calculations. This is based on the design premise that digital process racks do not experience significant drift. The "as found" tolerance for transmitters is defined as the sensor drift (SD) magnitude identified in the uncertainty calculations. These values are identified (as RCA or SD) on Tables 3-1 through 3-79. On a first pass, channel operability is defined as the ability to maintain calibration or be restored to within the calibration accuracy.

As Left Tolerance: The "as left" limit is identified in the plant calibration procedures. The "as left" tolerance is defined as the appropriate calibration accuracy in the uncertainty calculations for the sensor (SCA) or associated instrument rack (RCA). These values are identified (as SCA or RCA) on Tables 3-1 through 3-79.

5. Process rack drift is explicitly accounted for in the determination of channel operability via the definition of the As Found Tolerance set equal to the As Left Tolerance. Process rack drift is expected to be insignificant with respect to the calibration accuracy. Thus, if the rack module is left within the calibration accuracy (As Left Tolerance) at the beginning of the surveillance interval, the expectation is that the module would be found within that same tolerance at the end of the surveillance interval. This does not mean that a module in an as left condition at either extreme of the As Left Tolerance, could not result in an as found condition outside the As Left Tolerance and still satisfy the RD magnitude assumed in the uncertainty calculation. However, historical plant data suggests that instrument technicians drive the calibration error towards zero (well within the As Left Tolerance), thus this as left condition is not expected to be typical. In addition, Assumption 2 of Section 4.1 of the WCAP suggests that trending of the magnitudes and characteristics of RCA, RD, SCA and SD should be performed periodically. This trending process will confirm that RD is modeled appropriately in the uncertainty calculations.

   Sensor/transmitter drift is also explicitly accounted for in the determination of channel operability. First, a sensor/transmitter in the as found condition, within the As Left Tolerance, is by definition an operable device and no further action is necessary on the part of the instrument technician. Second, a sensor/transmitter in the as found condition, within the As Found Tolerance, is most likely performing within design (even when accounting for drift across zero, i.e., As Left = +0.25 % span error from desired, As Found = -0.75 % span error from desired) and thus is also an operable device. A sensor/transmitter found within the

As Found Tolerance, but outside the As Left Tolerance must be recalibrated to within the As Left Tolerance. A device capable of recalibration to within tolerance is considered an operable device. A device in the as found condition outside the As Found Tolerance is suspect, as drift is larger than assumed in the uncertainty calculation, but if it can be recalibrated to within the As Left Tolerance, it is considered an operable device. For this condition, the device characteristics (SCA, SD) should be further evaluated utilizing previous device data, i.e., trending, to determine if the larger magnitude drift has become a prevailing characteristic, suggesting that the device should be repaired or replaced, or is a one time occurrence. Again, Assumption 2 of Section 4.1 of the WCAP suggests that SCA and SD data characteristics should be trended to confirm that SD is modeled appropriately. The instrument technician driving the as left condition to zero and device satisfaction of the As Found Tolerance will typically satisfy the SD magnitude and the conclusion that the device is operating within design is appropriate.

6. The Westinghouse Setpoint Methodology defines the Nominal Trip Setpoint (NTS) as the Limiting Safety System Setting (LSSS). The NTS is the setting defined in the plant procedures and plant Technical Specifications at which automatic protective functions are initiated. Figure 3-2 of the WCAP notes the relationship of the NTS to the Safety Analysis Limit (SAL) and Safety Limit (SL).